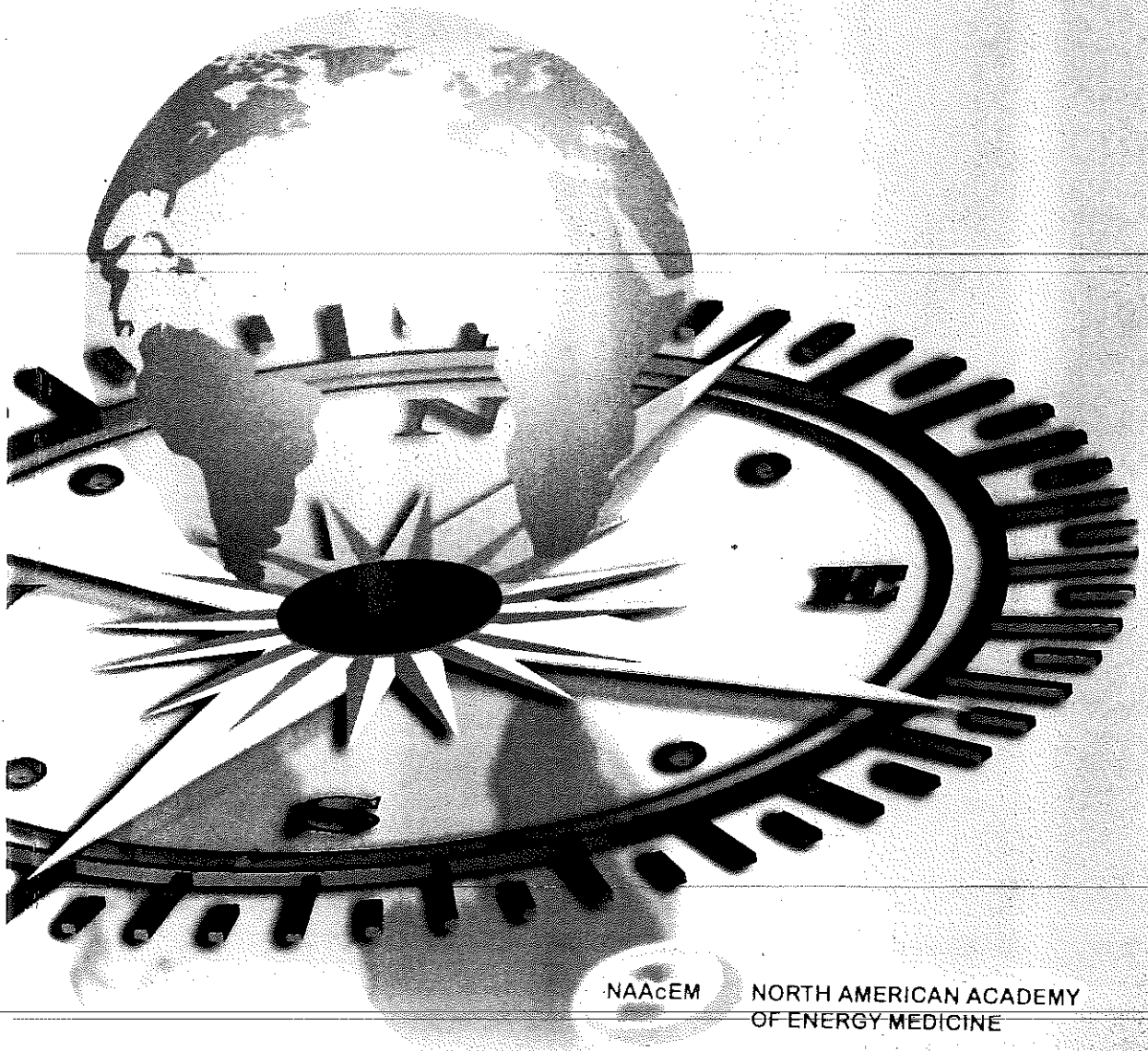
Joel P. Carmichael
DC, DACBSP

MAGNETIC RESONANCE STIMULATION

Using the Field to Maximize Your Health



NAAcEM NORTH AMERICAN ACADEMY OF ENERGY MEDICINE

MAGNETIC RESONANCE STIMULATION

Using the Field to Maximize Your Health

Joel P. Carmichael
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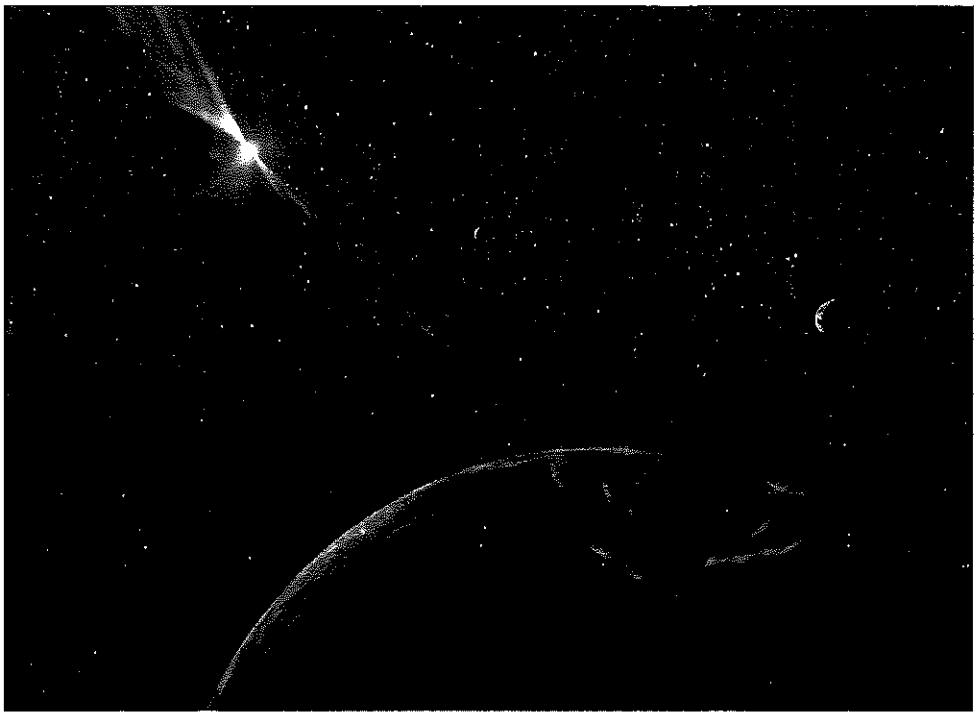
PREFACE



Solar prominence system, discovered by Alain [illegible]

Over the past few years there has been no other biophysical process that has aroused so much worldwide interest among scientists and health care professionals from varied disciplines and backgrounds as the magnetic resonance of atoms. This is where quantum physics collides with biology, and what a collision it is!

We are all made of tissues that are comprised of cells. The cells are made of molecules and the molecules are made of atoms. The atoms are made of subatomic particles including protons, neutrons, electrons, quarks, and other subatomic particles. We have used chemistry, organic chemistry and biochemistry for centuries in an effort to improve human health. In the last century we discovered quantum physics, whose laws helped us understand our universe better. Chemistry immediately embraced quantum theories. However, the world of biology and medicine did not. It is finally time to fuse these disciplines and set the table for the medicine of the future.

The most fundamental physical force in the universe is electromagnetism. With the advent of nuclear magnetic resonance (NMR) machines, more commonly referred to as magnetic resonance imaging (MRI), we find ourselves thrust upon the precipice of energy medicine, a burgeoning science that will significantly reshape how we think about health, disease, and wellness. By probing the ominous power of atoms we can harness unfathomable amounts

of energy, seemingly from thin air. Such energy could also lead the human race to the brink of destruction. But by understanding the delicate intricacies of the behavior of atoms, electrons, and other particles in health and disease we may unlock a future of hope for the removal of pain, suffering and premature death that none of us have ever dreamed.

Magnetic resonance, exploiting the intrinsic magnetic properties of atoms containing odd numbers of protons in their nucleus, can be used not only for diagnostic imaging, as with the MRI, but also to support wellness, healing, and recovery from a wide variety of injuries and ailments. It was the demonstrated power of magnetic resonance and pulsating magnetic fields that led to the inclusion of such energies in the FDA's official catalogue of approved treatments for bone growth stimulation, the healing of non-union fractures, and the accelerated healing of spinal fusions.

Much of the consumer information that can be found concerning magnetic fields for therapeutic use on the Internet is simplistic at best. In some cases the information is inaccurate. Disturbingly, many consumer websites completely ignore the science that is available on this subject. Bioelectromagnetic therapies have been utilized extensively in Europe and Asia for several decades, and research into the biological effects of magnetic waves has continued both in the U.S. and abroad for nearly a century. Because electromagnetic therapies are still in their infancy in the North America, both health care providers and the general public need a well-grounded scientific resource that presents the fundamental effects of magnetic resonance stimulation on the human body in an honest, straightforward yet practical and usable way. This book aspires to do all these things and be that resource. My aim is to convey the science of magnetic resonance stimulation understandably so that many people in North America (and worldwide!) will enjoy better health.

One difficulty in writing a book such as this is that there are at least two sets of potential readers. The first set is the doctors, nurses and allied health professionals who truly need to drill down specifics and technical information. The second is the home user who needs this book as a reference, a guideline, and a starting point for understanding various injuries and disease processes and how best to use magnetic resonance stimulation technology to its best advantage. The result of these two sets of reading audiences is that the text may shift its tone from time to time. If you are a layperson and not a health professional, feel free to skip over technical paragraphs. They won't last long, and soon you'll be on to more interesting material. If you are a health professional, I encourage you to employ your best critical thinking skills and go deeper, reading source material and references to perceive just how broad this topic is. If nothing else, this may allow you to forgive me for making what may appear to be, on the surface, unwarranted connections. Such connections are unintentional, accidental, but in the end, probably not as unwarranted as they might appear. I appreciate your interest in this new healing art and science, and call upon you to join me on this voyage into the future. Perhaps subsequent editions of this volume will tidy up the list of references and have room for the inclusion of a larger and more representative sample from the world literature.

Much of the research in this field is published in international journals that is either not readily available or are published in languages other than English. I would like to express my debt of

gratitude to the North American Academy of Energy Medicine and MediConsult, GmbH for their generous support in accessing some of this vast literature base. Without the extensive and detailed analysis of scientific studies in international databases made possible by the NAAcEM this book would not have met this author's objectives for scholarship.

I would like to extend special acknowledgement and personal thanks to Mr. Wolfgang Jaksch for his invaluable contribution to the content of this text. Wolfgang supplied the fundamental framework and "momentum" for the initial chapters (from Basic Principles through Side Effects and Contraindications). These pages bear the mark of his many years of research, and his personal experiences with clinicians and scientists in Eastern and Western Europe, Russia and the Baltic States. Without this framework and our many hours of informal collaboration this book would not exist in its present form. Wolfgang's tireless efforts to bring the profound benefits of magnetic resonance stimulation and pulsating electromagnetic fields to a world deluged with electrosmog span nearly two decades. Ultimately his knowledge, his own personal story with the MRS 2000, and his infectious passion for this wellness technology were pivotal in helping me achieve significant – and not infrequently, amazing – health and wellness benefits to family, friends, co-workers and patients. And it is because of these observed benefits that I chose to write this book. Wolfgang, thank you for the tireless efforts you have put forth for the benefit of many!

I would also like to thank my father, J. Robert Carmichael, for his enthusiastic efforts in spending many hours editing and re-editing this text. I am fortunate to have enjoyed such a close friendship with my Dad, owe him a large debt of gratitude, and freely express my love and admiration to him.

Sincere thanks also to Lisa Whaley for her time in proofreading this text.

Deep gratitude is due Thomas Moegele for is skillful layout, graphics and artwork for this text.

I am indebted to Hermina Danneil for introducing me to the wellness benefits of pulsating electromagnetic fields and the MRS 2000. I wouldn't believe it and didn't want to hear about it, and was far too busy – but she never gave up. Thank you, Hermina!

This book is dedicated to my wife Cheryl who, for over a quarter of a century has been the greatest and most joyful expression of God's love for me, and a wellspring of support during this project. Come away with me, my Beloved, and let's take time to celebrate the end of the writing, and the beginning the world's awakening together!

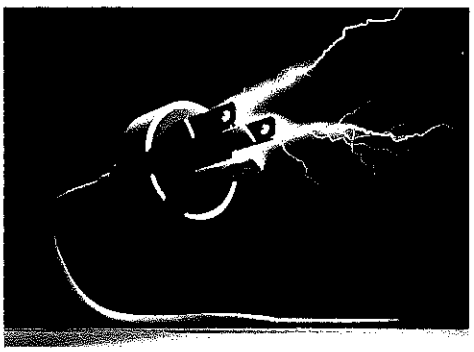
INTRODUCTION

Bioelectromagnetics has experienced perhaps the most diverse scientific evolution of any therapeutic discipline, dating back to ancient times. The Greek physician Galen noted the cleansing powers of magnetism in his book De Simplicum Medicamentorum Temperamentis Ac Facultatibus around 200 B.C. The Greek philosopher Aristotle spoke of magnets as 'healing therapy'. The word magnet comes from the ancient Greek magnes lithos, meaning "stone from Magnesia," an area of Greece that was known for its volcanic rocks with magnetic attributes. We now know the mineral in these rocks is magnetite.

Magnetic therapy was practiced in China around 2000 B.C., as recorded in The Yellow Emperor's Book of Internal Medicine. In that ancient medical text, "magnetic stones" were advocated to correct health imbalances. *(Lawrence 1998/1)* In the Middle Ages magnetic treatment was delivered by placing "lodestones" on the body. Lodestones, or "guiding stones," were so named because of their use in navigational compasses by Viking, European and Arab sailors.

At the end of the 19th century the electron was discovered and electro-magnetism was brought into the realm of science on the atomic level. Albert Einstein showed that electricity and magnetism are not discrete phenomena, but different aspects of the same phenomenon. *(Encyclopedia Britannica Vol. 18 15th Ed. 1991/2)* Medical textbooks included magnetism and electricity as therapeutic alternatives for insomnia, fatigue, arthritis, pain and convulsions. Magnetic boots, rings, girdles, caps and ointments were available in mail-order catalogues. At the same time Daniel David Palmer, Canadian fishmonger turned "magnetic healer" founded Palmer's School of Magnetic Cure in Davenport, Iowa. When in 1895 he began applying short-lever manipulations to the spine with great effect, and the Palmer School of Chiropractic was born.

Mention the word "magnet" and the word "therapy" together in the same sentence in North America today and many people start to backpedal. Several historical events explain why this is so.



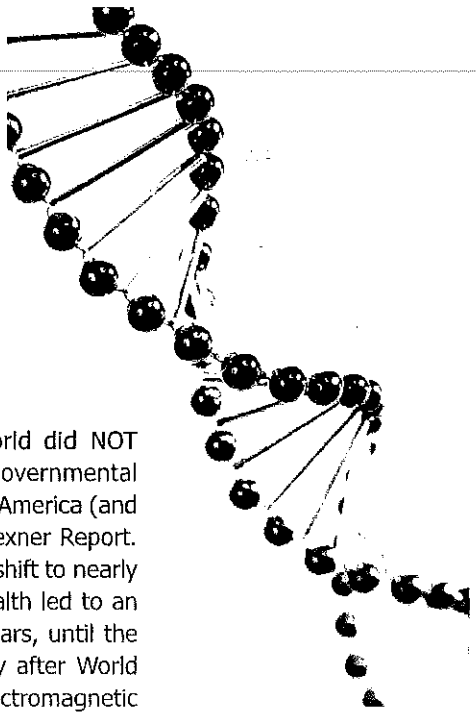
Magnetic therapy became shrouded in mystery in part because of Franz Anton Mesmer, an 18th century German physician and mathematician. He wrote his doctoral thesis on gravitational fields in human health. He postulated that the body had "magnetic poles" and that these poles move out of alignment with the universal magnetic flow causing all illness. He called magnetism within the body "animal magnetism." His patients sometimes fainted or went into

convulsions in his Paris salon, claiming that they had been "mesmerized." Mesmer's notions of magnetism gradually became equated with hypnotic suggestion.

Magnetic therapy as a branch of medicine and as an area of clinical research fell into further disfavor in North America as a result of the Abraham Flexner's report on "Medical Education in the United States and Canada," released in 1908. A full understanding of the healthcare environment during this time is important. The practice of medicine was poorly regulated. The delivery of health care in North America lacked a systemized, homogeneous approach. Mr. Flexner excoriated North American universities for the shabbiness and unevenness of the training they offered. At that time, medical education seldom involved any hands-on training in hospitals or laboratories or even any anatomical dissections. The students were typically released to practice without having passed any examinations, and the instructors, many of whom were quite ignorant, pocketed all the fees.

At the time of the Flexner Report, Drs. Will and Charlie Mayo, with their father, William Worrall Mayo, were still in the early years of the world's first group medical practice in the Minnesota frontier town of Rochester. The Mayo Clinic was an impressive display of great wisdom and forethought. By contrast, leaches, bloodlettings, elixirs and potions were also commonplace in most other parts of the United States and Canada.

The Carnegie Foundation commissioned Abraham Flexner to study medical education in the United States and Canada. Flexner's report, an indictment on the unscientific nature of medical education on this continent, caused a needed shift toward the methodical application of scientific method to the practice of health care. The mail-order catalogues were purged of electromagnetic and other devices. Virtually 100% of scientific inquiry was redirected following World War II as medical research and governmental funding bodies placed all their hope for the future health of mankind in biochemistry-based medicine. Jonas Salk discovered a vaccine for polio. Watson and Crick unlocked the DNA double helix. Antibiotics were developed. Pharmaceutical companies proliferated and profited.

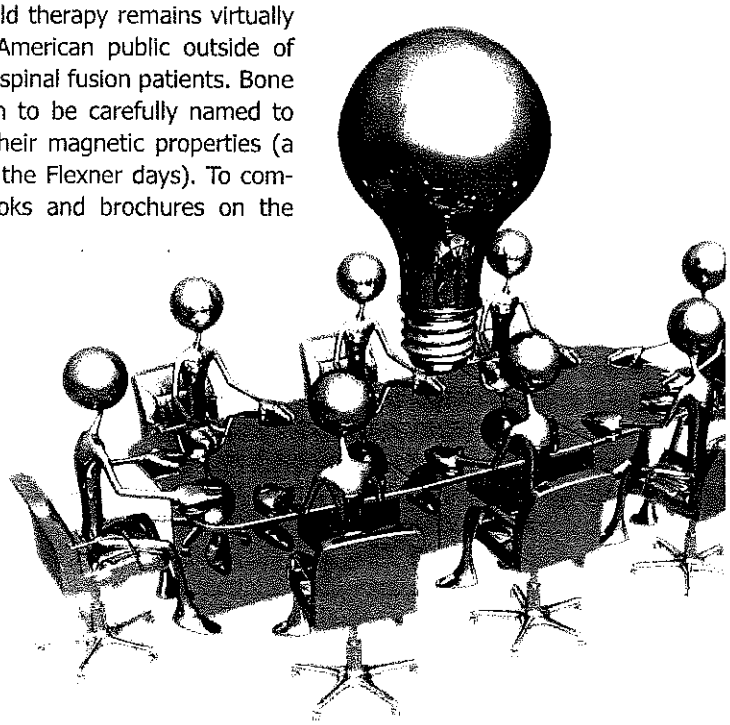


Importantly, other countries around the world did NOT impose the same political control and governmental restrictions on biomagnetic science that North America (and particularly the United States) did after the Flexner Report. The rise in power of political medicine and the shift to nearly 100% dependence on pharmaceuticals for health led to an unfortunate period of dormancy, lasting 60 years, until the mid 1970s. Meanwhile, beginning immediately after World War II, Japan began generating various electromagnetic

wave shapes by changing electrical currents. This modality quickly moved to Europe, first in Romania and the former Soviet Union. From 1960 to 1985, nearly every European country designed and manufactured its own magnetic therapy systems. Todorov published the first book on modern electromagnetic field therapy in 1982 in Bulgaria. This work summarized clinical observations using magnetic fields to treat 2700 patients with 33 different pathologies.

The modern clinical application of electro-biology in North America began in 1971 when Friedenberg described their success in the healing of a nonunion fracture treated with 10 microamps of direct current delivered with stainless steel electrodes. *(Friedenberg 1971/9)* Avoiding the invasive nature of Friedenberg's direct currents, Dr. Andrew Bassett at Columbia University Medical Center introduced a new approach for the treatment of non-healing bone fractures and pseudarthroses that employed very specific, biphasic low frequency electromagnetic signals. *(Bassett 1974a/3, 1974b/4, 1977/10, 1978/11 1982/12)* Public awareness also increased in the mid-1970s amidst reports of successful enhancement of the speed and endurance of racehorses treated with electromagnetic fields. Based on the published work of Dr. Bassett, in 1979 the FDA allowed electromagnetic fields to be used in the USA for non-union and delayed union fractures. A decade later the FDA allowed the use of pulsed radiofrequency electromagnetic fields for the treatment of pain and edema in superficial soft tissues. Medicare pays for the off-label use of pulsed magnetic field therapy for diabetic wound healing in the U.S. It is now commonly accepted that weak electromagnetic fields are capable of initiating various beneficial biological processes including healing for delayed fractures, pain relief, and modulation of muscle tone and spasm in multiple sclerosis and Parkinson's disease. *(Rosch 2004/5)*

How far have we progressed? Despite the large body of research, magnetic field therapy remains virtually unknown to the North American public outside of fracture care and among spinal fusion patients. Bone growth stimulators seem to be carefully named to avoid any reference to their magnetic properties (a throwback, no doubt, to the Flexner days). To complicate the problem, books and brochures on the healing properties of magnetism are often based on anecdotal observations rather than scientific studies. Anecdotal observations are a necessary starting point in our understanding of anything, but as Angrist stated, "Testimonial evidence is a mere hypnotic multiple of zero in an empty vacuum."



(in: Lewit 1984/14) The results of higher quality, controlled outcome studies are available and should be disseminated as widely as possible. This book, and the efforts of the North American Academy of Energy Medicine, seek to improve the public awareness of magnetic resonance stimulation and pulsed electromagnetic field therapy through education.

One challenge in the application of electromagnetic field therapies is lack of consensus concerning field strengths used in support of health. By browsing the Internet the casual reader might conclude, "everything seems to work." After all, the thinking goes, one device uses intensities in the milliTesla (mT) range, whereas transcranial ("through the head") magnetic stimulation devices use an incredibly high 1.5 – 2.5 Tesla (T) amplitude range. *(Georg MS, 1995/6; Padberg 2001/7)* (This high signal amplitude is similar to the field strengths encountered during MRI examinations, where 1.5 to 3.0 Tesla magnets are now in common use in the United States.) Other devices use field strengths around that of the Earth's magnetic field (45-50 microTesla (μT)). Still other devices take advantage of subtle magnetic field strengths in the nano- and picoTesla range. *(Sandyk 1996a/8)* Humans are continuously exposed to the earth's geomagnetic field (GMF) that ranges from approximately 66 μT at the geomagnetic poles to 26 μT at the geomagnetic equator. When applying therapeutic magnetic fields the GMF must always be taken into account, as these components will always be added directly to the strength of the applied magnetic field. Hence, a therapeutic electromagnetic regimen that applies field intensities that are one millionth of the GMF is extremely subtle indeed, and the results obtained need to be quantified reliably.

Even the pulse frequency settings across different available devices are highly variable. Oftentimes this is done in an effort to induce a defined cellular resonance. Unfortunately there are no reliable data on induced cellular resonance for many devices. *(Dertinger 2002/13)* There is, therefore, a strong need for ongoing research. The field strengths being utilized by different electromagnetic devices vary from picoTesla to Tesla – a factor of 1 trillion.

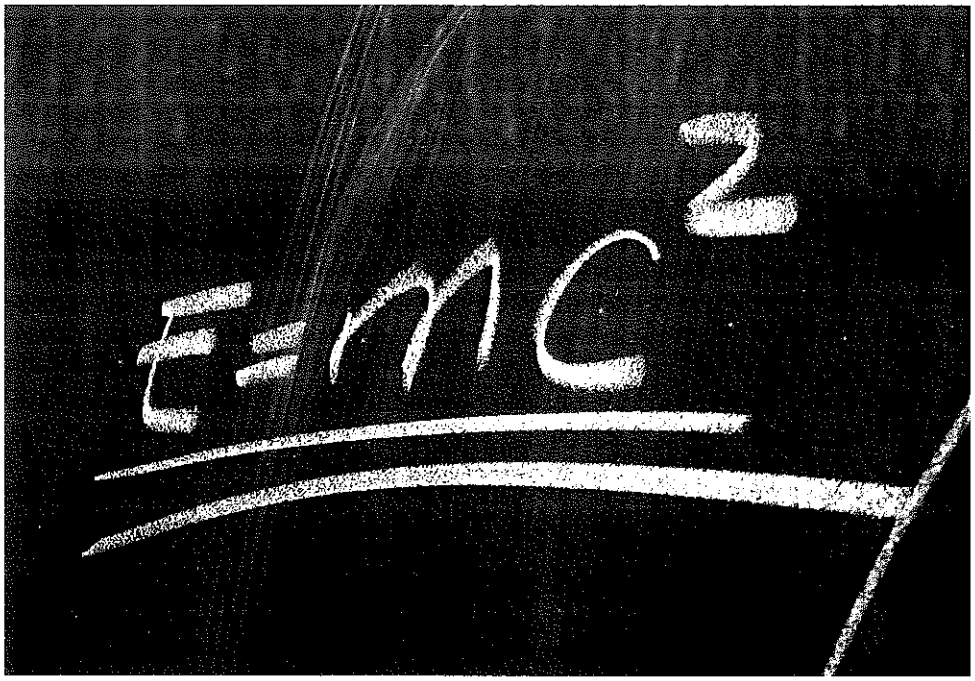
When reading scientific papers there is the potential danger of "throwing the baby out with the bathwater." The lack of measurable beneficial biological effect at a certain field strength and frequency cannot be extrapolated to mean lack of efficacy at all field strengths and all pulse frequencies. As with drugs, good research and collaboration among researchers and clinical experts will peel away the ineffective uses and help us define and appreciate the truly effective ones. Clinical consensus develops over time with accumulated data and experience.

Magnetic resonance stimulation and pulsed magnetic field therapy for health and wellness is a young science, but it is a vast science.

The chapters that follow contain vignettes from a synthesis of the current world literature on the biological effects of electromagnetic fields. A comprehensive treatment is not the goal of this book. Some of the myths, prejudices and errors in thinking about electromagnetism maybe be dispelled for the reader. My desire is to present at least a beginning framework for a well-grounded scientific basis of magnetic resonance stimulation. Though it is no longer possible to catalogue all the data available in a reasonably sized book, this synthesis reviews a fairly substantial number of basic science and controlled studies. While it is incomplete, it may encourage the reader to investigate further.

QUANTUM MECHANICS IN HEALTH AND DISEASE

For our purposes a brief discussion of quantum mechanics is necessary to help us grasp the role electrons play in health and disease. Since electromagnetism can influence electron behavior we need to understand some basics to be able to appreciate positive and negative energetic effects.



Our bodies are made of tissues. Our tissues are made of cells. Our cells are made of molecules, and these in turn are made of atoms. Atoms are comprised of subatomic particles, the most familiar of which are protons, neutrons and electrons. Some of us know about quarks and leptons.

What a strange nomenclature we're delving into! Remember our purpose: to understand health and disease from an energetic perspective. When we observe a non-healing ulcer in a diabetic patient we understand some of the chemical features of the ulcer itself. We understand the changes in tissue pH, the changes in vasculature and blood supply and we understand the risk of developing infection in that tissue. In some cases our antibiotics and topical treatments are useless, and the ulcer won't heal. Then we place the diseased limb in a magnetic field and within days we begin to see a miracle happen. The ulcer begins to shrink. The depth of the wound begins to fill in with healthy tissue. We are at the intersection point between the power of electrons and biological healing. While we don't need to become physicists, all of us need to understand and use energy better, and when we do, we'll enjoy better health.

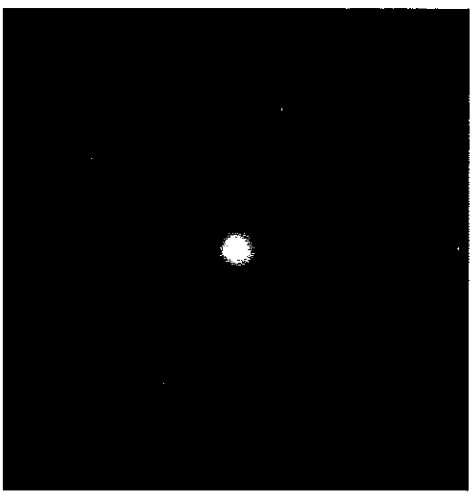
Quantum mechanics in brief

In physics, quantum mechanics is the study of the relationship between energy quanta (radiation) and matter; in particular that connection between valence shell electrons and photons. These electrons will form a repeated topic of discussion as we examine health and disease from a sub-molecular perspective.

Quantum mechanics is a fundamental branch of physics with wide applications in both experimental and theoretical physics. Quantum theory generalizes all classical theories, including mechanics and electromagnetism (except general relativity), and provides accurate descriptions for many previously unexplained phenomena such as black body radiation and stable electron orbits. The effects of quantum mechanics are typically not observable on macroscopic scales, but become evident at the atomic and subatomic level.

Until a broader, unified field theory is more fully developed it will be necessary to use quantum mechanics to understand the behavior of systems at atomic length scales and smaller. For example, if Newtonian mechanics governed the workings of an atom, electrons would rapidly travel towards and collapse into the nucleus. However, in the natural world the electrons normally remain in an unknown orbital path around the nucleus, defying classical (Newtonian) electromagnetism. In the early 20th century Niels Bohr simply proclaimed: "I will not allow them to collapse!" This is not a sufficient explanation. We now know that electrons continue to extract energy from an enormous but subtle universal reservoir of energy called the "zero-point field." It is the energy that remains in the universe at absolute zero temperature (zero degrees Kelvin).

Quantum mechanics was initially developed to provide a better explanation of the atom, especially the spectra of light emitted by different atomic species. The quantum theory of the atom was developed to explain what Newton's laws of motion and Maxwell's laws of classical electromagnetism could not explain: why an electron stays in its orbit.



Electron clouds

Quantum physicists have developed entirely new mathematics to allow for the study of subatomic particles and strings. This mathematics allows one to compute the probability of finding an electron in a particular region around the nucleus at a particular time. Contrary to classical mechanics, one can never make simultaneous predictions of conjugate variables, such as particle position and momentum, with accuracy. However, contours of constant probability, often referred to as "clouds," may be drawn around the nucleus of an atom to conceptualize where the electron might be located with the most probability. It should be stressed that the electron itself

is not spread out over such cloud regions. It is either in a particular region of space, or it is not. Heisenberg's uncertainty principle quantifies the inability to precisely locate the particle.

Particles behave like photons of light, and vice versa

Quantum mechanics began as the study of electromagnetic waves such as light. When it was found in 1900 by Max Planck that the energy of waves could be described as consisting of small packets or quanta, Albert Einstein exploited this idea to show that an electromagnetic wave such as light could be described by a particle called the photon with a discrete energy dependent on its frequency. This led to a theory of unity between subatomic particles and electromagnetic waves called wave–particle duality in which particles and waves were neither one nor the other, but had certain properties of both. While quantum mechanics describes the world of the very small, it is also needed to explain certain "macroscopic quantum systems" such as superconductors and superfluids.

As we will discuss later, electrons are fundamental to life and biology. It appears that a fundamental difference between life and death is the ability of tissues and cells to conduct electricity – to direct the flow of electrons in an organized fashion. The fact that quantum physics, as a discipline, has been excluded from medical and biological training is a travesty. The sooner we incorporate an energetic perspective into our understanding of molecules and atoms within diseased and healthy tissue, the sooner we will stumble upon major advances in thinking and healing.

BASIC PRINCIPLES

In describing electromagnetic waves it is important to discuss the nature of the signal being applied. Human tissues have shown dose-dependent responses to magnetic fields depending on the nature of the signal. One can induce meaningful electrical and magnetic current densities within biological tissue. Any substance that conducts electricity (including living tissue) possesses an induced electrical current (Faraday's law of induction). Magnetic fields create electrical potentials within tissues with a unique advantage over electrical current: no surface or needle electrodes are required. Magnetic fields are therefore non-invasive in the purest sense, and far easier and more efficient to apply. Since electromagnetic waves pass through matter, one does not even need to disrobe to receive and application of an electromagnetic signal.

The goal of this section is to provide a basic review of these signals such that the reader will realize that different signals have different biological effects. I will also define the electromagnetic characteristics of signals used by the MRS 2000+ designo® Med device, the one with which I have had the most experience.

The Four Parameters of electromagnetic signals

The four parameters used to define signals are waveform (or signal shape), field strength, frequency, and resonance. In theory these 4 components must be balanced and must be introduced into the body within an appropriate energy spectrum – a "biological window"[1] as it were – in order to produce the optimum health-promoting effect, and to avoid negative effects. It is the difference in these signal parameters that differentiates whether an electromagnetic signal is harmful (e.g., from cell phones, microwave ovens, dishwashers, alarm clocks, or power lines) or health-promoting (e.g., pulsed magnetic fields utilized in health care and for wellness.)

1 See later in this chapter for more on biological windows.

In order to illustrate these 4 parameters we will consider sine wave signals. Of all the time-varying signals utilized in electromagnetic therapies, the sine wave shape **(Figure 1)** is the easiest and simplest to understand.

A wave is a disturbance traveling through space, transferring energy from one point to the next. (Figure 1) Those of us who studied physics or algebra are familiar with the graphic depiction of sine waves. Mathematically, sine waves can be drawn on a coordinate system consisting of "x" and "y" axis. The y-axis contains both positive and negative values. A sine wave varies cyclically both above and below the y-axis, and is symmetrical about the zero-axis (or x-axis).

The most positive value is at the "peak" of the sine wave. This is called the "peak amplitude." This is the point of maximum displacement of the magnetic signal from zero. In bioelectromagnetic medicine, peak amplitude is usually measured in mT or μT.

Some electromagnetic therapy devices use signals that are derived from sine waves, but are slightly different. They use an electromagnetic sine wave signal applied in the same direction as a static magnetic signal. The amplitude of the electromagnetically generated sine wave is an additive to the static magnetic signal applied in the same direction, producing ion cyclotron resonance (ICR).

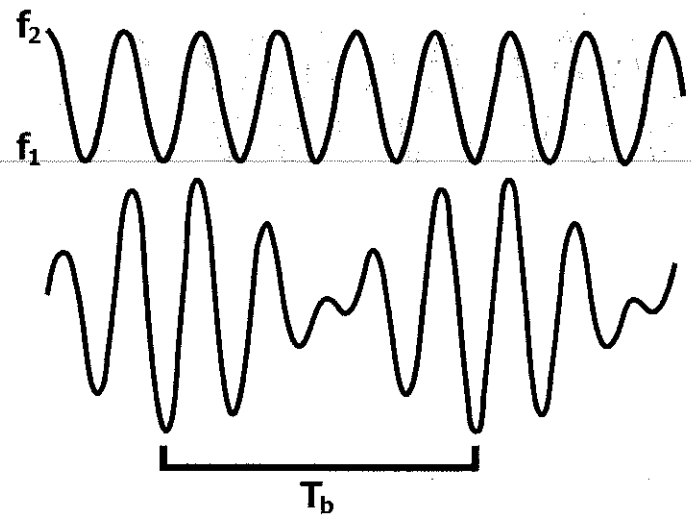
Magnetic signal shapes and behaviors can be manipulated by altering the electrical currents that generate them. This is usually done by computerized controls. Rectification of the sine wave signal means eliminating the negative part of the sine wave signal, either by flipping the negative cycle into a positive cycle (full rectification) or simply cancelling the negative cycle (half-wave rectification).

A magnetic wave that has alternating polarities (e.g., both positive and negative peaks (or cycles)) is called a bipolar wave. If the wave has been rectified and has only positive peaks (or cycles) it is called a unipolar wave. One should not place too much significance on the polarity of the different types of signals. Tissues exposed to waveforms that are alternating positive and negative, or more positive than negative (or vice versa) are not likely to respond differently if the polarity is reversed. A much more important, if not critical, component of the waveform is its rise time and fall time. **(Figure 2)**

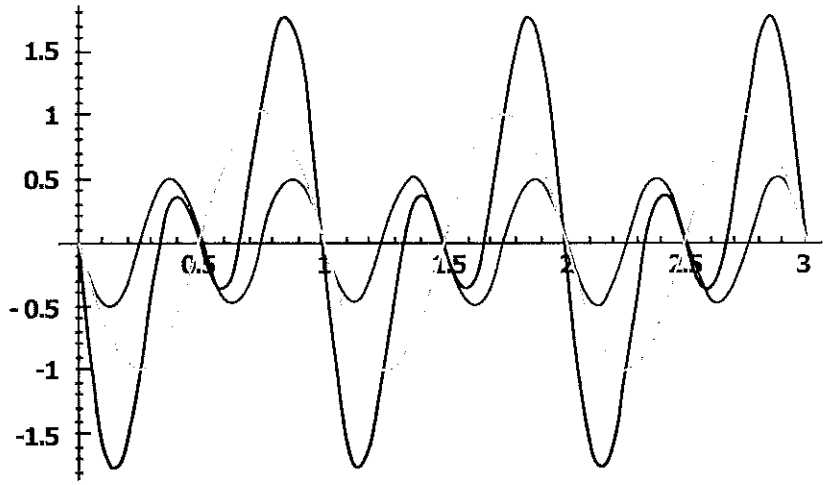
The left leg of the trapezoid (nearly a square wave form) has a short rise time and a symmetrically brief fall time back to baseline. These characteristics have been incorporated into some pulsed electromagnetic field therapy devices to great effect. This will be discussed in further detail below.

The shape of the sine wave can be changed by what is called "amplitude modulation." Adding 2 varying frequencies together produces a summation of both this. If summated frequencies are different, the lower frequency signal "rides" on the higher frequency "carrier" signal.

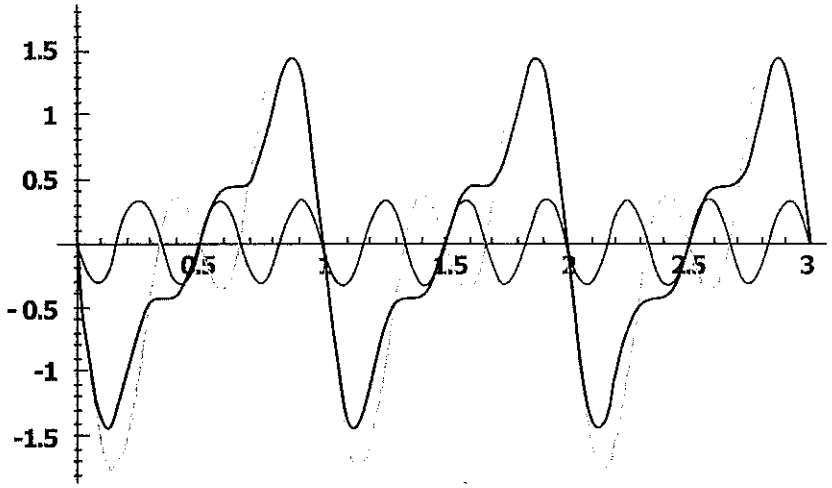
If both signals have the same amplitude, but varying frequencies, an interference pattern (Tb) is created that may enhance or deplete the biological effects of the magnetic stimulus. **(Figure 3)**



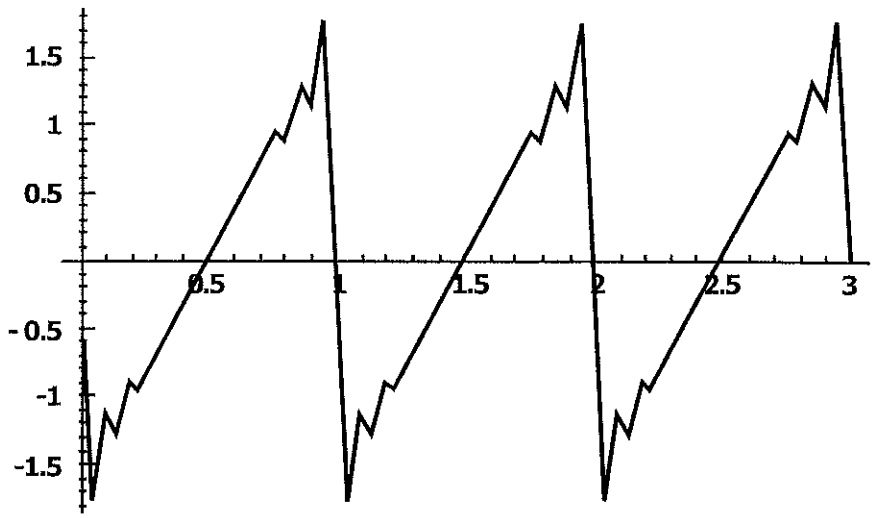
By combining cycles of electrically generated magnetic pulsations, "pulse trains" can be created which enhance biological effects of the magnetic stimulus. One of the most useful waveforms created in such a fashion is the "sawtooth" wave. In order to create a sawtooth waveform, we use 2 pulsations of varying frequency and amplitude (shown in green and blue in **Figure 4a**):



The summated wave is shown in red. Now, to the original pulse train we add another harmonic frequency (in blue), which results in a change in the summated wave (shown in red in **Figure 4b** below):



By continuing to add harmonic frequencies to the 9th harmonic, we achieve a nearly perfect sawtooth waveform with a rapid rise time (near the positive peak) and very sharp fall time. **(Figure 5)**



According to Liboff the therapeutic value of a given pulsed signal is highly dependent on how rapidly the rise time and fall time happen. *(Rosch 2004)* This signal characteristic cannot be underemphasized, and is perhaps the most important thing to note in our discussion about the 4 key parameters of an electromagnetic signal. The abrupt fall time represents a high peak voltage value that is responsible for ion displacement in the body. Greater ion displacement exerts a stronger biological effect. Note that, within the low-to-mid frequency ranges of therapeutic application, the signal shape may be as important, if not more important, than the intensity or field strength of the electromagnetic pulsation being used. In the same treatise just cited, Liboff stated: "It is important to remember that there is no such thing as a little or a lot of magnetic field." While this author may disagree with this statement, particularly at higher ranges of field intensity, the point is this: the shape of the electromagnetic signal is something to which very close attention needs to be paid.

Both the sawtooth signal shape and the square waveform have rise and fall times that are far more abrupt than a simple sine waveform. Again, the more abrupt the rise and fall time, the greater the biological effect. Clinicians and health technicians using this form of energy medicine must have a proper understanding of the relationship between signal shape and bioelectromagnetic interaction so they can knowledgeably evaluate signals emitted by various devices. Signal shape, frequency and amplitudes are all important variables in the use of electromagnetic impulses for health benefit.

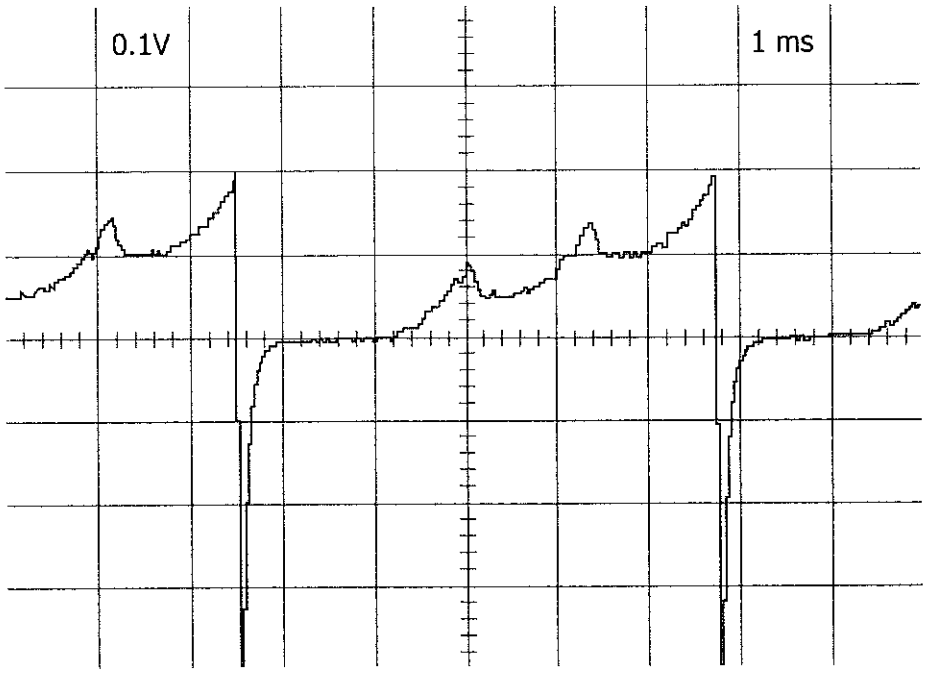
The sawtooth waveform

The most well-known signal shape is the sawtooth waveform introduced by Bassett in 1974. *(Bassett 1974c/15)* Dr. Bassett observed that changes in the electromagnetic signal induce

an electrical current within the treated tissue, with maximum current being induced when the signal changes most abruptly, namely when it falls from its peak value to its lowest value (fall time). The piezoelectric current induced within bone accelerated the bone healing. As a result of Bassett's work, this waveform has been FDA approved in the United States since 1979 for the treatment of non-union fractures and to aid in spinal fusion operations.

The MRS 2000+ designo® MED device has 3 applicators: a full body mat, a local pad applicator, and a small probe applicator. The signal shape delivered by the mat is a sawtooth waveform. **(Figure 6)**

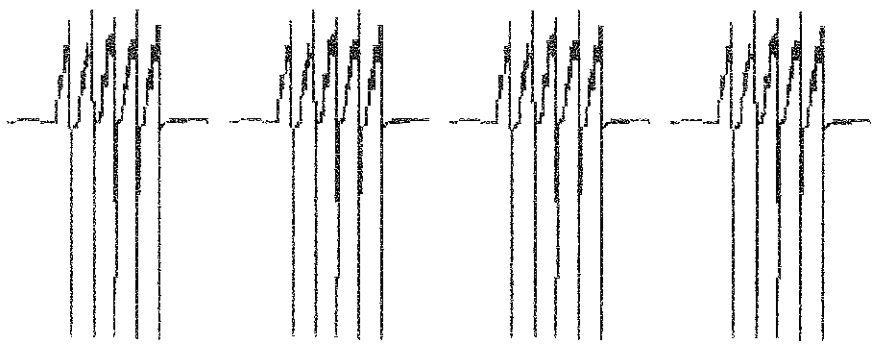
This waveform is a composite of a large number of harmonic sine waves in the low-frequency range. The sawtooth pulse of the MRS 2000+ designo® systems supplies its basic signal at a frequency of 64 Hz, which is the frequency of the natural heartbeat. Unlike simple sine waves or static, externally worn magnets, the sawtooth electromagnetic signal changes continuously, producing constant induction of electromagnetism into the body's tissues, maximizing ion displacement and preventing cellular membrane fatigue. This means that the cell membrane remains responsive to the signals, maximizing the beneficial effects of electromagnetic stimulation.



ΔV = 0.800 V rms = 0.075 V ΔT=10.00 ms 1/2T=0.100 kHz

The problem of signal specificity

If our knowledge were perfect, rather than progressive, it would be possible to know exactly what waveform works best for each of the body's tissues and organ systems, for each disease or condition, and for virtually any level of desired enhancement to one's health. As suggested above, there are many existing as well as new and developing diagnostic techniques to gain insight into the current health status of the human body, including standard blood chemistries and blood analysis, imaging studies (such as MRI, CT scan, bone scans and x-rays), functional MRI, Electro-Interstitial Scanning (EIS) for pH analysis of many internal organ systems (LD Technologies, Miami, Florida), nutritional analysis, scanning of the biofield using polycontrast imaging photography, variable heart rate monitoring, pulse monitoring (such as used in acupuncture and Traditional Chinese Medicine), live blood cell analysis, infrared thermography, electrodiagnostic testing (such as electrocardiography (EKG), electromyography (EMG) and nerve conduction velocity (NCV), electroencephalography(EEG), and many others. Much of the data from these types of biophysical feedback mechanisms have already begun to be incorporated into some uses of pulsed magnetic field therapy, (usually at a higher expense to the patient or end user, but in many cases well worth it.) However, much of the claims of superiority of waveform touted by device manufacturers are based on incomplete information at best. Some devices, such as the MRS 2000+ designo® MED deliver a wide variety of time-varying impulses (Figure 7) and amplitudes to ensure that a broad spectrum of electromagnetic energy is delivered to the cell membrane. It is believed, though not yet thoroughly proven, that cell membrane receptors selectively respond to signal shapes (and frequencies) that they need to derive optimum health – much like a tree



in a drought that will naturally respond to water applied to its root system. The philosophy of MediConsult GmbH, the manufacturer of the MRS 2000+ designo® MED, is to target the known "biological windows" we have mentioned above and will discuss further below.

The rate of change in a wave is its "frequency." Waves undulate from peak to valley to peak. The time from one peak to the next peak is a cycle. One cycle encompasses one positive (above-the-line) peak and one negative peak. The most basic unit of frequency is one cycle per second. One cycle per second (cps) is also referred to as one "hertz," in honor of 19th century German physicist Heinrich Hertz, whose discovery of electromagnetic waves led to the development of radio. A frequency of 25 Hertz (Hz) means 25 cycles per second.

1 cps = 1 Hz

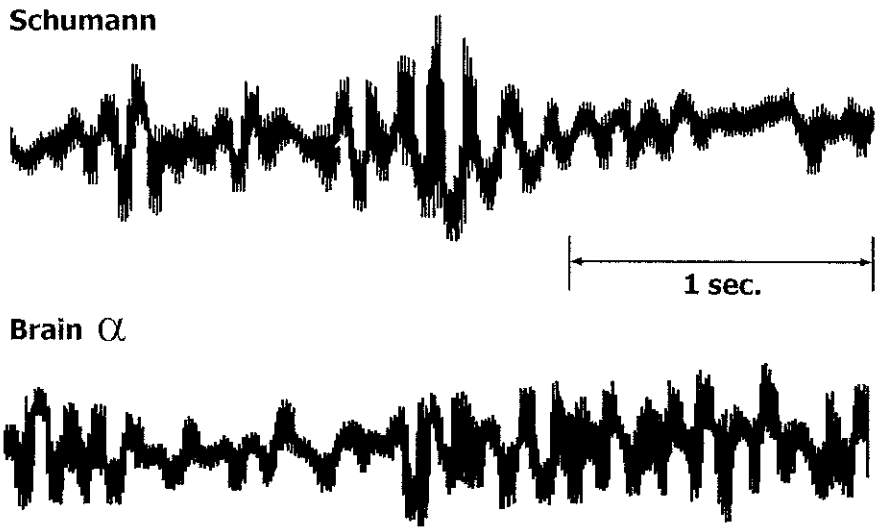
The frequency rate is measured from one peak to the next peak.

Sine waves are a mode by which energy is transferred across a medium (such as the body). The more cycles per second, the more energy transfer per second. With reference to therapeutic applications of bioelectromagnetic signals, the higher the frequency, the more energy is delivered to the body.

In pulsed (or pulsating) magnetic field therapy, one refers to cycles as pulsations. Thus, cycles per second are understood to mean pulsations per second. Thus, a 25 Hz electromagnetic frequency is a pulsed magnetic wave that is comprised of 25 electromagnetic pulsations per second.

The human body has many natural frequencies. Among them are the heartbeat, the cerebrospinal fluid flow, the respiratory rhythm, and the electromagnetic rhythms of the brain. John Zimmerman, PhD documented that the hand of a Touch for Health healer emits an electromagnetic frequency averaging between 7-8 Hz when the healer is actively engaged in employing healing touch.

Regarding nature and frequencies, it is also interesting to note that the alpha waves of the brain appear to be very similar, if not virtually identical to the "Schumann" electromagnetic resonances recorded at the Earth's surface. In 1954 Schumann and König reported on their discovery of naturally occurring electromagnetic pulsations on the Earth. *(Schumann 1954a/17)* Schumann resonances are natural waves excited by lightning strikes in the cavity between the Earth's surface and the ionosphere. In essence, lightning pumps energy into the earth-ionosphere cavity, and causes it to vibrate or resonate at extremely low frequencies. The electromagnetic waves created by lightning travel around the Earth at the speed of light, reflecting from the ionosphere to earth and back again in cyclical fashion. These waves circumnavigate the globe an average of 7.83 times per second. As noted above, this frequency correlates with the average frequency of alpha brain waves in human beings. **(Figure 8)**



The Schumann wave closely match the average frequency of alpha waves in the

There is an enormous range of electromagnetic frequencies either already in use or suggested for use in health care. Most of these frequencies deliver signal shapes of the simple sine wave variety. The frequencies in use range from the extremely low frequency (ELF) range of 3 to 300 Hz to the upper end as high as 50 billion Hz (50 GHz). For wellness and safety for the use of devices at home, it is recommended to stay with a device that delivers electromagnetic pulsations in the ELF range.

The Chinese Organ Clock and Frequency Variance of the MRS 2000+

The MRS 2000+ designo®'s whole body mat applicator uses pre-programmed frequencies that vary based on the time of day the device is used. The basis for this time variance of frequency is the Chinese organ clock.

According to Traditional Chinese Medicine (and other ancient healing traditions in Asia) vital energy flows through the twelve organs and completes one cycle every twenty-four hours. The organ clock shows the circadian flow of the vital energy (Qi – pronounced "Chi") through various organ systems in relation to the time of day. Each organ has maximum energy for two hours. The organ has minimum energy (or lowest flow of Qi) 12 hours later. **(Table 1)**

From Table 1 it can be seen that the maximum energy flow through the liver is at 2 am. Therefore, the liver's lowest corresponding energy flow is at 2 pm. The MRS 2000+ designo® delivers packets of energy that are believed to balance cellular resonance for all the organs and body systems simultaneously by varying frequencies through 4 pre-programmed intervals: 5 am to 10 am, 10 am to 3 pm, 3 pm to 8 pm, and 8 pm to 5 am.

THE CHINESE ORGAN CLOCK

TIME	MAXIMUM ENERGY	ORGAN/MERIDIAN
3 TO 5 AM	4 AM	LUNG
5 TO 7 AM	6 AM	LARGE INTESTINE
7 TO 9 AM	8 AM	STOMACH
9 TO 11 AM	10 AM	SPLEEN
11 TO 1 PM	12 NOON	HEART
1 TO 3 PM	2 PM	SMALL INTESTINE
3 TO 5 PM	4 PM	URINARY BLADDER
5 TO 7 PM	6 PM	KIDNEY
7 TO 9 PM	8 PM	PERICARDIUM
9 TO 11 PM	10 PM	TRIPLE WARMER
11 TO 1 PM	12 MIDNIGHT	GALL BLADDER
1 TO 3 PM	2 AM	LIVER

The 4 Programs of the MRS 2000+ Whole Body Mat, and the Main Frequencies Used

The frequency bands utilizing the unique sawtooth signal shape are composites of a large number of electromagnetic signals in the extremely low frequency (ELF) range. The basic signal frequency is 64 Hz and each pulsation requires 5.25 milliseconds (ms) to deliver. The main frequencies used in daily application are shown below:

Program 1 (morning: 5 am to 10 am)

The basic sawtooth signal is delivered as follows: one "packet" of sawtooth stimulation (comprised of 4 pulsations lasting 5.45 ms each) is followed by a 45 ms pause. Thirty of these 4-pulse packets are delivered as one "pallet" of stimulus, followed by a 1320 ms pause. This means that there are 66 ms (4 x 5.25 ms + 45 ms = 66 ms) required to deliver the pallet of pulsations. Since a reasonable estimate of the maximum frequency (in Hz) of pulsations is the inverse of the time involved, the carrier frequency of Program 1 = 1/**66 ms** (x 1000) = **15.15 Hz**.

This cycle of bioelectromagnetic signaling of every cell within the field is continued for 8, 16 or 24 minutes, depending on the session time setting used. Every 2 minutes during this signaling the polarity is reversed to prevent cellular fatigue or accommodation to the signal. The intention of this is to maximize the biological effect.

Program 2 (mid-morning to mid-afternoon: 10 am to 3 pm)

The basic sawtooth signal shape is delivered at 64 Hz, 4 times, followed by a 31.5 ms pause. (4 x 5.25 + 31.5 = 52.5 ms. 1/52.5 (x 1000) = 19.04 Hz) These 4-pulse packets are delivered

4 times, followed by a 24.3 ms pause. (3 x 52.5 ms + 24.3 ms = 181.8 ms. 1/181.8 (x 1000) = 5.5 Hz carrier frequency.) Both of these processes are repeated 20 times, followed by a 1364 ms pause. (20 x 181.8 ms + 1364 ms = 5000 ms. 1/5000 ms (x 1000) = 0.2 Hz)

Program 3 (mid-afternoon to evening: 3 pm to 8 pm)
The basic sawtooth signal shape is delivered at 64 Hz, 5 times, followed by a 36.75 ms pause (5 x 5.25 ms + 36.75 ms = 63 ms. 1/63 ms (x 1000) = 15.87 Hz) These 5-pulse packets are delivered 4 times followed by an 81 ms pause (4 x 63 ms + 81 ms = 333 ms. 1/333 ms (x 1000) = 3 Hz) Both of these processes are repeated 20 times followed by a 3340 ms pause (20 x 333 ms + 3340 ms = 10,000 ms. 1/10,000 ms (x 1000) = 0.1 Hz)

Program 4 (night: 8 pm to 5 am)
The basic sawtooth waveform is repeated 5 times followed by a 50.75 ms pause (5 x 5.25 ms + 50.75 ms = 77 ms. 1/77 ms (x 1000) = 12.99 Hz) These 5-pulse packets are delivered in pallets of 12, followed by a 1076 ms pause (12 x 77 ms + 1076 ms = 2000. 1/2000 ms (x 1000) = 0.5 Hz) Both of these processes are repeated 3 times followed by a 4000 ms pause (3 x 2000 ms + 4000 ms = 10,000 ms. 1/10,000 ms (x 1000) = 0.1 Hz)

Author's comment: Working the night shift
A common question for the use of the 4 Programs above with the whole body mat applicator is whether the time settings should be changed for those working a night shift. Even if the sleep cycle is changed, the body will still respond best to the program corresponding to the actual time of day. Therefore, a night worker should select the appropriate program based on real time of day using the MRS 2000+ as anyone else would. There should be no compensation in the use of these programs for changes in diurnal rhythm.

One Program for the Local Pad and Probe Applicators of the MRS 2000+ designo®
The local Pad and Probe applicators are capable of higher flux densities and are versatile in how they are applied externally to the body. There is no need for a Chinese Organ Clock for this application. A square waveform is used. Once the Pad or Probe applicator is selected, the indicator light for the other programs utilizing the whole body mat will switch off automatically.

The basic 5.25 ms signal is again used with the local applicators (although now in a square signal shape) and this signal is repeated 5 times followed by a brief 36.75 ms pause. (5 x 5.25 ms + 36.75 ms = 63 ms. 1/63 ms (x 1000) = 15.87 Hz) These packets are delivered in pallets of 4, followed by an 81 ms pause (4 x 63 ms + 81 ms = 333 ms. 1/333 ms (x 1000) = 3 Hz) Both of these processes are repeated 20 times, followed by a 3340 ms pause (20 x 333 ms + 3340 ms = 10,000 ms. 1/10,000 ms (x 1000) = 0.1 Hz)

Flux density is a quantitative description of a magnetic field that depends on current flow and direction. However, direction is not sufficient to describe a magnetic field. The material properties of the current flow must be spatially multiplied. The resulting magnetic intensity is

described as flux (or flow) density and has been given the unit Tesla (T), after Nikola Tesla, a Serbian born American scientist who is best known for many revolutionary contributions in the field of electricity and magnetism in the late 19th and early 20th centuries.

The determinants of current flow are the coil length (meters), the number of turns of the coil, and the strength of the current (Ampères) applied to the coil. Together with the induction constant and the specific resistance of the material, the flow density of a magnetic field can be calculated.

Diagnostic systems such as the magnetic resonance imaging (MRI) use field strengths in the Tesla range (1.5 – 3 T). The range of units has been shown below:

1 T	=	1 000 mT (milli-Tesla)
1 mT	=	1 000 µT (micro-Tesla)
1 µT	=	1 000 nT (nano-Tesla)
1 nT	=	1 000 pT (pico-Tesla)

"Gauss" is a unit of flux density still used in some parts of the world. 1 Gauss = 100 uT.

Transcranial magnetic stimulation, which is used successfully in the treatment of depression using strengths of 1.5 – 2.5 T, cannot be equated with pulsed electromagnetic field therapy and magnetic resonance stimulation of interest in this book. The intent in using these large pulsing magnetic fields in neurological practice is to treat depression by inducing a strong electrical current within the tissues of the brain. These electrical currents then "trigger" activity of nerve cells in the central nervous system. *(Padberg 2001/18, Kanno 2003)* Transcranial magnetic stimulation has replaced electroconvulsant therapy (electric shock treatment) in the treatment of depression in many areas. The electromagnetic applications discussed in this book are at field strengths 10,000 to 1,000,000 times weaker than fields applied in transcranial magnetic stimulation and in diagnostic magnetic resonance imaging (MRI).

The MRS 2000+ designo® systems uses extremely low field strengths. The "biological windows" of the human body are optimally accessed at field strengths in the low µT range.

Resonance

Resonance is a principle that was discovered by Galileo Galilei in 1602 while he studied pendulums. Resonance is the tendency of a system to oscillate with maximum amplitude at certain frequencies.

A common example of a resonance frequency is a playground swing, which acts as a pendulum. If you push a child on a swing in time with the natural interval of the swing

(its resonance frequency) the swing will go higher and higher (it's maximum amplitude). Applying a pushing force at any other time will interfere with (or dampen) the resonance frequency and the swing will be disrupted and go lower or stop all together. The energy absorbed the by the swing is maximized when it is in phase (or "in resonance") with the swing's oscillations.

The cell's of the human body vibrate, or oscillate. This can be seen in video footage of red blood cells traveling through vessels under high magnification, or macrophages chasing bacteria. Electromagnetic impulses of the appropriate frequencies can produce cellular resonance – vibration at maximum amplitude. Furthermore, neuropeptide receptors on the surface of the cell vibrate. As with the cell, electromagnetic impulses produce resonant vibrations of these membrane receptors to stimulate a variety of functions within the cell. There are approximately 75 trillion cells in the human body. Each cell membrane has over 1 million neuropeptide receptors. An electromagnetic field applied within the biological window signals all of these receptors simultaneously at the speed of light. One can picture the cellular resonance produced – all cell's vibrating and oscillating in phase. This is the essence of magnetic resonance stimulation. The profound beneficial effects in human physiology through magnetic resonance may be produced through improved intercellular communication and intracellular interactions through the induction of resonance in the body.

The higher the frequency, the more difficult it is to gauge the effect on the cell. Importantly, this applies to "unnatural" frequencies in the KHz and MHz range used by wireless phones, cell phones and many common household electrical devices. The new generation of magnetic field therapy systems targets the extremely low frequency range (below 75 μT) – matching known tonic oscillatory frequencies of the body's cells. The MRS 2000+ designo® systems are examples of the use of advanced computerized stochastic resonance modeling to achieve maximum cellular resonance.

Examples of resonance from sound and music

Subtle energies, such as extremely low frequency (ELF) magnetic waves, have profound effects on human physiology. One dramatic effect is the positive influence of pulsed magnetic fields on depleted bone density. To understand how this happens, we need to understand that we are dealing with waves. Waves have amplitude (strength) and frequency (which is determined by wavelength). Waves summate (adding together to become larger in amplitude) and they can also negate one another, thereby reducing amplitude. A simple example of this is the physics of sound waves. Harmony is the matching of two separate tones along the same wavelength. Two tones are combined. When their wavelengths and frequencies are in synchrony, we experience a pleasant sensation: a harmonic chord. Disharmony (e.g., music that is hard to listen to and "off key") occurs when separate tones have different wavelengths and are not in synchrony with one another.

Carrying this musical example further, a musical "overtone" occurs when harmonies are added upon one another in perfect mathematical relation. The harmonic chord is heard, and the overtone is heard as well. The overtone is heard, but has not been sung or played by an instrument. This is an example of "resonance," or more precisely, "stochastic resonance." The overtone is not produced directly; it is *derived* through the frequency of sound waves

vibrating (or oscillating) in harmony. This principle is fundamental to a proper understanding of magnetic waves and magnetic field therapy. Synchronous oscillation of electromagnetic waves is called resonance. Resonance is not produced directly, but is derived through a summation of electromagnetic vibrations within the cells of the body. The induction of cellular resonance – synchronous biomagnetic vibrations in the body – creates the biological window necessary to produce a wellness response in the tissues. Using a proper dosage of pulsed magnetic waves a biological harmonic "overtone" is created and membrane receptors of poorly functioning cells in the body begin to vibrate at the frequency of health. Through a variety of physiological mechanisms that will be discussed later, circulation is improved, the energy for healing is enhanced, healthy cell function is restored, and overall health is improved.

Harmonic oscillations are frequencies that develop as a multiple of the fundamental (or tonic) frequency – similar to the upper harmonics (or "overtones") in music. For example, rectangular impulses with a fundamental oscillation of 1 Hz simultaneously create upper harmonics of 3, 5 and 7 Hz etc. Upper harmonics to the 2nd upper harmonic have the same strength as the fundamental oscillation.

In order to create resonance, the field strengths (electromagnetic amplitude) and pulse frequencies (wavelengths) utilized must match the biological window being accessed. Mathematical calculations of probability are used to determine which field strengths and amplitudes are likely to induce the greatest resonance and therefore the most beneficial biological window for magnetic resonance stimulation. To restate the principle of resonance yet another way, if the intensities and field strengths used in applying magnetic resonance stimulation are similar to those of the biological window, a stochastic amplification creates a more profound wellness effect.

Rectangular impulses have a steep ascending and descending phase (sharp rise time and fall time). They create harmonics at odd-numbered frequencies (e.g., 3, 5, 7 and 9 Hz). The result is that they transfer a great deal of force. Interestingly and in contrast, sine waves produce harmonic oscillations at even-numbered frequencies (e.g., 2, 4, 6, and 8 Hz).

BIOLOGICAL WINDOWS

Dr. Ross Adey, an Australian born professor of anatomy and physiology working at UCLA School of Medicine, coined the term "biological window." *(Bawin and Adey 1976/16)* Adey measured the calcium output of brain cells in rabbits to demonstrate that this effect could only be triggered using very low magnetic field intensities and a specific low (16 Hz) frequency. Since Dr. Adey's initial discovery, the energy medicine literature has shown strong scientific consensus that biological windows are important.

A biological window is a range or spectrum of electromagnetic energies that are readily accepted by the body and converted to positive physiological responses. Signals that fall outside the biological window have little or no effect. Research has proven that living tissues readily detect, absorb and utilized electromagnetic signals within some frequency ranges and completely ignore the rest of the frequency spectrum. Magnetic resonance stimulation within the biological window can have a profoundly positive impact on health. Stimulation at frequencies and amplitudes outside the biological window will produce little or no positive health benefit.

This means that there is a range of intensities and frequencies for which the tissue is especially receptive. Magnetic fields pass through the body virtually without encountering any resistance. If the magnetic field impulses reach the body in a certain frequency, they can resonate with the natural oscillation of cells and organ systems. The resonance effect restores disrupted or abnormal cellular and/or cell receptor oscillations that are vital for metabolic processes, circulation, cell regeneration and the immune system.

STOCHASTIC RESONANCE

Insights from stochastics (calculations of probability) have greatly simplified the search for ideal intensities and frequencies. *(Hänggi 2002/20)* If the numerous metabolic processes or the information racing through our bodies could be made audible, it would sound somewhat like the "white noise" on the radio when we are searching for a radio station. This white noise includes energy from many of frequencies.

Stochastic resonance means that randomly applied energies can amplify weak oscillations into stronger ones to produce a change. This phenomenon can be explained best by considering a single marble in an otherwise empty egg carton. *(Hänggi 1991/21)* If the marble is gently swung by a weak, oscillating force, it cannot overcome the barrier to the neighboring hollow. However, if this movement is accompanied by a randomly applied shaking, the marble will sometimes overcome the barrier to the next hollow by the application of that chance energy. *(Hänggi 2001/22)*

Introducing a magnetic field impulse with a very low intensity produces momentary chaotic oscillations at the cellular level. The initial energy currents produced are haphazard, like white noise. However, certain impulses delivered across the low frequency spectrum will, by chance, match the frequency range of biological window for the cells and their membrane receptors. The cells and receptors begin to oscillate at resonance frequencies. Frequencies that, by chance, fall outside of the biological window do not dampen the resonance created because they are not received by the cell's receptors. Referring back to the playground swing analogy, this would be compared to a parent going through the motion of pushing a swing at a certain frequency, but standing in the baseball field rather than near the swing. The parent's regular motions (representing a true frequency) have no influence on the swing.

Certain body and cell reactions can only take place if a receptor is excited. There are no receptors for incorrect frequencies; that is, for frequencies outside the biological window. Frequencies outside the biological window occur, but they are like a parent standing out in the field in the example given above. The parent has no influence on the swing. Likewise, frequencies outside the biological window have no influence on cells and receptor sites that are responsive to other frequencies inside the biological window.

If a very strong magnetic impulse (e.g., with high amplitude) is applied to the cells, it will fall outside the amplitude window of responsiveness for the cell and its receptor sites at the cell membrane. Just as there is a range of acceptable frequencies that define the biological window, there is also a range of acceptable amplitudes that fall within the biological window. A strong electromagnetic impulse will evoke no biologically recognizable resonance.

Stochastic resonance is used in state-of-the-art magnetic field therapy equipment to target this biological window as much as possible. The MRS 2000+ designo® uses rectangular and sawtooth impulses preferentially. The evolved sawtooth impulses used in such systems are a combination of triangular and rectangular waves. Sawtooth waves make ideal use of the phenomenon of upper harmonics for both even and odd-numbered frequency

ranges. *(Bronstein 2001/19)* That is, the first upper harmonic produced by this waveform is equivalent to twice (even) the fundamental (or tonic) frequency; the second upper harmonic is equivalent to three times (odd) the fundamental frequency, etc.

In addition to sawtooth waveforms the MRS 2000+ designo® pad and probe applicators use rectangular impulses to maximize the beneficial impact to cells and their membrane receptors. The key is the sharp rise time and fall time of the waveform. This is the characteristic that produces ion dissociation, resonance of cell membrane receptors, and maximum access to the "biological window." Some authors have reported that it is necessary to apply waveforms that match the action potential[2] of a nerve impulse. However, nerve impulse waveforms often have gradual rise and fall times and are not capable of maximum ion dissociation. These authors ignore the many studies that demonstrate the profound biological effects of waveforms with sharp rise and fall times (such as the sawtooth and square waveforms).

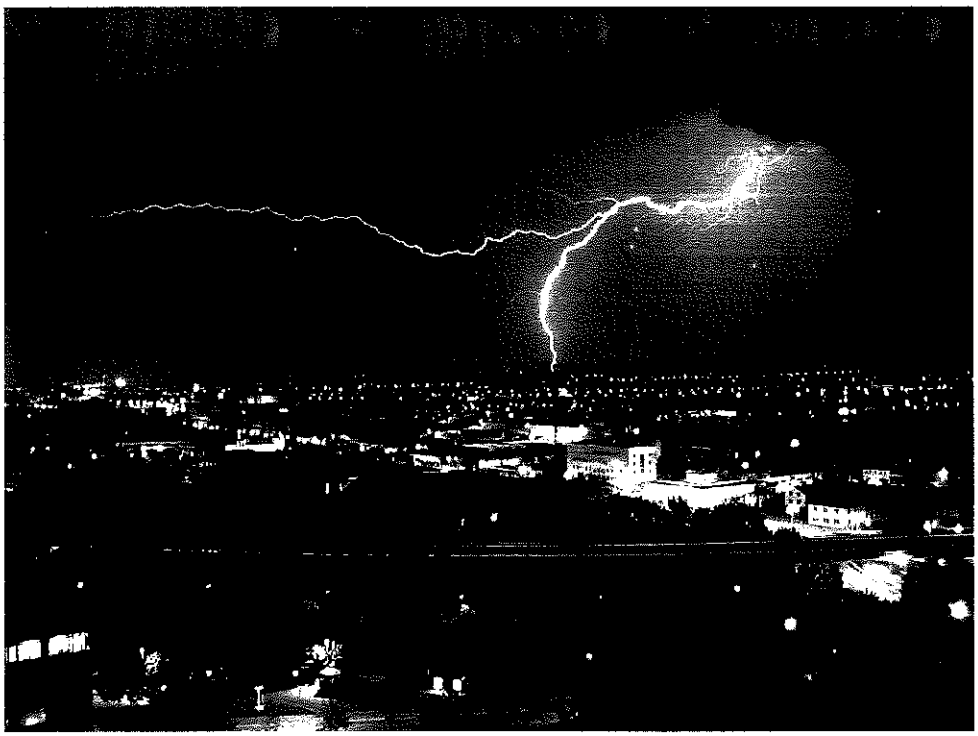
Summary: Stochastic resonance permits the delivery of a broad spectrum of wave frequencies and amplitudes to access the "active biological window" of cells and their receptor sites. Knowledge of the exact biological window is not necessary for each cell in a particular individual. Predictive probability, the use of a proven spectrum of frequencies and amplitudes, and knowledge of the effect of the fundamental harmonics of cell behavior ensure that signals are delivered through the biological window, and also ensure that magnetic resonance is having a beneficial physical benefit.

action potential is the depolarization of a muscle or nerve cell as a reaction to an incoming signal.

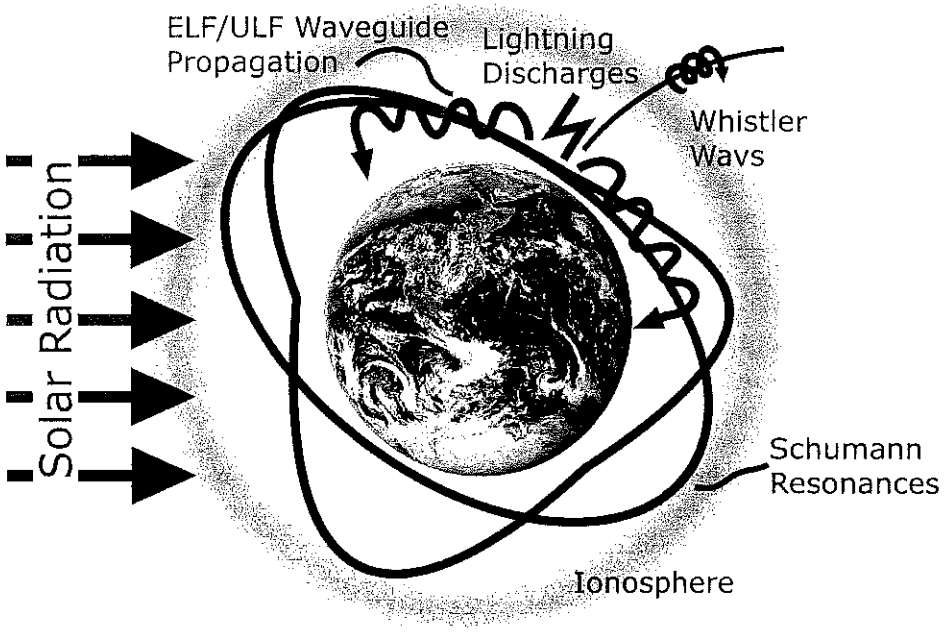
MORE ON "SCHUMANN RESONANCES"

In this chapter we have already mentioned the correlation between the frequencies of Schumann resonances to natural frequencies of the human body. What are these Schumann waves, and how do they develop?

From a global perspective the Earth is covered by a permanent lightning storm. The electromagnetic impulse from a flash of lightning in the tropics is transferred around the Earth's circumference at the speed of light, creating electromagnetic resonance.



At the beginning of the 1950's the physicist Winfried Otto Schumann discovered that the space between the Earth's surface and the conductive atmosphere (ionosphere) functioned as a waveguide (or spherical capacitor). *(Schumann 1954b/23)* This is because the ionosphere is capable of trapping electromagnetic waves. The many hundreds of lightning strikes that occur globally in this cavity create electromagnetic resonances with a fundamental frequency of 7.83 Hz. According to König this resonance frequency of the Earth is extremely stable. *(König 1962/24)* A recent study proved once again that the human body absorbs, detects and responds to extremely low frequency environmental electromagnetic signals in the Schumann resonance frequency range. *(Ćosić 2006/26, Cohen 1998/27)*



Further resonance modes occur at 6.5 Hz intervals due to the Earth's spherical geometry. These resonance modes (overtones) are detected in the background radio noise of the Earth's energetic field as separate peaks around 14.3, 20.8, 27.3 and 33.8 Hz. Furthermore, these overtones seem to be essential for our bodies.

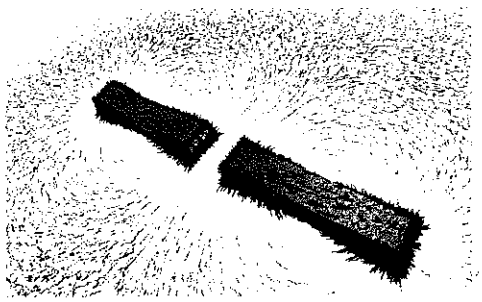
If our bodies are blocked from natural exposure to these natural waves (e.g., due to living and working in buildings constructed with concrete, steel and metal alloys, driving in cars on paved roads, and by the electro-pollution of ultra-high frequency radiations from cell phones, microwave ovens, wireless phone and computer networks, and radar/satellite signals, etc.) we are more susceptible to illness, loss of cell membrane integrity, compromised immunity, and depression. Recorded dips in the Earth's Schumann resonances have had strong correlation to heart attacks, car accidents, and a general increase in the death rate. *(Beck 1992/25)*

STATIC MAGNETS VS. PULSATING MAGNETIC FIELDS

A magnet, by definition, has the ability to attract iron. In magnetic materials, the most important sources of magnetism are: 1) particles having a non-zero magnetic moment (or "spin" within the magnetic field); and 2) electrical currents (or more correctly, moving electrical charges) that create magnetic fields. Magnetic poles (e.g., north and south) are simply convenient ways to refer to the two distinct ends of a magnet. The "magnetic field" is the space in which the magnetic forces produce measurable effects.

The primary change in physical matter produced by a magnetic field is the spin of electrons, or more correctly, their "orbital angular momentum" about the nucleus of an atom. In non-magnetic materials, the spin of paired electrons cancel each other out. The axes of spin of these electrons are non-parallel. In magnetic materials, however, the axes of spin (or "electron magnetic moments") line up, on average, to be parallel to one another. The resultant magnetic field can be quite powerful. The magnetic force or field lines are "thought" lines that describe the direction of the magnetic force.

The study of the arrangement of iron filings about the poles of a static magnet allows us to visualize the magnetic field, which we cannot see or feel directly. **(Figure 9)**



A static magnetic field is capable of moving electrons. Such electron movement is constant at the cell membrane due to the high volume of ion fluid exchange through the cell membrane's channels. When the intensity of the magnetic field is sufficient, ions are displaced through the magnetic field's actions on electron flow. This is called induction.

Induction does not occur when the ions associated with the cell membrane are in a resting state unless the magnetic field intensity (e.g., flux density) is very high (e.g., in the Tesla range – several million times stronger than the MRS 2000+ designo®.)

Electrical currents passed through conductive wire produce magnetic fields. Electromagnetic coils are the concentric rings (or "windings") used with copper wires to produce magnetic fields. With electromagnetic field generation, the field strength can be increased by increasing the number of concentric rings (loops, or windings) in the magnetic coil.

The rhythmic switching on and off of an electric current creates pulsating electromagnetic fields. Because they have a time-varying frequency, pulsating electromagnetic fields easily produce cell induction (cell membrane ion dissociation) through lower levels without producing

cell fatigue. That is, the frequencies and/or amplitudes are dynamic and always changing so the cells do not habituate, or fatigue, to the stimulus. Static magnets produce only one field strength and no frequency. Cells habituate to that field strength.

The difference between a magnetic bracelet, pendant or necklace and the MRS 2000+ designo®:

Dr. Walter Glück has eloquently and humorously described the difference between static and dynamic, time varying pulsed electromagnetic signals. He likens the static magnetic signal to someone saying: "I love you, I love you, I love you, I love you" in a repeated, mechanistic, strictly monotone fashion with no voice inflections and no changes. Though "I love you" is a pleasant message, when it is droned over and over (and over!) in unchanging fashion, the recipient gets bored with it, and the message (or "signal") completely loses its impact. Contrast this to the person who exclaims: "I love you!" in a variety of ways, with enthusiasm, passion, and ever-changing voice inflection. The message never gets old and never loses its power. These ever-changing "I love you" signals are the equivalents of the time varying, pulsating electromagnetic impulses generated by the MRS 2000+ designo® Systems.

Example: Ion transfer inside the body is essentially an electric current at the cell membrane surface. This means that as ions continue to be actively transported through channels in the cell membrane they can be driven by a static magnetic field. However, if the relative movement of ions across the cell membrane is lessened (as with illness and a lowered membrane potential), static magnets have much less influence.

Static magnets depend on the presence of motion to exert their biological effects. That's why early magnetic healers from Greece moved the magnes lithos – which emitted a static magnetic field – rapidly along the body of the patient. In the same way, our physical movement through the Earth's static geomagnetic field transforms the Earth's field into a pulsating magnetic field. There is an old adage that states: "Motion is life." From an energetic perspective, this is true indeed!

THE EARTH'S MAGNETIC FIELD / ZERO FIELD

We are all under the influence of the Earth's geomagnetic field. How is this field generated?

According to the "Dynamo Theory," first proposed by Albert Einstein shortly after he published his theory of special relativity in 1905, the Earth's geomagnetic field is created by the movement of electroconductive fluid through the magnetic field of the Sun. *(Gubbins 1999/30; Wikipedia 2008/28)*

At extremely high temperatures near the center of the Earth – 1043° K – electron spin of iron atoms becomes random and non-magnetic. Therefore "magnetized liquid iron" deep beneath the Earth's surface cannot be the source of our planet's magnetic field. However, iron in the Earth's liquid outer core, at a depth of approximately 2900 km, is a conducting fluid. That is, the hot liquid iron easily conducts electrons. When such a fluid flows (with motion) across an existing magnetic field (from the Sun, in this case), electrical currents are induced which, in turn, generate a magnetic field. The new magnetic field reinforces the existing magnetic field, producing a "Dynamo" effect. Dynamo is another word for an electrical generator. In this case, the dynamo refers to a magnetic field generator.

In summary, the Earth's magnetic field is caused not by magnetized iron deposits, but by induced electron flow in hot iron liquid deep within the Earth's core.

We can consider Earth as a gigantic magnet which forces compass needles all over the world to align with geomagnetic north and south. Both north and south magnetic poles exert force upon one another. This force decreases as distance from the pole increases. Therefore, the strongest magnetic fields are at both poles (approximately 66 μT) and the weakest of the Earth's magnetic field strengths is noted at the equator–the furthest distance from both poles (only 26 μT).[4]

Several thousands of years ago, the Earth's magnetic field was quite strong at 200 μT. Now it just manages to reach an average of 50 μT. Scientists estimate that even at 1,000 A.D., the field strength was still 100 μT.

According to NASA our solar system's star, the Sun undergoes a pole reversal (or "pole flip") every 11 years at the peak of every sunspot cycle. The next of the Sun's pole reversals will be 2012.

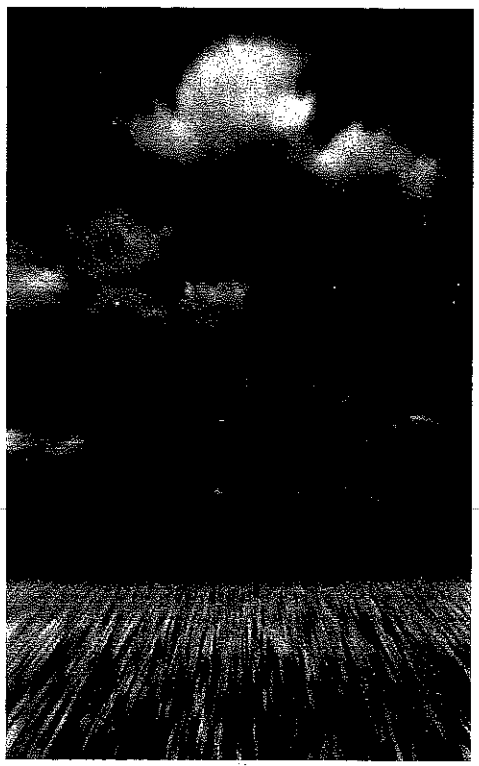
Earth's magnetic field also flips, but with less regularity. Consecutive reversals are spaced 5000 to 50 million years apart. According to NASA the last reversal happened 740,000 years ago. With the progressive weakening of the Earth's field in the last 1000 years we may surmise, by extrapolation, that there may be a natural pole reversal (flip or "jump") some-

[4] The strength of the magnetic field at the Earth's surface ranges from 26 (0.3 gauss) in an area including most of South America and South Africa to 66 μT (0.6 gauss) around the magnetic poles in northern Canada and south of Australia, and in part of Siberia.

time in this or the next millennium. Some researchers think our planet is overdue for another one, but nobody knows exactly when the next reversal might occur. *(NASA 2001/29)*

The zero field:
Nature abounds with evidence of the importance of the Earth's magnetic field for the health and survival of organisms. Whales, pigeons, geese, and even honeybees navigate by the magnetic field. Vegetation is highly responsive to magnetic fields. Apparently all mammals make use of the Earth's natural magnetic fields for survival and health, based on results of studies of the zero field.

A zero field is a space defined as the absence of any magnetic fields. It is a place where the intensity and strength of a magnetic field equals zero. Such a space is created by screening natural and artificial fields from flowing by the use of mu-steel (μsteel).



In one study of the zero field, mice spent 4 months without any electromagnetic influences. It was found that the mice aged much faster compared to age-matched controls who lived under exactly the same conditions with normal access to the Earth's magnetic field. In this study the mice blocked from the normal magnetic field had an increased tendency to form tumors. Furthermore, pathological changes were noted in the livers, leukocytes, kidneys and urinary bladders of these animals. Their fur became coarse and rough; their sex drive was significantly decreased. The mortality of these magnetic field-deprived animals was significantly increased over the control group. *(Warnke 1994a/32)*

The zero field and flicker fusion frequency in humans
In human subjects, who for reasons of safety were only allowed to remain in the zero field for a few weeks, important deficits in neurophysiology were noted.

The flicker fusion frequency is the point at which the eye sees an increasingly rapid flashing light as a continuous beam. Put another way, flicker fusion frequency, also known as flicker merging frequency or flicker fusion rate) is the number of frames per second required to reproduce motion in movie film or video. Early movies were typically shot at 16 frames per second (16 Hz), and the flicker was very noticeable. Today's movies are typically shot at 24 frames per second (24 Hz) and high definition television (HDTV) is shot at 60 full frames per second (60 Hz).

Humans have a maximum flicker fusion frequency of 60 Hz (or 60 "pictures per second" seen by the eye,) *(Winkler 2005/34)* and a minimum flicker fusion frequency just above 14 Hz (or 14 frames per second). In other words, at frequencies of 14 Hz, most people can detect flicker. It gets more difficult to detect flicker at higher frequencies. For example, TV is broadcast at 60 half frames per second in the United States.

The effect of the zero field on the visual system in humans is this: when exposed to a zero field, the flicker fusion frequency sank to a mere 8 frames per second (8 Hz) within a very short period of time. *(Warnke 1994b/33)*

The zero field and the perception of pain

Zero field studies show that a deficiency of magnetic field exposure lowers the threshold of pain perception.

Animals and humans have an endogenous opiate system that utilizes special chemical neuropeptides called endorphins. Endorphins are opiate-like substances with strong pain-relieving properties. Endorphins also elevate mood and trigger pleasure centers of the brain. Most of us are familiar with the "runner's high" associated with endorphin release. Endorphins are so-named because they bind to the same receptors on the surface of the cell membrane that bind to morphine. Hence the name "endogenous morphine," or end-orphin.

When the body is in pain or suffering from emotional or psychological stress, large amounts of endorphins are released. Endorphin release is responsible for the fact that people who sustain major trauma do not feel immediate pain.

In controlled experiments the deficiency of exposure to normal magnetic fields produced intolerance to pain in mice. Mice that were allowed to have normal exposure to the Earth's magnetic field exhibited no intolerance to pain. *(Choleris 2002/35)*

In human studies, the negative effects of depriving the body of normal magnetic fields were reversed by providing magnetic field strengths of a mere 0.5 µT. *(Stewart 2000/36)* The fact that this analgesic response was reversed by Naloxone, which blocks endorphins, proves that magnetic fields stimulate endorphin release in the body. *(Thomas 1997, Robertson 2006/37)*

Outer space is an environment very magnetically dissimilar to Earth. Beyond the Earth's atmosphere (the "ionosphere") there is a significant reduction in electromagnetic forces. As the result of our growing knowledge of the beneficial health effects of the Earth's magnetic field NASA, the Russian space program and others equip their space capsules and space suits with magnetic field generators to simulate those on Earth (50 µT). Prior to the discovery of the vital importance of magnetic fields to health in space travel, and prior to properly equipping

space craft astronauts and cosmonauts were returning to Earth very ill, with all their strength and energy depleted.

Magnetic field deficiency syndromes

After evaluating more than 11,000 human subjects Japanese researcher K. Nakagawa concluded that a large part of Western civilization is suffering from a lack of magnetic field – an epidemic of magnetic field deficiency – caused by the natural weakening of the Earth's magnetic field. *(Nakagawa 1976/38)* It manifests itself as chronic tiredness, insomnia, back pain and headaches as well as a lack of energy. Is it possible that fibromyalgia, chronic fatigue syndrome and other disease processes involving pain and fatigue are, in reality, magnetic field deficiency syndromes? We will delve in to these questions later in this volume.

According to one thinker, mankind is, genetically, still in the Stone Age. *(Worm 2001/39)* Our human genome has not adapted to the reduction in the Earth's magnetic field by 150 μT in just the past 2-3 millennia. Nakagawa has identified the fact that the human body requires sufficient levels of magnetic energy for optimal health. Our lifestyles, living quarters, modes of transportation and work environments are not conducive to receiving adequate exposure to the Earth's field. Many of us, if not all of us, will benefit from daily supplemental exposure to health-producing magnetic fields tuned to the biological windows of health.

Since magnetic resonance stimulation can be supplied with a high degree of precision, strength and timing for maximum cellular health, it represents the best first line of defense against magnetic field deficiency, and the most strategic offense in our pursuit of wellness, vitality, pain-free living, and long, active, productive lives.

BIOLOGICAL EFFECTS OF THERAPEUTIC ELECTROMAGNETIC FIELDS

At first blush the description of the "messenger substances," calcium channels and sodium-potassium pumps may seem daunting. Adding insult to injury, we'll be working together to get a grasp on the interplay between quantum physics and modern biology. Be of good cheer! Public lectures around the globe indicate that there is an intense, universal interest in energy medicine and the role magnetic resonance stimulation has to play.

People are hungry for this information. Be encouraged to understand as much as you can! Digest what you're able, and take a "pass" on the rest. The intended audience for this book is quite broad: so while we're keeping it simple, we'll get technical at times, and while we want to show the depth and wonder of it all, we'll try to keep it interesting and practical too! Hopefully we've found a good balance and this material will challenge you to appreciate how fearfully and wonderfully you were made!

Reader's tip: This chapter on "Biological Effects" is a discussion that will take more time to digest. Please move freely from place to place, gleaning what you will from different chapters and discussions. When you're ready to dig deeper, come on back here to "chew and reflect" awhile! The goal is for you to comprehend how magnetic resonance stimulation works!

MECHANISMS AND BIOLOGIC EFFECTS

Molecular and sub-molecular biology

Cell membrane neuropeptide receptor effect / messenger cyclic adenosine monophosphate (cAMP)

According to Bruce Lipton, Ph.D., cells are "sentient beings." That is, they have their own innate alertness, attentiveness and responsiveness to their environment. If you take a living cell out of the human body and nourish it in the proper environment it will continue to respond appropriately to stimuli.

The outer boundary of the cell is called the membrane. For years the membrane was thought to function merely as a barrier separating the inner contents of the cell from the outer environment. With progressive refinement in our experimental techniques and tools of investigation we discovered proteins within the dynamic surface of the cell membrane that are directly responsible for the behavior of cells in response to stimuli. These surface proteins are called neuropeptides. There are over 1 million neuropeptide receptors on the surface of each cell membrane in the body. There are approximately 75 trillion cells in the body. It's mindboggling.

Surface membrane receptors communicate with the cells' internal machinery. A receptor can be compared to a keyhole that can only take one particular key. The key is called a "first messenger" or chemical "ligand." Chemical ligands represent 3-dimensional molecules that fit perfectly into the receptor. For each unique receptor there is a unique corresponding ligand that fits it, binds to it, or "signals" it. When receptor signaling takes place by first messengers, the cell changes its behavior in a prescribed way and the inner machinery of the cell is directed to perform a prescribed function. These functions include the activation of enzymes such as protein kinase and the manufacture of proteins, the transfer of the effects of hormones that cannot pass through the cell membrane such as adrenaline and glucagon, and the regulation of calcium ion (Ca++) flow through the membrane.

Now here's the fun part. Surface membrane receptors include neuropeptide proteins. It has traditionally been thought that the "first messenger" that is needed to bind with the receptor site must be chemical in nature (such as hormones or other proteins, amino acids or enzymes) (See Figure 9.1). We now know this is not true! Neuropeptide receptors can be effectively signaled by electromagnetic impulses, or "non-ligands." In fact, in many cases the non-ligand triggers a more robust cellular response than a chemical ligand.

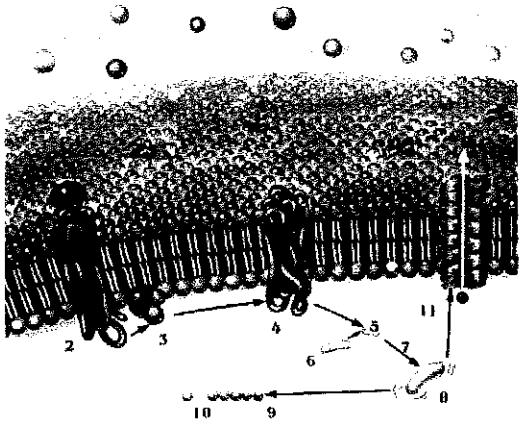
Once a membrane receptor has been signaled effectively (either by a chemical or by an electromagnetic impulse) how does the message get sent to the inner machinery of the cell so that the cell can perform a prescribed function? A "messenger" carries the message. Recall that the "first messenger" is the initial signal at the membrance surface. The "second messenger" carries the signal from the cell membrane to the cell's inner machinery. One of the most important "second messenger" substances is called cyclic adenosine monophosphate (cyclic AMP, or cAMP).

The Nobel Prize in Physiology or Medicine 1994

Signal Transduction in Cells

Cells in our body are surrounded by a lipid membrane. The "water-loving" heads of the phospholipid molecules (blue) are directed towards the outer and inner surfaces of the membrane. Many proteins stretch through the entire membrane.

A first messenger (1), a molecule of adrenaline, binds to a specific adrenaline receptor (2), a discriminator. Thereby, the transducer (3), a G protein - composed of alpha-, beta- and gamma subunits - is activated.



This, in turn, stimulates the amplifier (4), adenylate cyclase, which produces (5) the second messenger, cyclic AMP, from (6) ATP (adenosine-triphosphate). (7) A cascade of enzymatic reactions alters the behaviour of the cell and (8) via phosphorylation (9) glycogen is transformed to (10) glucose, which the cell uses to generate ATP. Phosphorylation can also alter membrane proteins, for example, ion channels (11).

To summarize what has been introduced so far: "First messengers" are substances that signal the neuropeptide receptors at the cell membrane surface. First messengers can be hormones or enzymes – but they can also be electromagnetic impulses. First messengers represent the key or "code" which triggers the receptor to form the "second messenger," cAMP. *(Mandler publication/40, McCleary 1991/41, Knedlitschek 1994/42)* cAMP sends the message to the cell's interior machinery to perform a specified task such as the manufacture of specific proteins.

Electromagnetic impulses that successfully signal membrane receptors do so because they cause the receptor molecules to vibrate or resonate in such a way that cAMP picks up the signal and carries it into the cell's interior ("signal transduction.") In energy medicine this

vibration or resonance is called "stochastic resonance." Stochastic resonance is produced at the cell membrane – the precise point of intersection between biology and quantum physics. This is where electromagnetic energy intervenes with biology to direct and improve biological function.

Electromagnetic energies that produce signal transduction (by cAMP and other mechanisms) to initiate improved, healthier cell function do so because those energies fall within a specific range of frequencies and/or amplitudes called the "biological window." If a range of frequencies or intensities fall outside the biological window signal transduction does not occur. No second-messenger activity takes place. The cell is not effectively signaled. No improvement of cell function is invoked.

cAMP is capable of initiating many functions within the cell. It is a sort of "jack-of-all-trades" in the hierarchy of different messenger substances. It is capable of orchestrating a wide variety of functions across all cell types within the body. For example, if the cell is a glandular cell, cAMP will manufacture a glandular product; if the cell is a skin cell within a patch of psoriasis, cAMP will direct the manufacture of normal proteins, if possible, to bring the diseased cell back to its normal state.

Through activation of protein kinase, cAMP can induce the phosphorylation of proteins that bind to certain promoter regions of DNA and mRNA. This results in the manufacture of genes by the nucleus.

The main functions of cAMP, an important "second messenger" substance, are:

- To increase protein synthesis. cAMP ensures that protein is available in sufficient quantities for the repair and regeneration of muscles and connective tissues.

- The promotion of cell differentiation. It is equivalent to designing the interior of a cell. The more differentiated it is, the better it works. In contrast to this, there is also cell proliferation, i.e. expansion of the cell but with a reduction in quality.

- mRNA- and DNA synthesis. Through its action on protein kinase, cAMP can switch certain genes on and off. Because cAMP messenger activity is triggered by electromagnetic signals, electromagnetic signaling within a proper biological window can switch genes on and off.

Summary/effects:
cAMP (cyclic-AMP) is also described as the "second messenger." The first messenger, or the first stimulus to signal the neuropeptide receptor at the cell membrane, is a hormone, an enzyme, or an electromagnetic impulse. Regardless of whether the signal is chemical or energetic – the second messenger, cAMP, picks up the message and directs the production of specified substances within the cell. These substances include proteins, genes, entire organelles, or completely new cells. The primary function of cAMP is to activate the cell's internal manufacturing processes.

Free calcium ions are perhaps the most important known second messenger substance in the human body. Outside the cell, calcium ions are present in a concentration 1000 times greater than inside the cell.[6] If a cell is excited by a nerve impulse, hormone, or electromagnetic field, special pores in the cell wall called ion channels open up. These channels are similar to the pipes in a dam. After the pipe valves have been opened, water flows through the wall of the dam. In similar fashion, once the ion channels have been opened, calcium ions flow through the cell wall where they become available to the inside of the cell for binding with other substances and to initiate specific cell functions.

Calcium ion levels inside the cell are increased in at least two ways. The first is by the mechanism described above: the opening of calcium ion channels. Secondly, calcium ions are released by structures inside the cell called "organelles." Organelles are specialized subunits in the cell. A mitochondrion (plural, mitochondria) is an example of an organelle that carries out the function of ATP production, a process that we will refer to throughout this book.

Like cAMP, calcium ion functions inside the cell as a second messenger substance. *(Adey 1982/44, Lin-Liu 1982/45)* In fact, calcium ions play an important role in activating cAMP. Once calcium ion concentration is increased within the cell, a number of important things happen. *(Carpenter 1994/46)*

Calcium ions:

- Convert nerve impulses into muscle activity
- Induce the release of hormones
- Inhibit allergic reactions
- Inhibit inflammation
- Activate enzymes

The activation of enzymes is of great importance for injury repair, sports medicine and rehabilitation:

Exercise at least once weekly has been shown to increase the number of mitochondria within muscle cells. Mitochondria are the "power stations" inside the cell that supply its energy (in the form of ATP production). Mitochondria burn glucose (derived from cellular carbohydrate and fat) and oxygen to manufacture the ATP necessary to provide the energy for muscle contractions. Those who are familiar with the Krebs Cycle (tricarboxylic acid cycle; TCA cycle) may recall that ATP production occurs inside mitochondria.

The mechanism increasing the number of mitochondria in muscle cells was only recently described in scientific literature. *(Science 2002/47)* A specific enzyme, "calmodulin-dependent

6 www.oc.chemie.tu.darmstadt.de "Calcium is also a second messenger"/43

protein kinase" is activated when it binds to 4 calcium ions. This changes its conformation and promotes the action of certain proteins. These proteins are responsible for the multiplication of mitochondria in large numbers.

Since every muscle contraction involves calcium ion exchange, every muscle contraction effectively promotes mitochondrial multiplication through calmodulin-calcium ion binding. Increased mitochondrial populations within the cells means more ATP, more energy, more strength and more stamina. This is, in fact, the effect of physical exercise on the cellular level. From a rehabilitation standpoint, increased ATP also means increased energy for rapid healing of injury and cell damage.

Calcium ions enter a cell very rapidly when exposed to pulsating magnetic fields tuned to the appropriate biological window. *(Huang 2000, Yost 1992, Barbier 1996, and Fitzsimmons 1994)*. These fields improve the ability of calcium to act as a second messenger, bind with calmodulin-dependent protein kinase, and increase the number of mitochondria within the cells. The result is the same: increased ATP and energy available for physical activity, healing and rehabilitation, and all energy-dependent processes of the body.

Summary / effect:
Free calcium ions act as an important messenger substance. When stimulating cAMP activity, calcium ions act as a "first messenger" (since the cAMP is a second messenger substance, conveying signals from the cell membrane to the internal machinery of the cell.) Through the binding of 4 calcium ions with calmodulin-dependent protein kinase, calcium is responsible for the promotion of increased mitochondrial populations within cells exposed to exercise and to pulsating magnetic fields. The net effect is increased ATP (either by exercise or by pulsating magnetic field exposure) and, among other things, increased energy for muscle contraction, exercise, and the healing of tissue damage.

Membrane potential and ATP synthesis

One key function of the cell's plasma membrane is to provide a stable environment for biological processes inside the cell. This is achieved through the protective function of "selective permeability." That is, the membrane allows certain substances to pass through it, but blocks the passage of other substances. One of the ways the cell membrane achieves selective permeability is through the establishment of a "membrane potential." Simply defined, the membrane potential of a cell is the voltage difference between the interior of the cell and the exterior of the cell. The cell's normal membrane potential (also known as resting potential) is 70-90 mV (milliVolts).

The membrane potential arises from the action of ion transporters that lie within the membrane, maintaining different ion concentrations (a concentration gradient) inside and

outside the cell. The typical membrane potential arises from the separation and imbalance of positively charged sodium ions (Na+) outside the cell from trapped (immobile) negatively charged ions (anions) inside the cell. In order for sodium ions and anions to be separated, a concentration gradient of potassium ions (K+) must first be established. This work is done by ion pumps and is fueled by ATP.

Biological processes activate the cell membrane, opening the potassium channel. As a result, potassium ion passes out of the cell through the channel. It takes a long time for these channels to close, so a disparate number of potassium ions are lost to the outside of the cell. The anions inside the cell dominate and there is an even greater negative charge inside the cell relative to the positive charges from potassium ions outside the cell. (This is called "hyperpolarization" and in this state the cell membrane is electromagnetically unstable.) In order to restore the balance of potassium inside the cell, the sodium-potassium pump performs an exchange. Sodium-potassium-ATPase (NaK-ATPase) is the enzyme that promotes the action of this pump. **Two ions of potassium are actively transported back inside the cell in exchange for 3 ions of sodium pumped to the outside.** This maintains the normal concentration gradient of potassium and returns the cell's membrane to a balanced resting potential. The ability of the cell to maintain a stable selectively permeable membrane (for its protection) is restored.

The amount of energy available at the cell membrane determines how many ion channels open, and therefore how well the cells maintain membrane stability and overall health. If the available energy is deficient, insufficient numbers of ions are exchanged, leading to compromised cellular health.

ATP – Energy for Everything!

ATP (adenosine tri-phosphate) is the universal fuel in the body and the common currency of all biological energy. It is manufactured inside organelles called the mitochondria (See Figure 12), inside the cell. ATP is utilized by every cell of the body and is therefore fundamental for all bodily functions including blinking of the eyes, digestion, breathing, blood circulation, fighting infections, the growth of hair – everything! On the cellular level, ATP is required to fuel the sodium-potassium pump. As stated above, if there is insufficient energy (or fuel) to operate ion pumps, cells – and therefore tissues and organs of the body – cannot experience optimal health and function.

Figure 12 – A mitochondrion in skeletal muscle showing the highly folded called the "cristae" within where ATP is made.

Most of the ATP utilized in the human body is used to fuel processes inside our cells. These processes include biosynthetic reactions, motility and cell division. The energy used by human cells requires the breakdown (hydrolysis) of 100 to 150 moles of ATP daily. This

amounts to approximately 50 to 75 kg of ATP. Hence, the average person will expend their body weight of ATP over the course of the day. *(Di Carlo 2001/48)* This means that each ATP molecule is recycled 1000 to 1500 times during a single day. ATP cannot be stored in significant amounts. Therefore its consumption closely follows its synthesis.

It is not possible to make 50-75 kg of ATP per day from our consumption of foodstuffs. Therefore, most of the ATP used by the body is recycled from existing ADP stores utilizing an enzyme called nucleoside diphosphate kinase (NDK).

We do synthesize ATP from food. Once carbohydrates and fats are broken down into their basic constituents (glucose and lipids) ATP is produced by glycolysis through the Krebs cycle (for glucose) or the process of beta-oxidation (for lipids). One molecule of glucose can yield 36 molecules of ATP. This process is called "cellular respiration" because it occurs in the presence of oxygen.

Another mechanism for ATP synthesis in the human body in the absence of oxygen involves the conversion of glucose to lactic acid. In this case, one molecule of glucose yields only 2 molecules of ATP. This is how ATP is available locally to the muscle for contraction in an emergency in a fraction of a second.

Once formed, ATP is ready to donate energy in the form of electrons wherever it is needed to fuel the processes of life. ATP concentrations exist in the body 10 orders of magnitude higher than ADP. That means that ATP concentrations are a thousand-fold higher, and the conversion of ATP to ADP in the cell releases a tremendous amount of energy. *(Nicholls 2002/49)*

ATP breaks down (hydrolyzes) into ADP plus one high-energy phosphate molecule. This molecule functions as an electron in the body – or pure energy – because a free high-energy electron becomes available in the process. The free electron can travel along microtubules within the cell and within the connective tissue matrix of the body at speeds approximating the speed of light. Apart from driving local biological processes these electrons are an important form of instantaneous information transfer throughout the body.

We have already discussed cAMP and calcium ions as important signal transducers at the cell membrane. ATP is important in membrane signal transduction as well. We have noted that ATP is used as a substrate by protein kinases that phosphorylate proteins and lipids. ATP is a substrate for another enzyme as well, called adenylate cyclase. Adenylate cyclase uses ATP to produce the second messenger molecule cAMP. And so, in once sense, we have come full circle!

Important to our consideration of energy medicine is the fact that ATP synthesis by mitochondria is increased by exposure to weak pulsating magnetic fields that are delivered within certain biological windows. Pulsating magnetic fields do this by increasing ATPase activity. *(Blank 1995/50, Lednev 2001/51)* ATP synthesis is also increased by electro-magnetic signaling of the cell membrane to open the ion pumps. The increased ATP synthesis continues for a time even after the ion pumps become inactive. *(Dertinger 2002/52)*

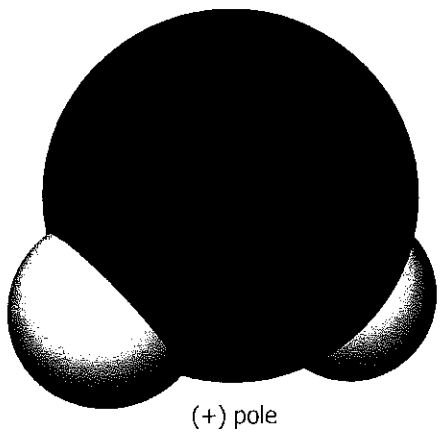
Let's summarize what we've discussed so far. Cells are driven to survive. In order to stay healthy the membrane must govern what goes in and what comes out of the cell. Membrane potential, the voltage across the cell membrane, selectively permits or blocks substances from entering the interior of the cell. Ion pumps open sodium, potassium and calcium channels to allow these ions to pass through the membrane. Ion pumps require fuel in the form of ATP.

Ion pumps are stimulated to function more effectively through electromagnetic field exposure. Electromagnetic impulses signal neuropeptide receptors at the cell membrane surface. These signals are converted into messages that are carried inside the cell (signal transduction) to promote increased synthesis of ATP via enzyme activation. ATP production is increased and ion pumps are supplied with sufficient fuel to open ion channels fully until ion balance and healthy resting cell membrane potential is restored.

Healthy cell membrane potentials range between 70 and 90 mV. Sick cells have membrane potentials as low as 30 mV, and in some cases, even less. Magnetic resonance simulation brings together all the necessary fuel, second messenger substances, calcium and electromagnetic energy to recharge the cell membrane, returning it to a healthy level.

Important Note about H_20

Water is a dipole molecule. That means that it has polarity. This polarity is produced by two positively charged hydrogen ions that bind to the same side of the oxygen molecule. Ions, which carry an electrical charge, are attracted to the dipole nature of the water molecule. In fact, ions surround themselves with water for this reason. This process is called hydration (at the cellular level). Ion hydration makes water more attractive to the cell's hydrophobic ("water rejecting") membrane. *(Marron 1988/53)*



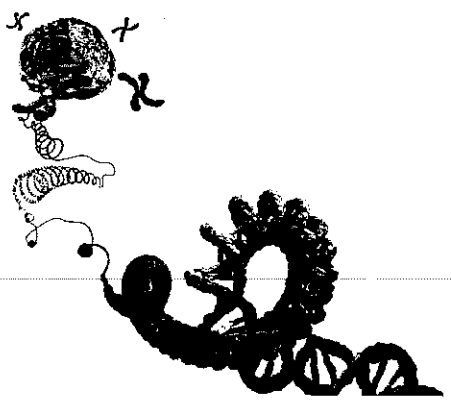
Water's ion-dipole attraction is important when considering interactions with the ion channels in the cell membrane. Since ions are always transported through channels in a hydrated state, any factors that improve ion hydration will enhance ion transport through the channels. Electromagnetic fields of appropriate frequency and amplitude charge the water dipole, making it stronger, resulting in more robust ion exchange through the channels.

These are some of the known mechanisms by which electromagnetic impulses increase cell membrane permeability – the improved flow of nutrients across the cell membrane.

Summary / effect:
ATP is the universal fuel in our body. Apart from the fact that it enables us to move our muscles and provide the required energy for liver, heart or kidneys, we also need ATP to fuel the ion pumps in the cell membrane. Ion pumps consume as much energy as all other bodily processes combined. Electromagnetic fields up-regulate and energize the ion pumps and signal the cell to produce more ATP. Investigators have shown that applied electromagnetic fields for 8 minutes significantly increases the energy available in the form of ATP.

DNA and mRNA synthesis

The blueprint for the manufacture of all proteins in the body is carried in the deoxyribonucleic acid (DNA). DNA is the reproductive machinery of the cell or, according to Dr. Bruce Lipton, the "gonads" of the cell. This flies in the face of the traditional view of DNA, which states that the nucleus houses the "brains" of the cell. As you may have guessed by now, the true guidance system and control center for the cell is the membrane itself. The membrane is the "brain" of the cell.



Ribonucleic acid (RNA) serves as a messenger that transfers the protein-building instructions from the blueprint (the DNA inside the cell nucleus) to the building site (the endoplasmic reticulum) outside the nucleus. Production itself takes place in the ribosomes.

Pulsing electromagnetic fields have been shown to increase DNA, *(DeMattei 1999/54, Ozawa 1989/55, DeMattei 2005/56)* mRNA synthesis in bone, *(Bodamyali 1998/57, Litovitz 1990/58, Chiabrera 1979/59)* and DNA synthesis in cartilage cells. *(Ciombor 2002/61, Fitzsimmons 2008/62)* The reported increased chondrocyte (cartilage cell) production was 150% and was attributed to nitric oxide release. In a study of lymphocyte cells, the amount of DNA increased by 62%. *(Chiabrera 1985/60)*

Some scientists have noted that the speed of electrons is increased within the DNA helix in response to electromagnetic stimulation. This may play some role in the observed increases in the expression of certain cyto-protective (cell protection) proteins, such as heat shock protein 70 (hsp70), when tissues are placed in biologically active magnetic fields.

Insight into the mechanisms of pulsed electromagnetic field therapies is steadily increasing. Low frequency, low amplitude electromagnetic fields are considered safe and effective with no reported side effects. Tuned to appropriate biological windows these energies have been studied and found to be effective for a wide range of health conditions when conventional approaches have failed. *(Markov 2007/63)* It is important to note that genotoxic effects (e.g., damage to the DNA and RNA) are not observed. *(Chiabrera 1994/64, Garcia-Sagredo 1990/65, D'Agruma 1993/66, Savitz 1990/68)*

Lymphocytes are important immune cells that fight unwanted invaders. When lymphocytes are removed from the body and kept alive in a cell culture they can no longer divide or replicate. However, if a pulsating magnetic field is applied the ability to replicate is restored. *(Whitney 1972/69)* Among lymphocytes drawn from young and old people alike, lymphocytes have been found to proliferate in response to exposure to weak, low frequency magnetic fields. *(Cossarizza 1989/70)* These effects are explained by the increased influx of calcium ions and protein kinase activity we have reviewed earlier. *(Byus 1984/72, Luben 1982/71, Monti 1991/73)*

Observed increases in lymphocyte proliferation in vitro (outside the body) do not permit us to conclude that the immune system is increased by electromagnetic field therapies. The effect within "living" systems is far more complex. However, like all other systems of the body, the immune system is energy dependent. That means that if there are low levels of energy in the body in the form of ATP the immune response is weakened. We know that ATP synthesis is up- regulated by exposure to pulsating magnetic fields. This most assuredly has a positive impact on the robustness of the immune system. Specific clinical examples are given elsewhere in this book.

PHYSIOLOGY

Piezoelectric effect and osteoblast proliferation

Previously one had assumed that the piezoelectric effect on its own was responsible for bone growth. Today, studies with bone cells have shown a direct stimulation with bone cells. To explain: With the help of the piezoelectric effect, one "simulates" the natural load on the bone. The bone receives growth signals that are transmitted to the bone formation cells.

The piezoelectric effect

The word "piezo" is Greek and means "to press" (peizein = press). The prefix is used to describe the electrical charge of crystals or bone substances in response to mechanical pressure.

If we put a compressive load on a bone the pressure is transmitted to the membrane of the bone cells. The result is the development of an electrical current within the bone that causes the bone to strengthen. *(Hayashi 1998/74)* This bone compression effect is generated by muscle tension across long bones with normal muscle contractions, by the Earth's gravitational field, and by pulsating magnetic fields.

Magnetic fields simulate the piezoelectric currents developed in bone by natural movement. *(Dealer 1981/75)* These currents cause cartilage and bone cells to proliferate, be renewed, or be regenerated together with the increase of appropriate messenger substances (cAMP, calcium ions, etc.). It is most impressive to witness the healing of complicated fractures evoked by magnetic fields when other healing approaches, including surgical fixation with screws and plates, have failed.

Bone structure

In order to adequately perform its functions as a skeletal framework, rigid protector of the spinal column and attachment point for muscles, tendons and ligaments, bones must have a great deal of tensile strength, compression strength, and elasticity. In order to fulfill these tasks, the bone consists of a thick, solid outer layer called the cortex, and a spongy interior with tiny rigid crossbeams called trabeculae.

The dual cortical-spongy bone structure is comparable to steel-and-concrete construction. The "steel supports" are equivalent to the cortical bone beams and the collagen fibers used to form them. The "concrete" is the pressure resistant bone minerals (calcium and phosphate) within the spongy bone.

Bone is a dynamic, living tissue. This fact can be lost by the fact that all models of bone are dry. We begin to view bone as a dry, inert substance, like wood. However, in the living body bone is a reservoir of calcium, a factory for producing blood cells, an attachment site for contraction, a hinge-point for joint movement, and even a delicate vibratory sensor, as in the tiny bones of the inner ear – the incus, stapes and malleus.

Bone matrix (or "osteoid") undergoes continuous breakdown and rebuilding. Osteoblasts are bone-forming cells. They incorporate calcium and other minerals into living bone matrix. Osteoblasts build mature bone cells. Osteoclasts remove bone cells. They break down bone substance. Osteoclasts prevent the formation of too much bone. Since bone is a living tissue, it has a "turnover rate." Old cells are replaced with new ones. The osteoblasts and osteoclasts must operate in a balanced fashion for this turnover to occur normally. In healthy bone there is equilibrium between the building forces (osteoblasts) and the breaking down forces (osteoclasts). The bones we have today will have been completely renewed after a few years. Bone turnover is a completely normal, necessary process.

Osteoblasts produce the bone substance. In addition to calcium and phosphate, they also use collagen to give the bone its extraordinary tensile strength. This is contrasted to eggshells which are also made of calcium but which have considerably less strength and more fragility than living bone.

Osteocytes (bone cells) and chondrocytes (cartilage cells) are a significant repository for calcium in the body, and supply this and other minerals for biochemical processes when needed. Chondrocytes are the most prevalent of all cell populations within the bony skeleton. Osteoblasts, osteoclasts and chondrocytes are the primary cells involved in bone growth.

Physical stresses such as compression or shear forces, movements, hormones and enzymes stimulate bone growth and repair. Pulsating magnetic fields represent a profoundly powerful signal for the stimulation of bone growth. In a magnetic field, bone cells lose their sensitivity to the bone-growth inhibiting effects of parathyroid hormone, so osteoblasts are unopposed and unhindered in their bone-building activities. Many studies, including research at the Institut für Strahlenforschung München (Institute for Radiation Research) in Munich, have shown that osteoblasts exposed to a biologically active magnetic field form significantly more Type 1 collagen than unexposed control cells. *(Indouraine 2001/76, Guldner 1999/77, Heermeier 1998/78).*

Type 1 collagen is the main protein in bone and is required in large amounts for bone healing to occur. For example, in the recovery of hip surgery Type 1 collagen is synthesized in amounts five times that of normal, as measured by the presence of collage Type 1-mRNA. The process of bone healing also produces a three-fold increase in the number of chondrocytes. *(DeMattei 2001/79, Sakai 1991/80)*

The Amplitude Window and Bone Healing

When the field strength is relatively high at 7 mT (milliTesla) osteoblasts were stimulated to increase bone production only at the beginning of the experiment. *(Diniz 2002/81)* Later in the study the osteoblast activity decreased. This is a reminder of the importance of the

biological window – and in this case, the amplitude window in exerting consistently positive therapeutic effects. Most beneficial effects occur at very low electromagnetic amplitudes (or "flux densities").

Summary/effect:
Bone production, whether in a person with osteoporosis or a non-healing fracture or having undergone spinal fusion surgery, can be stimulated by pulsating electromagnetic field exposure. Possible mechanisms of action include the piezoelectric effect, which induces an electrical current within bone similar to the current produced by the natural tensile, bending and pressure forces on the bone; by direct stimulation of osteoblasts and chondrocytes; and by the removal of the bone-growth inhibition effect of parathyroid hormone. Other mechanisms have recently been elucidated and are discussed later in this text.

We have touched upon the endorphins earlier. Endorphins are morphine-like neuropeptides produced by the pituitary gland and the hypothalamus during strenuous exercise, excitement, and orgasm, and in response to stress and pain. Endorphin receptors are found within the membrane of every cell in the body. These receptors were discovered by Dr. Candace Pert, who has written extensively about the role of our cells cumulatively in the expression of emotions.

Endorphins were named as a contraction for "endogenous morphine." As the name suggests, endorphins are powerful pain modulators. The reason why morphine works to eliminate pain is because this chemical binds to the same receptors as the chemical we are capable of producing in our brains at birth. The brain is truly nature's best pharmacy, and the natural "runner's high" has been validated. Chiropractic adjustments, acupuncture, massage therapy, prayer and meditation have all been shown to release endorphins in the body.

If mice in a room are shielded from the Earth's magnetic field (a "zero field" experiment), they are much more sensitive to pain than mice that are not shielded from the Earth's normal magnetic field. A controlled experiment that subjected both groups of mice to a pain stimulus showed that a very weak magnetic field strength of 0.5 μT was sufficient to prevent a reaction to pain. It is of interest that the zero-field mice became so intolerant to pain from endorphin depletion that they refused to cross a weak electric fence to reach food. They all died. None of the control mice died – they had enough endorphin to endure the electric fence and continue feeding.

Endorphins are necessary to give us the strength to endure the pain of daily life to "get the food." In the case of severely depressed persons, they seem unable to endure the pain – some are not even able to get out of bed.

The Earth's magnetic field is vital for endorphin production. Or put another way: Without the Earth's magnetic field, man would not be able to tolerate Earth. As Werner Heisenberg, one

of the fathers of quantum physics stated: "Electromagnetism is the essential energy upon which all of life and organisms depend."

Summary / effect:
The natural production of endogenous opiates (endorphins) is directly dependent on the presence of a magnetic field. Additional endorphin synthesis can be triggered using a pulsating magnetic field. This has far reaching consequences for health, vitality, pleasure and mental health, longevity, pain tolerance and athletic competition.

Due to its favorable effects on the aging process, growth hormone hGH (human growth hormone) is earning increasing mindshare with the public. Whether muscle growth, libido or keeping your skin smooth, there seems to be nothing that hGH, which is produced in huge quantities in children and youths, cannot do. It is the fountain of youth.

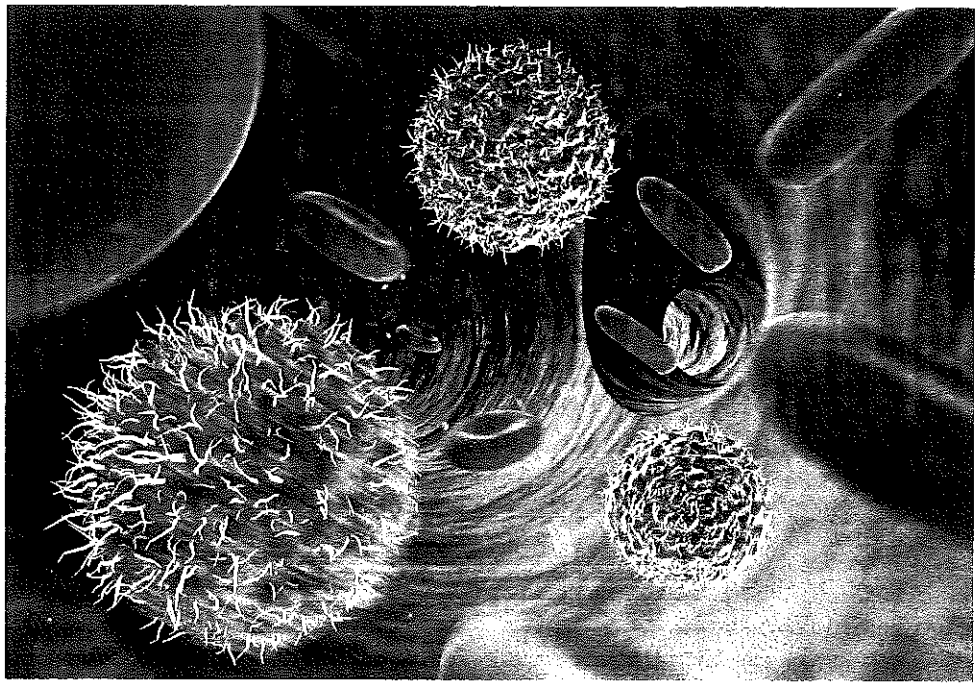
hGH does not work itself. It forms growth factors in the liver, IGF-1 and IGF-2 ("insulin-like growth factor"). Interestingly, IGF-2 is also associated with the activity of osteoblasts.

Electromagnetic fields in the biological window promote the synthesis of IGF-2. *(Fitzsimmons 1989/82, 1992/83, 1995/84)* These fields also promote deep and restful sleep. The greatest release of hGH is between one and two hours after the onset of sleep. The combination of deeply restorative sleep with increased IGF-2 may further promote the availability and actions of hGH. This little-known secret effect of electromagnetic resonance stimulation is still waiting to be discovered by the Anti-Aging-Industry, and perhaps more importantly, the health consumer who would love to tap into their own hGH reserves without the risks, high expense and pain of hGH injections.

Summary / effect:
Growth hormones work via the IGF hormones formed in the liver. Pulsating electromagnetic fields are capable of forming and promoting a specific growth hormone co-factor, IGF-2. Growth hormone is widely used in sports for performance enhancement. This is not without risk of danger and side effect. Natural growth hormone, manufactured in your own brain, is your body's best bet to improve skin, improve libido and sexuality, remain flexible, live more energetically and stave off premature aging.

T cells belong to a group of white blood cells known as lymphocytes. These cells play a central role in "cell mediated immunity." T-Cells are formed in the thymus gland, whence came the letter "T" in "T-cell." T cells can be distinguished from other lymphocyte cell types such as B cells and natural killer cells by the presence of a special receptor on the cell membrane called the T cell receptor (TCR).

Interleukins group of signaling molecules called cytokines that, while first discovered in white blood cells, have been identified as a product of a wide variety of bodily cells, most of



which have a role to play in the immune system. In fact, the function of the immune system depends in large part on interleukins. They play a role in co-stimulation, maturation, proliferation, activation, growth and differentiation of immune cells.

Interleukins (cytokines) are messenger substances of the immune system. For example, IL-1 stimulates the T-and B-lymphocytes. In addition, IL-1 and IL-6 increase the activity of bone and cartilage cells. However, IL-1 is a signal substance for inflammatory processes within the framework of chronic polyarthritis, whereas IL-6 is a messenger substance that is released in large quantities especially in the case of infections.

Studies show that the quantity of certain interleukins in biological systems, namely IL-1 and IL-6, increase following magnetic field exposure. *(Cossarizza 1993/85)* In addition, T-cells also increase in number, and therefore the activity of the phagocytes increase. The result is that a larger number of intruders are destroyed by macrophages – a more robust immune response.

IL-1 activates macrophages and endothelium. In small amounts IL-1 induces an increase in plasma proteins for "acute phase reaction" – a limited, controlled first response to a mild-moderate immune threat. However, in large amounts, IL-1 induces fever, a systemic response to a larger immune threat. IL-1 is found in high amounts in chronic polyarthritis, an autoimmune disease. Magnetic field sessions should not be used in such cases without the direct and knowledgeable supervision of a physician or qualified health care provider.

IL-6 also induces an acute phase reaction. It activates antibody secretion and T cells specifically to combat bacterial infections. Both IL-1 and IL-6 also stimulate the growth of bone and cartilage cells.

Summary / effect:
A pulsating magnetic field generally stimulates the immune system. Specific pre-species immune cell messengers are formed, namely the interleukins. These potentiate a strong immune response, and thus pulsating magnetic fields modulate the function of immune cells via the cytokines.

Prostaglandins are classified technically as hormones, but rarely behave as such. Originally (and erroneously) believed to be a part of prostatic secretions[8] these compounds were later found in almost all the body's tissues and organs. Prostaglandins are substances that influence vascular smooth muscle tone, platelet behavior, pain transmission by spinal nerves, calcium flow, cell growth, intraocular pressure and cell growth.

Prostaglandins are also closely connected to the cascade of chemical reactions that produce inflammation and pain. Contrary to the previous notion that prostaglandins are invariably increased by magnetic field exposure, a number of studies have shown that magnetic fields decrease prostaglandin production. *(Kawczyk-Krupka/86; Lohmann 2000/87; Vasil'eva & Gordeeva/88)* As a result of decreased prostaglandin production inflammation is inhibited and the pain associated with inflammation is reduced. In essence, magnetic fields tuned to the subtle frequencies and amplitudes of health are "anti-inflammatory" in nature – they are "prostaglandin antagonists" like anti-inflammatory medicines such as ibuprofen and other NSAIDs, Celebrex and other COX-2 inhibitors. The inhibition of prostaglandin release also prevents the aggregation of thrombocytes (or platelets). Whereas the prevention of inflammation is a prime factor in the treatment of pain and injury, inhibited platelet aggregation (anti-coagulation) improves the flow of blood in a way similar to acetylsalicylic acid (Aspirin®).

Nerve growth factors, or "neurotrophins," are small proteins that are important to the survival and differentiation of neurons (nerve cells) in the sympathetic and sensory nervous systems. The sympathetic nervous system is responsible for the "fight, flight or fright" mechanisms noted elsewhere in this book. The sensory nervous system delivers information about the environment to the brain for processing.

Studies have shown that after a nerve has been injured, electromagnetic fields of appropriate frequency and strength can speed up the healing of the severed or crushed nerve by 22-100%. *(Zhang 2005/95; Raji 1984/89; Sisken 1989/90; Longo 1999/91; Walker 1994/92;*

[8] Hence the name "prostaglandin." The prostaglandins found in the prostate gland were actually produced by the seminal vesicles and not the prostate gland.

Ito & Bassett 1983/93; Zienowicz 1991/94) The mechanism of action is not well understood. However, we do know that in order to be active NGF must bind to 2 types of receptors on the cell membrane surface in order to help nerve cells survive and repair.

It is postulated that the way electromagnetic fields work to repair nerves is by hastening the binding of 2 active receptors to NGF. Electromagnetic field exposure results in lowered levels of NGF. This is because the binding of NGF with these nerve cell receptors has increased, and less free NGF is available to be measured. In other words, lower levels of NGF mean increased nerve cell support, repair and growth.

Summary / effect:
Pulsating magnetic fields promote the growth of damaged nerves after traumatic injury, whiplash, sports injury, and surgeries. One important mechanism for this is the modulation of the binding of nerve growth factor (NGF) on receptor proteins on the surface of nerve cells.

Yawning and feeling the need to stretch are not the result of a lack of oxygen as is widely believed. Rather, yawning and stretching are due to the action of a tiny messenger substance in the brain called dopamine. This was proven by research with patients who have Parkinson's disease.[9] The disease eliminates yawning and stretching behavior entirely. *(Sandyk 1999a/96)* Dr. Sandyk demonstrated that dopamine receptors are stimulated under the influence of pulsed electromagnetic fields. Yawning and stretching behavior was restored by the co-operative action of these fields with dopamine.

Dopamine is a hormone and a neurotransmitter produced in several areas of the brain, including the substantia nigra and the ventral tegmental area. When acting as a neurohormone, it is secreted by the hypothalamus, inhibiting the release of prolactin from the anterior lobe of the pituitary gland. When used as a medicine, dopamine acts on the sympathetic nervous system, increasing heart rate and blood pressure.

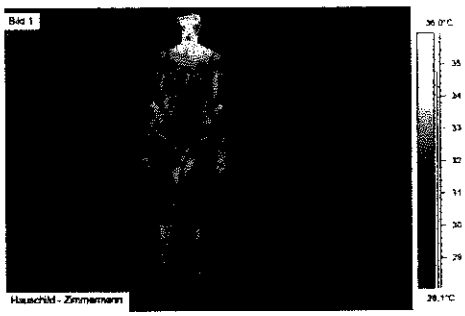
Dopamine receptors are stimulated under the influence of a magnetic field. As a powerful neurotransmitter acting on the sympathetic nervous system dopamine helps control libido and human sexual response. Patients with Parkinson's disease suffer from a diminished sexual life for this reason. When treated with pulsating magnetic fields male subjects with Parkinson's disease experienced a re-awakening of their sexuality and the improvement of erectile dysfunction. *(Sandyk 1999b/97)* Additionally, freezing gait ("akinesia") noted in Parkinson's patients was reversed by magnetic field therapy. *(Sandyk 1996b/98)*

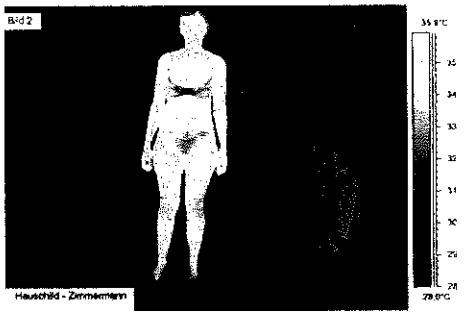
9 The symptoms of Parkinson's disease result in the loss of pigmented dopamine-secreting cells in the pars compacta region of the substantia nigra in the brain. The lack of dopamine results in increased inhibition of the ventral anterior nucleus of the thalamus, which sends excitatory projections to the motor cortex, thus leading to hypokinesia. Since pharmaceutical dopamine cannot cross the blood brain barrier to act directly on the central nervous system, dopamine is provided to patients with Parkinson's disease as L-Dopa, a precursor to dopamine that can cross the blood brain barrier.

Author's note: Clinical experience has also shown the restoration of libido and sexual response in men and women who do not have Parkinson's disease but who report loss of libido for various other reasons, including advancing age and adverse drug interaction, or for unknown reasons. This may be attributable to the stimulation of nitric oxide release by the MRS 2000+ designo® Systems used with these patients.

Summary / effect:
Pulsating magnetic fields stimulate the receptors for dopamine. This is especially important for Parkinson patients because dopamine levels are depleted as a direct result of this disease. In addition to the positive effects on libido in Parkinson patients, improvements in movement, gait, and the restoration of dopamine-dependent behaviors such as yawning and stretching have also been documented.

Infrared thermography is an imaging technique that demonstrates surface body temperature. This is a direct indicator of blood circulation to all areas of the body. Thermographic imaging demonstrates the increase in circulation following magnetic resonance stimulation. Animal studies have shown improved vasodilation and improved bloodflow through the vessels of the brain as well as a generalized increase in blood flow. *(Wang 2002/99; Gmitrov 2002/100)* These particular studies support the theory that increased calcium-calmodulin activity in the endothelial cells of the blood vessel walls stimulates the release of nitric oxide (aka nitrogen monoxide). Studies on bone proliferation have proven that nitric oxide synthesis is increased by exposure to pulsating magnetic fields. *(Diniz 2002/102)*





Nitric oxide has gained a reputation over the past several years as a biological wonder and perhaps the most important messenger substance in all organ systems of the body. It is fundamental in the field of neuroscience, physiology and immunology. Nitric oxide was proclaimed "molecule of the year" in 1992. *(Culotta et al 1992/103)* Nitric oxide, one of the few known gaseous signaling molecules and a free radical, is highly reactive, having a lifetime of a few seconds. It is formed in the cells in the endothelial lining (inner lining) of blood and lymph vessels and is known as the "endothelium-derived relaxing factor" (EDRF).

It signals the surrounding smooth muscle to relax, thus resulting in vasodilation (increase diameter of the blood vessel) and increasing blood flow. Increasing blood flow means improved circulation and oxygen delivery to the tissues.

Nitroglycerin and amyl nitrate serve as vasodilators because they are converted to nitric oxide in the body. The production of nitric oxide is elevated in people who live at high altitudes, helping them ovoid hypoxia. Viagra (sildenafil) stimulates blood flow to the penis by signaling the nitric oxide pathway.

Nitric oxide should not be confused with nitrous oxide, a general anesthetic used in dentistry, and a greenhouse gas.

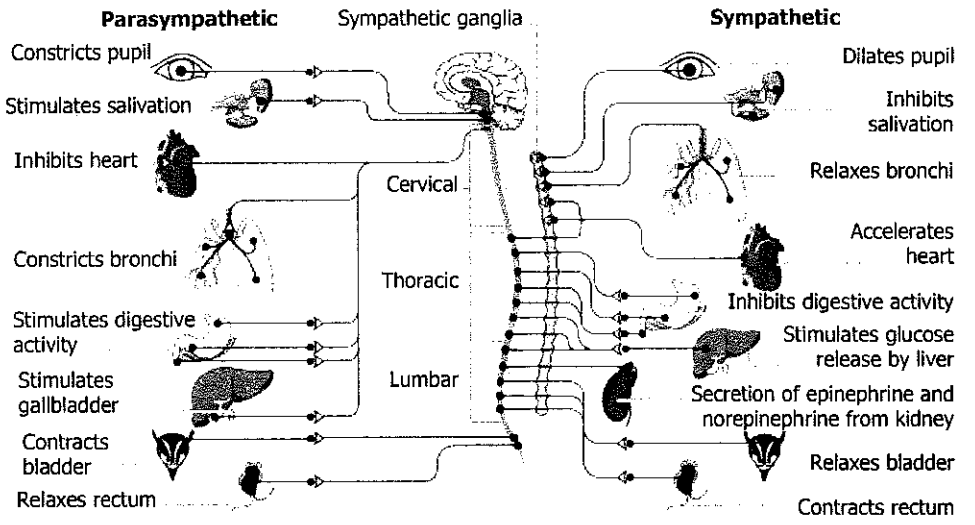
Appropriate levels of nitric oxide production are important in protecting organs such as the liver from damage due to lack of oxygen. It is also a powerful weapon used by macrophages and neutrophils to destroy bacteria as part of the human immune response.

A comprehensive literature review on the effects of magnetic fields on blood flow and blood vessels in the microvasculature, including mechanisms involving nitric oxide release, has recently been published. The preponderance of articles reviewed indicate that magnetic field exposures result in an increase in blood perfusion and oxygen delivery. *(McKay 2007/101)*

Summary / effect:
Pulsating magnetic fields cause the smooth muscle lining of blood vessel walls to relax, producing vasodilation and therefore increased blood circulation in tissue. This has profound therapeutic implications where insufficient tissue oxygen begins to damage health. While hyperbaric chambers are now used with widening popularity for health, wellness, and accelerated healing, the cost and expense of owning such devices is prohibitive for most people. Advanced magnetic resonance stimulation systems such as the MRS 2000 are affordable and a powerful way to improve circulation and oxygen delivery in the home.

Studies show that magnetic fields influence cell activity, blood flow and the autonomic nervous system. *(Grote 2007/107)* The autonomic (vegetative) nervous system is responsible for the inborn "fight, flight and fright" responses. It governs nearly all organ functions independent of conscious control. For example, breathing is something that happens automatically – we don't breathe "on purpose." The autonomic nervous system regulates this process.

The autonomic nervous system is comprised of two parts: the sympathetic nervous system and the parasympathetic nervous system. Stressful situations such as the pressure to perform well, sudden physical trauma, or a "black bear in the kitchen" (yes, this happens in mountain communities in Colorado!) activate the sympathetic nervous system. Adrenaline is released and blood is directed away from the abdomen and digestive organs to the muscles for rapid, massive action for "fight or flight." These are natural responses and aid in our survival. This is "normal" stress. In contrast, the parasympathetic nervous system is responsible for "rest and digest" functions such as relaxation and the assimilation of nutrients following a meal.



Stress research indicates that a large proportion of chronic, degenerative illnesses (and especially cardiovascular diseases and cancer) are associated with a sustained excessive stress response called vagotonia. Some European literature refers to this response as autonomic "regulation rigidity," meaning that the sympathetic nervous system is locked in to a vicious cycle of hyperactivity.[10] Researchers have found that vagotonia/regulation rigidity is closely connected to the development of cancer, cardiovascular disease, and other chronic, degenerative diseases. Health care systems that seek to treat these illnesses effectively must acknowledge this root cause. The identification and elimination of pre-pathological states in the body is the foundation of functional medicine, prevention, wellness care and anti-aging medicine. Chronic degenerative diseases are the bane of modern cultures, and excessive stress is the pre-pathological state that is the common denominator to many of them. We must address excessive biological stress specifically and fundamentally. Treatment of the autonomic nervous system must be proactive, well targeted and intentional. Magnetic resonance stimulation can accomplish these objectives. As an example of research that

10 Sympathetic nervous system activation causes adrenaline to be released into the bloodstream by the adrenal glands. This evokes the "fight or" response and the expenditure of calories and a burst of increased heart and skeletal muscle contraction, heart rate and respirations in response to the threat that activated the system. There is no off-switch for this reflex system. If the adrenaline is not consistently metabolized sufficiently with repeated threats, sympathetic overload will develop. The overactive sympathetic nervous system and increase in circulating adrenaline leads to excessive stress. The autonomic nervous system, in consequence, is unable to function normally due to the inhibitory dominance of the sympathetic nervous system.

points us in this direction, in one clinical study workers with hypertension improved autonomic balance through the use of low frequency magnetic therapy. *(Drobyshev 2002/108)*

Because of the pervasive, interconnected influences of the autonomic nervous system throughout the body, local applications of magnetic field therapy have systemic results. For example, a person suffering from generalized osteoporosis may undergo localized exposure to a therapeutic magnetic field to one arm. Experiments show that the bone density of both the treated and the untreated arm will increase. *(Tabrah 1990/104)* In a similar fashion, treating a headache does not require that the magnetic fields be applied to the head. It may be sufficient to treat the entire body (and thus the entire autonomic nervous system) leaving out the head. While the exact mechanism is unknown, pulsating magnetic fields have been observed to activate and rebalance the autonomic nervous system. *(Kravtsova 2000/105; Nikulin 1989/106)* In essence, autonomic functions "re-set." Excessive or dominant sympathetic or parasympathetic functioning is counterbalanced and natural fluctuations/oscillations between these systems is restored. Scientists note that since therapeutic magnetic fields enhance autonomic nervous system function and balance, the entire body should regularly and consistently be exposed. *(Anan'in 2001)*

Summary / effect:

The autonomic nervous system is a "central control system" which has considerable influence on all organ and metabolic functions. A chronically unbalanced autonomic nervous system frequently develops into "regulation rigidity," a biological environment that is conducive to the development of chronic illnesses, or perhaps is the cause of them. Permanent, uncorrected autonomic imbalance, such as in a chronic excessive stress reaction, is a hallmark in the process of developing regulation rigidity. Pulsating magnetic fields can positively influence illnesses that are connected directly or indirectly to chronic maladaptive stress reaction. The maintenance of healthy autonomic balance may prevent chronic degenerative illnesses from developing. Examples of these conditions include include hypertension (high blood pressure), atherosclerosis, arthritis and at least some forms of cancer.

THE SCIENTIFIC BASIS FOR THE USE OF PULSED ELECTROMAGNETIC FIELDS TO MAXIMIZE HEALTH

Studies outside of living organisms (e.g., in the laboratory, petri dishes and test tubes) are called in vitro studies. They give us strong clues regarding the biological effects of magnetic fields. However, in vitro studies are not sufficient to prove a biological effect. In other words, these studies don't prove that magnetic fields work the same way in the human body. In contrast to in vitro studies, in vivo ("in life") studies must be conducted and published.

There are thousands of published reports on the successful use of electromagnetic fields for a wide variety of illnesses and ailments. However, the quality of these studies is often poor. Before we go too far poking an unwarranted number of holes in this new field of medicine we must realize that pulsed electromagnetic field therapy is just that – a new field in medicine and wellness. By virtue of this fact, many or most of the studies available will be preliminary in nature. With the passage of time and repeat study, preliminary findings will be replicated and documented biological effects will become predictable certainties. Let us remember that this is a new science, and thank basic science and clinical researchers for providing the evidence we have available so far.

Having said that we must acknowledge that our knowledge base is incomplete. There is "user bias" introduced by the various companies who manufacture and market magnetic field therapy devices. The best type of study to reliably determine a true therapeutic effect is called a "randomized controlled clinical trial," or "RCT." Here are some useful definitions:

Randomized: This refers to how the subjects participating in the study are assigned to the study group, the sham group or the control group. In a randomized clinical trial, all subjects are assigned to the different groups by chance and chance alone.

Controlled: In such studies there is always a control group – a group of subjects who do not receive any treatment at all and serve as "controls." The control group consists of a population of subjects who are identical, on average, to the "treatment group" and the "sham treatment group."

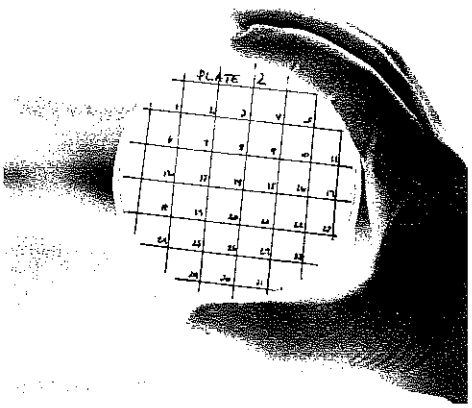
Double-blinded: An RCT is, by definition, an experiment conducted with two equal, concurrent conditions. First, a double-blind exists when the researchers themselves do not know which subjects are receiving the "real" treatment under study (the treatment group), and which subjects are receiving a "sham" treatment (placebo or sham treatment group). The second condition that must be met is that the subjects participating in the study do not know whether they are receiving the "real" treatment or the "sham" treatment. Both researchers and subjects must be blinded from the knowledge of real versus sham treatment in order for the study be considered a double-blinded study.

Placebo effect: The placebo effect is an effect produced solely as the result of an expectation that a particular treatment will work, when in fact the particular treatment is not

given – a sham (or "fake") treatment is given instead. The opposite of the placebo effect is the "nocebo" effect, where a study participant (or researcher) has a strong expectation that a particular treatment will NOT work.

The placebo effect can be a reflection of the patient's faith, confidence and belief that a particular treatment will work. For example, some cancer patients who are included in the sham treatment group for a chemotherapeutic agent will lose all their hair, even though the chemotherapeutic agent is normal dextrose solution rather than a drug. It was their belief that they were receiving the therapy that caused them to lose their hair. Likewise, a placebo effect may be a reflection of the doctor's faith, confidence and belief that a particular treatment will work. The more confidence a doctor has in a particular treatment, the higher the placebo rates of improvement attributable to the physician. This rate can be as high as 60%. A placebo is a sham medication or sham treatment. For example, if a doctor is convinced of the effect of a treatment – even though it is evident that the pill given contains a substance which is not effective – then up to 30% of the patients report their complaints have been relieved, or disappear altogether. The more strongly and self-confidently the doctor describes the probable effect, the higher the "placebo rates;" sometimes they can be as high as 60%.[11]

A full knowledge of the important components of randomized controlled clinical trials allows us to understand and identify important sources of error when we read published studies on the efficacy of magnetic field therapy. For example, study participants may not be truly randomized. More responsive subjects may be "cherry picked" for inclusion in the experimental treatment group. Researchers may not be blinded with regard to those of subjects receiving the experimental treatment. Participants who do not respond to the treatment being studied may simply be excluded from the final data set in order to improve the statistical results. There may not be a true control group, as subjects may have been allowed other treatments during the course of the study. These and other factors must be considered as we read the clinical literature pertaining to the efficacy of pulsating magnetic fields in the improvement of human health.



The beauty of pulsating magnetic fields is that no known sensory apparatus of the human body can perceive them.[12] As a result, pulsating magnetic fields are easily studied in a randomized controlled clinical

11 Online Pressearchiv Jochen Kubitschek www.online-hausarzt.de

12 While some claim to have the ability, it has not been proven that people can distinguish between the presence or absence of a weak pulsating magnetic field.

trial because the sham treatment is simply created by unplugging the electromagnetic coil from its source of electricity, and hiding this fact from the subject. The test subject is not asked to consider what treatment group they are in ("real" or "sham"). Reliable physiological parameters and outcome measures are used to determine whether a change has occurred in the "real" treatment group and whether such changes are statistically meaningful and different from changes observed, if any, in the control or sham groups. Thus, an RCT provides strong evidence for a true treatment effect, outside an effect expected by chance, that results from the true experimental treatment being evaluated.

What follows is a review of the literature regarding certain areas of application of pulsating electromagnetic fields for human health and wellness. This is not an exhaustive discussion as there are literally thousands upon thousands of journal articles addressing this topic, many of which are in the English language, many of which are not, and only a subset of which are accessible using journal article search engines. Among the thousands of studies evaluated, we routinely found negative results that seemed to contradict positive reports. However, closer inspection revealed that a large percentage of these negative results coincided with frequencies and intensities of electromagnetic impulse that fall outside the natural biological windows as we presently understand them. The amplitude may be too high, even by an order of magnitude exceeding 1000, 100,000, or 1 million. The frequency window may have been exceeded by similar orders of magnitude. And finally, the timing window may have been violated – treatments may have been carried out extensively with electromagnetic stimulation for 8 to 24 hours continuously. The inquisitive reader is encouraged to delve deeper into the biomedical literature, and to look for these subtleties in reports that concluded negative treatment response (or no treatment response) where other studies on the same topic report a strongly positive treatment response.

An example of the importance of understanding biological windows can be illustrated by considering the timing window as it applies to activation of the cell membrane. Cells fatigue to electromagnetic impulse stimulation when those impulses are non-varying, at fixed frequencies, amplitudes or treatment durations. Cells may become accustomed to electromagnetic stimulation due to the expenditure of messenger substance cAMP or calcium ion for a given treatment duration. This is why static magnetic fields do not work as well or as lastingly as time-varying, pulsating electromagnetic fields. Again, the known biological windows must be understood and taken into consideration as you determine which of the reported scientific findings you choose to accept, and which findings you will reject.

AREAS OF APPLICATION - A LITERATURE REVIEW

The areas of application described below are based on known physiological mechanisms from basic science research, and backed up by randomized, controlled evidence wherever possible. Clinical studies cited usually show unambiguous effects.

1. Treatment of bones not healing (nonunion) fractures, spine fusions and non-healing wounds.

General information:
Prior to 1993, 250,000 patients in the United States had been treated successfully for bone and wound healing disorders using pulsating magnetic fields. In the USA medical applications of pulsating magnetic field therapy occupy a small sector in orthopedic medicine and endocrinology that deals with bone healing, improving spinal fusion rates, and the healing of ulcers from diabetes, venous stasis, and pressure sores in bed-ridden or wheelchair-ridden people. Pulsating magnetic fields are FDA registered (since 1979) and are marketed to the orthopedic profession in the United States as "a bone stimulators."[13]

A review of pulsating electromagnetic field (PEMF) therapy studies published in 2000 stated that, in the case of bone healing disorders, PEMFs are a "proven treatment with the potential for use for arthritis, bony necrosis, osteoporosis and wound healing disorders." *(Trock 2000/109)*

Osteoporosis
According to the National Osteoporosis Foundation, about 85-90% of adult bone mass is acquired by age 18 in girls and age 20 in boys. Building strong bones during childhood can help prevent osteoporosis later in life. Based on the quality of the American diet, osteoporosis will predictably increase in the coming years. Of the 10 million Americans with osteoporosis, 8 million are women and 2 million are men. Costs associated with the treatment of osteoporosis are expected to increase from $19 billion in 2005 to over $25 billion by 2025. There has been a fivefold increase in office visits for osteoporosis (from 1.3-6.3 million) in the past 10 years.

[13] In contrast to the German law governing medical products that only requires that the quality of a technical medical device be proven, the American FDA (Food and Drug Administration) explicity demands proof of the clinical effectiveness of a device as well.

Osteoporosis is diagnosed by using dual energy x-ray absorptiometry (DXA) to measure bone mineral density (BMD). Medicare currently reimburses for BMD testing every two years.

Scientific literature on PEMFs and osteoporosis:
The non-dominant forearms of 20 osteoporosis-prone women were exposed to magnetic fields for 12 weeks. Pre- and post-treatment bone mineral density was measured using single-photon densitometry. Result: Significant and immediate increase in bone density during the 12-week treatment period." Cross-over" increases in bone density were also noted in the opposite, untreated arm. At 36 weeks (24 weeks after treatment ceased), the density of the bone began to decrease slightly. *(Tabrah 1990)* An 8-year follow-up measurement of the same group of women showed maintenance of the increased bone density over time. *(Tabrah 1998/110)*

Another study examined the effect of PEMFs on bone formation and disuse osteoporosis sustained during limb lengthening in a double-blind study. Seven males and six females were randomly allocated to receive either an active or an inactive PEMF coil. Result: Stimulation with PEMFs was shown to prevent bone loss adjacent to the distraction gap following limb-lengthening surgery. Bone loss in the sham treatment group was 54%, but in the active treatment group, only 10% at 12 months post-surgery. *(Eyres 1996/115)*

Fractures
In a published review of the literature, Gossling found 44 studies on PEMF for tibial fractures alone. *(Gossling 1992/114)* The healing rate for ununited tibial fractures with magnetic field therapy was 81% compared to 82% with surgery. After multiple failed surgeries, the success rate of PEMF is reported to be greater than with surgery. The relative success rate of PEMF vs. surgery increases with additional numbers of prior surgeries. In infected non-unions, PEMF was 81% successful whereas surgery was 69% successful. In open fractures, surgical healing exceeded PEMF (89% vs. 78%), whereas in closed injuries PEMF exceeded surgery (85% vs. 79%).

Fracture nonunion
Fractures that do not heal or only heal partially are called fracture nonunions. The incidence of tibial nonunion is estimated to range from 2-10% of all tibial fractures. The incidence is greatest with high-energy injuries and with open fractures. Nonunion fractures are also common among the elderly. Non-union rates for cervical spine fractures range between 5% and 100%, depending on the type and location of the fracture. *(Howard & Simpson, 1994/116)*

Post-surgical bone healing
In a study of the healing of bones post-operatively their was a twofold increase in bone callus formation in PEMF-treated fibulae (fibula bones). In addition, there was an increased quantity of new woven bone and increased bone stiffness as well. It was concluded that PEMF treatment improved osteotomy repair. Interestingly, these beneficial effects were not observed when a different PEMF waveform was used. This is additional proof that biological windows exist and that they are important when using PEMF therapy. *(Midura 2005/111)*

Spine pain and spine surgery
Spine surgery is becoming more and more prevalent in North America. Surveys conducted by the North American Spine Society have clearly indicated that most spine surgeons

themselves believe that too many spine surgeries are performed on this continent. The necessity for surgery seems to be obscured by the desire of the surgeon to practice using his advanced technical skills and new fusion materials, as well as the ever-present profit motive of the surgeon and the spine surgery industry. Often the most dismal outcome of a spine fusion surgery is when the bones fail to fuse, meaning that the spine remains unstable and the neurological tissues remain subject to excessive mechanical stresses. Bone stimulators, a form of pulsed magnetic field therapy, are becoming increasingly more commonplace in the management of post-operative spinal fusions, particularly in patients who are at higher risk of non-fusion, including those who smoke and are on certain medications. The difficulty with these bone stimulators is, however, that they are programmed to stop working after a given number of usage hours. A device costing $5-10,000 may work for a total of 10 months and then, essentially, self-destruct (de-program) and become useless.

Analyzing the industry as a whole it must be remembered, "Doctors do what they know." A surgeon who is confronted with a non-fusion patient is highly incentivized financially to perform another operation. As reimbursement rates for surgery decline and the risks of reoperation become more widely known more patients will be seeking nonsurgical alternatives to remediate their poor surgical outcome. The use of pulsating magnetic fields/magnetic resonance stimulation may prove to be useful, and perhaps even life changing, for many of these patients. The scientific literature supports PEMF therapy in post-fusion patients to accelerate fusion rates, and in non-fusion patients as well to produce a successful fusion.

Scientific literature on accelerated fracture healing, nonunion fracture healing, post-surgical bone healing and accelerated spinal fusion rates following spine surgery:
Thirty-five of 44 nonunited scaphoid fractures that were at least six months old (but with an average age of 40 months) healed in a mean time of 4.3 months after initiating PEMF therapy. The success rate for healing of non-healing scaphoid fractures with avascular necrosis was 80%. *(Frykman 1986/112)* In a longer-term follow-up, the same author and a colleague, both hand surgeons, downgraded the overall success rate by 11% by including 10 more patients in the study. These authors noted the effectiveness of PEMF therapy but, predictably, used the updated study to advocate for bone-graft surgery instead. In patients where originally reported healing of the bone had decreased, it was noted that PEMF therapy had been discontinued. *(Adams/113 & Frykman 1992)*

Using New Zealand White rabbits, osteotomies treated with PEMF for 60 minutes had significantly higher torsional strength than did sham controls at fourteen and twenty-one days postoperatively. Osteotomies treated with PEMF for 30 minutes were significantly stronger than sham controls only after twenty-one days but not 14 days. Normal intact torsional strength was achieved by fourteen days in the sixty-minute PEMF group, by twenty-one days in the thirty-minute PEMF group, and by twenty-eight days in the sham controls. In this animal model, it was concluded that low-frequency, low-amplitude PEMF significantly accelerated callus formation and osteotomy healing in a dose-dependent manner. *(Fredericks 2000/117)*

Acceleration of preliminary ossification by PEMF was noted following tibial osteotomy in rats. *(Ottani 1991/118)*

In a series of 64 consecutive patients undergoing hindfoot arthrodesis (bone fusion at the subtalar and/or calcaneocuboid joints in the ankle) pulsed electromagnetic fields significantly increased the rate and speed of union (5 weeks faster to fusion in subtalar joint and 4 weeks faster for the calcaneocuboid joint). *(Dhawan 2004/121)*

Ninety-one patients with congenital (fractures identified at birth) pseudarthrosis of the tibia treated with PEMF were analyzed. The authors concluded that episodic use of PEMFs were effective in controlling stress fractures until puberty was reached. Eighty-eight percent (88%) of Type I lesions healed, 80% of Type II lesions healed, and 19% of Type III lesions healed. The authors noted that there are no known risks associated with PEMF treatment. Magnetic field therapy was considered effective in the management of this therapeutically challenging population of patients. *(Bassett 1991/122)*

Nine delayed unions and nonunion of the proximal fifth metatarsal were treated with PEMF. By adding magnetic field therapy these fractures healed in two to four months, with an average healing time of three months. The study included a 39-month follow-up and no re-fractures were noted. Pulsating electromagnetic fields were found to be an effective alternative for the treatment of delayed unions and nonunion of the proximal fifth metatarsal. *(Holmes 1994/123)*

In a retrospective study of 61 randomly selected patients who underwent lumbar fusion surgeries for herniated discs in the low back, fusion succeeded in 97.6% of the PEMF treatment group body and only 52.6% of the unstimulated group ($P < .001$). The author concluded that PEMF stimulation enhances bony bridging in lumbar spinal fusions. *(Marks 2000/125)*

A randomized double-blind prospective study was conducted to determine the efficacy of pulsed electromagnetic fields for a lumbar interbody fusions. Ninety-eight (98) subjects were assigned to the active treatment group, and 97 subjects to the placebo group. The active group, treated with PEMF therapy, experienced a 92% fusion success rate while the control group had a 65% success rate. This study concluded that PEMF stimulation of bone graft material used in spinal fusions is effective. *(Mooney 1990/126)*

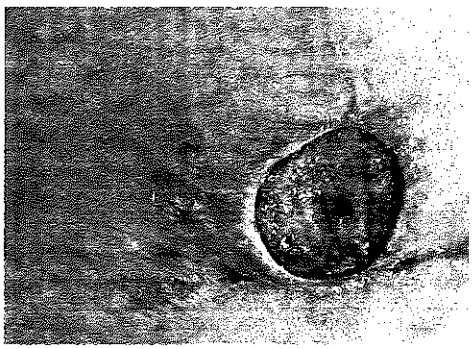
In the first randomized controlled clinical trial analyzing the effects of PEMF stimulation on cervical spine fusion, PEMF stimulation significantly improved the fusion rate at 6 months postoperatively in patients undergoing neck fusion surgery (ACDF with an allograft and an anterior cervical plate). There were no differences in the incidence of adverse events in the two groups, indicating that the use of PEMF stimulation is safe in this clinical setting. This study clearly demonstrates that PEMF accelerates bone fusion after neck surgery. *(Foley 2008/119)*

Mackenzie et al showed that PEMF stimulation was able to produce healing following nonunion of a 1-year old failed cervical fusion surgery in an adult. The patient remained symptom-free at 13-month follow-up after conclusion of PEMF therapy. The authors proposed PEMF therapy as a viable, non-invasive alternative to repeat surgical intervention in selected patients. *(Mackenzie 2004/120)*

Forty-eight (48) high-risk patients were treated with pulsed electromagnetic field stimulation following posterolateral lumbar fusion (PLIF) surgery with instrumentation. An independent radiographic assessment demonstrated a fusion success rate of 97.9%, and 59% of patients successfully returned to work. *(Bose 2001/124)*

Chronic wounds (decubitus, diabetic ulcers of the lower leg, etc.)

Pulsed magnetic fields accelerate skin wound healing in rats. *(Strauch 2007/127; Matic 2008/128)* They accelerate skin wound closure in diabetic mice and prevent tissue necrosis by stimulating angiogenesis (new blood vessel formation). *(Callaghan 2008/129)* Rectangle pulsed electrical current stimulation accelerates epithelial cell proliferation. *(Cheng 2006/131)*



Wound healing is an exciting area of clinical investigation, and energy medicine using pulsed electromagnetic fields will prove to be valuable tools for an aging population and a growing percentage of diabetics among us.

Scientific literature on wound healing (including burns) and ulcer healing:

A prospective, randomized, double blind, placebo-controlled multicenter study assessed the clinical efficacy and safety of pulsed electromagnetic limb ulcer therapy in the healing of recalcitrant, predominately venous leg ulcers. After 8 weeks of magnetic field treatment, there were significant advantages in terms of depth and size of wound, pain and granulation at the base of the ulcer compared to the untreated group. Investigators' global evaluations indicated that 50% of the ulcers in the active group were markedly improved versus 0% in the placebo group. In addition, 0% of the active treatment group worsened versus 54% of the placebo group. *(Stiller 1992/132)*

Researchers observed the response of 77 hand burn patients to treatment with low frequency magnetic fields. They discovered that treatment with PEMFs resulted in the inhibition of microbial flora of burn wounds, made the staphylococci and blue pus bacilli more susceptible to antibiotic attack, accelerated the healing of superficial burns, and better prepared tissue exposed to deep burns for autodermoplasty. The authors recommend the use of magneto therapy in the complex treatment of burned hands. *(Gaiduk 1985/130)*

Seventy-two (72) diabetics with leg ulcers were treated with magnetic field therapy. Ulcerous lesions resolved faster in 58% in the treatment group vs. standard diabetic wound therapy consisting of necrolysis (dissolution of dead tissue). In magnetic field treated subjects re-epithelialization (covering with skin) occurred more quickly. *(Kuliev 1992/133)*

Electromagnetic fields were compared to conventional treatment for 20 elderly patients with chronic conditions and varying long-standing pressure ulcers. Significant healing of these

decubitus ulcers only occurred if the patients underwent treatment with magnetic fields (100% very good to excellent healing in treatment group vs. 100% none to poor healing in conventional treatment group. *(Comorosan 1993/134)*

Standard intravenous injections with chemotherapeutic agents were erroneously administered in 400 patients (200 of them children). Local complications and general wound pathologies resulted, including adhesion-related intestinal obstruction. The treatment of these wounds included a comparison of standard medication to magnetic field therapy. Magnetic therapy proved highly effective: the wounds healing 3-3 ½ times faster with this treatment. The entire treatment duration was 2-3 times shorter among the magnetic field therapy treated patients. Interestingly, clinically verified partial adhesion-related intestinal obstruction was eliminated by the magnetic field therapy in 18 children after combined treatment for lymphosarcoma involving the ileum. *(Kiselev 2000/135)*

Headaches and migraine

In the United States, nearly 18% of women and 6% of men one or more migraine headaches per year. Most migraine headaches affect people between the ages of 35 and 45 years. The prevalence of migraine headache is 60% higher in lower income groups. Nearly 4 million American women and 1.5 million American men suffer at least one debilitating migraine headache per month. *(Steward 1992/136)* Episodic tension-type headaches affect 47% of American women and 42% of American men. *(Schwartz 1998/138)*

In Canada, the prevalence of migraine headache peeks at 40-44 years, and declines thereafter. In 1994 it was estimated that 2.6 million Canadian women (24.9%) and 0.8 million Canadian men (7.8%) suffered with recurrent migraine headaches. In Canada no relationship was found between lower household income and migraine headache. Approximately 66% of Canadian females and 76% of Canadian males suffer with tension headaches. *(O'Brien 1994/137)*

In Germany, approximately 10-15% of the adult population suffers from migraine headaches and 20-30% suffer from tension headaches at least once a month. Half of those suffering from migraine have an attack once a month; every 10th person has four or more attacks per month. Half of the female and a third of the male migraine sufferers cannot go to work 6 days per year. In 3% of the patients suffering from tension headaches, these complaints are chronic rather than episodic. By definition, these patients suffer from headaches 180 days per year or more.

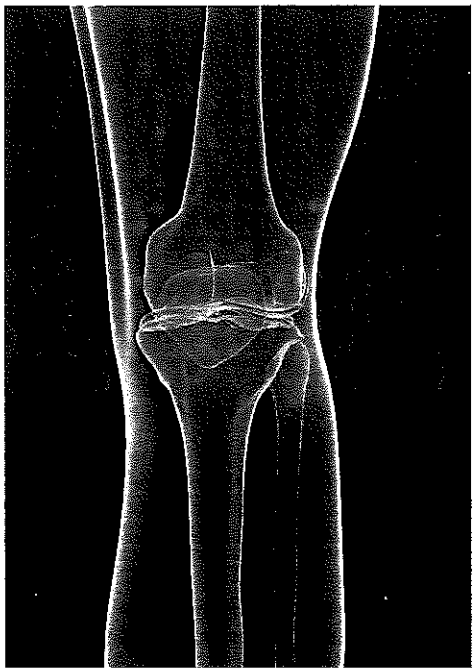
According to one study, approximately half the people suffering from migraine headaches are not receiving medical treatment. For those suffering with tension headaches 83% are not receiving medical treatment. It would appear that these people are averse to medicine and/or feel that their medical doctor cannot help them effectively.

Scientific literature on headaches and migraine:
Two studies were conducted during which 23 patients with chronic migraine were exposed to pulsing electromagnetic yields over the inner thigh. In an open study, 11 subjects kept a two-week headache log before and after 2-3 weeks of exposure to PEMFs one hour per day, five days per week. The number of headaches per week decreased from 4.03 during the baseline period to 0.43 during the initial two-week follow-up period, and to 0.14 during the extended follow-up, which averaged 8.1 months. In a double-blind study, nine subjects kept a three-week log of headache activity and were randomly assigned to receive two weeks of real or placebo pulsing electromagnetic exposures as in the open study. The six subjects exposed to real PEMF therapy showed a reduction in headache activity from 3.32 headaches per week to 0.58 headaches per week. *(Sherman 1998/139)*

A double-blind, placebo-controlled study assessed the efficacy of four weeks of impulse magnetic field therapy (16 Hz, 5 microT) for different types of headache and migraine. 82 patients were randomly assigned to receive either active treatment or placebo (n = 41 each) and were characterized according to one of seven headache diagnoses. Data for 77 patients were analyzed. Seventy-six percent (76%) of active treatment patients experienced clear to very clear relief of their complaints compared to only one placebo patient reporting some relief with the remaining placebo patients reporting slight relief or significant worsening of symptoms. *(Pelka 2001/140)* The location of application of magnetic field therapy in this study was the thigh, not the head. This supports the generalized autonomic control mechanisms presented earlier in this text.

Osteoarthritis is a type of arthritis that is caused by a breakdown and the eventual loss of the cartilage of one or more joints. Also known as degenerative arthritis, this is the most common form of arthritis, affecting over 20 million people in the United States alone. All races are equally affected. This disorder commonly affects the hands, feet, spine and the large, weight-bearing joints such as the hips and knees. Most cases of osteoarthritis have no known cause other than "wear and tear" and the aging process. With aging, the water content of cartilage diminishes. As a result, the surface of the cartilage begins to degenerate by flaking or forming tiny crevices. In advanced cases there is a total loss of the cartilage cushion between the bones that comprise the joint. Loss of the cartilage cushion causes friction between the bones and a tightening up of the joint capsule, leading to limitation of joint mobility. Inflammation of the cartilage stimulates new bony outgrowths called spurs (osteophytes) that enlarge the joints, sometimes producing joint deformity.

Next to aging, obesity is the most powerful risk factor in the development of osteoarthritis, followed by repeated trauma, surgery of the joint, gout, diabetes and hormone disorders. Interestingly, alcoholics suffer from hip joint arthritis at a relatively early age. The reason



to the circulatory system with subsequent nutritional disturbance of the cartilage cells in the hip joint.

Increases in knee and hip replacement procedures witnessed in the United States during the 1990s continued from 1997 to 2005. Over this time period, the volume of knee arthroplasties and hip replacements rose by about 69% (from 328,800 procedures to 555,800 procedures) and about 32% (from 290,700 procedures to 383,500 procedures), respectively. The demand for these procedures is projected to double in the next two decades.

Many people believe that the pain from arthritis is produced by friction between the bones – the "bone on bone" scenario commonly used to describe the condition. Rather, pain results from a tightening of the joint capsule, ligaments and myotendinous and fascial tissues that surround the joint. Muscle attachments become fibrotic and the patient suffers severe pain with every attempt at movement.

Pulsating magnetic fields initiate regenerative repair of the cartilage by stimulating cartilage cells (chondrocytes). However, it is still not clear why significant improvements in pain and joint function are achieved in relatively short period of time after initiation of PEMF applications. The immediate pain-relieving effect is repeatable and observable among arthritis patients, and may be due to alterations in prostaglandin synthesis and improved circulation and oxygen delivery to the ligamentous, myotendinous and capsular structures of the degenerating joint.

Scientific literature on knee osteoarthritis:
Knee arthritis (Gonarthritis): Here are the results of 3 studies with a total of 289 patients: Pain levels were measured in 176 patients randomly assigned to two different groups: a placebo group and an active treatment group. Using eight 48-minute treatment sessions in a two-week period a reduction in arthritis pain was significantly greater in the active PEMF treatment group (46%) compared with the placebo treatment group (8%).
(Jacobson 2001/143)

A double-blind trial of the clinical effects of pulsed electromagnetic fields in 27 patients with osteoarthritis of the knee was conducted. An average improvement across 6 different outcome variables of 23-61% was found compared with a 2-18% improvement across those same variables in the placebo treated control group. *(Trock 1993/144)*

A randomized, double blind, placebo-controlled clinical trial was conducted in 86 patients with osteoarthritis of the knee. It was concluded that PEMF has therapeutic benefit for arthritic knees in one or more observation points for pain, pain on motion and tenderness. At one-month follow-up: The knee mobility of the active treatment group increased compared to that of the placebo group. *(Trock 1994/145)*

Summary

Reduction in pain

Patients	Magnetic field group	Placebo group	Literature Reference
176	46 %	8 %	Jacobson 2001
27	23-61 %	2-18 %	Trock 1993
86	27.5 %	14 %	Trock 1994

Spine pain and spinal arthritis:
Spinal osteoarthritis can lead to lost flexibility, bone spurs (osteophytes), irritated nerves, back pain or spinal stenosis, and sciatica symptoms. At some point most spines will be subject to degenerative change owing to the passage of time alone. A 2007 study demonstrated that 37% of the general population (Germany) has back pain at any moment of time, and for 20% of these people the back pain is "severe or disabling." *(Schmidt 2007/147)*

In a very recent summary of evidence that initially collected over 31,000 articles for review it was found that there was insufficient support to show effectiveness of spine surgery for patients suffering with chronic low back pain. *(Haldeman 2008/146)* Disturbingly there is an eight-fold difference in the likelihood of undergoing spine surgery depending on the specific region of the United States in which one resides. *(Weinstein 2006/148)* In 2004, according to AHRQ, there was a 0.3% death rate associated with spinal fusion surgery (3 in 1000 patients died). In light of all these facts North Americans should be diligent to identify those interventions that, first, do no harm, and second, have a reasonable chance of producing lasting positive change. Magnetic resonance stimulation is a young science, but even in spite of this there is a growing body of clinical literature to support its safety and effectiveness for neck and back pain syndromes.

Basic science evidence is also growing for the support of magnetic resonance stimulation as a component in the treatment of herniated discs in the neck and back. It has been shown that cigarette smoking deprives the intervertebral discs of oxygen, lowering the pH levels, and hastens spinal degeneration. Spinal fusion rates are lower in cigarette smokers due to this effect. A study published by Hambly and Mooney demonstrated that cigarette smoke-induced lowered pH levels were prevented by daily exposure to pulsed electromagnetic fields. *(Hambly 1992/149)*

Scientific literature on spine pain and spinal arthritis (spondylosis; degenerative disc disease; facet arthrosis/arthritis of the small vertebral joints):
In a rigorous Cochrane review of literature of electrotherapy modalities for mechanical neck pain, limited but reliable evidence was found for the immediate benefit of PEMF therapy in chronic mechanical neck disorders and in acute whiplash injuries. By comparison, the Cochrane collaboration found unclear or conflicting evidence for Galvanic currents, iontophoresis, electrical muscle stimulation and permanent magnets. *(Kroeling 2005/141)*

The Bone and Joint Decade 2000-2010 affirmed that PEMF therapy has scientifically admissible support for its use in mechanical neck pain and associated disorders and is the only listed electrotherapeutic modality that has sufficient evidence suggesting benefit in the treatment of whiplash injuries of the neck. *(Hurwitz 2008/142)*

In an observational study of 353 patients suffering various forms of chronic pain, including post-herpetic pain as well as neck and back pain, the most notably positive results occurred in the group of patients suffering simultaneously with neck and back pain. This study admitted a wide variability in follow-up. *(Di Massa 1989/150)*

A systematic review of articles that addressed extremely low frequency PEMF therapy for chronic osteoarthritis of the cervical spine concluded that there was limited evidence that these energetic fields reduce pain in people with chronic cervical spine osteoarthritis. *(Kroeling 2005a/151; 2005b/152)*

A randomized, double-blind, sham-controlled trial of the effect of magnetic resonance stimulation using the MRS 2000 whole body mat was conducted on 34 patients with cervical osteoarthritis. Subjects received sessions on the mat twice daily for 3 weeks, 30 minutes per session. Neck range of motion, paravertebral muscle spasm and neck pain scores improved significantly in the active treatment group versus the sham treatment group ($p<0.001$), which showed no improvement. *(Sutbeyaz 2006/153)*

Hip arthritis (coxarthritis) and osteonecrosis:
Osteoarthritis is the most common type of hip arthritis. Also referred to as "wear and tear arthritis" or degenerative joint disease, osteoarthritis at the hip is characterized by progressive wearing away of the cartilage of the joint. Arthritis at the hip joints typically affects people over the age of 50 and is more common in people who are overweight. Weight loss tends to reduce symptoms associated with this condition. There may be a genetic predisposition to this condition since hip osteoarthritis tends to run in families. The prevalence of hip osteoarthritis is between 3-6% in the Caucasian population and, in contrast, is very low among Asian, black and east Indian populations.

Osteonecrosis (literally "bone death") of the femoral head is the endpoint of a disease process that results in bone necrosis, joint edema, and cartilage damage. It leads to joint arthritis that necessitates hip replacement surgery (total hip arthroplasty) in many patients. The cause of osteonecrosis in the hip joint may be traumatic or due to alcoholism, steroid use, sickle cell disease, or it may be without known cause (idiopathic).

Ninety rabbits were divided into four treatment groups to evaluate the ability of PEMFs to prevent steroid induced osteonecrosis. Fifteen of 40 PEMF-treated rabbits developed osteonecrosis versus 26 of 40 non-treated rabbits. *(Ishida 2008/157)* The authors noted that PEMF stimulation reportedly augments angiogenesis factors and dilates blood vessels; these effects may lower the frequency of osteonecrosis. Exposure to pulsed electromagnetic field stimulation before corticosteroid administration could be an effective means to reduce the risk of osteonecrosis.

Scientific literature on hip osteoarthritis and osteonecrosis:
In a study of 66 patients undergoing PEMF therapy for hip osteoarthritis for 4 weeks there was a significant reduction in pain and improved mobility. Improvements were sustained at 6 month follow-up. *(Dal Conte 1983/159)*

Because of its positive effects on osteogenesis (bone formation) and its chondroprotective (cartilage protection) effect on articular cartilage, pulsed electromagnetic field stimulation was reported on in 2006. Seventy-six hips in 66 patients with osteonecrosis of the femoral head who underwent PEMF stimulation were studied retrospectively. The analysis confirmed that pulsed electromagnetic fields are beneficial in the early stages of osteonecrosis, and may be able to preserve the hip or delay the onset and necessity of surgery significantly. The authors hypothesized that the short-term effect of pulsed magnetic field therapy was to protect the articular cartilage from the catabolic effect of inflammation and subchondral bone marrow edema. The long-term effect of pulsed electromagnetic field stimulation was thought to promote osteogenic activity at the affected area and prevent trabecular fracture and subcortical bone collapse. *(Massari 2006/154)*

Massari's findings are consistent with those of Bassett, who noted positive progression in 87% of 118 hips with osteonecrosis of the femoral head. *(Bassett 1989/155)*

Loosening of artificial hip or knee joints (arthroplasty or prosthesis):
Based on 2004 data there are over 384,000 hip replacements and 556,000 knee replacements performed each year in the United States. In Germany 170,000 patients opt for an artificial hip joint each year, and throughout Europe this number is approximately 550,000, with an annual increase of 2% per year. *(Stössel 1995/161)* Unfortunately, the useful lifespan of an artificial hip or knee joint is 10-12 years on average. The average age of a knee and hip replacement patient is 66 and 70 respectively. A common problem is that the prosthesis works loose slowly over time, and this causes pain. Due to this loosening and "toggle" the artificial joint needs to be replaced, necessitating a second surgery in a more elderly patient. This is disturbing since the chance of death during hip replacement surgery is 1% (1 in 100). To complicate the situation, there is often insufficient bone left for the second implantation.

Scientific literature on treatment of prosthetic joint loosening:
According to Japanese studies, magnetic field treatment lasting a number of months is successful in delaying the loosening of the hip prosthesis and therefore the need for subsequent operation by an average of 1.7 years. The pain is also significantly reduced.

In an American study of 37 hip replacement patients in 1993, the "Harris Hip Score"[14] was significantly improved for 53% of the 19 active treatment patients compared to the 11% of the 18-member control group. PEMF stimulation was provided for 6 months, and participants were monitored for 3 years after discontinuing active treatment. Fourteen (14) months after treatment it was noted that 6 of 10 patients had a relapse. As an "after-the-fact" change in study design, a "maintenance dose" of PEMF therapy was instituted at this time for the remaining positive responders consisting of one hour per day applications. This flawed study design resulted in 90% of the positive respondents eventually relapsing at 3 years. Nevertheless, it shows that delayed surgery was achieved for 14 to 36 months for 53% of patients compared with 1% of patients in the placebo group. *(Kennedy 1993/156)*

Konrad et al studied 24 patients with loosening of the hip prosthesis. Treatment was provided over a period of 18 months. Significant improvement in pain and hip mobility was noted. However, no benefits in bending and stretching outcomes were noted. *(Konrad 1996/162)*

In an animal experiment studying bone formation around dental implants inserted into the femur of rabbits, PEMF stimulation significantly increased bone formation versus the control group. *(Matsumoto 2000/160)*

Tendons are specialized tissues with high tensile strength. They attach muscles to bones. "Tendinopathy" is a term often used to describe the degenerative changes of tendons and their attachments. "Impingement syndrome," also known as "shoulder impingement," (e.g., of the supraspinatus tendon at the shoulder) is a common example of chronic wear-and-tear producing a painful inflammation of tendon tissue and limited range of motion.

Tennis elbow (extensor carpi radialis brevis tendinitis), bicipital tendinitis, patellar tendinitis (Jumper's knee) and Achilles' tendinitis are all examples of inflammations of tendinous tissue due to overuse or overload. Like impingement syndrome at the shoulder, these conditions can become quite chronic as well. Details of these conditions are discussed later in this text. The common denominator for these conditions: they are painful and reduce activity, productivity and quality of life significantly.

Several animal studies have explored the effects of pulsed electromagnetic fields on tendon tissue. Lee et al found that PEMF stimulation of Achilles tendonitis in rats resulted in greater reduction of inflammation, better return to histologic normal tissue and better collagen alignment. *(Lee 1997/165)* Greenough was unable to observe a significant effect for the use of PEMFs to repair adhesion formation in the flexor tendon of New Zealand White rabbits. *(Greenough 1996/166)* Most recently pulsed magnetic field therapy was found to markedly

[14] The Harris-Hip-Score is an assessment of gait, range of motion and pain in patients with hip joint degeneration.

increase the tensile strength in rat Achilles' tendon. Animals that received just 3 weeks of pulsed magnetic field exposure had an increase in the tensile strength of their Achilles' tendon up to 69%. *(Strauch 2006/168)*

Richards et al noted correctly that tendinous tissue heals more slowly than muscle and other tissues because of a relatively poorer blood supply. These authors cited the effects of pulsed electromagnetic fields in increasing blood circulation and improving autonomic signal transmission as being ideal for the treatment of disorders of tendon. *(Richards 1997)* Owegi proposed that PEMFs are effective for Achilles' tendinitis, and cited the need for a "revolutionary leap" from the more dominant pharmaceutical and surgical interventions to advanced applications of non-invasive therapies that minimize the risk of adverse drug side effects. *(Owegi 2006/169)*

Scientific literature on treatment of painful conditions of tendon:
A double-blind controlled study on 29 patients with persistent rotator cuff tendinitis compared response to PEMF stimulation versus non-treatment in the control group. All patients included in the study had failed to respond to conventional treatment including steroid injections. The active treatment group benefited significantly compared to the control group in the first 4 weeks. In the next 4 weeks there was no difference in the treatment group versus placebo. At this point active treatment was stopped, but measurement of symptoms continued. In the ensuing 8 weeks, there was no difference between treatment and placebo groups. Nevertheless, by the end of the study, 65% of the patients who had undergone 8 weeks of treatment with electromagnetic stimulation were free of symptoms and another 14% (5 patients) were much improved. The authors concluded that PEMF might be useful in the treatment of chronic, severe and persistent rotator cuff syndrome and possibly other chronic tendon lesions. *(Binder 1984/163)*

Though neither Devereaux *(Devereaux 1985/167)* nor Trudel *(Trudel 2004/170)* were able to find a significant difference in patients treated with PEMFs versus placebo controls for lateral epicondylitis (tennis elbow), Uzunca studied 60 patients in a randomized, controlled trial and found that active PEMF therapy reduces lateral epicondylitis pain better than placebo. *(Uzunca 2007/171)*

Sleep disturbances
For the 1 in 10 people who suffer chronic insomnia, it can feel like a prison. According to the National Sleep Foundation 60% of Americans report having sleep problems a few nights a week or more. More than 40% of adults experience daytime sleepiness severe enough to interfere with their daily activities at least a few days each month – with 20% reporting problems sleeping a few days a week or more. Similar data exist for other countries as well.[15]

15 For example, a survey conducted in Western Germany reveals that nearly every 4th German suffers from sleep disruption. Similar to their American counterparts, 15% of Germans report being frequently or permanently tired throughout the day and feel their performance is impaired. This percentage increases with age. Forty-four percent of Germans take sleeping pills.

At least 40 million Americans suffer from some form of sleep disorder. Those with sleep disorders are deprived of deep sleep (see below). Poor sleep has a high price. Fatigue is a contributing factor to more than 100,000 police-reported highway crashes, causing 71,000 injuries and 1500 deaths each year in the United States alone. (www.sleepfoundation.org)

Though 6 hours and 40 minutes of sleep is the new average (from 10:53 pm to 5:35 am), most people require 7 to 9 hours of sleep per night, with some requiring up to 10 hours per night.

Insomnia can result from having problems falling asleep, but it can also include those having problems staying asleep.

The five stages (cycles) of sleep

During a normal night's sleep we usually through five distinct stages or cycles. Stage 1 is a light sleep where we drift in and out of sleep and can be awakened easily. In Stage 2 eye movements stop and brain waves become slower. In Stage 3 extremely slow brain waves called delta waves begin to appear, interspersed with smaller, faster alpha waves. By Stage 4 the brain produces delta waves almost exclusively. There is no eye movement or muscle activity in Stage 4 sleep. It is very difficult to wake someone during Stages 3 and 4, which together are called "deep sleep." People awakened during deep sleep do not adjust immediately and often feel groggy and disoriented. In Stage 5 sleep the eyes move rapidly in various directions. This is called "REM" sleep. Breathing becomes more rapid, irregular and

shallow. The limb muscles become temporarily paralyzed.[16] Some experts believe that REM sleep helps to maintain and regenerate the network of neurons in the adult brain. *(Bruel-Jungerman 2007/172)* This stage of sleep is necessary for proper central nervous system development. REM sleep in humans decreases with age.

The five stages progress in cycles throughout the night from Stage 1 through Stage 3/4 deep sleep and Stage 5 REM sleep, then the cycle starts over again with Stage 1. The first REM period is short, and usually occurs 70-90 minutes after the onset of sleep. REM phases become longer as the night progresses. Adults spend almost 50% of total sleep time in Stage 2 sleep, about 20% in Stage 5 REM sleep and the remaining 30 percent in other stages. Infants spend half their sleep time in REM sleep.

The importance of deep sleep

As will be stated elsewhere in this text, deep sleep (Stage 3 and 4) is vitally important to human health. In this unconscious state the brain and body regenerate. The immune system is renewed. Human growth hormone is released in a significantly larger quantity than at any other time of the day. Insomnia deprives the body of deep sleep and is detrimental to mental and physical health, and the longevity of the sufferer.

Scientific literature on treatment of insomnia:

In this four-week double-blind, placebo-controlled study the effect of PEMF therapy for insomnia was explored using 101 patients randomly assigned to one of 3 diagnostic groups. Outcome measures included the intensity of sleep latency, frequency of sleep interruptions, sleepiness after rising, daytime sleepiness, difficulty with concentration, and daytime headaches. *(Pelka 2001b/174)* The results of this study are as follows:

PEMF group:	70% great improvement in sleep; or free of symptoms 24% significant improvement 6% slight improvement
Placebo:	2% great improvement 49% slight or significant improvement 49% no improvement

A dose-response relationship has recently been established between the strength of electromagnetic field exposure and the induction of sleep in 15 healthy males. The authors used a double-blind, sham-controlled crossover design. *(Regel 2007/158)*

16 Heart rate and breathing are irregular during REM sleep, and release of neurotransmitters in the brain is completely shut down. As a result, motor neurons are not stimulated and the muscles of the limbs are in a temporary state of paralysis. This is called "REM atonia" and is a normal occurrence during sleep. Rapid eye movement sleep behavior disorder (RBD) involves the loss of REM atonia (see footnote) during otherwise intact REM sleep. The loss of the normal, temporary state of paralysis leads to a wide range of movements during sleep, from small limb twitches to complex integrated movements where sufferers appear to be unconsciously acting out their dreams.

Nerve injuries
Magnetic field therapy accelerates recovery of use of the injured limb and enhances regeneration of damaged nerves in experimentally injured peroneal and sciatic nerves in rats. *(Ito 1983/178; Raji 1984/175)* Subsequent studies have also found the accelerated functional recovery and enhanced healing and regeneration in the sciatic nerve of rats. *(Mert 2006/176; Kanje 1993/177; Longo 1999)* Sisken presented a review of studies using electric and electromagnetic fields that provides evidence for the enhancement of regeneration following nerve injury. *(Sisken 1993/214)*

Parkinson's disease
In patients with Parkinson's disease, a specific central messenger substance –dopamine – is no longer synthesized in sufficient amounts. The result is impairment in central movement control. This includes the resting tremor observed in the extremities, rigidity of muscle tone, shuffling gait, and "freezing" or "braking" (akinesia; inability to move) observed during walking.

Scientific literature on treatment of Parkinson's disease:
Magnetic field therapy significantly reduces the tendency to fall (from akinesia) in 80-90% of Parkinson's patients (80-90%). In addition, other Parkinson's symptoms also improve. Significant and often lasting improvements in visual evoked potentials, speech impairment, cognitive impairment, male sexual function, dream recall, body image disorder, drooling, and visuospatial performance are reported through the use of extremely weak magnetic fields. It is postulated that PEMFs may augment dopamine and serotonin transmission in the brain. The cognitive (intellectual) performance also increased rapidly. *(Sandyk 1996c/179; 1997a/180; 1997b/181; 1995a/182; 1996d/183; 1996e/184)*

Multiple sclerosis
Multiple sclerosis (MS) is where the immune system attacks the central nervous system. It results in a process called demyelination – the myelin sheath of neurons is damaged. This compromises the transmission of nerve impulses through the affected nerves, causing impairment in sensation, muscle weakness, muscle spasms, or difficulty with movement, coordination or balance. Problems with speech, swallowing, vision or other functions may also be affected, depending on which nerves are involved. Cognitive impairment (brain processing) of varying degrees and emotional symptoms such as depression may also be experienced.

Muscle spasms and spastic contractions are often the most obvious and debilitating symptoms in MS. Pulsating magnetic fields have been shown to benefit muscle spasms in otherwise neurologically intact individuals (e.g., those suffering with back pain, athletic injury or muscle contraction headaches), and can similarly benefit patients with MS.

Scientific literature on treatment of multiple sclerosis:
The effect of repetitive magnetic stimulation on spasticity was evaluated in 38 patients with multiple sclerosis in a double-blind placebo-controlled trial. Electromagnetic stimulation was found to have an antispastic effect in multiple sclerosis as measured by patient self-score, clinical spasticity score, and stretch reflex threshold. *(Nielsen 1996/185)*

Thirty MS patients were randomly allocated to receive active versus sham treatment with electromagnetic field therapy. Actively treated subjects showed a significant improvement in the performance scale used, which measured bladder control, cognitive function, fatigue level, mobility, muscle spasticity and vision. There was also a significant improvement in a language task. *(Richards 1997/164)*

Postherpetic neuralgia

Those of us who had chickenpox in youth have the possibility of developing shingles later in life. During an initial infection of chickenpox, some of the virus remains in our bodies, lying dormant inside nerve cells. Years later, the virus may reactivate, causing shingles – a second outbreak of the varicella-zoster virus. Postherpetic neuralgia is a complication of shingles. The risk of developing postherpetic neuralgia is approximately 2% of those who have had chicken pox. *(Helgason 2000)* However, of those over 50 years of age who develop shingles, between 40-75% will develop postherpetic neuralgia.

The rash and blisters that accompany an outbreak of shingles resolves, but some people continue to feel pain that is sharp, jabbing, burning, deep or aching that characterizes postherpetic neuralgia. There is extreme sensitivity to touch and to changes in temperature. Itching, numbness and headaches are also associated with this condition.

No treatment is universally successful. However, without understanding the mechanism it appears that magnetic field therapy is effective for many patients.

Scientific literature on treatment of postherpetic neuralgia:

Vander Straten evaluated interventions to find those that may reduce or eliminate the development of postherpetic neuralgia in patients 50 years of age with shingles. *(Vander Straten 2001/186)* This observational study reports that of 32 patients with shingles, only one treated with PEMFs developed postherpetic neuralgia. (Again, in the age-group studied, between 13 and 24 patients would have been expected to develop postherpetic neuralgia.)

In 353 patients suffering chronic pain electromagnetic fields had the best effect on those with post-herpetic pain and those suffering with a combination of neck and low back pain. *(Di Massa 1989)*

Stress is regulated by the autonomic nervous system. For example, reports of murder, child abuse, economic crisis and political unrest that make up much of the evening news on television increase our blood pressure. Why is it that bad news is so much more entertaining and/or newsworthy than good news? While we definitely need to stay informed, packaging news as entertainment in order to improve ratings has given rise to a collective angst and "unsettledness" that keeps our sympathetic nervous systems in overdrive. About 90% of hypertension (high blood pressure) is ultimately caused by increased "sympathetic tone." This can be congenital (in a small number of cases), but more often is due to maladaptive responses to external or internal stresses.

External stressors include financial pressure, relational disharmony with family, friends and co-workers, and the expectations of others. I recently had a patient who prepared for weeks in advance for her mother to come to visit. This patient was in obvious distress and was nearly frantic about the prospect of not meeting or exceeding her mother's expectations. During this time the patient's physical condition, in this case her muscle spasm, headaches and back pain, increased. Once her mom had come and gone, the stress decreased and the physical symptoms decreased with it. In this case there was an external stress represented by the mother's actual visit, but there was also the internal stress of real or imagined expectations. How often are you like that? How often do you place undue pressure upon yourself to perform up to a certain standard? Is the standard real or imagined? Better communication might surprise you, put you at ease, and lower the stress in your life. In some cases we are haunted by living up to the expectations of someone who is no longer living. Overcoming this is hard work, and oftentimes requires some wise counsel and guidance from others.

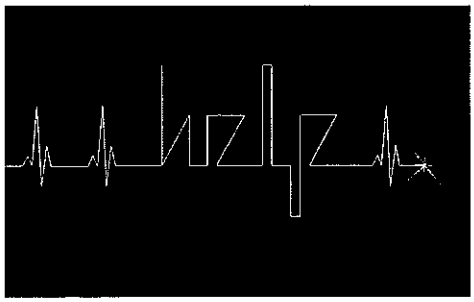
Physical factors also contribute to chronic sympathetic overload. A sedentary lifestyle and obesity are high on the list because these conditions preclude the proper metabolism and elimination of stress hormones once they have been released. We often refer to these hormones as the "fight or flight" hormones. What happens if you are sitting on the couch watching TV and you get stressed out over the evening news? Without physical exercise or action ("fighting or fleeing") these hormones continued to circulate and build up in the body, leading to increased sympathetic tone.

The lack of movement results in insulin resistance. This, in turn, prevents cells from being adequately supplied with sufficient quantities of glucose. Initially hypoglycemia results, and eventually type 2 diabetes may develop. Such persons may be irritable, more prone to stress, and in the case of full-blown diabetes, have increased heart rate and blood pressure. On a microscopic level, cellular damage is widespread in such individuals. The tragedy is that, for many of us, such an end stage of poor health is entirely preventable. It is worth noting that excessive alcohol consumption is often used to manage stress. Clearly this only makes matters worse, contributing not only to the development of diabetes, but also liver damage. Using alcohol to manage stress is a poor strategy. If this is your strategy, stop drinking and get help. Do it now.

Heart rate variability as a measure of sympathetic tone and stress

Heart rate variability (HRV) is a sensitive marker of cardiac sympathetic activity. *(Shuvy 2008/187)* Individuals with high HRV are more stress tolerant and resilient in the face of stressful environmental changes. *(Hansen 2008/188)* HRV is a good predictor for all-cause mortality and sudden death. It can be used as a clinical indicator for the risk of sudden cardiac death. *(Katz 1999/189)* Analyzing vagal reflexes in combination with HRV significantly increases the prognostic value of HRV in predicting total cardiac mortality. *(La Rovere 1998/190)*

Pulsating magnetic fields have been shown to have the ability to create a natural balance between sympathetic nervous system function (stress; "fight, flight, or fright") and parasympathetic function (relaxation; "rest and digest"). *(Anan'in 2001/191)* However,



research into the intricacies of the autonomic nervous system is still in its infancy. While it is comparatively easy to comprehend the direct effects of pulsating magnetic signaling on bone, wound healing and arthritis (since the pathophysiology of these processes is well understood) it is more difficult to understand the complex mechanisms by which these fields may have a stronger, more fundamental impact on overall human health through the improvement of autonomic balance. Stress-related pathologies of the autonomic nervous system have yet to be fully discovered, described, and understood.

Due to sweeping changes in modern society (e.g., the profusion of knowledge, information, decentralization, travel, the threat of wars, the decline of the sense of community, and growing isolation within our homes), at no time in history has an understanding of the autonomic nervous system been more necessary and important to our overall health.[17] Treatments and interventions that successfully improve the function of this system will be widely sought after and appreciated in a manner similar to the growth in our understanding of the benefits of regular physical exercise in the last 50 years. I believe magnetic resonance stimulation will play a central role in our battle against the epidemic of stress now spreading like a vapor through the modern world.

In summary, stress can have many manifestations in the human body. These include high blood pressure, psychological and emotional stress, cardiac arrhythmia, insomnia, and hastening of metabolic disorders such as diabetes mellitus and insulin resistance.

Scientific literature on treatment of stress:
Woldanska-Okonska et al reported on the effect of electromagnetic stimulation on cortisol secretion in humans. *(Woldanska-Okonska 2003/192)* The authors found that the circadian profile of cortisol secretion changed by 100% in patients exposed to magnetic fields. Interestingly, five times weekly application of magnetic field therapy resulted in a lowering of cortisol secretion at 4:00 PM one day after completing 15 applications. Changes were also noted one month after completing these applications, suggesting a long-term effect of magnetic field therapy on the hypothalamic-pituitary axis.

In a study of the influence of pulsed electromagnetic therapy on heart rhythm in hypertensive workers exposed to high levels of vibrational stress, positive changes were noted in autonomic

17 Think, for a moment, about our perception of time. Millennia ago we measured time by seasons. There was a harvest time, winter, summer, and spring. Later, we developed calendars and began celebrating festivals. The measurement of time contracted further by the recognition of days of the week, then hours of the day. The stress and time-pressure of life is now so intense that we measure life in seconds, wear wristwatches, and get flustered if our Internet connection is too slow. Blackberries and iPhones are essential. Texting is now vital to our second-by-second need for communication and information.

status and on central hemodynamics. These workers showed lower blood pressure. Interestingly, the most positive effect was among workers who had lower cumulative exposures to the vibration due to a shorter time on the job. *(Drobyshev 2001/198)*

The endogenous immune defense system is complex. Medical science is still searching for all the mechanisms that activate (strengthen) and deactivate (weaken) it. What makes us more susceptible to viral or bacterial infection? Two workers, both exposed to the same environment, may respond differently to exposure to an infectious organism. One worker becomes ill, while the other worker remains healthy. Why?

This is the question that plagued Dr. Daniel David Palmer in the late 1800s. Following the discovery of chiropractic medicine, which proposed the idea that a deficient nervous system leads to an increased susceptibility to infection, Dr. Palmer established an entire profession on his answer to that question. While his monocausal theory of disease (e.g., that all disease results from disorders in the spinal column) is now scientifically untenable and reductionistic – ignoring the complexities of the immune system – his thinking was incisive and profound at that time in North American history.

What Dr. Palmer stumbled upon in 1895 is very similar to what we have stumbled upon in our current discussion of energy medicine. The immune system is supported by a symphony of bodily systems supplied and energized by a variety of factors, not the least of which include good nutrition, regular exercise and movement, healthy patterns of sleep, proper breathing, good hygiene, a healthy nervous system, and exposure to natural, low-frequency (rather than high-frequency) magnetic fields.

Like D.D. Palmer, we respectfully point out that when we succumb to an infection such as a cold or flu, it is usually not because we were exposed to bacteria or viruses. Such exposures occur many times each day in the life of each one of us. Though there are notable exceptions, since most of us are not sick with an infectious illness every day of our life, we must realize that our illness came about as a result of a dip in immune function rather than because of viral or bacterial exposure per se. Our focus in energy medicine is on the strength and robustness of the immune system rather than on the avoidance of infectious organisms. The most cogent proof of this is AIDS – autoimmune deficiency syndrome. This disease, characterized by a depletion of the immune system, carries with it the increased risk of a myriad of infections.

Admittedly, the immune response is complex, and at some point my analogy breaks down. However, this fundamental principle applies almost universally: if our body's immune system were intact, very few, if any, infectious microbes would have a chance of survival.

We observe that professional athletes, under the stress of competition, are more susceptible to herpes infections – up to 6 times per year. The risk of upper respiratory infections also increases with high levels of training. Animal experiments confirm the "open window" theory that immunity decreases for one to three days following a stressful

situation, increasing the risk of viral or bacterial infection. Interestingly, the ingestion of refined sugar also suppresses immune response for up to 12 hours, an example of a dietary open window.

The regulating effect of a balanced autonomic nervous system can reduce the impact of stress and therefore minimize decompensation of the immune system. Pulsating magnetic fields not only directly enhance the activation of specific immune cells in the body, but also prevent disturbance and weakening of the immune system indirectly.

Scientific literature on immune system support:
In a study of 91 patients with benign prostatic hyperplasia treated operatively, the application of pulsed magnetic field therapy immediately after surgery eliminated deficiency of T- and B-cell immunity, raised functional activity of the lymphocytes and the phagocytic ability of neutrophils, reduced androgen intoxication, tissue edema, bacterial contamination, and the number of thrombohemorrhagic complications. *(Neimark 2006/197)* The implications of this study for the entire world of surgery and postoperative management have yet to be discovered. Combined with the proven accelerated wound healing conferred by PEMFs, the vast horizon of energy medicine has yet to be fully appreciated.

Lymphocytes are white blood cells that have an important role in the immune response. In vitro studies that show bone-healing acceleration from electromagnetic field therapy also show T-lymphocyte proliferation. *(Johnson 2001/199)*

In an in vitro study of the blood of 103 patients with multiple myeloma, acute leukemia, chronic lymphocytic leukemia and non-Hodgkin's disease, magnetic fields lowered the level of immunological deficiency. In acute leukemia a combined application of magnetic fields increased the T-lymphocyte population. In addition, the phagocytic activity of leukocytes increased significantly. *(Bessmel'tev 2001/200)*

Pulsating magnetic fields have been proven to increase the delivery of oxygen to the cells. This occurs by a variety of mechanisms, including the ferromagnetic separation of red blood cells (RBCs; erythrocytes – cells that carry oxygen to the tissues) from one another for greater oxygen binding to hemoglobin, the "unsludging" of blood (a mild blood-thinning effect), the release of nitric oxide producing vasodilation (increased blood vessel diameter), and the relaxation of blood vessel tone through regulation of the autonomic nervous system. These effects have been observationally proven through infrared thermographic imaging, through live blood cell analysis, through pulse oximetry (the monitoring of the oxygenation of hemoglobin), and through a variety of other means.

If each RBC can carry more oxygen through improved oxygen binding, more oxygen can be delivered to the tissues. As will be explained in further detail elsewhere, magnetic resonance therapy is believed to accomplish this by separating the blood cells from one another, exposing more membrane surface area to oxygen binding activities in the lungs. Arterial blood vessels form branches just like a tree. Large arteries branch into arterioles. Arterioles branch into hundreds of thousands of capillaries that have a diameter between 3-8 µm. One µm is a thousandth of a millimeter. Amazingly, the diameter of RBCs is the same. When the membrane surface of each RBC is fully exposed for oxygen gas exchange, more oxygen will bind inside the RBC and be carried away to parts of the body that need it.

Also, when RBCs repel one another, having been magnetically charged, the viscosity of the blood is decreased and the blood is effectively "thinned" to some degree. Thinner blood flows at a faster rate of blood flow through narrow channels, effectively increasing oxygen transport. Thick, sludgy blood slows the flow of blood and reduces oxygen perfusion.

When the diameter of the blood vessels is enlarged by relaxation of the smooth muscle tone in the blood vessel walls, the larger diameter allows for a greater volume of blood to flow in a given amount of time. Pulsed magnetic fields accomplish this through nitric oxide release and through autonomic nervous system controls. This increases the delivery of oxygen to the tissues.

In every stressful situation sympathetic tone is increased, and smooth muscle tone increases with it. This raises the blood pressure. In the tiniest arterioles blood flow can be shut off completely. The affected tissues are no longer supplied with oxygen. While muscles can continue to work without oxygen for a few hours, lactic acid builds up and eventually the ability to function grinds to a halt. Oxygen deprivation to more vital tissues – the kidneys, liver, and brain, for example – have more complex oxygen regulatory mechanisms. Even so, even minute levels of oxygen deprivation of these organs over the long term can have serious implications for long-term health and wellness. The liver's detoxification function may be impaired, for example, and the metabolism of foods, cholesterol and even medication is put out of balance. Likewise, mild but sustained oxygen deficit to the brain can affect productivity, creativity, mental ability, memory and mood. Ultimately, sustained lack of oxygen to the brain will dramatically increase the rate of irreversible brain cell degeneration.

Atherosclerosis
Atherosclerosis is a chronic inflammatory disease affecting the arterial blood vessel walls. There is an accumulation of macrophage white blood cells and low-density lipoproteins (LDLs) containing an excess of cholesterol and triglycerides. Atherosclerosis is commonly referred to as "hardening of the arteries." In healthy individuals fats and cholesterol are removed from the macrophages by high-density lipoproteins (HDLs). Due to high animal fat, caloric overage, stress, and the lack of exercise, the level of HDLs is reduced and atherosclerosis is given a foothold to begin developing in the large and small arteries. Unfortunately, this process is starting at progressively younger ages in North American adolescents and young adults!

The effect of magnetic field therapy cannot be estimated because the changes in the walls of the vessels are the main cause and not a narrowing of the vessels. Nevertheless, it is possible to increase the flow of blood.

Circulatory disturbances due to lack of exercise
Cardiovascular exercise can prolong your life. It can confer health to your heart, lungs and every organ system of your body, including the musculoskeletal system. It improves bone density and maintains a sharp, creative brain. Most of us are too busy to exercise, but also too stressed to NOT exercise.

When exercise is not possible for days, weeks, or – heaven forbid – months, you can increase the circulation of blood to the inner organs and muscles through the use of magnetic resonance stimulation regularly at home. Let me be clear, the MRS 2000 or other devices is not a substitute for exercise, nor is it intended to be. However, certain injuries, common diseases, physical conditions or circumstances may preclude exercise and in such cases, oxygen delivery is still important. We can ensure better oxygenation of our tissues through the use of magnetic resonance stimulation.

Scientific literature on arterial disease, blood flow and oxygen delivery to the cells:
In 70 patients treated for arterial occlusive disease of the vessels by hyperbaric oxygenation (HBO) in combination with pulsed electromagnetic field therapy, remission of symptoms lasted 1-2 years. In patients treated with HBO alone, remission lasted only 3-8 months. A prolonged positive effect was produced in 64 of 70 patients suggesting this combined therapy was both safe and effective in treating occlusive disease of the vessels. *(Reut 1990/203)*

A review of the literature published in Poland noted the positive influence of pulsed magnetic fields on dielectric and rheological properties of blood in the clinical studies cited. *(Sieron 2003/204)*

Robertson et al reviewed how cells are protected following an acute loss of oxygen (e.g., from heart attack or stroke) through direct protection with magnetic field therapies. This article reviews evidence indicating that magnetic fields confer cell protection via the expression of heat shock proteins and opioids, improved collateral blood flow, and nitric oxide induction. These mechanisms prevent cell death and provide for the oxygen needs of the cells.
(Robertson 2007/205)

Libido and sexual performance

In college I heard a speaker named Josh McDowell talk about how to enjoy "maximum sex." He encouraged the young co-ed audience of about 6000 students to wait for sex until marriage and to remain faithful to one partner for a lifetime. I'm not sure, but I think he cited examples from the animal kingdom where many species mate with one partner for life. He said: "Sex is fantastic, but doesn't make up all of life's pursuits. When you add it all up, it's about 1/12th of life – but WHAT A 1/12th!!" I think one of the reasons why I've been happily married for 28 years is because I took Josh's words to heart. I'm blessed (or lucky, if you prefer) and I know it!

So let's talk about that 1/12th!

A significant percentage of male erectile dysfunction (ED) problems are of a psychological nature, and relate to the stress of life. In women, anorgasmia can be due to changes in hormones, the side effects of medications such as antidepressants, or psychological as well. In both sexes, much of the remainder of sexual disorders to restricted or blocked blood flow. This may occur as a complication of diabetes mellitus or neurological disease, or may be simpler – it may be a magnetic field deficiency disorder producing restricted blood flow. While medications like Viagra® and Cialis® increase the flow of blood through temporary modulation of the release of nitric oxide they do not enhance the body's ability to release nitric oxide from the endothelial lining (the inner linining) of blood vessels. That's where pulsating electromagnetic fields enter the picture. Why rely on an expensive pill with potential serious side effects when, just maybe, your body's own intrinsic capabilities can be restored? Even in the case of psychological blockage, the autonomic regulation and enhanced sleep patterns provided by magnetic resonance stimulation can gradually renew libido and improve sexual response. Interestingly, normal rapid eye movement (REM) sleep is associated with penile erections in men and clitoral engorgement in women. When REM sleep is restored by pulsating magnetic fields in the 40-60% of people who sleep poorly, these genital responses are restored also in their sleep, laying the necessary foundation for the improved capacity for arousal during normal sexual encounters.

Scientific literature on sexual performance:

Sexual dysfunction (impotence / erectile dysfunction) was studied in 105 men and results were reported on 96 men who completed the study. Beneficial effects were noted in 70-80% of patients receiving active magnetic field therapy compared with 33% of men receiving placebo treatment. The author concludes that magnetic field therapy is associated with an increase in cavernous bloodflow. *(Gorpinchenko 1995/201)*

A double-blind, placebo-controlled study was conducted to assess the efficacy of three weeks of pulsed magnetic field therapy for erectile dysfunction. 20 male volunteers were randomly assigned to either an active treatment group or a placebo group. The active, PEMF-treated group reported significant improvements in the intensity and duration of erection, the frequency of genital warmth, and in overall well-being. The remaining 20% of PEMF-treated volunteers were found to have a flu-like infection after the study that may have influenced their results. (Too bad for them!) Only 30% of the placebo group reported improvement, and this was partial at best. No side effects were reported. *(Pelka 2002/202)*

As if the preceding discussion weren't enough of a formal discussion on anti-aging and wellness, let's talk a little further.

The term "anti-aging" is often used to connote an organized medical effort to arrest the aging process, or even reverse it using chemicals, bio-identical hormones, and surgical enhancements. This is in keeping with the prevailing collective mantra in our culture that has been successfully imbedded through the billions of advertising dollars by the pharmaceutical industry. This hypnotic mantra goes like this: "If my body's broken, a pill will fix it. If I'm sick, I need a pill." But take note – the mantra is currently expanding to this: "If I want to stay well, I need a pill." For example, currently young women across North America are being encouraged to take drugs to prevent cervical cancer.[18] Hold on to your hats – the next era in pharmaceutical mantra-making is on its way! I digress.

Anti-aging, in my mind, is a discussion about aging well and about proactively curtailing the damaging effects of aging that are avoidable. Studies from stress research have shown that the aging process is closely connected to a balanced autonomic nervous system.

18 Instead of advocating the taking of a pill to prevent cervical cancer shouldn't the discussion of the prevention of cervical cancer be directed toward nutrition and lifestyle change? Yikes! The pill should be reserved for those who cannot improve their diet and change their lifestyle.

This resonates with me as I recall the environment in which my grandparents and my wife's grandparents lived in rural America. My grandfather was a hard-working farmer and educator. He took a nap almost every day and never had trouble sleeping. When it was dark he went to bed. He had a simple life with plenty of time for reflection and rich fellowship with other people. He lived to be 92 and my grandmother lived to be 95. My wife's grandparents had a similar, uncomplicated life characterized by hard work, enriching friendships and contentment. They took naps also, and both live to be 102.

Now let's contrast the lifestyle of our grandparents with the culture we've made for ourselves and bought in to. I'm not saying it's wrong – of all people I'd rank myself at the top of the list of "adrenalin-o-holics." But that's the point. Stress research has shown that, with few exceptions, our autonomic nervous systems are "out of whack." They are out of balance and the sympathetic nervous system is winning. This is bad.

At the same time, we are becoming progressively more sedentary. Obesity among our young people is on the rise because of video gaming, 400 TV channels and text messaging that has replaced the need for going outside to play. Going out into the neighborhood used to be the only way kids were able to have a meaningful interaction with their friends. These days all you need is a cell phone, 2 thumbs and an unlimited text-messaging plan. Is this progress? Well, in some ways yes, but in other ways, it's a giant step backwards.

Forget the kids; think about yourself. You need exercise and so do I. We need to burn off the adrenaline that is cranking and churning through our bloodstreams. Better yet, we need to turn the tide on our sympathetic nervous systems by giving them a subtle energetic whammy. That whammy is called the MRS 2000! Magnetic resonance stimulation will fire up the parasympathetic nervous system so that we can sleep like grandpa and grandma did. They had bad news too. But they were more equipped to handle it. They had a better food supply and less junk food and refined sugar in their diet. Their lives weren't perfect, but in rural America, they spent a lot of time in the dirt, working the soil, in the Earth's natural magnetic field. They were moving. They were exercising in a natural magnetic field.

Think about it. Anti-aging has been around a lot longer than Dr. Ronald Klatz, who coined the term. In many cases our grandparents modeled healthy anti-aging for us.

We have seen thus far in this text the potential for electromagnetic fields to increase blood flow, to increase mitochondrial populations within the cells for increased energy (ATP) production (via calcium channel modulation), and by increasing the release of growth hormone (hGH) indirectly by lengthening stages of deep sleep and directly by stimulating the production of IGF-2 (insulin-like growth factor).

Scientific literature on anti-aging and wellness:
The presence of excessive free radicals and other reactive oxygen species has been directly linked to accelerated cellular aging and damage to the cell membrane, to membrane proteins, and to RNA, DNA and other cellular organelles. Very weak, ultra-low frequency pulsed magnetic fields have the ability to alter the rate of production of reactive oxygen species in

the body. When a proper phase relationship of magnetic pulses to metabolic oscillations is established, magnetic fields can curtail the production of reactive oxygen species. Interestingly, these authors show that cells do not respond directly to magnetic fields, but instead are sensitive to the minute electric fields that the pulsed magnetic fields induce. *(Rosenspire 2005/206)*

High-level European and Russian athletes "in-the-know," always in pursuit of a training secret or competitive advantage, have benefited from the performance-enhancing effects of pulsating magnetic fields for almost 2 decades. In the meantime North American athletes have been left in the proverbial "dark." Recall that, in the introduction of this book, cultural and societal pressures in America (brought on by the Flexner Report) precluded the natural evolution of bioelectromagnetic technologies here. Such was not the case in the rest of the world! The possibilities of athletic performance enhancement have been experienced and attested to by many world-class athletes.

Training optimization

Endorphin release is increased by the use of PEMF therapy. This results in an increased pain threshold that, in turn, allows for harder and more effective athletic training.

In sports medicine we speak of two energy systems: the anaerobic (or phosphagen) system, and the aerobic system. Muscle tissues may encounter sudden demands for lots of energy. The synthesis of ATP (e.g., "from scratch") cannot meet this demand. However, a high-energy phosphate pool in the form of phosphocreatine (or creatine phosphate) is stored within muscle to meet such demands. The best example is a sprinter running in the 100 m dash in the Olympic Games. The 100-meter sprinter, in the starting blocks, springs into massive action at the start of the race and sustains rapid, repeated, maximum muscle contractions for about 10 seconds. The demands for energy are enormous, and are adequately supplied by the stores of high energy phosphate in the phosphagen system in muscle. This is an anaerobic system where oxygen is not immediately required. Phosphagen stores will be resupplied using oxygen consumption after the race (hence the huffing and puffing beyond the finish line from "oxygen debt"), but the immediate needs are supplied without oxygen. An important byproduct of the phosphagen energy system is blood lactic acid. Excessive buildup of blood lactic acid (referred to as "onset of blood lactic acid," or OBLA) severely impairs muscle contraction and overall athletic performance.

By contrast, the aerobic system is a slower, energy-replenishing system that is ultimately more basic to survival. The aerobic system is the mechanism by which ATP is produced within the mitochondria of the cell by a process called oxidative phophorylation. In short, glucose and oxygen are put into the system, and ATP (pure energy) comes out.

In many sports a conversion between the two energy systems takes place. At the start of a 10K race, for example, there is a sprint for position at the head of the pack. The same is true of cyclists in the Tour de France or swimmers. The sprint from the starting line requires anaerobic metabolism and a well-tuned phosphagen system. Then, once position is established, a conversion to the aerobic energy system is required.

Magnetic field therapy has been found anecdotally to produce a "faster switch" to the aerobic energy system. The reason for this is the "forced" increase in ATP production described earlier that results from increased function of the ion pump. With more ATP available there is less need for the phosphagen system and therefore, less lactic acid buildup. With more ATP available, there is a quicker conversion to ATP dependent aerobic metabolism. The compromise of athletic performance brought about by lactic acid buildup (OBLA) is eliminated.

Sports injuries

Athletic injuries include tendinitis, contusions, bruises, sprains, and partially or fully torn tendons, muscles and ligaments. The initial reaction to musculoskeletal trauma is called the inflammation phase, or simply inflammation. Inflammation is characterized by four cardinal signs: rubor, tumor, dolor and calor. That is, redness, swelling (edema), pain and heat respectively. The redness is produced by increased blood flow and dilation of blood vessels. Swelling results from the influx of transudates from blood plasma, bringing macrophages to clean up the debris from dead and dying cells involved in the injury. Dolor is pain – a protective response brought about by inflammatory chemicals within the area of injury stimulating pain-receptive free nerve endings. And the warming of tissue, calor, is simply the temperature change brought about by increased circulation and fluid influx. All of these responses to acute injury result in a loss of function of the injured tissue.

The phase of injury repair

A distinction is made between the acute phase (inflammation phase) and the proliferation phase, which starts approximately 48 hours after the injury has taken place. During the acute phase blood and plasma exudates are released (bruising) as well as chemical inflammatory mediators – messenger substances that coordinate the early phases of tissue repair. Some of the healthy cells in the area of injury dedifferentiate so they can become new types of cells, if necessary, to replace cells of another type that have been destroyed. During the proliferation phase new cell tissue is produced, including new capillaries, collagen, tendon, bone and nerve tissue.

The "remodeling" phase starts between day 21 and day 60 following the injury. Remodeling organizes the new tissue for full physiologic function. Ideally the original state of the injured tissue can be fully restored in this way.

Edema

The earliest response to musculoskeletal trauma in sports injury is edema, or swelling. At the forefront of every injury is the formation of edema. Edema results from the infiltration of blood into the tissues from ruptured small vessels and by swelling caused by the passage of fluid through the walls of damaged capillaries.

The lymphatic system is responsible for removing edema from the area of injury. The rate of lymph drainage is dependent upon peristalsis and the movement of skeletal muscles to squeeze fluid through lymph ducts and vessels. The endothelial lining of the lymph vessels, as well as vessel diameter, also play a decisive role. The diameter of the lymph vessels is governed by the nitric oxide system described above in the same way it governs arteries and veins. We have already reviewed the flow enhancing effects of nitric oxide release brought about by magnetic fields.

Magnetic field therapy in the presence of acute inflammation is a two-edged sword. On the one hand PEMF stimulation increases blood flow and blood circulation. This can invite an increased volume of inflammatory mediators to the area of injury. On the other hand, magnetic fields can exert an anti-inflammatory effect by reducing the synthesis and release of prostaglandins, bradykinin, cytokines and other inflammatory mediators, and by increasing the resolution of edema through the lymphatic system.

As a general rule, do not use a local electromagnetic field applicator (e.g., MRS 2000 pad or probe) for a contusion injury immediately following injury and within the first 24-36 hours. Rest, ice, compression and elevation ("RICE") should be the predominant strategy at home. After this initial period, resolution of edema should be well underway and the enhancement of lymphatic drainage through pulsed electromagnetic stimulation is desirable. Continue applying the RICE strategy in conjunction with PEMF stimulation and motion.

The difference between the inflammation of trauma and the inflammation of infection.

Warning: Don't apply magnetic fields to acute local bacterial or viral infections!

Important: Swelling, heat, pain and redness from bacterial or viral infection should not be treated with a magnetic field. Symptoms will worsen owing to increased blood circulation.

Example: One of my colleagues recently experienced jaw pain which he originally attributed to dysfunction of his temporomandibular joint (TMJ). Curiously, an application of electromagnetic field therapy worsened the symptoms. This was an uncharacteristic response, and it puzzled me. Subsequently my colleague's dentist identified an abscessed molar in the back of his jaw by his TMJ. This explained the worsening of jaw symptoms, and underscores the necessity to refrain from using magnetic fields or viral infections of bone and soft tissues.

Chronic widespread pain is the cardinal symptom of fibromyalgia. This symptom is common in the general population with comparable prevalence rates of 7.3% to 12.9% across different countries. Fibromyalgia is associated with other rheumatic disorders, with chronic viral infections, and with systemic illnesses. Up to 65% of patients with systemic lupus erythematosus meet the criteria for fibromyalgia. A high prevalence of fibromyalgia is seen among relatives of patients with fibromyalgia and suggests the possibility of genetic or environmental factors. *(Neumann 2003/207)*

Females are at greater risk of fibromyalgia (3.4% women to 0.5% in men). The risk appears to increase to middle age, and then decline.

The prevalence of fibromyalgia in the general population ranges from 0.5% to 5%. Its estimated prevalence is 3-5% in the United States and 2-3% in Germany. In other literature it is reported that there are 12 million fibromyalgia patients in the United States, with 1.5 to 2 million patients in Germany. The proportions of this problem are huge and, in light of the clinical, anecdotal and research evidence for the efficacy of pulsed magnetic field therapy in fibromyalgia, it's time to work hard for heightened awareness of PEMF therapy for this group of patients!

Scientific literature on fibromyalgia:
A double-blind placebo-controlled study was conducted to investigate the effects of pulsed low-frequency magnetic fields on pain ratings in patients with rheumatoid arthritis and with fibromyalgia. Pain was evaluated using the McGill pain questionnaire, a visual analogue scale, and anxiety ratings. A significant improvement in pain ratings was noted for the active treatment group, with no significant improvement in the sham treated group. *(Shupak 2006/208)*

In a more recent double-blind placebo-controlled trial, PEMF-treated fibromyalgia patients showed a trend toward lower overall pain that approached statistical significance ($p = 0.06$) despite low numbers ($n=17$). This trend was not evident in the sham-treated group ($p = 0.93$; $n = 15$). *(Thomas 2007/209)* Due to pain-reduction effects that were most noticeable in the fibromyalgia patients included in this study, the authors called for a larger randomized, double-blind clinical trial with fibromyalgia patients exclusively.

Forty guinea pigs were divided into two groups and the rate of orthodontic tooth movement was measured in a 10-day experiment. 20 guinea pigs served as a placebo control, and the

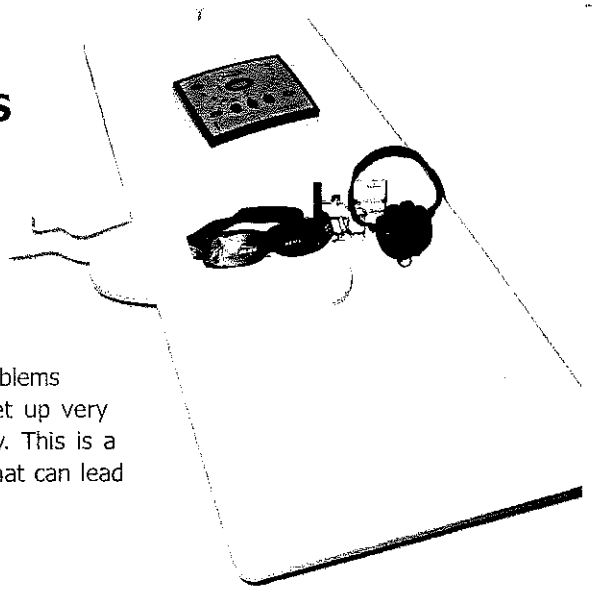
other 20 guinea pigs were exposed to pulsed electromagnetic fields. The treated animals showed a significantly increased rate and final amount of orthodontic tooth movement, and also demonstrated histologic evidence of significantly greater amounts of bone and matrix deposition in the area of tension between the orthodontically moved maxillary incisors. The authors concluded that it was possible to increase the rate of orthodontic movement and bone deposition through the application of pulsed electromagnetic fields. *(Stark 1987/193)*

Satake et al proved that pulsed electromagnetic fields act on cytoplasmic calcium ions (intracellular second messenger substance) to strengthen fibroblasts in the periodontal ligament, and that periodontal ligaments therefore have osteoblast-like features. *(Satake 1990/194)*

A randomized trial was conducted on 44 Wistar rats that concluded PEMF-induced vibration enhanced the effect of mechanical and magnetic forces on tooth movement. *(Darendeliler 2007/196)*

SIDE EFFECTS AND CONTRAINDICATIONS

SIDE EFFECTS



There are no known side effects from low intensity magnetic field application. However, we do recommend that people with orthostatic problems (dizziness when getting up) should get up very carefully after magnetic field therapy. This is a result of increased blood circulation that can lead to a redistribution of the blood.

ABSOLUTE CONTRAINDICATIONS

The following precautions should always be observed:

- **Do not use with acute inflammations**
  - For inflammation due to trauma, wait 24-36 hours.
  - For infectious inflammations, doe not use pulsed electromagnetic field therapy at all.
- **Do not use during acute flare-ups of autoimmune diseases or rheumatologic conditions**
  Examples include an acute flare-up of rheumatoid arthritis or SLE – even though it is unclear whether the stimulating effect of a magnetic field on the immune system has ever activated auto-immune bodies. Nevertheless, without flare-up it is safe to use low frequency, low amplitude pulsing electromagnetic fields (e.g., in multiple sclerosis (suspected to be an auto-immune disease) or ankylosing spondylitis (a seronegative spondyloarthropathy) during the phases when they are less "active" with a magnetic field in order to increase the flow of blood.)
- **Do not use during pregnancy**
- **Do not use with newborn babies younger than two weeks old.**
  After this the baby may safely accompany the mother on the whole body mat applicator at the "Sensitive" or "10" setting. (There are no reported harmful effects, and in fact, the frequencies and amplitudes used by the MRS 2000 are probably beneficial. This is just a precaution.)
- **Do not use with electronic implants**
- **Do not use with serious cardiac arrhythmia**
- **Do nut use during acute attacks of hyperthyroidism**
- **Do not use concurrently with prolonged oral steroid use without the supervision of a physician**

A magnetic field should not be used:

- **During pregnancy**
- **On new born babies**
- **With electronic implants** such as pacemakers or insulin pumps. However, this only applies to magnetic field therapy equipment with field strengths in the mT range. Magnetic field systems with the strength of the Earth's magnetic field (below 50 µT) are harmless. Since the probe applicator has field strengths to 70 µT, this applicator should not be used near the chest in someone with a unipolar (old generation) pacemaker. Please check with the manufacture of your pacemaker to make sure. If you have a bipolar pacemaker there is no risk of harm. If you use an insulin pump, simply turn it off and remove it if you can do so safely during an application of magnetic resonance stimulation.
- **Serious cardiac arrhythmia (Lown IV b and higher)**
  Cardiac arrhythmia manifests as either an increased heart rate (tachycardia) or a decreased heart rate (bradycardia). Arrhythmias can affect the atrium (upper chambers) or the ventricles (lower chambers) of the heart. When the ventricles beat too fast or out of rhythm this can be potentially life threatening. Ventricular tachycardia (rapid ventricular rhythm) may represent a contraindication to the use of pulsing electromagnetic fields.[19]
- **Acute attacks of hyperthyroidism**
  Hyperthyroidism is triggered by the uncontrolled production of thyroid hormones. It results in inner restlessness, hot flashes, palpitations, weight loss despite increased appetite, sleep disturbances and exhaustion. Due to the potential of magnetic fields to increase blood circulation and metabolism, magnetic field therapy is unsuitable.
- **While actively taking oral steroids**
  Oral steroids create changes to mood, bone metabolism, circulation and other cellular and systemic effects. Since the dosage of steroids must be carefully controlled, and since PEMF stimulation may enhance the assimilation of these compounds, magnetic field applications should not be performed without the supervision of a qualified health care specialist.
- **In the presence of metastatic disease**
  Please read the section on "Tumors" immediately below. In the case where cancer has metastasized the decision to apply electromagnetic field therapy must consider many factors, including the type of cancer, the prognosis, the current cancer treatment regimen, and other items. In general, metastasis contraindicates the use of pulsed electromagnetic field stimulation. There are exceptions, so ask a qualified, trusted health professional.

Important: A goiter (or "struma") usually indicates that a person is suffering from hypothyroidism rather than hyperthyroidism. If thyroid hormone replacement therapy has been instituted, it is because the thyroid gland is under-functioning. In this case, there is no contraindication to using magnetic field therapy.

[19] The Lown classification system for cardiac arrhythmias has been widely used. A Lown class IVb arrhythmia designates the presence of non-sustained ventricular tachycardia. This is a diagnosis that requires additional clarification by a cardiologist because this is a potentially life-threatening arrhythmia. It is often seen in hypertrophic cardiomyopathy.

RELATIVE CONTRAINDICATIONS

Magnetic field therapy should only take place under the supervision of a doctor or other qualified health professional in the following:

- **Malignancies and tumors**
  Patients with malignant and nonmalignant tumors should always be under the supervision of a competent healthcare provider. Do not undertake the application of magnetic field stimulation without consulting a qualified healthcare professional. Neither the MRS 2000+ designo® Systems providing magnetic resonance, nor any other pulsed magnetic field therapy device, can cure cancer.[20] Magnetic field therapy does not cure cancer.

  Furthermore, with reference to the MRS 2000+ designo® Systems, the manufacturer (MediConsult GmbH) states the following: "Magnetic fields with a field strength of less than 100 µT do not cause cancer – even if applied permanently, 24 hours a day, for years."

  We are faced with the fact that high frequency, high field strength electromagnetism represents a significant environmental toxin – something I have referred to as "electro-smog." And in fact, electrosmog may be carcinogenic (cancer causing). However, publications that fail to distinguish explicitly which frequencies and field strengths are suspected of carcinogenicity are confusing to the general public. One of the primary missions of the North American Academy of Energy Medicine is to increase public awareness regarding the beneficial effects of extremely low frequency (1-1000 Hz), low field strength magnetic stimulation to counteract electrosmog.

In 2001, a subcommittee of the World Health Organization (WHO) and the International Agency for Research of Cancer (IARC) published contradictory data that does not clearly explain the distinction between high frequency, high flux density electromagnetism (notably an environmental toxin) and the safe and therapeutically beneficial forms of electromagnetism in the 1-1000 Hz, 0.3 – 1000 µT range. In fact, their report suggests generically that magnetic fields may not be safe. *(IARC Monograph, 2001/215)* The report fails to mention that the test rats used to determine carcinogenicity of magnetic fields were first exposed to a chemical carcinogen, invalidating any conclusions that might be drawn from subsequent exposure to electromagnetism. *(Veyret/216)*

Risk of cancer from extremely low frequency (0-90 Hz), low amplitude electromagnetic systems is zero. Consider the fact that, in the case of modern magnetic field systems such as the MRS 2000+ designo®, the flux densities (field strength; amplitudes) used (0 – 980 µT) are in the µT range and for most settings equate with the strength of the Earth's magnetic field (26 - 66 µT). Consider also that the Earth's magnetic field used to be twice as strong

20 Disclaimer: The MRS 2000+ designo® systems are not intended to diagnose, cure, treat or prevent cancer, tumor diseases, or any other disease.

(150-200 μT) in centuries past. If 0-90 Hz frequencies are carcinogenic, then the Earth's Schumann waves are carcinogenic. If 0-200 μT is carcinogenic, then the Earth's geomagnetic field is carcinogenic. Obviously, this cannot be the case! The planet we live on, as a source of magnetic radiation, is non-toxic, and in fact, conducive to life!

To carry our comparison further, please note that magnetic resonance imaging (MRI) machines use magnets with field strengths of 1.5 to 3.0 T. These devices have up to 3 million times more field strength than the MRS 2000+ designo® systems. If the MRI, which uses 3.0 T, is deemed to be safe for the public to use, then the MRS 2000+ must be safe at 3 million times weaker field strengths.

Your kitchen's toaster, your vacuum cleaner and a typical heating pad have a field strength of 100 μT.[21] Your color television has a strength of 500 μT. Your cooker, shaver and desk lamp have electromagnetic flux densities of 1000 μT or higher. The WHO is not concerned about these common conveniences because these levels of electromagnetism are safe.

There are numerous in vitro laboratory studies that reveal how the metabolism and proliferation of cancer cells are activated by magnetic fields outside the biological window. These in vitro findings show that certain magnetic fields can promote the growth of tumor cells in a test tube. But it does not follow that extremely low frequency, low amplitude magnetic fields cause cancer in living humans (in vivo). The cells of the human body, including potential cancer cells, are subject to numerous central control mechanisms. This is not the case "in vitro." The test tube cells are entirely detached from built-in biological controls.

A significant number of physicians and scientists have managed to achieve remarkable immune stimulation with magnetic field therapy without causing the malignant tumors to progress or change in any way. It is doubtful, at the time of this writing, that immune stimulation from pulsed electromagnetic field therapy is sufficient to arrest the growth of a tumor. This is because cancer cells have inborn protections against the bodies endogenous immunity. In any case, clinical experience using the MRS 2000 with many cancer patients in Europe reveals that most cancer patients experience improved vitality with decreased pain (due to the endorphin effect).

21 So if kitchen appliances have low electromagnetic field strengths, can't they be used as wellness devices? The answer is no! Don't go near your toaster while it's working – you'll get burned! All common appliances run at 60 Hz. These are outside the biological window for health effect as discussed earlier in this book.

Important points to remember in the case of malignancy:

1. Magnetic fields in the therapeutic range do not cause cancer.
2. Even in "the worst-case scenario" of the intentional or unintentional exposure of a primary malignant tumor (diagnosed or undiagnosed), the electromagnetic effects that are believed to promote cancer and others which clearly inhibit cancer growth (such as alkalization and oxygenation of tissues) cancel each other out.
3. Malignant tumors are averse to the oxygen-rich environment created by pulsed magnetic field therapy. Cancer is extremely sensitive to increases in the partial pressure of oxygen – slowing down its growth and proliferation. However, general cell activation (upregulated protein synthesis) invoked by a magnetic field has not been shown to be advantageous to the tumor cells. To the contrary, cancer regression has been observed in vivo using magnetic fields. *(Ogorodnikova 1980/217; Malter 1987/218)* Cancer cell growth inhibition was shown by Sarimov using pulsed magnetic fields tuned to the frequency of the first harmonic of zinc (Zn++). *(Sarimov 2005/219)*
4. In the case of new metastatic tumors (daughter tumors which grow considerably faster than the original tumor) magnetic field effects that promote tumor growth may predominate. In such cases pulsed magnetic field exposure should not be performed; it is contraindicated.
5. In the case of advanced cancer with poor prognosis (e.g., end-stage disease) magnetic field exposure seems to have beneficial effects in vitalizing the body and in pain relieving properties (endorphin formation). These effects may significantly improve the quality of life for the time remaining for the loved one.

- **Epilepsy**
  In the past it was believed that magnetic field therapy could trigger an epileptic seizure. Such an opinion can no longer be supported for applications of magnetic field exposure in the µT range (such as those provided by the MRS 2000). Observed increased frequency of seizures are based on field strengths in the mT range or stronger. To the contrary, several studies have proven that the frequency of epileptic seizures actually decreases in conjunction with pulsed magnetic field therapy using very low field strengths (between 0.1 nT and 1 µT). *(Weinstein 2001/210; McLean 2001/211; Ossenkopp 1991/212)*

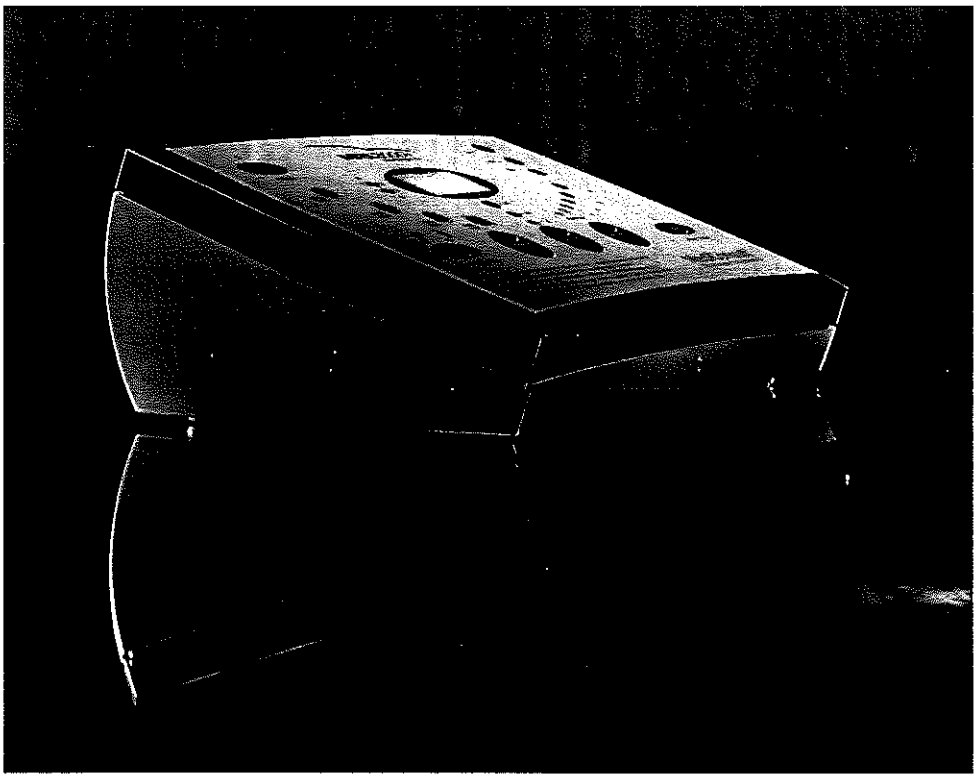
  In a cohort of over 150 patients with various forms from epilepsy treated over a 2 ½ year period, Sandyk and Anninos were able to attenuate seizure activity using magnetic field therapy. *(Sandyk 1992/213)*

- **Patients on anticoagulants**
  Magnetic field therapy energetically separates red blood cells leading to a relative blood thinning effect. This may augment blood that is already thin enough.
- **Disorders of excessive calcium metabolism**
  PEMF stimulation can increase intracellular calcium, but may alter extracellular calcium as well. Ask your doctor if magnetic field support is right for you, based on your condition.
- **Patients on immunosuppressant drugs**
  Magnetic fields tend to strengthen immune response in a variety of ways. Therefore, in clinical scenarios where the immune system must be weakened intentionally, such as in organ transplants, magnetic field therapy may be contraindicated.

- **Patients on growth hormone suppressant drugs**
  Magnetic fields may promote the release of growth hormone through a variety of mechanisms discussed above. For conditions where there is excessive growth hormone, this effect would be contraindicated.
- **Any patient with any rare disease where the pathophysiology needs to be considered** Such patients should consult a qualified health care provider prior to starting a course of magnetic field stimulation.

PRACTICAL USE & APPLICATION

Basics for using the MRS 2000+ designo® Systems

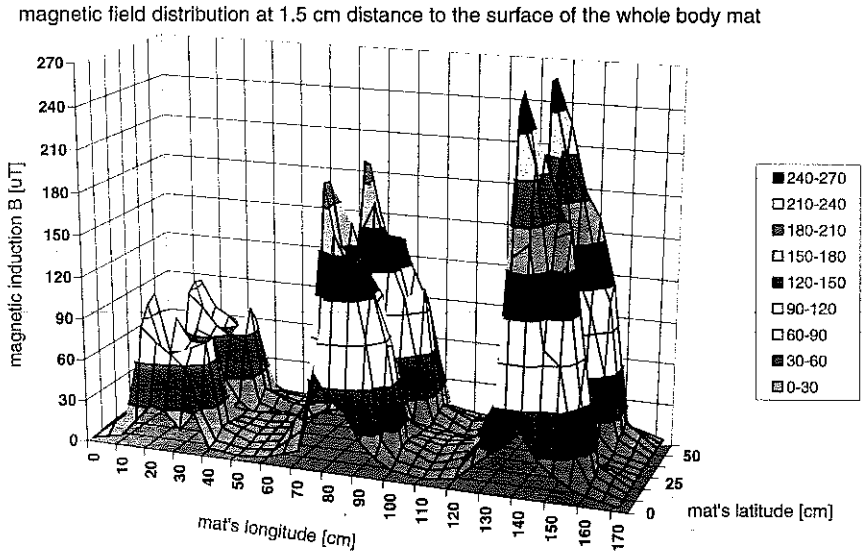


"MRS" is an abbreviation for magnetic resonance stimulation. The MRS 2000+ designo® systems provide pulsating magnetic signals at frequencies and intensities that have been proven to have a beneficial effect on health and biological support. Energy in the form of are transmitted as purposeful information to unhealthy cells whose function has been disturbed.

Every MRS 2000+ session consists of three key elements: the control unit, the applicator, and the area of the body that will be the focus of application. The control unit generates electrical pulsations with specific shape, duration, frequency and amplitude characteristics. At specifically programmed time intervals, these pulse contours are sent to the applicator in use (either the whole body mat, the local pad, or the probe), and converted by copper coils in the applicator into a pulsating magnetic field. The applicator to be used, intensity of magnetic field used and the duration of session are selected on the front panel of the control unit.

For sessions using the whole body mat, a selector button for current time block is also used. The MRS 2000+ control unit delivers one of 4 different programs to the whole body mat, each one designed to deliver the best energetic signal based on the time of day. Biological rhythms exist in nature with which we are familiar. For example, a rooster crows at dawn. Our bodies have similar rhythms. Acupuncture recognizes and uses these daily cycles of energetic fluctuation in its methods through the use of the Chinese Organ Clock. In the same way, the physicists, engineers and physicians who developed the MRS 2000+ incorporated circadian rhythms into the MRS 2000. When using the whole body mat, one need only select the time of day in which the application is being provided, and the control unit automatically delivers the optimal pulsating magnetic field.

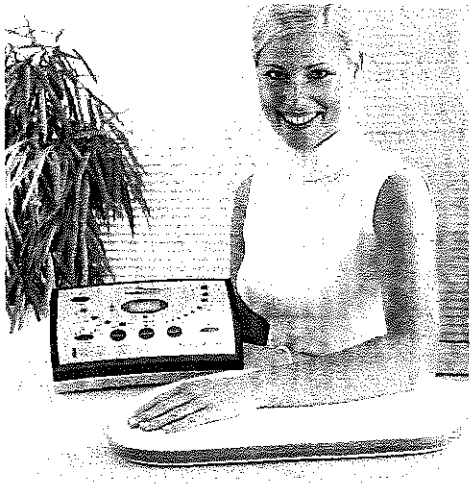
The whole body mat uses 3 pairs of coils: one pair at the upper third of the mat, one pair at the middle third, and one pair at the lower third. The field contours produced by these coils have been graphically mapped by clinical researchers, and are shown in Figure 2. (From Bioelectromagnetics 27:365-377 (2006) by Gwechenberger, Rauscha, Stix et al. Reproduced with permission of John Wiley & Sons, Inc.)



[illegible] magnetic induction along the whole body mat's surface (peak [illegible] 270 ± 20%. The other available therapy programs show [illegible] distribution deviations less than 15%). [The color figure for this [illegible]]

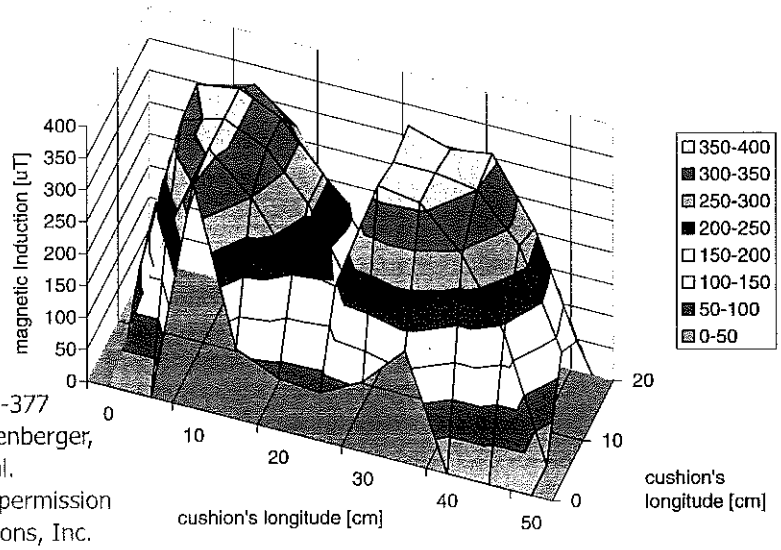
The whole body mat is used for whole-body sessions, for enhancement of systemic regulatory actions of the body, for enhanced circulatory effects and oxygen delivery, for improving energy, stamina and sleep, and for overall wellness. The 3 pairs of coils in the whole body mat produce a sawtooth magnetic waveform.

The pad and the probe are used for local applications. Since circadian rhythms (also known as biorhythms) are a function of the whole-body as a unit, and not a local



function, selecting the pad or the probe will disable the lights above the program button on the control unit. This happens for two reasons. First, the 4 time-dependent treatment programs are not needed. Second, the systemic benefits of the sawtooth waveform are not utilized.

magnetic field distribution at 1.5 cm distance to the surface of the applicator cushion



From Bioelectromagnetics 27:365-377 (2006) by Gwechenberger, Rauscha, Stix et al. Reproduced with permission of John Wiley & Sons, Inc.

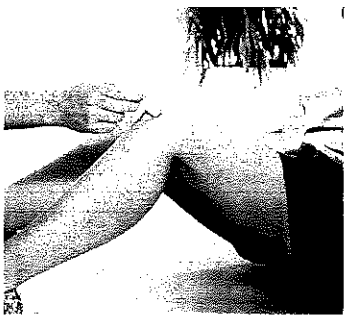
The pad uses 1 pair of coils with an equal number of copper windings to generate two symmetrical electromagnetic field contours The control unit delivers electrical impulses to the pair of coils in the local applicator pad that are converted into a square-shaped electro-

magnetic impulse. This waveform has been shown to have specific benefits for local treatment including manipulation, analgesic therapy and muscle relaxation. See Figure 4.

Similar to the applicator pad, the control unit delivers signals that are converted to a square waveform to the local applicator probe. The probe is used for analgesic application to arthritic joints, sinus infections, stimulation of acupuncture points, sports injuries and a variety of other ailments.

The probe is the applicator that converts electrical impulses to the highest intensity average of pulsed magnetic field – to 70 μT. The maximum average output of the whole body mat and local applicator pad is 40 μT each. Maximum output is reached for each applicator when the control unit is set at "400" on the MRS 2000+ designo® MED system, and "200" on the MRS 2000+ designo® HOME system.

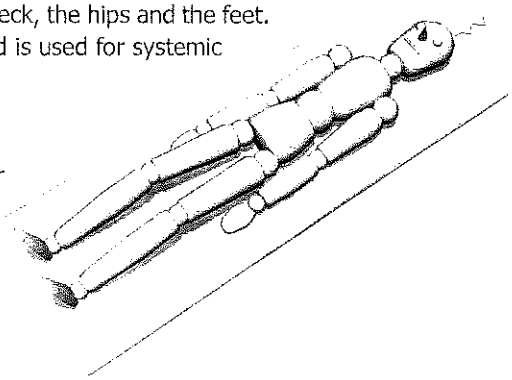
The probe is not included with the HOME system. Different circuit boards are used within the control units of the HOME and MED systems, and because of the way they are manufactured, there is no upgrade pathway from the HOME system (the system without the probe – maximum output to 40 μT) and to the MED system (where the probe is included and the maximum output is 70 μT through the probe applicator).



The SLRS, or Sound Light Relax System, includes two optional components that can be added to either the MED system or the HOME system. These components consist of the visual and the auditory stimulus components. The visual stimulus is comprised of a series of computer-controlled pulsed light signals that vary their pattern and frequency with time. These are delivered by wearing a special pair of sunglasses or goggles. The auditory stimulus is similarly comprised of a series of computer-controlled acoustic signals that vary with time. These are delivered through headphones. The SLRS system (with goggles and headphones) is used in conjunction with the whole body mat applicator to support relaxing or stimulating applications.

Proper use of the whole body mat

The mat has 3 pairs of coils located at the neck, the hips and the feet. The mat uses a sawtooth-shaped signal and is used for systemic health and wellness benefits.



Here are basic guidelines for selecting field strength: The older you are, the longer your health has been compromised, the more fatigued you are, the thinner you are and the more nervous you are, the lower the intensity you should use with the whole body mat.

Conversely, the younger you are, the more athletic, the more recent the onset of an illness, the better balanced, or the larger you are in body type, the higher the intensity you should start with.

Note: If you have recently had surgery (see specific section on this) you should start by using the lowest setting, which is "Sensitive." This setting is basically a logarithmic attenuation of signal strength.

One end of the whole body mat has the cord for connection to the control unit. The cord-end of the mat is always the end at which the head is positioned. The mat is covered with vinyl on both sides. There is no "up" side or "down" side. The mat can be flipped over and used on either side. The reason is because the pulsating magnetic fields emit from the coils perpendicular to the plane in which the coils lie, and they emit in both directions.

Lie on the mat face up. If you have back pain, bend your knees. The mat can be placed on the floor, a massage table, or a firm mattress. It should not be placed on a surface where the mat will bend, indent or deform from being flat. The copper coils should not be bent, so the mat should never be rolled, and it should never be folded in places other than the folds that were present when the mat was shipped. These folds do not disturb the 3 pairs of coils in the mat. The whole body mat applicator (and the pad applicator, too) should never be moved or carried by its cord because the cord can loosen or dislodge from its point of attachment. The mat (and pad) should always be transported using the travel bag that was designed for this purpose.

Basic Whole Body Mat Home Use
Use the Whole Body Mat at Home in the following scenarios:

For Wellness:
For wellness and prevention in young and athletic people up to the age of 50, use the whole body mat 8 to 16 minutes per day at a setting between 10 and 50.

For Support:
To support the body in time of illness, stress or threat to the immune system, use the whole body mat 8 to 16 minutes 2-3 times daily at 25 in the morning, 25 mid-day, and 10 at night before bed.

Note: Studies have shown that the cells of the body may desensitize over time in response to pulsating magnetic fields. That means that the intended beneficial biological effects diminish with continued repetition. For this reason, the MRS 2000 delivers packets of energy that are time-varying with regard to the impulse delivered, and also with regard to the rest phase in between the impulses. To fully prevent any desensitizing effect, it is advisable to use the whole body mat applicator no more than one hour per day, and periodically to interrupt the use of the mat for one or two days. In applying energies of various forms to the human body for the improvement and maintenance of wellness, "less is more."

When the probe and the pad applicators are used, it is often in the context of a specific, localized condition. In this instance, the pulsating magnetic field may be used for several hours per day. In the case of bony healing pulsating magnetic fields have been used in the literature variably from one hour per day to 10 hours per day with no reported adverse effects. The same is true for wound healing and skin ulcerations.

In my experience, most conditions for which a local applicator would be used require no more than 2-4 applications per day using the MRS 2000. And in most cases, the optimal treatment time is between 8 and 16 minutes.

USING THE MRS 2000 IN CHILDREN – GENERAL INSTRUCTIONS

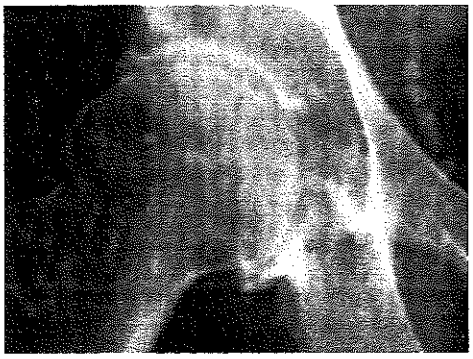
Common questions arise regarding the use of the MRS 2000+ designo® MED and HOME systems in children. Is there a minimum age requirement? Within certain age ranges should the session intensity and/or duration be adjusted? This section is provided to answer these questions.

There is absolutely no harm using magnetic resonance stimulation with infants > 2 weeks old who accompany their mom or dad on the whole body mat. My recommendation is to use an intensity setting of "sensitive" or 10 to begin with, and not go above a setting of 25. Infantile colic may improve with sessions on the mat. If unattended it is recommended that an infant young child be placed on the whole body mat (e.g., in a crib or protected area only) at the "sensitive" setting only.

The local applicators – the pad or the probe – are not necessary in the absence of any physical complaints or symptoms. The whole body mat applicator is best to support wellness of your infant or child. If the local applicators are used to support a localized health condition it is recommended to follow guidelines listed elsewhere in this text for that condition (if available), and to use only the lowest intensities ("sensitive" to 10.) Once the initial response of your child is known, intensities may be gradually increased, but this is usually not necessary.

The duration of treatment in infants should be 8 minutes maximum regardless of the applicator used.

ORTHOPEDICS



There are no known side effects from magnetic resonance stimulation. However, we do recommend that people with orthostatic problems (dizziness when getting up) should get up very carefully after magnetic field sessions. This is a result of increased blood circulation that can lead to a redistribution of the blood.

Overall, the following precautionary guidelines apply: Do not use in the case of acute fever. Although there is no definitive evidence that extremely low frequency magnetic fields activate autoimmune antibodies, more clinical research is necessary. In the meantime, do not use the MRS 2000 during acute attacks of autoimmune diseases (such as in a acute flare-up of rheumatoid arthritis or systemic lupus erythematosus, etc.) On the contrary, years of clinical experience and published case reports suggest a sufficient margin of safety in the use of pulsating magnetic fields for wellness benefits in people with autoimmune diseases (such as those listed above and such as ankylosing spondylitis (morbus Bechterew), enteropathic arthropathy, colitis and irritable bowel syndrome) when they are less "active" in order to take advantage of the magnetic field's enhancement of blood flow.

Description - Osteoarthritis

Arthritis is one of the most pervasive diseases in the United States and the leading cause of disability. According to the Centers for Disease Control and Prevention, it is estimated that 1 of every 3 Americans is affected by the more than 100 types of arthritis. Pain and inflammation, particularly of the joints throughout the body, characterize arthritis.

Osteoarthritis, also called degenerative joint disease, osteoarthrosis, or simply arthrosis, is the most common form of arthritis. Osteoarthritis is the "wear-and-tear" form of arthritis that occurs when joint cartilage deteriorates over time.

Osteoarthritis can affect any joint in the body, though it most commonly affects joints in the hands, hips, knees and spine. Osteoarthritis typically affects just one joint, though in some cases, such as with finger arthritis (e.g., Kellgren's arthritis), several joints can be affected.

Osteoarthritis can gradually worsens with time, and no true cure exists. Taking pro-active steps to manage osteoarthritis is essential to curb the potentially debilitating effects of this disease.

Nutritionally, glucosamine sulfate 1500 mg per day has been shown to regenerate cartilage, or at least slow the rate of degeneration. Glucosamine sulfate is 80% absorbed. In contrast, chondroitin sulfate is only 17% absorbed. These nutritional supplements compete equally for binding sites, and therefore chondroitin sulfate compromises the absorption of glucosamine sulfate. Many vitamin companies bundle glucosamine sulfate with other substances, including MSM. My advice is to take pure, pharmaceutical grade glucosamine sulfate by itself for the best impact on osteoarthritic joints. The smaller joints of the hand may be slower to respond to glucosamine sulfate therapy. I had one patient who had arthritis of his hands so bad he could not make a closed fist. In fact, it was difficult for him to even bend his fingers. He began using glucosamine sulfate as I had prescribed, and he experienced no response for the first 3 ½ months. However, in the fourth month, he experienced major improvements to the point where he was able to close his fist fully. Continued use of glucosamine sulfate has maintained this improved function and elimination of arthritic pain.

Anti-inflammatory medications are effective, but the side effects are often intolerable. These medications tend to acidify the body as well, with far-reaching ill effects with long-term use. In some cases, however, anti-inflammatory medications are the best therapy available for certain individuals.

The knees, the shoulders, the fingers and the wrists are significantly impaired daily activities when osteoarthritis is present. One of the most powerful tools in these joints is the probe applicator of the MRS 2000 Med System. At a setting of 400, the probe can be used for 1-16 minutes for any singular painful joint afflicted with osteoarthritis. What might take glucosamine sulfate four months to achieve can sometimes be achieved in one, singular half-hour session using the probe methodically from joint to joint as the pain dictates.

Settings and application

For osteoarthritis, use the whole body mat twice daily for eight minutes. Start at an intensity setting of 10, and work towards 25 to 100 in the morning or afternoon, depending on body size and overall health. In the evening use a setting of 10. Use the pad applicator 2-3 times per day at 16-24 minutes each to the affected part. Larger joints require a longer session time and/or a higher intensity setting. For example, the hip joints can be addressed for 16 minutes at a setting of 200. For smaller and mid-size joints begin using the probe applicator at 200-400 for 1-8 minutes, depending on the size of joint being addressed. The knee joint, the largest joint in the body, can be exposed for 16 minutes several times daily.

Description

Arthritic sensitivity to weather occurs in conjunction with osteoarthritis, rheumatoid arthritis, fibromyalgia, and a host of other degenerative conditions of the joints and connective tissues. Many people have a grandmother who could predict damp weather more reliably

than the weatherman. Grandma was listening to her joints. They rarely tell a lie. Specific conditions associated with arthritic sensitivity are discussed elsewhere. The main point of this section is to point out that benefits to synovial tissues, ligaments, cartilage, and supportive muscle and tendon derived from pulsed magnetic field therapy also accrue to "the joint that tells you it's going to rain."

Settings and application

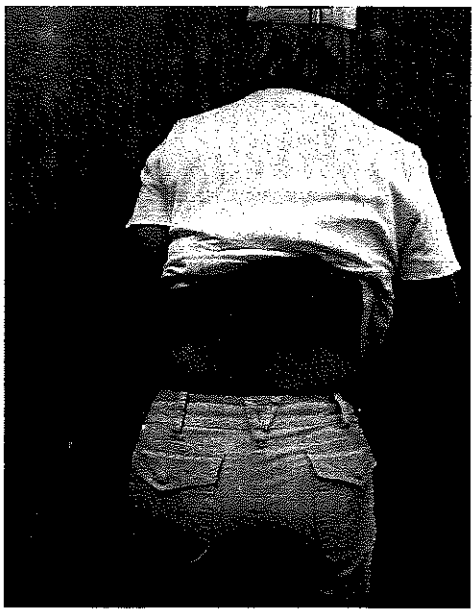
If you have joints that are better than a barometer in predicting the weather, use the whole body mat to support healthy joints and connective tissues 3 times per day at a setting of "sensitive" or 10 initially. You can increase the intensity setting from there as your needs and preferences dictate.

Description

Herniated discs are the bane of modern man. While 80% of all citizens of industrialized nations experience back pain, about one in 10 of these cases require treatment for the diagnosis of herniated disc. While herniated discs can occur as the result of trauma, more often the root cause is inactivity combined with an acute episode of overactivity and overload. In a nutshell, modern man suffers with "the lack of variety of movement." We no longer hunt for our food, or gather grain to make bread. We get up in the morning and sit at the breakfast table. We get into the car and sit for the commute to work. Perhaps we take the subway or bus, but we sit all the same. We arrive at work, get to the desk and, you guessed it, sit. For recreation, we go to the opera, the theatre, a sporting event, and ... sit! Or maybe we'll just stay at home, rent a movie, take our place on the couch, and sit. Our trunk muscles lose tone, our hamstrings become tight, our gluteal muscles become weak, and little by little our discs start to dry out. They lose fluid through the vertebral body end plate. Once this fluid loss process begins to take place, something as trivial as bending forward to pick up the morning newspaper can provoke a breakdown in the outer layers of ligamentous tissue called the annulus fibrosis. Annular tears are the result. These severe back pain episodes that arise from disc breakdown, but do not irritate the nerves that pass into the buttocks, thighs, and calves.

When circumferential tears in the annular fibers of the disc coalesce into radial tears, nuclear material under high pressure begins to seep out, producing a disc herniation. This nuclear material contains highly inflammatory chemicals that irritate the nerve roots, giving rise to sciatic pain. Pain, numbness, burning, tingling, and other sensations

can be experienced in the buttocks, thighs, calves and feet as a result. Usually the pain is unilateral, and most often involves irritation of the nerve root at one disc level only. Contrary to popular belief, the pain does not result from compression of the nerve root by the bulging disc, but rather, from the chemical irritation of the nuclear material about the nerve root sheath.



Patient with antalgia to the right due to low back pain.

The pain of a herniated disc is often very severe, and the patient presents bent over to one side. This is called antalgia. Most often sitting hurts the worst, and bending forward produces increased pain in the back, into the buttocks, and down the leg. In more severe cases, weakness develops, with loss of power in rising up on the toes, ascending the stairs, or walking on the heels. Neurological examination often reveals a loss of reflex in these more severe cases. The most worrisome finding for the physician is the loss of strength, and this may provoke a recommendation for surgical consultation.

This severe pain of a herniated disc is accompanied by muscle spasm. This muscle spasm is often quite severe as well, and leads to confusion in making a correct diagnosis. Often times the pain of muscle spasm eclipses the pain emanating from deeper structures, and a misdiagnosis of muscular back pain is made. Importantly, the muscle spasm contributes to, and perpetuates, the discogenic pain by increasing internal disc pressure. When muscles that cross the disc space have more tension, more disc compression results. The MRS 2000 is powerfully effective in releasing tension from these muscles, and this effectively provides for the reduction of pressure and compression within the disc.

Effective treatments for herniated discs include manipulation and mobilization, nonsurgical spinal decompression, McKenzie extension exercise protocols, intrinsic stabilization exercises, and the avoidance of forward bending and prolonged sitting. Acupuncture is effective for pain, while massage therapy usually aggravates the condition if begun too soon. Clearly, massage is helpful once the severe, acute pain is under control.

"Hundreds of cases of disc herniation in Denver have been managed successfully have been managed successfully at The Center for Spine Pain & Weliness using MRS 2000 in conjunction with other modalities. In some cases, the MRS 2000 has proven to be indispensable. Patients reaching a therapeutic plateau may be able to progress much further, and often they resolve fully once MRS 2000 treatment is added to the treatment regimen.

Settings and Application

In a specific effort to relax the tight paraspinal muscles, we use the whole body mat at a setting of 10 for 24 minutes. This has yielded the most consistently positive results in people suffering from severe back or neck pain due to disc herniation, enabling us to begin non-surgical spinal decompression therapy and/or exercises sooner, accomplish gentle supportive chiropractic adjustments with greater effect, and shorten the time to recovery. We also use the pad for 16 minutes at an intensity setting of 200 to the low back for most patients with lumbar disc herniation, and at 100 for most patients with cervical disc herniation.

Description

Low back pain affects 80% of all Americans, with a point prevalence of 11%. This means that, at any given moment, just over one of every 10 people is experiencing back pain. Most back pain resolves spontaneously. It is often associated with overexertion, but just as commonly, it is related to inactivity. In fact, it is my experience decades of treating back pain that it is the lack of variety of movement that is the bane of industrialized nations. This lack of variety of movement is squarely at the root of modern society's back pain problem. We no longer hunt for food or gather berries and nuts. In certain cultures back pain is virtually unknown. People of these cultures squat rather than sit. They are extremely flexible, and obesity is virtually unknown among them. I have discussed specific forms of back pain under the headings "Degenerative Disc Disease," "Herniated Disc," and "Synovitis (Facet Syndrome)." My current discussion addresses back pain as a muscular entity.

Sleeping positions, lifting technique, and proper ergonomics and work postures are essential for managing and preventing low back pain. Equally important are the strength of your "core" muscles – the tranversus abdominus, the lumbar multifidus, the gluteal muscles and the abdominal muscles. When the spinal muscles become overactive, spinal joints, called facet joints, become compressed and can become locked. Even for muscular syndromes, chiropractic manipulation and adjustments are the fastest, most effective means of restoring proper joint health. Manipulations signal the muscles through reflex pathways to relax. The sooner one receives chiropractic adjustments for acute back pain, the more quickly full resolution of symptoms is achieved. Many studies prove that manipulation is the treatment of choice for acute back pain, and outperforms medication and exercise. Often exercises are introduced too soon, only to make the problem worse.

Muscles that have been deprived of oxygen for a sustained period of time routinely respond well with concurrent use of the MRS 2000. The beauty of the MRS 2000 is that it is a non-thermal form of therapy. Heat, especially in acute (recent onset, often severe) back pain, is pro-inflammatory and will usually increase pain once it is withdrawn from the back and the tissues are allowed to cool off. By using a heating pad, you can effectively turned a "three-day problem" into a three-week episode of aggravated back pain. Ice is anti-inflammatory and is strongly recommended in the acute phase of back pain.

In addition to the chiropractic adjustments and the MRS 2000, acupuncture, massage, and topical liniments can be helpful. Once the acute phase of pain is resolved, trunk strengthening is essential. Intrinsic stabilization training, Pilates, and other forms of rehabilitation can prevent recurrence of symptoms.

Settings and application

Use the mat applicator twice daily for eight minutes each. Start at an intensity setting of 10, and increase to a setting of 25. Use a setting of 10 in the evening. For acute low back strains, use the pad applicator 3-5 times per day for 16 minutes at an intensity setting of 150-200. For mid-back pain, use an intensity setting of 100. In the case of neck pain begin using the local pad applicator at an intensity setting of 25-50.

Comments

Do not use a heating pad. Instead, use ice 15-20 minutes twice per hour. Avoid bending forward, twisting, and stooping. The MRS 2000 yields excellent results when used properly in conjunction with the principles discussed above.

Description

Sciatica classically refers to sharp, burning, tingling, or aching pain down the buttock, thigh, calf and foot. Sciatica was so named because of a presumed pinching of the sciatic nerve, the largest peripheral nerve in the body. However, this is a misconception. While there is a syndrome involving pinching of the sciatic nerve directly, called piriformis syndrome, direct peripheral nerve involvement is not common.

The most common cause of sciatica is pinching of a nerve root in the low back just as the nerve branches off the spinal cord. Hence, sciatica is not a problem of the thigh or buttock, it is most often a problem originating. Pinching of the nerve root in the low back is called "radiculopathy." Herniated discs in the low back often cause radiculopathy. Sciatica can also be caused by a narrowing of the channel through which the nerve root passes out of the spinal column on its way to forming the sciatic nerve. This is called "foraminal stenosis."

It is not uncommon for sufferers of sciatica to believe they have a problem with their hamstring muscle, or some other muscular problem. Sometimes sciatica is misdiagnosed as a hamstring tear. They will seek massage or other muscle therapies, which help temporarily, but the pain returns. As noted elsewhere in this text, since the primary culprit producing the pain is

usually an inflammatory reaction between the nerve root and noxious chemicals being released by the disc, no amount of muscle therapy will produce lasting results. The most effective approach is to reduce the inflammation around the nerve root, and if there is a discogenic cause, to stop the disc from leaking noxious chemicals. In the much less common case where the sciatic nerve is truly entrapped by the piriformis muscle, the goal is to reduce the mechanical irritation within the sciatic nerve as it passes through, over, or under the piriformis muscle.

The powerful anti-inflammatory effects of pulsed magnetic fields are a valuable treatment adjunct in cases of sciatica, no matter what the cause. It is important to position the pad applicator of the MRS 2000 so that one coil covers the low back where the nerve root could be inflamed, while the other coil into pad covers the sciatic nerve over the piriformis muscle.

Settings and application
In severe cases of sciatica, the whole body mat applicator can be used up to three times per day. Start with an intensity setting of 25, and increase if necessary to 50 or 100, depending on body size, overall health and results obtained. In the evening, always use a setting of 10 initially. The pad applicator, positioned as described above, can be used 2-3 times per day for 24 minutes at a setting of 150-200.

Description
See "Sciatica" and "Herniated Disc."

Settings and application
See "Sciatica."

Description
Cervical myelopathy can be described as pressure to the spinal cord resulting from degenerative change in the neck. See "degenerative disc disease" above for a description of how this degenerative change begins. Cervical myelopathy usually affects people beginning in their sixth decade of life, and manifests as tingling, numbness, or weakness in the arms and hands on both sides. One experiences difficulty buttoning a shirt or performing fine motor skills,

and when severe, there are changes in handwriting. This can be appreciated by looking at progressive changes in handwriting in a check register, for example. People with cervical myelopathy may experience changes in gait due to a slower transfer of neurological information to and from the brain through the cervical spinal cord. Walking slowly may be normal; however, when forced to walk with greater velocity, disturbance of gait becomes evident. Clinically, a positive Hoffman's reflex is often present, with increased reflexes and possibly a Babinski response at the ankles. It is my observation that cervical myelopathy is often overlooked diagnostically, and therefore treatment is delayed.

Cautionary Note: When untreated, severe cases of this disorder may lead to permanent disability. It is essential to be under the care of a competent, knowledgeable and experienced spine specialist, which may include a properly trained chiropractor, physician or spine surgeon. The use of the MRS 2000, as in all cases of illness and disease, has value as a wellness device in supporting suppleness of muscles, the range of motion of joints, blood circulation, and regulation of the nervous system.

Settings and application

The whole body mat applicator is used twice per day for eight minutes. Begin at an intensity setting of 10, working to 50 for morning use. Use an intensity setting of 10 in the evening. The pad applicator can be used up to three times per day for 16 minutes at an intensity setting of 20-50, and up to 100 in exceptional cases. Literature from Europe indicates an initial reaction in 3% of cases. Overall satisfactory results are reported in 60% of patients. Again, the MRS 2000 is an ancillary, supportive measure. When symptoms are progressive, the advice of a qualified spine specialist should be sought.

Description

Muscle tension and muscle splinting can be a response to blunt trauma, to pain or injury of a deeper tissue, bone or ligament, or in response to pain signals originating in an internal organ, such as in acute appendicitis, tubal pregnancy, gastritis or more ominous syndromes such as a tumor or cancer. Sustained or progressive cases should be evaluated and properly diagnosed.

When muscle tension and splinting are acute and have a clearly identified cause that is benign and does not require professional attention, improving circulation, relaxing and balancing the autonomic nervous system and facilitating cellular intake of nutritive fluids may be of profound benefit. Magnetic resonance stimulation may be as effective as massage therapy, acupuncture and chiropractic adjustments for some people. Many patients with chronic tension at our clinics in south Denver have significantly reduced their need for our outpatient services through the home use of the MRS 2000.

Chronic tension is a primary manifestation of stress. Stress, in our society, is literally killing us. We don't achieve deep, restorative sleep and, as a result, we are unable to release growth hormone to regenerate and replenish our tissues and feel young, vibrant and alive. Adrenaline is overactive in our bodies. Blood vessels are and our tissues do not receive adequate levels of oxygen. Our stress response, what Hans Selye calls the "general adaptive" is fundamentally responsible for much of the heart disease and chronic degenerative diseases with which our society is afflicted.

The value of magnetic resonance stimulation for stress and chronic muscle tension is obvious. By restoring sleep, the natural restorative processes of the body are engaged through normal nocturnal hormone release. Blood circulation and tissue oxygenation is enhanced. Cells and tissues repair. The autonomic nervous system is regulated and muscle tone is relaxed and softened.

Settings and application
The key component in treating muscle stress and splinting is magnetic resonance stimulation using the whole body mat. The mat is used three times per day for 8 minutes, beginning at a setting of 25 and increasing to 50 or 100 as tolerated for morning and mid-day applications. Use an even higher setting if you are large, tall, extremely muscular or particularly young and healthy. An evening setting of 10 is recommended before bed to enhance sleep.

The pad applicator can be used for local applications twice daily for 16 to 24 minutes at 50 to 100 for the neck and shoulders, shoulder blades, arms and legs. Use a setting of 100-200 for the low back and buttocks.

In my experience, a strongly positive response is noted in at least 90% of people who use the MRS 2000 regularly at home.

Muscle aching associated with colds and flu

Description
Muscle aching associated with colds and flu is called "myalgia." It usually resolves when the underlying viral infection resolves. Magnetic resonance stimulation is used for supportive, calming and symptomatic relief.

Settings and application
Use the whole body mat applicator 3 times daily for 8 minutes each beginning at 50-100 in the morning, 50-100 in the afternoon, and 10 in the evening.

Precautionary Notes: Do not use magnetic resonance stimulation in the case of a moderate or high fever (e.g., fever greater than 100° F in an adult and 102° F in an child under the age of 12.) The increased body temperature may indicate a bacterial infection for which antibiotic therapy is required. All cases of influenza and fever should come under the care of a competent health care professional. Among the elderly, influenza can lead to pneumonia and death.

A. Whiplash / Acceleration-Deceleration Injury

The term "whiplash" describes injury to the neck following a motor vehicle or car accident. The most common type of car accident is the rear impact, and the driver or passenger of a vehicle that gets "rear-ended" is at the greatest risk of injury.

Historically, whiplash has been poorly understood, and has been shrouded in medicolegal issues due to monetary claims over injury. However, recent research has helped clarify why occupants struck from behind experience more extensive injuries than those in other types of crashes. Significant ligamentous disruption occurs and is often undiagnosed, under-diagnosed, or summarily dismissed. Whiplash injuries of the neck are positively associated with an increased rate of degenerative change in the cervical vertebral column.

Whiplash injuries can be complex and may include a variety of related problems, some of which can be serious and may result in the need for surgery. These include: joint dysfunction, disc herniation with or without neurological injury, chronic myofascial injury, concomitant shoulder injury, faulty movement patterns, chronic pain, and closed head injury.

The most common symptoms in whiplash include neck pain, usually on one side, and arm symptoms. Radiating pain can expand to the inside of the shoulder blade or upwards from the neck over the top of the head. Oftentimes pain, tingling, numbness or burning will extend to the fingers. This usually raises the suspicion of a cervical disc herniation with nerve root pressure. When tingling, numbness or pain is restricted to the thumb and first finger, a disc herniation at the C5-6 level is usually present. However, when tingling, numbness or pain is restricted to the fourth and fifth fingers, a myofascial pain syndrome involving the shoulder girdle muscles is more common than disc herniation. When a herniated disc produces radiation of symptoms to the hand in the 4th and 5th digits it most commonly involves the C7-T1 disc. Tingling, numbness or pain involving the middle finger often raises suspicion of a disc herniation at the C6-7 level in the neck. In all cases, neurologic injury should be ruled out and may require consultation with a spine specialist, such as an appropriately trained chiropractor, osteopath, physiotherapist, or spinal surgeon. The most worrisome finding on examination is muscle weakness, as this may be progressive or permanent if not diagnosed or treated properly. Paralysis, or the threat of paralysis, is extremely rare in whiplash injuries, but unfortunately is all too often mentioned by surgeons to recruit patients into surgery. The North American Spine Society publicly laments the fact that there are far too many unnecessary surgeries being performed in the United States.

The most important clinical finding to look for, apart from a neurological injury, is the presence of true instability in the neck. This can be easily diagnosed with x-ray examination. Cervical instability may represent a contraindication to chiropractic spinal manipulation, the treatment of choice for most whiplash injuries. Even in the absence of neurologic injury or radiating symptoms to the arm or hand, cervical instability may be present. It is therefore advisable to consult a competent chiropractor or other spine specialist who can rule out true instability in the neck.

Because of the mechanical nature of whiplash injury, it is important to initiate corrective mechanical therapies as soon as possible following injury. Restoration of normal joint function accelerates the rate of healing, and minimizes the risk of a complicated or protracted recovery. To restore normal joint function, chiropractic spinal manipulation is strongly recommended. Chiropractic spinal manipulation has become the treatment of choice in the last several decades in the United States and Canada for whiplash injuries. One of the reasons is that chiropractors are the most highly trained and skilled professionals in the art and science of spinal manipulation. A study by the Rand Corporation noted that chiropractors perform 94% of all manipulations delivered to patients in the United States. Other studies of comparative training note that Doctors of Chiropractic receive up to three times more hands-on clinical training in spinal manipulation than any other healthcare specialty, including osteopaths, medical doctors, and physiotherapists.

Adjunctive therapies for whiplash include electrical stimulation, ice, low level laser therapy, exercise rehabilitation, proprioceptive and sensorimotor rehabilitation, soft tissue therapies (including massage, Graston Technique®, PUSH® therapy and myofascial release), and acupuncture. The use of magnetic resonance stimulation and the MRS 2000 may soon become a widely recognized cornerstone of whiplash management due to the proven beneficial effects on all soft tissues of the body.

In this day and age, becoming involved in a car accident is a major traumatic event, both physically and emotionally. The stress involved can be tremendous, if not overwhelming. The MRS 2000 can be a very useful tool in every aspect of the recovery period following a car accident, including the management of stress."

Settings and application

The whole body mat should be used as support for muscle relaxation, stress management, and normalization of metabolism at a setting of 25 in the morning and 10 in the evening. The use of the whole body mat should not be overlooked, as it is an invaluable stress management tool.

The pad applicator can be used up to five times per day for eight minutes each to the neck and shoulders at an intensity setting of 100. Sit or lie down for these applications, as you are comfortable. In my experience, a positive result is noted in at least 85% of patients.

Torticollis is a rare, painful condition of the neck variably caused by muscle spasm, trauma, joint locking and vertebral subluxation, or abnormal motor signals from the brain. In the latter instance it is referred to as cervical dystonia. In torticollis the neck muscles contract involuntarily, causing the head to turn to one side.

Symptoms generally begin gradually and then peak in 1-3 days. There is marked muscle spasm and limited range of motion. A chiropractor may note abnormal joint motion. In the case of onset at birth or in early infancy, cervical dystonia is suspected.

There is no cure for cervical dystonia, but this condition sometimes resolves on its own. The current approach to this most severe form of torticollis is injecting botulinum toxin into the affected muscles to reduce muscle contractility.

Chiropractic and manual therapy methods are effective in addressing the mechanical and muscular components of torticollis when it is produced by trauma, sports injury, motor vehicle injury, or simply sleeping in the wrong position. As a general rule adults should avoid stomach sleeping since this gives rise to sustained abnormal joint loading and asymmetrical muscle length and contraction patterns that can lead to an episode of torticollis.

Magnetic resonance stimulation is an invaluable supportive measure for the relaxation of muscle, sedation of the nervous system, and for analgesic effects. When there is no access to chiropractic or manual medicine expertise the MRS 2000 may be used as a stand-alone application, often with excellent results over 7-14 days.

Settings and application
The whole body mat should be used in support of overall neurological balance, at a setting of 10 for 16 minutes twice daily. The pad applicator should be applied to the neck and shoulder region while lying face up twice daily at 10 (depending on age and size of the person) for 8 to 16 minutes.

Pad intensities should be based on age and size. Use "50" in child 4-8 yrs old and "10" in child 1-4 yrs old).

Alternating with the pad applicator, the probe can be used once daily for 8 to 24 minutes using gentle circular pressures at the origin and attachment of the muscles involved (typically the sternocleidomastoid and suboccipital muscles).

Initial reaction: None.

Description
See degenerative disc disease (DDD) and herniated nucleus pulposus (HNP) above. Also, see muscle tension and spasm above.

Settings and application
For an isolated low back pain syndrome, used the mat applicator twice daily for 24 minutes at an intensity setting of 10. The pad can be used twice per day for 16 minutes at 50-100 in the thoracic spine, and at 100-200 in the lumbar spine. Bend the knees with feet flat on the mat if this is more comfortable.

Description
Scoliosis is an abnormal curvature of the spine. It affects girls twice as often as it affects boys. About 5 persons of 1,000 are affected. Scoliosis usually becomes apparent in those older than 10 years of age.

In most cases (85%), the cause of scoliosis is unknown. We don't know how scoliosis developed. In the other 15% of cases, the cause is either functional, where the spine is normal but the curvature is the result of another problem, or it is structural as an adaptation of another disease process such as muscular dystrophy, metabolic disease, or Marfan syndrome. Common functional causes include leg length inequality or antalgic pain posturing from back or muscle spasms from abdominal inflammation such as appendicitis.

Scoliosis is usually painless. However, there are observable signs that can be detected by inspection. The head may be off center. One hip or shoulder may be higher than the other. Opposite sides of the body may not appear symmetrical.

When scoliosis becomes symptomatic, the most common manifestation is back pain. Due to spinal deformity, the spinal curvature has 2 sides: a convex side of the curve, and a concave side. Inspecting the back from behind can most easily reveal the curvature. Muscles on the side of convexity are lengthened and under tensile stress. Muscles on the side of concavity are shortened, often fibrotic, and tight. Oftentimes scoliosis includes a rotary component where the vertebrae twist, limiting the room available for contents of the thoracic cage such as the heart and lungs. When severe, scoliosis can shorten lifespan due to these space-limiting changes brought about by spinal deformity.

The majority of scoliosis patients do not require bracing treatment or surgery. Chiropractic care and corrective postural exercises may help. At The Center for Spine Pain & Wellness in, we use corrective heel lifts, postural wall leaning exercises and gentle mobilizing chiropractic adjustments to keep the curve supple and to reduce or correct curves below 25°. Not infrequently, we are able to lessen a curvature of up to 20° by at least 50% using these methods, especially when we begin treatment before the age of 13 when a leg length inequality is associated with the condition. When the degree of curvature is less than 25°, the child or adolescent can be reexamined every 4-6 months. If the curve is more then 25° but less than 30°, more aggressive corrections are attempted, and if the curve is progressing, a back brace may be used for treatment. Curves that are greater than 45° are evaluated by

a fellowship trained spine surgeon who specializes in spinal deformity and scoliosis. Surgical correction involves fusing vertebrae together to correct the curvature and may require inserting rods next to the spine to reinforce the stabilization of the curvature.

Treatment options pivot around whether the curve is progressing or not. My wife has a scoliotic curvature that is less than 20°. She's had it for several decades of marriage and shows no signs of worrisome progression. One of my daughters has seemingly inherited this same trait. Again, there is no sign of worrisome progression. A child or adolescent with a 20° curve and four more years of growth (as determined by skeletal maturity scoring of the iliac crest using a full spine x-ray taken to assess the curvature) may require treatment while a child with 29° of curvature who has stopped growing may not require treatment. The key determinant is progression of the curvature.

Settings and application

To support better circulation of blood and oxygen to the paraspinal muscles, use the whole body mat 8-16 minutes 2-4 times per day beginning at 25-50 in the morning, 25 at midday, and at 10 in the evening. No initial reaction should be expected.

Description

Spondylolisthesis literally means the slippage of the spine. It refers to the forward slippage of one vertebra on another, made possible by either a disruption of bone in the back, or by degenerative remodeling of joints in the back. When a disruption of bone is present, the condition is referred to as isthmic spondylolisthesis. The bone is separated at the "pars interarticularis" and can readily be diagnosed with x-ray. Degenerative remodeling of the facet joints in the low back allow for forward slippage in some persons over the age of 55. This is referred to as degenerative spondylolisthesis.

Because of the disruption in the posterior elements of the spinal column, leaning backwards tends to aggravate pain stemming from spondylolisthesis. Forward leaning produces relief of symptoms. There are several degrees of slippage, with more serious cases demonstrating further movement of one vertebra upon another. In many cases, specialized manipulation called flexion-distraction therapy can eliminate the pain from spondylolisthesis completely. In other cases, this therapy is partially beneficial, but other treatments may also be necessary. We have had significant success at The Center for Spine Pain & Wellness using nonsurgical spinal decompression therapy in conjunction with flexion-distraction manipulation and the MRS 2000. Patients who may have otherwise required lumbar spinal fusion are pain-free and fully functional today due to a combination of mechanical and energetic interventions.

The value of the MRS 2000, as with most spinal pain syndromes we treat, is in producing significant paraspinal muscle relaxation, improved sleep, and high-energy electrons for their anti-inflammatory effects. This potentiates the effectiveness of mechanical therapy we provide, improving our chances of resolving the pain without unwanted narcotic medication, injections, or spinal fusion surgery.

In the nonresponsive cases, spine fusion may be necessary. The most common approach currently in our region of North America is a posterolateral lumbar interbody fusion (PLIF). A "pars block" injection is often performed prior to surgery to determine if the back pain is truly coming from the disruption in bone in patients with isthmic spondylolisthesis, producing anesthetic blockade of the pars interarticularis. With degenerative spondylolisthesis, there are often other factors such as stenosis with spinal cord compression or foraminal compression and nerve root irritation producing buttock, thigh, calf, and foot symptoms on one or both sides. Conservative therapy should always be tried first, with surgical intervention being a last resort.

Settings and application

The whole body mat should be used at an intensity setting of 25-50 in the morning and 10 in the evening. Use the pad applicator two times per day for 16 minutes at 100-200 in the low back. Bend the knees with feet flat on the mat if this is more comfortable. An initial reaction is rare, but young women may experience a mild increase in pain prior to the pain decreasing.

Description

Degenerative disc disease is often used synonymously with osteoarthritis. However, most trained health professionals separate these terms for the sake of precision in communication, and due to the fact that there are unique to structures involved in spinal degenerative change.

As discussed above under the heading "herniated disc", the intervertebral disc tends to dry out with advancing age. When it loses fluid, the disc loses height and there is more circumferential tension on the outer ligamentous fibers of the disc. This creates traction spurs, or spondylophytes, in the spine. The presence of "spondylophytes" (or bony spurs) at many levels of the spine is called discogenic spondylosis. These days, the more popular term is "degenerative disc disease."

An excellent randomized controlled clinical trial examined the effect of the MRS 2000 on cervical degenerative disc disease in a consisting of 34 patients (also

referred to as cervical "osteoarthritis.") *(Sutbeyaz 2006)* The whole body mat was used twice daily for 30 minutes over a period of 3 weeks. There were significant increases in range of motion, reduction of pain and reduction in muscle spasms in the neck and shoulders in the MRS 2000 treatment group evaluated by objective outcome measures.

Findings in this study are consistent with our own observations at The Center for Spine Pain & Wellness in Colorado. Patients who are able to use the MRS 2000 consistently twice per day begin to notice a significant increase in the suppleness of the neck, even when chiropractic adjustments and manipulation cannot be performed (due to the advanced nature of the x-ray findings). Massage felt good, but its benefit was only temporary. Most (but not all) chiropractic methods are difficult to perform, or even contraindicated, because there is little movement possible in the advanced degenerative joints. However, evidence-based scientific knowledge is sufficient enough to support the idea that when patients place themselves in the magnetic resonance field, protein synthesis and cell membrane permeability increase, and in consequence, new, healthy cartilage may form while the old, worn out cartilage cells are carried away. Given enough time these regenerative, anti-aging effects of the MRS 2000 manifest as changes in range of motion and lessening in pain and movement restriction.

A 68 yr-old male patient presented for the treatment of chronic low back and lower buttock pain. He had also suffered with cervical degenerative disc disease for nearly a decade. He did not expect that we would be able to help with his neck, and this was not a focus of our treatment. This gentleman used the MRS 2000 whole body mat applicator twice daily at home for 6 weeks. On return to the clinic, his back pain had improved somewhat but not resolved. However, his neck range of motion, which hadn't been a focus of treatment, improved so remarkably that he was able to demonstrate 90 degrees of rotation to either side, pain free. He was able to back up his vehicle in the driveway with full range of motion and no pain, and of course, he was delighted!

This type of result is very typical and requires but one thing: consistent use of the MRS 2000 at home! These observations apply equally well to the low back and midback as well as the neck.

Settings and Application

As with osteoarthritis, use the whole body mat twice daily for 24 minutes each application. The settings and progression are the same as for osteoarthritis. Use the pad applicator for 16-24 minutes to the affected area of the spine. For the neck, begin at an intensity setting of 25-100. If you are larger, use a higher setting. This also applies to the mid-back, or thoracic spine, where you begin with an intensity setting of 50-150. And for the lumbar spine (low back), begin with an initial intensity setting of 100-200.

The inner lining of a joint consists of synovial cells. These cells produce synovial fluid. When these cells are irritated (usually by overuse, over exertion, or trauma) the cells produce more fluid than the joint is designed to hold, and joint swelling occurs. This process is called synovitis.

The entire world of inflammation can be seen as a lack of high-energy electrons flowing freely within the inflamed part. Anti-inflammatory medications are, from an energetic perspective, "electron donors." Regardless of the chemistry involved, the essential importance and effectiveness of an anti-inflammatory treatment is its ability to deliver electrons in an excited state to an area of inflammation. The body uses these electrons to reduce the inflammation.

Synovitis is a manifestation of joint inflammation. The MRS 2000 is an effective means of delivering electrons in an excited state directly to that inflammation. This is true for joints that are deeply housed within the body, such as the facet joints of the spine, as well as easily accessible joints like the knee, ankle and wrist.

Settings and application
For synovitis use the whole body mat applicator two times per day for eight minutes. Begin with an intensity setting of 10 and increase to 50 as dictated by symptoms. Remember, in energy medicine, it is often the case that "less is more." Always use an intensity setting of 10 in the evening. The pad applicator can be used up to four times per day for 8-24 minutes at an intensity setting of 100 for elbows, 200 for knees, 150 for hands, and 200-400 for feet. For "facet syndrome," a synovitis affecting the spinal joints of the low back and neck, use the pad applicator at 200-400 for 16 minutes.

Description
A ganglion cyst is a fluid-filled tumor or swelling overlying a joint or tendon. It appears as a cyst. The cyst is filled with clear, colorless, jellylike fluid. Depending on the size, cysts may feel firm or spongy.

Ganglion cysts are more common in women, and 70% occur in people between the ages of 20-40. Rarely, ganglion cysts occur in children younger than 10 years. Ganglion cysts most commonly occur on the back of the hand (60-70%), and at the back or front of the wrist joint. The most common cause of a ganglion cyst is thought to be trauma. Another theory suggests that there is a defect or weakness in the joint capsule or tendon sheath, allowing a herniation of connective tissue to occur. This herniation forms the ganglion cyst.

Most ganglion cysts cause some degree of pain, usually following acute or repetitive trauma. However, in up to 35% of cases, no pain is present. Ganglion cysts can occur suddenly, may get larger or smaller, and may even go away, only to come back at another time.

In times past, home remedies passed down through the centuries included the use of a heavy book to physically smash the cyst. This is ill advised, however, because it can produce further trauma and injury, and does not keep ganglion cysts from returning, perhaps in a worse fashion than ever.

If the cyst is producing mechanical irritation or pressing on a vessel, it may need to be surgically removed. In some cases, a cyst may respond to the application of pulsating magnetic field therapy and disappear where it had not disappeared before. Studies have shown that up to 74% of people who have the fluid drawn out of ganglion cyst do not suffer a recurrence. This is called aspiration, but is still less successful than surgery. Manipulation of a joint associated with a ganglion cyst is not effective.

Settings and application

The pain and irritation of a ganglion cyst may benefit by using the pad applicator 2-4 times daily for 24 minutes at an intensity setting of 200-400. Alternatively, the probe applicator may be used 2-4 times per day for 24 minutes at a setting of 400. Initial reactions have not been reported.

Carpal tunnel syndrome causes pain, tingling, and numbness in the hand from pressure on the median nerve in the wrist.

The carpal tunnel is a narrow tunnel located on the palm side of the wrist. This tunnel protects a main nerve, the median nerve, to the hand and nine tendons that flex the fingers. Pressure

on the median nerve produces numbness, tingling, pain and, eventually, the hand weakness that typically characterizes carpal tunnel syndrome. Illnesses, pregnancy, and obesity can cause carpal tunnel syndrome. Rest (using cock-up wrist splints) and exercises to increase suppleness and forearm flexibility relieve symptoms. When this does not work, treatment is appropriate. This treatment includes soft tissue release therapies to the forearm such as

Graston Technique®, deep massage, Nimmo® Technique or active myofascial release. It may include low level laser therapy, Kinesiotaping for forearm and wrist support, work station modification, and mobilizations of the cervical and thoracic spines, shoulder, elbow, and wrist joints. All such treatment may be significantly augmented by the use of pulsed magnetic fields due to the documented benefit of these fields in accelerating regeneration of damaged nerve tissue. For example, in a 1991 study, Rusovan and Kanje found significantly increased nerve regeneration rates in crushed rat sciatic nerves exposed to pulsating magnetic fields. *(Rusovan 1991/220)*

Fortunately, for most people who develop carpal tunnel syndrome, proper treatment usually can relieve the pain and numbness and restore normal use of the wrists and hands. While steroid injections are used by some orthopedists in non-resolving cases, people who cannot obtain relief by conservative measures may be better off undergoing surgery than receiving injections, which may not be as effective in the long term.

I have observed some cases of carpal tunnel syndrome resolve fully with use of the MRS 2000 alone. The application of pulsating magnetic fields is beneficial when used alone, in conjunction with other conservative measures, and when used preoperatively and postoperatively when surgery is required.

Severe and refractory cases may benefit from the use of low-level laser therapy, the use of a cock up wrist splint, the use of a more expensive, rentable Dynasplint (www.dynasplint.com), Graston Technique®, massage, acupuncture, and mobilization with exercise. In some cases, there is a concurrent nerve entrapment syndrome in the neck, at the thoracic outlet, or within the soft tissues of the upper extremity. Often times these more proximal sites of nerve entrapment are ignored as the focus of treatment is typically directed at the carpal tunnel alone.

Settings and application
Use the pad or probe applicators three or four times per day for 16 minutes at an intensity level of 150-200. If you have a probe with the MRS 2000 Med unit, use this applicator at an intensity level up to 400 on the palm side of your wrist.

A "bursa" is a small, fluid-filled sac that lubricates and cushions pressure points between bones and the tendons and muscles that cover them near joints. Bursae (plural for "bursa") reduce friction and irritation at these pressure points and help the joints move more easily by providing lubrication.

Bursitis is an inflammation of a bursa. There are more than 150 bursae in the human body. When one or more of these become inflamed local pressure or movement can be extremely painful.

An inflamed bursa can fill up with fluid and produce swelling, heat, pain and redness. This is easily diagnosed at the elbow ("olecranon bursitis") and at the knee ("pre-patellar bursitis"). Bursitis can affect the shoulders, elbows, hips, knees, heels and the feet and toes.

At The Center for Spine Pain & Wellness the most common bursitis we see is "trochanteric bursitis," or bursitis at the outside of the greater trochanter or lateral "hip bone." This condition can be brought about by running or cycling, by pregnancy, or simply by preferring to lie on one "favorite" side to sleep. Trochanteric bursitis also accompanies many cases of lumbar disc herniation because disc herniations produce weakness of the gluteal muscles. Once the gluteal muscles are weak they become easily overloaded, creating excessive pressure on the trochanteric bursa. Given that we are a sports medicine and non-surgical spine specialty practice it is quite natural that we would see bursitis in this location more than any other. Bursitis in this location may also occur in response to a hip injury or in conjunction with arthritis of the hip.

Symptoms of bursitis include dull aching or stiffness in the area of the bursa with movement, the presence of warmth or swelling locally, and occasionally redness of the skin over the bursa.

Unlike the elbow, where swelling of the bursa is so obvious it can be alarming to people, bursitis at the hip doesn't cause any visible swelling or skin redness because the hip bursae are located beneath the large gluteal muscles. So the point is this: not all bursitis is alike.

Bursitis at the elbow may result from repeated bending and extending the elbow, as in basketball, baseball, tennis or golf. Shoulder bursitis often results following an injury to the rotator cuff, but may also include an injury from a fall or from lifting. Bursitis at the front of the knee results from repetitive kneeling, laying carpet, scrubbing the kitchen floor, gardening or doing activities that place pressure on the knees. A sharp traumatic blow to the knee can also cause inflammation here. Ankle bursitis commonly occurs with improper footwear or weightbearing, or with prolonged pressure, as in wearing iceskates.

In our experience in Colorado about 40% of bursitis patients resolve fully by using the MRS 2000 as a stand-alone physical supportive measure. In the remainder of patients magnetic resonance stimulation is an adjunctive application that may help accelerate the healing process.

Olecranon bursitis (at the elbow) is the most resistant, chronic and difficult to treat form of bursitis. Regardless of the modalities chosen (ice, heat, electrical stimulation, pulsed magnetic fields, etc.) this condition resolves over time and only with avoidance of aggravating factors such as continued pressure to the elbow at a work station or desk.

Settings and application
For bursitis at the shoulder, elbow, knee, ankle or hip (trochanter), use the pad and/or probe applicator at 150-400 for 8-16 minutes twice daily. The whole body mat should always be used in support of overall metabolism, at a setting of 25 in the morning and 10 in the evening.

Initial reaction: 5-10% of cases may experience an initial increase in aching pain. If this occurs, lower the intensity by half.

Description
According to data presented at the 2007 annual meeting of the American College of Rheumatology, Boston, Massachusetts, there has been a 2% reduction in the amount of disability among senior citizens each year for the past several years. Increasing numbers of total joint replacement surgeries may be responsible for this decrease. There has been a fourfold increase in total joint replacements among senior citizens since 1982. Overall, the increasing number of joint replacement surgeries accounts for about 4%-5% of the national decline in disability for senior citizens. A major change in health care economics occurs, this trend should continue.

In spite of the good that has been derived from joint replacements, there are pitfalls. Prosthetic joints are more susceptible to infection. Hardware can loosen, creating a bothersome or painful shifting and altered mechanics. There can be difficulties in the incorporation of prosthetic metals with active, living bone.

A randomized controlled trial on 37 patients examined the effects of pulsed magnetic fields in the treatment of loosened cemented hip prostheses. It showed a remarkable 53% success rate. However, long-term follow-up analysis revealed a 90% relapse rate at 3 years, even with maintenance therapy of 1 hour of pulsed magnetic field therapy per day. *(Kennedy 1993)*

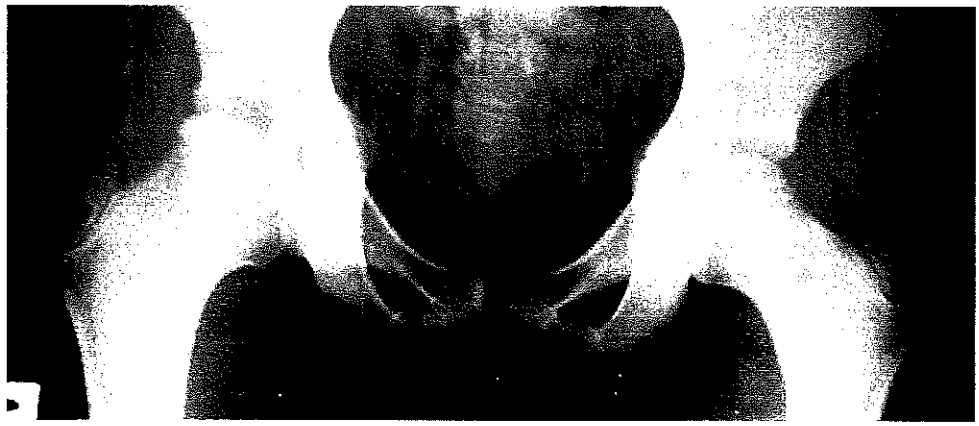
The value of pulsed magnetic fields in the treatment of artificial joints has not been conclusively proven either way. The fact that there was a 53% success rate simply means more research must be done to refine the protocols and to more effectively access the correct biological window. In addition, pulsed magnetic fields may have utility for infected joints. Nanobacteria and biofilms hide out on the surface of the metal and are difficult to detect diagnostically. We already know that magnetic field therapies increase ATP production, and therefore the energy and vitality of the immune system. Neutrophils and leukocytes that kill pathogens require ATP to performed their immune functions. By increasing the potential of the cell to manufacture more ATP, more energy is available in the local tissues to kill infectious organisms. This is how pulsed magnetic field therapy may exert an antibiotic effect.

Settings and application
In the case of home MRS 2000 therapy for a total joint replacement or a prosthetic joint, use the whole body mat applicator two times per day for eight minutes each. Begin at an intensity setting of 10, and progress to a setting of 50 for morning or afternoon sessions. Always use an intensity setting of 10 in the evening. The pad applicator may be used at the knee 2-3 times per day for 24 minutes at an intensity setting of 150. Gradually increase from 8-24 minutes. For the hip joint, use the pad applicator three times per day for 24 minutes at an intensity setting of 50, and gradually increase to 150 or 200. Hip joint replacements are often associated with trochanteric bursitis, or greater trochanter pain syndrome (GTPS).

Comment
If you are using the MRS 2000 immediately postoperatively, begin at the "sensitive" intensity setting (whole body mat only), and gradually increase to the intensity as noted above. The

duration of treatment for a prosthetic joint is at least six months. A brief increase in pain may be noted in about 5% of cases. Titanium reacts better to the MRS 2000 than does a cemented hip. Begin before surgery if possible. If you are able to do so, this accelerates post surgical recovery.

21. Legg-Calve-Perthes Disease



Description

Legg-Calve-Perthes is a disease of childhood associated with a temporary disruption of blood supply to the hip joint. Without adequate blood flow, a process can occur in which the bone becomes unstable, and may break easily and heal poorly.

Legg-Calve-Perthes disease usually affects only one hip, but sometimes it develops in both. It affects children of nearly any age, but is most common among boys ages 4 to 8.

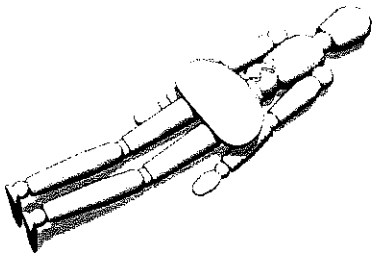
Children who develop Legg-Calve-Perthes disease when they're very young often have the best outcomes. The younger your child, the more opportunity there is to reshape the affected hipbone.

The mechanisms by which pulsating magnetic fields improve bone metabolism are not fully understood. However, there is ongoing research in this area. The induction of tiny electrical microcurrents within bone seems to stimulate bone-forming cells called osteoblasts. In addition, through a variety of mechanisms discussed elsewhere in this book, pulsating magnetic fields improve circulation, and the delivery of oxygen through all tissues. Both effects may be valuable in supporting children afflicted with Legg-Calve-Perthes disease.

Settings and application

The whole body mat should be used in support of overall metabolism, at a setting of 25 in the morning and 10 in the evening. Increase morning setting to 50 or 100 if this setting results in better post-session status. Use the pad up to 2 times per day for 24 minutes at

100, with the center of one coil overlying the head of the femur. The probe may be used at a setting of 400 for 8 minutes to the trochanteric region as well.



In supporting children with Legg-Calve-Perthes disease in conjunction with orthopedic treatment, be patient. This is a chronic, slowly resolving condition. Clinical experience from Europe indicates 75% good to very good results using the MRS 2000. An initial reaction is noted in 2-3% of cases.

Description

Your knee joint is comprised of four bones held together by ligaments. The thighbone (femur) makes up the top part of the joint, and two lower leg bones, the tibia and the fibula, form the lower part. A fourth bone, the patella (or knee cap), slides in a groove on the end of the femur.

Ligaments are large bands of collagen-based tissue that connect bones to each another. In the knee joint, four primary ligaments attach the femur to the tibia, lending stability to the knee as it bends and straightens. These include the collateral ligaments along the inner (medial) and outer (lateral) sides of the knee, the anterior cruciate ligament (ACL) and posterior cruciate ligament (PCL), which cross each other as they stretch diagonally from the bottom of the femur to the top of the tibia.

Other structures in your knee include:

- Tendons. These fibrous bands of tissue connect muscles to bones. The knee has two important tendons, which make it possible to straighten or extend the leg: the quadriceps tendon, which connects the long quadriceps muscle on the front of the thigh to the patella, and the patellar tendon, which connects the patella to the tibia.
- Meniscus. This C-shaped cartilage, which curves around the inside and outside of the knee, provides cushioning and shock absorption, and allows some rotation of the femur on the tibia.

- Bursae. A number of these fluid-filled sacs surround your knee. They help reduce friction around the knee joint so that ligaments and tendons slide smoothly.

Normally, all of these structures work together smoothly. But injury and degenerative disease can disrupt this balance, resulting in pain, muscle weakness and decreased function.

Knee injuries are often due to overuse, bony alignment problems, repetitive use in athletic competition or physical activities, and failure to warm up and stretch before exercise. But they can also result from trauma, such as a car accident or sporting injury, a fall or a direct blow to your knee.

Ligament injuries: Collateral ligament sprains occur most frequently in sports that require quick stops, planting the foot and twisting, such as soccer, basketball and skiing, or in contact sports such as football and basketball where repeated blows to the inside or outside of the knee can cause the opposing ligament to stretch or tear. Collateral ligaments can also be damaged by repetitive stress. They lose their elasticity and the knee becomes unstable. The resulting excessive motion leads to accelerated wear and tear on the cartilage-covered surfaces of the knee (osteoarthritis) and on the menisci.

Most ACL tears and sprains are sports-related. They frequently occur during activities such as football, basketball, soccer and skiing, where again planting and twisting movements are involved. ACL tears rarely result from contact with other players, but they can develop with an awkward landing from a jump or fall. PCL tears, on the other hand, aren't usually associated with sports. Because the PCL is a strong ligament located deep inside the knee, tears usually result from high impact traumatic injuries, such as car accidents or falls with the knee bent from a distance. And because a high-force impact is needed to damage the PCL, other ligaments are often injured at the same time.

Tendon injuries: Inflammation of the quadriceps tendon (tendinitis) can occur in people who run, bicycle or ski. It can also result from inflammatory diseases that occur throughout the body, most notably rheumatoid arthritis. "Baby boomers" who are "weekend warriors" are more likely to rupture their quadriceps tendon than are seasoned athletes. And patellar tendon ruptures frequently occur in active younger people who have a history of tendinitis or who have had steroid injections in their knees. Steroid injections weaken collagen tissue and make it more susceptible to tears.

Meniscus injuries: A meniscus tear results from aggressive planting, pivoting or sudden turns – any activity that twists or rotates the knee while it is loaded with body weight. Occasionally, the meniscus tears while lifting something heavy. Older adults sometimes tear their meniscus during repetitive movements, such as kneeling or squatting, but more often it tears because it has degenerated over time.

Bursitis: Prepatellar bursitis often occurs after prolonged kneeling – scrubbing floors, gardening, or installing tile or carpet, for example. It is also called housemaid's knee or carpet layer's knee. It can also be caused by a local infection or as one of the signs of arthritis or gout.

Dislocated kneecap: Kneecap (patellar) dislocations can occur in contact sports and in activities that require an abrupt change of direction while accelerating, such as squash, volleyball, tennis, or racquetball. Knees that turn inward or kneecaps that are higher than normal may predispose to this injury.

Osgood-Schlatter's disease: This condition can develop in athletic young people during the years when their bones are growing rapidly – usually ages 10 to 15 for boys and 8 to 13 for girls. Osgood-Schlatter's disease isn't really a "disease" at all – it belongs to the category of disorders called "osteochondroses." It is a breakdown of the tibial tubercle beneath the tendinous insertion of the patellar tendon to the tibia. The condition results from repeated tension on the patellar tendon on a growth plate at the top of the tibia – the tibial tubercle. This usually occurs during activities that involve explosive running, jumping and bending, when the pull of the quadriceps muscle is at its peak, placing high tension on the patellar tendon. With repetitive tensile stress, the tendon may begin to pull away from the tibia, resulting in a small bump that is very tender to the touch. In severe cases, the tendon may come away from the tibia completely.

Hyperextended knee: This usually results from a contact injury such as soccer, football or basketball. It can also occur as a result of an awkward landing such as coming down from a rebound in basketball or from a spike in volleyball.

Settings and application
The whole body mat should be used in support of overall metabolism, at a setting of 25 in the morning and 10 in the evening. For acute knee injury, use the probe the setting of 200-400 for 8-16 minutes three times daily. The pad may also be used at a setting of 150-400. For chronic knee injuries, use the probe at 50-150, and the pad applicator at 100-200.

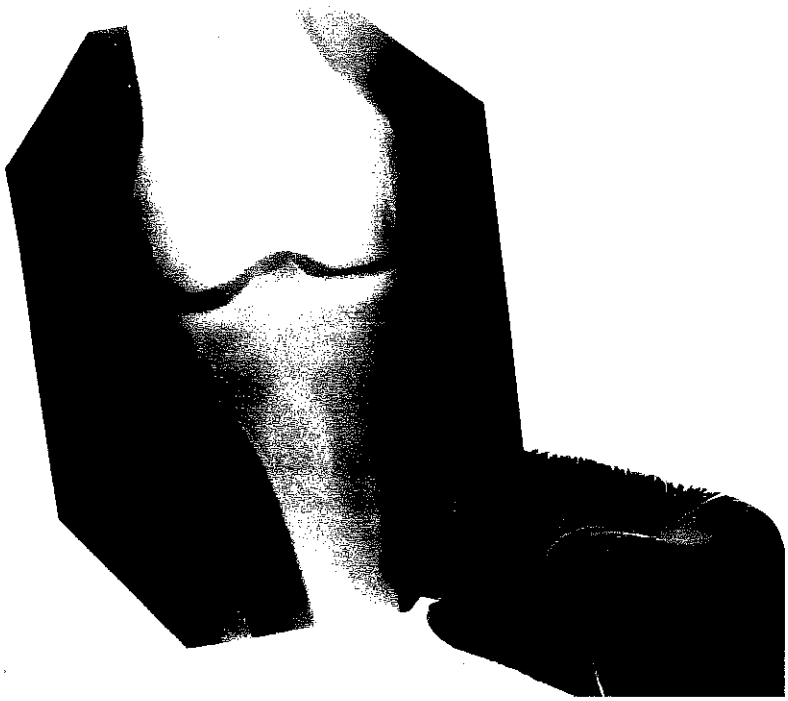
Description
Iliotibial band syndrome is the most common cause of lateral knee pain in runners and cyclists. The pain results from tightness of a broad band of tissue connecting the outside of the hip (greater trochanter) to the outside of the lower knee. Competitive runners and triathletes are especially susceptible. Biomechanical imbalances increase susceptibility, such as unequal leg length or weak hip abductors. Unbalanced ground reactive forces such as pitched concrete surfaces, uneven natural terrain or training errors such as increasing intensity and/or duration of exercise too quickly, wearing worn or ill-fitting shoes, and excessive uphill or downhill running also contribute to ITB syndrome.

Myofascial release therapy, corrective orthotics, massage, hip joint mobilizations, sacroiliac joint mobilizations, exercise rehabilitation, foot manipulation, Graston Technique®, and the regular use of a foam roller at home have all been effective in the treatment of iliotibial band syndrome. Since the tight band produces local inflammation, the anti-inflammatory effects of pulsating magnetic fields are beneficial. Additionally, since pulsating magnetic fields improve cellular metabolism, this technology may promote or accelerate the healing process.

Settings and application
The whole body mat should be used in support of overall metabolism, at a setting of 25 in the morning and 10 in the evening.

10.V. Heel Spur / Plantar Fasciitis

Description
Heel spurs are common in patients who have a history of foot pain caused by plantar fascitis. In the setting of plantar fascitis, heel spurs are most often seen in middle-aged men and women, but can be found in all age groups. The heel spur itself is not thought to be the primary cause of pain; rather, inflammation and irritation of the plantar fascia is thought to be the primary problem. A heel spur diagnosis is made when an X-ray shows a hook of bone protruding from the bottom of the foot at the point where the plantar fascia is attached to the heel bone.



The biological effects of electromagnetic signals are particularly profound in bodily structures that have a crystalline architecture. Such is the case with bone, cartilage, tendon, and ligament. The crystalline lattice is so highly organized, that it allows extra electrons to flow at the speed of light. Some thinkers in energy medicine believe that the connective tissue system, with its microtubules and collagen linkages, is a more primary mechanism of information exchange than the nervous system. And far faster! For these reasons, the MRS 2000 can have profound beneficial effects for inflammations that occur in the connective

tissues. The heel spur is just such a condition. Unlike ultrasound or conventional electrical stimulation, pulsating magnetic fields easily pass to the depth of inflammation at the interface between plantar fascia and bone spur. There, electromagnetic signaling is converted to electrical microcurrents which produce an in the cell membrane permeability, protein synthesis, and cellular repair. In effect, this is anti-inflammatory energy medicine at its best.

Settings and application
Use the pad applicator or probe applicator three times per day for 16 minutes at an intensity setting of 400. No initial reaction is encountered. There is at least a 50% good to very good result, even in cases resistant to other treatments. Proper exercises must be done consistently to stretch the plantar fascia, and the muscles of the foot.

Description
Fractures are defined as any disruption in the cortex of bone. The majority of fractures occur as a result of trauma or injury. However, there are some diseases that weaken bone and result in a fracture without trauma. The cause of fracture must be clearly identified, and the underlying disease must be treated.

Fractures are usually simple to diagnose with the use of x-ray, and most fall under orthopedic care for casting and stabilization. In some cases, surgery is required, and is referred to as "open reduction and internal fixation (ORIF)." Fractures to the spine may require surgery to prevent permanent paralysis when a fracture fragment impinges upon the spinal cord.

The literature is replete with good evidence for the value of pulsating magnetic fields in the treatment of non-healing fractures, in the improvement of fusion rates following spinal fusion surgeries, and for the acceleration of bone healing – and therefore for faster reduction of pain – in commonly encountered fractures.

The use of the MRS 2000 is of significant benefit in cases of fracture. Small fractures of the toes or fingers may heal and become fully asymptomatic within just a few days. The pain of severe fractures can be greatly reduced by the supportive use of pulsating magnetic fields.

Settings and application
The whole body mat should be used in support of overall metabolism, at a setting of 25 in the morning and 10 in the evening. The whole body mat can be used 2 to 3 times per day. For fractures to the large, long bones of arms or legs, use the pad applicator and the setting of 200-400 from 3 to 6 times per day for 8 to 24 minutes per application. Treat focal areas of pain with the probe at the setting of 400 as well. For fractures to smaller bones, the probe applicator may be used at a setting of 400 for 8-16 minutes per application, 3-6 times per day, depending on the time available.

For fractures to the spine or pelvis, the pad applicator should be used at a setting of 200-400 over or under the fracture site. Note on Pad Placement for Fractures: When using the pad

applicator, note that the greatest intensity of the field produced is at the center of the copper coils, of which there are two. These copper coils can be visualized by backlighting the pad applicator so that light shines through from the backside while looking at the front side. Once the location of copper coils is understood, use the center of one copper coil directly over the fracture site. This principle applies for the use of the pad in all orthopedic and sports injury applications.

XXVI. Osteomyelitis

Description

Osteomyelitis refers to an infection within bone. Infections reach a bone by traveling through the bloodstream or locally spreading from nearby tissue. Infections can also begin in the bone when it is exposed to an open wound, allowing germs inside. Osteomyelitis commonly affects the long bones of the arms and legs as well as the spine and pelvis.

Osteomyelitis is a serious condition, requiring aggressive treatment to prevent the spread of infection and to save the bone.

Signs and symptoms of acute osteomyelitis include fever that may be abrupt in onset, irritability or lethargy in young children, and pain, swelling, warmth and redness in the area of the infected bone.

Chronic osteomyelitis is more common in adults. Signs and symptoms of chronic osteomyelitis include warmth, swelling and redness over the area of the infection with pain and tenderness, chronic fatigue, drainage from an open wound near the infection, and sometimes – but not always – fever.

Occasionally, osteomyelitis will cause no signs and symptoms. This is especially true in cases of osteomyelitis of the spine, pelvis and hip.

Bones are normally resistant to infection. In order for osteomyelitis to occur, a situation that weakens the local immunity of the bone must be present. Trauma, a puncture wound, or other concurrent diseases such as sickle cell anemia, HIV or diabetes (with poor circulation) weaken the immune system and predispose to osteomyelitis. Disorders such as skin infections, dental infections, and urinary tract infections can give rise to osteomyelitis. In people with poor circulation, what begins as a small cut may progress to a deep ulcer that can expose deep tissue and bone to infection.

Surgical debridement of the infected bone in combination with antibiotic therapy is usually required for osteomyelitis. However, not everyone can undergo surgery. People who are seriously ill may not be able to endure extensive surgery and recovery. In such cases, antibiotics can be used for a longer period of time.

The value of pulsed magnetic field therapy is particularly high in those who are unable to endure surgery. Through improved cell membrane permeability, antibiotic therapy is boistered. Circulation is improved and the immune system is strengthened.

The best way to prevent osteomyelitis is to maintain a healthy immune system and to oxygenate all tissues. Regular use of the MRS 2000, including post-operatively, in case of orthopedic or dental surgery, can assist greatly in this. Other measures include smoking cessation to improve circulation, eating fruits and vegetables to improve immunity and the availability of antioxidants, and working hard to gain control of your health if you have diabetes, are HIV positive, or have any other diseases with compromised immune system.

Settings and application
The whole body mat should be used in support of overall immune function, at an initial setting of 25 in the morning and 10 in the evening. Gradually increase to 50 or 100 for the morning application. Use the pad or probe applicators 2-3 times per day for 24 minutes at 100-200 (probe up to 400).

The healing time for people with osteomyelitis may be protracted, especially in adults who have the chronic form of this disease. Continued application for up to one year is not unusual. The MRS 2000 applications have the added benefit of supporting surrounding soft tissues that may be affected by chronic inflammation, ulceration and infection as well.

Description
Rheumatic fever develops as a rare complication to untreated or undertreated streptococcal throat infection. Strep throat is common in children and teenagers between the ages of five and 15, though it can also develop in adults. It causes damage to the heart, joints, brain, spinal cord and skin.

The symptoms of rheumatic fever appear within a few weeks after a strep throat infection. This is extremely uncommon, and only a small percentage of people with strep throat rheumatic fever. While there is no cure for rheumatic fever, it can be prevented by prompt and complete treatment of a strep throat infection. Standard medical treatment includes the use of antibiotics against Streptococcus A.

Rheumatic heart disease refers to permanent heart damage resulting from rheumatic fever. The heart valves develop fibrous adhesions as a result of inflammation, compromising their function in opening and closing.

Symptoms of rheumatic fever include painful, swollen joints, chest pain, fatigue, shortness of breath, faint pink or red rash, jerky body movements, and fever. A history of strep throat will always be noted. A strep infection may be suspected when fever accompanying a sore throat with swollen glands lasts for more than 24 hours. Since strep throat can be asymptomatic in rare cases, may be more difficult.

Interestingly, the exact cause of rheumatic fever isn't known. There may be a disruption of cell-to-cell communication and a depression of immune function that allows streptococcal bacilli to colonize deep within the body.

There are no definitive lab tests for rheumatic fever. Doctors make a diagnosis based on the preceding evidence of strep infection (by blood sample or throat culture), the presence of joint pain and swelling that moves from joint to joint, and inflammation of the heart, called "carditis."

During the first attack of rheumatic fever, 50% of patients develop heart inflammation. However, this does not always result in permanent heart damage. People with rheumatic fever usually recover fully within six weeks. One or more heart valves may be scarred, and heart damage may not be discovered until years later. Other complications from rheumatic fever include joint inflammation, brain inflammation with the loss of coordination and uncontrolled movement called "Sydenham's chorea" or "St. Vitus' dance," broad patches of faint pink or red skin irritation called "erythema marginatum," and nodules occurring beneath the skin.

The best way to prevent rheumatic fever is to prevent strep throat. The best way to prevent strep throat is through a strong, healthy immune system. While this is not always possible, robust immune health is more likely to occur through healthy nutrition, good sleep habits, lower stress, and exercise. Exposure to the healing frequencies of nature through magnetic resonance stimulation may be quite helpful. Exposure to charged electrons by walking in nature, walking barefoot on grass, lying on the beach, lying on a picnic blanket in a meadow or park, hiking, camping, and other activities are also energetically beneficial. In Chinese medicine, the back of the neck is regarded as a point of entry for "wind." When wind (a "pathogen" in Chinese medicine) enters the body, it gives rise to upper respiratory infections. The way to prevent wind from entering the body is therefore as easy as wearing a scarf and keeping the back of the neck warm.

Settings and application

To support optimal wellness in the presence of rheumatic fever the whole body mat applicator can be used 4 times per day for 8 minutes each at a beginning intensity setting of 25 in the morning, 50 at noon, 50 at mid-day, and 10 in the evening. Increase morning settings to 100-150, midday settings to 100, and evening settings to 25 as preferred.

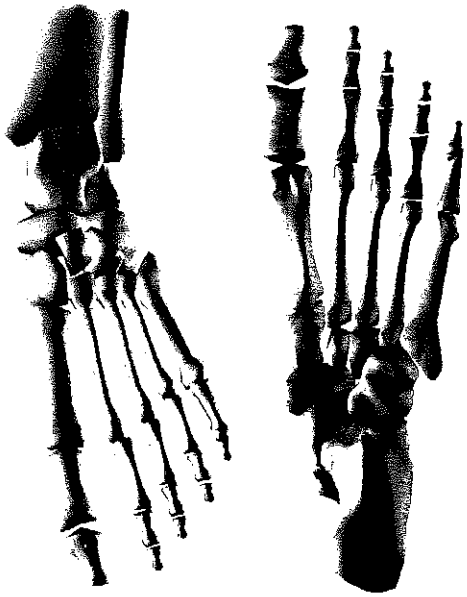
Use the pad applicator 2-3 times per day for 16 minutes each at an intensity level of 25-50. The pad may be placed over shoulders, neck, hips and lower abdomen at this setting. For the elbow and knee, use an intensity level of 100-150. For feet and hands, use an intensity level of 150-200.

Note: An initial reaction may be encountered in 10% of cases. This involves a brief intensification of pain and can last for 3-4 weeks. If you experience an initial reaction be patient and don't get discouraged. There is positive response in 70-80% of cases.

Description

Metatarsalgia is a painful condition involving the small bones of the foot called "metatarsals," the long bones of the forefoot, and "metatarsal heads" are the end of the bones nearest

the toes. The pain in metatarsalgia is usually located on the underside of the foot (the sole or plantar surface of the foot) underneath the metatarsal heads. If you have metatarsalgia you'll have pain in your forefoot beneath the soft tissue pads of the foot. The condition arises from abnormal stresses to the forefoot during gait, including overtraining, misfitting footwear, high heels, or athletic competition. Degenerative changes of the foot, or changes related to disease may also predispose to metatarsalgia.



The primary treatment strategy is to lessen the excessive weight passing through the ends of the metatarsal bones. This can be accomplished by using a metatarsal arch support – often available in grocery or drug stores – or more permanently by the use of corrective orthotics. We use orthotics extensively in our clinic in Denver, and we are virtually 100% successful in eliminating pain from metatarsalgia.

Pulsed magnetic field therapy is extremely valuable in reducing inflammation and pain in a large majority of patients. Combined with specialized taping of the foot, laser therapy, foot and ankle manipulation, or soft tissue therapy like Graston Technique®, the pain can usually be eliminated in just a few days. In athletes, this means a faster return to training and competition, and this is always one of the most satisfying aspects of our sports medicine practice.

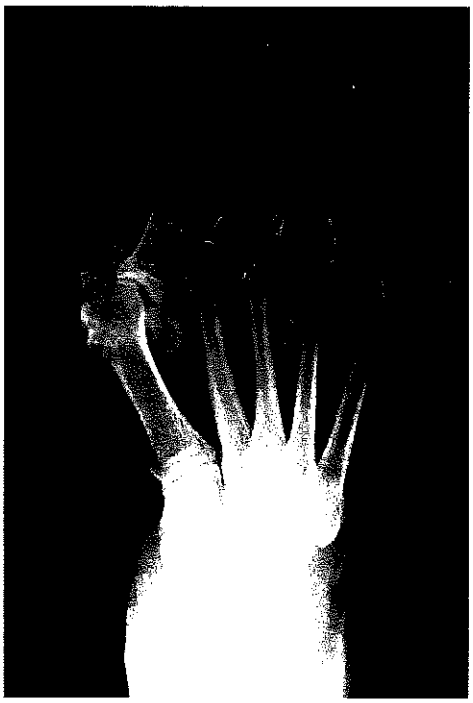
Settings and application

Metatarsalgia pain is most effectively supported by the use of the probe applicator using an treatment intensity of 200-400 for 16-24 minutes 1-3 times daily. We also use the pad applicator for 16-24 minutes at 200-400, as this can be combined with low-level laser therapy or concurrent soft tissue therapy, depending on the needs of the patient. If you have an MRS system at home, you may not require outpatient therapy by virtue of the fact that you have ready access to support three times per day. Good for you! An initial reaction involving increased pain may occur in up to 10% of patients. When this occurs, lower the intensity by half and continue as above.

Description

"Bunion" is a term to describe a deformity of the great (or "big") toe. The technical term is "hallux abductovalgus." The great toe, consisting of 2 bones called "phalanges," is the termination of the first metatarsal. Collectively these bones – the phalanges and metatarsal – are referred to as the first "ray." The first metatarsal of the foot often splays toward the midline of the body. This is called "primus varus." The big toe commensurately deviates away

from the midline of the body, creating an angled deformity at the metatarsophalangeal joint. ("hallux valgus.") The angle of the bones involved creates what appears to be a visible "bump" at the inside of the big toe. This can be a source of significant mechanical irritation.



Bunions are aggravated by wearing pointed shoes, high heels, and in sports requiring strong lateral movements, such as tennis, squash, racquetball and soccer. People who have tight hip and buttock muscles may walk with their toes pointed outward. They develop excessive pronation and abnormally high stress on the inside of the big toe. This produces (or further advances) the development of bunions.

Correction of the underlying causes produces relief. Orthotics may be useful for correcting excessive pronation, and soft tissue therapy to the hips and buttocks may allow the toes to face straight ahead during gait. High heel shoes and pointed shoes should be avoided completely. Stretching and restrengthening exercises for hips, buttocks, and lower extremities can ensure lasting improvement in gait mechanics.

Our sports medicine practice in Denver sees a large number of high-level runners. When competing at a high level, overtraining is the rule rather than the exception. Oftentimes, it is early in the training for a marathon, for example, when pain from bunions. The MRS 2000 has been extremely beneficial in eliminating bunion pain in running athletes.

When equivalent mechanical stresses occur at the outside of the foot, affecting the little toe, a similar inward deformity can occur – called a bunionette. The treatment of bunionettes is basically the same as for bunions.

In some cases of bunion, gentle mobilization is helpful. However, as often as not, mobilization of the great toe aggravates, rather than relieves, the symptoms. A knowledgeable chiropractor, sports physician or therapist will be able to determine the best approach. It is fortunate if you are able to consult a health care provider who is conversant with energy medicine and pulsating magnetic field therapies.

Settings and application

For painful bunions or bunionettes, use the probe applicator 3-4 times per day at an intensity setting of 100-400, depending on chronicity. The more chronic the case, the lower the intensity.

Use the program regularly for the best results. Given this sensitive area, an initial reaction will occur in up to 25% of cases, with an initial pain increase. If you experience an initial reaction, decrease the intensity setting to 10 or 25, and slowly work back to 100-400.

Description

Hammertoe is a flexion contracture – or bending – of one or both joints of the second, third, fourth, or fifth (little) toes. The toes appear flexed all the time, and this abnormal bending can put pressure on the toe when wearing shoes, causing problems to develop. Common symptoms of hammertoes include: 1) pain or irritation of the affected toe when wearing shoes; 2) corns (a buildup of skin) on the top, side, or end of the toe, or between two toes. Corns are caused by constant friction against the shoe. They may be soft or hard, depending upon their location; 3) calluses (a thicker type of skin buildup) on the bottom of the toe or on the ball of the foot.

Corns and calluses accompanying hammertoes can be painful and make it difficult to find a comfortable shoe. But even without corns and calluses, hammertoes can cause pain because the joint itself may become dislocated.

Hammertoes usually start out as mild deformities and get progressively worse over time. If left untreated, hammertoes can become rigid and will not respond to non-surgical treatment. Corns are more likely to develop as time goes on – and corns never really go away, even after trimming. In more severe cases of hammertoe, open sores or skin ulcerations may form.

Because of the progressive nature of hammertoes, they should receive early attention. Hammertoes never get better without some kind of intervention.

What Causes Hammertoe?

The most common cause of hammertoe is a muscle/tendon imbalance. This imbalance, which leads to a bending of the toe, results from mechanical (structural) changes in the foot occurring over time in some people.

Shoes that crowd the toes often aggravate hammertoes. And in some cases, ill-fitting shoes can actually cause the contracture that defines hammertoe. For example, a hammertoe may develop if a toe is too long or a heel is too high, forcing the front of the foot and the toes into a cramped position. We all (men and women alike) have done a disservice to the women of our culture by perpetuating the idea that high heels are more attractive. They are uncomfortable, unhealthy, and produce bunions, hammertoes, and the soft tissue irritations that go with them. My challenge to the reader is to fight back by wearing great shoes with large toe boxes and supportive flat sandals with plenty of room for the toes. Let's redefine beauty one foot at a time!

Occasionally, hammertoe is caused by some kind of trauma, such as a previously broken toe. In some people, hammertoes are inherited.

A number of non-surgical measures may be helpful for hammertoes. Corns and calluses may be trimmed or padded. As noted above, changes in footwear may make the difference. Custom orthotic devices may help control muscle or tendon imbalance, and improve gait. Soft tissue therapies to the tendon, such as Graston Technique®, can address fibrous adhesions in the flexor tendons. Manipulations of the foot and toes can help maintain or improve joint mobility. And bolstering the capacity for irritated soft tissues to heal through the use of the MRS 2000 can help control inflammation and stimulate healing.

Surgery may be necessary when all other measures fail. The most common surgical procedure is called "arthroplasty." In this procedure, the surgeon removes a small section of the bone from the affected joint.

Another surgical option is "arthrodesis," which is usually reserved for more rigid toes or severe cases, such as when there are multiple joints or toes involved. Arthrodesis is a procedure that involves fusing a small joint in the toe to straighten it. A pin or other small fixation device is typically used to hold the toe in position while the bones are healing.

Patients with hammertoe often have bunions or other foot deformities corrected at the same time. The length of the recovery period will vary, depending on the procedure or procedures performed.

Settings and application

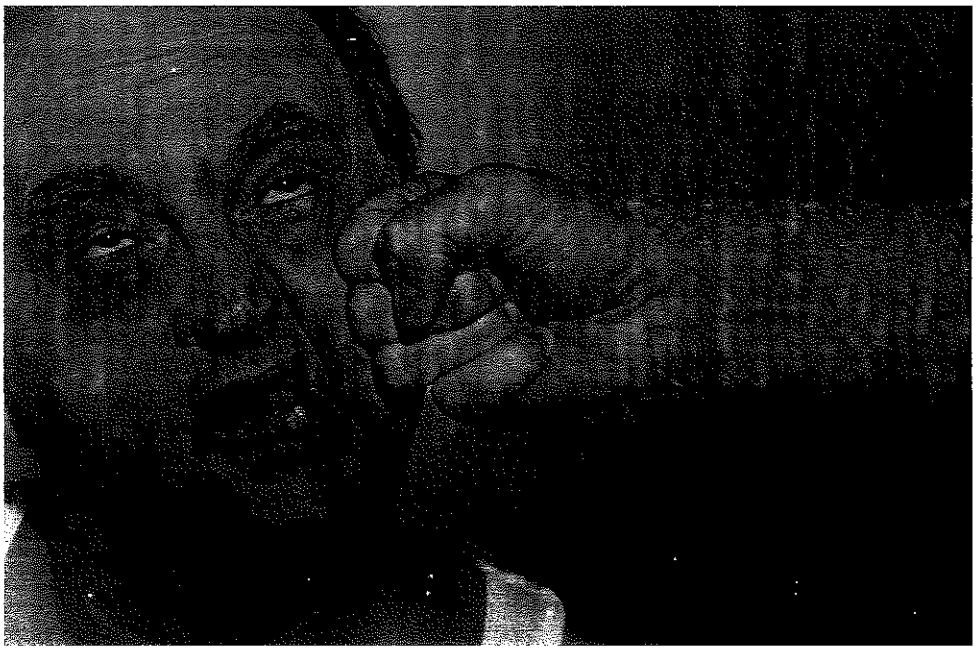
The probe applicator should be used 3-4 times per day for significant pain in the soft tissue irritations that accompany hammertoes. If a probe is not available, a pad applicator can be used. The initial intensity settings should be 100-400, and time can be 8-16 minutes, depending on how many toes are. 10% of cases will experience an initial increase in pain, and in this case, intensity settings should be reduced.

Description

Acute injuries are common in the athletic population. We have dedicated a complete section of this text to sports injuries. Another form of acute injury, whiplash trauma, has also been discussed separately.

In general, acute injuries involve an acute inflammatory reaction, which is the initial phase of healing. In this phase, macrophages and other cells are cleaning up inflammatory debris almost as soon as it is being produced by the tissue damage of injury. In the inflammatory phase, more dead tissue is being produced that is being cleaned up. As the healing process progresses, more dead cells are being removed from tissue, and fewer remaining healthy cells are succumbing to the trauma.

Understanding the cellular response in acute injury clearly points to the value of magnetic resonance stimulation as a potentially important adjunct in maintaining cellular function and balance as healing gets under way. All of these processes require adenosine triphosphate (ATP) as fuel, and electromagnetic energy increases the intracellular



production of ATP by the mitochondria. As we have seen in the case of wound healing, electromagnetic therapy functions as a powerful electron donor, improving upon the inflammatory reaction, and resolving unnecessary levels of inflammation so that healing is accelerated.

Rehabilitation of injury usually occurs after the inflammatory phase of healing is complete. Regeneration of tissue and the remodeling of tissue toward the pre-injury state is occurring in this phase. New collagen tissue is being produced, and protein synthesis rates are high. The reason why adults heal more slowly than children is that our aging protein synthesis machinery is slowing down. Our cell membranes are not as vigorous. Magnetic resonance stimulation fuels the remodeling and repair phase, and increases the rate of protein synthesis for faster, more complete tissue reconstruction.

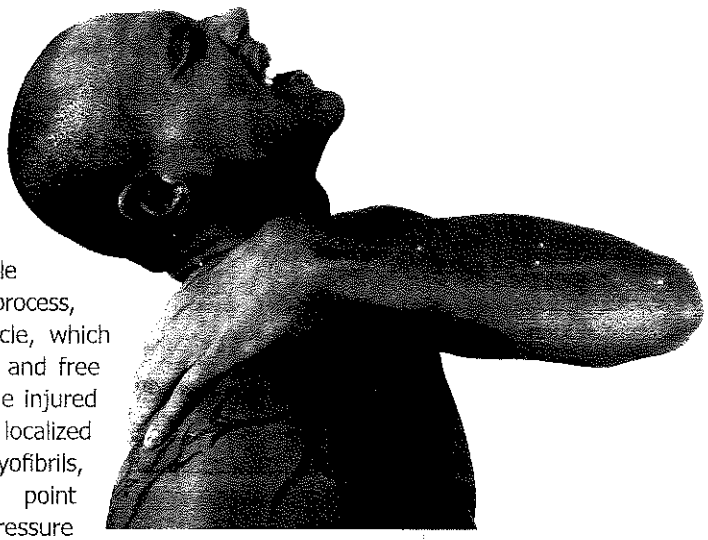
These processes of recovery from acute injury are governed by electromagnetism. Surrounding the injured tissue with an electromagnetic field tuned specifically to the active biological windows of nature may result in faster, more complete healing. This is a systemic process, and the whole body mat applicator of the MRS 2000 is essential for balance and support of the system. The MRS 2000 has the added benefit of alkalizing the body, and this is anti-inflammatory in its effects as well.

Settings and application

The whole body mat should be used twice daily for eight minutes at an intensity setting of 50 in the morning and 10 in the evening. The pad or probe applicators can be used several times per day for 16 minutes at 50-100, or the probe applicator at 150-400. An initial reaction in acute injuries is rare, but may be manifested as swelling (as with the

jaw joint) and mild increases in pain in 15% of patients. Ice is an indispensable tool in the acute phases of injury healing. The "rule" that ice should be used for the first 72 hours and then replaced with heat is a myth. Use ice twice per hour for 15 minutes, and continue doing so as long as there is pain and inflammation, assuming you have time available. The more severe your injury, the more time you'll have to comply with this recommendation. Otherwise, do the best you can.

Unfortunately, there are still physicians out there who will recommend heat or a heating pad for acute injuries. This is a huge mistake in all cases because heat is pro-inflammatory whereas ice is anti-inflammatory.



Description

Myofascial pain is produced by the presence of myofascial trigger points within muscle. These are typically brought about by trauma or injury to the muscle wherein the muscle is overstretched, pulled or torn. In the process, the sarcoplasmic reticulum of muscle, which contains calcium ions, is disrupted, and free calcium ions are released around the injured muscle cells. This produces a localized contraction of the microfibers called myofibrils, and pressure within the trigger point increases. Increased osmotic pressure prevents the normal flow of oxygen into the muscle, and tissue hypoxia (lack of oxygen) results. The area within muscle containing the trigger point becomes hypermetabolic, and local temperature within the trigger point increases. Trigger points become painful because they harbor lactic acid, bradykinin, serotonin, prostaglandins, histamine and substance P, all of which irritate pain-sensitive nerve fibers in the area.

Trigger points have the unique characteristic of referring pain, tingling, numbness, or burning sensations to other parts of the body. For example, trigger points can exist in the shoulder muscles that refer symptoms to the hand or fingers. Trigger points in neck muscles can produce headache pain behind the eyes. Trigger points in the neck muscles can also produce jaw pain, a sensation of fullness inside the ear, changes in hearing, or even watering of the eyes. Trigger points in low back muscles can mimic sciatic pain. In fact, I've had patients undergo spine surgery for a putative disc herniation who felt no improvement following the surgery. These people subsequently experienced complete relief of sciatic symptoms once myofascial trigger points were eliminated from the low back and buttocks. The tricky part is that sometimes myofascial trigger points are, in fact, produced and perpetuated by herniated or bulging discs in the back or neck.

We are fortunate at The Center for Spine Pain & Wellness to have experienced massage therapists who identify and treat myofascial pain with great skill. In many cases, myofascial trigger points produce tension of larger muscle groups with resultant spinal joint dysfunction. The combination of massage and chiropractic manipulative therapy is quite effective. Once we discovered the powerful tissue oxygenation capacities associated with pulsed magnetic field therapy, our clinical results improved even further. Trigger points seem to require an improvement in overall tissue permeability to resolve quickly. The combination of electromagnetic stimulation and acupuncture therapy in resistant cases is quite satisfactory.

In some medical circles, it has become popular to inject trigger points with steroid preparation. This is ill-advised due to the profoundly damaging effects that steroids have on collagen tissue. There are times when steroid injections are essential. Injecting trigger points with a steroid solution is not one of those times. Ever!

Settings and application

The whole body mat should be used in support of overall metabolism at a setting of 25 in the morning and 10 in the evening. If myofascial pain is severe as a result of trauma, the mat can be used 2-4 times daily for 8- 16 minutes. An initial reaction may occur with any increase in intensity setting. Increases, if any, should occur gradually, especially in cases of trauma or chronicity.

Description

Necrosis means cell death. Cells are killed by heat, injury, low oxygen (ischemia), inflammation, and infection. Reba Goodman, working at Columbia University, found that pulsating magnetic fields increase the expression of hsp70, a protein that protects cells from death. Together with co-workers, Dr. Goodman has envisioned the use of pulsating magnetic fields pre-operatively for open-heart surgery patients to limit cell death due to the stresses of surgery, a higher yield of post-operatively viable cardiac tissue, and, ultimately, better surgical outcomes. This revolutionary synthesis of energy medicine with surgery is the beginning, I believe, of the medicine of the future. What is merely an idea today will, quite surely, become reality tomorrow. This is an intensely exciting time to be involved in the field of energy medicine, and in particular, to see the principles of quantum physics being applied to biology for the benefit of all humanity. Much work needs to be done!

One of our patients, whom I'll call Mary, suffered from xerostomia, a complete loss of the function of her salivary glands due to radiation therapy following surgery for throat cancer. Xerostomia is a common consequence of radiation therapy in the neck. I wonder how many people in the world suffer with 'no spit.' Saliva contains important digestive enzymes, and, without these enzymes, digestion is impaired and poor absorption of nutrients results. Overall health declines.

Our post-radiation therapy patient used the probe three times per week for 8 weeks and, in that time, her ability to salivate was fully restored. The fact that she is able to produce

saliva is putative evidence that tissue necrosis was reversed and that previously incapacitated exocrine glandular tissue was regenerated to full function.

Her oncologist dismissed the patient's recovery. She had gone without saliva for 3 years and nothing helped until the 8 weeks of applying the MRS 2000. It is a clear case of cause-and-effect, and there is no doubt in the minds of any of our clinical staff that pulsating magnetic field therapy produced this result.

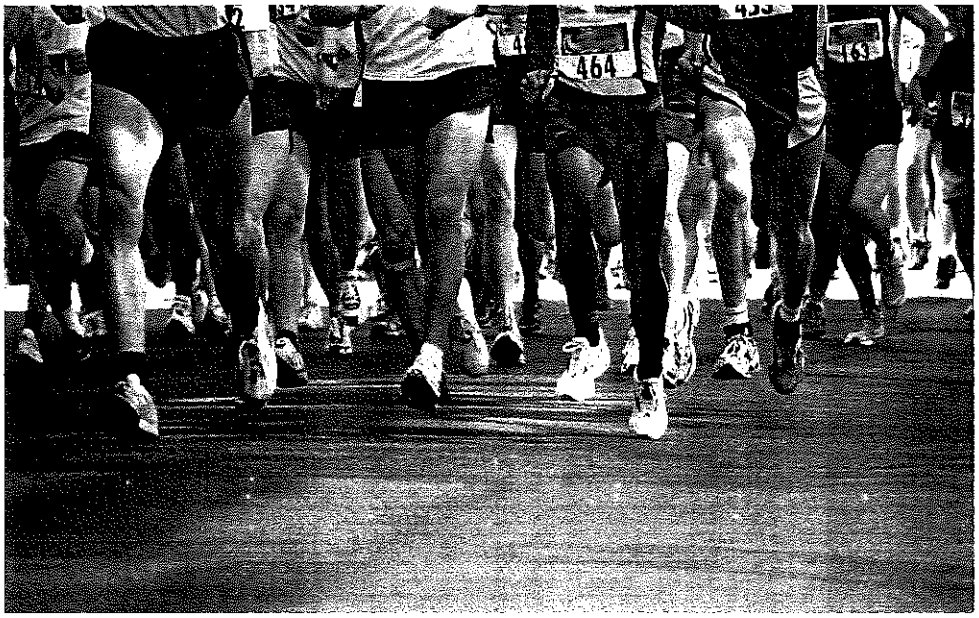
Tissue necrosis involving the skin will be discussed in additional detail elsewhere under ulcers, diabetic ulcers and wound healing. At this point, it is most important to point out that pulsed magnetic field therapy can do nothing for cells that are dead. However, cells that are near death, but not dead, may benefit from exposure to electromagnetic signaling. The expression of heat shock protein 70 (hsp70) is one example of basic research that seems to support the idea that necrotic tissue that contains viable cells can regenerate or heal to some degree. The repair of chronic skin ulcerations by exposure to pulsating magnetic fields is another example of the positive impact magnetic fields have on tissue necrosis.

Necrosis should be understood in terms of a deficiency of high-energy electrons, or electrons that are in an excited state. These high-energy electrons prevent inflammation. By supplying high-energy electrons to tissue necrosis, the metabolism is upregulated, tissues are alkalized, and the spark needed for the healing is provided. The MRS 2000 delivers bioelectromagnetic signals that ionize, surrounding the area of tissue necrosis with a cloud of high-energy electrons capable of suppressing the chronic inflammatory reaction that leads to necrosis.

Settings and application

The whole body mat should be used supportively. Use the pad applicator three times per day for 24 minutes at an intensity setting of 200 at the site of necrosis. The probe applicator can be used five times per day for 16 minutes each at 400 over a bone if there is osteonecrosis (e.g., in the hip, wrist or ankle bones). No initial reactions should be expected. There is a 60% good to very good response rate using the MRS 2000 in support of optimal cellular function.

SPORTS MEDICINE

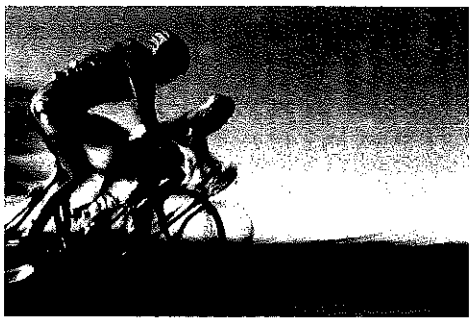


The value of magnetic resonance stimulation to the athletic population is inestimable. Olympians, professional and intercollegiate athletes, and weekend sports enthusiasts have used the MRS 2000 with great benefit. The German cross country ski team, perennially a top finisher in the Winter Olympic Games, has had the advantage of using the MRS 2000 for years.

Many sports endeavors require the athlete to train in the off season, train and compete during season, and reach a "peak" level of performance at the end of the season or for a particular event, such as a State, National or World Championship, or the Olympic Games, World Series, NBA Finals or Super Bowl.

To be able to peak at the right time, to maximize the number of training days, and to limit or eliminate illnesses through a strengthened immune system (in spite of the stresses of competition and travel) is to have a significant edge over the competition. The whole body mat stimulates increased production of ATP by the mitochondria. ATP provides electrons in an excited state to drive all the processes of life, including muscle contraction, respiration, oxygen exchange, blood flow, recognition and elimination of invading pathogens and other immune functions, and the digestion and utilization of nutrients. When these and other natural processes are enhanced because there is more energy available, athletic performance is also enhanced. While so much of athletic endeavor at the highest level seeks to enhance body chemistry (sometimes illicitly through anabolic steroids) the vast potential inherent to energy medicine in the form of pulsating magnetic fields and magnetic resonance is almost entirely overlooked.

Imagine endurance sports such as cross country running or skiing, or the Tour de France. While manipulation of the blood constituents through blood doping is effective in enhancing performance, it is either illegal or strongly frowned upon by most international sports governing bodies. Exposure to low frequency electromagnetic fields tuned to the frequencies and intensities occurring in nature improves circulation, oxygen utilization and efficient oxygen consumption. The aerobic athlete has more oxygen available for endurance and there are no needles, no side effects, and no ethical problems.



Further, pulsating magnetic fields have been proven to strengthen bone. The crystalline architecture of bone, tendon, ligament and cartilage make these tissues perfect recipients for the excited electrons conferred through the MRS 2000. Collagen-dominated structures such as tendon and ligament and cartilage are strengthened and made less susceptible to injury. Chronic inflammations – the results of overtraining at a high level (a requirement for world class athletes) are brought to resolution. The overall health of the athlete is enhanced.

Is the MRS 2000 a panacea for the athlete? No, but in my opinion, nearly so. Athletes we treat at the highest levels of competition don't merely aspire to be free of injury or pain, they want their bodies to have the absolute perfection of function that is necessary to be a world champion. It's not just about repairing what's broken; it's striving to achieve perfection. Perfect muscles! Perfectly coordinated, flexible soft tissues! Tendons and ligaments and joints that communicate with one another at high speed through the connective tissue matrix – where electrons are superconducted through the body at the speed of light, not merely at the much slower speeds of the nervous system.

For combustion, one needs fuel, oxygen and ignition. For the neuromusculoskeletal combustion that takes place within the body of the athlete – at whatever level of competition – the fuel is good nutrition, and oxygen is supplied by the healthy function of respiratory system from the air we breathe. But what is the ignition? Ignition is supplied by electricity in the body, or more correctly, electrons. These electrons are manufactured in the body as ATP. When a high-energy phosphate bond is broken and ATP is converted into ADP, the cleavage of that bond releases an electron in a high-energy state. That electron is the essence of the energy that drives biological processes. And it is that energy that ignites the fuel and consumes oxygen to produce a personal best or a world-class performance.

Magnetic resonance stimulation increases the production of ATP in the body. The future will bring increased awareness of this powerful attribute of the MRS 2000, and, with ever-increasing frequency, we will hear of athletes using the power of energy medicine to fuel them to victory. In fact, various forms of energy medicine have already been in use for decades by the elite. The good news is that this technology is now available for the rest of us!

Some Basic Rules of Application
Due to the regulation and enhancement of the immune system, athletes should use the whole body mat regularly, at least once or twice daily. The intensity settings will vary depending on the sport, the training schedule, and the intended date where the athlete needs to reach a peak, if any.

Given my experience with world-class athletes in a variety of sports, I am aware that athletes come in many shapes and sizes. I am continuously in awe of the incredible physical attributes that are acquired by athletes who apply themselves to one-and-only-one specialty endeavor. I've seen adapted musculature that seems specially tailored to a singular activity – and so it is. The legs of the cyclist, the upper body and flexibility of a gymnast, the hamstrings of a world-class sprinter, and the supporting neck and shoulder musculature of an Olympic weightlifter are just a few examples.

Daily Use of the Whole Body Mat in Athletes
Some of these athletes will require the highest intensity settings prior to a training bout, while others will require consistently the lowest settings for the recovery period following a training session. As we advance in our knowledge of the application of magnetic resonance stimulation, coaches, trainers, exercise physiologists, and other members of the sports medicine team will learn ways to maximize the athlete's overall health, training, and performance using different treatment variables. I congratulate the professional and amateur athletes, and their organizations and training departments for exploring the limits of human performance by perceiving the vast potential of quantum bioenergetics.

For the present, initial intensity settings for the whole body mat should be 25 in the morning and 10 at night. The athletes should feel free to experiment, since the best results may be very far removed from these initial recommendations. I encourage as many athletes, coaches, trainers, sports chiropractors, and team physicians as possible to become conversant with energy medicine and with the use of the MRS 2000 through attendance at a certification program. At such weekend programs, the entire array of treatment variables are discussed in detail, and applications to specific athletic environments can be explored on an individual basis.

For the athletic injuries noted below, no mention of settings for the whole body mat will be made, unless these are deemed to be unique and specific for a particular injury.

1. Muscle Strain (Torn Muscle)

Description
A strain is a twist, pull, or tear of a muscle or tendon, a cord of tissue connecting muscle to bone. It is an acute, usually non-contact, injury that results from overstretching or over-contraction. Symptoms of a strain include pain, muscle spasm, and loss of strength. While it's hard to tell the difference between mild and moderate strains, severe strains not treated professionally can cause damage and loss of function.

The most common locations of muscle strain are in the hamstring, calf, and groin. A hamstring pull is often precipitated by muscle imbalance between the quadriceps and hamstring, or by

the presence of joint locking at the sacroiliac joint. Occasionally, the hamstring can pull while the lower limb is weight-bearing and the athlete sustains ballistic contact, as in American football. The muscle is subjected to an acute overload, tearing the muscle.

A calf strain usually involves the gastrocnemius muscle, the large muscle with two heads in the back of the calf. This muscle tears more often in men, with the number one sport being tennis. Explosive contractions of this muscle are required for serving and for net play. Known as "tennis leg," this condition has sidelined many professional athletes. It also occurs in jumping sports such as basketball and volleyball.

Groin pulls or strains frequently occur in hockey and soccer, as well as in other sports requiring lateral movements such as basketball, racquetball and tennis. Dysfunction of the sacroiliac joint may predispose to a groin strain.

Stretching and warm up are essential for all athletic endeavor, as is adequate hydration. Sacroiliac joint dysfunction is common in both male and female athletes, and chiropractic or osteopathic evaluation to ensure normal joint mobility should be part of an athlete's regular regime of supportive care.

Pulsed magnetic field therapy, as in all cases of muscle injury, accelerates the healing process by up-regulating the synthesis of proteins to replace injured tissue, and by improving circulation and removal of cells that have been destroyed.

Adequate rehabilitation of muscle strain may include massage or other soft tissue therapies, gentle restrengthening exercises which progress into exercises that stimulate competition, and protective taping or biomechanical correction (such as orthotics or kinesiotaping).

Settings and application

For muscle strains, the whole body mat should be used once or twice per day for eight minutes at a setting of 25-50. In addition, the muscle strain should be treated locally with the pad applicator or probe 3-4 times per day at an intensity setting of 200-400 for 8 to 16 minutes. Initial reactions are not common.

Description

A bruise, or muscle contusion, results from blunt trauma directly to the muscle belly. This often occurs from a fall or from contact with a hard surface, a piece of equipment, or another athlete during sport. A bruise results when muscle fibers and connective tissue are crushed, tearing blood vessels within the tissue. Torn blood vessels may cause a bluish appearance. Most contusions are minor, but some can cause more extensive damage and complications.

Some bruising may appear following a muscle strain such as in the case of a hamstring tear. The tearing of muscle, and the blood vessels that go with it, cause a leakage of blood into the soft tissues. Hours to days later, a bluish, bruise-looking discoloration appears at or below the site of muscle tearing. This discolored skin is not painful – it is not a bruise. It is merely a collection of blood pigments within tissue. As the blood pigments resolve, they turn green, then yellow, then disappear.

The most common area of muscle contusion is the front of the thigh. This is called a "quadriceps contusion." Wherever the contusion occurs, ice should be applied immediately with the muscle positioned in a lengthened state. In the case of a quadriceps contusion, the knee should be fully flexed during the application of ice.

The beauty of pulsed magnetic field therapy is that the electromagnetic signals pass through matter. One can begin pulsed magnetic field therapy immediately, even as the muscle is being treated with ice. The electromagnetic signals pass through the ice pack, and all the way through the muscle, bolstering the early phases of healing. Arnica[22] or other topical homeopathic preparations can support the healing of muscle contusion as well. Adequate rehabilitation of the muscle must follow the initial efforts to resolve pain and inflammation.

Note: The application of continuous ultrasound in case of muscle contusion is not advised as this can give rise to the deposition of calcium within muscle. This condition is called "myositis ossificans." The MRS 2000 has become a very attractive alternative in the support of muscle contusions.

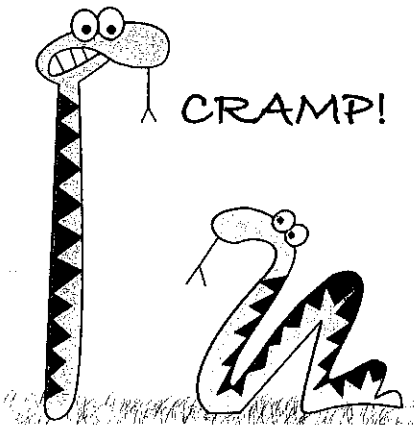
Settings and application
Use the pad applicator 3-4 times per day for 16-24 minutes at an intensity setting of 150-400. The probe applicator does not emit a broad enough signal to encompass the full muscle requiring exposure to the magnetic field. In this case, the pad applicator is recommended.

Use topical arnica liniment or ointment 1 hour before using the pad applicator as a topical herbal transdermal pre-loading strategy. The pulsed electromagnetic field, by increasing cell membrane permeability and porosity, will promote the absorption of arnica for an even greater anti-inflammatory and healing effect.

11. Muscle Cramps

Description
Muscle cramps involve a sustained, involuntary contraction of muscle, causing pain. Muscle cramps may be due to dehydration, depleted electrolytes (salt, potassium, magnesium and calcium) and/or overuse. The underlying cause should always be identified. Most muscle cramps are not serious. If your muscle cramps are severe, frequent, constant or non-resolving, see your health care provider.

22 Arnica montana has long been used medicinally. Liniment and ointment preparations are used for strains, sprains, and bruises. It contains thymol derivatives and, when used topically, has anti-inflammatory properties that assist normal healing processes.



Cramps can occur in any skeletal muscle, but are most common in the legs and feet and muscles that cross two joints (the calf muscle, for example). Cramps can involve an isolated muscle bundle or entire groups of muscles. The most commonly affected muscles are at the back of the calf and lower leg (gastrocnemius), the back of the thigh (hamstrings), the front of the thigh (quadriceps) and the feet, hands, arms and abdomen.

Cramps feel very hard to the touch and can last from seconds to several minutes or longer. A severe cramp creates anxiety and makes the cramp even worse. Not infrequently cramps will ease up only to return several times before they go away entirely.

Improving fitness, maintaining adequate hydration and avoiding muscle fatigue can prevent muscle cramps. Stretching regularly after exercise and warming up before exercise can also help. Specific stretches of the calf muscles, hamstring and quadriceps muscles should be part of every stretching routine.

The thirst mechanism in humans is significantly underdeveloped. Most patients I see in practice are dehydrated, or at least under-hydrated. To complicate matters, Colorado is a high-altitude desert environment, so we are losing fluids through our skin. We cannot perceive that we are sweating in this environment because the sweat never beads up on the skin due to the dry air. This is in contrast to my days in St. Louis, where the humidity along the Mississippi River was ever present and sweat wouldn't evaporate.

Aside from athletic competition in hot weather, particularly at the first part of football season, another common scenario of muscle cramping in Colorado happens in January or February with a deep snow. People go to bed the night before a big storm, sleep for 6-8 hours, and wake up to a fluffy white blanket covering their driveway, street, and mailbox. After peeking out the window, the excited Coloradan quickly pulls on his or her boots, grabs a shovel and digs in. What's wrong with this picture? There was no pause to drink water. It's been since last night at 7:00 PM that water was ingested. It's now 7:00 AM, 12 hours later, and still no water. The body is in a state of relative dehydration, and the low back is about to experience a whammy.

All of this snow shoveling related back pain might be eliminated or severely curtailed with greater observance of body hydration. Without the severe muscle cramping from the dehydration, the lumbar discs would be protected, and would not be herniated during snow shoveling. For all of my mountain friends, whichever mountain range you find yourself in, please wake up a little early, and drink water, not coffee the first thing in the morning (especially if you're the one holding the snow shovel). Coffee will dehydrate you and make matters worse. Save the Starbucks for later – and make sure that you have plenty of water

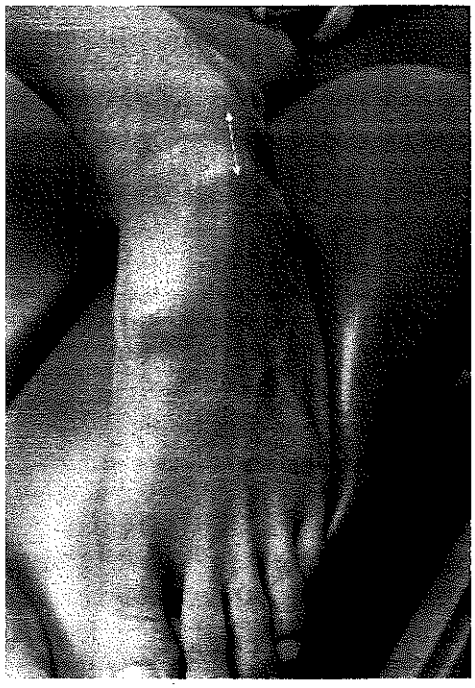
on board all day long. You never know when you're going to have to help a coworker or neighbor dig out.

Magnetic resonance stimulation will relax muscle, improve muscle circulation, improve muscular oxygenation, and regulate the autonomic nervous system. All of these counteract muscle cramping, and may be quite helpful.

Settings and application
Use the whole body mat for the autonomic nervous system regulatory effects once or twice per day for 16 minutes. Use an intensity setting of 25 in the morning and 10 in the evening. For localized muscle cramping, use the pad applicator at a setting of 200 for 8-16 minutes 2-4 times per day, depending on severity. Drink lots of water!

Description
Ligaments are tissues that connect bone to bone. While they do have the capacity to lengthen and shorten to a degree, they are non-contractile tissue. They function to stabilize joints.

A sprain is a stretch or tear of a ligament. The tear can be minor, moderate, or a complete full thickness tear. This represents the three grades of ligamentous sprain. A Grade I tear is a minor sprain with minimal excess of movement of the joint. A Grade II sprain involves



moderate joint laxity with the loss of joint stability resulting from the loss of ligamentous function. A Grade III sprain means that virtually all the stabilizing function attributable to the ligament is lost.

The most commonly sprained ligament in the human body is the anterior talofibular ligament at the outside of the ankle. This happens when the foot turns inward, and you "roll" the ankle. Perhaps the most famous ligament injury is the ACL, or anterior cruciate ligament, of the knee. Repair of this ligament has become the darling of arthroscopic surgery. Hats off – and kudos to Western medicine on this one! Repair of these ligaments restores normal knee joint mechanics and may help prevent the onset or rapid advance of osteoarthritis at the knee.

The positive effects of pulsed magnetic fields on collagen tissue are discussed elsewhere in this text. Ligamentous tissue is highly organized and crystalline in nature, and therefore highly responsive to magnetic resonance stimulation.

The more acute and recent knee injury, the higher the intensity setting. The more chronic the condition, the lower are the intensity settings.

Settings and application

While both the pad and probe are effective, I preferred to use the probe for its more localizing effects in the case of ligamentous sprains. About 75% of patients will report a noticeable improvement in symptoms after one or two applications. Most of the remaining patients don't feel a change in symptoms. They just heal faster. Perhaps this is because their symptoms are milder. Tangible improvements with pulsed electromagnetic fields are more readily apparent when tissue is more abnormal, or where injury is more severe.

Initial intensity settings in the acute case range from 200-400. I routinely use the probe applicator at 400 for ankle and knee sprains, and at 200-400 for sprains of the elbow and wrist. Sprain injuries of the vertebral column are discussed elsewhere.

Description

Periostitis is an inflammation of the periosteum – Saran wrap-like covering of the bones. Periostitis most commonly affects the long bones of the body. Inflammation begins with overuse of muscles and tendons that insert into the bones, and it is at or near the point of insertion where periostitis pain develops.

A common form of periostitis is tibial periostitis, or shin splints. Medial tibial stress syndrome is another name for conditions in this category. The shinbone is inflamed along the insertion of muscle and connective tissue on the inside of the calf. Lateral shin splints involve a similar inflammation of bone on the outside of the calf. There is tenderness along the bone as you feel the bone with your fingertips. Nodules or small bumps may also be felt along the bone. These bumps represent swelling and inflammation of the periosteum.

Shin splints respond very well to pulsed magnetic field therapy. As a bony inflammation, pulsed magnetic field therapy stimulates the bone to heal more rapidly. A faster return to sport is possible by using the MRS 2000.

Supportive measures include ice massage, specific proprioceptive response taping (SPRT) or kinesiotaping for support of the shin while training and competing, and soft tissue therapy. When mechanical faults like excessive pronation perpetuate the condition, this is corrected with orthotics and gentle manipulations to the lower extremity and feet.

Note: An infective form of periostitis results from exposure to germs. This acute condition produces fever, malaise, and often pus leaking from a wound near the bone. This requires cleaning and antibiotic therapy. Even in such cases, pulsed magnetic field therapy may have an immune-strengthening role to play. However, medical consultation is important in such cases.

Settings and application

To support the recovery from shin splints and similar manifestations of periostitis, use the pad or probe at 200-400 for 8-16 minutes 2-3 times daily. Decrease the intensity setting if you feel an initial reaction, which may occur in 10% of cases.

Description

The meniscus is a cartilaginous pad between the end of the femur and the tibia. Two menisci, the medial meniscus and a lateral meniscus, are "standard equipment" in each knee.

Meniscus tears come in various forms and affect various locations in the knee. It is beyond the scope of this text to discuss meniscus tears in detail. However, the most common clinical finding is joint line tenderness, and this is a fairly reliable clinical finding that is confirmed by MRI examination.

Surgical suturing can repair peripherally located meniscus tears in younger athletes (under 21) since the blood supply is adequate. Bucket handle tears, posterior horn tears and defects that produce a flap will cause locking, clicking and/or popping of the knee. When these signs are combined with medial or lateral joint line tenderness, the index of suspicion for meniscus tear is high.

Note that the cartilaginous menisci have a generally poor blood supply, and this blood supply is directly related to the ability of the tissue to heal. The most strategic use of the MRS 2000

is therefore to promote improved blood supply for healing and regeneration of cartilage tissue in the young athlete, and for postoperative accelerated healing in the older athlete or weekend warrior. Exercise rehabilitation is essential and quite helpful. Acupuncture can help reduce swelling profoundly in the case of acute meniscus tear.

Settings and application
For an acute meniscus tear, use the probe at 400 for 16-24 minutes, three times per day. Lay the side of the probe flat against the area of greatest pain on either the inside or outside of the knee, which ever is most painful. In the absence of a probe, the pad can be used at 200-400 for 16-24 minutes, three times per day.

41. Delayed Onset Muscle Soreness (Acute Overload)

Description
Delayed onset muscle soreness (DOMS) pain in muscle occurs 12-48 hours after exercising. It often occurs as the result of beginning a new exercise program, changing to a new sport, or after an abrupt increase in exercise intensity or duration. The soreness is a normal response to unusual exertion and represents an adaptation leading to increased strength and stamina of muscles as they recover and rebuild. The soreness worsens within the first few days following activity and subsides over the next few days.

The pain of delayed onset muscle soreness is different than the pain of acute muscle strains and sprains. Sprains and strains are felt as an abrupt, sudden onset of pain occurring immediately during or after an activity. Sprains and strains are associated with swelling or bruising.

Muscles are loaded by exertion and shortening action. This is called concentric muscle contraction. However, there is another kind of muscle contraction where the muscle is tightening at the same time the length of muscle is increasing. For example, when you curl a dumbbell, you lift the weight from a straight-arm position to a bent arm position, shortening in the bicep muscle. When you slowly lower the weight from the raised position back down to the straight-arm position, the muscle is contracting at the same time it is lengthening. This is called eccentric muscle contraction. Eccentric muscle contraction produces far greater strain on muscle, and is often the cause of delayed onset muscle soreness. Going downstairs, running downhill, lowering weights and the downward motion of squats and push-ups are all examples of eccentric muscle contraction. Small tears in muscle develop that contribute to soreness and mild swelling.

A recent Cochrane Collaboration study from Australia demonstrated that stretching does not help delayed onset muscle soreness. *(Herbert 2007/225)*

Therapeutic ultrasound has been studied for DOMS. It was found that continuous ultrasound helps DOMS, while other ultrasound settings do not.

The best way to treat delayed onset muscle soreness is to prevent it from happening in the first place. Start slowly and increase exertion levels gradually. The 10% rule states that you

should never increase an exercise program by more than 10% in any one week of training. Ice, whirlpool baths, and gentle massage may help to resolve the pain. Improving muscle circulation and accelerating muscle repair and recovery through pulsed magnetic field therapy is logical. However, studies must be done to prove the value of pulsed magnetic field therapy in delayed onset muscle soreness specifically.

Certain muscle pain or soreness can be a sign of a serious injury. If your muscle soreness does not get better within a week, consult your health care provider.

Settings and application
Following overexertion with exercise use the whole body mat at an intensity setting of 10 for 24 minutes, twice daily. As the muscle soreness subsides, increase to 25 or 50 as tolerated. As always, drink lots of water!

Wait for 2 days after beginning to feel the pain to start using the pad or probe applicators; use ice, whirlpool baths or gentle massage instead during this time. The local applicators used in concentrated fashion may promote increased blood flow to a local area of pain where the applicator is used, and this may increase pain. While this is not harmful per se, it is not a desired effect. The local applicators should be used at an intensity setting of 50 in the beginning. Again, the main applicator to use immediately is the whole body mat.

Description
Recovery from exercise is as important in the athlete's training regime as is the training itself. The more fully and completely the athlete can recover from an exercise bout, the more efficient training can be. Recovery involves the autonomic, or vegetative, nervous

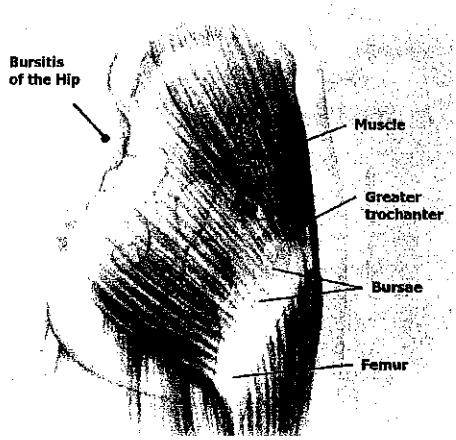
system, circulation, and metabolism. Biochemically, muscle glycogen stores are depleted, electrons are reduced to their lowest energy states, and large amounts of ATP have been consumed. The replenishment of these basic physiological functions may be accomplished nicely through magnetic resonance stimulation in combination with adequate nutrition, hydration, massage, and gentle stretching.

Settings and application

The whole body mat should be used in support of overall metabolism at a setting of 25 in the morning and 10 in the evening. Immediately following an exercise bout, the whole body mat should be used at a setting of 10 for 24 minutes. The athlete must hydrate adequately prior to this application, and may bring an extra water bottle onto the mat to charge the water electromagnetically for consumption at the conclusion of the session. No initial reactions are noted. Over time, the athlete may observe faster recovery and more robust exercise bouts as a result of increasing amounts of energy.

Description

The human body has more than 150 bursae. These small, fluid-filled sacs lubricate and cushion pressure points between the bones and the tendons and muscles near the joints. They help joints flex, extend and rotate with ease and without friction. Bursitis occurs when a bursa becomes inflamed. When inflammation occurs, movement or pressure is painful.



Bursitis often affects the joints of the shoulders, elbows or hips. Bursitis also can occur at the knee, heel and the base of the big toe. Bursitis pain usually goes away within a few weeks or so with proper treatment, but recurrent flare-ups of bursitis are common.

The symptoms of bursitis include a dull ache or stiffness in the area around the elbow, hip, knee, shoulder, big toe or other joints. The pain worsens with movement or pressure. The area may feel swollen or warm to the touch. Occasionally skin redness occurs in the area of an inflamed bursa.

An extremely easy to diagnose but sometimes difficult to treat form of bursitis occurs at the outside of the hip. This is called trochanteric bursitis because pain is primarily over the greater trochanter. The trochanter is a ridge of bone beneath the insertion of the gluteus maximus muscle at the outside of the hip. The gluteus maximus is a very powerful muscle and would create great amounts of friction if it weren't for the trochanteric bursa. Bursitis in this region is typically non-resolving and very commonly treated in our office. In many cases,

this bursitis can be handled exclusively with supportive applications of the MRS 2000. In some cases, however, ultrasound, over-the-counter medications, acupuncture, massage, or exercise rehabilitation are required. The iliotibial band, a broad band of tissue on the outside of the thigh, is almost universally tight in these cases, and the application of a foam roller at home can assist greatly in loosening this muscle. Patients who have used the pad applicator over the iliotibial band have reported positive results.

Common causes of bursitis are overuse, muscle weakness, stress and direct trauma to a joint, such as with repeated bumping or prolonged pressure from kneeling. Bursitis may also arise when there is an infection, underlying arthritis, or gout. Again in the case of trochanteric bursitis, an underlying lumbar disc herniation may be present that creates gluteal muscle weakness. This weakness predisposes to the development of the bursitis. Sometimes, the cause of bursitis is unknown.

Bursitis of the shoulder often results from injury to the rotator cuff, the muscles and tendons that connect your upper arm bone to your shoulder blade. Causes of the injury may include falling, lifting and repetitive overhead arm activities. Sometimes, it's hard to distinguish between the pain caused by bursitis and that caused by a rotator cuff injury.

Bursitis at the back of the elbow (olecranon bursitis) is associated with actions requiring you to repeatedly extend (or hyperextend) the elbow. Simply leaning or resting on the elbows can lead to olecranon bursitis, also. Olecranon bursal inflammation may arise from pushing a vacuum cleaner back and forth. Throwing a baseball and swinging a tennis racket or a golf club are other examples of repeated physical activities that may lead to bursitis of the elbow or shoulder.

With bursitis at the knee a soft, egg-shaped bump occurs on the front of your knee, the result of repetitive kneeling while laying carpet, scrubbing a floor, pulling weeds or doing other activities that place pressure up through the front of the knees. A sharp blow to the knee can cause inflammation of the bursae around the kneecap as well. People with arthritis who are overweight often develop bursitis of the knee.

Bursal inflammation at the back of the heel (where the Achilles tendon inserts into the heel bone) is called calcaneal bursitis. This commonly occurs as a result of improper footwear or prolonged walking or in sports where constrictive boots or shoes are worn such as in ice hockey or snowskiing.

You may not be able to pinpoint a specific incident or activity that led to your bursitis. In some cases, the inflammation may stem from a staphylococcal infection.

Treatments and drugs:

Bursitis treatment is usually simple and includes:

- Resting and immobilizing the affected area
- Applying ice to reduce swelling

- Taking nonsteroidal anti-inflammatory drugs (NSAIDs) to relieve pain and reduce inflammation

Apart from bursitis at the hip, simple self-care and home treatment often handles a bout of bursitis, and symptoms may disappear completely within a couple of weeks. Resting or avoiding activities that aggravate bursitis pain, applying ice to reduce swelling, and taking anti-inflammatory herbal preparations, enzymes, or fish oil can help in addition to standard recommendations for over-the-counter nonsteroidal anti-inflammatory drugs. When symptoms don't disappear, outpatient treatment is warranted. Exercise rehabilitation to strengthen weakened muscles, supervised use of a foam roller, specific stretching exercise and anti-inflammatory physical modalities are generally prescribed. Because there is inflammation, the painful bursa lacks a sufficient number of excited-state electrons. Pulsed magnetic field therapy signals the cell membrane and surrounds the bursa with a cloud of excited electrons to reduce the inflammation.

Sometimes, your doctor may recommend physical therapy or exercises to strengthen the muscles in the area. Additionally, your doctor may inject a corticosteroid drug into the bursa to relieve inflammation. This treatment generally brings immediate relief and, in many cases, one injection is all you'll need.

If your bursitis is caused by an infection, antibiotics are necessary. Sometimes the bursa must be surgically drained, but only rarely is surgical removal of the affected bursa necessary.

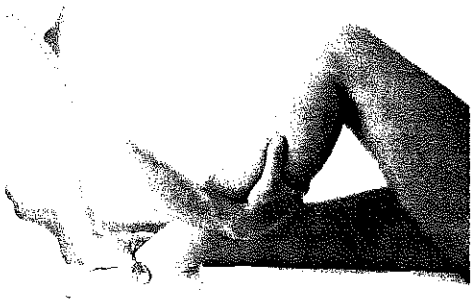
Settings and application

To support pain from bursitis, use the pad applicator 3-4 times per day for 16-24 minutes at and intensity level of 150-400, or use the probe applicator locally 3-4 times per day for 8-16 minutes at a setting of 400. An initial reaction may occur in up to 20% of bursitis cases. If an initial reaction consisting of mild pain increase occurs, lower the intensity level to 25 and gradually increase.

Description

Chronic exertional compartment syndrome is an uncommon, but serious form of exercise induced muscle pain that affects the arms or legs. Compartment syndrome is more common in seasoned athletes who participate in sports that involve repetitive movements, such as running, Tae Bo, swimming, racewalking, or cycling. This condition is also known as chronic compartment syndrome or exercise-induced compartment syndrome.

Chronic exertional compartment syndrome is difficult to diagnose because the affected limbs – one or both calves – exhibit no abnormality. The standard Western medical understanding states that conservative treatments typically do not help chronic exertional compartment syndrome. Surgery is usually the treatment of choice, and consists of a procedure called "fasciotomy" in which the investing layers of tissue outside the muscle bundles are slit longitudinally to create more room for muscle expansion.



One of our patients at The Center for Spine Pain & Wellness is a Tae Bo Instructor who is involved in training classes several times each day. One day, she felt a pop in her left lower leg and calf. She sustained bruising at the inside of the calf, and the bruising extended from the knee to the ankle. Her calf symptoms became progressively worse over the subsequent 11 months. When she presented to our clinic, she reported severe aching, cramping and tightness with intense pressure and fullness in the left calf, worsened by exercise and exertion. After six weeks of failed conservative therapies including electrical stimulation in ultrasound, no significant improvement was noted. The patient consulted a surgeon and surgery was scheduled.

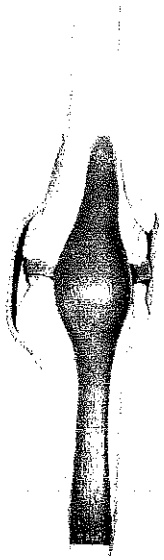
At this point, our treatment changed to include supportive applications of pulsed electromagnetic field therapy using the MRS 2000 pad applicator for 16 minutes three times per week. Mild improvement was noted after the first application. Definite improvement was noted by the third application, and symptoms were completely resolved by the 10th application. A subsequent flare-up six weeks later due to over exertion was resolved with two additional applications of pulsed electromagnetic field therapy. Another flare-up occurred at three months, and again was resolved with two additional applications.

Results like this for conditions that are typically reserved for surgery cause us to give pause and think about the nature of the musculoskeletal system. Clearly, in this case of chronic exertional compartment syndrome, what was lacking was energy. That energy was supplied in the form of pulsed electromagnetic signals. Other forms of energy had already been tried, including ultrasonic waves and electrically generated muscle stimulation. These were not the answer, but pulsating electromagnetic signals provided something else that was effective. Based on the fact that electromagnetic waves passes through matter, we are confident that all affected cells in this injury were signaled at the speed of light, improving cell membrane permeability even at the muscle-bone interface. In a manner similar to the healing of un-united fractures, as observed by Dr. Andrew Bassett in the 1970s, we are observing that pulsed magnetic fields have the ability to stimulate a healing response in soft tissues that other forms of conservative therapy do not have. Fortunately for this patient, surgery was cancelled – her 11 months of persistent symptoms resolved completely. No further therapy has been needed in the last year.[23] A total of 14 applications using the MRS 2000 were provided.

23 For the technically-minded reader, I include the following data: Each treatment consisted of 16 minutes of pulsed electromagnetic field (PEMF) therapy: flux density of 70 microTesla (μT), a carrier frequency of 3 Hz delivering 5 packets of 5.25 millisecond (ms) pulsations followed by a 36.75 ms pause. The electromagnetic signal shape of the 2-coil applicator pad used was a rectified square signal. Ice was continued at home. Mild improvement was observed after the first PEMF treatment. Definite improvement was noted at visit #3. Symptoms were entirely resolved by the 10th visit, with a flare-up 6 weeks later due to overexertion. The patient was released on her 12th visit. She returned 3 months later with a flare-up. She was treated twice more and released to an as-needed basis.

Settings and application
Use the pad applicator for 16 minutes twice daily at an intensity setting of 200-400. Both calves should be placed on top of the pad while lying face up. In the above-reported case, the patient only received three times per week, and full resolution of symptoms was still obtained. No initial reaction is to be expected.

Description
A tendon is a thick, fibrous contractile tissue that attaches muscles to bone. Tendinitis is an inflammation or irritation of this tissue. Tendinitis causes pain and tenderness within the tendon, usually near a joint. This condition is common at the heels, shoulders, elbows, and wrists. When severe, tendinitis may lead to rupture, or tearing, of the tendon requiring surgical repair. Oftentimes however, rest, conservative treatment and home remedies are all that are needed.



Symptoms associated with tendinitis include pain, tenderness, and mild swelling in some cases. When swelling occurs, this often represents an infiltration of inflammatory cells, and when this is chronic, can lead to degeneration of the tendon (myxoid degeneration). In this case, the swelling is exquisitely tender.

Tendinitis represents one of the most common overuse injuries people encounter. Tennis elbow, for example, represents tendinitis of a muscle in the forearm near the elbow called the extensor carpi radialis brevis (ECRB). Achilles tendinitis is common in runners and tennis players and represents an inflammation just above the heel. Patellar tendinitis, or "Jumper's knee" occurs just below the kneecap in basketball players, volleyball players and runners. Rotator cuff tendinitis leads to shoulder pain. Golfer's elbow represents tendinitis of the tendons that cause the wrist to flex. The involved tendon is located at the inside of the elbow, on the opposite side where pain is felt in tennis elbow.

Tendons slide through lubricated membranes called sheaths. If the sheath of tissue that surrounds the tendon becomes scarred and narrowed in small joints, such as the finger, it may cause the tendon to lock in one position. This occurs in a condition called trigger finger.

The pain of tendinitis is usually worse with activities that use the muscle that is attached to the involved tendon. A health care provider specializing in sports medicine, chiropractic

sports medicine, physiatry or orthopedics can easily diagnose tendinitis. X-rays are not helpful and are only performed to rule out other disorders that may accompany the tendinitis. An MRI may be necessary to reveal a deeply located tendon inflammation. In some cases, systemic diseases such as rheumatoid arthritis may be an underlying cause for tendinitis, and, therefore, blood tests may be ordered.

Conservative therapy for tendinitis includes eliminating the pain and reducing inflammation as the first order of business. This is accomplished through pulsating magnetic field therapy, ice, electrical stimulation, iontophoresis, ultrasound, soft tissue therapy such as the Graston Technique®, and a specialized form of massage known as "transverse friction massage." Medical doctors often prescribe corticosteroid injections, but these run the risk of permanently weakening the collagen within the tendon, and these are not recommended because such injections can contribute to tendon rupture. In rare cases, steroid injection is helpful, particularly with trigger finger, when a board-certified hand surgeon performs the injection.

Once the initial pain and inflammation are under control, treatment should progress to include exercise rehabilitation. Protective or assistive taping can accelerate the rate of return to competition for an athlete with tendinitis (and return to productive work for the rest of us!) For both the inflammation phase and the rehabilitative phase of healing, pulsed magnetic field therapy is extremely valuable. As with ligament and bone, tendon tissue is highly organized in a collagen matrix, and it is highly receptive to signaling with electromagnetic fields. Early in my experience with the MRS 2000, a gentleman came to me with chronic tennis elbow from playing racquetball. He had had non-resolving pain for over two years. Four or five applications with the probe and his elbow pain disappeared completely. I spoke with him six months later and the pain still had not returned. I must point out that this gentleman had tried many treatments for his elbow pain without success prior to using the MRS 2000.

Achilles tendinitis

Achilles tendinitis has plagued me personally since I ran track in high school. I sustained a grade one tear of the tendon, and this healed up within about 8 weeks. Five years later, the pain came back as I resumed a running program. The tendinitis has continued to bother me intermittently over the last 25 years, and became progressively worse beginning 10 years ago. The pain and tightness of the calf muscles is so intense that, at times, it feels as if there is a dagger stabbing into the back of my calf. The calf pain is a secondary muscle syndrome; the primary problem is this shortened Achilles tendon. There is a nodule in the tendon that is exquisitely tender and represents local chronic inflammation.

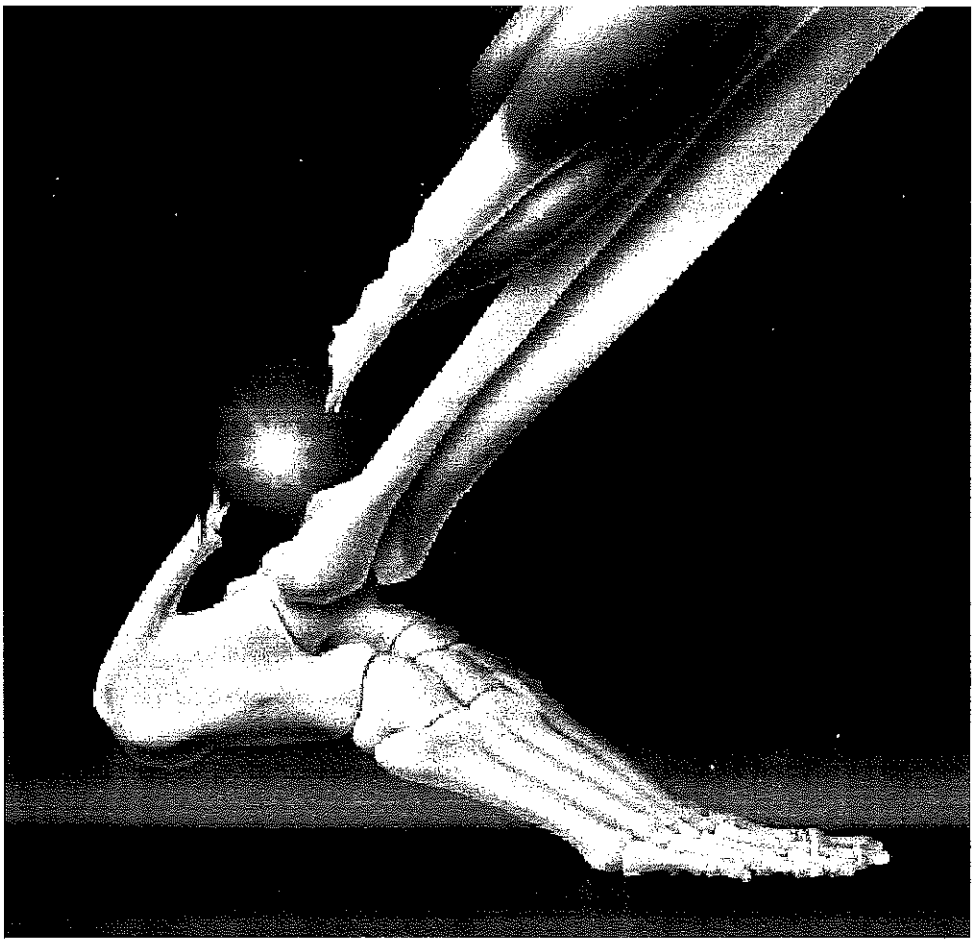
Because this condition has prevented me from running, I have avidly searched through literature for years in an effort to find a permanent and lasting solution apart from tendon lengthening surgery. I have tried ultrasound, aggressive eccentric muscle training, acupuncture, massage, foot manipulations, orthotics, low-level laser therapy, and other forms of deep muscle therapy. Remarkably, pulsed magnetic field therapy using the MRS 2000 seems to have resolved the problem the best as long as I continue to apply this energy on a regular basis.

Most of us have an Achilles' heel, and, in my case, my Achilles' heel is my Achilles tendon! The nodule is 90% improved and I expect it to resolve further with regular use. I am able

to play tennis and run with no pain. The parameters I use for applying the MRS 2000 are listed below.

Settings and application

Use the pad applicator 3-4 times per day for 16-24 minutes at an intensity setting of 150-400. In addition or as an alternative, use the probe applicator locally 3-4 times per day for 8-16 minutes at a setting of 100-400. In my own Achilles tendinitis, I use the pad applicator at 400 for 16 minutes immediately prior to exercise. I use the probe at 400 for 24 minutes repeatedly at the swelling, or nodule, within my Achilles tendon. For shoulder tendinitis, use the probe at 200 initially. For the wrist and elbow, use an intensity setting of 400.



Description

When a tendon ruptures partially or completely, the same principles as for tendinitis apply in the use of the MRS 2000. The only difference is intensity setting if there has been recent surgery.

Your health care provider can diagnose a tendon rupture reliably. A defect can often be felt within the substance of the tendon. In some cases, advanced imaging studies such as an MRI are necessary. Surgery may be warranted based on symptoms or the loss of function. Whether surgery is performed or not, pulsed electromagnetic field therapy delivers significant potential benefits.

Settings and application
Use the pad applicator 3-4 times per day for 16-24 minutes at an intensity setting of 150-400. In addition or as an alternative, use the probe applicator locally 3-4 times per day for 8-16 minutes at a setting of 100-400.

If tendon surgery has been performed, begin 48 hours after surgery using the probe applicator pad at an intensity setting of 10-25. Gradually increase the intensity over the course of 4-6 weeks to a maximum of 400, or less if this is better tolerated. No initial reaction should be encountered if a gradual increase in intensity is observed.

XIII. Tenosynovitis

Description
As noted in the section on tendinitis, tendons slide through lubricated membranes called sheaths. Sheaths are lined with fluid-producing cells called synoviocytes. Tendon sheaths become inflamed in response to overuse. As an example, the use of hand shears to clip grass in the garden using a squeezing motion of the hand is a repetitive motion that can give rise to tenosynovitis at the thumb. This particular injury is referred to as "DeQuervain's" stenosing tenosynovitis. It leads to pain at the wrist where the tendon sheath of the thumb crosses the wrist joint.

Tenosynovitis causes pain with movement. The condition is diagnosed by pain, swelling, or increased temperature in the involved tendon sheath. Resisted contraction tests and local palpation will confirm the diagnosis, usually in the absence of any need for imaging studies.

Tenosynovitis can be treated with bracing or stabilization of the joint associated with the involved tendon. Local application of ice may also be beneficial. Ultrasound, acupuncture, and other conservative therapies to reduce inflammation can be useful. Pulsed electromagnetic field therapy is a supportive means of accelerating the healing response.

Settings and application
Use the pad applicator 3-4 times per day for 16-24 minutes at an intensity setting of 150-400. In addition or as an alternative, used to probe applicator locally 3-4 times per day for 8-16 minutes at a setting of 100-400.

XIV. Joint Dislocation

Description
A joint is the point where two or more bones connect with each other. A joint dislocation is an injury in which the ends of bones are forced from their normal positions. The end of

one bone is displaced relative to the end of the other bone. Dislocations usually happen in response to trauma. These are fairly common injuries in contact sports such as football, soccer, gymnastics, hockey, and volleyball.

All dislocations require prompt medical attention to return the bones to their proper positions without damaging the joint. Once relocated, the joint will require several weeks of rest, followed by rehabilitation. Some joints, such as the kneecap (or "patella") and shoulder have an increased risk of repeated dislocation.

A dislocation is not merely the displacement of bones. As the bones displace, the ligaments, tendons, and muscle that surround the joint can be torn and traumatized. Blood vessels can be compressed by displaced bone, and nerve tissue can be damaged or crushed. This is particularly true at the shoulder joint where an anterior dislocation of the shoulder may injure the brachial plexus, a complex web of nerve tissue that forms the nerves passing from the neck into the arm. A competent health care provider can evaluate the injury to determine if the dislocation has damaged blood vessels or nerves. In rare instances, attempts to relocate the injury may produce further harm if not performed by a knowledgeable professional.

In summary, a joint dislocation must be understood in terms of the breadth of tissues that are injured. Elsewhere in this text we have covered isolated injuries of muscle, tendon, ligaments, joints, and bone. In the case of dislocation, all of these tissues may be implicated. Pulsed electromagnetic energy will signal all of these tissues simultaneously, bolstering cellular repair processes, improving local circulation, accelerating the removal of damaged cellular debris, and maximizing the replacement of injured tissue with new, healthy tissue.

Settings and application
Use the pad applicator 3-4 times per day for 16-24 minutes at an intensity setting of 150-400. In addition or as an alternative, use the probe applicator locally 3-4 times per day for 8-16 minutes at a setting of 100-400. I prefer to use the probe applicator for most cases of joint dislocation due to the ability to target the inflammation with greater specificity.

Description
Maximum human performance: This is the ultimate aim of the Olympic games, and of professional sport. Power, endurance, strength, and flexibility are all factors that translate into better performance in a given athletic endeavor. Each one of these parameters may be enhanced through the use of pulsating electromagnetic fields in specific ways. Admittedly, much research needs to be done in this area. In the realm of human performance enhancement, energy medicine is in its infancy. However, this is not to say that we are entirely without data. We have many reports of athletes using the MRS 2000 in the pre-competition environment to great advantage.

Power is the ability to exert force over time. Strength is the ability to exert force. Endurance is the ability to sustain an aerobic activity over time. And flexibility refers to the suppleness of muscle such that the joints are free to move through a wide range of motion.

For power and strength, muscles must achieve the ability to generate force. By using the whole body mat at an intensity setting of 200-400 for eight minutes immediately prior to a maximum effort, increased muscular power may be realized. Evidence suggests that magnetic resonance stimulation increases the production of ATP. It is by this mechanism that increases in muscular force generation may occur.

Aerobic capacity for endurance is enhanced by increases in oxygen delivery and utilization. We have seen elsewhere in this text that both oxygen delivery and utilization may be enhanced by exposure to extremely low frequency pulsating electromagnetic fields.

Flexibility is a function of neuromotor control, body temperature, muscle viscosity versus elasticity, genetics, body type, and circulation. The regulatory effects of magnetic resonance stimulation on the autonomic nervous system may bring greater balance to the neuromusculoskeletal system in addition to increasing circulation. Over time, improvements in flexibility may be noted. This has been discussed in detail, as in the case of chronic exertional compartment syndrome and in my own case of Achilles tendinitis.

These basic factors must be borne in mind as the MRS 2000 is utilized in precompetition build up. In the pursuit of maximum human performance, one can never have enough excited-state electrons on board, especially those that are generated by energy fields matching the low-level frequencies and amplitudes of nature.

Settings and application

To maximize muscular force generation, use the whole body mat applicator for eight minutes at an intensity setting of 200-400. If this is used daily during training, withhold this application of treatment for two days immediately prior to the day of competition, then use the whole body mat as close to competition as possible. Larger athletes should use a setting of 400.

To maximize aerobic capacity and flexibility, use the whole body mat applicator for 16-24 minutes 1-3 times daily at a setting of 25-150 in morning and afternoon, and at a setting of 10-25 in the evening. Higher settings can be used for larger athletes here as well.

Description

Recovery and regeneration are functions of the autonomic (or vegetative) nervous system. Cells have been broken down by training and competition. They need to undergo repair. This recovery phase is just as important as the training itself. Proteins, oxygen and nutrients need to flow freely. Energy stores need to be replaced. Stores of ATP – the ultimate carrier of electrons in the body – need to be replenished. On a chemical level, muscle glycogen needs to be replenished as well.

The recovery process is therefore a symphony of cooperation between the mechanical aspects of the athlete, the body chemistry and nutritional needs of the athlete, and the energetic needs. All of this happens in the milieu of the autonomic nervous system, and in the context of the athlete's own psychology. Improve upon any one component of the symphony and the athlete's performance will increase. Improve upon all of the components of the symphony, and champions are born. There is not a single component discussed herein that is untouched by exposure to extremely low level pulsating electromagnetic energies.

Notes on electromagnetic fields, steroid abuse and athletic performance enhancement:

Currently, the world of athletic performance enhancement is held captive by a fascination with drugs and hormones. This addiction carries grave consequences for the world of sport. It is no longer a question of what the body can do, but rather, who has the best chemist or pharmacy, and who can hide the latest designer anabolic steroid from detection. The thrill of victory is sometimes celebrated more in a laboratory than on the field of competition. My hope is that through rigorous enforcement and pre-emptive education of athletes at a young age we will lose our fascination with drugs in deference to natural means of maximizing the function of each cell in the body. I understand the drive for victory and for a gold medal, but I believe people are most interested in seeing what we can do naturally as we continue to explore the limits of human performance. Electromagnetism is no more invasive than the use of electricity in a rehabilitation environment. In fact, at the amplitudes and frequencies we use, these signals are much less invasive. They do exert biological effects, but these effects are calibrated to the innate capacities of the individual athlete. Anabolic steroids can make a machine out of anyone. Subtle, verifiable energies do not, and cannot. They are as harmonious with nature as organic fruits and vegetables.

Settings and application

Use the whole body mat applicator as soon after competition or an exercise bout as is practical for 16-24 minutes at an intensity setting of 10. The Sound Light Relax System can be used in conjunction with magnetic resonance stimulation for additional benefit. The importance of maintaining adequate hydration through the intake of plenty of water cannot be overemphasized.

Description

It used to be that some athletes of high caliber who reached collegiate, professional or Olympic ranks would train beyond the ability to recover. However, in the past 25 years the disturbing trend toward athletic specialization at a young age has led to the rise of overtraining syndrome in youth. Many children and adolescents can no longer afford wide and varied exposure to many sports: they must choose one sport and choose it early. Gymnastics and ice skating are good examples. So are sports like football, soccer, baseball, swimming and hockey. And don't forget dance and cheerleading!

Because of the pressure to succeed at such a young age, overtraining syndrome is becoming more commonplace. Athletes train for competition or a specific event and train longer and harder so they can improve. Without the proper amount of rest and recovery, these vigorous regimens can tax the autonomic nervous system and actually decrease performance.

Athletic conditioning requires balance between muscular overload and recovery. The recovery phase must engage the autonomic nervous system fully. When there is too much overload or too little recovery, autonomic function is compromised and both physical and psychological symptoms manifest. These symptoms include the feeling of being washed out, tired, drained and having low-energy, generalized soreness, aches and pains, a sudden drop in performance, insomnia, headaches, depressed immune function (including an increased number of colds and sore throats), a decrease in training capacity and intensity, moodiness and irritability or depression, a loss of enthusiasm for sport, a decrease in appetite, an increased incidence of injuries, and a compulsive need to exercise.

Because athletes are variable in their response to stress, there are no specific exercise limits for preventing overtraining per se. However, there are excellent training guidelines to reduce the risk. Schedule adequate periods of rest. Vary training throughout the year, and plan this variation well in advance. Drink plenty of fluids and ensure adequate dietary protein and carbohydrates to nutritionally support the cellular repair processes required. Cross training can help reveal whether certain muscle groups are being overworked and uncover mental fatigue. Regular massage therapy can help rejuvenate the overused muscles.

An increase in heart rate variability can reveal overtraining syndrome. This is because the body is succumbing to stress and the adrenal glands become overactive. While working with elite cross-country skiers, Heikki Rusko developed an orthostatic heart rate test (The Orthostatic Test) to detect the presence of adequate physical recovery. To obtain this measurement, do the following:

1. Lie down and rest comfortably for 10 minutes at the same time each day (morning is best).
2. At the end of 10 minutes, record your heart rate in beats per minute.
3. Then stand up.
4. After 15 seconds, take a second heart rate in beats per minute.
5. After 90 seconds, take a third heart rate in beats per minute.
6. After 120 seconds, take a fourth heart rate in beats per minute.

Athletes who have adequately recovered will show a consistent heart rate between measurements. Rusko found a marked increase (10 beats/min or more) in the 120-second post-standing measurement of athletes on the verge of overtraining. These athletes had not fully recovered from a prior exercise bout, are fatigued or otherwise stressed, and need additional rest. *(Uusitalo 1996/226; Uusitalo 1994/227; Kirwan 1988/228)*

A training log that includes a record of how rested the athlete feels each day can help identify trends toward overtraining syndrome as well.

Exercise is essential for good health. Research has shown that moderate levels of exercise can increase immunity. In those who have overtraining syndrome, low levels of active exercise in the context of overall rest recover faster from this condition. The key is to nurture the de-compensated autonomic nervous system toward normalized function.

Settings and application
Use the whole body mat applicator for 16 minutes at an intensity setting of 10 3-5 times per day. Because of the profound, regulatory effects of pulsed magnetic field therapy on the autonomic nervous system, the MRS 2000 may actually prevent overtraining, and enable a higher level of athletic performance enhancement through fewer missed days of training. In essence, planned, daily use of the MRS 2000 during training enhances rest and recovery by enhancing autonomic nervous system function.

Description
The brachial plexus is a network of nerves passing from the neck underneath the collarbone to the arm and hand. An injury to the brachial plexus occurs when these nerves get stretched or torn. This often occurs when the shoulder is pressed down forcefully while the head is pushed up and away from that shoulder. Injuries to these nerves are common in contact sports such as football, but they can also result from trauma sustained in motor vehicle accidents and falls.

The severity of brachial plexus injury is highly variable. The mildest brachial plexus injury is a stretch injury to the nerves known as a "Stinger" or "Burner." These injuries feel like an electric shock or burning sensation shooting down the arm. The athlete will complain of numbness or weakness. Often these symptoms last only a few seconds or minutes. More severe injuries involve a tear or rupture of the nerves, which can lead to permanent loss of function and physical impairment. In such cases, consultation with a neurologist

is recommended, with appropriate testing of the electrical activity of the nerves. This test is called an EMG (electromyography). An MRI may help visualize the extent of damage to the brachial plexus.

Nerves regenerate slowly, about one inch per month. If the length of injured nerve tissue is long, it may take several months to achieve full restoration of nerve function. Pulsating magnetic fields are proven to speed up the rate of regeneration of damaged nerves. *(Longo 1999; Walker 1994; Kanje 1993)* The use of the MRS 2000 may therefore be an important support intervention for athletes who have sustained a Stinger or Burner. Because of more rapid healing, pain and inflammation may abate more quickly. Low-level laser therapy, transcutaneous nerve stimulation (TENS), and acupuncture may be helpful in managing these injuries as well.

Settings and application

For acute Stingers or Burners, use the MRS 2000 pad applicator 16 minutes 2-4 times per day at an intensity setting of 200-400. Smaller athletes should use 100-150 initially.

Description

Osgood Schlatter's Disease is not a disease at all. It is an overuse syndrome. The condition was named after two physicians, Dr. Robert Osgood and Dr. Carl Schlatter, in 1903. These doctors defined a painful inflammation at the insertion point of the patellar tendon to the upper portion of the lower leg just below the kneecap in adolescents involved in running and jumping activities. This insertion point, called the tibial tuberosity, is not fully mature in young athletes. When subjected to the strain of repeated jumping and running, the patellar tendon can tug away at the bone causing inflammation.

Osgood Schlatter's Disease affects mainly boys aged 10-16 years old. This condition can be intensely painful, especially when the athlete falls directly on the bony prominence that is inflamed. It is common in basketball and volleyball players. The condition resolves when the athlete becomes skeletally mature and stops growing.

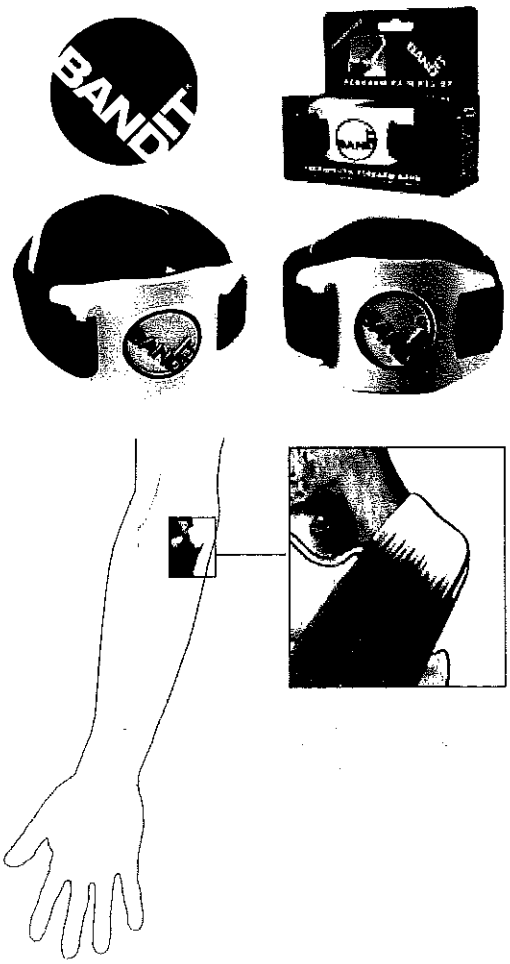
Various treatments have been recommended for this condition since its description in 1903. More far-fetched treatments have included the placement of a tongue depressor directly over the tibial tuberosity and striking the tongue depressor with a rubber mallet. This is ill-advised, and will only make the condition worse. During acutely painful periods, rest has proven to be beneficial, together with ice massage and active, gentle massage of the patellar tendon in an upwards direction. Electrical stimulation, acupuncture, and supporting taping or bracing can help manage symptoms. Pulsating magnetic fields

have a beneficial effect on bone and tendon regeneration, and may reduce inflammation in conjunction with other measures.

Settings and application
For Osgood Schlatter's Disease, use the probe applicator for 8 to 16 minutes at 200-400 either preceding or following a session of ice massage to the patellar tendon and tibial tuberosity.

2. Tennis Elbow and Golfer's Elbow

Description
The most common condition for which patients seek medical attention for elbow pain is tennis elbow, or lateral epicondylitis. This condition is an overuse syndrome involving the muscles that cock the wrist back into extension. The extensor carpi radialis muscle is specifically implicated. This muscle inserts into the lateral epicondyle of the elbow.



Tennis elbow produces pain over the outside of the elbow with gripping movements, with repeated extension of the wrist, or with extreme flexion of the wrist. There may be pain with flexing or bending the elbow. Those who play racquet sports, swing a hammer repeatedly, carry a briefcase daily, or perform repeated gripping activities are prone to develop this condition. There is pain with lifting, and often there is pain radiating down the forearm to the hand due to the development of active myofascial trigger points.

The condition is easy to diagnose, but due to extreme variability in severity, may be quite difficult to treat. In some cases, one or two applications of the MRS 2000 may eliminate the pain and inflammation of this condition completely. One patient, in his mid-40s, who was an avid racquetball player, suffered from tennis elbow for over two years. His pain was daily and continuous. He tried varying standard physical therapy treatments without lasting benefit. Using the probe, this condition resolved fully in just 5

applications. He returned to full, vigorous racquetball activity, and at six-month follow-up, there was no recurrence of tennis elbow.

Other cases are much more difficult to treat, and may take weeks or even months to resolve fully. In rare cases, chronic inflammatory cells have infiltrated the tissue so completely that surgery is required. Ultrasound, Graston Technique®, active rehabilitative exercise, acupuncture and chiropractic spinal manipulation may accelerate recovery. If a racket sport is involved, attention to proper grip size for the racket, and proper technique for backhand strokes may be necessary to prevent recurrence. In the initial phases of treatment, rest from the inciting activity is important. When returning to activity, supportive taping using Kinesiotape or specific proprioceptive response taping can be beneficial. We have also used IceWave® non-transdermal acupuncture patches in conjunction with our taping techniques to produce a more rapid resolution of pain and an earlier return to work activity or competition. The most effective, affordable tennis elbow brace we have found is the Proband® / BandIt® brand. (Pictures on previous page used by permission.)

Golfers elbow is an inflammation of the flexor tendon at the inside of the elbow. It is an exact correlate of tennis elbow with the exception that it involves overuse of the tendons and forearm muscles that flex the wrist, rather than extend it. Treatment for golfers elbow is the same as for tennis elbow except that the location of treatment is the common flexor tendon rather than the extensor carpi radialis brevis tendon. The BandIt® brace is used on the inside of the elbow, and all other treatments, taping and therapies are directed toward the medial epicondyle and tendinous insertions. (See picture of attachment site of common flexor tendon.)

Settings and application

For tennis and for golfers elbow, use the probe applicator at a setting of 200-400 8-16 minutes twice to four times daily at home. Combine this treatment with ice massage and the use of a good brace. Gentle stretching and range of motion maneuvers can be beneficial. Symptoms that are non-resolving or slowly resolving indicate the need to consult a qualified health professional.

Description

Tennis leg afflicts middle-aged athletes who have experienced early degenerative muscle atrophy due to aging and inactivity. Tennis leg occurs more often in males who were highly competitive in sport during adolescence. Due to the demands of vocation and family, a once competitive athlete becomes sedentary. Subsequently he or she returns to vigorous athletic activities. The period of inactivity coupled with the degeneration we all experience due to aging and relative inactivity predisposes to this injury.

Tennis leg involves a tear of the muscles and tendinous portion of the calf muscle known as the gastrocnemius. This injury can occur in tennis players, runners, or in any athlete who performs sudden, abrupt changes in direction and explosive movements involving ankle flexion (plantar-flexion). There is a significant loading of the calf muscle when the athlete's ankle is bent upward, and when followed by a rapid contraction that bends the ankle downward the muscle tears.

The onset of tennis leg is sudden, and the athlete experiences a sharp, well localized pain in the back of the leg. The pain is severe and debilitating. While this condition may be prevented through proper warm-up and stretching, the athlete is often unaware of the deconditioned state of the calf muscles, and the problem is really one of overload. A tear may occur during long distance running after the first mile or two. The degree of tearing may be mild, moderate or severe. Mild cases of tennis leg may resolve within two weeks. Severe cases may require 2-3 months to resolve fully.

Treatment of this acute condition should include the application of ice 16 minutes twice hourly with rest and elevation of the limb. During icing, the pad applicator of the MRS 2000 can be used at 200-400 for 16 minutes. As pain reduces and walking become more comfortable, massage and Graston Technique® can be helpful. Kinesiotaping and protective circumferential compression using an elastic band or brace can expedite earlier return to training and competition.

Settings and application
Combine the use of the pad applicator for 16 minutes twice hourly at an intensity setting of 200-400 with ice in the acute phase of this injury.

The MRS 2000 is extremely valuable for ongoing training and prevention of tennis leg. Immediately prior to stretching, warm up and/or competition, apply the pad applicator for 8 to 24 minutes at a setting of 200-400. Warm up slowly. Stretch, but don't overstretch. Make sure you are well hydrated. Improved circulation, oxygen delivery and muscle relaxation through pulsating magnetic field therapy can profoundly improve the functional capacity of an athlete with this and related conditions such as Achilles tendinitis and chronic exertional compartment syndrome.

PAIN

Pain is one of the most significant and expensive health problems in North America. Of the 10 leading causes of lost time at work in the United States, back pain heads the list. Joint pain ranks 5th. In the general population, 50-85% of people who have neck pain continue to experience neck pain 1-5 years later. Chronic pain following injury from work and auto collisions continues to rise. Depression is a common companion disorder. According to a recent study, pain is a primary problem in over 50% of cancer patients. (Beuken-van Everdingen 2007/229)

Given that many painful conditions are discussed under their related orthopedic, sports medicine or regional sections in this text, only a few conditions will be addressed separately here.

The more acute the pain, the more frequent and intense the MRS sessions should be. An initial reaction may occur in 5-10% of cases depending on the location, nature and chronicity of the condition.

Description

Between 11 and 25 million Americans suffer from migraine headache. Headache is one of the top 10 leading reasons for people to consult their physician. Up to 17% of women and 6% of men have experienced a migraine.

A typical migraine consists of moderate to severe pain in the head with a pulsating or throbbing quality. This pain may be confined to one side of the head (classic migraine), or may involve both sides (common migraine). The pain worsens with physical activity, is usually associated with sensitivity to light and sound, and may be accompanied by nausea with or without vomiting. A migraine headache may interfere with regular activities and work, and can last from 4-72 hours. Migraines can occur several times per month or just a few times per year.

Many experts agree that migraine headaches begin with a musculoskeletal component early in life. Muscle tension headaches begin with tightness and spasm in the neck, producing joint locking. Left untreated, these chronic muscle tension headaches begin to involve the autonomic nervous system with visual disturbances, nausea and loss of appetite in conjunction with headache pain. According to Eugelius Spierings, MD, a Harvard neurologist and

world-renowned headache expert, many cases of migraine headache may not have evolved if the neck-related muscle tension headaches would have been successfully addressed earlier in life. These muscle tension headaches are often easily addressed with chiropractic spinal manipulation, myofascial release therapy or massage, and proper diet and exercise habits. Jack LaLanne, the iconic TV exercise personality of the 50's and 60's (still energetically alive and active at age 94) had chronic headaches prior to his discovery of regular, vigorous exercise at the age of 16. His newly adopted regimen of daily exercise eliminated his chronic, daily childhood headaches completely.

Sugar addiction, with significant fluctuations in blood sugar levels and hypoglycemia, is on the rise among youth in the United States and Canada. With increased sedentary, computer-dependent activities and less time outdoors, type 2 Diabetes is on the rise among youth as is obesity. It is no surprise that our broken food chain in North America among people raised on Kool-aid, cookies, doughnuts and candy has corresponded with a rise in migraine headaches in early mid-life. While many new drugs are available to preempt a full-blown migraine headache, they are expensive and unnecessary when given the alternative of regular exercise, healthy diet, adequate hydration, proper sleep, and exposure to healthy outdoor environments. We have pointed out elsewhere in this text that we suffer a magnetic field deficiency owing to our enclosed dwellings, cars and concrete work environments. There is significant interference with the Earth's geomagnetic field, and in addition, we are exposed to unnatural electromagnetic pollution. Many cell phone users reported increased headaches when they hold the phone directly to their head.

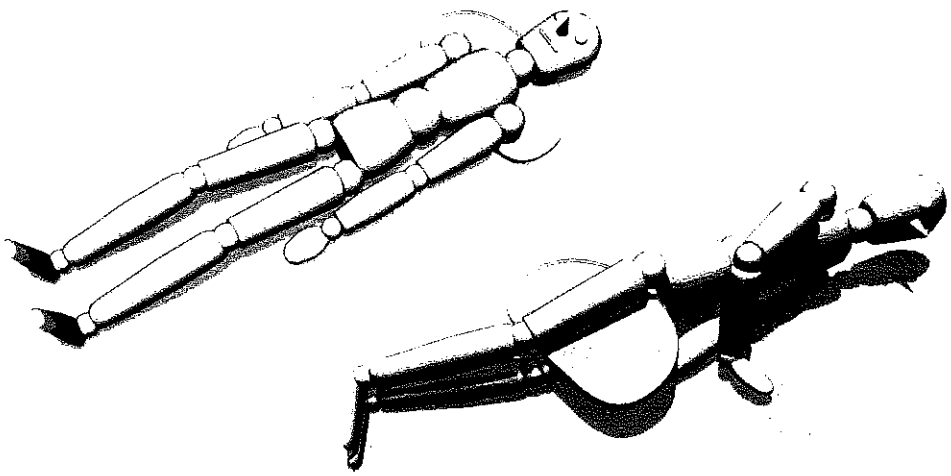
In all cases of severe headache, a more serious cause must be ruled out. Therefore, it is advisable to consult a qualified health provider for accurate diagnosis of a severe headache condition. In adolescent females, a significant hormonal component to headache exists. We have found acupuncture to be highly effective in such patients regarding hormonal regulation. In younger patients, and in patients who are unenthusiastic about acupuncture needles, acupuncture points can be with the probe applicator of the MRS 2000+ designo® Med system.

Pulsating magnetic field therapy using the MRS 2000+ designo® systems can have a sedative effect on the nervous system as well as improve circulation and oxygenation to tense muscles at the base of the skull, in the neck and in the shoulders. These muscles often contain myofascial trigger points that refer pain into the head, neck or jaw. There is often significant upper cervical joint dysfunction, or joint blockage, which must be addressed by a qualified chiropractor or osteopath. Myofascial release therapy can be a significantly beneficial adjunct in the non-pharmacologic management of migraine headache and its muscle tension precursors.

We have observed cases where daily use of the MRS 2000+ designo® is a key factor to full, lasting relief. For example, an 11-year-old boy with chronic migraines began using the MRS 2000 daily at home. His need for chiropractic care has been greatly reduced because the number of headaches this young athlete experiences has been curtailed to nearly zero. And his parents are delighted that this young man does not need to rely on a pill to obtain relief and full control over headaches!

Settings and application
The whole body mat applicator should be used three times per day for eight minutes, beginning with an intensity setting of 25 in the morning, 10 at mid-day and 10 or sensitive level in the evening. The pad applicator can also be used up to three times per day for 8-16 minutes at a setting of 5-150. The pad is placed underneath the head and shoulders while lying down so that the back of the head rests just below the curved edge of the pad. Larger patients may increase the intensity setting to 200 using the pad.

One small randomized controlled study of the use of pulsating magnetic field therapy in migraine headache patients attributed the improvement to the redistribution of blood flow. *(Sherman 1998/139)* In this study, the magnetic field was applied to the inner thighs of patients with migraine headache. A statistically significant reduction in headache intensity and frequency was noted in the patients who received the active pulsating magnetic field therapy, even after an average of 8.1 months follow-up.



If you are under the care of an acupuncturist, ask which 2-4 points would be most helpful to stimulate using the probe applicator. Use an intensity setting of 50-100 for the stimulation of these points using the probe.

The beneficial effects of regular, vigorous exercise, proper nutrition which incorporates a predominance of fruits and vegetables in their natural state, adequate water intake, a good night's rest, stress management and healthy work postures cannot be overemphasized in successful treatment of migraine and muscle tension headaches. Take time to perform breathing exercises where you breathe deeply in through the nose and out through the mouth. Be patient, as it may take several weeks to begin to experience significant improvement.

Description

The physical cause for phantom limb pain originates in the brain. Most people who've had a limb removed sometimes feel as if their limb is still there. The phantom limb may feel cold, warm, itching or tingling, but when painful, treatment may be required. Phantom limb pain is not the same as pain from the remaining stump of the amputated limb.

Phantom limb pain usually begins within the first few days of an amputation. The pain usually involves a part of the limb that is furthest from the body, such as the hand of an amputated arm. This intermittent pain may be triggered by weather changes, by pressure to remaining part of the limb, or by emotional stress. Researchers now know that nerves that served the missing limb reprogram themselves, and this reprogramming changes the mapping of the brain's circuitry.

There is no medical test to diagnose phantom limb pain. Acupuncture, transcutaneous electrical nerve stimulation (TENS), and pulsed magnetic field therapy may be helpful.

Settings and application

Use the whole body mat applicator two times per day for eight minutes. Gradually increase the intensity setting from 10 in the morning to 100. A setting of 10 should be used in the evening. The pad applicator can be used twice daily for 24 minutes at the setting of 150-200 to the lumbar spine for lower limb phantom pain and at 100-150 to the neck and shoulders for upper limb phantom pain.

See "Rheumatology."

See "Rheumatology."

Description

As noted elsewhere in this text, a syndrome is a set of symptoms that go together. As such, failed back surgery syndrome isn't really a syndrome at all. It is a generalized term to refer to patients who did not have a successful result from back surgery.

Spine surgery is basically performed to accomplish one or both of the following: to decompress a nerve root or spinal cord that is pinched; and, to stabilize a joint that moves too much by fusing the bones together.

In spite of arguments to the contrary, there is no reliable scientific research to prove that one surgical approach works better than another. Spine surgery to eliminate acute pain and weakness in the arms or legs is 95% successful. However, spine surgery does nothing to alleviate back pain or neck pain that accompanies the sciatic pain or arm pain respectively.

Therefore, spinal surgery should always be considered only as a last resort once all other appropriate, non-surgical, conservative measures have been exhausted. As regards chronic low back pain, there is insufficient evidence of the effectiveness of surgery on pain and post-operative function to draw any firm conclusions about its value. *(Haldeman 2008)*

The primary reason for a poor surgical outcome following back surgery is the fact that the presumed lesion causing pain was not, in fact, causing the patient's pain. For example, pain from the sacroiliac joint may mimic sciatica pain from a disc herniation. Disc herniations that are asymptomatic commonly appear on MRI examination. A spine surgeon may conclude that a patient's thigh pain is coming from a disc herniation when, in fact, it is coming from a dysfunctional sacroiliac joint. Not infrequently, over the years, my colleagues and I have alleviated low back pain that did not improve through surgery by correcting sacroiliac joint dysfunction.

The value of MRS 2000 therapy for failed back surgery syndrome is in addressing tight, tense paraspinal and gluteal muscles, enhancing sleep for improved repair processes, and improving oxygen delivery mechanisms. Failed back surgery syndrome is not a diagnosis, but rather, the lack of a diagnosis. It is important for a person who continues to have pain following spine surgery to obtain a correct diagnosis. A qualified non-surgical spine specialist such as a Doctor of Chiropractic, a physiatrist, or an interventional pain management specialist can help to define the problem accurately.

Settings and application

The whole body mat applicator should be used for 24 minutes 2-3 times per day at an intensity setting of 10. This is a supportive procedure that is an excellent complement to other interventions. There is no contraindication to using pulsed magnetic field therapy in patients with implanted spinal devices. The most modern devices are currently made of titanium.

Description

Complex regional pain syndrome (CRPS) is an uncommon, chronic condition usually affecting the arm or leg. It manifests as intense burning or aching pain along with swelling, skin discoloration, altered temperature, abnormal sweating, localized osteoporosis, and hypersensitivity in the affected area. The nature of complex regional pain syndrome is puzzling, and the cause is poorly understood in traditional western medicine.

This is one of those diseases that may be better understood once the sciences of quantum mechanics and the submolecular biology are integrated with biochemistry and biology. Albert Szent-Gyorgyi, who won the Nobel Prize in 1937 for discovering Vitamin C (which he called "hexuronic acid"), lamented the fact that while chemistry embraced the findings of quantum physics and applied these physical laws to the great benefit of mankind, biochemistry did not and has not. *(Szent-Gyorgi 1960/230)* The good professor challenged us to think of diseases in terms of disruptions of atoms and electrons and electron flow in addition to our classical biochemical understanding. Since electricity is fundamental to so many life processes, it may be disruptions to the flow of electricity that explains many currently baffling health

conditions. Is it possible that CRPS is one such condition? Could CRPS be an electron deficiency syndrome, or a magnetic field deficiency syndrome? Only well-designed clinical trials combined with evidence-based clinical experience will answer these questions. The freedom to explore such questions should not be limited by powerful corporations holding sway over research funding programs or governmental agencies.

The reason CRPS may be an electron deficiency syndrome is that it is often associated with significant loss of bone density and localized osteoporosis. Obviously, we must not be seduced into simplistic concepts. However, we must be willing to look at syndromes such as this through another frame of reference if we are to gain better understanding, and ultimately, better, more effective treatment.

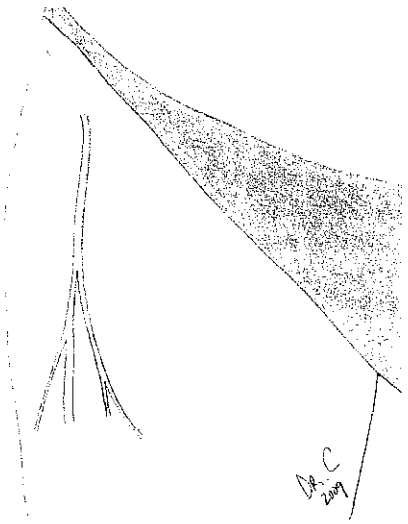
Women are more likely to be affected by CRPS than men. Although CRPS is most common in people between the ages of 40 and 60, it can occur at any age. Treatment for CRPS is most effective when started early in the course of the syndrome.

Settings and application
Use the whole body mat applicator three times per day for eight minutes per application. Start at the "sensitive" intensity setting and work slowly up to a setting of 25 in the morning. A setting of 25 to 50 may be used at mid-day, as tolerated. Use a "sensitive" setting in the evening.

In up to 25% of cases, there is an intensification of pain (initial reaction). Do not be discouraged by this, as it is fairly common. In order to move through this period, applications may be made more comfortable by using "North" polarity only. The MRS 2000 automatically switches from North to South polarity every 2 minutes. At the beginning of a treatment session, the polarity is always North. Begin treatment as usual. At 2 minutes, stop the machine (using the start/stop button) and then press the button again to restart. The MRS 2000 will begin again at North polarity. By doing this 3 times, every 2 minutes, an 8 minute treatment session can be achieved with North polarity only.

It is encouraging to note that nearly 7 of 10 CRPS sufferers may benefit from the use of magnetic resonance stimulation in a way that profoundly improves quality of life. The MRS 2000 can be used as an important adjunct to standard treatment protocols that include medications, applying heat and cold, Capsaicin cream, physiotherapy and gentle range of motion exercises, sympathetic nerve-block injections, TENS, and biofeedback. What seems absent from traditional medical therapy is a supportive nutritional program, and more holistic approaches such as detoxification, chelation therapy, and psychological/spiritual support.

Description
Meralgia paresthetica is an entrapment of the peripheral nerve that presents itself in the surface layers of the skin near the outer waistline. The lateral femoral cutaneuous nerve is susceptible to the pressure of clothing in this location.



In people who have a pendulous abdomen, this nerve can become irritated more readily. The same applies for pregnant women. Nevertheless, meralgia paresthetica can occur in non-obese, non-pregnant people too. Rarely, this condition can occur in conditions that affect the nerves, such as diabetes.

This condition involves a burning or tingling sensation superficially over the skin of the front and outer thigh. Less commonly, this condition can produce dull pain in the groin area or across the buttocks. Usually symptoms are present only on one side. Wearing pants or slacks with a tight waistline or a tight belt may aggravate meralgia paresthetica. Workers who wear heavy equipment around their waist, such as policemen and construction workers, may also be more predisposed to this condition.

In making the diagnosis, a competent health care provider will take a thorough history and palpate the area locally. X-rays and electrodiagnostic testing are only performed when the diagnosis isn't clear. In all cases, the lateral femoral cutaneous nerve is entrapped.

Conservative treatment and supportive care of meralgia paresthetica may include ultra-sound, low level laser, massage or other soft tissue treatments, avoidance of tight-fitting clothing, and pulsed magnetic field therapy. Weight loss is recommended for obese individuals.

Settings and application

Because the nerve is entrapped in a very localized area, the probe applicator is ideal for supporting recovery from meralgia paresthetica. Use to probe applicator for 16-24 minutes at an intensity setting of 100-200 up to 4 times daily. The whole body mat applicator can be used to enhance systemic circulation and oxygenation of blood as well. This may assist the nerve in more rapid regeneration.

VIII. Trigeminal Neuralgia

Description

Trigeminal neuralgia involves spontaneous attacks of excruciating, lightning-like pain that shoots through the face. Initial attacks are short and intermittent, but as the condition progresses, episodes can become more frequent and of longer duration. In some cases, episodes can last weeks or months. More women are affected than men, and most people with trigeminal neuralgia are over 50 years old. Pain is experienced in the areas supplied by the trigeminal nerve or its branches, including the cheek, jaw, teeth, gums, lips, or less often the eye and forehead.

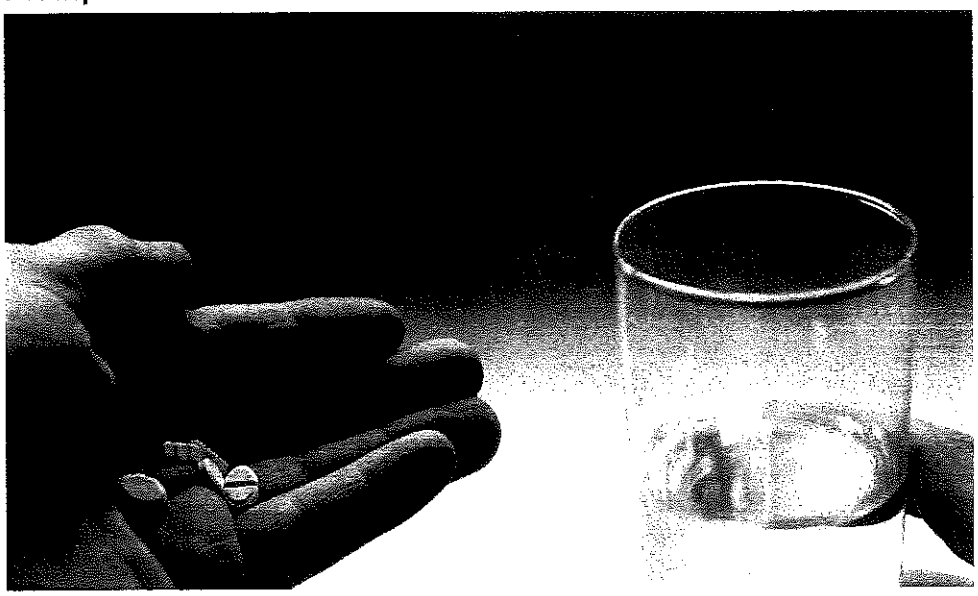
Traditional medical treatments for trigeminal neuralgia include medications, injections or surgery. Alternative medicine includes acupuncture, biofeedback, electrical stimulation of nerves, nutritional therapy, vitamin therapy, and pulsed magnetic field therapy. Nutritional and vitamin therapies may interact with medications. There are no potential adverse reactions in combining pulsed magnetic field therapy, acupuncture, or electrical stimulation with medical treatment. If anything, the increased cell membrane permeability that comes with these supportive measures can enhance medical management.

Settings and application

The trigeminal nerve is inflamed in this condition. The MRS 2000 may be an important adjunct for more rapid, lasting resolution of symptoms. For an acute attack of trigeminal neuralgia, use the probe applicator just in front of the ear at an intensity setting of 150-200 for eight minutes. In chronic cases, lower the intensity setting to between 25 and 50. These can be provided hourly throughout the day. Acupuncture and other Traditional Chinese Medicine procedures are also recommended for the best palliative relief of pain. Medicines and pain injections may be necessary due to the severity of pain.

Neuropathic Pain/Neuralgia

Description



The pain of peripheral neuropathy has been discussed elsewhere. Common causes of painful peripheral neuropathy include herpes zoster infection, HIV-related neuropathies, diabetes and other metabolic diseases, nutritional deficiencies, toxin exposure, malignancies, and immune disorders.

Neuropathic pain can affect the peripheral nervous system, the central nervous system, or both. Central neuropathic pain follows a spinal cord injury, stroke, and multiple sclerosis.

Fibromyalgia may represent a central neuropathic disorder because it responds to medications that are effective for neuropathic pain.

Cancer is a common cause of neuropathic pain due to direct invasion of a tumor into peripheral nerves, or as a side effect from chemotherapy or radiation therapy.

The pain of neuralgia is distinctly different from normal peripheral pain such as one might experience by hitting a thumb with a hammer. This pain may be likened to an electric shock, or be continuous or intermittent. It can include burning or coldness, pins and needles, numbness and itching.

Settings and application

The goal of support using the MRS 2000 in neuropathic pain/neuralgia is improved balance and regulation of the autonomic nervous system, to enhance restorative sleep, and to assist the body in decreasing the irritability of the nervous system. The whole body mat should be used 3-5 times daily at low intensity settings from "Sensitive" to 50 at most. Application times may vary from 8-24 minutes. Adequate hydration is crucial. An initial reaction can be expected in up to 20% of people. Longer term, daily use of the MRS 2000 over a period of months can be expected to produce the best results.

BLOOD AND CARDIOVASCULAR SYSTEM

The cardiovascular system is composed of the heart, the blood, and the blood vessels. The heart beats 60-90 times per minute, or in conditioned individuals, about 50 times per minute. A sophisticated electrical conduction system within the heart drives heart muscle contractions in a process that is never ending for an entire lifetime. This one bodily process alone is miraculous! As the heart beats, it pumps blood through the vessels, where the constituents of blood are delivered to the tissues to sustain life. In this introduction, I have explored one aspect of this system in greater detail because it relates very specifically to one of the mechanisms by which the MRS 2000 enhances health and wellbeing in the body. Feel free to skip over this section if it is appears too technical. Given my discussions with hundreds of people throughout the world, and answering many questions on the topic, I am confident that some who read this book will be satisfied with the time it took to read and understand what follows.

Pulmonary circulation cycles through the lungs where blood is oxygenated as we breathe. The is then distributed through the systemic circulation where the remainder of the body's tissues receive oxygen from the blood. The average adult has 4-6 liters of blood, consisting of red blood cells (erythrocytes, or RBCs), white blood cells (leukocytes, or WBCs), platelets (thrombocytes) and plasma. Approximately 92% of the blood is water, and nearly half of the blood's volume is made up of RBCs. Blood forms in the bone marrow, a red, spongy tissue contained within the cavities of many of the larger bones of the body.

The total amount of iron in the body averages about 4 grams (g). Men lose about 1 milligram (mg) of iron per day through the stool, and menstruating women lose an additional 1 mg of iron per day through blood loss. Nearly 65% of iron in the body, or 2.5 g, is located within the RBCs in the form of hemoglobin. The hemoglobin molecule has the ability to combine loosely and reversibly with oxygen. The primary function of hemoglobin is to transport oxygen from the lungs to the tissues, and this function depends upon its ability to combine with and release oxygen readily.

The heme portion of the hemoglobin molecule is synthesized primarily in the mitochondria of developing RBCs in the bone marrow. Each heme molecule combines with a very long polypeptide chain called a globin. There are four separate iron atoms in each hemoglobin molecule; each of these can combine with one molecule of oxygen, making a total of four molecules of oxygen that can be transported by each hemoglobin molecule. It is the hemoglobin that is responsible for the color of the red blood cell. When iron is bound to oxygen, the heme group is bright red in color, and when it lacks oxygen it is blue-red.

In the lungs, oxygen diffuses across the RBC membrane. In the lungs, oxygen concentration is high, so oxygen binds with hemoglobin. When oxygen concentration is low, as in the tissue capillaries, oxygen is released from the hemoglobin. This is the basis for almost all oxygen transport from the lungs to the tissues. The total quantity of oxygen bound with hemoglobin in arterial blood calculates normally to a 97% oxygen saturation level.

RBCs are shaped like flattened discs, which gives them a much greater surface area with which to exchange oxygen and carbon dioxide in the lungs and with cells in the body. Exposure to pulsating electromagnetic fields increases cell membrane permeability, so oxygen can pass more easily across the RBC membrane to bind with hemoglobin. Oxygen and hemoglobin also bind more readily at higher pH levels, where the body is more alkaline. There may be a greater degree of oxygen-hemoglobin binding in the lungs as a result of the mildly alkalizing effects of exposure to a low frequency pulsating magnetic field.

Under conditions of high temperature, lower pH, and lower oxygen concentration outside the lung, the oxygen-hemoglobin within the RBCs releases its oxygen to the tissues. Again, the discoid shape of the RBC is conducive to greater surface area exposure to surrounding cells of the capillary walls, and greater delivery of oxygen.

Ultimately, oxygen utilization by the cells is controlled by the rate of energy expenditure within the cells. This energy expenditure is measured in the body as adenosine diphosphate (ADP), the molecule that is left over when an ATP molecule releases a high-energy electron (losing a phosphate bond in the process.) ADP combines with nutrients and oxygen to reform ATP, and this ATP provides energy to the tissue cells for all of its functions. Since pulsed magnetic field therapy is proven to increase ATP production, more free oxygen may be available to individuals regularly exposed to low frequency electromagnetic fields because more ATP already resides within the cell, and less oxygen is therefore required to reform ATP. Thus, intracellular energy may be enhanced.

The breadth and magnitude of the energizing effect of enhanced oxygen delivery can be appreciated by recognizing the fact that, at any one time, there are more than 25 trillion RBCs in circulation in the adult. This is more than the combined total of all other cell types in the body. Following exposure to low frequency/low amplitude magnetic fields, the potential binding sites of hemoglobin molecules are more fully occupied due to maximized oxygen binding in the lungs. Further, scientific studies have proven that RBCs release more of their valuable oxygen under the influence of magnetic field therapy. More oxygen is delivered to all the tissues of the body, and the net effect is better health, more energy, and stronger immunity.

On a final note, the presence of iron in the hemoglobin molecule is of great importance on an energetic level. The definition of a magnet is the ability to attract iron. 2.5 g of iron are distributed evenly within the 25 trillion cells that make up the RBC population. When placed on the whole body mat applicator virtually all of these cells are signaled simultaneously at the speed of light with magnetic energy. The effect upon the RBCs is to cause them to repel one another, and separate. Where they might have aggregated together, collections of RBCs distribute themselves away from each other, thereby maximizing the surface area available for oxygen exchange. Pulse oximetry and thermography confirm that oxygen delivery and utilization are measurably enhanced by the use of pulsed magnetic field therapy. These effects are crucial to the understanding of applications of the MRS 2000 to the cardiovascular system, and to all internal organ systems in general, since all require oxygen to function optimally.

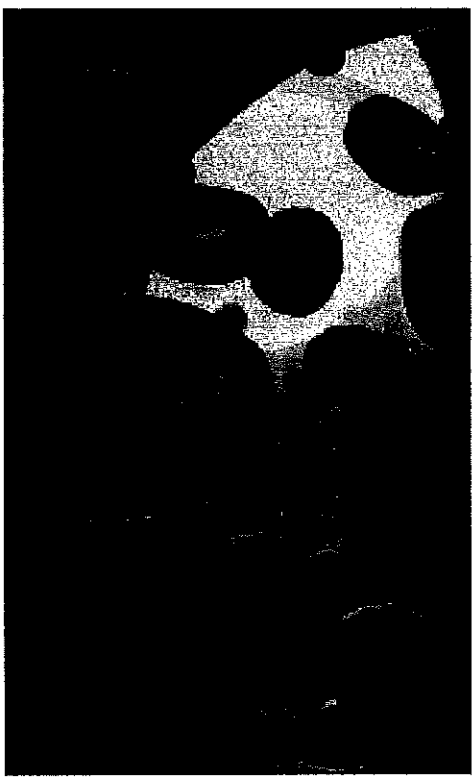
Description

Red blood cells (RBCs) contain hemoglobin, the red, iron-rich protein that gives blood its red color. In order to form hemoglobin in the RBCs, they need iron, protein and vitamins from a nutritious diet. Anemia is a state in which the number of red blood cells or the concentration of hemoglobin within them is below normal. As a result, the blood does not carry enough oxygen to the tissues.

Three possible reasons for low red blood cells or low hemoglobin are as follows: 1) the body doesn't produce enough healthy RBCs; 2) the body loses RBCs faster than they can be replaced; or 3) the body destroys RBCs faster than they can be replaced.

Anemia is a common blood disorder. Women and people with chronic diseases are at increased risk of the condition. People with anemia feel tired because they lack the energy they derive from adequate amounts of oxygen. Some types of anemia can be prevented by eating a healthy, varied diet. Since there are different types of anemia, we will explain each in brief.

Iron deficiency anemia. This is the most common form of anemia and it affects about 20% of women, 3% of men, and about 50% of pregnant women in the United States. When there is inadequate iron in the diet.



The body recycles iron from RBCs that have completed their life cycle. In essence, this is an important source of iron for the production of new RBCs. In conditions where there is excessive blood loss, this important source of iron is depleted. Again, iron deficiency anemia may result. Such conditions include heavy menstruation, a bleeding ulcer, parasitic infection in the lower bowel, or a colon polyp. An iron poor diet can lead to this type of anemia as well. The growing fetus in a pregnant woman can deplete iron stores, resulting in anemia in pregnancy.

Vitamin deficiency anemia. When the diet is lacking in folic acid or vitamin B12, RBCs do not mature within the bone marrow properly. They are released into the bloodstream as large, abnormal RBCs. People who have intestinal malabsorption of

these important nutrients are prone to this type of anemia, which is also called pernicious anemia. Untreated pernicious anemia can lead to nerve damage and decreased mental function, as vitamin B12 is important not only for healthy RBCs, but also for optimal nerve and brain function.

Aplastic anemia. Aplastic anemia is the inability of the bone marrow to produce all three types of blood cells, RBCs, WBCs and platelets. Chemotherapy, radiation therapy, environmental toxins, pregnancy, and systemic lupus can produce this condition. Because aplastic anemia is life threatening, those undergoing chemotherapy or radiation therapy must weigh their options with the realization that these therapies may represent a potential cause of death.

Anemia of chronic disease. Chronic diseases such as cancer, rheumatoid arthritis and Crohn's disease may produce anemia. Kidney disease can also result in anemia due to a shortage of a special neuropeptide produced by the kidneys called erythropoietin. This neuropeptide signals the bone marrow to produce RBCs. Without this signal, the bone marrow does not produce enough RBCs.

Sickle cell anemia. Sickle-shaped RBCs result from a defective form of hemoglobin present in some people of African and Arabic descent. The irregular shaped RBCs die prematurely, resulting in a chronic shortage of red blood cells. Because of the increase in RBC death with release of iron into the bloodstream, excessive iron builds up in the body, and must be chelated. Sickle cell anemia may be life-threatening, or lead to life-threatening complications.

Anemias associated with bone marrow disease. Since RBCs are manufactured in the bone marrow, any disease of bone marrow will affect the volume and health of circulating RBCs. Such diseases include leukemia, multiple myeloma, lymphoma, and other cancer-like disorders.

Hemolytic anemias. Autoimmune disorders, certain drugs, and certain blood diseases can result in the premature destruction of RBCs – a process called hemolysis. Hemolytic anemias may cause yellowing of the skin (jaundice) and an enlarged spleen.

Other anemias. There are rare forms of anemia, such as thallassemia major and minor, that affect those of Mediterranean descent.

Symptoms of anemia include weakness, pale skin, chest pain, dizziness, shortness of breath, fast or irregular heartbeat, numbness or coolness of the extremities, headache, and cognitive problems. Anemia has a gradual onset, and may be so mild that it goes without detection.

Based on the fact that there are multiple kinds of anemia with different types of clinical outcome, it is important to identify the cause of anemia specifically through consultation with a qualified health professional to obtain adequate blood testing.

A qualified health professional should be seen for fatigue without explanation. Iron deficiency anemia is common, but it is not safe to assume a diagnosis without testing. There are many other causes of unexplained fatigue besides anemia.

For iron deficiency anemia, a high quality iron supplement is recommended. Iron and calcium should not be taken at the same time, since these minerals chelate one another.

Settings and application
Pulsed magnetic field therapy improves cell membrane integrity, membrane transport, oxygen binding capacity and the release of oxygen to the tissues. Use the whole body mat applicator three times per day for eight minutes per application. An intensity setting of 25 should be used in the morning, 25-50 at midday, and 10 in the evening. No initial reaction should be expected.

Description
Aneurysms can occur in several different areas of the body. Aneurysms in the brain lead to stroke, and will be discussed under a separate section. Aneurysms of the abdominal and thoracic aorta will be discussed herein.

When the vessel wall of the aorta weakens, a bulge may develop. The aorta is the largest vessel in the body, having the diameter roughly equivalent to the diameter of a garden hose. If the bulge in the vessel wall ruptures, massive blood loss may result. This is a life-threatening condition. Approximately 15,000 people die of an abdominal aortic aneurysm each year in the United States. Men are 5-10 times more likely than women to develop aortic aneurysms. However, the risk of rupture, in the case of gender, is significantly higher in women than in men. Aortic aneurysms occur more commonly in whites than in people of other races.

Most aneurysms are small and progress slowly. They remain asymptomatic and do not rupture. However, once an aortic aneurysm is identified, doctors want to closely monitor this condition to implement surgery when necessary.

While aneurysms can occur anywhere along the path of the aorta, most occur in the abdominal section. Aneurysms may progress slowly, or quickly, and the rate of expansion is hard to predict. As an aortic aneurysm enlarges, people may notice a pulsating sensation near the navel, tenderness or pain in the abdomen or chest, or not infrequently, back pain.

People with high blood pressure, especially if it is poorly controlled, are at increased risk of developing an aneurysm in the aorta and elsewhere in the body. Smoking is one of the most significant and preventable risk factors. Some people are born with a weakness in the aortic wall, such as those with Marfan syndrome.

A different, but related condition to aortic aneurysm is called aortic dissection. In this case, the thick arterial wall of the aorta tears between its layers. This causes blood to fill the tear

between layers, blocking the vessel and preventing blood flow to other parts of the body. Aortic dissection is a life-threatening emergency.

The best treatment for aortic aneurysm is prevention. Stop smoking! If you have high blood pressure, use diet and exercise and medical management to control it. Atherosclerosis can predispose to aortic dissection, and is related to high levels of animal fat in the diet. Consider eating very little animal fat, and increase raw fruits and vegetables. If you have a connective tissue disorder such as Marfan syndrome, you'll need to be monitored at intervals with abdominal ultrasound examinations. Young athletes with this syndrome are encouraged to abstain from sport that has a high exertional component on the cardiovascular system.

Since abdominal aortic aneurysms are usually asymptomatic, screening examinations are recommended for people at risk of developing an aortic aneurysm. Men between the ages of 65 and 75 who have ever smoked, who have hypertension, or those who have a family history should be screened with abdominal ultrasound. In the practice of spine medicine, a calcified aortic aneurysm may appear on x-ray examination of the lumbar or thoracic spines. When the diameter of such an aneurysm exceeds a certain threshold, surgery is recommended even if the aneurysm is asymptomatic. Dacron mesh is placed around the aneurysm to stabilize it from further expansion.

The purpose of magnetic field therapy for aneurysms is to strengthen connective tissue and to be supportive.

Settings and application
Use the whole body mat twice per day for eight minutes at an intensity setting of 25-50 in the morning and 10 in the evening.

Description
The coronary arteries supply oxygen to the heart muscle, or myocardium. Coronary artery disease is the second most common cause of death in the United States, accounting for almost one death per minute. More than half of those who die suddenly from coronary artery disease have no previous symptoms. Women have a slightly higher rate of mortality from coronary artery disease compared with men, and angina pectoris is more often the presenting symptom of coronary artery disease in women than in men by almost 2 to 1.

Angina pectoris, or chest pain, results from low levels of oxygen in the myocardium. There is an imbalance between blood supply to the myocardium and demand for oxygen by the myocardium. Angina is the most common presenting symptom among patients with coronary artery disease.

Low levels of oxygen in the myocardium results from (1) a reduction in coronary blood flow caused by atherosclerotic plaques, (2) abnormal constriction or insufficient relaxation of the coronary vessel walls (called coronary spasm or Prinzmetal angina), or (3) reduced oxygen carrying capacity of the blood. In up to 30% of patients with chest pain, there is either no

atherosclerosis or minimal atherosclerosis of the coronary arteries. In these patients, the inability of these vessels to relax under periods of increased oxygen demand is the cause of the anginal chest pain. Severe anemia can cause reduced oxygen carrying capacity, and may result in anginal chest pain.

The treatment of angina pectoris involves treatment of risk factors for atherosclerosis. These include a family history of premature coronary artery disease, cigarette smoking, diabetes mellitus, high cholesterol, high blood pressure, and emotional stress. Recent studies have shown that lowering cholesterol levels through statin drugs does not diminish the incidence of heart attack (myocardial infarction)!

Another important risk factor in the development of angina pectoris and myocardial infarction is metabolic syndrome. This is characterized by the presence of increased insulin in the blood, abdominal obesity (waist circumference > 40 in for men or > 35 in for women), decreased HDL cholesterol levels (<40 mg/dL for men or <50 mg/dL for women), and high blood pressure (over 130/85 mm Hg). Based on data from the 2000 U.S. Census, an estimated 47 million Americans have metabolic syndrome. People with metabolic syndrome have a three-fold increase risk of coronary atherosclerosis and stroke compared with those without this syndrome. Angina is typically described as a squeezing pressure, heaviness or tightness in the chest. The duration of an attack of angina is 3-5 minutes. People with angina often describe it as the feeling of someone standing on their chest. A positive Levine sign, looked for by doctors, is a closed fist over the chest to describe the pain. More than 6 million people in the United States have angina. Since it is hard to distinguish angina from other forms of chest pain, medical attention should be sought immediately. Chest pain that persists for longer than 3-5 minutes may represent a life-threatening condition. An EKG and blood tests can rule out myocardial infarction.

Any treatment that promotes increased circulation, dilation of blood vessels, and the enrichment of oxygen delivery to the heart will help angina pectoris and patients who have undergone coronary by-pass surgery. Any treatment that produces increased calm, less stress, and less anxiety will also help prevent attacks of angina pectoris. The value of the MRS 2000 is therefore supportive in patients with angina. Underlying causes of angina pectoris must be addressed specifically with diet, exercise, and in certain cases, medication. Acupuncture, massage, and lifestyle change may reverse the underlying heart disease over time.

Settings and application

Use the whole body mat applicator three times per day for eight minutes. Begin with an intensity setting of 25 in the morning and gradually increase to 50 or 100. At midday use a setting of 25-50, and use the setting of 10 in the evening. Use the pad once daily for 16 minutes to the thoracic spine at an intensity setting of 50-100. Use the pad daily for eight minutes to the chest at a setting of 50.

The metabolic demands of the heart need support nutritionally. Use the gel form of CoQ10, Carnitine, D-ribose (5 g twice daily), magnesium and omega 3 fatty acids. These supplements will work together with pulsed magnetic field therapy to maximize ATP and oxygen to the heart muscle in conjunction with permanent diet and lifestyle changes.

Description

Approximately 730,000 Americans have a new or recurrent stroke each year. A stroke occurs when the brain sustains an interrupted or severely reduced supply of oxygen, causing brain cells to die. Stroke is a medical emergency. Early treatment can minimize complications and improve longterm outcome.

Risk factors to stroke include high blood pressure, stress, smoking and high cholesterol. Oral contraception also increases the risk of stroke, particularly in combination with smoking.

The onset of stroke is often without warning. However, some people may experience one or more temporary interruptions of blood flow to the brain called a TIA (transient ischemic attack) as a precursor to an impending stroke. These manifest as short attacks of dizziness lasting only a few seconds, transitory disturbances in perception or gait, and sudden speech or vision disorders. Since these symptoms appear to be harmless, they are usually ignored.

Symptoms that a stroke is occurring include trouble speaking, slurred speech, word hunger (difficulty finding the right word to explain the symptoms), paralysis or numbness on one side of the body, difficulty walking, visual disturbance, or severe unusual headache accompanied by stiff neck, facial pain, vomiting or altered consciousness. Any or all of the above symptoms are an indication that immediate medical attention should be sought at the emergency room of a hospital since every minute counts. The longer a stroke goes untreated, the greater the amount of damage and potential permanent disability.

About 80% of strokes are produced by blocked or reduced blood flow to the brain from plaques. These are fatty deposits in arteries that deliver oxygen to the brain. These plaques may be present in the carotid arteries (most common) or the vertebrobasilar arteries. With deprived oxygen and other nutrients, brain cells begin to die within minutes.

An embolism is a blood clot or other particle in a blood vessel that is carried to the brain by the normal circulation. The embolism produces a blockage that deprives the brain of oxygen, resulting in a stroke. Irregular beating in the heart's two upper chambers (atrial fibrillation) is often the cause of a cerebral embolism.

A stroke can lead to severe paralysis of motor function, speech difficulties, problems with ambulation and mobility, and cognition. The goal of pulsed magnetic fields therapy is to

promote circulation and, therefore, provide better oxygen supply to the brain, promote nerve regeneration, accelerate the body's healing processes, activate the brain cells that have not died, facilitate rehabilitation and to help support other therapies in preventing recurrence.

Settings and application

Use the whole body mat applicator up to four times per day for 8-16 minutes per application. An initial intensity setting of 50 should be used in the morning, increasing to 150 or to tolerance. An intensity setting of 50-100 should be used at noon, 25-50 should be used in late afternoon, and a setting of 10 should be used in the evening. There are no initial reactions. Begin pulsating magnetic fields as soon as possible following a stroke, and continue the applications for several months. The longer it has been since the patient has had a stroke, the longer the treatment duration (in weeks or months).

Early on in our experience with the MRS 2000, a patient who had been paralyzed for four months after a stroke, with no movement possible in her leg, was placed on the whole body mat. Following a 24-minute application, the patient was able to raise the leg several inches off the mat. This was her first demonstration of improved motor function.

Supportive therapy for stroke must include physical therapy, gait training, and may include nutritional support including Chinese herbal remedies, homeopathy and/or naturopathy, essential fatty acids (evening primrose oil, borage oil, EPA-DHA), B-complex, vitamin C, E and selenium.

The full potential value of pulsating magnetic field therapy for stroke patients must be explored through clinical research.

Description

My experience as a hospital resident led me to observe several operative procedures performed by a vascular surgeon. Many of these were femoral-popliteal artery bypass surgeries for peripheral vascular disease. Patients undergoing this operation experienced leg pain when walking (intermittent claudication) due to widespread accumulation of fatty deposits in the arteries (atherosclerosis).

Peripheral vascular disease is a common circulatory problem in which narrowed arteries reduce blood flow to the limbs, usually the legs and feet. Widespread atherosclerosis can reduce blood flow to any part of the body, and becomes clinically significant to health when it affects the heart, brain or legs. Pre-disposing risk factors to peripheral vascular disease include smoking, excessive dietary animal fat and sugar, and the lack of exercise. These factors produce diabetes, obesity, high blood pressure, and high cholesterol. Other factors include a family history of peripheral vascular disease, heart disease or stroke, excessive levels of homocysteine (a protein that helps build and maintain tissue), and excessive levels of C-reactive protein (a marker for inflammation).

Intermittent claudication, the predominant symptom in peripheral vascular disease, is characterized by muscle pain or cramping in the legs or arms provoked by exertional activity, such as walking or repeated lifting. Calf pain is the most common location of intermittent claudication. The classic presentation is a report of "exercise-pain, rest-relief." Other symptoms of peripheral vascular disease include coldness of the lower legs or feet, numbness or weakness, sores on the toes, feet or legs that won't heal, color changes in the legs, hair loss on the feet and legs, and changes in the toenails. The skin of the calves may appear shiny. Painful cramping may also occur in the hip or thigh muscles after climbing stairs.

The two major goals of treating peripheral vascular disease are to reduce pain so that normal physical activity can be resumed, and to stop the progression of atherosclerosis to reduces the risk of heart attack and stroke. These goals may be accomplished through dietary and lifestyle changes. Quitting smoking is the single most important thing to reduce the progression of blockage. Omega-3 fatty acids found in cold-water fish such as salmon, tuna, halibut, mackerel, and herring improve the suppleness and flexibility of peripheral arteries, and also reduce inflammation associated with the accumulation of plaques.

Exercise is an essential component for the treatment and prevention of peripheral vascular disease. Proper exercise helps condition the muscles to utilize more oxygen more efficiently. Ginkgo may allow people with intermittent claudication to walk longer distances with less pain. However, this herb can cause bleeding when taken in high doses, and may be dangerous if paired with anti-platelet medications, including aspirin. Use Ginkgo only under the direction of a qualified health professional.

Supportive nutritional and herbal supplementation may include the gel form of CoQ10, vitamins C, B, and E, calcium, magnesium and selenium, other essential fatty acids (evening primrose oil, nigella oil), gotu kola, garlic, grape seed extract and ginseng.

Traditional medical therapies include high blood pressure medication, medication to control blood sugar, medication to prevent blood clots, and medication to relieve symptoms. In severe cases, bypass surgery, angioplasty, or thrombolytic therapy using clot-dissolving drugs is used.

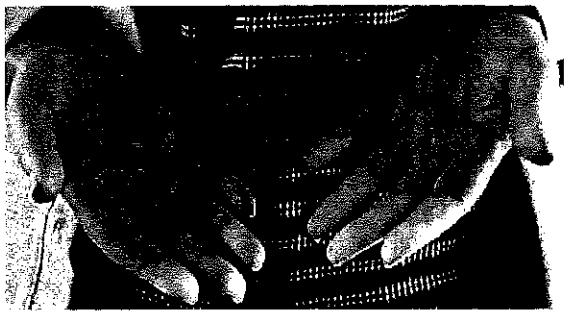
Pulsed magnetic field therapy can improve calcium content in the blood, improve oxygen supply to the peripheral tissues, reduce inflammation in the plaques adhering to vessel walls, release nitric oxide for vessel wall expansion, and enhance energy stores available to the cells.

Settings and application

Use the whole body mat applicator up to three times per day for eight minutes each application. In the morning, an intensity setting of 25 should be used, and gradually increased to 100. At noon, use an intensity setting of 25-50, and use a setting of 10 in the evening. The pad applicator may be used twice daily for 24 minutes at 150-400 to the legs or feet. This is particularly beneficial immediately prior to exercise or exertion.

Description

Raynaud's disease is a condition where the arteries that supply the skin are narrowed, limiting blood circulation to the affected areas. This commonly affects the fingers, toes, ears, and tip of the nose, and is brought about by cold temperatures or stress. Women are more likely to have Raynaud's disease, which is more common also in colder climates. Often this condition is more a nuisance than a health concern requiring treatment.



Raynaud's attack in a scleroderma patient
(used by permission of www.scleroderma.org)

The blood vessel spasms that occur with Raynaud's disease causes the skin of the fingers or toes to turn white at first, appearing almost artificial or mannikin-like. The affected areas may turn blue, feel cold and numb, and limit sensory perception. As an episode passes, circulation improves, and the affected areas turn red, throb, tingle or swell. The fingers or toes then return to normal color. Not everyone experiences all three colors – white, blue, and red – and the sequence of color change may vary among individuals.

Raynaud's disease has two main types, primary and secondary. The primary form occurs without any underlying medical condition, and is known as Raynaud's disease. This is the most common form of the disorder. A secondary form, called Raynaud's phenomenon, is caused by an underlying condition, such as scleroderma, lupus, rheumatoid arthritis, Sjogren's syndrome, rare diseases of the arteries, repetitive trauma, carpal tunnel syndrome, smoking, or certain drugs, such as beta blockers, estrogen, chemotherapeutic agents, or ergotamine. Raynaud's has also been linked to thyroid gland disorders.

A variety of remedies may be used to manage Raynaud's disease. From a lifestyle perspective, stop smoking and increase exercise. Control stress levels. Avoid caffeine. Keep the fingers and toes warm as much as possible. Avoid constricting clothing. Avoid tools at work that makes the hand vibrate, as this may increase the frequency of attacks. Stressful situations may trigger an attack, so promoting relaxation and calm may lessen the frequency of attacks. Biofeedback has been shown to be beneficial in patients with Raynaud's disease. A biofeedback therapist can be suggested, and books and tapes are also available. Niacin, known to cause blood vessel dilation, can increase blood flow to the skin. Niacin supplementation, particularly with a time-released niacin that avoids excessive flushing, may be beneficial.

During an acute attack of Raynaud's disease, move to a warmer area, placing the hands or feet under the armpits or against a warmer body parts. Wiggle fingers and toes. Run warm, but not hot, water over the fingers and toes. Massage of hands and feet and rubbing the hands together may also be beneficial.

Magnetic field therapy can improve oxygen delivery mechanisms, thereby supporting other forms of management in patients with Raynaud's disease. Acupuncture and herbal remedies such as butcher's broom, ginkgo biloba, gotu kola, and grape seed extract may also be helpful.

Settings and application

Use the whole body mat applicator up to three times per day for eight minutes per application. An initial intensity setting of 25 can be used in the morning and at noon. A gradual increase in intensity from 25 to 50 may be tried. For an evening session use a setting of 10-25. In addition to the whole body mat applicator, the pad applicator may be used twice daily for 24 minutes per application at a setting of 100-200 locally. And initial reaction is rare, but may manifest as cramping or pain. In such cases, add a good source of magnesium as a nutritional supplement.

Description

As noted above under the heading "stroke," an embolism is a particle that becomes detached from one location in the body and migrates in the bloodstream to a smaller artery where it becomes stuck, causing a blockage of blood flow. Emboli are usually caused by blood clots in the veins, atherosclerotic plaques, or fat resulting from fractures or other bone injuries.

When an embolus becomes lodged in the lung (pulmonary embolism), it may be fatal. Pulmonary embolism is a leading cause of hospital deaths and an increasing threat to passengers on long airplane flights. Most blood clots, giving rise to pulmonary embolism, originate in the legs, but they can also form in the veins of the arms and in the right side of the heart, or at the tip of a catheter placed in a vein.

When a pulmonary embolism does occur, anticlotting medicines greatly improve the outcome. Symptoms include a sudden shortness of breath unrelated to activity, chest pain, a cough that produces red or blood streaked sputum, and rapid heartbeat. Anxiety, excessive sweating, clammy or bluish colored skin, weak pulse, lightheadedness or fainting, wheezing, and leg swelling may also occur. These symptoms represent a medical emergency.

An embolism can block a coronary artery in the heart, giving rise to myocardial infarction, or lodge in an artery in the brain causing a stroke. Anticoagulant medications are given to prevent existing clots from enlarging and stop the formation of new ones. Warfarin and the fast-acting heparin are used together in the earliest stages of care. Anticoagulant therapy may continue for six months or longer, depending on the presence or absence of underlying disorders that may cause a recurrence of blood clotting.

Settings and application

Post magnetic field therapy plays a subordinate role in the case of embolism, or none at all. Once the condition is stabilized, the whole body mat applicator may be used for eight minutes 2-3 times daily at a setting of 10-25 to help regulate the autonomic nervous system and enhance oxygen delivery. If on anticoagulant medication, do not use the MRS 2000.

Description
A hematoma is a collection of blood outside the blood vessels, and generally results from internal bleeding or damage to the blood vessels. This can be a space-occupying lesion, exerting pressure on surrounding tissues. If the surrounding tissues contain nerves, nerve compression may result, with neurological symptoms. Such is the case when a subdural hematoma in the brain produces damage to the delicate brain tissue. This is a severe form of hematoma with a high mortality rate, and it represents a medical emergency. For our purposes in this text, we will discuss the use of pulsed magnetic field therapy in support of superficial, musculoskeletal (rather than internal organ) hematomas below the neck.

In a superficial hematoma, swelling may be palpable, and is often painful to touch. The associated bruising, or ecchymosis, appears as a bluish discoloration of the skin. A contusion of muscle or bone may be related to the trauma that gave rise to the hematoma, and may be the source of the extravascular blood.

Aggressive use of ice 15 minutes twice per hour may help to control swelling associated with hematoma. The affected limb should be elevated during the application of ice, and, as often as possible, otherwise. Magnetic field therapy opens blood channels and can improve the removal of cellular debris and waste products. Proteolytic enzymes, such as bromelain, can control local inflammation and pain, as well as enzymatic breakdown of blood products.

Settings and application
The pad or probe applicator may be used 3-5 times per day for 24 minutes per application at an intensity setting of 200-400. There are no initial reactions, and this supportive treatment is well tolerated. We support the healing of hematoma, bruising and contusion with topical arnica, Traumeel (a homeopathic preparation), and the application of Kinesio® tape techniques. Acupuncture and low-level laser therapy are also helpful and effective.

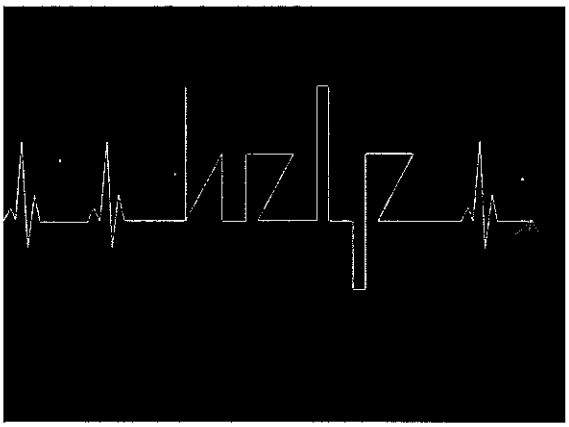
Description
Hemorrhage is the uncontrolled loss of blood. Hemorrhaging can be internal or external. There are many causes, including disorders of the blood clotting mechanism, trauma to the blood vessel walls, cancer, or diseases affecting the stomach, kidneys or urinary tract. Any injury to an internal organ or to the brain or upper spinal cord may produce internal hemorrhaging that leads to death or permanent illness, impairment or disability.

Hemorrhage of the internal organs can produce rapid pulse, dizziness, weakness, collapse, shock, increased blood pressure, and pale, cold, sweaty skin. With chronic hemorrhage into the bowel, black or tarry stool results. Bright red blood in the stool is most often the result of hemorrhoids. Blood in the urine gives rise to a suspicion of hemorrhage of the kidneys or urinary tract. Always consult a medical physician immediately if blood is present in the stool, urine, vomit or sputum.

Magnetic field therapy has regulatory effects on the autonomic nervous system that may be valuable in supporting syndromes or injuries that involve hemorrhage. Reduced inflammation, reduced swelling, and improved oxygen delivery are also known effects from the exposure to low frequency, low amplitude pulsating magnetic fields.

Settings and application

In all cases of hemorrhage, the exact cause should be identified, and a qualified health practitioner should provide concurrent care. For support of a hemorrhagic condition using the MRS 2000, the mat applicator can be used once or twice daily for eight minutes at an intensity setting of Sensitive to 25.



Description

A myocardial infarction, or heart attack, occurs when a blockage occurs within a coronary artery, depriving the heart muscle (myocardium) of oxygen. This produces cell death (necrosis) of heart tissue.

Common signs and symptoms of a heart attack include pressure, fullness, squeezing or crushing pain at the center of the chest that last for more than a few minutes, cold, clammy hands and sweating, and impending sense of doom, pain extending up the neck to the jaw, into the shoulder or upper back, or down the arm, fainting, nausea or vomiting, and increasing episodes of chest pain.

It is now recognized that women may have different or less noticeable heart attack symptoms than men. Symptoms in women may include abdominal pain or heartburn, unusual or unexplained fatigue, lightheadedness, dizziness, and clammy skin.

Some people will experience no symptoms whatsoever. These are known as "silent" heart attacks. While a heart attack can occur at any time, many people experience a heart attack early in the day, with physical exertion, or just after breakfast or a heavy meal. Many people who experience heart attacks have warning signs in advance. The earliest predictor of an attack is recurrent chest pain (angina pectoris), which results from a more temporary disruption of blood flow to the heart that does not produce cardiac cell death.

A heart attack usually occurs as a result of an atherosclerotic plaque occluding a coronary artery. Coronary artery disease is the major underlying cause of heart attacks. Coronary artery spasm, a less frequent cause, can occur as the result of using illicit drugs such as cocaine.

The risk of heart attack increases with smoking tobacco, high blood pressure, high cholesterol or triglycerides levels, lack of physical activity, obesity, diabetes, alcohol, family history of heart attack, and higher blood levels of homocysteine, C-reactive protein and fibrinogen. Many of these risk factors can be modified or eliminated through adjustments to diet, exercise and stress. However, certain risk factors, such as gender, cannot be changed. Men are generally at greater risk than women of heart attacks. However, following menopause with the drop in estrogen, the risk of heart attack increases in women.

A Word About Serum Cholesterol, HDLs and Pulsed Magnetic Fields

Several studies have examined the effect of pulsed electromagnetic fields on atherosclerotic plaques and cholesterol levels. Recently Luo et al *(Luo 2007/274)* found that after 8 weeks of exposure to low-intensity, 15 Hz pulsed magnetic fields, rabbits with alimentary hyperlipemia showed a 40-52% decrease in total blood cholesterol and a 67% increase in high density lipoprotein (HDL) levels. Bellossi et al, in 2 studies *(Bellossi 1996/275, 1998/276)* demonstrated a significant decrease in cholesterol and triglyceride plasma levels following 24 hours after a 60 minute exposure to a 12 Hz pulsed magnetic field. Torres-Duran et al *(Torres-Duran 2007/278)* also found that total serum cholesterol was decreased in Wistar rats 96 hours after a single 2-hour exposure to a 60 Hz pulsed magnetic field. Todorov, an early leader in the field of magnetic field therapy, published a paper in 1973 that showed the cholesterol-lowering effects of high-frequency electromagnetic fields on the serum of rabbits. *(Todorov 1973/277)*

If someone with you experiences symptoms of a heart attack, immediately activate the emergency medical system by dialing 911 or your local emergency number. If you have been prescribed nitroglycerin for angina pectoris previously, take it – it may improve blood flow to the heart. If someone falls unconscious with a presumed heart attack, began cardiopulmonary resuscitation (CPR), if you are trained. This will maintain the delivery of oxygen to the brain and body. In the first few minutes following a heart attack, ventricular fibrillation may occur, effectively eliminating useful delivery of oxygen. The use of an automatic external defibrillator (AED) can shock the ventricles back into normal function before the hospital is reached.

Once hospitalized, there are many medications used to manage the symptoms of heart attack and the underlying coronary blockage. Some of these treatments include aspirin, thrombolytics, super aspirins, blood thinners, nitroglycerin, beta-blockers, and cholesterol-lowering medications. Surgical treatments include coronary angioplasty and stenting, and coronary artery bypass.

Cardiac rehabilitation is essential following a heart attack and bypass surgery. Medical physicians typically prescribe blood thinning medications, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, and cholesterol-lowering medications.

Natural interventions include cessation of smoking, control of blood pressure through exercise (if allowable), permanent weight loss and maintenance of ideal body weight, dietary and nutritional modifications to lower cholesterol (including the use of high quality red yeast

rice), acupuncture, and the use of supportive nutritional supplements such as D-ribose, carnitine, the gel form of CoQ10 and magnesium.

Settings and application
Magnetic resonance stimulation is used following heart attack to support the autonomic nervous system for stress management, for relaxed vascular tone, to improve oxygen delivery, and to promote overall improvement in circulation. The whole body mat applicator can be used three times per day at a setting of 10-50 for 8-16 minutes per application.

Description
Congestive heart failure results from the weakening of the heart muscle as a pump. The heart is unable to pump enough blood to meet the body's demands. Coronary artery disease, high blood pressure or other conditions may gradually weaken the heart, stifling its ability to pump effectively.

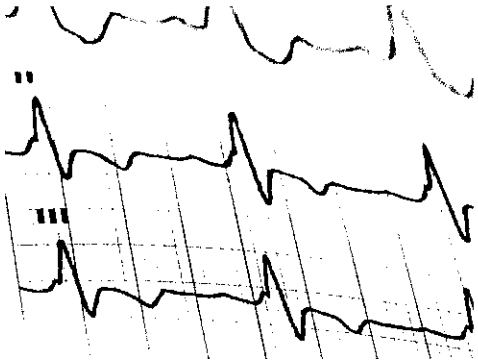
Congestive heart failure is not reversible, but can be treated with good results. Lifestyle changes, including exercise, lowering salt intake, managing stress and depression, and losing excess weight can prevent fluid buildup and improve the quality of life.

The best way to prevent heart failure is to control risk factors such as coronary artery disease, high blood pressure, high cholesterol, diabetes and obesity. Faulty heart valves, congenital heart defects, and heart arrhythmias can produce heart failure, and these risk factors should be addressed when identified. Diseases such as diabetes, severe anemia, hyperthyroidism, hypothyroidism, emphysema, lupus, hemochromatosis, and amyloidosis may also contribute to heart failure.

Congestive heart failure is a slowly developing, chronic condition characterized by several of the following constellation of symptoms: fatigue, weakness, rapid or irregular heartbeat, shortness of breath with exertion, reduced ability to exercise, persistent cough or wheezing with white or pink blood-tinged phlegm, swelling of the lower legs, ankles and feet due to fluid retention, lack of appetite (but not sick), and difficulty concentrating with decreased levels of mental alertness.

Standard medical treatment for congestive heart failure includes two or more medications that variably strengthen heart muscle contractions, lessen the exertional load on the heart by lowering plasma volume or dilating blood vessels, or slow the heart rate.

Settings and application
Magnetic resonance stimulation can be used in cases of heart failure to help support normal heart rhythm, improve circulation and oxygen delivery, calm the mind and body, improve calcium metabolism and perhaps strengthen cardiac contractions. The whole body mat applicator is used two to three times per day at a setting of 10-50 for 8-16 minutes per application.



Description

Arrhythmias are a deviation from normal, steady heartbeat. They are common and usually harmless. Most people will experience an occasional skipped beat, fluttering in the chest, or racing heart. However, some arrhythmias can be life threatening.

Common signs and symptoms of arrhythmia include a racing heartbeat, a slow heartbeat, a fluttering in the chest, chest pain, shortness of breath, dizziness, lightheadedness, fainting or near fainting. These symptoms result from abnormal contractions of one or more of the hollow chambers that make up the heart. The two upper chambers are called the atria, and the two lower chambers are called the ventricles. Electrical signals that polarize muscle cells cause these chambers to contract and eject blood. These electrical signals are generated by specialized tissue at the center of the heart called the atrioventricular node. These signals are generated at a normal rate of 60-90 times per minute in the normal adult.

Arrhythmias can be caused by heart disease, high blood pressure, diabetes, smoking, excessive use of caffeine, drug abuse, stress, over-the-counter medication, prescription medication, dietary or oral supplements, and scarring of heart tissue from prior coronary artery disease or cardiomyopathy, or a previous heart attack.

Tachycardia signifies a rapid heartbeat where the heart rate is greater than 100 beats per minute. Bradycardia, conversely, refers to a slow heartbeat with a resting heart rate of less than 60 beats per minute.

Atrial fibrillation is a fast, chaotic beating of the upper chambers of the heart. The risk of developing atrial fibrillation increases over the age of 60. It is seldom life threatening, but can give rise to more serious conditions, such as stroke.

Supraventricular tachycardia signifies a burst of rapid heartbeats that can last for seconds to hours. Symptoms produce significant discomfort. This arrhythmia is common in younger people.

Other forms of arrhythmia include ventricular tachycardia, ventricular fibrillation, long QT syndrome, and the bradycardias such as sick sinus syndrome, and conduction block.

Risk factors for arrhythmia include age, genetics, coronary artery disease, thyroid problems, drugs, herbs such as ephedra, high blood pressure, obesity, diabetes, electrolyte imbalance, alcohol consumption, the use of stimulants such as caffeine, nicotine or illicit drugs like amphetamines or cocaine.

To support the healthy functioning and rhythm of the heart, eat heart healthy foods, increase physical activity, quit smoking, cut back on caffeine and alcohol, and find ways to reduce the amount of stress. Avoid stimulant medications as much as possible.

Important Note: Patients with arrhythmias sometimes receive pacemakers. A unipolar pacemaker is a contraindication to the use of magnetic field therapy because the magnetic field may interfere with the pacemaker's electronic control mechanisms. Most modern pacemakers are bipolar and pose no problem for the use of the MRS 2000 system. An excellent study of the MRS 2000 found that pad and probe applicators (but not the whole body mat applicator) produced interference with unipolar pacemakers. *(Gwechenberger 2006/231)*

I have had the privilege of observing people with arrhythmia who have used magnetic resonance stimulation for wellness in the home. In one notable case there was a significant, nearly immediate reduction in atrial fibrillation directly associated with the use of the MRS 2000 on a daily basis at home. Perhaps this was due to the autonomic regulation and to increased ATP production by cardiac muscle. The patient's cardiologist eliminated two heart medicines he had been taking following quadruple coronary bypass surgery two years earlier. The patient had experienced symptoms and signs of atrial fibrillation for two years following his bypass surgery.

Settings and application

For support of the autonomic nervous system, improved energy, and increased efficiency of oxygen delivery, use the MRS 2000 for 8-16 minutes each morning at an initial intensity setting of 25, and for 8-16 minutes in the evening at an intensity setting of 10. As always, it is vital to have adequate water intake in conjunction with this program.

Description

Hypertension is classically defined as blood pressure higher than 140/90 mm Hg when measured on at least two separate occasions. Hypertension is a leading risk factor for heart disease, and as noted elsewhere in this chapter, heart disease is a leading cause of death in the North America. In addition, hypertension is the number one modifiable risk factor for stroke. Approximately 77% of people, who have a first stroke, have hypertension. Sixty-nine percent (69%) of people who have a heart attack have hypertension. Seventy four percent (74%) of people with congestive heart failure have hypertension.

Early-stage symptoms may include dull headaches, dizzy spells, or increased nosebleeds. However, hypertension can be present for years without any symptoms at all. This is why it is important to have your blood pressure checked at least every two years from the ages of 20-40, and yearly after that. Just as too much air pressure can damage the tire, too much pressure in the vessels can damage those vessels, leading to life-threatening conditions such as heart attack and stroke. In the U.S., approximately 80 million people over the age of 60 have high blood pressure, or about 25% of this population. About one third of people with high blood pressure are not aware that they have it.

In about 90-95% of patients with high blood pressure, there is no identifiable cause. This type of high blood pressure is called essential hypertension or primary hypertension. The remaining cases of high blood pressure are caused by kidney abnormalities, tumors of the adrenal gland, certain congenital heart defects, medications, such as birth control pills or cold remedies, prescription drugs, and the use of illegal drugs such as cocaine and amphetamines. High blood pressure occurs more commonly in older people, and more often in men. It is particularly common among blacks, developing at an earlier age than in whites. High blood pressure also tends to run in families.

The lack of physical exercise, being overweight or obese, smoking or chewing tobacco, excess dietary salt or too little dietary potassium, too little dietary vitamin D, too much alcohol, high levels of stress, high cholesterol, kidney disease and sleep apnea can predispose to hypertension. Most of these factors can and should be modified! Sometimes pregnant women experience high blood pressure as a result of their pregnancy.

Nutritional supplements that can help lower blood pressure include the gel form of Coenzyme Q-10 (CoQ10), omega-3 fat acids, garlic, fish oils, cocoa, calcium, blonde psyllium, and linolenic acid. Since some of these supplements may interact with medications, it is always best to take these supplements under the direction of a qualified health professional.

Lowering stress levels is important, and may include prayer, meditation, yoga or deep breathing exercises. Massage and acupuncture have been proven to lower blood pressure at least temporarily, as has chiropractic manipulative therapy. Literature suggests that pulsating magnetic fields have the potential to modify microcirculatory perfusion. *(McKay 2007/101)*

Settings and application
Use the whole body mat applicator 2-3 times per day for eight minutes each. Begin using an intensity setting of 25 in the morning, 10 at noon, and sensitive in the evening. Slowly, gradually increase to tolerance over several weeks to months. The pad applicator can be used twice daily for 16 minutes at a setting of 50 to the neck and shoulders with the upper border of the pad at the hairline. Long-term results depend on weight reduction, stabilization of obesity, and good compliance to medical management and/or alternative medicine strategies. Remember to address as many risk factors as possible, and stay well-hydrated.

See "Heart Attack / Myocardial Infarction"

Description
The dire consequences of coronary artery disease have been discussed earlier in this chapter under the heart attack/myocardial infarction section. Here we'll focus on prevention.

Coronary artery disease develops in the context of a poor diet full of sugar, fat, and simple carbohydrates. A heart healthy diet consists of fruits and vegetables consumed in as close to their natural state as possible, whole grains, very little meat, very little dairy, and omega-3 fatty acids from oily fish. If you smoke, please stop. Reduce and manage stress through

lifestyle modification. Easier said than done, but there it is. Books by Dean Ornish (Reversing Heart Disease) and Colin Campbell (The China Study) may help to set us on the right track. *(Ornish 1990/232; Campbell 2005/233)* And cookbooks like Vegan Planet can teach us how to select and prepare delicious, heart-healthy foods. *(Robertson 2003/234)*

Settings and application

Magnetic resonance stimulation promotes oxygen transport, assists in the prevention of atherosclerotic plaques due to an anti-inflammatory effect, releases nitric oxide from the vessel walls and improves reflex autonomic vasodilation. The whole body mat applicator should be used three times per day at a setting of 10-50 for 8-16 minutes per application. A lower intensity setting (e.g., 10) should be used at night before bed.

Supportive nutritional supplements include D-ribose, carnitine, the gel form of CoQ10 and magnesium. Red yeast rice may be used to lower cholesterol when possible.

Description

Dizziness is a term that can refer to light-headedness, feeling faint, or feeling unsteady. If you have a sense that you are spinning, this is classically described as dizziness. If you have a sense that the room is spinning, this is referred to as vertigo.

Dizziness is a common complaint for which patients see their healthcare provider. It is rarely a sign of a serious condition.

A person complaining of dizziness may experience the following: faintness, lightheadedness, fatigue, weakness, difficulty concentrating, wooziness, unsteadiness, loss of balance, vertigo, or blurred vision during rapid movements of the head and neck.

Sometimes dizziness occurs as a symptom of a serious underlying condition, such as a closed head injury, high fever, meningitis, loss of consciousness, stroke, or heart attack. Unexplained dizziness or vertigo in conjunction with hearing loss, blurred vision, very stiff neck, speech impairment, falling or loss of balance, numbness or tingling, or chest pain is a medical emergency. Call 911 or go to a local emergency room.

The organ systems that may be impaired and cause a complaint of dizziness include the inner ear, the eyes, the brain and the sensory nerves. Causes include (1) vertigo (which may, in turn, be related to benign paroxysmal positional vertigo (BPPV), inflammation of the inner ear (labyrinthitis or acute vestibular neuronitis), Meniere's disease, vertigo related to migraine, acoustic neuroma, or serious problems such as stroke, bleeding in the brain from trauma, or multiple sclerosis), (2) faintness (due to drop in blood pressure or reduced cardiac output), (3) disequilibrium (due to inner ear problems and sensory disorders such

as peripheral neuropathy), and (4) lightheadedness (again, from inner ear disorders or from anxiety or hyperventilation).

In the elderly, this increases the risk of falling. Due to the prevalence of osteoporosis in this age group, fracture can occur, and this is often an event that leads ultimately to terminal decline.

Standard medical treatment of dizziness depends on the cause. If there is an underlying disease, it will represent the primary focus of care. Prevention includes being aware of the possibility of losing balance, falling, and sustaining serious injury. Remove tripping and slipping hazards such as the end of rugs, exposed electrical cords, slippery rugs on kitchen floors, slippery shower floors and bathtubs. Install hand railing, nonslip mats, and good lighting. Avoid caffeine, alcohol and tobacco that restrict blood vessels and may worsen dizziness or lightheadedness. Avoid operating motor vehicles or heavy equipment if you experience frequent dizziness.

Magnetic resonance stimulation may improve microcirculation to the inner ear and has been found to be beneficial in 60% of dizziness cases. *(Thuile 2000/235)*

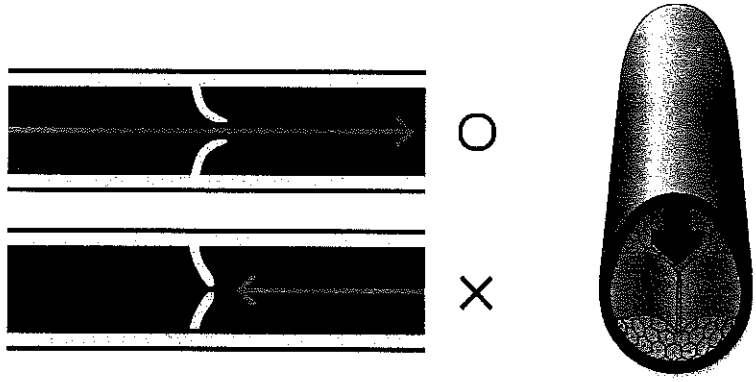
Settings and application
Use the whole body mat applicator twice per day for 8 minutes each application. Begin with an intensity setting of 25 in the morning and 10 in the evening. Gradually increase to the desired level.

The pad applicator may be used once or twice daily for eight minutes each application. An intensity setting of 25-50 should be used initially, and gradually increased to 100 as indicated by response. Place the pad under the head and neck. The probe applicator may be used once or twice daily for eight minutes each time, beginning at an intensity setting of 100-150, lying the side of the probe lightly over the external skin flap of the ear.

VENOUS DISORDERS

A vein is a blood vessel that carries deoxygenated blood back to the heart. The movement of blood through veins is made possible by the heartbeat, and also by peripheral muscle contraction. For example, walking and running produce contractions in the calf muscles that help to express blood through the veins upward against gravity. This is known as the skeletal muscle pump. The venous system contains one-way flaps called valves that prevent backflow of blood in the direction of gravity.

The veins take de-oxygenated blood to the right atrium of the heart, which transfers the blood to the right ventricle where the blood is then pumped into the pulmonary arteries to the lungs. The pulmonary veins are the only veins in the body that carry oxygenated blood. They return blood from the lungs to the left atrium of the heart, which empties blood to the left ventricle. Oxygenated blood is pumped from the left ventricle back out to the body.



The outermost layer of veins is comprised of collagen wrapped in helical bands of smooth muscle. The interior lining of a vein is comprised of endothelial cells. The venous system is flexible enough to contain all of the blood volume of the human body. However, the primary job of the venous system is to return blood to the heart for re-oxygenation. When the veins fail to do this, there is a drop in the volume of blood pumped by the heart, and the brain and other organs are deprived of oxygen.

Description

When the endothelial lining of a vein becomes inflamed, it becomes sticky. Blood cells accumulate and a blood clot forms. This results in swelling, pain and a feeling of heaviness in the leg or other region of the body. The affected vein may be near the surface of the skin, or it may be within a vein coursing deeply through a muscle, causing deep venous thrombosis (DVT). A clot in a deep vein can break loose and become lodged in the lung, producing pulmonary embolism.

Thrombophlebitis, an inflammation of the vein with clotting, is often caused by prolonged inactivity such as sitting in an airplane or automobile for an entire day. This decreases blood flow through the veins and increases the chance for blood clots to form. Taking estrogen pills may also lead to thrombophlebitis. People, who have had a stroke or are paralyzed or have certain forms of cancer, are at increased risk of thrombophlebitis. Pregnant women have increased pressure on veins and are discouraged from long periods of car travel or air travel because of an increased tendency to develop thrombophlebitis. Smoking, obesity, and a family history of blood clotting also predispose to this condition.

When a superficial vein is affected, a red, hard, tender cord may be felt. The area is often hot and extremely sensitive to touch. There is pain with standing or walking. A fever may or may not be present. If a deep vein is affected, producing DVT, people often have no symptoms.

The value of magnetic field therapy in cases of thrombophlebitis is to reduce inflammation and swelling, and to improve autonomic nervous tone affecting the smooth muscle that forms the outer layer of veins. Medical doctors treat thrombophlebitis and a deep venous thrombosis using prescription anticoagulant medications.

Compression stockings (such as Jobst stockings) are used in treatment of thrombophlebitis, and also in prevention. Anyone traveling long distances should wear these stockings as a supportive measure. Consistent, moderate exercise is helpful to maintain health of the venous system.

Settings and application

In the initial, acute, inflammatory phase of thrombophlebitis the MRS 2000 should not be used. This is because a fever may also be present or in the process of developing, and fever is a contraindication. Acupuncture during this phase is quite beneficial.

Once the acute phase has subsided, use the whole body mat applicator three times daily for 16 minutes each application. Begin at an intensity setting of ten and gradually increase to 150 in the morning, and to 50 at noon. Continue using the whole body mat at a setting of 10 in the evening.

Deep venous thrombosis requires careful monitoring by a medical physician as there is a risk of pulmonary embolism, as noted above.

See "Dermatology"

Description

When vein valves fail, the direction of blood flow in a vein reverses. This condition leads to increased internal pressure on the vein wall and pooling of blood below the valve, resulting in dilation or bulging that is visible through the skin. Varicose veins range in size from large, bulging veins to smaller blue veins called reticular veins and finally to tiny web-like veins

called spider veins. The typical distribution of spider veins occurs in the ankles, lower inner thighs and the front and sides of the thighs. Reticular veins are most often noted in the outer thighs, extending into the backs of the thighs and knees. Varicose veins can usually be traced from the upper inside of the thigh, sometimes branching extensively into the calves, ankles and even into the foot.

Varicose veins are often regarded as a cosmetic nuisance, but in reality, they also present potentially serious health problems that can be corrected with proper therapy. The larger varicosities put the patient at risk for phlebitis (painful inflammation), brownish discoloration of the skin, dermatitis and, in advanced cases, clot formation with ulceration and permanent scarring. Reticular veins may or may not develop into severe health hazards, but they are often accompanied by significant symptoms of local tenderness or burning and itching.

Risk factors for development of varicose veins are numerous. Heredity and gender play a big role.

Spider, reticular or varicose veins affect approximately 30% of North American females. Men, although fewer in numbers, do suffer from varicosities, with a tendency to develop the more severe, bulging and ropey veins that may lead to complications. Other factors include pregnancy, use of birth control pills and hormonal replacement therapy. Frequently, varicose veins that develop in pregnancy resolve within a few months after delivery. This is due to relief of the pressure on the pelvic veins that was previously caused by the enlarged uterus. With multiple pregnancies, however, these veins may reappear and become permanent. Trauma, prolonged standing and obesity may also contribute to the development of varicosities.

Self-help methods for treating varicose veins include exercising, losing weight, and the avoidance of tight clothes around your waist, thighs or groin, elevating the legs, avoidance of standing or sitting for long periods, and the use of compression stockings around the ankles and feet. Don't sit with your legs crossed. When these methods don't work, other treatments are available, including sclerotherapy, laser surgery, vein stripping, and endoscopic vein surgery. Before undergoing any procedure, understand any health risks and possible side effects. In some cases varicose veins will return even after a successful procedure.

Settings and application

Use the whole body mat applicator three times per day for 16 minutes per application. The intensity settings can start at 25-50 in the morning and increase to 150 as tolerated. The midday application should begin 50, and the setting of 10 should be used in the evening. The pad applicator can be used at a setting of 50 for 16 minutes twice daily locally.

Description

Hemorrhoids basically represent a varicose vein affecting the vessels in the anus and rectum. They may result from straining during bowel movements or from increased pressure on these veins in pregnancy or in certain diseases. Hemorrhoids are common, affecting about 50% of all adults over the age of 50. They may produce itching, bleeding and pain.

Constipation, hard stools, and straining at the stool are all precursors to the development of hemorrhoids. Because this condition affects 50% of the population, basic bowel hygiene is important and needs to be discussed.

Adequate water intake, increasing fiber in the diet (35 g per day), consistent exercise, and the avoidance of excessive animal protein and fat (and red meat in particular) can help prevent stools from becoming hard and difficult to pass. Many people are unaware that it is normal to have bowel movements once or twice daily. Some grow up believing that one or two bowel movements per week is sufficient. This is incorrect, and very unhealthy. A daily routine is encouraged where bowel movements occur roughly the same time each day.

Many people are familiar with the laxative effects of coffee. This may seem to be helpful, at first, but, in fact, coffee extracts fluid from the bowel lining. A much more normalizing warm beverage is green tea, which nourishes and hydrates the bowel lining.

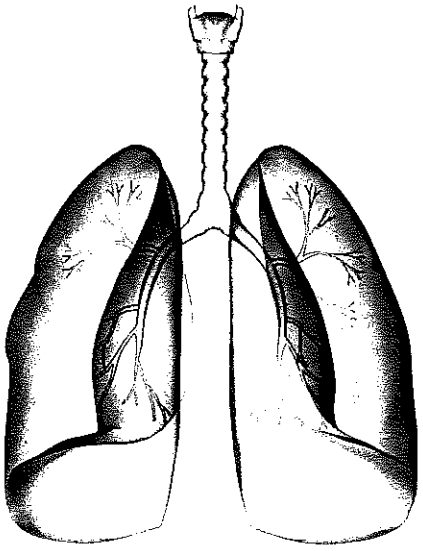
To ensure adequate fiber intake, I recommend a cooked multi-grain cereal for breakfast. This may include brown rice rice, oats, wheat and millet, and perhaps other grains as well. Those who are gluten intolerant can substitute accordingly. Studies have shown that 35 g of fiber daily can prevent colon cancer. Fiber adds volume to the stool, especially when there is adequate water intake also.

Settings and application

For autonomic regulation, positive influence of the collagen matrix, and improved blood flow use the whole body mat applicator two times per day for 16 minutes each application. Initial intensity settings using the MRS 2000 should be 25-50 in the morning and increased to 150 as tolerated. The midday application should begin 50. The intensity setting for evening application should be 10.

For pain, itching and inflammation use the probe applicator EXTERNALLY. Remaining fully clothed, place the tip of the probe applicator near the rectum. The electromagnetic waves will pass through the clothing and signal the inflamed tissues. The probe should never be used internally for any condition or placed in any bodily orifice. Use an intensity setting of 50-200 for 8 minutes, twice to three times daily.

RESPIRATORY SYSTEM



The primary function of the respiratory system is to supply oxygen to the blood. This occurs via gas exchange between the small cells of the lungs, called alveoli, and red blood cells (RBCs) in the small pulmonary capillaries. The respiratory system is comprised of several specialized structures that allow ambient air to become 100% humidified and warmed to body temperature to facilitate this all-important gas exchange. These structures include the mouth nose/sinuses, and throat (pharynx and larynx), the respiratory airways (including trachea, bronchial tubes, smaller bronchioles), the lungs, and the rib cage and diaphragm with their respiratory muscles.

The respiratory process includes inhalation and exhalation. Inhalation is initiated by the diaphragm, and supported by the external intercostal (rib) muscles. At rest, the average adult takes 10-18 breaths per minute. Exhalation is a passive process, but can be forced by contraction of abdominal and internal intercostal muscles.

Respiratory illnesses may involve any of the specialized structures and tissues that make up the respiratory system. The functions of RBCs have been discussed in detail at the beginning of the chapter on the cardiovascular system. Since oxygen transport is a harmonious interplay between the circulatory and respiratory systems, a fuller understanding may be gained by reviewing that chapter.

Scientific literature indicates significant effects of electromagnetic fields on microcirculation, on angiogenesis (the formation of new blood vessels), and on nitric oxide metabolism. Most studies indicate that pulsating electromagnetic fields produce a vasodilatory effect through the release of nitric oxide and through a relaxation of vascular tone. Together with angiogenesis, the net effect of exposure to appropriate magnetic fields is the improvement of blood perfusion and oxygen delivery. *(McKay 2007/101)*

Asthma

Description

Asthma a the condition where the airways to the lungs become inflamed and constricted. The bronchial walls produce extra mucus and the muscles of these walls tighten, resulting in less oxygen available for gas exchange. There is difficulty removing oxygen-depleted air from the lungs with exhalation because the airways are constricted. People with asthma may exhibit only minor wheezing, or they may suffer with severe, life-threatening asthma attacks.

The symptoms of asthma include shortness of breath, chest tightness or pain, wheezing or a whistling sound when exhaling, coughing, and increased susceptibility to upper respiratory infections. When managed poorly, asthma can lead to increased lost days at work or at school.

The cause of asthma is unknown, but it may be due to a combination of environmental and inherited factors. Asthma may be triggered by airborne allergens, respiratory infections, physical activity (exercise-induced asthma), cold air, air pollution, cigarette smoke, and certain medications such as aspirin, non-steroidal anti-inflammatories and beta blockers. It can also be aggravated by allergic reactions to certain foods, the onset of the menstrual cycle in women, and gastroesophageal reflux disease.

The pharmacologic treatment of asthma is becoming more sophisticated every year. In addition to bronchodilators, inhaled corticosteroids and leukotriene modifiers are used to reduce inflammation and decrease mucus production in bronchial airways. There are short-acting and long-acting inhaled bronchodilators, as well as oral medication. When a strong allergic component exists, allergy medications are also used.

In the United States, new rules governing albuterol inhalers become effective in 2008. A new propellant will be used that is less harmful to the ozone layer. This propellant will have a different taste and feel and will require the inhaler to be washed with water once weekly. These inhalers are more costly, and produce a less forceful spray than older inhalers.

Nonpharmacologic treatment includes chiropractic manipulation to improve rib cage and respiratory muscle function, acupuncture to modulate inflammation and mucus formation, and stress reduction when stress is a significant trigger for asthma attacks. Chinese herbs, aromatherapy, and other nutritional supplements may be extremely valuable in curtailing the frequency of asthma attacks. With exercise-induced asthma, a pre-competition warm-up to induce and work through the episode of bronchoconstriction can facilitate better performance in competition. Magnetic resonance stimulation is valuable in modulating vascular and autonomic tone as well as oxygen saturation and delivery.

Settings and application

For asthma, use the whole body mat applicator 2-3 times per day for 16 minutes. Begin with an intensity setting of 10 and gradually increase to between 50 and 150 in the morning. Use a setting of 50-100 at noon, and 10-25 in the evening. Larger persons may use 25 as an initial setting. Use the pad applicator once daily for 24 minutes at a setting of 50-100 over the chest.

Description

Acute bronchitis is an inflammation and infection of the bronchial tubes, usually following a cold. The chest feels sore and a cough develops. Smoking and exposure to smoke, air pollution, dust or toxic gases are risk factors for bronchitis, with or without a preceding cold. Most cases disappear within a few days, though coughing can linger for weeks. A chronic cough may signal asthma or chronic bronchitis, conditions that require medical attention.

A productive cough that brings up yellowish gray or green mucus is a primary sign of bronchitis. When the bronchial tubes are inflamed, they produce large amounts of this discolored mucus. If this persists for more than three months, it is an indication of chronic bronchitis.

Symptoms of bronchitis include chest congestion, soreness and constriction, wheezing, sore throat, sinus congestion, mild fever with chills. A chronic sinusitis may mimic chronic bronchitis because the colored nasal discharge and chronic cough produced from the sinuses may be similar to signs and symptoms from the bronchial tubes.

Chronic bronchitis is common in smokers, where the cigarette smoke kills the fine hair-like structures (cilia) lining the bronchial tubes. The cilia normally helps to circulate mucus upwards to lubricate and protect the bronchial tubes. Smokers have fewer numbers of cilia, and, therefore, mucus accumulates, particularly during hours of sleep. Hence, when smokers arise, a typical morning hacking cough is used to express this mucus. The accumulation of mucus predisposes to chronic bronchitis.

Chest auscultation (with a stethoscope), possibly a chest x-ray, and perhaps pulmonary function tests will be used to diagnose bronchitis and exclude other disorders. In some older adults, infants and smokers, chronic bronchitis can lead to pneumonia. Since viruses rather than bacteria often cause bronchitis, antibiotics are often ineffective. Nevertheless, a healthcare practitioner must rule out a bacterial infection.

Settings and application

For improved immune function, autonomic regulation, and enhanced cellular function, use the whole body mat 2-3 times per day for 16 minutes at an intensity setting of 50-150. Gradually increase from a setting of 10 initially. The application can be used once or twice daily for 24 minutes at a setting of 50-100 over the chest. Supportive therapies, including acupuncture, naturopathy, homeopathy and chiropractic, can be beneficial.

People suffering with bronchitis should get plenty of rest, drink extra water and hot tea, use an atomizer to warm and humidify inhaled air, and use herbal remedies and lozenges or nonprescription medicines to relieve excessive coughing.

Emphysema

Description

Emphysema is caused by damage to the small air sacs (alveoli) and small airways in the lungs. This damage makes it difficult to exhale. The lungs are expanded. When emphysema has progressed, it requires a great deal of energy to expel air from the lungs. Damage to the alveoli compromises the ability of the respiratory apparatus to produce adequate gas exchange.

The main symptom of emphysema is shortness of breath, with a resulting decrease in the capacity for physical activity. Other signs and symptoms include chronic, mild cough, loss of appetite and weight loss and fatigue. Weight loss results because the act of eating can compete with the need to breathe. In addition, eating causes the stomach to expand, and this limits the room the lungs have available to expand, making it harder to breathe as well.

The most common cause of emphysema is cigarette smoking. Cigarette smoke destroys the microscopic hairs (cilia) that line the bronchial tubes, giving rise to bronchial inflammation and eventual breakdown of the elastic fibers that form the bronchial tubes. Even exposure to secondhand smoke can increase the risk of emphysema, particularly if you work or live in a smoke-filled environment. Occupational exposure to chemical fumes and exposure to indoor and outdoor pollution can increase the risk of emphysema. A very small percentage of patients with emphysema have low levels of a protein called alpha-1-antitrypsin. The lack of this protein can lead to progressive lung damage, and the symptoms of emphysema can begin at an early age.

The best treatment for emphysema is to prevent it in the first place, if possible. Avoid smoking, or if you smoke, please stop. You may need to take steps to clean and condition the air you breathe in the home. If you live with a smoker, set up boundaries around that behavior that honor your loved one's preference as well as your health. If possible, have your loved one read this paragraph also, because I'm asking them politely to stop smoking, too! One simple question for your loved one who smokes: would you teach your dog to smoke? Why not? (And that's my point – we need to regard our own health, and the health of our loved ones, with the same practical love and regard we have for our non-human companions. Stop smoking!

In the workplace, smoke-free environments are becoming more common. In Colorado, it is illegal to smoke a cigarette within 10 feet of the entrance of the building. Unfortunately, this is not enforced as strongly as it should be. However, the passage of this law is a step in the right direction. If you have health concerns related to smoking or toxic fumes in your work environment, bring this to the attention of senior level management. Change should be made, and laws in your state or province may support you.

Two of the author's experiences with cigarettes, and a strong plea: My wife's brother died at the age of 46 from lung cancer. He never smoked cigarettes, but he worked as a bartender in a smoke-filled environment for about eight years. His work environment produced scarring of the lung tissue. Carcinoma eventually developed, and this cancer killed him slowly and painfully over the next 18 months. He died one day after his 46th birthday on December 26, 1996.

My mother died suddenly from a ruptured cerebral aneurysm. She smoked cigarettes from the time she was in college. Cigarettes weakened the vessel walls in her brain. The vessel walls ruptured (aneurysm). My mom was brain-dead within about two hours. She was 63 -- too young!

Cigarettes are not your friends. Again, if you smoke, please stop now! Tobacco use does not make you a bad person. This behavior does not signify that you are lacking in intellect or in any other admirable quality – except regard for your own current and future health.

Settings and application

The MRS 2000 is valuable in support of the immune system to lessen the occurrence of secondary pulmonary infections. Use the whole body mat 1-3 times daily. Morning intensity settings should be 25-50 initially, and may increase from there as tolerated. Many people

will prefer to keep the morning application at a lower intensity setting. Evening applications should use an intensity setting of no more than 10.

Description

Pneumonia (or pneumonitis) is an inflammation of the lung usually caused by an infection with bacteria, viruses, fungi, or other organisms. Worldwide, pneumonia is the leading cause of death in children. This is of special concern in people afflicted with chronic illnesses and impaired immune systems, such as those with HIV and the elderly. Many cases of pneumonia develop suddenly with fever, chills, cough, shortness of breath, and chest pain. Some cases of pneumonia follow environmental exposure to smoke, toxic fumes, or other irritants to lung tissue.

Infectious organisms that cause pneumonia include bacteria, viruses, mycoplasma, and fungi. The symptoms of pneumonia depend on the organism causing it. For example, mycoplasma is a tiny organism that produces a gradual onset of mild, flu-like symptoms that may not be severe enough to cause you to go to the doctor. This type of pneumonia is called "walking pneumonia" and is common among schoolchildren and young adults.

The classic symptoms of pneumonia include chest pain, sudden onset of fever, coughing, and shortness of breath. The cough may be productive, expressing dark yellow, bloody, or rust-colored phlegm. Diagnosis is confirmed with blood tests, chest x-rays, and possibly the examination of a sample of phlegm to identify the causative organism.

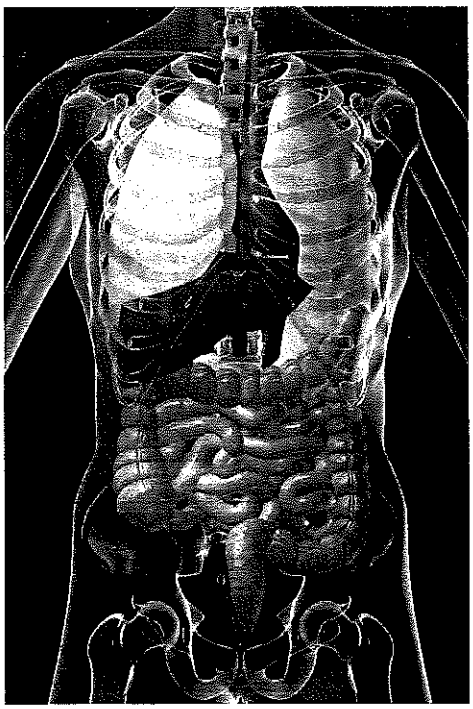
Pneumonia requires medical treatment to prevent complications. These complications include lung abscess, bacteria in the blood stream (bacteremia), and fluid accumulation around the lungs (pleural effusion).

Supportive measures that boost the immune system and relieve symptoms include rest, plenty of water, acupuncture, homeopathic and/or naturopathic remedies, and pulsed magnetic field therapy.

Settings and application

For immune support, use the whole body mat applicator 1-3 times per day for 8-16 minutes. Initial intensity settings should be 25-50 for morning applications, and 10 at night. Intensities in the morning and at midday can increase to 50-150 as tolerated. The pad applicator can be used over the chest at a setting of 50-150 for eight minutes twice daily.

GASTROENTEROLOGY



The digestive system is comprised of the digestive tract, a series of hollow organs joined in a long, twisting tube from the mouth to the anus. Gastroenterology is that branch of the healing arts that cares for these organs.

The organs of the digestive tract include the mouth, esophagus, stomach, small intestine, large intestine (also called the colon), rectum, and anus. The lining of these organs is called the mucosa. Two related structures, the liver and pancreas, are non-hollow organs that secrete digestive juices into the upper digestive tract. The gallbladder, lying directly adjacent to the liver, stores and concentrates the liver's digestive juices for release into the upper intestine. In the lower digestive tract, the appendix is a small, hollow out-pouching in the right lower abdomen whose function remains the topic of debate.

The digestive process is complex, but basically involves the breakdown of food so that the nutrients can be extracted and absorbed. Chewing, digestive enzymes, stomach acid, and other digestive juices are added to improve the breakdown and facilitate the transfer of nutrient energy into the body from the food we eat. Once all nutrients are extracted, the lower digestive system combines the undigested, unabsorbed particles of food with bodily waste products and packages them for elimination.

All components of the digestive system are subject to infection, inflammation, and other forms of breakdown and dysfunction. Since pulsed magnetic fields enhance cell membrane permeability, ion exchange, ATP production and nutrient transport, such fields can lend great support in the management and recovery of diseases of the digestive tract.

Guidelines for use of the MRS 2000 for the digestive tract

Pulsed magnetic field therapy has a balancing, harmonizing effect on the digestive tract, which is governed by the autonomic nervous system. Use the whole body mat applicator two to three times a day for eight minutes each time. Use an intensity setting of 25-50 in the morning, 25 at noon, and 10 in the evening. Use the pad twice daily for 16 minutes each application: eight minutes at 50 to the low back with the legs bent to focus treatment to the lower bowel, and 100-200 to the stomach and abdomen for eight minutes.

Description

When the lining of the stomach is inflamed, the condition is called gastritis. The inflammation often results from an infection with bacteria (Helicobater pylori) that causes stomach ulcers as well. Gastritis causes a burning pain in the upper abdomen, and occasionally, bloating, belching, nausea or vomiting. If it is chronic, gastritis can lead to an increased risk of stomach cancer. For most people, however, the condition rapidly resolves with proper treatment.

Sometimes gastritis is the result of taking too much over-the-counter medication, such as aspirin, ibuprofen (Advil, Motrin, Nuprin), or naproxen sodium (Aleve). Stress, increasing age, and bile reflux disease can also increase the risk of developing gastritis.

Common remedies for gastritis include the use of anti-antacids, acid blockers such as Zantac or Pepcid, and medications that shut down acid pumps such as Prevacid or Aciphex. Antibiotics can be used to treat the underlying H. Pylori infection.

Prevention of gastritis includes eating a healthy diet, and reducing fat and grease in the diet. Limit or eliminate refined sugar, alcohol, and dairy. Since smoking increases stomach acid, and thwarts the healing processes of the body by depriving it of oxygen, stop smoking. Acupuncture, nicotine patches and/or strong accountability can help you become a non-smoker permanently. Throw away your lighters, matches and ashtrays, and transform the ashtray in your car into a terrarium or good fragrance dispenser. If you regularly use over-the-counter pain medications, change your medication, or better yet, eliminate the need for painkillers through natural means such as chiropractic, acupuncture, an alkaline diet, and regular exercise. Maintain a healthy weight, manage stress, and drink green tea instead of coffee.

Settings and application

The use of the MRS 2000 for gastritis should follow the guidelines set forth at the beginning of this chapter.

Description

The pancreas is a dual function organ that contributes digestive enzymes to the digestive tract, and also excretes insulin and glucagon for the transport of carbohydrate across the cell membranes and the regulation of carbohydrate metabolism. Insulin is vital to sugar metabolism, and pancreatic enzymes are important for digesting proteins, carbohydrates and fats. When the pancreas becomes inflamed, both of these functions can be affected.

Pancreatitis can be either acute or chronic. Both conditions can lead to serious complications, including dehydration, low blood pressure, internal bleeding, shock, and death. Acute pancreatitis is the sudden onset of mild to markedly severe abdominal pain, tenderness and swelling accompanied by nausea, vomiting and fever. The diagnosis is made by blood tests that reveal elevated pancreatic enzymes, elevated white blood cell count, high blood sugar,

and low calcium levels. While high serum calcium levels can cause pancreatitis, low levels of calcium in the blood are the result of pancreatitis. In the case of chronic pancreatitis, additional tests may be necessary, including abdominal ultrasound, x-ray of bile and pancreatic ducts, and a pancreatic function test.

The pain of acute pancreatitis may be so severe that hospitalization is required. The focus of treatment will be on pain relief, improving nutritional absorption, and making dietary changes. Chronic pancreatitis can cause diabetes in some individuals. Therefore, diabetes is treated concurrently.

One important, primary risk factor in the development of pancreatitis is chronic, long-term alcohol abuse. Other factors include underlying gallbladder disease with the development of gallstones, ethnicity (black Americans are more likely to develop acute pancreatitis), gender (men are more likely to abuse alcohol than women), genetics, and the presence of other medical conditions.

Pancreatitis may be prevented through avoiding excessive alcohol use, smoking cessation, and limiting dietary fat intake, particularly red meat and fried foods. Drink plenty of liquids, particularly water, and eat smaller, more frequent meals.

Settings and application

The use of the MRS 2000 for pancreatitis should follow the guidelines set forth at the beginning of this chapter.

Description

Gastroesophageal reflux disease, or GERD, is a condition where stomach acid flows backwards (reflux) up into the esophagus, producing irritation of the lining of the esophagus (esophagitis). Over time inflammation ensues, causing difficulty swallowing, breathing problems, constriction of the esophagus, and bleeding. GERD may be due to an underlying weakness of the esophageal sphincter, a contractile valve between the esophagus and stomach.

Certain factors aggravate GERD. These include overeating, alcohol, lying down after eating, fatty and spicy foods, chocolate, caffeine, tomato sauce, carbonated beverages, cigarette smoking, and certain medications such as sedatives, tranquilizers, and calcium channel blockers. You are at risk of developing GERD if you are obese, have a hiatal hernia, are pregnant, have asthma or diabetes, have a peptic ulcer, or have Zollinger-Ellison syndrome (a rare disorder in which the stomach produces extremely large amounts of acid.)

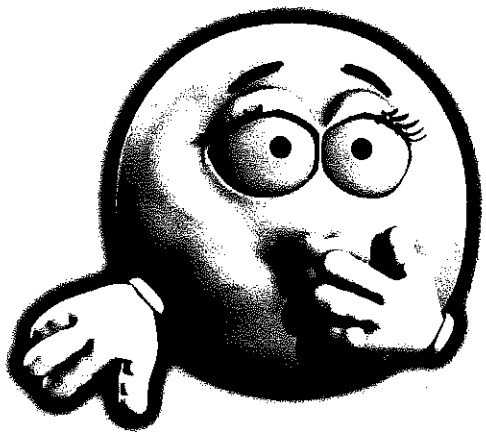
A physician should be consulted if heartburn is experienced several times per week or returns after antacid wears off or produces difficulty swallowing, or awakens you at night. Surgery may be warranted if bleeding is present, stool is black, there is weight loss, or conservative management fails. Commonly used medications include antacids, H-2 receptor blockers, proton pump inhibitors, and prokinetic agents that help the stomach empty more rapidly.

In severe cases, surgery is performed to restructure the union between the esophagus and stomach. Newer procedures are performed laparoscopically through three or four small incisions, or endoscopically through the oral cavity where no incisions are required.

GERD can be helped at home by weight loss, eating smaller meals, eliminating fatty or fried foods, alcohol, chocolate, garlic, onion, caffeine and nicotine, avoiding stooping and bending, and avoiding lying down after a meal. Loose fitting clothes around the waist relieve pressure around the abdomen and therefore around the lower esophagus.

Acupuncture, pulsed magnetic field therapy, an alkaline diet, exercise, and weight loss are all beneficial in support of resolving GERD.

Settings and application
The use of the MRS 2000 for GERD should follow the guidelines set forth at the beginning of this chapter.



Description
Nausea is defined as a sense of abdominal uneasiness with an urge to vomit. Nausea and vomiting have many causes and are usually benign and self-resolving. Persistent nausea should always be taken seriously.

Conditions that give rise to nausea and vomiting include motion sickness, chemotherapy and radiation therapy, gastroenteritis, drugs, influenza, pancreatitis, gallstones, GERD, toxins including nicotine, migraine headache or inner ear disturbance, brain tumor, peptic ulcer, liver disease and kidney failure. Home treatment includes rest, staying hydrated, eating bland foods, avoiding obnoxious odors, and using over-the-counter motion sickness medications.

It is important to see a health care provider if the nausea is associated with a severe headache, particularly if it is a kind of headache you've never had before. Also, if vomiting last for more than two or three days, or if you're unable to keep liquids down, you may become dehydrated and need fluid replacement. If vomit has the appearance of coffee grounds or contains any blood, your doctor will suspect a more serious disorder.

Pregnancy produces nausea between the sixth and 14th weeks due to hormonal changes. If you are taking hormones, this may give rise to nausea and vomiting. Toxins in food (food poisoning) will produce sudden onset, often violent vomiting as the body naturally wants

to rid itself of toxins quickly. Acupuncture can be significantly effective in assisting people with nausea, regardless of the cause. Because of autonomic regulation and a calming effect, magnetic resonance stimulation may also be profoundly beneficial.

Settings and application
For a sedating, regulatory autonomic nervous system effect, use the whole body mat applicator 1-3 times daily for 16-24 minutes at a low intensity setting such as 10-25. There are many reported cases where the MRS 2000 has helped people complete a course of chemotherapy and/or radiation therapy with much greater comfort due to the attenuation of nausea.

Description
This is a common condition that may relate to the ingestion of certain foods. When cramping, gas or bloating is not associated with a particular organ disorder, it may be helped through the use of magnetic resonance stimulation.

This condition may be associated with the ingestion of legumes and peanuts and peanut butter as well as vegetables from the cabbage family, including cabbage, broccoli, and cauliflower. Symptoms include gassiness, cramping and bloating of the abdomen. Symptoms may be precipitated during a menstrual period, and may relate to autonomic tone of the uterus and/or ovaries.

Settings and application
For the alleviation of abdominal cramps from gas or bloating, use the pad applicator for 24 minutes at a setting of 200. Small children can use the pad at a setting of 50-100.

Description
Up to 20% of all Americans have irritable bowel syndrome (IBS). It is one of the most common chronic conditions for which people consult a doctor. Onset of symptoms rarely occurs after the age of 35. Symptoms include abdominal cramping, bloating and gas, and alternating bouts of diarrhea and constipation. Mucus may be observed in the stool, and there may be a bloated feeling. IBS does not cause inflammation or change the mucosa of the bowel, so there is no increased risk of colorectal cancer with this disorder.

The cause of IBS is unknown. Bowel contractions may be stronger and last longer than with normal bowel function. Food is forced through the digestive tract more quickly, producing gas, bloating and diarrhea. Alternatively, food passage is slowed down because of abnormal bowel contraction, and stools become dry and hard. Scientists believe that IBS is caused by changes in the nerves that control the peristaltic contractions of the bowel. There may be increased sensitivity to the stretching of the bowel with food or gas, leading to pain or bloating. This may be a disorder of autonomic control. Since IBS is more common in women, hormonal changes may also play a role.

The Rome criteria[24] for the diagnosis of IBS suggests that at least two of the following need to be present:

1. a change in frequency or consistency of the stool (alternating constipation and diarrhea)
2. straining, urgency or difficulty emptying the bowels completely
3. mucous in the stool
4. bloating or abdominal distention

Red flags to consider include new onset of symptoms after the age of 50, weight loss, fever and recurrent vomiting. These may be signs of something more serious than IBS, and in the presence of typical IBS symptoms; each red flag is an indication to see your doctor.

Treatment of IBS focuses on symptom relief. A high fiber diet can help both constipation and diarrhea by increasing stool volume. In the case of constipation, this draws more fluid into the bowel. In the case of diarrhea, this gives substance for the excess fluid to bind to.

Antidiarrheal medication, eliminating high gas foods, and treatments for depression are commonly recommended. Since dairy products consistently lower the pH of the bowel, predisposing to irritation, if not inflammation, restricting dairy intake significantly is a good idea. Some patients with IBS may be lactose intolerant.

Some studies have shown acupuncture to be effective for IBS symptoms. It helps relax muscle spasms and improve bowel function, together with Traditional Chinese Medicine techniques. Peppermint, as an herb, has natural anti-spasmodic effects in the bowel. Use enteric-coated peppermint capsules. As always, herbs should be taken only under the direction of a qualified health professional. Probiotics, or "good bacteria" such as acidophilus and bifidus, can be taken in supplement form to decrease the symptoms of IBS by regenerating the intestinal flora. Green tea, digestive enzymes, vitamin B complex, and flaxseed oil may also be of benefit.

Chiropractic and osteopathic manipulation have been shown to help control the symptoms of IBS in some patients.

Settings and application

The use of the MRS 2000 for IBS should follow the guidelines set forth at the beginning of this chapter. The MRS 2000 has a calming, sedative effect on bowel function and can offer significant beneficial support for this condition.

Description

The presence of small, bulging pouches in the digestive tract represents a condition called diverticulosis. These are commonly occurring structures that develop beyond the age of 40.

[24] http://ibdcrohns.about.com/cs/ibs/a/romecriteria.htm

In fact, in the United States more than 50% of people over age 60 have diverticula. The fact that they are common does not make them normal, and the American diet needs to be re-examined due to our heavy emphasis on animal protein and fats, and particularly red meat from beef. Very few Americans, relatively speaking, eat enough fiber each day – the recommended daily intake is 35g.

Though diverticula can form anywhere along the digestive tract, most often these occur in the large bowel. These pouches seldom produce symptoms, and most people do not know they have them. When one or more of these pouches become inflamed or infected, severe abdominal pain, fever, nausea and a marked change in bowel function ensue. This condition is called diverticulitis. Most inflammations of the diverticula are short lived, and can be treated with rest, dietary changes and, when infections exists, antibiotics. However, serious cases of diverticulitis may ultimately require surgery to remove the diseased portion of the colon.

Risk factors for diverticulitis include aging, low dietary fiber intake, and the lack of exercise.

Attacks of diverticulitis can mimic appendicitis due to the sharp, usually severe pain that occurs suddenly. Unlike appendicitis, however, diverticulitis usually affects the left lower abdomen rather than the right side. Abdominal tenderness, fever, nausea, constipation and diarrhea may be accompanied by less common signs and symptoms, which include vomiting, bloating, bleeding from the rectum, frequent urination, difficulty or pain with urination, and tenderness over the abdomen due to a tight waistline or bending over.

Treatment of diverticulitis depends on the severity of signs and symptoms, and whether this is the first attack. Hospitalization is reserved for severe attacks. Home care consists of dietary restrictions that include the avoidance of high fiber initially since the colon needs to rest and heal. Gradually, fiber can be reintroduced into the diet.

The prevention or slowing of the progression of diverticulitis simply requires observing some basic principles of wellness. These include eating more fiber, drinking plenty of water (I recommend one half your body weight in equivalent ounces), being more responsive to bowel urges, and regular exercise.

Raw almonds or pumpkin seeds that have been soaked in water for 24 hours are hydrated, softer and sweeter tasting on the palate, and a great source of fiber. Increase dietary fiber slowly to avoid bloating from gas. Most adult North Americans (including Canada, the United States and Mexico) do not drink enough water. If you weigh 150 pounds, you need to drink 75 ounces of water daily.

In our busy, convenience-driven commuting culture, we often postpone or do not have opportunity for bowel movements. We ignore bowel urges for the sake of convenience. The urges subside, and we may then forget to take time for a bowel movement that day. This is a mistake, and may predispose to diverticular disease.

Settings and application

There is definitely a place for the use of the MRS 2000 in diverticulitis. After one of our patients had a severe attack that resulted in a hospitalization, she reflected upon the fact that, as long as she had been regular with the use of the MRS 2000, no attacks had occurred. When she went for 5 weeks without using the MRS is 2000, she had a severe attack, and was hospitalized. She was advised to undergo surgery for bowel resection; that is, to have a portion of her colon removed. As a result of this experience, and not willing to undergo surgery, our patient resolved to have MRS 2000 at home for use on a daily basis. As of this writing, she has had no further episodes of diverticulitis.

For the support of diverticulitis the whole body mat is used 1-3 times daily at a setting of 10-25 for 8-16 minutes. Use the pad applicator over the lower abdomen for 8-16 minutes at a setting of 100-200.

Description

Ulcerative colitis affects the innermost lining of the mucosa of the large intestine (colon) and rectum. It produces inflammation and ulcers. Like Crohn's disease, it is characterized by abdominal pain and diarrhea. Unlike Crohn's disease, however, it does not affect other areas of the digestive tract.

The cause of ulcerative colitis is unknown. However, while it used to be thought that stress was the primary culprit, current thinking has shifted to the immune system and hereditary factors are more important in the development of ulcerative colitis. The condition often begins in the 30s. Both Crohn's disease and ulcerative colitis more commonly affects whites, but people of Jewish or European descent are 4-5 times more likely to have inflammatory bowel disease. The conditions are more common in people living in developed, urban areas. High fat and refined foods in the industrialized areas may be a factor.

Crohn's disease is a condition of the bowel where inflammation and ulceration spread deeply into the layers of the bowel mucosa. Like ulcerative colitis, Crohn's disease is painful and debilitating, producing abdominal pain and diarrhea. It may lead to life-threatening complications. Unlike ulcerative colitis, Crohn's disease begins earlier in life, and most people are diagnosed between the ages of 20 and 30. Smoking increases the risk of developing Crohn's disease.

New studies suggest there is a correlation between the use of an acne medication (Accutane; isotretinoin) in the development of inflammatory bowel disease.

You should seek medical advice when you experience abdominal pain, blood in the stool, or recurring bouts of diarrhea that do not respond to over-the-counter medications. In addition, an unexplained fever that lasts more than a day or two in conjunction with these other symptoms may herald inflammatory bowel disease. Neither Crohn's disease or ulcerative colitis is fatal. However, they may cause life-threatening complications, such as bowel

obstruction, alteration, perforation, fissures, and fistulas. People with inflammatory bowel disease are at a mildly increased risk of developing colon cancer. Some of the medications used to treat inflammatory bowel disease (those used to suppress the immune system) are also associated with a small increased risk of cancer development.

Standard medical treatment includes the use of anti-inflammatory medication, immune system suppressors, antibiotics, antidiarrheals and laxatives, as well as pain relievers, iron supplements, vitamin B12 shots, calcium and vitamin D supplements. Surgery is only recommended when the clinical course reveals significant damage to a portion of the digestive tract.

Certain foods and beverages aggravate symptoms and inflame the bowel. Eliminating dairy foods, high fat foods (usually from meat), and foods that tend to make your signs and symptoms worse. These may include "gassy" foods (such as beans, cabbage, broccoli, cauliflower), and raw fruits and juices, especially citrus fruits. You may also need to eliminate spicy food, popcorn, alcohol, caffeine, as well as chocolate and soda pop. Steaming or cooking the vegetables may allow you to tolerate them. Eating small meals limits the potentially negative side effects of food intake.

While not a cause, stress can make inflammatory bowel disease worse, and should be controlled through exercise, biofeedback, regular deep breathing and relaxation exercises, hypnosis, prayer, meditation, and listening to relaxing (scientific studies recommend classical) music. In many cases, acupuncture/Traditional Chinese Medicine, naturopathy, homeopathy, chiropractic medicine, and pulsed magnetic field therapy can make a crucial difference in living and functioning with inflammatory bowel disease.

Settings and application
The use of the MRS 2000 for inflammatory bowel disease should follow the guidelines set forth at the beginning of this chapter.

Description
Appendicitis is a condition where the appendix becomes inflamed and filled with pus. Symptoms begin with pain around the mid-abdomen near the navel, and as symptoms progress over 6-12 hours, the pain localizes to the right lower abdomen. The pain may be associated with nausea and sometimes vomiting, loss of appetite, constipation, diarrhea, and the inability to pass gas.

Appendicitis is most common in people between the ages of 10 and 30. Standard treatment is surgical removal (appendectomy).

The value of pulsed magnetic field therapy is in postoperative care. Studies have shown that exposure to time-varying magnetic fields can enhance wound healing. Furthermore, the constitutional cellular, anti-inflammatory and autonomic regulatory effects of magnetic fields can benefit the surrounding tissues following appendectomy.

Settings and application
Use the whole body mat applicator at the "Sensitive" intensity setting in the first 1-2 days postoperatively. The pad and probe applicators can be used over the right lower abdomen at a setting of 50-150, twice to three times daily for 8-16 minutes per application.

Description
Diarrhea and constipation have been discussed in the section on irritable bowel syndrome. Please refer to that section of this chapter for additional detail.

Since diarrhea can result from viral infection, bacterial infection, parasitic infection and antibiotic medications, any persistent episodes of diarrhea should be brought to the attention of a qualified healthcare provider. Other common causes of diarrhea include lactose intolerance, fructose, artificial sweetness, surgery, and other digestive disorders discussed in this chapter.

Diarrhea is a form of fluid loss that can lead to dehydration. Therefore, it is important to drink plenty of fluids, and especially water, broths and juices. However, avoid apple or pear juices since these may actually make the diarrhea worse. Avoid caffeine and alcohol. If traveling abroad, vigilant attention to bottled water, cooked foods, and the avoidance of fresh vegetables washed in potentially unhealthy water are important. And whether you are at home or abroad, wash your hands regularly, and especially before you eat.

Settings and application

The use of the MRS 2000 for diarrhea and constipation should follow the guidelines set forth at the beginning of this chapter. The MRS 2000 has a calming, sedative effect on bowel function and can offer significant beneficial support for this condition.

Acupuncture is strongly supportive of magnetic field therapy in the treatment of both diarrhea and constipation in order to normalize bowel function. Eliminating coffee and caffeine from the diet are helpful, and replacing this with green tea is recommended. Increasing fiber and a multi-grain cooked cereal for breakfast with adequate amounts of water intake throughout the day are excellent for a clean, well-functioning colon. For chronic constipation or parasitic bowel infections, colonic therapy from a competent therapist using sterile, disposable equipment may produce significant positive changes to the function of the lower digestive tract.

Description

Nonalcoholic fatty liver disease (NAFLD) is a term that is used to describe a range of conditions affecting the liver in persons who drink little or no alcohol. And accumulation of fat within the liver is called steatosis, or simply "fatty liver." A more serious condition is called non-alcoholic steatohepatitis, involving inflammation of the liver with or without fibrous adhesions. In untreated, cases this can progress to cirrhosis or even liver cancer.

Fatty liver is the most common liver disease in Central Europe, and is the most common cause of liver disease in North America as well. With an increasing incidence of obesity and diabetes in Western countries to epidemic proportions, it is a growing problem. It's true prevalence is unknown, but it may affect as many as 30% of North Americans.

Causes may include obesity, high blood pressure, high triglycerides and cholesterol, and insulin resistance. These are all problems related to nutritional excess, though the mechanisms are variable. NAFLD can result from excessive intake of animal protein and fats or refined sugars. It may also result from the high levels of stress that typify the North American lifestyle. Genetics and gender play a role. It is most prevalent among Hispanics, relatively rare among African-Americans, and more common among boys than girls.

The American Liver Foundation and other experts estimate that 2-5% of American children over the age of five, nearly all of whom are obese or overweight, have NAFLD. The scope of this disease has only recently been recognized. Whereas only a handful of cases were reported in medical journals in the 1980s, a spate of recent medical studies reveal that this is a serious and growing problem. Warning signs include the presence of belly fat, diabetes, cholesterol and heart problems in these children. It is estimated that NAFLD will become the top cause of liver transplants by the year 2020.

Blood tests can easily detect liver dysfunction, but a biopsy is necessary to confirm the diagnosis of fatty liver disease.

Steatosis is usually asymptomatic. When symptoms are present, they are vague and non-specific, including fatigue, malaise, a dull ache in the right upper abdomen, and possibly an enlarged liver. An essential part of treatment is lifestyle modification, including weight loss, the avoidance of alcohol, sweets, proteins and fats of animal origin, improved diabetes control, and better cholesterol control.

American culture is not changing in favor of becoming lean, but it should. A diet rich in fruits and vegetables can have a significant impact on this disease by curbing obesity. Regular exercise – which used to be so common with outdoor play among children, has been replaced by sensory-rich handheld electronic games. Let the alarm be sounded for the sake of our children and grandchildren: exercise is essential! Limit the handheld games and encourage your children to go outside and play (in safe areas, of course.)

Elsewhere in this text we have discussed how high cholesterol may be helped by red yeast rice. Stress reduction through massage, pulsed magnetic field therapy and acupuncture, combined with good nutrition can help manage this disease favorably.

Settings and application
The use of the MRS 2000 for steatosis should follow the guidelines set forth at the beginning of this chapter. The MRS 2000 has a calming, normalizing effect on organ function and may offer significant support for this condition. In addition, use the pad applicator over the liver at an intensity setting of 50-150 for 8-16 minutes two to three times per day.

Milk thistle is a tremendous liver detoxifier. In our clinic, we use Protandim®, a very powerful antioxidant that includes milk thistle. Ecliptex® is a product that is less widely available, but also contains milk thistle. Other herbs and nutritional supplements are purported to improve liver health as well, including omega-3 fatty acids, N-acetyl cysteine, alpha-lipoic acid, and vitamin D. Vitamins and herbs that have the potential to worsen liver symptoms include vitamin A, iron, valerian root, and comfrey. Herbs and nutritional supplements should be taken under the direct supervision of a knowledgeable healthcare provider.

Description
Hepatitis refers to a wide array of inflammations that affect the liver. Conditions in this category include alcoholic hepatitis, toxic hepatitis, and hepatitis A, B. and C.

Viral hepatitis.
Hepatitis A is a highly contagious viral infection of the liver. It is transmitted through contaminated food or water or from close contact with someone who has been infected. Not everyone with hepatitis A develop signs or symptoms. Others may develop an illness similar to the flu. People with hepatitis A usually recover completely with no liver damage. Unlike hepatitis B and C, this condition does not develop into chronic hepatitis. The best way to protect against hepatitis A is to wash your hands often, particularly around mealtime.

Hepatitis B is a serious liver infection caused by the hepatitis B virus (HBV). While most adults recover fully from hepatitis B, this condition can progress into chronic hepatitis, cirrhosis, or liver cancer. Infants and children infected with HBV are more likely to develop a chronic liver condition. Women with HBV can pass the infection to their babies during childbirth. The symptoms of hepatitis B infection include loss of appetite, nausea and vomiting, weakness and fatigue, abdominal pain, dark urine, jaundice (a yellowing of the skin and the whites of the eyes) and joint pain. Strong medications are used to treat chronic HBV infection. When liver damage is severe, liver transplant may be considered.

Sexual contact (with saliva, semen or vaginal secretions), dirty needles used to inject illicit drugs, international travel to regions where HBV is endemic, and childbirth can transmit HBV. Therefore, practice safe sex, don't share needles or syringes, tell your sexual partner that you have HBV, and don't share razor blades or toothbrushes. Transmission does not occur through casual contact or by sharing a swimming pool, telephone or toilet seat with someone who has the virus, or by donating blood.

Hepatitis C (HCV) is the third of six identified hepatitis viruses (A, B, C, D, E, G). It is usually not diagnosed until it becomes symptomatic. By that time, liver damage has usually occurred, and many years have passed from the time of initial infection. While there are vaccines for hepatitis A and hepatitis B, no vaccine exists for HCV.

Early-stage symptoms of HCV include fatigue, nausea, poor appetite, muscle and joint pains, and tenderness over the liver. Later on, jaundice and low-grade fever develop. The most common cause of HCV in North America is the receipt of a blood transfusion prior to 1992. The virus is also transmitted through direct contact with blood, sharing contaminated needles with an infected person, and through tattooing or body piercing. Diagnosis is confirmed through blood tests. A liver biopsy will determine how advanced the disease has become. Most people with HCV develop chronic hepatitis (see below). Some also develop cirrhosis of the liver.

Chronic hepatitis is inflammation of the liver that lasts for more than six months. It can result in cirrhosis, an enlarged spleen, fluid accumulation in the abdominal cavity, and deterioration of brain function over time. This condition can persist for years or even decades. In most people, the symptoms are mild and it does not result in significant liver damage. In some people, however, it eventually damages the liver, resulting in cirrhosis (scarring of the liver), liver failure and sometimes, liver cancer. Between 60 and 70% of chronic hepatitis cases are caused by HCV. Hepatitis A and E viruses do not cause chronic hepatitis.

Vaccinations for hepatitis virus A and B exist. Health-care providers who work around needles may be required to receive a vaccination due to the possibility of an accidental needle stick following the use of a needle in an infected person. In acute cases of hepatitis, absolute bed rest is necessary.

Jaundice is a physical sign of liver dysfunction. It manifests as a yellowish discoloration of the skin and sclera (the white portion of the eyes). Jaundice occurs in conjunction with many liver diseases. Old or damaged red blood cells are removed from circulation by the

spleen. Hemoglobin is broken down into a dark greenish yellow pigment called bilirubin. Bilirubin is then carried by the bloodstream to the liver and is excreted into the intestine as a component of bile. If bilirubin cannot be excreted in bile quickly enough, it builds up in the blood. Excess bilirubin is deposited in the skin resulting in the yellowish discoloration called jaundice. Aside from liver disease, jaundice is often present in newborns as a result of overproduction of bilirubin.

Cirrhosis is irreversible replacement of a large amount of normal liver tissue with non-functioning scar tissue. It develops in response to chronic liver inflammation. Regeneration of new liver cells is not possible. Alcoholism and hepatitis are the most common causes. Symptoms include poor appetite, weight loss, feeling weak, sick and tired.

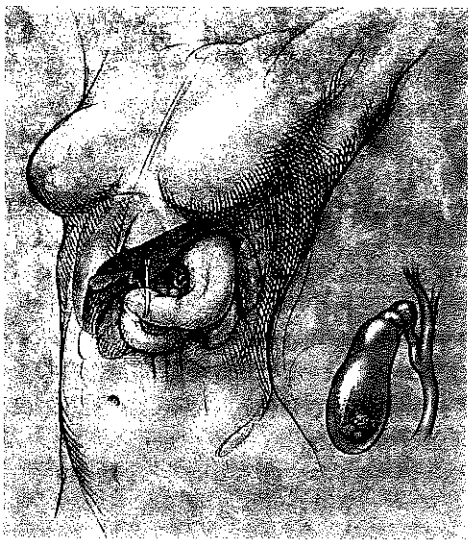
In the United States, the most common cause of cirrhosis is alcoholism. Over a period of years, drinking as little as 2/3 ounce of pure alcohol (a large glass of wine, 13 ounces of beer or 2 ounces of whiskey) a day for women or 2 ounces (four glasses of wine, three beers or 6 ounces of whiskey) a day for men can damage the liver. If these volumes of daily alcohol intake appear familiar to you, you need to stop drinking.

Cirrhosis is the third most common cause of death after heart disorders and cancer among people between the ages of 45 and 65. Scar tissue blocks blood flow through the portal vein, and it blocks the flow of bile out of the liver into the digestive tract.

Settings and application
For all liver diseases and cirrhosis, use the whole body mat once or twice daily for eight minutes using an intensity setting of 25-100 in the morning and 10 at night. The pad or probe may be used twice daily for 16 minutes at an intensity setting of 150 to the right upper abdomen. Supportive forms of therapy include acupuncture, liver detoxification and herbal remedies.

41. Gallbladder/Cholecystitis

Description
Cholesterol is manufactured in the liver, and in some cases, too much cholesterol is excreted. Gallstones are deposits of predominantly cholesterol crystals or calcium salts in the gallbladder or bile ducts. This results in inflammation of the gallbladder, referred to as cholecystitis. Gallstones are more common among women and in American Indians (Native Americans). Obesity and a diet high in animal proteins and fats increase the risk of developing gallstones. While most gallstones do not cause symptoms, they may provoke a gallbladder attack, or "biliary colic."



The pain of cholecystitis is located in the upper abdomen, usually on the right side under the ribs. The pain may radiate up the back to the right shoulder blade and be accompanied by nausea and vomiting. The muscles of the right side of the abdomen become rigid. The pain typically increases in intensity over 15 minutes, and may remain steady for up to 12 hours. Nausea and vomiting are common. Fever may also be present.

A health care provider should evaluate a symptomatic gallbladder. Other causes of severe abdominal pain accompanied by nausea and vomiting need to be ruled out.

If gallstones do not cause symptoms, no treatment is necessary. However, in the United States, surgical removal of the gallbladder is the most common treatment for symptomatic gallstones. Surgery can be performed laparoscopically or in traditional open fashion.

Prevention of gallstones may be aided by maintaining a healthy body weight, regular exercise, a diet high in fresh fruits and vegetables and low in animal protein, animal fat, butter, mayonnaise and fried foods.

Settings and application

In addition to general recommendations made above for the use of the whole body mat applicator, use the pad applicator 1-3 times daily at a setting of 100-200 over the right upper abdomen. The probe can be used just under the right rib cage at a setting of 400 for eight minutes 3-5 times per day during the course of acute episode of biliary colic (gallbladder attack).

INFECTIOUS DISEASES

At a 2008 medical conference I had the privilege of viewing a video from the Karolinska Institute, that body of scientists that confers the Nobel Prize. Picture this in your minds eye: the video showed a neutrophil "chasing" a bacterium. Through a combination of chemotaxis and vibrational sensibility, the neutrophil identified the enemy and chased it. The bacterium, perceiving the threat somehow, tried to escape. When the bacterium turned right to elude its pursuer, the neutrophil turned right and closed in for the kill. This was an amazing process to watch! In the words of Dr. Bruce Lipton, our cells are truly "sentient beings." The neutrophil overtook the bacterium, and once fully engulfed (through a process called phagocytosis), the neutrophil released enzymes in what appeared to be an internal explosion. The barrage of enzymes destroyed the bacterium completely.

Dr. James Oschman, who presented the Karolinska Institute's neutrophil video footage at this 2008 medical conference, made his point very clear. This entire vignette of internal warfare – the immune system in action and the chasing down of invading infectious organisms – was intended to display the amount of energy expended by our immune cells. The entire "chase," start to finish, requires ATP as fuel. The corollary truth is that anything that can stimulate the production of more ATP within the body will, therefore, most assuredly strengthen the immune system, among a host of other benefits.

Happily, pulsed magnetic field therapy has been shown to increase the production of ATP within the mitochondria by signaling the cells and their organelles directly and in an all-encompassing fashion. The body, so energized, is able to ward off infection with a bolstered and revitalized immune system.

Author's Important Note: It is not the intention of magnetic resonance stimulation and pulsed magnetic fields as supplied by the MRS 2000 to diagnose, cure, prevent or treat any infectious disease – or any other disease for that matter. However, Dr. Oschman's comments about the energy needs of our immune cells makes it clear that magnetic resonance stimulation at appropriate frequencies and intensities can strengthen the function of the cells of our bodies through the increased production of ATP. The MRS 2000 is a wellness device designed to enhance the vigor, energy and health of every cell in the body, thereby making disease, infection, pain and inflammation less likely to occur – and when they do occur, are more rapidly resolved.

Incidentally, neutrophils are the most abundant of the white blood cells (WBCs) that comprise the immune system. They squeeze through the capillary walls and into infected tissue where they engulf the invaders (e.g., bacteria) by phagocytosis. Neutrophils have a never-ending task, even in healthy people. The throat, nasal passages, and colon harbor vast numbers of bacteria. Most of these are commensals, and do us no harm. But that is because neutrophils keep them in check. Heavy doses of radiation, chemotherapy and other forms of stress can deplete the number of neutrophils so that formerly harmless bacteria begin to proliferate. A resulting opportunistic infection can be life-threatening.

General Guidelines for Use of the MRS 2000 in Infectious Illness

As noted elsewhere in this text, the MRS 2000 is not intended to diagnose, treat, cure or prevent any disease or illness. It is a wellness device used to support optimal function of the cells in the same way nutritional supplements do. The following is a general guideline for the use of the MRS 2000 in infectious illness:

Attention: If you have a fever over 100° F, do not use the MRS 2000. Fever is a relative contraindication. Improved blood flow occurs with exposure to pulsed magnetic fields. In the case of bacterial infection, increased blood flow may raise the body temperature.

For chronic, low-grade infections involving a low fever or no fever, use the whole body mat applicator at an intensity setting of "Sensitive" to 10 for 8-24 minutes 1-3 times daily. A setting of 25- 50 may be used during the morning application.

Some cutaneous infections are discussed in the chapter on dermatology.

Description

Influenza (the flu) is a viral infection of the upper respiratory system. Up to 36,000 Americans die each year of complications of the flu, and more than 200,000 are hospitalized, according to the Centers for Disease Control and Prevention.

Symptoms of the flu include fever over 101° F in adults and over 103-105° in children accompanied by chills, sweats, headache, dry cough, muscular aches and pains, congestion, loss of appetite (anorexia), fatigue and weakness, and in children, diarrhea and vomiting.

The influenza virus is an airborne virus that travels on droplets when someone with an infection coughs, sneezes or talks. The virus can live on computer keyboards, telephones, and on kitchen counters, where it can be transferred to hands, then to eyes, nose or mouth. The risk of contracting the flu is greater in the elderly, those with a weakened immune system, in pregnant women, and in those who are in regular, close contact with infants or young children.

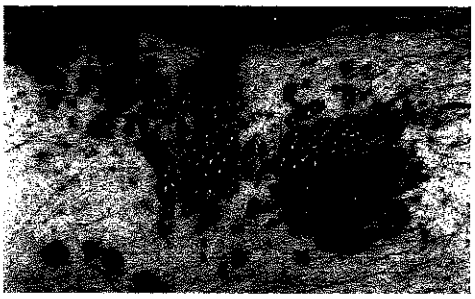
Treatments include bed rest, intake of lots of fluids, and symptomatic management. Over-the-counter drugs, such as Tamiflu®, have been found to increase the risk of self-injury and confusion in children, so those taking such preparations and should be closely monitored. When possible, try to manage symptoms without drugs, get plenty of rest, and try chicken soup. Reye's syndrome, caused by using aspirin in children or teens, is a rare but fatal complication, so aspirin should be avoided.

Common sense healthy habits will help prevent infection with the influenza virus. A healthy diet, plenty of sleep, and regular exercise can strengthen the immune system. Limit air travel from November to January. Avoid crowds, and wash your hands frequently. Use the MRS 2000 every day, even if you need to take it with you on trips using the travel bag.

Settings and application

For prevention and strengthening the immune system against influenza, use the whole body mat applicator one to three times daily. A morning application should use an intensity setting of 25-50, or higher if desired. An intensity setting of 10 should be used before bed. Applications can vary in time from 8-24 minutes.

Do not use the MRS 2000 if you have a fever over 100° F. Once the fever has subsided, use the guidelines listed at the beginning of this chapter. Remember to drink plenty of fluids, get plenty of rest, and eat a healthy diet devoid of refined sugar, high fatty foods, and dairy.



Description

Shingles (herpes zoster) is an infection that results from reactivation of the varicella-zoster virus, the organism that causes chickenpox. Shingles causes painful blisters to form, and occasionally results in chronic pain in the affected area. During a chickenpox infection, the virus spreads in the bloodstream and becomes dormant in the dorsal root ganglia; special collections of nerves near the spinal cord. Under periods of stress later in life, the virus reactivates, and travels down affected nerve fibers to the skin, where it creates painful, virus-filled blisters in a well-circumscribed area. The fluid in these blisters can cause chickenpox. Within about five days, the blisters dry and form a scab. Because nerves are affected, this condition is locally very sensitive and painful. Most scabs resolve in about two weeks, unless the immune system is significantly compromised.

Shingles is most common after the age of 50. Reactivation of the viruses sometimes occurs in conjunction with compromise to the immune system, such as in HIV, cancer, or with the use of immunosuppressant drugs.

Once shingles occurs, a second bout is rare. In the elderly, persistent pain following shingles is called "postherpetic neuralgia."

Medical treatment consists of high doses of antiviral drugs to reduce the duration and severity of symptoms, steroidal anti-inflammatory drugs to reduce inflammation and lower the risk of postherpetic neuralgia, and narcotic pain relievers in severe cases. Topical, cutaneous skin patches that contain capsaicin or lidocaine may be soothing.

Complementary medicine includes the use of pulsed magnetic fields, acupuncture, and other techniques to promote relaxation. Stress avoidance and the use of over-the-counter anti-itch creams or calamine lotion and nonprescription hydrocortisone cream are of symptomatic benefit.

Settings and application

For supportive care of herpes zoster, shingles and postherpetic neuralgia, see the guidelines listed at the beginning of this chapter. High dose vitamin B12 injections provide excellent support, and magnetic resonance stimulation may improve cellular uptake and utilization of this nutrient in cases of herpes zoster, shingles and postherpetic neuralgia.

[illegible] Herpes simplex / Genital herpes

Description

Herpes simplex viruses (HSV-1 and HSV-2) cause recurrent infections affecting the skin, mouth, lips, eyes and genitals. HSV-1 usually causes clusters of vesicles around the mouth called cold sores. It is important to note that these are external lesions that are located on or around the lips, and are not to be confused with canker sores, which are located inside the oral cavity. Cold sores are contagious. Canker sores are ulcerations inside the mouth, and they are not contagious. HSV-2 is the viral organism that usually causes genital lesions.

Transmission of HSV occurs from close contact with an individual who is infected with the virus. After the initial infection, HSV remains dormant in the nervous system from which it can periodically emerge, causing recurrent symptoms. Recurrences are brought about by physical or emotional stress, a suppressed immune system, febrile illnesses, or over exposure to sunlight.

HSV lesions may appear anywhere on skin or mucosa, but are most frequently found around the mouth or lips, conjunctiva, cornea, and the genitals. Initial symptoms include tingling discomfort or itching, after which clusters of small, tense blisters appear on a pink or red base. These blisters persist for a few days, then dry, forming a thin, yellowish crust. Complete healing takes 7-12 days, and does not require treatment. In immuno-suppressed individuals, such as those with HIV or cancer, the lesions may last for weeks or longer.

Prevention of cold sores is aided by observing the following guidelines: (1) Avoid kissing and other skin contact with people while blisters are present; (2) Avoid sharing eating utensils, towels, lip balm or other items that can spread the virus when blisters are present; (3) Keep your hands clean; (4) When you have an active lesion, avoid spreading the virus to other parts of your body by hand contact; (5) Manage stress, limit sun exposure, and use sunblock.

Cold sores and herpes lesions are painful. Over-the-counter ointments, such as topical lidocaine or benzyl alcohol (Zilactin®), can bring relief. Homeopathic ointments are also available. Over-the-counter pain relievers can help ease the discomfort, but remember not to give aspirin to children, as this may trigger a rare, but potentially fatal disorder known as

Reye's syndrome. Use cold or heat to ease the pain. Avoid squeezing, pinching or picking at a blister.

The importance of the immune system in preventing recurrences of cold sores/HSV cannot be overemphasized. The value of the MRS 2000 in supporting the immune system in this, and all other, infectious diseases may be significant.

Settings and application
Follow the general guidelines given at the beginning of this chapter for the use of the MRS 2000 with infectious illness. Earlier applications in the day may be most effective. Before 8:00 pm, and in the absence of fever, use the probe or pad applicator for eight minutes 3-5 times daily at an intensity setting of 200-400 directly to the symptomatic areas. Cover the pad or probe with a fresh towel so that the applicator does not accidentally come in direct contact with any lesions.

Stress reduction may be enhanced with the MRS 2000 system using the SLRS (sound/light relax system). This may also help prevent recurrences. High doses of vitamin C, antioxidants, Echinacea, and St. John's Wort may boost the immune system and lower stress. A very small number of MRS users may note a short-term increase in blistering. The anti-inflammatory benefits of the MRS 2000 are most noticeable in the itching stage of a herpes simplex episode.

A common childhood vaccination, known as MMR, inoculates against measles, mumps and rubella in combination. It is usually given between 12 and 15 months of age, and then again between four and six years of age, prior to entering school. While 5% of inoculations result in a mild rash, fewer than one in 1 million doses of MMR cause a serious allergic reaction. Nursing newborns are protected for the first 6 months from viral infection by immune proteins (immunoglobulins) that are passed to them in breast milk.

Comments on vaccinations and autism
Vaccination in the United States is in controversy. Some believe that autism can result from early childhood vaccination (specifically MMR, discussed below), and if this is true, this is a grievous situation. Extensive reports by the American Academy of Pediatrics, the Institute of Medicine and the Centers for Disease Control (CDC) claim that there is conclusive data to show that there is no relationship between vaccination and autism. Both promoters and detractors of childhood vaccination note that the detectable signs of autism occur between the ages of 18 months and 30 months, which is coincident with the time that many children are given their first MMR vaccine. It is beyond the scope of this textbook to enter this debate or examine this question in detail. Knowledge is progressive, and currently our knowledge is partial, or there would not be disagreement. One day we will have more knowledge, and perhaps a full understanding of autism.

I will relate one personal story with regard to the use of drugs to prevent infectious illness. In the mid-1980's, as was routine in the United States, vaginally born babies used to have silver

nitrate drops placed in their eyes to prevent blindness in the event the mother has a known history of, or tests positive to, venereal disease (specifically, gonorrhea). This practice is no longer in force – erythromycin ointment is used instead to protect against a broad spectrum of normally occurring bacteria. Our first daughter had silver nitrate drops placed in her eyes and she immediately developed severe chemical conjunctivitis. Her poor little eyelids bulged from the inflammation and irritation brought about by the silver nitrate. Early baby pictures were not pretty – she looked like Yoda. I was outraged. My wife did not, does not, and has never had gonorrhea or any other venereal disease. Inexpensive lab tests could have been performed to prove this prior to labor and delivery, eliminating the need to use silver nitrate drops with our daughter! Instead, the drops were used, and subsequent treatment was then required for the doctor-induced, drug-produced inflammation of the eyes of our newborn child! Where is the logic in this? My point: if you have a child who has autism and there is even a remote chance that there is some relationship to MMR vaccination, you may be right. While I can't possibly know what this feels like, I have a slight inkling about the doctor-produced/drug-induced, cause-effect feelings that surround this issue due to my training, my education and my clinical experience. Science and knowledge are progressive and further study, research, vigilance and political action are needed.

For our current purposes, and with all due respect to the reader and to institutional western medicine with which the reader and author may disagree, I am referencing western medical authorities (e.g., the CDC and the Mayo Clinic) in the United States. In citing this information I am neither advocating nor discouraging the use of vaccinations, but rather presenting reference material that can be researched in greater detail by individual readers and their families. I encourage you to speak with your doctor or licensed healthcare provider at length about the risks and benefits of vaccinations. The record of history seems clear: certain vaccinations have saved many lives. In the process of carrying out these good intentions, vaccinations have caused some harm (e.g., severe allergic reactions have been proven to occur.)

I conclude this discussion with a reminder of the goal of this book: to educate the reader about the power of magnetic resonance to optimize health. I am encouraging you to live a lifestyle of wellness and empowered self-care using supportive measures that encourage a strong immune system, a robust cellular metabolism, and maximum oxygenation of all your body's tissues. By incorporating sound, time-tested wellness principles (e.g., excellent nutritional habits, regular exercise, proper sleep, and proactive stress management) with the new discoveries of energy medicine, the goal of this book can be achieved. Used properly and within appropriate biological windows magnetic resonance stimulation will support and optimize the body's defenses, promoting healthy function of every cell in the body.

Description

Mononucleosis. Mononucleosis is a mild to moderate infectious disease transmitted through saliva, or by coughing or sneezing. The virus has a 4-8 week incubation period; in young children it may be shorter and the course of the disease less symptomatic. The Epstein-Barr virus causes mononucleosis. Symptoms include fever and night sweats, swollen lymph nodes in the neck and armpits, loss of appetite, headache, sore throat, weakness and fatigue, and an enlarged spleen. The disease often runs its course within 2-4 weeks, though

enlargement of lymph nodes and spleen may be noticed for a few weeks longer. In some cases, the course of the illness may produce fatigue that can last for months. When the spleen is enlarged, it is at increased risk of rupture with blunt trauma. Therefore, children and adolescents with mononucleosis are required to abstain from contact sports due to the increased risk of splenic rupture, which is a medical emergency.

Treatment consists of a healthy diet, gargling with salt water (1/2 teaspoon salt to 8 ounces of warm water) and plenty of rest and fluids. There is no vaccination to prevent infection by the Epstein-Barr virus. A healthy immune system is the best prevention. Infected individuals should avoid the spread of the virus to others by avoiding the exchange of saliva and the sharing of eating utensils, drinking cups, dishes and food.

Potential complications of mononucleosis include hepatitis, jaundice, anemia, thrombocytopenia, inflammation of the heart, and swollen tonsils leading to obstructed breathing. The Epstein-Barr virus can lead to more serious illness in people with impaired immune systems, such as those with HIV, cancer or organ transplant recipients.

Measles. Measles is a highly infectious upper respiratory infection characterized by cough, runny nose, inflamed eyes (conjunctivitis), sore throat, high fever and a red, blotchy skin rash. Worldwide, there are approximately 30- 40 million cases of measles per year resulting in nearly one million deaths. In the United States, there are reports of increasing numbers of measles cases each year, in spite of the presence of a highly effective measles vaccine. Prior to the introduction of the vaccine in the United States, there were nearly a half-million measles cases and 450 measles-related deaths in the United States each year. Since the vaccine has been used in the United States, measles cases have been reduced by more than 99%. According to the CDC, measles outbreaks are more likely to occur in communities with a high number of unvaccinated individuals.

Also known as rubeola, measles symptoms begin 10-12 days after exposure to the virus. There may be sensitivity to light, as well as tiny white spots with bluish-white centers found on the inner lining of the cheek, called Koplik's spots. The fever may spike to as high as 104-105° F. The skin rash spreads rapidly down the chest and back, and then to thighs and feet. The rash fades after about 1 week. Those infected with the measles virus are contagious from about four days before to four days after the rash appears. As a result, isolation is required. It may be necessary to remove non-immunized siblings from the infected person's house during this time.

Measles should be treated symptomatically with plenty of water, the use of a humidifier to relieve cough or sore throat, and wearing sunglasses to rest the eyes. During this particular

illness, avoid watching TV as this may tax the eyes. During the active phase of this infection, isolation from non-immunized, non-infected individuals is important. The use of the MRS 2000 may be beneficial for immune support, but only after the spike in fever has subsided. (See Guidelines at the beginning of this chapter.)

Important note: In cases of measles the use of the SLRS system is contraindicated! While there are no studies proving adverse or harmful side effects, SLRS sessions should be postponed until all signs of active infection are cleared.

Mumps. Infection with the mumps virus primarily affects the salivary glands on the sides of the face below the ear called parotid glands. Mumps infection can cause swelling in one or both of these glands. The number of mumps cases in the United States dropped dramatically after the introduction of the vaccine in the 1960s.

Mumps symptoms begin approximately 2-3 weeks after exposure to the virus, and include swollen, painful parotid glands, pain with chewy or swallowing, fever, weakness and fatigue. The virus is spread through the saliva when an infected person sneezes, coughs, or shares eating utensils or drinking cups. Mumps is diagnosed through the use of a virus culture, or a blood test to detect mumps antibodies. Serious complications are rare, but can include encephalitis, meningitis, miscarriage, pancreatitis, inflammation of the ovaries, or inflammation of the testicles. If you suspect that you have mumps, see your doctor. In uncomplicated cases, no treatment is required, and the illness is simply allowed to run its course, which takes about two weeks.

Rubella. Rubella is another highly contagious viral infection similar to the measles. In fact, it is sometimes referred to as the German measles or three-day measles. Women who are pregnant and infected with the Rubella virus in their first trimester run the risk of losing their baby or having the baby be born with serious birth defects.

Signs and symptoms of rubella occur two to three weeks after exposure to the virus. Symptoms include moderate fever to 102°F, headache, runny nose, conjunctivitis, enlarged lymph nodes at the base of the skull, in the back of the neck and behind the ears, and a fine pink rash that runs from the face to the trunk, then to the arms and legs before disappearing. Young women infected with the virus will experience aching of the joints.

Rubella has been effectively eliminated in the United States, according to the CDC, as a result of childhood vaccination. However, cases of rubella still occur in North America in unvaccinated, foreign-born adults. The disease is still common in many parts of the world. The greatest concern for North American women is traveling abroad and contracting the illness in the first trimester of pregnancy. The CDC recommends rubella vaccination prior to traveling abroad.

Roseola. Roseola is an extremely common infection of childhood caused by 2 common strains of the herpes virus called roseola. The condition manifests as the presence of fever for several days followed by a rash. The condition is not serious and requires bed rest, plenty of water, sponge baths during fever, and monitoring the fever. The illness runs its course uneventfully. In rare cases, a very high fever can develop and should be recognized so that medical attention can be sought as necessary.

Chickenpox. Chickenpox is a highly contagious infectious disease caused by the varicella-zoster virus. It is transmitted via airborne droplets from sneezing or coughing or by direct contact with saliva. It is characterized by a red rash with itching lesions spread over the face, scalp, chest, back, and even affecting the throat, eyes, and external genitalia.

Superficial spots typical of the rash usually manifest less than two weeks after exposure to the virus. These spots turn into small blisters that break open and crust over. The rash is accompanied by fever, mild headache, cough, runny nose, and abdominal discomfort with or without loss of appetite. Infected children can transmit the virus up to 48 hours prior to the appearance of rash, and they remain contagious until the lesions crust over.

Those who have been infected with the varicella-zoster virus may develop herpes zoster infections later in life. (See Herpes Zoster/Shingles/Postherpetic neuralgia above.) A vaccine for chickenpox (Varivax) became available in 1995. Prior to this time, childhood chickenpox was almost a rite of passage, ensuring about 1 week of missed school. Nearly 90% of those who are immunized against the virus are completely protected. This means that shingles and postherpetic neuralgia can be avoided later in life. While it is (rarely) possible to get chickenpox more than once, if you've had chickenpox, you don't need the vaccine. Pregnant women and those who are immunocompromised, and those allergic to gelatin and neomycin should not receive the vaccine.

Because my three daughters were otherwise robustly healthy, they each rather enjoyed (dare I say this?) their "week off from school" with chickenpox. (We know other families who aren't so lucky.) The course of this illness is usually mild in healthy individuals. In our home, we practiced careful attention to the fever, encouragement to avoid scratching, cool oatmeal baths, calamine lotion to the skin lesions, chicken soup, and tender loving care. Had it been available we would still opt not to have the vaccination. Each family must determine what seems best for them. There is no singular "right answer," and, in some cases, there are other risk factors to consider. Talk to your doctor.

Settings and application

For prevention and strengthening the immune system against common infectious illnesses of childhood and youth, use the whole body mat applicator once or twice daily. A morning application should use an intensity setting of 10-50. Children under the age of 8 should not exceed intensities of 25 or session durations above 8 minutes. In all children, regardless of age, an intensity setting not to exceed 10 should be used before bed. Applications in children over 8 can vary in time from 8-16 minutes.

Please refer to "Using The MRS 2000 in Children – General Instructions" listed earlier in this book.

Caution: Do not use the MRS 2000 if there is a fever over 100° F. Remember to drink plenty of fluids, get plenty of rest, and eat a healthy diet avoiding refined sugar, high fatty foods, and dairy.

IMMUNE DISORDERS

The immune system is designed to protect against threats from injury, infectious disease, and stress. The immune response is rapid; areas of inflammation are walled off quickly, limiting the threat to survival and long-term health. The immune system, comprised of the white blood cells (WBCs) and lymphocytes, works in cooperation with the hormone system and neurological system to prioritize threats to which it responds.

The skin and mucous membranes are the first line of defense against infectious attack. WBCs, including neutrophils and macrophages, are first responders to bug bites, cuts, puncture wounds, and to invasion of the mucous membranes via the body's orifices. The lymphatic system, consisting of a network of lymph nodes and lymphatic vessels, forms antibodies against disease carrying germs. These antibodies signal killer macrophages to attack disease-causing invaders, rendering them harmless. This process is narrated in detail earlier in this text, in the section on "Infectious Diseases."

Description

Allergies represent a miscommunication of the immune system. The immune system mistakenly identifies a harmless airborne or food substance as something harmful, and starts producing antibodies to the substance. A subsequent exposure to this substance causes the immune system to release chemicals such as histamines into the bloodstream. When the immune system produces antibodies to normally occurring substances within the body, the result is an "auto-immune" disease.

Environmental allergic reactions are triggered by exposure to airborne pollens, spores (e.g., from fungi or molds), dust mites, cockroaches, dander, fire ant bites, bee stings, and air pollutants. Food allergies can be triggered by eggs, shellfish, sulfites in wine, nitrites injected into meats, monosodium glutamate, chocolate, strawberries, cheese, citrus fruit, peanuts, and a variety of other foodstuffs.

Symptoms of an airborne allergy include runny nose and nasal congestion, watery or itchy eyes, sneezing, cough, itching of the nose, throat and palate, sinus pressure and facial pain, a decreased sense of smell or taste, and swollen, blue colored skin under the eyes. There is no fever associated with allergies, and symptoms persist as long as there is exposure to

the allergen involved. This differentiates allergic symptoms from the common cold, where symptoms subside within 5-7 days.

Exposure to environmental allergens can be reduced by having air ducts cleaned, using air filters, by carefully selecting household pets, and by using natural fibers in place of synthetic substances. Protective clothing, extermination services and using insect repellent can limit allergic reactions to pests. Avoid foods that trigger allergic reactions.

The most severe and dangerous allergic reaction is called anaphylaxis. Anaphylaxis occurs when the immune system severely reacts to an environmental substance, drug, or allergen. The chemicals released during anaphylaxis produce a sudden drop in blood pressure and severely narrow the bronchial tubes causing difficulty breathing, unconsciousness and, in some cases, death. Those with known environmental allergies or a history of anaphylaxis can be prepared by carrying self-injectable adrenaline (epinephrine) preparations such as the EpiPen, EpiPen Junior or Twinject with them. The proper use of these devices should be studied in advance of use, and other family members or loved ones should be trained as well. In the case of anaphylactic shock, the skin will appear pale and will feel cool and clammy. There will be a week, rapid pulse, shallow breathing, confusion and anxiety. This is a medical emergency. Call 911 or your local emergency number. Keep the person comfortable, loosen tight fitting clothing, manage any vomiting or bleeding, and stabilize the person by laying them on their back with feet elevated.

Settings and application
Use the whole body mat applicator 3-4 times per day for 16 minutes each time. Begin using an intensity setting of 10, and gradually increased to a setting of 100 for the morning, 50 for the afternoon, and use 10-25 in late afternoon to early evening.

Avoid exposure to allergic triggers as much as possible. Get plenty of rest and drink adequate amounts of water. Exercise regularly. Homeopathic remedies may be extremely beneficial. Allergy elimination technique, a form of acupuncture, has reported benefits. Use essential fatty acids, Evening Primrose Oil, flaxseed oil and borage oil together with vitamin C and an alkaline diet to boost the immunity. An alkaline diet is primarily based on the avoidance of dairy and red meats, and emphasizes alkaline foods such as fresh vegetables and some fruits and whole grains.

Description
The list of autoimmune diseases continues to grow with clinical research. Many conditions once thought to have external cause are now recognized to be autoimmune disorders.

The hallmark of an autoimmune disease is the manufacture of antibodies against the body's own tissues. The list of diseases includes Type I diabetes, Hashimoto's disease, multiple sclerosis, juvenile rheumatoid arthritis, Sjogren's syndrome, autoimmune hepatitis, polymyositis, and dermatomyositis, to name a few. While it is beyond the scope of this

text to discuss every human ailment, some of the conditions listed above are presented elsewhere in this reference text.

Magnetic field therapy has well-documented anti-inflammatory and analgesic effects that may help down-regulate the misguided autoimmune response and lessen the severity of symptoms in autoimmune diseases.

Settings and application
Use the whole body mat applicator 3-4 times per day for 16 minutes each time. Begin using an intensity setting of 10, and gradually increase to a setting of 100 for the morning, 50 for the afternoon, and use 10 in late afternoon to early evening as tolerated. More chronic conditions should continue supportive applications of the MRS 2000 at lower intensity settings.

[illegible]

Description
Candida albicans is normally present on the skin, in the intestinal tract, and in the genital region of women. Those with a weakened immune system can develop an infection called candidiasis. This infection spreads to the bloodstream. In the mouth, candidiasis is called thrush, or trench mouth. Creamy white, painful patches form inside the mouth. Skin infections produce a burning rash. Inflammations affecting the esophagus produce painful swallowing. The condition can even affect the heart valves and enlarged spleen, or infect the retina, producing blindness.

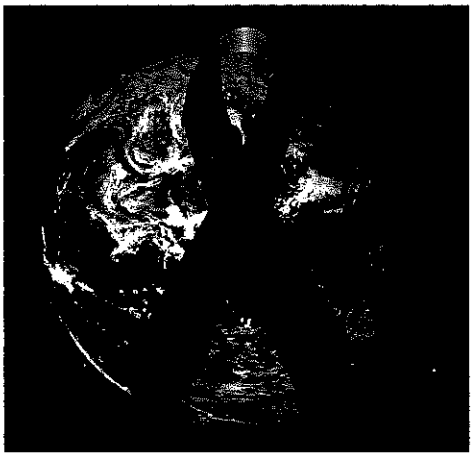
Most commonly, candida infections affect the mouth or vagina. Oral Candida infections manifest as white specks on the inside of the cheeks, or elsewhere in the oral mucosa. Vaginal infections produce itching, burning, pain and a watery, white or cottage cheese-like vaginal discharge that is irritating to the surrounding skin. Treatment should be aggressive to prevent spread to the internal organs. In principle, there is no harmless yeast infection.

The normal immune response is suppressed by the ingestion of refined sugar for 8-12 hours. In some individuals, excessive refined sugar in the diet can lead to a lastingly weakened immune system. Strict avoidance of sugar and yeast products (such as breads) can strengthen the immune system and greatly reduce susceptibility to recurrent candida infections.

Settings and application
To strengthen the immune system, use the whole body mat applicator 2-3 times per day for eight minutes each time. Use an intensity setting of 50 in the morning, 25 at noon and 10 at night.

Avoid refined sugar of any kind, and all bread products for, at least, 30-60 days. Support the immune system with complementary interventions, including acupuncture, traditional Chinese medicine, naturopathic and/or homeopathic medicines, and chiropractic care. Research has proven that chiropractic manipulation increases the respiratory burst of

polymorphonuclear leukocytes in immediate response to treatment. That is, chiropractic manipulation lifts the immune response. People who have weakened immune systems benefit significantly through the combination of chiropractic care and magnetic field therapy.



Description

HIV is a chronic, life-threatening condition caused by human immunodeficiency virus (HIV). HIV increases susceptibility to certain types of infections and cancers that the body normally resists, such as pneumonia and meningitis. HIV viruses progressively destroy white blood cells called lymphocytes. These cells are important to the body's immune defenses, and once destroyed, the body is more susceptible to attack by other infectious organisms.

Acquired immunodeficiency syndrome (AIDS) is the most severe manifestation of HIV infection. HIV infection and AIDS have reached epidemic proportions with nearly 1 half-million deaths reported in the United States through December of 2000. 36 million people worldwide are infected with HIV. Currently, an estimated 800,000 people in the United States are infected with HIV, with 40,000 new infections occurring each year. The most common route of HIV transmission is through sexual contact. Direct contact with an infected person's blood can also transmit the virus.

Persons infected with the HIV virus are encouraged to get immunizations, stop smoking, avoid the use of illicit drugs, eat a diet rich in clean fresh fruits and vegetables, whole grains and lean protein, avoid foods that increase risk of infections, such as unpasteurized dairy, raw eggs, raw seafood and sushi, drink pure water, get regular exercise, get plenty of sleep, find ways to relax, wash hands regularly with soap and water, and make sure their doctor truly understands how to treat HIV.

Settings and application

Use the whole body mat applicator 3-4 times per day for 16 minutes each time. Begin using an intensity setting of 10, and gradually increased to a setting of 100 for the morning, 50 for the afternoon, and use 10 in late afternoon to early evening as tolerated. More chronic conditions should continue supportive applications of the MRS 2000 at lower intensity settings.

UROLOGY

The urinary tract is primarily designed to filter waste products from the blood and concentrate them in the urine, maintain electrolyte balance, and to help maintain proper blood pH (acid-base balance) in concert with the respiratory system.

The body normally produces about 1.5 L of urine for 24 hours. The urine is the primary means of eliminating waste products containing nitrogen from the metabolism of amino acids in protein (through urea). Normal blood pH is maintained by regulating the excretion of bound acids (uric acid) and ammonium ions.

The urinary tract is susceptible to infection, inflammation, mechanical stricture, and poor regulation by the hormonal and neurological systems. A few of the more common pathologies affecting the urinary system are presented in this chapter.

General Guidelines for Use of the MRS 2000 for Urinary Tract Disorders
For prevention and strengthening the immune system in disorders of the urinary tract, use the whole body mat applicator one to three times daily. A morning application should use an intensity setting of 25-50, or higher if desired. An intensity setting of 10 should be used before bed. Applications can vary in time from 8-24 minutes.

Do not use the MRS 2000 if you have a fever over 100° F. Once the fever has subsided, use the guidelines listed at the beginning of this chapter. Remember to drink plenty of fluids, get plenty of rest, and eat a healthy diet devoid of refined sugar, high fatty foods, and dairy.

Description
Urethritis is an inflammation of the urethra, the tubular channel of smooth muscle through which urine is emptied from the bladder. Normally, bacteria reach the urethra from the anus. Due to the proximity of the anus and urethra in females, urethritis is much more common in women. During toilet training, female children should be taught the most hygienic way to use toilet paper is to avoid bringing fecal matter forward.

Urethritis produces pain or burning with urination. In some cases, urethritis produces no symptoms. When the infectious organism is from a sexually transmitted diseases, such as gonorrhea or chlamydia (which affects both men and women,) a yellowish-green discharge is present.

With a bladder infection (cystitis), there will be burning and pain with urination, and in addition, a persistent, strong urge to urinate, lower abdominal discomfort, a low-grade fever, and pelvic pressure. There may be blood in the urine (hematuria).

Infections that progress upward through the ureters to the kidneys can cause acute pyelonephritis. This produces a high fever with shaking, chills, nausea and vomiting, and pain in the upper portion of the lower back (flank pain).

Treatment of UTIs depends on the location of the primary infection and the infectious organism involved. Antibiotic treatment is usually required, and the symptoms clear up within a few days of beginning treatment. When treated properly, UTIs rarely lead to complications. However, pyelonephritis can become chronic, leading to permanent damage of the kidneys. Young children and the elderly are particularly susceptible to kidney damage. Women who have had three or more UTIs are likely to have more recurrences so a greater focus on the health of the immune system is warranted in these individuals.

Settings and application
See the general guidelines listed at the beginning of this chapter. In addition, use the pad applicator at a setting of 100-200 over the pubic area for acute infections where fever is at or below 100°F. For chronic kidney infections, lie on the pad applicator with it placed under the kidneys with the knees bend, feet flat on the resting surface. Alternatively, lie on your stomach with the pad placed over the kidneys.

Forms of supportive therapy include acupuncture, homeopathy or naturopathic remedies, herbal remedies, and the intake of copious amounts of water. No initial reactions to magnetic field therapy should be expected.

Refer to discussions elsewhere in this textbook regarding increased ATP production and the supportive effect this has on the function of immune cells.

Description
Urinary incontinence is the loss of bladder control. While that affects millions of people, this is not a normal part of aging or post-menopause, and is not the inevitable consequence of childbirth. It may be a self-limiting disorder or the manifestation of a more serious condition.

Causes of urinary incontinence include the overuse of alcohol, over hydration, dehydration, too much caffeine, bladder irritation from citrus drinks, carbonated drinks, tea or coffee, and as the side effect of some medications. Incontinence may also occur in conjunction with a urinary tract infection, pregnancy, constipation, or decreased bladder capacity due to aging. With the loss of estrogen following menopause, the lining of the bladder can weaken, making the bladder more irritable and increasing the signals that create the urge to urinate. An enlarged or inflamed prostate, bladder disease, and neurological disorders such as multiple sclerosis, Parkinson's disease and stroke may also give rise to urinary incontinence.

The value of pulsed magnetic field therapy in urinary incontinence is one of enhanced autonomic, neuroregulatory control. An overactive or irritable bladder may be quelled by the rejuvenation or regeneration of cells that line the bladder under the influence of magnetic resonance stimulation.

Settings and application
Follow the general guidelines set forth at the beginning of this chapter. In addition, use the pad applicator twice daily for 16 minutes at a setting of 50-200 over the pubic area and sacrum for 8-16 minutes 2-3 times per day. When the prostate gland is involved, use the probe externally (and remain fully clothed) at a setting of 200-400 for eight minutes one to three times daily.

Other measures that might be helpful include the use of Kegel exercises, bladder training, scheduled toilet trips, and fluid and diet management. Obesity can complicate urinary incontinence, and losing weight may help eliminate the problem. Medications are prescribed in the presence of urinary tract infection or to lower the fluid content in the body. Electrical stimulation and urethral inserts can be used. As a last resort, surgery may be performed.

Supportive therapies include acupuncture, homeopathy or naturopathy, and herbal therapies. Ironically, increasing fluid intake may help significantly.

Description
Kidney stones (nephrolithiasis) result when the minerals in urine are overly concentrated and crystallized. Most kidney stones are comprised of calcium.

Passing a kidney stone is excruciatingly painful. Pain will start in the back, radiating to the lower abdomen and growing. No permanent damage is produced, but patients undergoing this painful condition do not want to repeat the episode!

A number of factors contribute to and increase the risk of forming kidney stones, including dehydration, lack of exercise, obesity, hypertension, high doses of vitamin D, intestinal bypass surgery, urinary tract infection, inflammatory bowel disease, a high protein diet, or hereditary disorders, such as cystinuria, where the kidneys excrete excessive amino acid. Overactive parathyroid glands can produce recurrent kidney stones.

Treatment will vary, depending on the cause. Noninvasive techniques include extracorporeal shock wave lithotripsy in which the patient is submerged in a tank of water and shock waves are used to obliterate the stones. Surgical procedures include percutaneous nephrolithotomy, ureteroscopic stone removal and, when indicated, parathyroid surgery.

Settings and application
Follow the general guidelines set forth at the beginning of this chapter. Use the pad applicator at an intensity setting of 100-200 for 60 minutes twice daily over the kidneys. Supportive therapies include acupuncture, traditional Chinese medicine, homeopathy and/or naturopathy, and the intake of copious amounts of fluid.

Description
Prior to the invention of Viagra, there was no such thing as "male erectile dysfunction (ED)." While it is true that impotence, decreased libido and curbed male sexual performance predated the discovery of Viagra, emergence of a new condition, ED, to complement the development of a new drug is marketing genius to say the least! Unfortunately, the side effects of Viagra and other similar preparations make it useless for many men.

A key ingredient in Viagra is nitric oxide. The drug was developed based on Nobel prize-winning research that showed that nitric oxide is present within the endothelial lining of blood vessels. When nitric oxide is released, the smooth muscle lining the blood vessels relax, the vessel dilates (expanding in circumference), and blood flow is increased.

One powerful aspect of exposure to pulsed magnetic fields is that they promote the release of nitric oxide from the endothelial lining of blood vessels. However, these fields do so without the side effects of taking a pill.

As a spine and sports medicine expert practicing in Denver, I come in contact with a large number of patients who are introduced to the MRS 2000 for supportive wellness concurrent to a complaint of pain or injury. Rarely do I hear complaints regarding impotence, erectile dysfunction or anorgasmia. Nevertheless, more than a handful of patients have returned to the clinic after using the MRS 2000 for pain, arthritis and fatigue (even as infrequently as three times per week) to voluntarily, and in unsolicited fashion, report a significant boost in sexual performance, or complete resolution of one or more of the aforementioned symptoms. I attribute these reports to an enhancement of nitric oxide metabolism, circulation and autonomic nervous function. Men volunteer that they have experienced firmer erections, increased sexual stamina, and complete resolution of impotence, in some cases. Natural, physiologic morning erections that are common in adolescence, but have faded with middle age have reportedly returned. The depression that accompanies reduced sexual dysfunction evaporates as performance is restored.

Nitric oxide metabolism is as important to the female sexual response as to the male. One notable case involved the report of a female who had been anorgasmic for eight years. This condition was remedied within six weeks of initiating whole body mat sessions using the MRS 2000.

Impotence, the loss of libido, and other sexual dysfunction may have a serious underlying cause and may require a consultation with a competent healthcare specialist. Decreased testosterone production in males may be traceable to changes in pituitary function. Some patients suffer with depression or other mood disorders. Certain medications, such as Neurontin, can suppress sexual response as well. If you are taking medications and have decreased libido or sexual performance, become familiar with the side effects of your medications.

Settings and application
For enhanced nitric oxide metabolism and its potential enhancement of human sexual response,

use the whole body mat applicator twice daily for 16 minutes at an intensity setting of 25 in the morning and 10 at night.

Supportive therapies include acupuncture and Chinese Herbal medicine. Be patient. Results may require weeks or months to fully manifest. There are no initial reactions. Underlying health disorders that affect libido and sexual response, such as diabetes, depression, and diminished testosterone production must be ruled out and treated accordingly.

Benign Prostatic Hypertrophy (Prostatic Enlargement)

Description

Prostate enlargement, known as benign prostatic hypertrophy or "hyperplasia" (BPH), becomes increasingly common as men age, especially after the age of 50. Probably in response to hormonal changes, the cells within the prostate gland reproduce more rapidly, resulting in enlargement of the gland. In some cases, this enlargement will impinge upon the urethra as it passes through the prostate gland, partially blocking the flow of urine. Urine may stagnate in the bladder, increasing susceptibility to kidney stones and urinary tract infections. More serious obstructions can give rise to kidney damage.

Symptoms of BPH include difficulty starting or stopping the flow of urine, a weak urine stream, the frequent need to urinate, dribbling at the end of urination, the need to strain while urinating, the inability to completely empty the bladder, blood in the urine, and urinary tract infection. A hallmark of this disease is the increased frequency of urination at night (nocturia). There is an increased risk of BPH with aging, heredity, and national origin – BPH is more common in Whites and Blacks and Asians.

A complete menu of surgical procedures for BPH is available when the condition becomes severe enough. Self-care is largely dictated by symptoms, and includes limiting beverage intake, limiting caffeine and alcohol, limiting diuretics if they have been prescribed, limiting decongestant and anti-histamine use, keeping the legs, feet and ankles warm, staying active with regular exercise, scheduling bathroom breaks, and urinating when you feel the urge. Postponing urination can overstretch the bladder, causing damage.

Common herbal remedies are proven to help reduce the symptoms of BPH. These include Saw Palmetto, Beta Sitosterol and Pygeum. Herbal remedies are commonly used in Europe to treat BPH. Raw pumpkin seeds and zinc are commonly used and may be of significant benefit. Since I have a family history of BPH, I soak raw pumpkin seeds in filtered water for one day to activate the enzymes within the seeds, and then consume them within 24 hours, often while the seeds are still moist. Delicious!

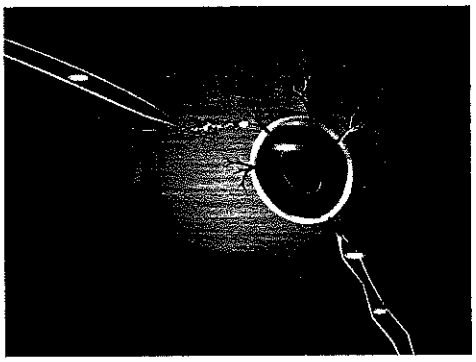
Settings and application

Use the whole body mat applicator twice daily for eight minutes at an intensity setting of 100 in the morning and 10-25 in the evening. Use the pad applicator for 60 minutes twice daily at 100-200 over the pubic bone. No initial reactions are reported.

According to Christian Thuile, M.D., a former professor at the University of Vienna in Austria with extensive experience in magnetic field therapy, the MRS 2000's low frequencies and amplitudes do not adversely affect a tumor in the prostate gland, whether benign or malignant. If you have a malignancy in the prostate gland, your PSA levels must be monitored closely with "active vigilance" regardless of the forms of therapy you are using, whether pharmaceutical, herbal, energetic, or surgical.

NEUROLOGY

The nervous system is comprised of a specialized network of cells that conduct electrical impulses between the body, the brain and the spinal cord. Nerve cells are connected with a fair degree of complexity, and utilize electrochemical signals to convey information. Nerve networks consist of plexuses, synapses, autonomic, peripheral and central nerves, and various types of nerve endings that convey information about pain, pressure, light touch, temperature, vibration, joint position sense, balance, light, sound, taste and other modalities.



There are interconnections between the nervous system, the connective tissue conducting system (called the "living matrix" by Oschman), the hormonal system, and the immune system. In fact, given the connections with the musculoskeletal/locomotor system, it is easy to see why many chiropractors view the nervous system as the master governing system of the human body. Osteopathy traditionally disagreed with this assessment, ascribing mastery to the circulatory system instead.

Given what I am learning about the human body and the still largely unacknowledged body of literature concerning the interaction between fundamental energies and biological systems, I would have to ascribe governance of all body systems to electromagnetic energy itself, which pervades, supersedes, transcends, underlies and permeates information transfer throughout the entire human organism. My chiropractic predecessors were correct in so far as recognizing electricity as a primary transmitter of information. However, electrical conduction as a means of information transfer is by no means restricted to the nervous system. When the essence of this reality is widely known and acknowledged, it will revolutionize medicine and health care as we know it.

Description

As a friend of mine is so fond of saying, life in the new millenium is often lived "Mach V with your hair on fire." The advent of modern conveniences has not afforded us more time, but rather, armed us with the means to produce more and accumulate more stuff in less time. I wonder if many of the technological advances we enjoy are actually worth it. In fact, I'm quite sure that they are not. We have become a time-impoverished people who have exchanged discretionary time and a broad base of quality relationships for purchasing power–the ability to own stuff. We have a tendency to become "survival non-listeners." Technology and profusion are accelerating the break-neck pace of life, and we are overwhelmed. I've finally sorted out my collection of VCRs only to discover we've already moved past DVDs to Blu-Ray. TiVO, YouTube and iTunes may even make these obsolete. Of course, one day TiVO as we now know it will be obsolete too!

The point of this discussion is that most adrenal glands and autonomic nervous systems I am acquainted with are under attack and over-taxed. This is why I listen to classical music almost exclusively, eliminate caffeine from my diet, and use the MRS 2000 on a daily basis, often with the SLRS system. I'm getting normal autonomic tone back. I'm sleeping deeply and restoratively and feel my body utilizing oxygen more efficiently during exercise.

Let's take a look at the adrenal glands and their functions: The adrenal cortex (the outer layer of adrenal tissue) synthesizes corticosteroid hormones from cholesterol made in the liver. Cortisol, one of these hormones, is released from the adrenal glands in direct response to stress. The adrenal medulla (the inner portion of the adrenal gland,) makes adrenaline (epinephrine), which is also part of the acute stress response (also known as the fight-or-flight / fright-fight-or-flight response).

There are some by-products of cortisol metabolism that have a sedative effect. These by-products may contribute to an overall feeling of depression. If the fight-or-flight response continues to be stimulated day after day and never shuts off, the continuous release and breakdown of cortisol may contribute to persistent and severe depression, as well as feelings of anxiety, helplessness and impending doom. Such stress-induced depression often results in sleep disturbances, loss of sex drive and loss of appetite. It may also increase susceptibility to certain personality or behavioral disorders.

Studies show that chronic activation of stress hormones may alter the operation and structure of brain cells that are critical for memory formation and function.

Elsewhere in this textbook we have discussed the fact that exposure to pulsating magnetic fields can markedly enhance sleep, improve sex drive, and sedate the nervous system. Regular use of the MRS 2000 may support a variety of related neurological, hormonal and immune interactions in such a harmonic way as to diminish the stress response and the release of stress hormones by the adrenal gland. In turn, this may eliminate the sedative effect of cortisol with the associated symptoms of depression.

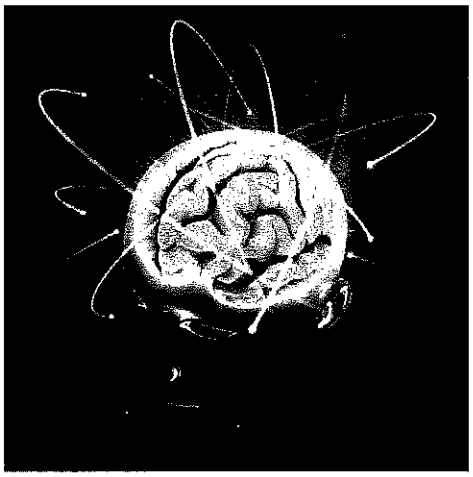
Settings and application
Use the whole body mat applicator twice to three times per day for 8-16 minutes per application. The morning application should use an intensity setting of 10-150 (beginning at low settings at first), with 50-100 used at midday and 10 used at night. In some depressed persons, a lower setting is preferred throughout the day. In others, a higher setting seems to produce a more favorable result. Feel free to experiment with this. The SLRS system may be of significant additional benefit. The use of the pad applicator over the adrenal glands (near the kidneys) at a setting of "Sensitive" to 25 in chronic cases, and gradually increase to 200 as tolerated.

Dementia and Alzheimer's Disease

Description
Senile dementia is the decline of cognitive function with age. As we age, the brain shrinks, and reduced cognition (thought processes and mental ability) may be associated with loss

of memory, diminished attention span, difficulty with the language, impaired mobility and difficulty with problem solving. In some persons, disorientation may occur.

Named after Dr. Alois Alzheimer, a German neurologist, **Alzheimer's disease** is the most common form of dementia, which currently affects about 4 million Americans. With a steadily aging population, the prevalence of Alzheimer's is expected to triple by the year 2050. The disease usually develops after the age of 65. Symptoms include disorientation, word hunger, increasing and persistent forgetfulness, impaired judgment, difficulty performing familiar tasks, and personality changes associated with stubbornness, social withdrawal, restlessness and depression.



Researchers believe that low-grade inflammations exist within the brain that predispose to the development of beta amyloid protein plaques and tau protein tangles, both of which are uniquely increased in patients with Alzheimer's disease. There is still debate as to which came first, the inflammation or the plaques and tangles. Since inflammation is an underlying common denominator for much pathology in the body, I predict that eventually an inflammatory precursor to the development of plaques and tangles will be discovered.

Risk factors for the development of Alzheimer's disease include over exposure to certain toxic heavy metals such as aluminum. People with Alzheimer's have deposits of aluminum in their brains. A history of head injury, female gender, pre-existing heart disease, hypertension and high cholesterol, hormone replacement therapy, heredity and advancing age are also identified risk factors.

While no studies have offered conclusive proof that Alzheimer's can be prevented, maintaining good cardiovascular health, regular exercise, weight control, and good control of hypertension and high cholesterol may prove to reduce the risk. Vitamin E and gingko biloba have been shown to be "possibly protective." Red yeast rice may contribute to the control of high cholesterol. Mental fitness, with regular demands on thinking processes, may be protective. Turn off the TV! Heavy toxic metal chelation therapy (now made much less expensive with the advent of sodium dicalcium EDTA in rectal suppository form) can effectively remove aluminum from the body.

Vascular dementia is the second most common form of dementia after Alzheimer's disease. It affects 1-4% of all people over the age of 65. The prevalence rises precipitously with advancing age. The onset of symptoms is usually sudden, often following a stroke. This condition is associated with the impairment of thinking, ambulation, bladder control and vision. Unsteadiness of gait often causes falls.

A severe narrowing or complete blockage of blood vessels in the brain causes vascular dementia. Other causes include profoundly low blood pressure, cerebral hemorrhage, and bleeding from damaged vessels associated with lupus or temporal arteritis.

Some people have a combination of vascular dementia and Alzheimer's disease.

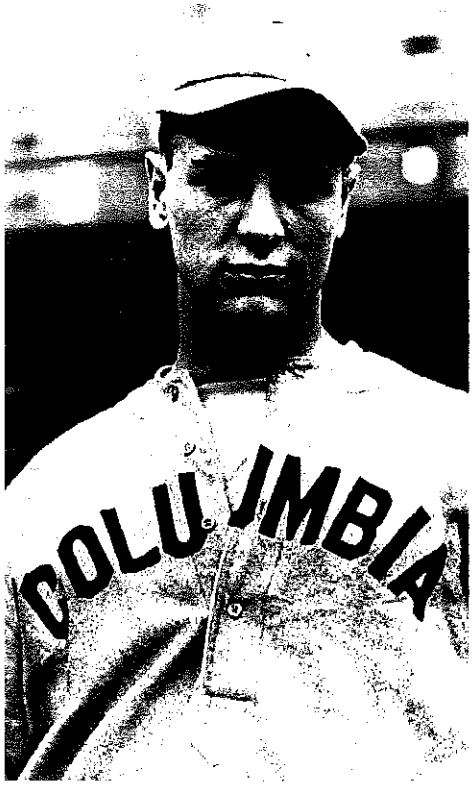
Many patients with dementia who undergo magnetic field therapy show short-term improvement. Improved circulation and oxygen utilization, and a calming effect from regulation of the autonomic nervous system may address and support the symptoms that accompany dementia.

Settings and application

Use the whole body mat applicator twice to three times per day for 8-16 minutes per application using an intensity setting of 10-150 in the morning, 50-100 at midday and 10 at night. The SLRS system is recommended for use in conjunction with the MRS 2000.

Description

Amyotrophic lateral sclerosis (ALS) is also known as Lou Gehrig's disease in the United States, after Hall of Fame baseball player Lou Gehrig, who died in 1941of this disease. The cause and cure are unknown. Early symptoms begin in the hands or feet and progress to other parts of the body. Because the condition affects the motor nerve cells, weakness and paralysis are hallmark symptoms. Weakness eventually spreads to the muscles controlling speech, swallowing, gripping, walking, and breathing. Sadly, most people with ALS die of respiratory failure within 3-5 years of diagnosis. ALS affects more men than women. The disease often develops between the ages of 40 and 60.



Treatment focuses on symptom relief and the maintenance of the highest possible quality of life. In this regard, magnetic resonance stimulation of the motor nerve cells may hold promise. Oxygen utilization is made more efficient through exposure to pulsed magnetic fields. With compromised respiratory function, the MRS 2000 may ease discomfort with breathing.

Settings and application
Use the whole body mat applicator 3-5 times per day at an intensity setting of "Sensitive" or 10. Applications can be provided for 8-16 minutes, with a maximum of one hour per day on the whole body mat applicator. The pad applicator may be used over the lungs and chest at a setting of 100-200 for eight minutes 2-3 times daily as well.

From a European health care provider using the MRS 2000 with a client who has ALS:
"I wanted to update you concerning the client I have with ALS. The MRS 2000 has helped her SO much!!! Her choking episodes have abated and she is eating regular food; even salads again. This is INCREDIBLE! In addition she uses the probe on her wrist and hand and the pain is gone after using it, as well as in her leg. Remember ... this is the woman who was given months to live!"

Description
Seizure disorders can be divided into two basic categories: epileptic, and nonepileptic. An epileptic seizure has no apparent cause, or trigger, and occurs repeatedly. A non-epileptic seizure is provoked by an underlying condition that irritates the brain, such as a high fever in children.

Seizures represent a disruption in the transmission of electrical signals within the brain. A seizure involves a loss of consciousness with uncontrolled movement and convulsions, or it may be as subtle as feeling strange sensations, or simply staring blankly for a few seconds. Altered electrical activity in the brain that gives rise to these seizures will often have its onset during childhood or, alternatively, after the age of 65.

Non-epileptic seizures can be produced by high fever, brain infection (encephalitis), metabolic disorders such as kidney or liver failure, high levels of blood sugar or sodium, by inadequate oxygen supply to the brain, by structural damage to the brain, by fluid accumulation within the brain, or by birth defects or injury to the brain during birth.

Author's Note: The use of pulsed magnetic fields is contraindicated for people who have a recent history of active epileptic seizures. Experts in energy medicine have noted that the frequency and intensity of seizures can be lessened considerably through the use of magnetic field therapy, and there are case reports and some animal studies that have shown positive altered seizure threshold as well. However, this area remains to be studied and it is this author's opinion that the MRS 2000 should not be used for people under active care for epilepsy.

The use of transcranial magnetic stimulation for patients with depression – involving much higher signal amplitudes than is used by the MRS 2000 (by an order of magnitude of 10,000 to 100,000 microTesla or more), and the common use of magnetic resonance

imaging (MRI) studies (which places patients in a field 1-4 million times more powerful than the field generated by the MRS 2000) for 45 minutes or more make it abundantly clear that the frequencies and amplitudes used by the MRS 2000 are safe.

Description

Paralysis is the complete loss of muscle function of one or more muscle groups. It can be caused by damage to the central nervous system and brain, but is especially common with injuries to the spinal cord. Paralysis is caused by trauma, stroke, polio, spina bifida manifesta, multiple sclerosis, Guillain-Barré syndrome and botulism. Paralysis can affect a specific area of the body, such as in Bell's palsy, which affects the facial nerve, or it can be regional, such as in stroke victims who lose function on one side of the body (hemiplegia), or it can be global, involving injury to the spinal cord (quadriplegia).

Complications in quadriplegia from spinal cord injury may include urinary tract problems, bowel management difficulties, pressure sores, deep vein thrombosis and pulmonary embolism, respiratory difficulty, spasticity, weight control issues, autonomic dysreflexia with constriction of blood vessels, sexual dysfunction, and pain. Some of these conditions have been discussed separately in other parts of this textbook.

Dead nerve cells cannot be brought back to life by any known form of therapy or treatment. However, in the case of viable nerves cells, nerve cell regeneration has been documented in animal models (e.g., rat sciatic nerves exposed to crush injury) in response to exposure to pulsating magnetic fields. Further research in this area is warranted.

For all forms of paralysis, whether local or generalized, the MRS 2000 may help support comfort and/or recovery through the promotion of healthy nerve cell function.

Settings and application

For general support and calming of the autonomic nervous system, for improved circulation and oxygen delivery, and to support the function of the immune system, use the whole body mat 3-5 times per day for 8-16 minutes per application. A maximum of one hour per day should be used with this applicator. Intensity settings should be low, but may gradually be increased, and the perceived effects monitored.

For local forms of paralysis, such as Bell's palsy, use the pad applicator (50-150 intensity setting) or probe applicator (200-400 intensity setting).

In fewer than 5% of cases, there may be a subjective sensation of pain that lasts for a few days. For this reason, intensity settings should be increased gradually.

Much that is known about the effect of pulsating magnetic fields in patients with multiple sclerosis is due to the prolific work of Dr. Reuven Sandyk, currently at State University of New York. Dr.

Sandyk has carefully documented significant, positive changes in muscle spasticity and neurological function in patients with multiple sclerosis in the International Journal of Neuroscience.

Description

Multiple sclerosis (MS) is a disorder in which the immune system mistakenly destroys cells that produce myelin, the substance that insulates nerves in the central and peripheral nervous systems. The causes of this autoimmune disorder are poorly understood, but may relate to the presence of a protein that gains access to the body through a virus. Genetic and environmental factors may also play a role.

It is estimated that MS affects about 300,000 people in the United States, and more than 1 million people worldwide. Twice as many women are affected as men. Initial symptoms begin between the ages of 20 and 40. In some people, multiple sclerosis is a mild illness, while in others it can be severe, leading to permanent physical disability.

Under attack by the immune system, myelin becomes inflamed, swollen and detached from nerve fibers. Areas where myelin has been destroyed become hardened (sclerosed) patches of scar tissue. Affected areas of the nervous system cannot conduct electrical impulses properly, and this produces many of the features of MS.

Disease modifying medications are available for treatment early in the course of the disease. These include beta interferons, glatiramer (Copaxone), natalizumab (Tysabri) and for aggressive forms of MS, mitoxantrone (Novantrone), a drug that is used in chemotherapy for many cancers and has serious side effects. Other medications are used for progressive forms of the disease, including corticosteroids, muscle relaxants, and medications that reduce fatigue. Complementary treatment includes physical and occupational therapy, counseling, and plasma exchange to restore neurological function in people with sudden, severe attacks of disability when high-dose steroids do not work.

Self-care for MS includes getting enough rest, regular aerobic exercise, being careful to avoid extreme heat (due to heat's worsening effect on symptoms), and eat a well-balanced, nutritious diet to support a healthy immune system. Supportive therapy includes movement therapy, herbal remedies (including evening primrose oil), and pancreatin. Massage or acupuncture may be used to good effect.

There is clearly enough evidence to support the use of pulsating magnetic field therapy in patients with MS. The extent to which magnetic fields can modify the course of the disease is unknown.

Settings and application

Use the whole body mat applicator twice to three times per day for 8-16 minutes per application using the low intensity setting, "Sensitive" initially. While the lower setting may consistently work best, higher intensity settings may be used over time. If desired, gradually attempt to increase to intensity settings up to 100 in the morning and 50-100 at midday. Continue to use a setting of "Sensitive" or 10 at night.

For localized spastic symptoms, use the pad applicator twice daily for 16-24 minutes at 25-150.

And initial reaction (e.g., mild to moderately increased symptoms) may be noted in less than 5% of cases. This subsides within two weeks of continued use of the MRS 2000. Experienced European physicians report that the MRS 2000 is helpful for patients with MS, and they note that applications of magnetic resonance stimulation does not result in any long term exacerbation of symptoms in MS patients – and to the contrary, is quite beneficial.

Description

Neuritis refers to the general inflammation of a component of the peripheral nervous system (the nerves of the arms and legs, primarily). Symptoms depend on the nerves involved, but may include pain, paresthesia, paresis (weakness), hypesthesia (decreased sensation), anesthesia (no sensation), paralysis, muscle wasting, and the absence of reflexes.

Neuritis may result from underlying conditions that cause localized neuritis, affecting a single nerve, or polyneuritis, affecting multiple nerves. Localized neuritis occurs in diabetes, local peripheral nerve injury, or diphtheria. Polyneuritis may be present in patients with MS, chronic alcoholism, cancer, vitamin B12 deficiency, diabetes, hypothyroidism, porphyria, and other metabolic diseases. Inflamed nerves commonly relate to physical injury, chemical injury, radiation injury, or infections such as herpes simplex and shingles, which are discussed elsewhere.

Therapeutic measures for inflamed nerves include the use of pain relieving medications or ointments, vitamin B complex, movement exercise, massage, acupuncture, and other treatments depending on the cause and location of symptoms.

Neuralgia literally means "nerve pain." More common neuralgias include sciatica, "trigeminal neuralgia" and "postherpetic neuralgia" (shingles), all of which are discussed elsewhere in this textbook. Whatever the cause or location, persistent neuralgia can disrupt sleep, produce a loss of appetite, and significantly compromise the quality of life.

Settings and application

Use the whole body mat three times per day for eight minutes per application, starting with a setting of 25 in the morning, 10 at noon and "Sensitive" in the evening. The pad applicator may be used twice daily for eight minutes at a setting of 50 locally, and the probe applicator can be used twice per day for eight minutes at 100-150 locally.

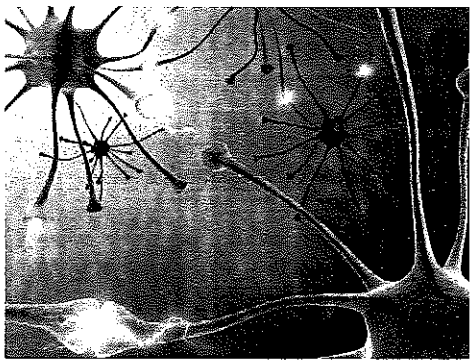
Parkinson's Disease

As with multiple sclerosis, Dr. Reuven Sandyk, currently at State University of New York, has contributed much to our understanding of the effects of pulsating magnetic fields in patients with Parkinson's disease.

Description

Parkinson's disease (PD) is a slow, progressive degenerative disorder of the central nervous system characterized by tremor when the muscles are a rest (resting tremor), increased

muscle tone (rigidity), slowness of voluntary movements, and difficulty maintaining balance (postural instability). Dementia is common in people with PD. It affects about 1 of 250 people over the age of 40, one of 100 people older than 65, and about one in 10 of people older than 80. Men are more likely to develop PD than women. The disease develops gradually, often beginning as a barely noticeable tremor in just one hand.



Family members or friends may notice a decrease in the ability to show facial expression in a person with PD. Speech may become soft, mumbling, or monotone. Arm swing during gait is lost, and movement slows down (bradykinesia). The stride becomes short and the shuffling, and feet may seem to freeze on the floor. It becomes difficult initiating movements. Normally unconscious movement patterns are no longer automatic. Muscles may become rigid.

PD results from the decreased production of a neurotransmitter in the brain called dopamine. A particular area of the brain, called the substantia nigra, is rich in dopamine receptors, and appears to play an important role in this disease.

Medical treatment with levodopa or dopamine agonists and others can produce dramatic improvement, but the benefits of drugs often diminish over time. Physical therapy, improved nutrition and exercise, and in some cases, surgery, may be helpful. Surgery involves deep brain stimulation where an electrode is implanted within the part of the brain that controls movement. A pulse generator is implanted under the skin in the upper chest, like a pacemaker, and the connecting wire travels under the skin from the generator to the electrode. The surgery carries risk of hemorrhage within the brain and stroke.

Research indicates that diets high in fiber and containing plenty of fruits, vegetables and whole grains prevent constipation that commonly occurs with this motor disorder. In later stages of the disease, falling can occur more frequently, and patients are encouraged to walk cautiously to overcome disturbance of balance and coordination. One of the most frustrating symptoms is the loss of fine motor control, which makes getting dressed and grooming difficult. Allow plenty of time to get dressed, use Velcro instead of buttons, and choose loose fitting clothes that can be put on easily, without zippers or hooks.

People with PD are low in Coenzyme Q10 (CoQ10). The gel form of this supplement is best, and can be obtained without a prescription. Massage, tai chi, Pilates and yoga can encourage motor control, flexibility, and improved circulation to, and tone of, muscles.

Because of its effects on calcium channels, muscle membrane polarization, and autonomic regulation, magnetic resonance stimulation using the MRS 2000 may have a positive effect on muscle rigidity and bradykinesia.

Settings and application

Use the whole body mat three times per day for eight minutes per application, with an intensity setting of 25-100 in the morning, 50 at midday, and 10 in the evening. Use the pad once daily for eight minutes, increasing gradually from a setting of 10-100 in the neck area. Less than 5% of PD patients experience a brief, mild exacerbation of trembling. This subsides within two weeks.

Peripheral neuropathy/PDN neuropathy

Description

The nervous system is divided into two major components: the central nervous system, consisting of the brain and spinal cord, and the peripheral nervous system, comprised of peripheral nerves lying outside the brain and spinal cord. A peripheral neuropathy involves impaired function of a peripheral nerve. There are four types of peripheral neuropathy: Polyneuropathy, mononeuropathy, mononeuritis multiplex and autonomic neuropathy. A radiculopathy is a special case of neuropathy involving the spinal nerve roots. This condition, commonly associated with sciatica, has been discussed in detail elsewhere in this text.

The symptoms of peripheral neuropathy consist of tingling, pain, burning, loss of sensation, a cold sensation, altered sensation such as hypersensitivity, and muscle weakness. It may involve a single nerve, multiple individual nerves, or multiple nerves in a symmetric distribution throughout the body. If the hands are involved, there may be difficulty buttoning shirts or performing other fine motor skills. In the lower limbs, walking may be difficult due to an ill-defined unsteadiness. Patients may lose balance frequently, not be exactly sure where their feet are, or stumble and fall. To maintain balance, patients are likely to widen their stance, and walking becomes less rhythmic and fluid. A doctor may find decreased sensation to pinprick, a loss of vibration sense, muscle weakness or atrophy, and a decreased joint position sense on examination.

In North America, the most common polyneuropathies are associated with diabetes and alcoholism. Worldwide, however, leprosy is the most common polyneuropathy. Diabetic and alcoholic neuropathies usually begin with sensory disturbances in the feet, ankles and shins. By the time symptoms reach the upper shin, the fingers are usually involved. A typical stocking-and-glove pattern of sensory loss develops. As the condition advances, weakness can be detected. There is an inability to walk on the heels. Over time, an obvious foot drop

may develop. In an estimated 30% of cases, no specific cause can be identified, and the diagnosis of chronic idiopathic axonal neuropathy is made.

Mononeuritis multiplex is associated with rheumatologic diseases that produce vasculitis of the nerves, such as systemic lupus erythematosus, rheumatoid arthritis, Sjogren's disease, or polyarteritis nodosa.

Autonomic neuropathy involves autonomic nerve damage. This can produce a drop in blood pressure, dizziness, and difficulties with constipation, diarrhea, sexual dysfunction, and thinning of skin with susceptibility to bruising and poor healing.

The main factors to consider with regard to the potential benefit of pulsating magnetic field therapy in peripheral neuropathy are circulation, enhanced oxygen delivery, and autonomic regulation. The blood vessels that supply nerves are called the vasa nervosum. Improved blood flow through these vessels and oxygen-enriched blood corpuscles may help to address the atrophy associated with many peripheral neuropathies.

Anyone afflicted with peripheral neuropathy should be under the care of a competent healthcare provider. Some peripheral neuropathies can be fatal. Accurate diagnosis and proper management are essential. Pulsating magnetic field therapy is a supportive intervention only.

Settings and application

For peripheral neuropathy, use the whole body mat applicator up to four times daily for 16-24 minutes. The initial intensity setting should be 10-25. Use the pad applicator for feet and ankles at an intensity setting of 200-400 as often as possible.

Since peripheral neuropathy can result from nutritional deficiency (in relation to alcoholism or other disorders) adequate vitamin supplementation is recommended. In particular, thiamine (vitamin B1) and cyanocobalamin (vitamin B12) are advised and can be taken as part of a balanced B-Complex formula.

We have observed subjective, sustained improvements in sensation in patients afflicted with diabetic neuropathy who undergo serial applications of the MRS 2000.

Weintraub et al studied neuropathic pain in the feet of patients. Twenty-four feet were included in the study. Their conclusion that pulsed electromagnetic field therapy produced unexpected and short-term analgesic effects in more than 50% of individuals is a strong encouragement to continue to pursue the evaluation of the effectiveness and usefulness of PEMFs in peripheral neuropathy. *(Weintraub 2004/236)*

Description

Restless Leg Syndrome (RLS) is a periodic limb movement disorder characterized by extreme discomfort of the legs while sitting or lying down. In most cases, the cause is unknown, but sometimes iron deficiency (with or without anemia), kidney failure, or peripheral neuropathy

may be implicated. There is a persistent urge to get up and move around, and movement provides temporary relief. RLS can begin at any age, and affects men and women equally. People with this condition often described their condition as jittery, creeping, crawling, burning, and aching.

The classic hallmarks of RLS are leg symptoms beginning with an activity that are relieved by movement, worsening of symptoms in the evening, and in 80% of RLS patients, night time periodic limb movements of sleep (PLMS). PLMS manifests as uncontrolled twitching or kicking movements throughout the night during deep sleep. Due to these bothersome movements, people with RLS find it difficult to fall asleep or stay asleep. Insomnia may lead to excessive daytime drowsiness.

A recent article published in European Neurology *(Stehlik 2008/179)* proved an increased prevalence of RLS among women diagnosed with fibromyalgia. The prevalence of RLS among the general population is 2-15%. This study showed that the prevalence of RLS among women with fibromyalgia was 64%. In addition, the women with RLS in addition to fibromyalgia suffered more with insomnia and excessive daytime sleepiness as measured by the Epworth Sleepiness Scale.

Theoretically, RLS may represent a hyperpolarization disorder of the central nervous system due to electromagnetic field deficiency in our modern living and working environments. These environments are rife with materials that collectively interfere with, or attenuate, our exposure to healthy doses of the Earth's geomagnetic field: concrete, iron rebar, motor vehicles, bricks, mortar, and high-rise buildings.

Settings and application
Use the whole body mat applicator four times per day for 8-16 minutes per application. Begin with a setting of 25 in the morning, 10 at noon, 10 in the late afternoon, and sensitive in the evening. Due to the profound benefits observed with the MRS 2000 for sleep, over 70% of RLS patients may experience positive effects in support of this disorder.

Recommended positive, healthy lifestyle changes include limiting tobacco, alcohol and caffeine, using baths and massages, relaxation techniques such as prayer, meditation or yoga, and a more intentional bedtime sleep routine that encourages calm and quiet. The use of candles, nighttime baths, and essential oils for aromatherapy may create an environment conducive to sleep. Clearly, magnetic resonance stimulation may play a vital role in supporting deep, restorative sleep patterns.

A folk remedy for restless leg syndrome is to place a bar of soap under the bottom sheet of the bed. Internet sites and other venues have many testimonials attesting to the fact that this remedy has been helpful. The soap can stay in it's store wrapper. It is placed under the bottom sheet of the bed. A bar of soap in bed can't hurt, and you might end up with a better smelling bed if nothing else!

See "Paralysis"

See also "Dizziness" in the Blood and Cardiovascular System chapter

Description

Meniere's disease is a disorder characterized by recurring attacks of disabling vertigo (room whirling), hearing loss, and ringing in the ear (tinnitus). Also known as endolymphatic hydrops, Meniere's disease is caused by an imbalance of fluid in the inner ear. Inner ear fluid is continually being secreted and re-absorbed such that a constant volume of fluid is present. With either increased production or decreased re-absorption of this fluid, imbalance results. Meniere's is more likely to develop between the ages of 40 and 50. It is estimated that about 615,000 people in the United States have this disorder, which usually affects just one ear.

Symptoms include sudden attacks of unprovoked, severe, disabling vertigo, nausea and vomiting. There is a fullness or pressure in the ear. Tinnitus may be present, and hearing may gradually worsen over months or years.

Vertigo maybe be confused with dizziness or lightheadedness, so it is important to consult a qualified healthcare provider for a definitive diagnosis. Some important and potentially serious causes of dizziness are discussed elsewhere in this text.

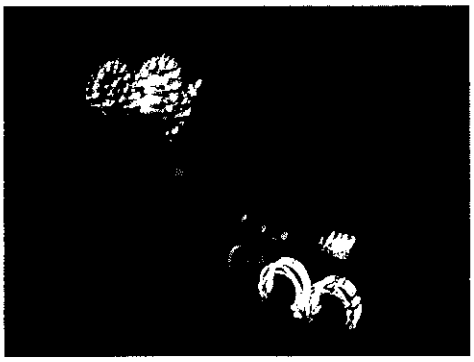
The diagnostic criteria for Meniere's disease require a history of two spontaneous episodes of vertigo, each lasting 20 minutes or longer together with verified hearing loss, ringing in the ears or fullness of the ears, and the exclusion of other causes of such symptoms. Hearing and balance assessment may be performed (usually by an ENT specialist,) including a test called electronystagmography (ENG). In this test, electrodes are placed on the skin near the eyes and on the forehead. Cool and warm water are injected into the back of the ear canal. Measurements of involuntary eye movements are made, and the nature of the inner ear problem is confirmed.

Treatment with motion sickness and anti-nausea medications are typical. A salt-restricted diet and maintaining a steady fluid intake throughout the day can help regulate body fluids. Sodium restriction can be taken further with limiting monosodium glutamate (MSG). Many patients with Meniere's are encouraged to eat five or six smaller meals rather than three meals per day. Avoid caffeine, quit smoking, and reduce stress to lessen the severity of symptoms. In severe cases, a surgery may be performed, such as endolymphatic sac decompression, labyrinthectomy, or vestibular nerve section. The use of a hearing aid may improve hearing.

In support of inner ear fluid balance, magnetic field therapy may assist cell membrane permeability, ion balance, and microcirculation. Neurological function may be positively affected as it relates to hearing loss and tinnitus. (See the chapter on Otolaryngology.)

Settings and application

For the support of Meniere's disease, use the whole body mat twice daily for eight minutes per application, gradually increasing to an intensity setting a 100 in the morning. Use an intensity setting of 10 in the evening. The pad applicator can be used once or twice daily for



eight minutes to the neck area at an intensity setting of 50-100. The probe applicator can be used once or twice daily for eight minutes to the affected ear at a setting of 100-200 by placing the probe lightly on the fold of ear cartilage at the front edge of the ear.

Note: The probe is used externally only and should not be placed inside the ear canal.

Peripheral Left Cranial Nerve 7 (Bell's) Palsy

Description

Bell's palsy is the sudden onset of paralysis affecting one side of the face. It results from an infection of the seventh cranial nerve (the facial nerve) by herpes simplex virus, or in rare cases, as a manifestation of Lyme disease, or from compression of this nerve by sarcoidosis.

The hallmark of Bell's palsy is facial drooping due to weakness and paralysis of the facial muscles. The face becomes flat and expressionless on one side. Tone of muscles around the eye is weakened, blinking occurs less frequently, and the eyes become dry and irritated. There is often a heightened sense of hearing (hyperacusis), and saliva production may be diminished resulting in a dry mouth (xerostomia). The diagnosis of Bell's palsy is based on recognition of the typical appearance of facial paralysis in the absence of other diseases. A blood test may be done to check for Lyme disease, and chest x-rays and blood tests may also be performed to rule out sarcoidosis.

In mild to moderate cases, Bell's palsy resolves within weeks or months with or without treatment. Acupuncture with moxabustion and cupping[25] can markedly speed the rate of recovery, and magnetic resonance therapy may support a speedier recovery as well. In rare cases, paralysis may be chronic and irreversible. If the eye cannot close completely, it must be protected from excessive dryness through the use of an eye patch and artificial tears.

Settings and application

For Bell's palsy, use the whole body mat twice daily for eight minutes per application, at an

25 Cupping refers to an ancient Chinese practice in which a cup is applied to the skin and the pressure in the cup is reduced (by using change in heat or by suctioning out air), so that the skin and superficial muscle layer is drawn into and held in the cup. In some cases, the cup may be moved while the suction of skin is active, causing a regional pulling of the skin and muscle (the technique is called gliding cupping).

intensity setting a 100 in the morning and 10 in the evening. The probe applicator should be used at a setting of 200-400 twice to four times daily for 8-16 minutes per application. Apply the probe to the cheek just in front of the ear. Alternatively, the pad applicator can be used at a setting of 100-150 twice daily, with the pad under the back of the head and shoulders like a pillow.

Relaxation techniques, biofeedback, B vitamins and zinc may provide additional relief.

XIV. Trigeminal Neuralgia

See the chapter on Pain.

XV. Stress-Induced Depression (Burnout, Exhaustion, Stress)

For further reading, see the sections on Stress-Induced Depression, Heart Attack, and Fibromalgia/CFS/CFIDS.

Effects of stress ...

... On your body	... On your thoughts and feelings	... On your behavior
• Headache	• Anxiety	• Overeating
• Chest pain	• Restlessness	• Undereating
• Pounding heart	• Worrying	• Angry outbursts
• High blood pressure	• Irritability	• Drug abuse
• Shortness of breath	• Depression	• Excessive drinking
• Muscle aches	• Sadness	• Increased smoking
• Back pain	• Anger	• Social withdrawal
• Clenched jaws	• Mood swings	• Crying spells
• Tooth grinding	• Job dissatisfaction	• Relationship conflicts
• Stomach upset	• Feeling insecure	• Decreased productivity
• Constipation	• Confusion	• Blaming others
• Diarrhea	• Burnout	
• Increased sweating	• Forgetfulness	
• Tiredness	• Resentment	
• Sleep problems	• Guilt	
• Weight gain or loss	• Inability to concentrate	
• Sex problems	• Seeing only the negatives	
• Skin breakouts		

Description

The effects of stress are widespread throughout the body. When stress produces ongoing symptoms in one or more organs that are predominately under the control of the autonomic (vegetative) nervous system, the condition is referred to as "autonomic (vegetative) dystonia." Fundamentally, this disorder represents the inseparable connection between the mind and the emotions. Various authors from Europe *(Thuile 2000)*, Asia *(Fujii 2002/238)*, and North America *(Sarno 1998/237)* have addressed this phenomenon. Stress affects the musculoskeletal system as well, often in combination with cardiovascular, gastrointestinal, immune, infectious or genitourinary disturbances. Dr. John Sarno at New York University School of Medicine has enjoyed startling success by treating somatic complaints such as back pain, chronic generalized muscle aches and pains, and headache through a mind-body approach.

Symptoms associated with stress-related over-activation of the autonomic nervous system include headache, chest pain, pounding heartbeat, high blood pressure, shortness of breath, muscle aches, back pain, clenched jaws, tooth grinding, stomach upset, constipation, diarrhea, increased sweating, tiredness, sleep problems, weight gain or loss, decreased libido, menstrual spotting, and skin breakouts. Often, these physical symptoms are associated with anxiety, depression, and a sense of impending doom. Emotional burnout and a morbid bent toward negative, depressed thinking can result. People may overeat, under-eat, abuse drugs, drink alcohol excessively, experience relational problems and anger outbursts, or withdraw socially.

Some authors doubt the existence of autonomic dystonia. *(Curtius 1972/239; Birkmayer 1967/240)* Others have relegated autonomic dystonia to the realm of psychosomatic disorders but, in so labeling this syndrome, have denied the power and reality of the mind-body connection. However, using techniques described by Dr. Sarno, I have helped patients recover from disc herniations and chronic pain in a matter of days simply by identifying strong underlying emotions that were perpetuating the pain and muscle spasm. One notable disc pain patient was scheduled for surgery in just a few days. He cancelled the surgery and was fully recovered by the following week! Once the patient became aware of underlying toxic emotions, muscle tension and organ system disturbances began to improve. The MRS 2000 was used – and is often used – in conjunction with this process. Very importantly, magnetic resonance stimulation supports the sense of calm and muscle relaxation needed for recovery to take place.

A patient with autonomic dystonia has symptoms that point to a bodily system or organ that is largely or completely under autonomic innervation and control. Physical complaints may relate to the cardiovascular, gastrointestinal, respiratory or urogenital systems (or a combination of the above). The symptoms are usually of two types, neither of which indicates a true physical disorder involving the organ or system concerned. First, there are complaints based upon **objective** signs of autonomic arousal, such as palpitations, sweating, flushing, tremor, and expression of fear and distress about the possibility of a physical disorder. Second, there are **subjective** complaints of a nonspecific or changing nature. These complaints may include fleeting aches and pains, sensations of burning, heaviness or tightness, and feelings of being bloated or distended. Patients may express concern that their symptoms are related to a specific organ or system, and indeed there may be functional organ disturbance.

Settings and application

Use the MRS 2000 to support autonomic dystonia, stress and burnout as follows: Lie on the whole body mat applicator three times daily for 16-24 minutes at the setting of 10 each time. Some individuals may note a mild increase in somatic discomfort initially. More than three of four patients report very good results as a result of the autonomic regulatory effects of the MRS 2000. The SLRS system may also be used to sedate the brain via the visual and auditory pathways.

Supportive therapies include acupuncture, good nutritional habits, good hydration, regular exercise, the cultivation of a positive mental outlook, and prayer, meditation and/or relaxation techniques. Herbal remedies and teas, and adrenal glandular preparations (protomorphogens) may also be of benefit.

OPHTHALMOLOGY

One of our most amazing capacities is the ability to see. Through vision, we convert photons of light into electrical signals that are transmitted in and interpreted by the brain. The eye is the organ of site – a transducer of photons into electrons. It refracts visual signals through the cornea to the special photoreceptor cells (rods and cones) lining the retina. There are approximately 130 million photoreceptors cells absorbing photons of light. From the back of the eye the visual information is transferred to 1.2 million nerve cells (axons) that convey the information, in real time, to the visual cortex of the brain via the optic nerve and optic tract. In 2006, researchers at the University of Pennsylvania calculated the bandwidth of the human retina to be about 8960 kb per second.

The visual system is subject to injury, inflammation, and degenerative change. Several common conditions are discussed in this chapter.

General guidelines for the use of the MRS 2000 in support of conditions involving the eye. The pad or probe applicators can be used at the temples twice daily for 16 minutes. An intensity setting of 50-150 should be used, increasing the amplitude gradually from a setting of 50. The intent of magnetic field therapy is to support the immune system, maximize cell membrane fluid exchange, normalize membrane ionic dissociation, and improve local blood flow.

Note: If you experience difficulty falling asleep after using the pad or probe for the eyes as described, use the MRS 2000 earlier in the day.

Description
Astigmatism refers to a disorder in the refractive ability of the eye, and the visual distortion associated with it. It is caused by an imperfection in the curvature of the front of the eye. In people with astigmatism, the surface of the eye may be flatter or steeper, producing abnormal contours of the cornea or the lens and giving rise to corneal or lenticular astigmatism respectively.

Astigmatism produces blurry vision at all distances. It is most commonly present at birth, but may also develop after eye injury, disease or surgery.

Corrective eyeglasses or contact lenses easily treat astigmatism. Refractive surgery can reshape the surface of the eye, and procedures include LASIK, LASEK or photorefractive keratectomy (PRK). Radial keratotomy is no longer performed due to poor results over the long term.

Description
The outermost layer of the eye is called the conjunctiva. When this layer of cells is inflamed, the condition is known as conjunctivitis. Inflammation can be caused by infection, allergy, or

irritation from chemicals or foreign objects. Under the section on "Infectious Diseases" I have described chemical conjunctivitis resulting from the use of silver nitrate in the eyes of newborns.

Conjunctivitis of the left eye

The most common cause of conjunctivitis is a viral infection. Conjunctivitis can be part of the constellation of symptoms in certain people with rheumatologic or connective tissue disorders, albeit rarely. Bacterial conjunctivitis often produces a thick, yellow and green discharge, and may be present along with an upper respiratory infection or sore throat. Both viral and bacterial types of conjunctivitis are highly contagious. The condition is most common in children, but can affect people of any age.

The best way to control the spread of conjunctivitis is the avoidance of close contact with an infected person. Those infected should not touch their eyes with their hands, and they should wash their hands frequently. Do not re-use the towel and washcloth. Do not share cosmetics or personal care items. Parents should keep an infected child at home for a least one day for active home treatment.

Home care may include the application of warm compresses to the affected eye or eyes. To make a compress, soak a clean, lint-free cloth in warm water and wring it out before applying it gently to the closed eyelids. In cases of allergic conjunctivitis, avoid rubbing the eyes, use cool compresses, and try over-the-counter antihistamine eyedrops, such as Naphcon-A or Opcon-A. Your alternative health provider may have natural antihistamine remedies as well.

A sty is a painful, red lump on the edge or inside of the eyelid, also known as a hordeolum. It may look like a pimple or a boil and is usually filled with pus. It may swell, producing pain and discomfort, and disturb vision. In some cases, it may be difficult to open the eye fully.

While most sties disappear within a few days, multiple sties can develop, leading to a generalized inflammation of the eyelid called blepharitis. Sties are caused by a bacterial infection with staphylococcus, but they are not highly contagious. The fine dust from eye makeup left on all night may clog a pore, giving rise to a sty. Contact lens wearers with unclean hands may infect the eye.

Sties often heal without treatment. Hot compresses 2-4 times per day can relieve symptoms. A medical doctor may prescribe topical antibiotics in persistent cases. A similar condition, known as a "chalazion," is a blockage of a different gland inside the eyelid. This may require surgery.

The lens of the eye is located just behind the iris–the pigmented part of the eye – and the pupil. The lens helps to focus rays of light as they pass through the eye to convey sharp, vivid images to the retina. The lens is made of water and protein fibers. With aging, the protein fibers break down in a clump together, clouding small areas of the lens. These clumps of broken down protein are cataracts. As a cataract grows larger, the clouding of vision increases.

These clumps of protein can be removed surgically, the only effective treatment for cataracts. The lens can be replaced, or corrective eyeglasses can be worn following cataract removal. Cataracts cannot be cured with medications, dietary supplements, exercise or optical devices. However, the risk of developing cataracts is lessened if you avoid smoking, eat a balanced diet with lots of fruits and vegetables, wears sunglasses, and avoid chronic illnesses, such as adult-onset diabetes, if possible.

Description

The eye consists of several chambers of fluid. In order to keep the eye healthy, new fluid must continually be circulated within these chambers. The chamber in the front of the eye contains fluid known as aqueous humor. This fluid normally exits the eye through a drainage system where the iris and cornea meet. When the drainage system is disrupted, fluid is unable to drain and pressure builds up within the eye. Increased fluid pressure in the eye is a condition called glaucoma.

Blacks are 6-8 times more likely to develop glaucoma than whites, and to develop permanent blindness as a result. Because of this, black North Americans should have their eye pressure monitored annually above the age of 25. Everyone over the age of 60 is at increased risk of developing glaucoma.

Diabetes, a history of high blood pressure, heart disease, and hypothyroidism can also increase glaucoma risk. Prolonged corticosteroid use increases the risk of developing secondary glaucoma.

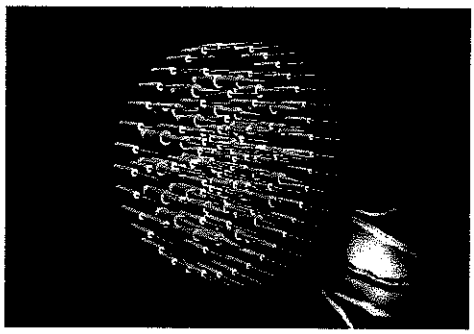
Pharmaceutical and surgical treatments for glaucoma are generally directed at improving the drainage of aqueous humor from the fluid chamber in the front of the eye. Various eyedrops and oral medications are available. With prolonged increased pressure, damage to the optic nerve can occur, so newer "neuroprotective" drugs are being developed. Surgery is reserved for progressive cases that are unresponsive to medical management.

Regular eye exams are the best means of early detection. An overweight condition and high blood pressure, both precursors to insulin resistance and Type II diabetes, should be controlled through proper diet and exercise. Since serious eye injuries can lead to glaucoma, wear protective eyewear for high-speed racquet sports or when using power tools. Herbal remedies, though advertised, have not been proven beneficial.

Description

Retinitis pigmentosa is a rare, progressive degeneration of the retina that eventually causes blindness. This condition is often inherited. The photoreceptor cells of the retina are responsible for converting visual light into electrical impulses for the optic nerve. When these cells degenerate, vision becomes poor in the dark.

The first symptoms of retinitis pigmentosa often begin in early childhood. Over time, peripheral vision is compromised, and in late stages of the disease, only a small portal of vision in the central visual field remains (tunnel vision).



Diagnosis is suspected with examination using an ophthalmoscope. Advanced testing, such as an electroretinogram, may help confirm the diagnosis.

Literature indicates that no conventional treatment has been shown to slow the progression of retinal damage in this condition. High doses of Vitamin A are recommended by some doctors, but the value of this treatment is unknown.

Short-term improvements in vision have been subjectively reported following exposure to pulsating magnetic fields generated by the MRS 2000.

OTOLARYNGOLOGY (EAR-NOSE-THROAT)

Components of the respiratory and digestive system have a confluence of openings and air cavities in the face and head. These structures, and the diseases that affect them, are the concern of the ENT specialist. Anatomically, the system is comprised of the ear (with all its constituent parts), the nose and sinuses, the throat, larynx, pharynx, vocal cords, trachea, esophagus, the salivary glands, the major vessels, nerves, tonsils, adenoids, soft and hard palate, and lymph channels and lymph nodes in the head and throat.

A detailed description of these many structures, their respective physiologies, and the biological systems they are involved with, is beyond the scope of this text. My purpose is to briefly present useful information concerning several common ailments and how they may be supported through magnetic resonance stimulation. The task of choosing just a few conditions was difficult. I have attempted to be as practical as possible in selecting conditions for the discussions that follow in this chapter.

Description

A cold is a viral infection of the upper respiratory tract affecting primarily the nose and throat. It is caused by one of more than 200 known viruses, and symptoms tend to vary greatly. Many North American adults will experience cold episodes 2-4 times per year. Preschool children, by contrast, may have up to 10 episodes per year.

Symptoms of a common cold include runny or stuffy nose, itchy and sore throat, cough, congestion, slight body aches or a mild headache, sneezing, watery eyes, low-grade fever up to 102°F, and mild fatigue.

While the cold is common, it should not be considered normal. A reorientation of our thinking is required. The goal of health and wellness is to support every aspect of life such that the immune system is as strong and vital as possible. This does not mean that all viral infections are avoidable. However, a strong, robustly functioning immune system can markedly reduced the frequency of cold episodes. As I have noted elsewhere in this text, the dietary over-use of refined sugar, the lack of restorative sleep, the lack of consistent exercise and stress are key factors in our susceptibility to infectious illness in North America.

Complications to the common cold include acute ear infection (otitis media), acute sinus infection, strep throat, and wheezing in children with asthma. Ear infections are particularly common in children, and will be discussed separately.

Nurseries and day care centers come replete with plastic toys, markers, and eating utensils, all of which make perfect collection points for the saliva-laden transmission of cold viruses. Many of these facilities have sound hygiene practices and clear policies about keeping sick children at home. Nevertheless, some moms and dads shamefully use the day care center as a surrogate grandmother, and kids tend to cough in each other's faces. When youngsters

do cover their mouths, they may still–unwittingly–touch their neighbor's face, food or crayola box with hands freshly baptized with moist, humidified virus. Yuck! If you're a parent with a sick kid, stay at home, get a sitter, lean on a friend from church or synagogue or get grandpa or grandma (if they're healthy enough and can read the two paragraphs that follow).

Here's some commonsense cold-fighting advice: Wash your hands and teach your kids to wash their hands thoroughly. Do not use fabric hand towels to dry your hands. They get re-used a lot and can harbor germs. Use paper towels, the air dryer on the wall (hit the start button with your elbow, not your hand) or an alcohol-based hand gel that fights germs. If you eat out at a restaurant, fast food or otherwise, wash your hands and teach your kids to do the same thing! Or, carry alcohol-based hand gel in the car and use it religiously. When leaving the bathroom, remember that the door handle may contain viruses and bacteria from people who don't wash. Don't touch the door handle if possible (use your shoulder to push the door open), or use a paper towel to insulate your hand from the handle and dispose of the paper towel in a nearby receptacle once outside.

And more advice: If you are around someone who has a cold, don't allow him or her to cough or breathe directly in your face. If you have a cold, don't cough or breathe directly in their face either. Always use tissues for sneezing and coughing, and when these are not available, cover your sneeze with the inside of your arm with a bent elbow. Be careful not to twist or flex your neck when covering a sneeze like this – bring the inside of your arm to your mouth, not your mouth to your arm, so that your neck is protected. Do not share drinking glasses or eating utensils, ever (it's just a good habit). Keep kitchen and bathroom countertops clean.

And still more advice: If you travel by air, are seated by somebody healthy, and can control the air nozzle, turn it off. The air in the cabin is being re-circulated. That means that germs in a sneeze in seat 46F might reach you in 9A. Sit on the aisle seat if you can, so that you can use the lavatory often. And you'll need to do this, because I'm recommending that you drink as much water as your body can hold. You'll have to arrange for time enough after clearing airport security to buy a big bottle of water (or two). The longer the flight, the more water you'll need to drink. Travel supplements like AirBorne® might help, and won't hurt.

If all of this sounds like overkill, I don't apologize. I learned sterile technique in my hospital residency when scrubbing up for surgery. Many trained physicians worldwide think as I do – there is a germ on every surface! Your job is to pay attention to hand contact with surfaces that harbor viruses and bacteria (like railings and banisters, for example) and make sure you wash your hands before you eat. Here's an interesting fact: a plastic cutting board can harbor viable infectious

organisms for up to 4 days, whereas a wooden cutting board will not allow such organisms to live more than a few hours. Think of all the plastic and metal you touch every day, then picture yourself putting a piece of fruit or a bite of fish taco in your mouth. I rest my case. (And remember to teach your children and grandchildren to wash their hands!)

Having been sufficiently warned, do NOT live in fear of germs – don't become a 'Howard Hughes'. Just practice good hygiene. Utilize the immune boost you can gain from daily use of the MRS 2000. If you end up with a cold now and then, don't get down on yourself. Colds are not always avoidable. Just pay attention.

The common western treatment of infection by cold viruses is symptomatic only. In my experience, acupuncture and Traditional Chinese Medicine, including herbal remedies and moxabustion, do a better job of targeting the cause. In this paradigm, "wind" is considered a pathogen, or disease-causing agent. When you get a cold, "wind" is thought to literally enter the body – usually at the nape of the neck. Keeping the back of your neck covered and protected from the wind is a key preventive strategy in Traditional Chinese Medicine. Wear a scarf!

A low-grade fever may be present, up to 102° F. If you have a fever at or below 100° F, or if it is clear that bacterial infection is not present, magnetic resonance stimulation can be started to provide more energy for immune function and to confer greater comfort as the virus runs its course.

Settings and application
For prevention and strengthening the immune system against cold viruses, use the whole body mat applicator one to three times daily. A morning application should use an intensity setting of 25-100. An intensity setting of 10 should be used before bed. Applications can vary in time from 8-24 minutes.

The services of a competent acupuncturist with at least 4 years of training in Traditional Chinese Medicine is encouraged if your cold symptoms are severe. Some studies show that zinc and vitamin C can reduce the symptoms if taken early, and that Echinacea can be preventive.

Caution: Do not use the MRS 2000 if you have a fever over 100° F. Once the fever has subsided, use the guidelines listed at the beginning of this chapter. Remember to drink plenty of fluids, get plenty of rest, and eat a healthy diet devoid of refined sugar, high fatty foods, and dairy.

Description
Approximately 75% of children have experienced at least one ear infection by the age of three. 'Otitis' means inflammation of the ear, and 'media' refers to the middle ear. Otitis media is the most common cause of earache. Symptoms in very young children include pulling or tugging at the ears because of earache, disrupted sleep, increased crying and irritability, headaches, fever, and discharge from the ear.

In young children, an acute ear infection will often follow a common cold. Symptoms include a green or yellow discharge from the nose, the recurrence of a fever following a cold, and sleeplessness with irritability.

Nearly 80% of otitis media infections resolve spontaneously. If a virus caused the illness, an antibiotic medicine won't help. Furthermore, due to more than 20 years of over-prescription with antibiotics in the United States, resistant bacterial organisms have emerged. Because of this, guidelines were developed for using antibiotics with acute ear infection. *(Rosenfeld 2001/241)* In this guideline, a "wait-and-see" approach is adopted. All children under the age of six months with a confirmed diagnosis of otitis media continue to be placed on antibiotic therapy. Children older than 6 months who have a fever in excess of 103°F are also placed on antibiotic therapy. When an illness is otherwise deemed to be severe, antibiotics are considered since complications of an ear infection can include severe headache, confusion or focal neurologic symptoms that may indicate a spread of infection to the brain or its protective layers of covering (meningitis).

Aside from antibiotic therapy, analgesic drops are available for placement in the external ear canal to make the ear feel better. Myringotomy is a surgery where drainage tubes are placed through the eardrum (tympanic membrane) to the inner year, allowing fluids to emerge. This may be considered in the case of non-resolving infection, particularly with hearing loss.

Conservative home measures include the use of a hot compress over the affected ear, bedrest, chicken soup, and tender loving care. Magnetic resonance stimulation can support convalescence and recovery when fever is below 100° F. Over-the-counter pain relievers are often recommended. Do not give aspirin to children and adolescents younger than 16 due to the risk of Reye's syndrome, a rare but serious complication.

Prevention of recurrent ear infections can be accomplished by observing the following guidelines: hold your baby in the upright position to bottle feed; breast-feed your baby for at least six months; avoid secondhand smoke; and keep your child away from other children who are sick.

Settings and application

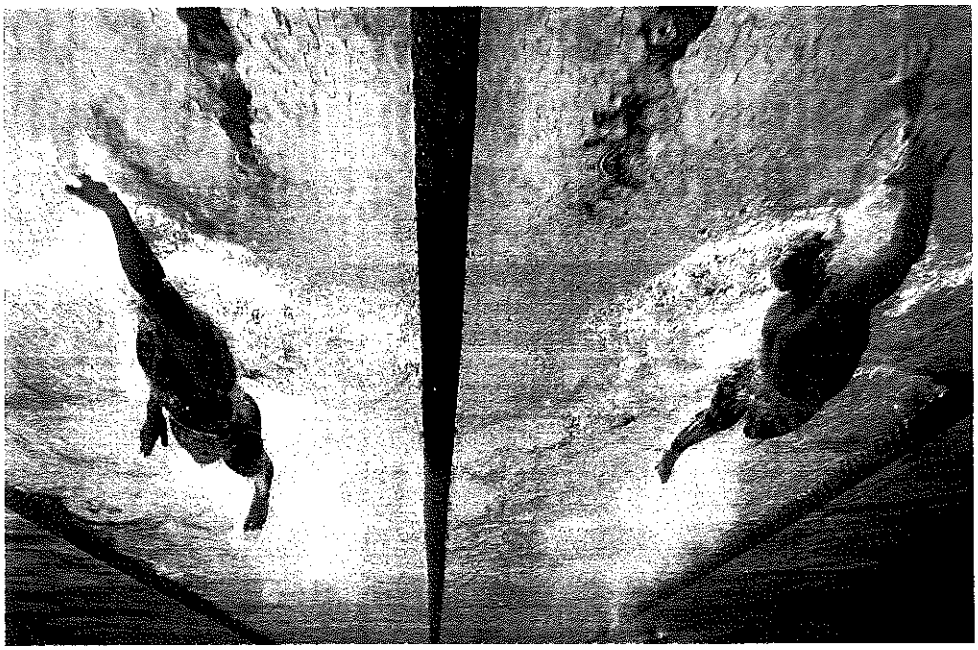
Use the whole body mat applicator to support the immune system 1-3 times daily. Because this condition normally affects youngsters, an intensity setting of 10-25 should be used for eight minutes each application. Like the mat, the probe applicator should only be used when fever is below 100° F. Continue to monitor temperature to determine the appropriateness of magnetic field therapy with the MRS 2000.

Description

Swimmer's ear is an inflammation of the outer ear and ear canal. It is caused by exposure of the ear to excess moisture where water becomes trapped in the ear canal. A sharp object used to clean the outer ear, or a fingernail, may scratch the skin lining the canal, allowing bacteria or fungi to enter, producing an infection. Swimmer's ear is most common in children

and young adults, but can occur at any age when there is an underly ing medical condition that weakens the immune system, such as diabetes.

Symptoms include pain in the outer ear canal, or a feeling of fullness or stuffiness in the ear. There may be decreased or muffled hearing. Usually only one ear is affected.



Settings and application
Use the whole body mat applicator to support the immune system 1-3 times daily at an intensity of 10-50 in the morning and midday, and 10 at night. The probe can be used 1-3 times daily for 4-8 minutes at an intensity setting of 50-150 with the tip of the probe pointed toward the ear canal. The probe should not be inserted into the ear.

Description
Dry scratchiness and painful swallowing characterize pharyngitis. Viruses are much more commonly the cause than is bacteria. It is a common symptom of cold or flu, and often is the first indication of an upper respiratory infection. A sore throat can also occur with mononucleosis, laryngitis, and in conjunction with allergies, dry air, environmental pollution, secondhand smoke, the use of chewing tobacco, whiplash injury to the neck, overuse of the vocal cords by yelling, and gastroesophageal reflux disease (GERD).

Antibiotics do not speed the recovery of sore throat caused by bacteria, such as streptococcus pneuomoniae (strep throat), that are helped little by antibiotics, and don't prevent infections from recurring. Medical doctors in North America are much less likely to

prescribe medication than in the past due to overuse of antibiotics with the development of antibiotic resistant strains of bacteria.

Most sore throats resolve without treatment. The best self-care measures include getting plenty of rest, drinking lots of fluids, gargling with salt water (1 teaspoon salt to 8 ounces warm water), using honey with lemon, breathing humidified air, avoiding smoke and other pollutants, and resting the voice.

Settings and application
Use the whole body mat applicator to support the immune system 1-3 times daily at an intensity of 10-50 in the morning and midday, and 10 at night. The probe can be used 1-3 times daily for 4-8 minutes at an intensity setting of 50-150. Aim the probe upwards and inwards at front of the neck toward the area of soreness internally.

Description
When the vocal cords are strained from overuse, they become inflamed, irritated or infected. This condition is known as laryngitis. The vocal cords are two folds of mucous membrane comprising the larynx, or voice box. The inflammation makes the voice sound hoarse, or when severe, reduces the sound of the voice to a whisper. The inflammation may cause a sore throat, throat dryness or coughing, or a sensation of rawness at the back of the throat.

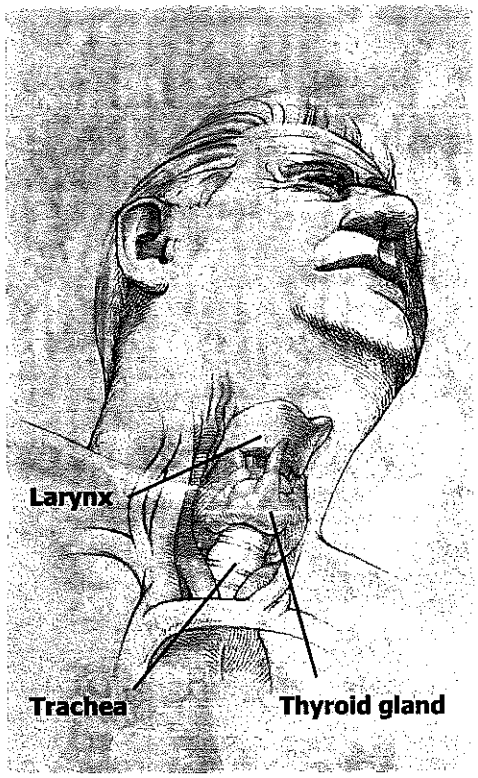
Laryngitis is usually caused by a viral infection or by vocal strain. With chronic overuse of the voice (such as singing, coaching, or cheerleading), laryngitis can become chronic. When caused by bacteria or fungi, anti-microbial treatment is necessary. Other causes include acid reflux (GERD), smoking, excessive alcohol use, chronic sinusitis, inhaled pollutants, allergies, and infrequently, cancer.

Laryngitis is often self resolving, but when it is chronic, the vocal cords can be visualized directly by the insertion of a thin, flexible tube with a camera into the nose or mouth and down the back of the throat (laryngoscopy). Serious cases may require oral corticosteroids, and when indicated, acid reflux medications.

Self-treatment should include breathing moist air (inhaling steam from a hot shower or vaporizer), resting the voice, drinking plenty of fluids while avoiding alcohol and caffeine, sucking on lozenges, gargling with salt water, and treating any underlying diseases.

The anti-inflammatory and immune balancing effects of pulsed magnetic field therapy may hasten recovery and relieve symptoms in cases of laryngitis.

Settings and application
Use the whole body mat applicator two to three times daily for 8-16 minutes at 25-50 in the morning, 50 at midday, and 10 in the evening. Use the probe applicator for 8 minutes



directly aimed at the larynx (midway between the chin and upper portion of the collarbones) at 200-400. (See illustration.) Please note: the larynx, or voice box, is located at the "Adam's apple" higher in the throat than the thyroid gland. Aim the probe as specifically as possible by lightly feeling the firm cartilage tissue at your "Adam's apple."

One of the most powerfully positive demonstrations of pulsed magnetic field therapy applied to infectious illness I have witnessed relates to its application in patients with chronic sinusitis. In one notable case, the female patient in her early 50's suffered from chronic sinusitis for over five years. Every time she consulted her otolaryngologist, her sinuses were swabbed to analyze the bacteria growing there. Based on personal discussions with this physician, there are carefully documented medical records to confirm that no fewer than four species of bacteria would be growing at any one time in this patient's sinus cavities. After using the MRS 2000 several times each day over the course of several months, the sinus infections were completely eradicated. This was confirmed with subsequent sinus swabs. The patient remains infection free over one year later.

Description

Most cases of sinusitis are acute, resolving in less than four weeks. Viruses, bacteria or allergy usually cause sinusitis. Chronic sinusitis is one of the most common chronic illnesses in the United States, affecting 30-40 million Americans each year.

Settings and application

For acute sinusitis or chronic sinusitis, use the probe applicator beginning with 4 minutes to each sinus at a setting of 150-400. Increase to 8 minutes per sinus over the course of 1-2 weeks. The MRS 2000 may increase the production of adenosine triphosphate (ATP), thereby strengthening the regional immune system. In all cases of regional infection such as this, the whole body mat applicator should also be used 1-3 times daily for 16 minutes each. An Intensity setting of 10-50 should be used in the morning and afternoon sessions initially, and 10 should be used in the evening. Intensity and treatment duration can increase or decrease to tolerance.

Description

Tinnitus is the medical term for ringing in the ears. Exposure to loud noise is a common cause, and many members of the Armed Forces end their tour of duty with a chronic ringing or other noise in their ears. One male patient, in his early 40s, had served in Iraq on two separate occasions as a Marine. He was told not to expect his hearing to return. He noted significant improvements in hearing after just five applications of the MRS 2000.

Aside from heavy equipment, chainsaws, excessively loud music from rock concerts or MP3 players, tinnitus can also be caused by advancing age, stiffening of the bones in the middle ear (a condition called "otosclerosis"), ear wax buildup, Meniere's disease, stress or depression, head injury, a non-cancerous tumor of the nerve to the ear called acoustic neuroma, high blood pressure, excessive intake of aspirin (hypersalicylism), atherosclerotic blocking in the neck vessels that feed the brain and ear, and other medications.

Treatment of tinnitus depends on the cause. If there is earwax, it should – of course – be removed. Medicines may need to be changed. Other medicines claim to be able to reduce tinnitus, such as iprazolam, camprosate and tricyclic antidepressants. Alternative medicine such as acupuncture, hypnosis, ginkgo biloba, and zinc supplements may be beneficial.

On my first trip to Germany where I was introduced to a cadre of medical physicians from various specialties who use the MRS 2000 in practice, I was impressed with the enthusiasm they each seemed to show for a predictable improvement in tinnitus by applying the probe applicator. In Europe, pulsed magnetic field therapy has been used for decades, and is a recognized medical treatment. Many patients receiving this treatment have had their tinnitus eradicated. In the United States and Canada, where we use pulsed magnetic field therapy to support overall cellular health and wellness, and where the MRS 2000 does not treat, prevent, cure or diagnose any disease, many people with ringing in the ears have reported the same response through use of the MRS 2000 in the home.

Tinnitus may be one of those conditions that receive top priority for research among our troops returning from Iraq and other parts of the world. It would be a shame to be told you had to live with ringing in your ears when there may be an effective, lasting solution for the problem. Conversely, in cases of otosclerosis, the MRS 2000 has not been effective in my observation.

Settings and application

The probe applicator should be used for four minutes at an intensity setting of 100-200 to each ear affected by tinnitus. The

tip of the probe should be aimed directly into the ear with the tip of the probe placed gently on the skin flap (tragus) at the front of the ear.

Sleep deprivation, fatigue, stress, depression, anxiety and irritability can give rise to or complicate tinnitus. Therefore, the whole body mat applicator should also be used once or twice daily. Begin with an intensity setting of 25 in the morning and 10 at night, and use the mat for 8-16 minutes per application.

Description

Mastoiditis is a bacterial infection in the mastoid process, the prominent skull bone behind the ear. It results from an unsuccessfully treated or untreated infection of the middle ear (otitis media) that spreads to the surrounding bone. Symptoms developed days or weeks following acute otitis media of bacterial origin. A collection of pus, called an abscess, may form in the bone. Skin over the mastoid process may become swollen, tender and red. Other symptoms may include low-grade fever, pain within and around the ear, and a creamy, profuse discharge from the ear. Pain tends to be persistent and throbbing. Hearing loss can become progressively worse. The cartilage of the ear itself may become red and irritated. The condition can progress and become chronic.

Antibiotic therapy is recommended, and IV antibiotics may be necessary. When infection has involved significant portions of the bone, drainage is required.

Settings and application

Use the whole body mat 2-3 times daily for 8-16 minutes per application at an intensity setting of 25-50 in the morning and at midday, and 10 in the evening. Use the probe applicator locally to the mastoid for 8 minutes at 150-400 twice to four times daily unless there is a fever over 100°F.

Author's Note: The MRS 2000, including both mat and probe applicators, should NOT be used in case of fever over 100° F.

Description

Xerostomia is the lack of saliva. The primary symptom is a sensation of dryness of mouth. Aside from this, symptoms also include a sore throat, changed ability to taste, trouble

speaking or swallowing due to thickness of tongue and dryness, bad breath, cracked lips, poor digestion, increased plaque, gum disease and tooth decay, and sores or split skin at the corners of the mouth.

The salivary glands normally produce 45-50 ounces of saliva per day. This fluid contains enzymes that help to break down food and aid digestion. Without these enzymes, digestion is impaired, and malabsorption of nutrients may occur. If xerostomia is chronic, it can dramatically impact nutritional health.

Saliva also prevents tooth decay, rinses food and plaque from the teeth, and limits the amount of bacterial growth in the mouth.

The most common cause of xerostomia is as a side effect from the use of prescription or over-the-counter drugs. Medications that are commonly prescribed for depression and anxiety, anti-histamines, high blood pressure medicine, anti-diarrheal medication, muscle relaxants, drugs for urinary incontinence, and drugs for Parkinson's disease can all produce dry mouth.

Another common, important cause of dry mouth is chemotherapy and radiation therapy for cancer in the head, neck or throat.

One of our patients, a female in her early 70s, had undergone radiation therapy following surgery for throat cancer. After completion of her treatments, she had lost the ability to salivate. A common scenario after surgery like this, the patient had suffered the complete inability to salivate for 3 years.

The patient had tried everything medicine had to offer to recover her ability to salivate. Among her health complaints, she noted dry mouth in her intake history. We recommended she use the MRS 2000 to promote optimal cellular function and wellness, which she did faithfully for several months. To her delight – and ours – her ability to salivate returned completely. This was especially gratifying since she had been suffering for so many years with this problem.

Dry mouth can also be caused by damage to the seventh cranial nerve in the head, diabetes, anxiety and depression, Sjogren's syndrome and stroke.

When dry mouth is caused by the use of other medications, the dosage of these medications may be adjusted, if possible. Common drug therapies for xerostomia are pilocarpine (Salagen) and cevimeline (Evoxac). These drugs are designed to stimulate saliva production.

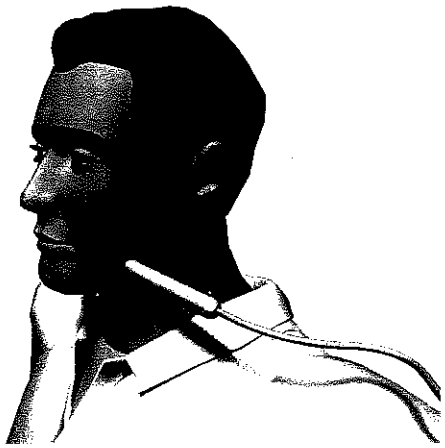
The use of cigarettes and chewing tobacco should stop if dry mouth develops. (You should stop smoking or chewing tobacco anyway – it's bad for you!)

Home remedies include avoiding acidic foods, refined sugar, hard candy and raisins as these all tend to promote tooth decay. Visit the dentist more frequently to monitor oral health.

Sip water frequently throughout the day, or use an over-the-counter saliva substitute. Use a room humidifier to add moisture to the bedroom air. Try to breathe more through the nose than the mouth.

Settings and application

For chronic xerostomia/dry mouth of any cause, place the tip of the probe applicator externally near the salivary glands under the jawbone (mandible). These can be located at the top of the neck in front, at the angle of the jaw. Use the probe applicator for 4 minutes to each side at an intensity setting of 10 one to three times daily. No initial reaction is to be expected. Use the MRS 2000 consistently over many weeks for the best results. Gradually increase the intensity if necessary to a setting of 100 to 200.



DENTISTRY AND ORAL PATHOLOGY

The health of the oral cavity is important. Tooth and jaw problems can produce pain locally, and they can cause and/or perpetuate chronic disease. This is widely known in Europe, and a concept that is just beginning to gain traction in North America.

In the early 1990s, I had the privilege to teach postgraduate chiropractic rehabilitation courses with Dr. Gary Tuthill, a chiropractor and athletic trainer to the Los Angeles Rams professional football team. Dr. Tuthill related the story of a famous running back, Eric Dickerson, who suffered with recurrent hamstring strains. Nothing could resolve Dickerson's hamstring problems until, one day, cavities were located in his teeth. Once the cavities were taken care of, no further hamstring problems occurred.

Chronic dental cavities and root canals that leave dead bone within the biological system of the human body can harbor bacteria, and have harmful effects on the body. These bacteria become a focus of disturbance. Neurotoxin's released from these bacteria easily enter the lymph system since every tooth has a direct connection to this system.

The teeth are not just sharp objects in the face designed to chew food for swallowing. They are living organs. Amalgam fillings can function as a cellular poison for some individuals, and the removal of amalgam fillings may be the turning point for the improvement of health in many people suffering with chronic illness and disease. Chronic diseases and conditions known to relate to dental problems include neuralgias, chronic sinusitis, headaches, movement disorders and joint diseases. Amalgams and other toxic heavy metals, such as mercury, palladium and titanium produce harmful effects on the body.

New, proven methods of heavy metal chelation therapy are available to remove mercury and other toxic heavy metals from the body. These methods do not require intravenous circulation of chelating agents, and are therefore affordable and easy to use.

A note about mercury toxicity The World Health Organization has stated that there is no safe level of mercury in the body because mercury is not naturally eliminated from the body. Mercury is far more poisonous than arsenic and lead. One microgram of mercury contains approximately 43 billion atoms of mercury. The Agency for Toxic Substances and Disease Registry has set the minimal risk level (MRL) for continuous exposure to mercury vapor at 2.0 mcg/m3 of air per hour over a 24-hour period.

In the United States in the 1830s, medical physicians also practiced dentistry. Dental amalgams were introduced at this time, and consisted of 50% silver filings and 50% elemental mercury.

Because medical physicians already recognized that mercury was poisonous, the medical association subsequently banned its members from using mercury. At the same time, barbers were also practicing dentistry in the United States, and were using mercury because it was inexpensive. Barbers placed no ban on the use of mercury.

Seeing a significant loss of revenue to the barber-dentists, the doctor-dentists led a coup against the medical profession's ban on mercury. In 1859, the doctor-dentists started their own association, the American Dental Association (ADA). From its inception, the ADA has denied the harmful effects of mercury in the human body. According to Tom McGuire, DDS, the ADA has historically denied that mercury could harm the body. Currently, dentists use over 34 tons of mercury per year in North America and the ADA considers it malpractice to recommend the removal of amalgams.

It is now proven that mercury vapor is released from mercury-containing amalgam fillings, and this release of vapor is directly proportional to oral temperature. Chewing, drinking hot fluids, and brushing your teeth produces heat and releases mercury vapor into the body.

Some of Europe's finest wellness clinics use magnetic field therapy routinely to calm down the nerves, reduce pain and promote wound healing following a dental intervention. By using magnetic field therapy, pain-reducing medicines are usually unnecessary, and complications following dental procedures are rare.

Description

Gingivitis is rarely painful and is associated with relatively minor signs, including red, swollen and bleeding gums. However, untreated gingivitis can progress to periodontitis, a serious infection that destroys the oral tissues and bones that support the teeth. Periodontitis increases the risk of stroke and heart attack, and disturbs normal balance of blood sugar levels. Pregnant women with periodontitis have an increased risk of delivering a premature baby.

Smoking, a weakened immune system, medications, and hereditary factors play a role in the development of gum disease. A diet deficient in calcium, vitamin C and other antioxidants, and B vitamins can contribute to periodontal disease. Daily brushing and flossing and regular dental checkups can reduce the chances of developing periodontal disease.

The gums appear swollen, bright red or purple, and feel tender to the touch. Teeth may become loose, and pus may be observed between the teeth and gums, producing a bad taste and persistent bad breath. The gums may recede making the teeth appear longer.

Periodontal disease begins with the development of plaque and tartar (calculus). The longer plaque and tarter remain, the greater the risk of developing inflammation between the gums and teeth due to the accumulation of bacteria.

Noninvasive treatments for periodontitis include the practice of good oral hygiene at home and seeing a dentist for professional cleanings. Scaling, root planing and sometimes the use

of antibiotic mouth rinses or flosses may be encouraged. Surgical treatments include flap surgery, soft tissue grafts, bone grafting and guided tissue regeneration.

Magnetic field therapy has been shown to enhance cell membrane permeability, oxygen delivery, immune function, and protein synthesis. Using the MRS 2000 regularly for periodontal disease, gingivitis and gum recession may be a valuable adjunct in recovering from these conditions.

Settings and application
Use the whole body mat applicator 1-3 times per day for eight minutes per application with an intensity setting of 25-100 in the morning, 50 at midday, and 10 in the evening. Use the probe applicator at an intensity setting of 200-400 for 4-8 minutes to the affected areas. The tip of the probe should be aimed externally at the cheek to stimulate the diseased tissue beneath the cheek. Do not insert the probe inside your mouth. The probe is for external use only.

If a bone cavitation occurs as a complication to periodontal disease–such as in necrotizing ulcerative gingivitis–use the probe applicator directly to the area of cavitation for 8-16 minutes at a setting of 400.

Description
As noted at the beginning of this chapter, the use of magnetic field therapy promotes wound healing and reduces pain. It may work in conjunction with antibiotics to prevent or limit infections that may occur following a tooth extraction.

Individuals, whose immune systems are weakened, are particularly susceptible to these infections. Such patients are often placed on prophylactic antibiotic prescriptions. Pre-treatment using the MRS 2000 for its potential immune strengthening properties can be performed. Following extraction, the local probe applicator is recommended.

Settings and application
Pre-extraction preventive protocol:
In order to support and strengthen the immune system prior to a tooth extraction, use the whole body mat three times per day for eight minutes per application, with an intensity setting of 25-100 in the morning, 25-50 at midday, and 10 in the evening.

Post-extraction protocol in the ABSENCE of infection:
Following an extraction use the probe applicator locally at a setting of 10 for eight minutes to the area of extraction. Gradually increase dosage to an intensity setting of 200 over a 7-10 day period.

Post-extraction protocol when an infection is suspected:
A local infection or abscess can be aggravated by increased blood flow. If you have increased

pain, swelling, warmth, fever and/or redness in the area of extraction an infection may be present. In such a case, do not use the probe applicator for at least 48 hours after beginning antibiotic therapy under the supervision of your dentist or medical physician.

Description

A dry socket (alveolar osteitis) occurs following a tooth extraction if the blood clot at the site of extraction is dislodged. This exposes underlying bone and nerves, and may cause intense pain. Proper postoperative dental care usually prevents this condition from developing. Pain may radiate from the sockets to the ear, eye or to the same side of the face. There may be bad breath or foul air in the mouth, or an unpleasant taste in the mouth. Lymph nodes around the neck or jaw may be swollen, and bone may be visible in the sight of tooth extraction.

Flushing the socket, pain medication and medicated dressings by the dentist or oral surgeon can provide appropriate relief. Flushing may continue at home using a plastic syringe with a curved tip. Complete healing may take 10-14 days.

To avoid a dry socket following a tooth extraction, brush teeth gently, avoid drinking through a straw, avoid spitting, avoid vigorous mouthwashes, and avoid foods that may become lodged in the socket, such as popcorn, peas, peanuts, etc. Avoid the temptation to place the tip of your tongue in the socket.

Settings and application

In conjunction with other treatments recommended by your dentist, use the probe applicator 3-5 times per day for 8 minutes each at a setting of 100-400 to the dry socket by holding the tip of the probe to the outer cheek. The magnetic waves will pass through the cheek and may stimulate the nerve, bone and soft tissue cells causing the dry socket to heal more quickly, without infection.

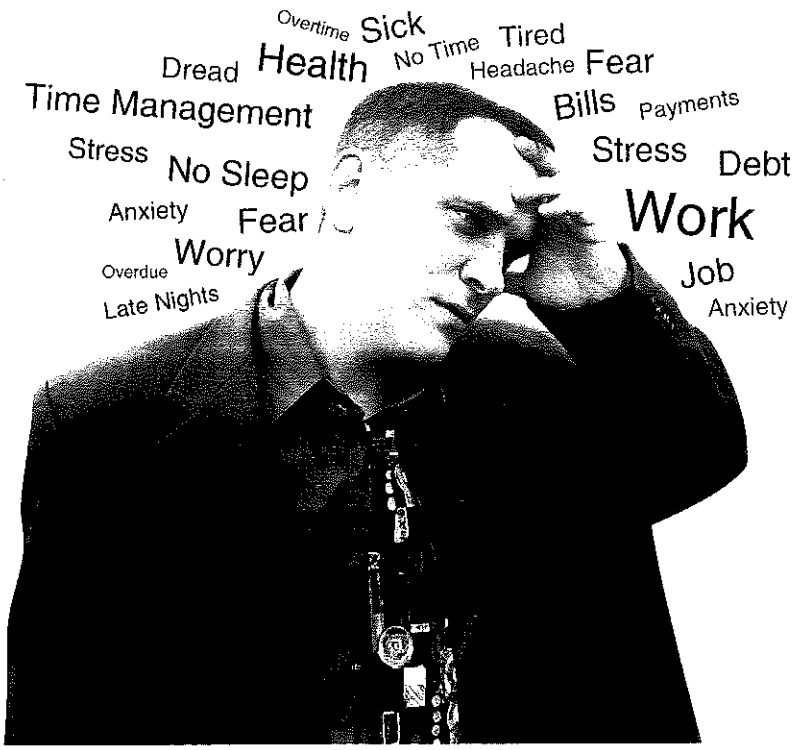
See the chapter on Pain

See the chapter on Otolayrngology

See the chapter on Neurological Conditions

PSYCHOLOGY

The psalms of Scripture tell us: "As a man thinks in his heart, so is he," and "A joyful heart is good medicine." Ancient wisdom records the relationship between the mind and emotions. Psychology teaches us that the mind, body and emotions are inseparably linked to one another. Albert Einstein has stated: "The sole governing agency of the particle is the field." While he may have been referring to quantum physics exclusively, he may have also been referring to reality in general, including the realm of psychology. The field (our environment in microcosm and in macrocosm,) governs every molecule of our bodies, as well as the emotions that permeate every cell of our bodies.



Positive and negative thoughts have physical expression in the biological responses of the hormone system, the neurological system and the vascular system, to name but a few. Thoughts provide context and contour to the environment of the human body–essentially constituting a "field." As such, this field lends governance to the "particles" of the human body; that is, the tissues and cells, sub-molecular structures, cell membrane receptors, mitochondria, blood flow and electron flow. Do you find this hard to believe? The evidence is all around you! For a detailed discussion, I encourage you to explore Bruce Lipton's book, The Biology of Belief. *(Lipton 2005/242)* There is no need to agree with everything that Dr. Lipton says. However, the fundamental science is good, and his argument that thoughts affect cellular behavior is incontrovertible.

Likewise, Dr. Candace Pert discovered endorphin receptors on the surface of every cell. She declared that these neuropeptides were "molecules of emotion" – and that our feelings are not contained exclusively in our brains, but in fact are expressed through every cell in the body via these receptors. These facts are both amazing and true. They will revolutionize the medicine of the future. *(Pert 1997/245)*

Any stimulus that can signal neuropeptide receptor response in every cell of the body simultaneously can affect the emotional state of the entire human being. Electromagnetic signaling using the whole body mat applicator of the MRS 2000, to which these neuropeptide receptors are highly sensitive, is a stimulus that does just that. The current applications of pulsed magnetic field therapy in psychological disturbance have just barely scratched the surface. For example, a pulsed magnetic field originally designed for magnetic resonance spectroscopic imaging was found to alleviate symptoms in bipolar patients, while another MRI pulse had no effect. *(Rohan 2004/243)*

Transcranial electromagnetic stimulation (TES) is a relatively new electromagnetic technology used to treat depression. This technology received FDA-approval in October, 2008. It utilizes extremely high amplitudes of electromagnetic intensity. TES represents regionally focused treatment to the brain only using frequencies and amplitudes that are outside the scope of this book.

The more generalized, natural, holistic, widespread cellular response that I have observed personally and with many loved ones, patients and friends using the MRS 2000 is a calming, mood lifting, stress-reducing effect that I highly recommend to anyone living in the new millennium. Our hectic, time-starved schedules and stress-filled lives can use all the help we can get!

It is important to also make mention of the fact that the Sound Light Relax System (SLRS) can have profound, positive effects on anxiety, depression, attention deficit and hyperactivity, memory problems, anger, and low arousal states of the brain. Brain wave entrainment occurs using the visual and auditory pathways that are stimulated by the SLRS. This system comes as an optional attachment to both MRS 2000 Home and Med Systems.

See "Autonomic Dystonia"

Description

Bedwetting is involuntary urination during sleep at night. Prior to the age of six or seven, this is common, and not a concern. Nighttime bladder control develops at different rates among children, and is a function of neurology rather than toilet training. When bedwetting persists beyond the age of seven, it may be primary enuresis (where there's never been a dry night) or secondary enuresis (where there has been at least six months of dry nights).

Before the age of five, about 40% of children wet the bed. It is more common in boys. By the age of five, bedwetting persists in 10-15% of children. Some children have a bladder that is not fully developed, while others are not able to recognize a full bladder during deep sleep. Stress, urinary tract infection, hormonal imbalance, diabetes, and sleep apnea may also give rise to bedwetting. In rare cases, an anatomical defect is present in the neurological system or urinary system.

Bed-wetting may lead to guilt, embarrassment, and low self-esteem. Parents should not shame, punish or tease a child who wets the bet, but rather encourage and reassure the child that this is a normal phase that will soon be outgrown. In the meantime, plan for easy cleanup from bedwetting by using plastic mattress covers and absorbent underwear. Keep fresh sheets and pajamas available. Share the responsibility for cleanup with your child, as this may help him have a greater sense of control. Chiropractic care has been effective for many children with nocturnal enuresis. Sometimes bladder training, moisture alarms or medications may help.

The use of the MRS 2000 may become an important part of the bedtime routine. The bladder should be emptied right before bed, and fluids may be partially restricted after dinner until bladder control is established.

Settings and application

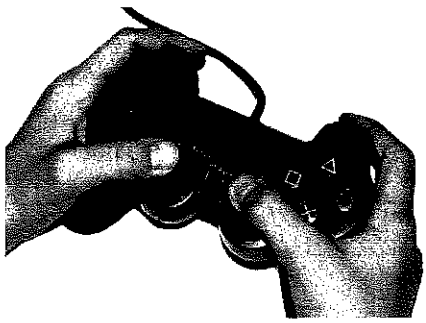
Use the whole body mat applicator twice daily for 8-16 minutes per application. An intensity setting of 25 should be used in the morning, and 10 should be used at night. The pad applicator may be placed over the bladder area for eight minutes at a setting of 10-100 once or twice daily.

See "Stress-induced Depression" in the Chapter on Neurology

Description

Attention deficit/ hyperactivity disorder is characterized by inattention, hyperactivity and impulsive behavior. It affects millions of American children and can persist into adulthood. Interpersonal relationships, self-esteem, and school or work performance are detrimentally affected by this disorder.

About one child in four with ADHD has a relative with the condition. Women who smoke, use alcohol or abuse drugs, or who are exposed to environmental poisons such as polychlorinated biphenyls (PCBs) are more likely to have children with symptoms of ADHD. Interestingly, children with ADHD have up to 4% smaller brain volumes than children without ADHD.



A 2004 study published by Christakis, et al in Pediatrics conclusively established a link between high volume early television exposure and subsequent attention deficits in children. *(Christakis 2004/244)* For every one hour watched per day by an infant, there was a 10% increase in the chances of developing attention problems that could be diagnosed as ADHD by age 7. In other words, a toddler watching three hours of television daily had nearly a 30% higher chance of having attention problems in school.

TV watching "rewires" an infant's brain and the damage shows up at age 7 when children have difficulty paying attention in school. The pace of TV is taxing on the young, developing brain. Quick, unnatural changes in the visual and auditory fields expose babies' brains to overstimulation, potentially causing permanent changes in developing neural pathways. The persistent noise of television may compete with normal language and speech development as well.

On the positive side, some studies have shown that certain children's programs (such as Sesame Street and Mr. Roger's Neighborhood) increased a child's knowledge base, racial attitude, positive social behavior and imaginative play. However, Power Rangers and action cartoon programming such as Batman and Superman increased aggressive behavior.

Newer studies reveal that an increasing number of children of all socioeconomic classes are spending more time with handheld electronic games than watching TV. Rapid, unnatural scene changes are just as common with these devices as with TV, and content leans heavily toward continuous action and, in many cases, aggression also.

The rise in obesity among children in North America may be linked to the sedentary use of television and handheld electronic games, which displace balanced time for outdoor activity, imaginative whole-body activities (kinetic and kinesthetic play) and exercise.

Patience, physical contact and eye contact as expressions of positive affection are essential in helping children with ADHD. Improving organizational skills, identifying difficult situations, ensuring your child gets plenty of rest, engagement in athletic activity, gymnastics, dance lessons or martial arts classes, and a positive, proactive discipline plan can help the entire family cope. An excellent book for parents is Parenting with Love and Logic, by Foster Cline and Jim Fay. *(Cline 1990/246)*

Settings and application

The MRS 2000 has a calming effect on the nervous system, and may be of significant value in providing structured, well-defined down time for children with ADHD. The SLRS system has been used with the MRS 2000 in children with ADHD to great effect, and is highly recommended. The visual and auditory stimulation guide the brain from an overly excited, scattered brain wave pattern to a more natural, calm state over the duration of a whole body mat application. Program 2 is recommended for entraining alpha brain waves in these children.

Use the whole body mat applicator 2-5 times daily for eight minutes per application. Increase to 16 minutes as tolerated by the child. Limit the use of the whole body mat to one hour per day. The intensity settings should begin at 10 and be raised to more no more than 25.

Description

It is estimated that 60% of Americans have trouble falling asleep or staying asleep. Insomnia is an epidemic, according to the National Sleep Foundation. Sleep problems are widespread, on the rise, and often associated with other conditions such as sleep apnea, anxiety, and as a complication of medication use. Insomnia is cited as the most common reason people are late for work. People who sleep well are happier and healthier. When sleep is poor or inadequate, people feel tired or fatigued, their social and intimate relationships suffer, and their work productivity and ability to drive safely on the roadways is negatively affected.

Deep sleep is imperative for human health. One reason for this is human growth hormone (HGH) release. HGH release by the anterior hypothalamus in the brain is triggered by a number of natural stimuli, the most powerful of which are sleep and exercise. About one hour after the onset of deep sleep, HGH (somatotrophin) is released in its largest dose of the day. This hormone is essential for healthy turnover of many of the body's tissues, including muscle, bone and collagen. It is important for the repair of these tissues when they are injured. Its release helps prevent obesity. It is therefore not surprising that refined sugars in the diet inhibit the release of HGH.

The largest release of growth hormone in the body is one hour after the onset of deep sleep. For the majority of adult North Americans where sleep is disrupted or impaired, this infusion of HGH is compromised and the body's ability to repair and regenerate is diminished. The aging process is, in effect, accelerated.

The MRS 2000 provides a form of pulsed resonance that has been shown to enable restful sleep for the body. In one study of pulsed electromagnetism, 95% of insomnia patients

obtain complete relief of their symptoms. Another study found a reduction in sleep disturbance in 83% of those exposed to the electromagnetic field. A third study showed more than 70% of patients had results within five days, and insomnia improved between 77 and 97% in those patients. Experience with many patients and friends in our clinics have confirmed this effect with the MRS 2000. Furthermore, numerous animal studies on the effects of pulsating magnetic fields clearly showed the induction of somnolence in direct response to the magnetic field.

There is no evidence to suggest that pulsed magnetic field exposure is directly related to the release of HGH or other hormones.[26] However, the quality and depth of sleep is directly related to the quantity of HGH that is released. Since low frequency pulsed magnetic fields help to relax the body and induce more restful sleep, indirectly the application of this technology can enhance the frequency and quantity of natural HGH released into the body. It follows that the net effect is more restful sleep, lowered stress levels, improved repair and regeneration of connective tissues and muscle, and better overall health.

I predict that magnetic resonance stimulation and other forms of energy medicine such as acupuncture will, in the future, become the predominating alternatives of choice for insomnia. When a patient presents with the condition that a healthcare provider absolutely knows they can help – with a great degree of confidence – the provider's heart skips a beat with excitement! Doctors love to help people. Before discovering the power of energy medicine, I heard many complaints of insomnia and realized I didn't have much to offer. When we added acupuncturists to our practice, things changed dramatically. Then, when we began using the MRS 2000 things changed dramatically again. These days, when I hear a patient complain of insomnia I get excited because I'm sure I can support at least 95% of such cases. We now have very effective solutions for this problem!

Insomnia can lead to excessive daytime drowsiness and irritability. Stress, anxiety, depression, prescription drugs or long-term use of sleep medications, working the night shift or changing the circadian rhythm, too much late TV, and eating too late in the evening, can cause it. In the case of TV, imagine watching an adult TV show or movie full of tense, suspenseful, adrenaline producing fighting, explosions and chase scenes. (Batman, James Bond, and Monday Night Football come to mind. The 10 O'Clock News is usually bad news, and this only makes matters worse!) After cranking up the adrenaline levels in the body, we brush our teeth and trip off to bed expecting to fall asleep. What's wrong with this picture? Well, the answer is obvious.

We need to observe a regular bedtime routine that is conducive to sleep, rest and relaxation. A cup of warm green tea and a shower can relax the body, inside and out. Avoid eating that

[26] Only one study exists in the English language, where a high-frequency (900 MHz) magnetic field produced a mild, transient increase in cortisol. *(Mann 1998/173)* Cortisol is released in response to stress, and the authors of this study concluded that the observed change was an adaptive response to the magnetic stimulus. Interestingly, there was a trend in the 900 MHz frequency range to suppress REM sleep in this study. Recall that the MRS 2000 does not use a high frequency field.

sugar-laden "bedtime snack." (My Grandpa and Grandma Carmichael used to make us ice cream floats before bed when we'd visit the farm in Iowa. It was great fun, but we were "wound up" children for quite a while afterwards!) Listen to calm, relaxing music. From a neurological perspective, "Techno" might not be the best genre on your iPod playlist during the waning hours of the evening!

Whether I have time for applications of the MRS 2000 during the day or not, I make sure not to miss the evening application, right before bed. The stress of the day and my desire for restful, restorative sleep requires it. Often times, I use the SLRS system in conjunction with this application. Sleep happens.

Settings and application
Use the whole body mat applicator at an intensity setting of 25-50 in the morning, 25-50 at midday, and/or 10 at night. The duration of the application should be 8-16 minutes. Use the SLRS system to help enhance the feeling of drowsiness and the onset of deep, restful sleep. Once you've experienced the positive health effects of energy medicine in this way, you may want to tell others about your experience.

Adjunctive, supportive measures for insomnia include the use of Valerian root and Melatonin.

See "Muscle Tension," "Spasm," "Autonomic Dystonia," and "Stress-Induced Depression"

DERMATOLOGY

Dermatology is the branch of medicine that concerns itself with the skin, hair, sweat glands, and other cutaneous and subcutaneous organs. The skin is the largest sensory organ in the body, containing approximately 20,000 receptors that send messages to the brain per square inch of surface area. Much of our experience with our environment takes place to the skin. Several specialized structures exist within our skin (or, "integument") to protect us from disease and from harm.

When the skin cells break down and become dysfunctional, the changes are easy to observe and photograph. Skin ulcerations, rashes and other lesions are clearly visible, and their response to pulsating magnetic field therapy is just as visible. Perhaps no more direct dramatic change in cellular health is as easily observed as in the realm of dermatology.

Description

A hair follicle has, at its base, sebaceous glands. These glands secrete an oily substance called sebum. Sebum lubricates the hair as well as the skin. It travels upwards along the shaft of a hair and out through the opening of the hair follicle onto the surface of the skin.

Acne pimples, zits or blemishes occur when the hair follicles become clogged with dead skin cells, sebum, and occasionally, bacteria. Excess production of sebum can build up, combined with dead skin cells, and the result is a clogged pore. The follicle wall bulges, giving rise to a "white-head." When the clog opens to the surface of the skin it darkens as the result of contact with the air and/or accumulation of soil particles on the skin's surface. This produces a "blackhead." Redness and inflammation develop, and the raised lesion is known as a pimple or zit.

Hormones (especially progesterone), bacteria, heredity and other factors may contribute to the increased production of sebum that leads to acne. Some women who take birth control pills or get pregnant experience the onset of acne due to the hormone changes.

Excessive scrubbing dries out the skin, can produce scarring, and makes acne worse. Severe forms of acne include the development of pustules (red, tender bumps with white pus at their tips) and nodules (large, solid, painful lumps deep beneath the surface of the skin that can cause scars.)

Settings and application

Use the whole body mat applicator two or three times daily for 8-16 minutes per application at an intensity setting of 25-50 in the morning and afternoon, and10 in the evening. Adjunctive skincare methods are encouraged, together with nutritional, dietary and stress management measures. Subcutaneous ultrasound treatment using a SkinDream® Titanium produces stimulation and improved function of the hair follicles, softening the skin and lessening surface irritation.

The benefit of magnetic field therapy is in its anti-inflammatory effects, as well as the improvement of nutrient exchange at the cell membrane. Improvement may be noted in as little as 4-6 weeks. However, severe cases of acne may require 2-8 months to achieve permanent and lasting results.

An initial reaction may worsen the acne for one to two weeks in 20% of people. This should be expected, and should not discourage continued use of the MRS 2000 as a supportive measure to ultimately aid in producing lasting reduction of acne blemishes.

Description

As noted at the beginning of this chapter, improvements in skin disorders under treatment are readily visible, and a cause-effect relationship to these improvements is easy to see. Venous stasis ulcers, diabetic wounds and pressure ulcers will be discussed here.

A significant body of research evidence exists for the efficacy of pulsating magnetic field therapy for ulcerations of the skin. Ieran, et al studied venous ulcers in a randomized, controlled clinical trial. *(Ieran 1990/247)* After 90 days of treatment 67% of the active treatment group had healed ulcers, versus 32% of the control group. At one year follow-up, 89% of the active treatment group had healed ulcers, versus 42% of the control group. The researchers concluded: "... stimulation with pulsating electromagnetic fields is useful in obtaining the healing of a very high percentage of ulcers, in a short time."

A similar study by Stiller, et al in the British Journal of Dermatology showed significant improvement without side effects in venous ulcers at eight weeks, as measured by wound depth, wound area and pain intensity. *(Stiller 1992/248)* This group concluded that pulsating electromagnetic field therapy was safe and effective treatment for recalcitrant venous leg ulcers.

Salzberg studied 30 male spinal cord injured patients with stage two or stage three pressure ulcers and found that active, non-thermal pulsed electromagnetic energy treatments significantly improved healing. *(Salzberg 1995/249)*

Chronic venous insufficiency (CVI) can lead to life-threatening infections of the lower extremity. Between 2-5% of Americans have skin changes associated with CVI, and 500,000 Americans have venous ulcers. The peak age of onset is 40-49 years for women and 70-79 years in men. Age, family history and lifestyle are significant risk factors.

Sixteen million Americans have diabetes, and of these, 800,000 develop diabetic foot ulcers. These foot ulcers a responsible for more hospitalizations than any other complication of diabetes. It is estimated that 12-24% of foot ulcers require amputation.

Pressure ulcers, also known as decubitus ulcers, developed in 3-11% of all persons hospitalized with an acute illness. One third of these patients are under the age of 70. Pressure sores are the direct cause of death in 7-8% of all paraplegics.

Pulsating electromagnetic fields improve efficiency of hemodynamics through improved circulation and create changes in cell membrane potential, leading to accelerated healing. The MRS 2000 may be a powerful tool in supporting the healing of ulcers and wounds. Clinical case reports are numerous. In Hawaii, for example, where diabetes is rampant, amputation for ulcerations is fairly common. We know of at least one case where a diabetic patient began using the MRS 2000 just two weeks prior to a scheduled amputation surgery. The positive changes in skin coloration and local circulation in the foot and ankle were so significant in just one week that the amputation surgery was cancelled.

Settings and application
For venous ulcerations, pressure sores and diabetic wounds, use the pad applicator for 16-24 minutes at an intensity setting of 150-400. Larger individuals should use a higher intensity setting. Applications should be provided 3-5 times daily. No initial reaction should be expected.

Description
Eczema, also known as atopic dermatitis, is most likely due to a combination of dry, irritated skin together with a malfunctioning of the body's immune system. Stress or other emotional disorders may produce or aggravate dermatitis, but do not cause it. Allergic symptoms are frequent, and eczema tends to run in families with asthma or hay fever.

Measures that can be used to prevent or lessen the symptoms of eczema include bathing less frequently, moisturizing the skin, drying the skin using a gentle patting motion with a towel after bathing, and limiting the use of soaps and deodorants to only mild, hypoallergenic products.

Home remedies for eczema include the identification and avoidance of allergic triggers such as rugs, bedding and clothing, as well as harsh soaps, detergents and deodorants. Calamine lotion or anti-itch cream can be used. Cool baths using baking soda, uncooked oatmeal or colloidal oatmeal (e.g., Aveeno), and applying cool, wet compresses may relieve symptoms. In severe cases, topical prescription strength corticosteroid creams may be used, and oral steroids may be prescribed temporarily as well. However, serious potential side effects such as cataracts, osteoporosis, muscle weakness, decreased resistance to infection, high blood pressure, and thinning of the skin can result from long-term use of steroids.

Settings and application
Use the whole body mat applicator 1-3 times daily for 8-16 minutes at an intensity setting of 25-50 in the morning, and 10 at night. The goal is to promote autonomic regulation and enhanced function.

Description
A furuncle, or boil, is a localized area of deep infection within the hair follicle by staphylococcus bacteria. The area around the boil is red and swollen. Boils often penetrate into deeper

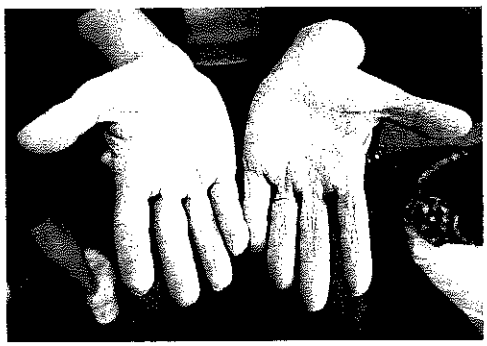
layers of skin, and are filled with pus and dead cells. When several furuncles occur together and coalesce, they are called carbuncles. A carbuncle can get to be 2 inches in diameter or more.

Usually a boil will fill with pus within a day, then it continues expanding. It may reach golf-ball size before developing a yellow-white tip that finally ruptures and drains. The rupture and drainage relieves pain and inflammation. A carbuncle is a cluster of boils that often occurs in the back of the neck, shoulders or thighs, especially in older men. Carbuncles produce a deeper, more severe infection then boils do. They develop and heal more slowly, and often produce scars.

Since boils, furuncles and carbuncles represent a deep bacterial infection, they may need to be drained by a physician. Deep infections that cannot be completely cleared may be covered with sterile gauze so that pus can continue to drain. Antibiotics may be prescribed to help heal severe or recurrent infections. A cloth soaked in warm salt water applied to a boil or carbuncle for 30 minutes several times daily may help the lesion burst and drain more quickly. Salt water can be prepared by adding one teaspoon of salt to one quart of boiling water. Let the water cool until comfortably warm for application with the cloth.

Settings and application
Prior to the rupture of a boil or carbuncle, the MRS 2000 may be used to accelerate the rupture and lessen pain. Use the probe or pad applicator at an intensity setting of 100-150 for 16 minutes 3-5 times daily.

Note: The probe or pad applicator should be covered with a small plastic bag to keep it clean from pus. An initial reaction may occur in 20-25% of cases. This may be relieved or avoided altogether by using the MRS 2000 simultaneous to the application of a warm compress.



Description
Lichen planus is an inflammation of the skin. It is not an infection, and it is not contagious. The cause is unknown. It may represent an allergic or immune reaction. It may represent an electron deficiency disorder – in a category of condition that requires a new way of thinking

about diseases in general. Electron deficiency disorders must be appreciated by thinking at a submolecular level where an understanding of the flow of electrons is as important as an understanding of chemical reactions, if not more. The fact that lichen planus has been treated with phototherapy using ultraviolet light gives more credence to the idea that energy medicine may be vital to unlocking greater insight into this poorly understood disorder.

Lichen planus is more common in middle-aged adults, and it is more frequent in females. People with liver disease such as cirrhosis or hepatitis C are more likely to develop this skin disorder.

Classical medical treatment for lichen planus includes the use of antihistamines, topical ointments or steroid creams, oral steroid medications, or immune suppressing drugs. Home remedies include the use of tub soaks with colloidal oatmeal (Aveeno), over-the-counter oral antihistamines (Benadryl and others), cool compresses and over-the-counter ointments or creams containing 1% hydrocortisone.

One of our patients developed lichen planus in November of 2006. The condition was chronic, and involved mucous membranes (her lip) which can take years to resolve. Nothing helped and she'd tried several medical treatments. The skin of her hands, forearms, legs, neck and back was affected. The skin appeared significantly reddened, flaky and fragile. It was interesting to note that when she ate foods containing refined sugar, her condition worsened. (See before and after pictures on page 299.)

This patient began using the MRS 2000 regularly in October 2007, and within nine weeks and 27 applications the lesions were significantly improved, although still itchy at times. Currently the condition is well under control with infrequent use of the MRS 2000. Her skin appears normal.

Settings and application

Use the whole body mat applicator for 8-16 minutes at an intensity setting of 25. In addition, use the local pad applicator at a setting of 25-150 for 8-16 minutes to the affected areas of skin. In the above case we found it beneficial to use the probe applicator at setting of 100 for 4 minutes each to two separate areas of the lip.

Description

Alopecia is another word for hair loss. It is common in male pattern baldness and is most often related to higher levels of testosterone (androgenic alopecia). Another form of baldness, alopecia areata, is thought to be an autoimmune disease, but the cause is really unknown. Some cases of alopecia areata are stress-induced. The hair can be lost several times, but generally grows back.

Inflammatory conditions of the hair follicles can produce baldness in such conditions as lupus erythematosus or lichen planus. This is called cicatricial (scarring) alopecia.

Hair loss can follow deep emotional or physical stress, such as the death of a loved one. This is called telogen effluvium, and can also be the result of a sudden, high fever, sudden excessive weight loss, nutritional deficiencies, surgery or metabolic disturbances. The hair loss of chemotherapy in cancer patients may, in some cases, result from this. Typically hair re-grows once chemotherapy treatments cease.

Excessive hairstyling produces a form of hair loss called traction alopecia. Diabetes and other diseases, hormonal changes, chemical treatments of the hair, scalp infections (ring worm, a fungal infection) or mental illness (trichotillomania, or hair-pulling disorder) can also produce hair loss.

The treatment of hair loss must address the cause. Dermatologists often prescribe drugs, including Rogaine, Finasteride and oral corticosteroids. Two scientific studies report positive effects of magnetic field therapy for androgenic alopecia. *(Maddin 1990/250; Bureau 2003/251)*

Settings and application
Use the whole body mat applicator for 8-16 minutes at an intensity setting of 10-100 once to three times per day, concluding the day with an intensity setting of 10. The pad applicator can be used at 25 to 100 for 8 minutes once or twice daily. Studies suggest that treatment should continue for 6 months or more for the best results.

Description
Patches of skin that itch causing the urge to scratch characterize neurodermatitis. Also known as lichen simplex chronicus or "scratch dermatitis" the cycle of scratching and itching can cause the affected skin to thicken and feel leathery. The cause of the condition is unknown.

Triggers for itching include scratching the area, stress or anxiety, and other conditions of the skin such as eczema or psoriasis. Persistent scratching may lead to bacterial infection and permanent scarring. Classical treatment includes prescription medication such as oral steroids or antihistamines, or even anti-depressants or anti-anxiety medicines due to the incessant itching leading to compulsive scratching. Wet dressings can help the skin absorb medicated cream, and protect the skin from scratching. Cool baths, textured

cotton clothing, mild soaps and hypoallergenic perfumes, and stress management can reduce the urge to scratch.

Settings and application
For improved relaxation, stress management, and autonomic balance, use the whole body mat applicator 2-3 times per day for 8 to 16 minutes. Morning and afternoon applications should begin at an intensity setting of 25-50, and the evening application should be at an intensity setting of 10. The SLRS system may also help relax the brain to overcome stress or anxiety in conjunction with neurodermatitis.

Description
Psoriasis is a common, chronic skin condition characterized by the presence of red patches of skin covered with silvery white scales. Dry, cracked and bleeding skin may itch, burn, or be painful. The fingernails may thicken, or developed ridges or pits. This condition can be associated with joint pain, swelling and stiffness called psoriatic arthropathy.

Psoriasis is related to the immune system. Overactive T lymphocyte cells (T-cells) fail to recognize healthy skin cells as normal, and begin to attack them. This results in a continual cycle of new skin cell formation because the T cells kill the outermost layer of skin too quickly.

Injuries to the skin such as cuts or scrapes, bug bites or sunburns may provoke increased psoriasis lesions. Heavy alcohol consumption, smoking, cold weather and stress will also flare up psoriatic episodes.

Categories of traditional medical treatment for psoriasis include: 1) topical treatments, 2) oral medications (including chemotherapeutic agents such as Methotrexate), and 3) phototherapy. The mildest forms of treatment are begun first. The goal is to find the most effective way to slow cell turnover with the fewest possible side effects.

Combining traditional medical treatments for psoriasis with energy medicine, and specifically with pulsating magnetic field therapy, may increase the effectiveness of treatment. Research has shown that electromagnetic fields modulate the proliferation of T cells in vitro. Authors of a preliminary laboratory study published in 2001 suggest that electromagnetic fields might be used with positive benefit in patients with psoriasis. *(Johnson 2001/252)*

An older clinical study in Italy examining 110 patients with psoriasis who underwent pulsating magnetic field therapy found 73-75% good results for classical and guttate psoriatic lesions, and 100% good results for lesions in and around the scalp. No side effects were reported. The authors opined that pulsating magnetic field therapy exerted a systemic effect. *(Castelpietra 1984/253)*

Settings and application
For improved immune cell communication, potential modulation of T lymphocytes and

systemic circulatory enhancement use the whole body mat applicator 2-3 times per day for 8 to 16 minutes. Use an intensity setting of 25-50 in the morning and at midday, and an intensity setting of 10 in the evening.

V. Hyperhidrosis (Excessive Sweating)

Description

Hyperhidrosis is the excessive secretion of sweat. It is a condition that usually affects the underarms, the palms of the hands, the head, the face, and the feet. People with hyperhidrosis are often embarrassed by this condition, excusing themselves in social situations, and not infrequently suffering with anxiety or embarrassment.

Hyperhidrosis is characterized by excessive and bothersome sweating that can soak through clothing, produce clamminess or wetness of the palms of the hands or soles of the feet. Some women going through menopause will experience hyperhidrosis in conjunction with hot flashes. Recently an older female patient of mine complained about the difficulties of being at a gathering of women in a formal social setting when her head became soaked with sweat following a hot flash. Her hair was ruined and she felt the need to excuse herself from the event.

Hyperhidrosis is always associated with warmth. As such it must be differentiated from a cold sweat. A cold sweat represents the body's response to a serious illness, such as cardiac disease, anxiety, severe pain or shock. A cold sweat without apparent reason is the body's warning signal that immediate medical attention is required. A warm, excessive sweat – hyperhidrosis – is a different phenomenon.

Focal hyperhidrosis involves excessive daytime sweating of the palms and feet, and sometimes the underarms, without known cause. This form of hyperhidrosis runs in families and is suspected to have a genetic component.

By contrast, generalized hyperhidrosis affects large areas of the body. This would include the menopausal hot flashes noted above, and may also occur in conjunction with systemic disease such as a hyperthyroidism, leukemia, lymphoma, or infectious disease. Some people suffering with myocardial infarction (heart attack) may have generalized hyperhidrosis, and may not differentiate the excessive sweating from a "cold sweat." Any person with an occurrence of chest pain, neck pain or facial pain in conjunction with excessive sweating should seek medical attention immediately.

Excessive sweating may give rise to heat rashes or prickly heat, bacterial infections or warts, especially around and hair follicles, or fungal nail infections.

Medications are available for hyperhidrosis, but the side effects of suppressing the actions of acetylcholine (the chemical that signals the sweating response) can be significant and widespread, including dry mouth, constipation, blurred vision, urinary retention, loss of taste, dizziness and confusion. Iontophoresis, the delivery of electrical current and ionized pharmaceuticals to the hands and feet, is a procedure performed by dermatologists.

Botulinum toxin (Botox), the chemical used to paralyze facial muscles to eliminate wrinkles, has the side effect of blocking the nerves to the sweat glands. It has been used in some cases to treat hyperhidrosis. The effect lasts about four months, is expensive and must be repeated. In severe cases, surgery is sometimes performed to remove the sweat glands.

Hyperhidrosis may represent over-activation of the sympathetic nervous system or the under-activation of the parasympathetic nervous system. Autonomic imbalance may benefit from the application of magnetic resonance stimulation since the field produced improves parasympathetic function.

Settings and application

To improve autonomic function and contribute towards the balance of the sympathetic and parasympathetic nervous systems, use the whole body mat applicator 2-3 times daily for 16-24 minutes per application. Begin at an intensity setting of 25 for applications in the morning and at mid-day, and use 10 at night before bed.

Description

It is important to be able to distinguish between burns that are minor from burns that are serious. Burns are classified into three degrees, a first-degree burn being the least serious, and a third degree burn being the most serious.

From a treatment standpoint, burns are divided into two groups: minor and major. Minor burns can be treated at home without medical attention. Major burns require immediate medical attention.

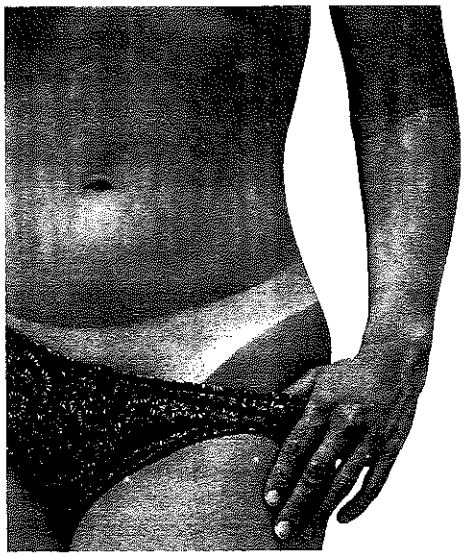
A first-degree burn involves the outer layer of skin (epidermis) only. It may involve swelling and pain. A first-degree burn should be treated as a minor burn.

A second-degree burn involves the second layer of skin (dermis) as well as the first, or outer, layer of skin (epidermis). If a second-degree burn involves a small area no larger than 3 inches in diameter, it should be treated as a minor burn. However, if it is larger, or involves the face, feet, hands, groin or buttocks, it should be considered a major burn and medical attention should be sought immediately.

A third-degree burn involves all layers of skin and causes permanent tissue damage. It may involve tissue to the level of bone. These burns are painless because nerve tissue has been destroyed. Areas may be charred black or appear dry and white. Toxic smoke inhalation often occurs in conjunction with such severe burns, and signs of respiratory distress may be obvious.

Minor burns, including first-degree burns and second-degree burns smaller than 3 inches in diameter can be treated by cooling the burn with running water for at least five minutes, applying a sterile gauze bandage loosely, and using herbal, homeopathic or over-the-counter

anti-inflammatories. (Please remember never to give aspirin to children or teenagers in order to avoid Reyes' Syndrome.) Minor burns usually heal without formal medical treatment. However, increased pain, redness, fever, swelling or bruising may represent infection, and if this occurs, seek medical attention.



Major burns require emergency medical attention. Dial 911 to access the emergency medical response system if such service is available in your area. Do not remove burned clothing, but make sure the victim is no longer in contact with hot or smoldering fabric. Do not immerse third-degree or large second-degree burns in water, as this may cause shock. Monitor breathing and circulation until emergency help arrives. Be prepared to administer cardiopulmonary resuscitation (CPR) if breathing ceases.

Sunburn is a form of first-degree burn caused by excessive exposure to ultraviolet (UV) light. Darker skin color blocks the UV rays. However, people with lighter complexions are unable to produce enough melanin to protect the skin. Up to 90 percent of UV rays pass through clouds, and the burning capacity of sunlight is reflected off snow, ice, sand and water. UV rays penetrate the atmosphere more completely at higher altitude. The combination of snow and high altitude produces severe sunburns to the face, nose and lips of many visitors coming to Colorado to snow ski for the first time. Unfortunately, people are not aware that the burning is taking place as their minds are occupied with the beauty of the Rocky Mountains, the fresh air and blue sky, and the wonderful ski terrain. By the next morning lips are swollen, faces hurt and in general, people remember to wear sunscreen and lip protection ~ always! Thankfully, mountain resorts have sun protection available everywhere, and there are reminders posted everywhere to avoid excessive sun exposure.

Due to increased risk of skin cancer with excessive and repeated sunburn early in life, children should be protected from sunburns.

Sunburn is treated as a minor burn, and treatment can include cold compresses, moisturizing cream, aloe vera lotion, and in severe cases, hydrocortisone cream. Proteolytic enzymes, homeopathic anti-inflammatories, or over-the-counter pharmaceutical anti-inflammatories may help with pain. If blisters form, they should be covered with gauze if they need to be protected, but they should not be broken.

Magnetic resonance stimulation may have an analgesic effect for the early management of sunburn and for minor burns. In addition, as with the benefit derived for skin ulcerations from improved circulation and oxygenation to the skin, magnetic resonance stimulation may

promote a more robust, complete healing response in victims of major burns. Energy medicine should be used in conjunction with other treatments.

Settings and application

Minor Burns: For local minor burns to the extremities, cover the burn with gauze if necessary and use the pad applicator pad and intensity setting of 150-400 for eight minutes 3-5 times daily. For minor burns to the face or ears, use the probe at 150-400 for eight minutes 3-5 times daily. There is no need to touch the applicators (either pad or probe) directly to the area of burn if local pressure to the burn area is uncomfortable.

For Sunburn: Use the whole body mat applicator at a setting of 25 twice to three times daily for eight minutes.

Major Burns: Depending on the severity and breadth of burn area the victim may be in intensive care or a hospital's burn unit for an extensive period of time. When possible and practical, a family member or friend may hold the pad applicator 4-6 inches away from the area to treated at an intensity of 400 for 8 minutes, 5 times daily. No direct contact with the pad applicator should be made in order to avoid pressure. As soon as the burn victim is able to lie down, they should use the whole body mat applicator (e.g., in a home environment) at a setting of "Sensitive" or 10 for 8-24 minutes three times daily for up to one hour of total time on the mat per day. This should only be done under the direct supervision of a qualified healthcare provider.

RHEUMATOLOGY

Rheumatology is a subspecialty of medicine devoted to the diagnosis and treatment of rheumatic diseases. Rheumatologists are concerned with diseases of bones and joints, treating inflammatory and degenerative arthritis, autoimmune disorders, musculoskeletal pain and osteoporosis. They also deal with painful disorders involving the connective tissues and soft tissues around the bones and joints. Common conditions include rheumatoid arthritis, ankylosing spondylitis (Morbus Bechterew), gout, and systemic lupus erythematosus.

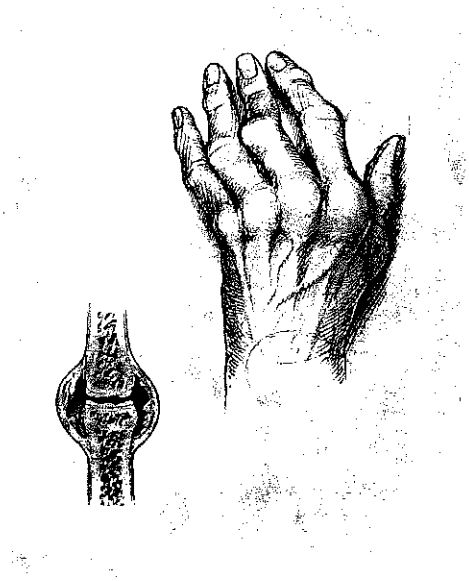
Since rheumatology concerns itself with autoimmune disorders and inflammatory arthritides, acute flare-ups are commonly experienced in many patients attending a rheumatologist's clinic. These flare-ups are monitored by the presence of inflammatory proteins in the blood stream. Blood tests are essential to the work of the rheumatologist. Eyrthrocyte sedimentation rate (ESR), C-reactive protein, rheumatoid factor, anti-nuclear anti-body (ANA), and anti-cyclic citrullinated peptide antibody (anti-CCP) are some of the screening and specialized tests used to diagnose these inflammatory conditions. When elevated in the blood, these substances can indicate the presence of active inflammation, clinically manifested as a flare-up. An increase of these substances in the blood may also correlate with a higher incidence of "initial reaction" with exposure to extremely low frequency pulsating magnetic fields. Initial reactions are not harmful, but the attendant unpleasant symptoms can be avoided by waiting until a flare-up has resolved prior to utilizing applications of pulsating magnetic fields.

In summary, when supporting rheumatological disorders the rule of thumb is to abstain from using magnetic resonance stimulation in the presence of an acute flare-up of an inflammatory or autoimmune disease. Once the flare-up has resolved, magnetic resonance stimulation may help support improved activity levels, decrease pain and enhance quality of life.

Description

Rheumatoid arthritis (RA) is an inflammatory form of arthritis that causes joint pain and damage. This disease attacks the lining of the joints (synovium) causing swelling. The inflammatory reaction in RA is produced by reaction of white blood cells (leukocytes) with the synovial cells lining the joints. For some unknown reason the white cells misidentify the synovial cells as unwanted invaders. The condition is up to three times more common in women. It affects approximately 1% of the population worldwide. The onset of symptoms is typically between the ages of 40 and 60. When it affects young children it is called juvenile rheumatoid arthritis.

RA usually causes joint pain, swelling, and tenderness at several joints simultaneously. It can affect the fingers and hands, as well as the shoulders, elbows, knees, jaws, back and neck. The condition may vary in severity with periods of severe symptoms followed by remission of pain and swelling. Eventually it leads to joint damage and deformity. Even the simplest tasks can become difficult as a result of the joint pain and deformity associated with rheumatoid arthritis.



Blood tests are commonly used to diagnose RA. The most important ones include erythrocyte sedimentation rate (ESR, or "sed rate"), rheumatoid factor (an antibody), and anti-cyclic citrullinated peptide (anti-CCP), all of which are elevated in patients with RA. Elevated ESR is a non-specific screening test that demonstrates the presence of inflammation in the blood. It is always elevated when RA symptoms are active. In contrast, anti-CCP antibodies aren't present in all people with RA.

Because of the well-documented physiological effects on cells and tissues, including an anti-inflammatory effect, the literature on pulsating magnetic fields for RA is expanding:

As early as 1994, Mohammad-Ali and Kolkebrock studied the effects of a 70 microTesla intensity and a 1.36-14.44 Hz magnetic resonance frequency on a monolayer culture of human RA, noting a distinct change in some matrix metalloproteinase (inflammatory chemical) activity. *(Mohamed-Ali 1994/256)* A recent pilot study showed that low intensity, extremely low frequency pulsating magnetic fields show a meaningful trend toward reducing pain and improving sleep and functional status in women with RA. *(Bourguignon 2008a/254; 2008b/255)* A small randomized, controlled clinical trial of RA patients demonstrated a significant reduction in pain scores in women receiving one 30-minute treatment. *(Shupak 2006)* Several animal studies indicate a strong anti-inflammatory effect at the cellular level through restored cell membrane calcium ATPase activity, reduced alpha-2-macroglobulin, lowered lipid peroxides and reduced activity of lysosomal enzymes, and increased antioxidant enzymes. *(Dortch 2006/257; Selvam 2007/258)* We have written elsewhere in this text that, at a cellular level, inflammation represents a deficit of the availability of high-energy state electrons. The chemical anti-inflammatory changes reported in these animal studies are consistent an increase in local tissue high-energy electron flow. Pulsating magnetic field therapy was also shown to have a membrane stabilizing action to further reduce the release of inflammatory enzymes. *(Kumar 2005/259)*

Based on the promising developments we are seeing from basic science research, clinical research, and with patients in the practice it is imperative that magnetic resonance stimulation occupies a prominent place in supporting the wellness, vitality and quality of life in patients suffering with RA.

Settings and application

As in cases of systemic lupus (SLE) (see below), patients who are experiencing a severe flare-up of RA should not use the whole body mat applicator of the MRS 2000. A severe flare-up will most often be associated with a significant elevation in ESR (see blood tests above). It is important to remember to discontinue use of the MRS 2000 briefly when a major inflammatory episode arises. Clinicians can monitor the ESR to determine appropriate timing for resuming application of pulsating magnetic fields.

Once a severe flare-up has subsided, use the whole body mat 1-3 times per day for eight minutes, starting at a setting of 10, and working toward a setting of 25 to 50 with the first morning use. Always use an intensity setting of 10 in the evening. Gradually increase the intensity setting if desired. The pad or probe can be used three times per day for 16-24 minutes at an intensity setting of 50-200, placing hands on pad or applying the probe to the affected joints. These local applicators may be used with swelling, stiffness and joint pain at intensity settings between 100 and 400. Applications can last up to 24 minutes and may be applied 4 to 10 times daily.

Omega-6 (gamma-linolenic) and Omega-3 (eicosapentaenoic and docosahexaenoic) fatty acids have been found in preliminary studies to reduce the pain and stiffness associated with RA.

An initial reaction may occur in up to 25% of rheumatoid arthritis patients, especially at the PCP joint (first knuckle), often of the first or second fingers. In some of these persons this initial reaction may be intense. Prevent this by very gradually increasing the intensity setting. Begin at 10, and increase slowly. You may need to limit the treatment time as well. This initial reaction should not be a barrier to continue treatment because of the significant proven benefits that are possible.

Description

Systemically Lupus Erythematosus (SLE) is a chronic inflammatory autoimmune disease with a variety of symptoms including fatigue, fever, joint pain, stiffness and swelling, butterfly rash on the face over the cheeks and bridge of the nose, hair loss, mouth sores, shortness of breath and chest pain, dry eyes, weight loss or weight gain, easy bruising, and Raynaud's phenomenon. Most people with SLE experience episodic "flares" of symptoms that come and go. Anxiety, depression and memory loss may accompany this condition.

SLE may develop suddenly or occur gradually. It may be severe and progressive, or temporary. The cause of SLE is unknown. The diagnosis is difficult, and includes the identification of clusters of symptoms that occur together over time. Any combination of four of the 11 symptoms increases the likelihood. Here is a list of the 11 symptoms:

1. Butterfly rash over the cheeks and bridge of the nose
2. Scaly rash

3. Skin sensitivity to sunlight (sun rash which appears after exposure to the sun)
4. Painless mouth sores
5. Joint pain and swelling of two or more joints
6. Swelling around the heart or lungs
7. Kidney disease
8. Seizures or psychosis (neurological SLE)
9. Low blood count (red blood cells, white blood cells, or low platelets)
10. Positive anti-nuclear antibody tests (indicating autoimmune disease)
11. Other positive blood tests (anti-DNA, anti-Sm (Smith antigen), anti-phospholipid)

Common medications used in the treatment of SLE include nonsteroidal anti-inflammatory drugs, anti-malarial drugs, and corticosteroids. Symptomatic treatment of joint pain and swelling, skin rashes, fatigue and swelling around the heart and lungs may require these medications, as well as topical creams, antidepressants or in severe cases, immunosuppressive drugs.

Chronic butterfly rash, hair loss, and skin rashes occurring in SLE patients have improved significantly with applications of the MRS 2000. Interestingly, up to 65% of patients with SLE meet the criteria for fibromyalgia also. *(Neumann 2003/260)* SLE patients with overlapping fibromyalgia-like symptoms may benefit from magnetic resonance stimulation in the same way fibromyalgia patients do.

Settings and application
As in cases of rheumatoid arthritis, do not use the whole body mat applicator of the MRS 2000 during an acute, severe flare of SLE symptoms. When such symptoms are absent, use the whole body mat applicator up to three times daily at the "Sensitive" intensity setting for 8-16 minutes per application. Gradually adjust the intensity up as tolerated.

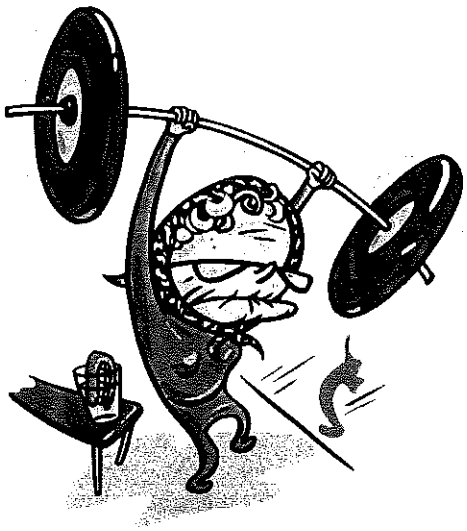
The local pad and probe applicators may be used symptomatically for joint pain at intensity settings between 100 and 400 for 8 to 16 minutes per application. Several applications per day may be beneficial.

Fish oil and flaxseed oil, containing omega-3 and other fatty acids, may assist in the management of joint stiffness and pain in patients with SLE. Use green tea to help nourish and lubricate the intestinal tract also, as this may help the skin and overall bodily sensitivity to inflammation according to the dictates of Traditional Chinese Medicine.

See "Metabolic Diseases."

Osteoporosis

Description
Osteoporosis means "porous bones." Due to low levels of calcium, phosphorus and other minerals the bones become weak and brittle. Fractures can occur with minor exertions such as lifting a grocery bag, bending over, or even coughing.



Bone demineralization is the cause of osteoporosis. This occurs when bone minerals are lost faster than they are replaced. Peak bone mass is achieved around the age of 35. After this, there are slight losses in bone density each year. At menopause, when estrogen levels drop, bone loss can increase dramatically. Osteopenia refers to mild bone loss that isn't severe enough to be called osteoporosis, but that increases the risk of osteoporosis. Doctors can detect osteopenia or early signs of osteoporosis using a variety of devices to measure bone density.

In addition to a drop in estrogen levels with menopause, other risk factors associated with the development of osteoporosis include gender, age, race (increased risk when one is white or from Southeast Asia), family history, frame size, tobacco use, eating disorders, corticosteroid medications, hyperthyroidism, the use of medications (including methotrexate, SSRIs, diuretics, anti-seizure medications and antacids), medical conditions that decrease calcium absorption, breast cancer, low calcium intake, sedentary lifestyle, excessive soda consumption, chronic alcoholism, and depression.

A common result of osteoporosis is fractures. These usually occur in the spine, hip or wrist. One third of women over 65 will have vertebral fractures and 90% of women over the age of 75 have evidence of osteoporosis. Many people think osteoporosis is a disease of women only. However, it also affects men, and the prevalence of osteoporosis in men will increase in the coming decade.

According to the National Osteoporosis Foundation, there were over 2 million fractures related to osteoporosis in the United States in 2005. There were nearly 300,000 hip fractures, nearly 550,000 vertebral fractures, nearly 400,000 wrist fractures, and over 800,000 fractures at other sites combined. These fractures lead to an impaired quality of life from pain, vertebral compression, and loss of ambulation. Six months after a hip fracture, only 15% of people can walk across the room unaided.

Osteoporosis is a largely unrecognized potential cause of death. Osteoporosis-related fractures are often the precipitating event that leads to permanent infirmity and terminal decline. In 24% of those over 50 years of age suffering from hip fractures, death occurs within 12 months. A woman's risk of osteoporosis-related hip fracture is equal to her risk of developing breast, uterine and ovarian cancer combined. Osteoporosis-related fractures can be expected to double during the next 5 decades.

In the early stages of bone loss, there are no symptoms. However, once the bone is weakened sufficiently, symptoms arise from fracture or from vertebral collapse. People with osteoporosis may observe loss of height over time, accompanied by a stooped posture called "kyphosis."

Several factors can influence healthy levels of bone mineralization, and bone density. These factors include regular exercise, adequate amounts of dietary calcium and vitamin D, and good hormone balance. The effects of pulsating magnetic fields on bone density have been proven through extensive research. In animal studies, the use of pulsed electromagnetic fields was shown to be effective in restoring the trabecular bone structure in 35 Sprague-Dawley rats. *(Chang 2003a/221; Chang 2003b/222)* Rubin, McLeod et al induced osteoporosis in the ulna bone of turkeys, noting a 13% loss of bone compared to intact contralateral controls. By using a treatment regimen of one hour per day of pulsed electromagnetic fields, these researchers observed a bone-forming effect that they believed would be useful in treating patients with osteoporosis, those astronauts living for prolonged periods in weightless environments, and immobilized patients. *(Rubin 1989/223)*

In humans, researchers conducted a study with eight-year follow-up on changes to bone density after short-term electromagnetic field therapy. *(Tabrah 1990)* Using single photon absorptiometry to reliably measure changes in bone mineral density in a group of postmenopausal women with osteoporosis, they showed significantly increased bone density of the radius (a forearm bone commonly fractured at the wrist in these women) treated with pulsed magnetic fields. Eight years later, they showed maintenance of increased bone density of the treated radius bones over time, even though the therapy had been applied only for a short term in the first year of the experiment.

The scientific literature is replete with examples of restored bone density in cases of osteonecrosis of the hip, of non-healing fracture, and of up-regulated bone formation in a variety of circumstances. While the topic is somewhat exhaustive, it may be of interest, so the reader is invited to visit PubMed[27] and, for example, perform an author search on "Bassett CA" (Dr. Andrew Bassett). Over 100 citations will be returned, many of them discussing PEMFs and bone metabolism.

The mechanisms of bone restoration using pulsed electromagnetic field therapy have been explored widely, and include the induction of piezoelectricity, desensitization of parathyroid hormone receptors, signaling of extracellular bone matrix and transmembrane proteins (to increase synthesis of bone proteins via the "mTOR" pathway and stimulation of osteoblastic proliferation and differentiation). *(Patterson 2006/224)*

Settings and application

Use the whole body mat applicator three times per day for 8-16 minutes per application. Start at an intensity setting of 25 in the morning, and work toward 50 or 100, or to your preference. Use the mat at a setting of 50-100 at noon, and add 10-25 in the evening. Use the pad once daily for 24 minutes at the chest and lumbar spine areas at a setting of 100-150.

If you are experiencing spinal pain from osteoporosis, you may experience pain relief in as soon as 4-6 weeks. Long-lasting changes in bone density may be observed in 12-18 months or sooner. Repeat bone density testing at 12 months. Even if bone density is not increased in

[27] PubMed can be found at http://www.ncbi.nlm.nih.gov/pubmed/

one year, the progression of the disease may be arrested by including the daily use of the MRS 2000 in your regimen of supportive treatments. Keep going! There may be a slight intensification of pain in approximately 15% of patients who experience pain from osteoporosis. This pain usually disappears within 7-10 days. Experience has shown 80% good to very good results with the use of the MRS 2000.

V. Ankylosing Spondylitis (Morbus Bechterew)

Description

Ankylosing spondylitis, known in many parts of Europe as "Morbus Bechterew," is a form of inflammatory arthritis in the same family as rheumatoid arthritis. It primarily affects the joints between the vertebrae, but can also affect other parts of your body, including tendons, ligaments, hips, shoulders, knees, and eyes. This is a chronic condition where new bone forms as the body tries to heal the inflammation. The vertebrae begin to grow together, and the result is that the spine becomes stiff and inflexible. When the spine fuses late in the disease, expansion of the ribs is limited, and lung capacity and function is compromised. Oxygen utilization, especially in older people with this disease, is therefore at risk of being compromised.

Electromagnetic therapy has been found to benefit patients with ankylosing spondylitis. *(Claisse 1986/261)*

Settings and Application

Since ankylosing spondylitis has several phases of activity, the use of the MRS 2000 is dependent upon the symptoms being expressed at any particular time. Inflammation gives rise to pain, and the MRS 2000 can be used to help attenuate pain due to its ability to reduce inflammation.

The whole body mat should be utilized twice daily for eight minutes at an initial setting of 10. Increase or decrease as symptoms dictate. In a clinical setting, sessions should be provided at least three times per week. For more local areas of pain, begin by using the pad and/or the probe 1-3 times per week for 16-24 minutes at a setting of 150-200. The MRS 2000 user should feel free to alter the intensity settings upward or downward, or lengthen or shorten the treatment time as symptoms and response dictate.

Note: Due to their interrelationships, please read this section together with the section on Chronic Fatigue Syndrome below:

Description

More than 12 million Americans have fibromyalgia. Most of them are women, and women are 10 times more likely to get this disease than men. Fibromyalgia is a set of symptoms that occur together as a syndrome. These symptoms include widespread pain, incapacitating fatigue, a decreased pain threshold at specified tender points, and the presence of anxiety or depression.

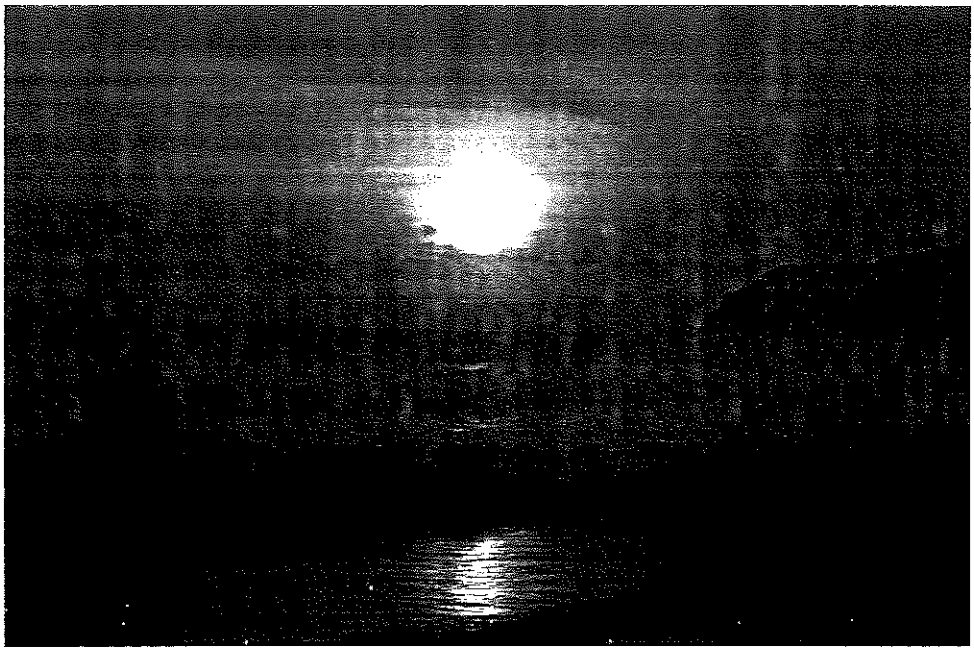
Fibromyalgia patients may experience pain in the back, neck, hips and shoulders and may experience significant sleep disturbance with the lack of restorative sleep, fatigue and/or morning stiffness on arising. Muscles may ache, twitch, or burn, and there may be numbness or tingling in the fingers or feet. Symptoms can mimic osteoarthritis, bursitis or tendinitis, but the pain is more generalized. Fibromyalgia is often classified as an arthritis-related illness, and is the most common illness after osteoarthritis. Painful tender points or trigger points (not the same as myofascial trigger points) are usually noted at certain parts of the body. Other associated symptoms include dry mouth, nose or eyes, poor circulation in hands and feet, painful menstrual cramps, irritable bowel syndrome, incontinence, the inability to concentrate (called "fibro fog"), hypersensitivity to heat or cold, and chronic headaches. Chronic pain and other symptoms of this disorder can often be lessened through medications, lifestyle changes, and stress management.

There are no definitive diagnostic tests for fibromyalgia. The diagnosis of fibromyalgia is a diagnosis of exclusion. Once other serious causes of widespread pain and fatigue are ruled out, a qualified healthcare provider will use well-defined diagnostic criteria developed by the American College of Rheumatology in order to confirm the diagnosis.

Complementary and alternative medicine procedures can help manage the symptoms of fibromyalgia. Therapeutic massage and myofascial release therapies can relieve deep muscle pain. Massage therapy may be prefaced with moist hot packs. The treatment relieves pain from tender points, muscle spasms and tense muscles. Moderately intense aerobic exercise 3-5 times per week is recommended, and pool exercise has been shown to be particularly effective. The American Pain Society also endorses chiropractic manipulation, acupuncture, massage and hypnosis. Deep breathing and other relaxation techniques may reduce stress that triggers symptomatic episodes of fibromyalgia. Sleep is essential to allow the body to heal itself, and non-restorative sleep is a diagnostic hallmark of fibromyalgia.

At The Center for Spine Pain & Wellness we developed a non-pharmacologic approach, prior to using the MRS 2000, with better-than-average results. However, since using the MRS 2000, we have seen a dramatic increase in our effectiveness in assisting patients with this condition. Our treatment regimen used to include the use of moist hot packs, gentle spinal manipulation, and very gentle massage. We would encourage patients to do their best to find ways to sleep and fully rest, and we recommended cardiovascular physical fitness exercise 4-5 days per week based on studies we had read. Co-management with a rheumatologist or physiatrist was the rule of the day in order to obtain prescription medications for sleep. With the introduction of wellness technologies in our clinic, and specifically the MRS 2000, all that has changed.

I have read that in certain parts of Japan, fibromyalgia is referred to as "magnetic field deficiency syndrome." And based on personal experience with some patients who have severe, chronic forms of this disease, that is what I think fibromyalgia is: a magnetic field and/or electron deficiency disorder. This is an instance where understanding a disease process in submolecular, energetic terms, rather than in chemical terms, made all the difference in our approach – and our results.



Nancy's story

One of our patients (whom I'll call Nancy) was so afflicted with fibromyalgia pain that she was nearly bedridden. Nancy set up camp in her home at her reclining chair. She was often unable to make it to the curb to get her mail from the mailbox. What once had been a high energy, successful professional was now reduced to sedentary inactivity -or disability?- as a result of the onset of fibromyalgia and chronic fatigue syndrome. Her mental acuity became blunted as well. Nancy became a regular fixture in our clinic. The relief she obtained was temporary, but it kept her going.

Nancy tried pulsed magnetic field therapy and felt such a difference that she started using the MRS 2000 religiously at home. Within weeks, she started spreading her appointments to the clinic further and further apart, and within three months she stopped coming to the clinic altogether. Energy was restored, and the patient literally got her life back. Now, over one year later, she has lost weight, looks great, and has a vibrant glow about her. The chronic sinus infections that had been afflicting her for years have resolved fully. These infections have been carefully documented by her ENT surgeon, who herself was puzzled and yet amazed by this seemingly miraculous and sudden resolution of a chronic sinus infection that was resistant to all other treatment.

What is going on here? By all modern western medicine standards, this is beyond our current understanding of fibromyalgia. The patient will tell you that she was a member of a national fibromyalgia organization, and she had been to fibromyalgia support groups. She stated that she has tried every form of therapy for fibromyalgia that has come down the pike. For her, nothing has even come close to working as well as daily application of the MRS 2000 at home.

Electrosmog and magnetic field deficiency

We live, work and drive in environments that are shielded from the Earth's magnetic field. In Colorado, we sleep upstairs, and most homes come with basements. Concrete and rebar block the Earth's magnetic field in the home, in our places of employment, and while driving to and fro on highways and paved streets. The metal in our cars is an added source of interference and insulation from the Earth's field. This field is essential to all living organisms, just as food and water and oxygen are essential. Our culture is simply unaware that the magnetic field is essential to our health. We are not paying attention to the ways in which the electrons in our bodies are being depleted from our bodies. Electrosmog is denuding us of excited-state electrons. Our dwellings and workplaces insulate us from natural geomagnetic vibrations. The lack of regular exposure to such natural frequencies is detrimental to our health and one of the reasons why we are becoming progressively sicker as North Americans.

Think about lying on your back on a beach at the ocean, the gentle waves rhythmically pounding the surf. Think about lying on your back on a picnic blanket in the park. Think about walking barefoot in the grass. Think about the fresh air after the rain. All of these scenarios have one thing in common: these environments are rich in charged, excited-state electrons. These environments provide no insulation from the Earth's geomagnetic field. These environments undo stress and tension, if we let them.

In the last 150 years, our ionosphere has been bombarded with a myriad of new forms of radiation never before encountered in human history. These include radio waves, microwaves, radar waves, cell phones and transmission towers, wireless computer hubs, and satellite communications. Our atmosphere is literally buzzing with wireless communications, and there appears to be no limit to the expansion of such technology in the foreseeable future. Fibromyalgia is, perhaps, one of the manifestations of this profound environmental change. The good news is this: the induction of resonant cellular vibrations by the application of magnetic resonance stimulation is one way to counteract the potentially harmful effects of electrosmog and restore balance and well-being to our bodies.

Complementary treatments
Other treatments I recommend for fibromyalgia include acupuncture and massage, as noted above. Chiropractic care can improve the range of motion of neck and low back joints, and even Nancy still comes in for chiropractic care periodically for just this purpose. Biofeedback may be of benefit as well.

Ultimately, treatments that boost sleep and reduce pain are likely to have the best effect for the fibromyalgia patient. As you will read elsewhere in this text, few (if any) natural wellness remedies are as effective as magnetic resonance stimulation in producing restorative, deep sleep. For this reason alone, the MRS 2000 is by far the top shelf recommendation of choice for my fibromyalgia patients.

Settings and application
See below under "Chronic Fatigue Syndrome" as magnetic resonance applications for this Syndrome and Fibromyalgia are similar and often overlapping.

Chronic Fatigue Syndrome (CFS) (Chronic Fatigue Immune Dysfunction Syndrome (CFIDS))
Chronic fatigue syndrome (CFS) is a complicated disorder involving incapacitating flu-like symptoms that can drain energy and, in some cases, last for many years. Women are diagnosed 2-4 times as often as men, but gender isn't a proven risk factor. The condition is most common in people between 40 and 60 years of age. Signs and symptoms are similar to those of a common viral infection. However, unlike flu symptoms that subside within a few days or weeks, the symptoms of chronic fatigue syndrome persist. This syndrome can affect people who were previously healthy and full of energy. Key symptoms for diagnosis include loss of memory or concentration, sore throat, mildly enlarged lymph nodes, headache, sleep disturbance, extreme exhaustion lasting 24 hours after mental or physical exertion, muscle soreness, and joint pain that moves from one joint to another without any signs of inflammation. The diagnosis of CFS is made when a person has unexplained, persistent fatigue lasting for six months or more with at least 4 of the 8 symptoms noted above.

A constellation of additional symptoms for CFS/CFIDS includes abdominal pain, chills or night sweats, nausea, dry mouth, chronic cough, chest pain, earache, morning stiffness, irregular heartbeat, diarrhea, dizziness, balance problems, fainting, jaw pain, allergies or sensitivities to food, medicines, noise, chemicals, or odors, and bloating. Cognitive difficulties include the

inability to comprehend or retain what is read, the inability to calculate numbers, impairment of speech or reasoning, and word-finding difficulties. Shortness of breath, irritable bowel, numbness, tingling or burning sensations, and gynecological problems including PMS and endometriosis have also been reported. This long list of symptoms is precisely what makes this syndrome so complicated and difficult to treat.

The cause of CFS is unknown. Theories on causation include underlying depression, iron deficiency anemia, low blood pressure, hormonal changes, impaired immune function, allergies, and viruses such as Epstein-Barr or human herpes virus 6.

Once the symptoms of CFS have begun, they may reach a crescendo and stabilize. These symptoms are intermittent. Some patients recover completely, while others progressively worsen.

I have discussed fibromyalgia together with CFS/CFIDS because these conditions often overlap or coexist. My observations of fibromyalgia and CFS/CFIDS patients who undergo pulsed magnetic field therapy have convinced me that at least a subset of these patients have an energy deficiency disorder at the sub-molecular level. Perhaps our treatment of these syndromes may improve as we reorient our understanding to an energetic, rather than exclusively chemical, perspective.

These syndromes may turn out to be primary examples of electron deficiency disorders. One key interface between electrons and biochemistry is adenosine triphosphate (ATP). When a high-energy phosphate bond is broken and ATP is converted into adenosine diphosphate (ADP), energy is released in the form of an excited-state electron. This energy drives all of life's processes, including the immune system, cellular respiration, assimilation of foodstuffs, muscle contraction, organ function, and locomotion. Pathologies such as fibromyalgia and CFS/CFIDS involve such a wide variety of symptoms that one suspects impaired function of the human organism at a more basic, energetic level. Pulsed magnetic fields in the appropriate frequency range increases production of ATP, giving the body more energy for all systems.

I have been privileged to witness patients with these syndromes enjoy marked improvements in their overall status through the use of the MRS 2000 on a daily basis. For every symptom listed above, a corresponding improvement has been observed through the introduction of daily pulsed magnetic field therapy. While dramatic benefits do not occur in every case, or with predictable surety, these syndromes represent the perfect place for intensive clinical outcomes research.

Settings and application

The key to successful supportive benefit using the MRS 2000 for fibromyalgia and CFS/CFIDS is daily, repeated use of this technology. Many people will require patience and persistence. The significant value of the MRS 2000 in producing enhanced immune function, increased ATP production, improved circulation and markedly enhanced sleep cycles make this a perfect supportive complement for people suffering with these conditions. Begin using the whole body mat applicator three times per day for 8-16 minutes with an intensity setting

of 10-25 in the morning, 10-25 at mid-day, and 10 in the evening. Larger or more corpulent people may begin at a setting of 50 or higher. Sensitive individuals may need to begin at the "Sensitive" setting.

As the body adapts, the whole body mat applicator may be used up to 4 times daily for 8-16 minutes each.

A note about adequate hydration during magnetic field therapy:
As in all cases of magnetic field therapy, adequate hydration is essential. Per day, drink at least half the weight of the body in ounces. In other words, if you weigh 150 pounds, you should consume 75 ounces of water per day minimum. Since water is a dipole molecule with paramagnetic characteristics, taking your water on to the mat applicator with you can effectively magnetically charge the water, potentially providing added wellness benefits.

Supportive treatments include massage, acupuncture and gentle chiropractic manipulation. Home treatment should include 4-5 times per week cardiovascular physical fitness exercise such as water walking, back stroke or other low-impact activity. Combining conservative therapies like these may obviate the need for most, if not all medicines in some individuals.

ONCOLOGY

Why is cancer on the rise? Is it because we are living longer? Has cancer always been there and we've just not succumbed because we weren't living long enough?

The answer is no. Cancer is on the rise in absolute terms, independent of our advancing longevity. Our exposure to environmental toxins worldwide is at an all time high. Packaged and processed convenience foods have decimated sound nutrition for millions of people in the United States and Canada. Saturday afternoons on the porch swing, Sunday dinners, and fresh picked vegetables from the garden are as foreign to us as a family farm. Refined sugar pummels our immune response, but we're addicted to it anyway. Antiperspirants laced with aluminum and mercury fillings are "the new lead paint," threatening us with the chronic illness of toxic heavy metal overload. Peters et al stated that the presence of dental amalgams of differing alloy "causes pathological galvanic currents and voltage resulting in superficial erosions of the oral mucosa and eventually the emergence of oral cancer." *(Peters 2008/262)* Similarly, isolated pockets of inflammation elsewhere in the body from unresolved trauma, old root canals affecting the jaw bones, and poor nutrition affecting the lower bowel may, over time, release free radicals and other toxins into our bodies that give normally-occurring pre-cancerous cells a more favorable chance to colonize, forming tumors in the body.

And that's the point. Cells that are not following the normal blueprint of health are routinely identified and destroyed by healthy neighbors so that they don't form tumors. When these

pre-cancerous cells carrying rogue blueprints are not recognized as broken or abnormal, this lack of recognition is a BIG problem.

One of the interesting things about cancer cells is that they don't die on schedule. Programmed cell death (PCD) involves a series of biochemical events leading to a characteristic change in cell morphology, followed by death. In contrast to necrosis, which is a traumatic form of cell death resulting from cellular injury, PCD (also known as apoptosis) is necessary for cell differentiation and normal development. However, cancer cells demonstrate an insufficient amount of apoptosis, resulting in uncontrolled cell proliferation and tumor development.

My brother-in-law passed away just after his 46th birthday from lung cancer. He was not a smoker, but he was a bartender for eight years in Steamboat Springs, Colorado. He worked daily in a smoke-filled environment at the bar. The tobacco companies told us that secondhand smoke could not cause cancer. Now, of course, we all know better. Scarring of lung tissue by tobacco smoke limited his lung's ability to identify the pre-cancerous cells that were forming. Perhaps the inhaled smoke itself produced a greater concentration of mutated pre-cancerous cells. They multiplied. Eventually my brother-in-law developed a Pancoast tumor in the apex of his left lung. Only when it had reached Stage IV – too late – did it become symptomatic.

It would be a tragic oversimplification to pin all cancers everywhere on just one cause. Cancer is complex: a vast and growing problem that has affected most all of us, or someone we love. In spite of the West's best funding efforts to pharmacologize the cure for cancer, pharmacologic cures elude us. Even our treatments for cancer cause cancer. Though we have made great progress, and our advances in knowledge are impressive, the fact remains that the incidence and prevalence of most cancers continue to rise. Our culture's nearly exclusive dependence on pharmaceuticals is misguided. Currently our greatest hope for survival for many cancerous tumors is early detection and the news that the cancer is operable and can be surgically removed.

Make no mistake: cancer pharmacology is big money. If "the cure" were found, an entire multibillion-dollar industry would languish or collapse. In spite of altruistic notions to the contrary, "money drives the machine" when it comes to chemotherapy.

The number one cause of bankruptcy for a family in the United States is a cancer diagnosis. Fifty percent (50%) of bankruptcy filings originate with hospital bills that cannot be paid. On average, it costs a cancer-victim's family $350,000 out-of-pocket for their loved one to die from cancer. Doctors and surgeons often discount their fees or wave them in part or in

full, while Big Pharma gets paid 100% for chemotherapy. Hospitals fall somewhere in the middle with regard to compassion for the people. It's not easy. Healthcare economics for many people has been difficult to understand for a long time.

When it comes to cancer prevention, our environment counts.[28] Our thoughts and emotions count. Our stress levels count. Our lifestyle and habits count. Our relationships count. Our disposition and mental attitude count. Our nutrition counts. While family history and genetics are factors, they don't account for the whole story as some would like to believe. We are not mere victims of our DNA.

I encourage every reader of this book to purchase and read "The China Study" by T. Colin Campbell and Thomas M. Campbell II. *(Campbell 2005/233)* This is a thoughtful discussion of cancer as it relates to our diet from an important, defensible and well-researched perspective. The senior Dr. Campbell carries the highest academic and professional credentials and is a recognized world authority. The book is a definitive treatment of the relationship between nutrition and cancer. Ad slogans such as "Got Milk?" and "Beef, It's what's for Dinner" will take on new meaning once you understand what the authors have to say.

Back to the main point: good (but depleted) cells don't recognize cells-gone-bad in the bodies of people who have cancer. It is hoped that some day mechanisms are identified by which cellular recognition can be made perfect. Some claim that such mechanisms already exist in the form of certain nutrients or molecules we can ingest. Others suggest that enhancing cellular communication and recognition through energetic means may be the answer. By inducing cellular vibratory resonance, for example, with the MRS 2000, we may be enhancing each cell's ability to recognize and interact with other cells in ways that are health-producing. Both may be right, and there are most certainly other possibilities. Given the freedom to pursue these mechanisms, time will tell.

The objective of a cancer cure must be to create an environment where cancer can't live, thrive or grow. The cells of the human body must be as robust, healthy and vibrant as possible – seething with "life energy" if you will – to present a major challenge to the survival of a mutagenic cell or colony of cells. I believe this "life energy" is fundamentally electromagnetic in nature, and any true cure for cancer will need to recognize and harness this energy.

Getting Technical for a Moment ...

A brief review of the scientific literature hints at the potential for the identification of positive, life-enhancing biological windows through which magnetic resonance stimulation may enhance the life and health of those afflicted with cancer. For example, melatonin, a potent antioxidant, is known to be oncostatic. That is, melatonin provides significant protection against cancer initiation as well as colonization. Pulsating magnetic fields stimulate the production of melatonin by the pineal gland. *(Reiter 1993/263)* Repetitive stimulation with low

[28] For example, the use of toxic pesticide sprays and fertilizers in agriculture and the incidence of cancers among those living in farmland areas may correlate with the increasing incidence of cancers seen among rural America residents.

frequency pulsed electromagnetic stimulation activates tumor necrosis factor and inhibits tumor growth in mice. *(Yamaguchi 2006/264)* Using an ion parametric resonance model, exposure to 38.7 μT, 20 Hz magnetic fields inhibits the growth of human cervical cancer cells and osteosarcoma cells. *(Sarimov 2005)* Electromagnetic fields applied to oral mucosa cancer cells decreased cancer cell proliferation when a direct electrical field treatment was applied. The mechanism of effect was found to be the generation of robust reactive oxygen species, NADPH oxidase subunits and heat shock protein 70 (hsp70). *(Peters 2008)* In essence, the field exposure in this study produced a high-energy electron-rich environment.

Malter et al found that non-parenchymal liver cells gained increased tumor killing potential following exposure to therapeutic levels of pulsating magnetic fields. *(Malter 1987)* Rius et al discovered that cancer cell growth was inhibited after the simultaneous action of light and exposure to a pulsed electromagnetic field. *(Rius 1985/265)* Anti-tumor resistance was enhanced in 20 lung cancer patients exposed to 20- 30 sessions of magnetic field therapy. In this study highly differentiated adenocarcinoma was the most sensitive cell type to the anti-cancer action of the magnetic field. *(Ogorodnikova 1980)* More recently an electromagnetic field was found to inhibit the proliferation of human lymphoma cells. *(Gluck 2001/266)* Zhang and Zhang noted a similar effect with extremely low frequency electromagnetic fields, and suggested that the mechanism was arresting the blood supply to the developing tumor. *(Zhang 2002/267)* Pulsed electromagnetic fields combined with halogen lamp exposure to induce a photodynamic effect kills human K-562 and U-937 cancer cells in vitro. *(Traitcheva 2003/268)*

Author's Note: The MRS 2000+ designo® Systems are not intended to diagnose, cure, treat or prevent any disease or ailment. These are wellness devices intended to enhance the operation of cells that are impaired in their capacity to take in nutrition, eliminate waste, produce energy, communicate, recognize threats, and stay healthy.

It is important to note that some of the electromagnetic frequencies and/or amplitudes produced by the MRS 2000+ Systems have been found, in research environments, to have cellular effects that inhibit the survival or proliferation of cancer cells. Other studies have been performed to confirm that exposure to magnetic fields with intensities many times higher than the MRS 2000 are safe and very well tolerated by human beings with advanced cancers. *(Ronchetto 2004/269)*

Magnetic resonance stimulation can be used to help increase comfort and promote pain relief and enhanced sleep in patients with cancer of various forms. The immune system is supported and healthy cells have more strength and energy. Abnormal cancer cells seem to be weakened and begin to observe the rules of programmed cell death (PCD; apoptosis) once they've been exposed to electromagnetic fields tuned to the frequency of health. Because of positive effects on cell membrane permeability, some cancer patients have required less narcotic pain medicine and therefore enjoy a higher quality of life by virtue of the use of the MRS 2000. The immune system is supported and healthy cells have more strength and energy.

Settings and application

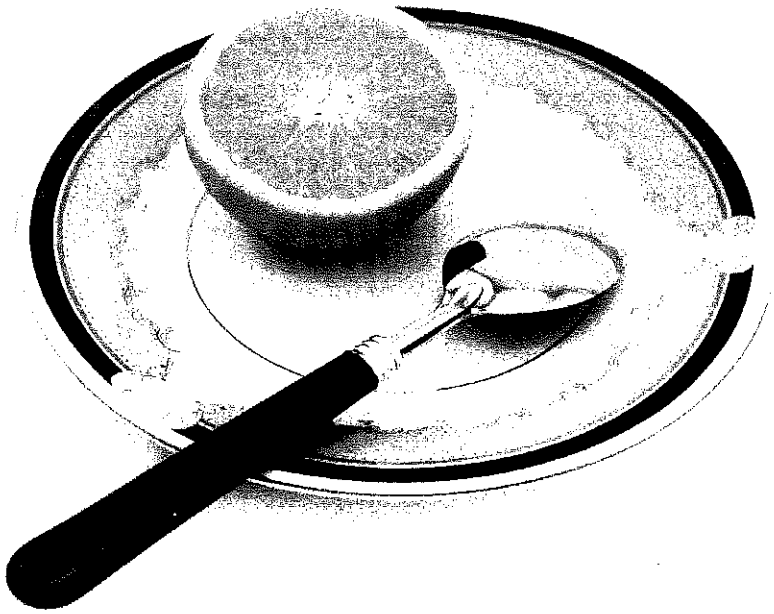
The proper use of the MRS 2000 in the presence of tumor disease depends on the type, severity, staging and concurrent treatments involved. Many cancer patients undergo surgery

to remove the primary tumor. Immediately postoperatively, the lowest amplitude setting ("Sensitive") should be used to help support the healing process. If chemotherapy is being undertaken, the "Sensitive" setting again should be used to help manage nausea for several applications for 2-4 days following the chemotherapy session.

As a general guideline, the whole body mat applicator can be used to 3-5 times per day for eight minutes per application. Begin with an initial intensity setting of 25-50 in the morning, 25 at noon, 10 in the late afternoon, and "Sensitive" in the evening.

Supportive therapies including acupuncture, antioxidants, Omega 3 and Omega 6 essential fatty acids, and strict observance to a pristine nutritional regimen.

METABOLIC DISEASES



Inborn errors of metabolism, or genetically inherited metabolic diseases, will not be addressed, as this topic would perhaps require a second volume. Here we will discuss disorders of metabolism that are common in North America.

Recently a condition known as "metabolic syndrome" has been recognized. This syndrome involves the presence of several metabolic disorders occurring simultaneously. Metabolic syndrome is defined as the presence of obesity, elevated blood pressure, elevated triglycerides and insulin resistance. More specifically, the form of obesity involves a distribution of abdominal fat around the waist ("apple shape") versus a distribution of fat around the buttocks and thighs ("pear shape.") There is an elevated level of triglycerides and a low level of high-density lipoprotein's (HDLs).

The risk of metabolic syndrome increases with age. It affects 10% of people in their 20s, 40% of people in their 60s. Disturbingly, about one in eight schoolchildren in the United States have three or more of the constituents of metabolic syndrome and the prevalence is increasing.

If you have abdominal obesity and a percent body fat that is more than 25% over your ideal body weight, or if you have a family history of type 2 diabetes, you are at risk of developing metabolic syndrome. There is also a link between metabolic syndrome and the presence of polycystic ovary disease.

The need to exercise, lose weight, eat healthy and stop smoking has never been greater in North America. Somehow we need to lose our dependence on convenience food and fast food, become consistent with intake of fresh fruits and vegetables, learn good portion control, become wise rather than trendy in our use of nutritional supplementation, nutraceuticals and electroceuticals (electron-donating supplements), and take time to chew, swallow, and enjoy one another over the course of a meal. (Tim Horton's and Starbucks will have to wait!)

Description

Unless there is an endocrine problem or underlying disease, most people become obese as a result of caloric overage and lack of portion control. That is, obese people are overfed, selecting a disproportionate amount of unhealthy foods that are calorie rich. This is a choice. Obese people who are holding steady at 275 pounds must ask themselves why they don't weigh 375 pounds. Let me repeat that. If you are overweight at 275, why don't you keep gaining weight and eventually reached 375? Usually the answer is because you wouldn't dare allow yourself to weigh that much. However, you have allowed yourself to weigh 275. Why? It is because of your internal thermostat, a weight that you CHOOSE.

Each of us unconsciously sets our own internal barometer, or thermostat, which in the above example makes weighing more than 275 unacceptable (but allows 275 to be acceptable.) The first thing that must change for permanent weight loss is a change in that thermostat. Otherwise, weight loss becomes a repeated exercise in futility with successive yo-yo periods of weight loss followed by weight gain.

Losing weight is hard work. It requires rigorous exercise, which is also hard work. It requires dietary discipline and restriction of calories. Ultimately, it requires a reprogramming of food selection habits at the grocery store and in restaurants, and acquiring and consistently using the new skill of portion control. Cheating only delays the goal. If you are overweight and desire to return to an ideal body weight you must ask yourself, first of all, why do you eat? Are you on the "reward-punishment program" – using food in a manner that was never intended? Do you use food to medicate for sadness or depression, or as a reward for a job well done? How was food used in your household growing up? Was it a reward for good behavior or good grades?

Let me issue a warning to parents: don't use food to reward your kids! And don't withhold food as punishment! Obesity in North America is on the rise in no small part due to the misuse of food by parents with their children. It is hard work to teach good nutritional principles to our kids. But it's much harder for our children to lose weight permanently and live at their ideal body weight if they become obese and sugar-addicted as children. It's time to change the program in North America. It starts in your head with right information, continues at the grocery store and in the kitchen with menu planning and food preparation, and consummates with planning for and engaging in regular exercise. Go for it!

Settings and application

For general metabolic support and increased energy use the whole body mat applicator 2-3

times per day. The morning intensity settings should be 100-200 as you begin use of the MRS 2000, and may increase to 400 for 8-16 minutes. The application at midday should be at an intensity setting of 50-150 and treatment should be 8-16 minutes. The evening application should be in the 10-25 range for 16 minutes.

Eat foods that are rich in fiber, as the studies show adequate dietary fiber produces lower insulin levels. The daily recommendation for fiber is 30-35 g. This can be incorporated practically by consuming high fiber snack foods such as raw almonds, sunflower seeds or pumpkin seeds. A great way to make these more palatable and to prevent them from drying your throat is to soak them for several hours prior to consumption. The first time I tried this with almonds I was surprised by the sweetness and enhanced taste, and I was pleased at how much easier almonds could be swallowed. Maybe it is the dry climate in Colorado, but maybe soaking high-fiber seeds and nuts is a good thing. Stay away from refined sugar, breads and cakes (simple carbohydrates).

Exercise regularly. See a health care provider if you suspect you may have an underlying endocrine disorder that is preventing you from losing weight. Change your thermostat by seeing yourself *as you are in the process of becoming:* energetic, happy, healthy and at a weight that is more consistent with great health and long life.

Take nutritional supplements and "enerceuticals." You'll need some basic cellular support to jumpstart your metabolism into better and better performance.

Description

Type 2 diabetes, once known as adult onset or non-insulin-dependent diabetes, is a chronic metabolic disease that results from the development of insulin resistance. The function of insulin is to help transport the body's most basic sugar (glucose) across the cell membrane to fuel intracellular processes. When cells are resistant to insulin, glucose does not pass the cell membrane in sufficient quantities. Rather, it remains in the bloodstream, increasing blood sugar levels. Left untreated, type 2 diabetes can be life-threatening.

Insulin resistance seems to be related to high levels of abdominal fat and inactivity. Regular exercise, healthy portion control, and good food selection habits can therefore help prevent insulin resistance and the onset of type 2 diabetes. Stress produces hormone release that can impair insulin metabolism, so stress management is important as well.

The effect of MRS 2000 applications on blood sugar levels in type 2 diabetics has been studied. In some cases the overall health of the individual is so enhanced that healthy blood sugar levels can be maintained with progressively decreasing levels of insulin. In other cases, blood sugar levels are more easily regulated, but the need for insulin is not eliminated. Technology is now available to allow monitoring of blood sugar levels so closely and accurately that the individual can easily determine the effects of the MRS 2000 on blood sugar.

In addition to a positive influence on blood sugar levels, low-frequency pulse magnetic fields have a positive effect on diabetic wound healing and the prevention of diabetic ulcers. *(Callaghan 2008/129)* The mechanism is stimulation of fibroblast growth factor-mediated angiogenesis (the development of new capillaries). Recently one diabetes patient, scheduled for amputation of foot and ankle, was able to show such improvement in tissue circulation after the use of the MRS 2000 for just 1-2 weeks that his surgery was cancelled and his lower extremity was spared. He continues to use the MRS 2000 daily.

Some patients with diabetes experience severe neuropathic pain in one or both lower extremities. Studies show that pulsed magnetic field therapy can have a significant pain-relieving effect on this condition. *(Weintraub 2004/236; Musaev 2003/270)*

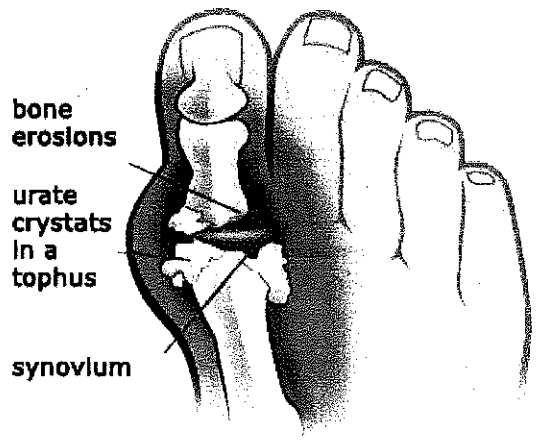
Even in type 1 diabetics, the MRS 2000 seems to have a regulatory, beneficial effect such that blood sugar levels are more easily manageable.

Settings and application
Use the whole body mat applicator twice to three times daily for 8-16 minutes. Begin in the morning at an intensity setting of 25 and end in the evening with an intensity setting of 10. The midday application can be started at a setting of 25-50.

Description
Gout often begins as the sudden onset of severe pain in the big toe accompanied by heat, redness and swelling. Men are more often affected than women, but women are more susceptible following menopause. Uric acid crystals from the metabolic breakdown of purines in the diet are deposited within the joint space, producing inflammation and intense pain. Foods containing purines include organ meats, anchovies, herring, asparagus, canned soups and mushrooms.

Gout is often diagnosed by its location and the typical appearance. However, diagnosis can also be confirmed by a joint fluid test (showing urate crystals) and a blood test (showing elevated uric acid).

Colchicine, a toxic substance from meadow saffron, is the most common medication used to treat gout. However, it may cause uncomfortable side effects such as nausea, vomiting and diarrhea. Steroids and non-steroidal anti-inflammatories are also used. As an alternative, the ingestion of cherries, blackberries, blueberries, raspberries and purple grapes may lower uric acid levels. Vitamin C supplementation can also lower uric



acid levels; however, megadoses of vitamin C can increase uric acid levels, so keep the dosage to 1500 mg per day or less.

Settings and application
Use the pad or probe applicator for 16-24 minutes at an intensity setting of 50-150 at the point of pain.

Over the long term for gouty arthritis use the whole body mat applicator 1-3 times daily for eight minutes each time. The initial intensity setting should be 25-100 in the morning, 50-150 at noon, and 10-25 in the evening.

Repeated attacks can be prevented through weight loss, eating slowly, chewing well, eating 5-6 small meals per day, and consuming a diet low in purines. Herbal and homeopathic remedies, glucosamine sulfate, shark cartilage, omega-3 and omega six fatty acids, and other supplements may also be beneficial.

Hypothyroidism

Description
Hypothyroidism is an underactive thyroid. Thyroid hormone is important for energy metabolism. Hypothyroidism tends to develop slowly over a course of years. Signs and symptoms include fatigue, sluggishness, increased sensitivity to cold, constipation, pale, dry skin, muscle aches, tenderness and stiffness, pain, stiffness or swelling in the joints, muscle weakness, heavier than normal menstrual periods, brittle fingernails or hair, a puffy face, a coarse voice, loss of libido, forgetfulness and depression. If untreated, hypothyroidism may produce severe or even life-threatening consequences. In advanced cases, known as myxedema, blood pressure and breathing can be reduced to extremely low levels and coma can ensue.

Hypothyroidism is diagnosed through blood tests. It can be monitored inexpensively through electrointerstitial body fluid scanning (EIS) or through routine but more expensive blood tests. Common treatment consists of thyroid hormone replacement in the form of the synthetic hormone levothyroxine (Synthroid, Levothroid, Levoxyl, Unithroid) or other thyroid hormone preparations (e.g., Armour Thyroid). Since certain medications, nutritional habits or dietary supplements limit the absorption or utilization of levothyroxine, monitoring is required by a health care provider. Soy products, a high fiber diet, iron supplementation, aluminum hydroxide, calcium supplements, and Cholestyramine (Questran) are examples.

There are no studies that show an increase in the release of thyroid hormone in response to pulsating magnetic fields. However, energy levels, nitric oxide release for improved libido, improved circulation, joint pain relief and improved bowel function through improved cellular exchange of nutrients are all effects which can have a direct, if not dramatic effect on people with hypothyroidism.

Settings and application
Use the whole body mat applicator twice daily for 16 minutes. A morning intensity level of 25

is recommended, with an evening intensity level of 10. Higher intensity levels may be tried in the morning, particularly to enhance available bodily energy throughout the day.

Use the pad or probe applicators twice daily for eight minutes each at an intensity setting of 50 to the neck area.

Description

An overactive thyroid, where excessive thyroxine is released, is called hyperthyroidism. Too much thyroxin can significantly accelerate the body's metabolism, resulting in rapid weight loss, rapid or irregular heartbeat, sweating, nervousness, anxiety attacks, tremor, difficulty sleeping, heat intolerance and irritability.

Hyperthyroidism may be accompanied by an enlarged thyroid gland (goiter). This manifests as a swelling below the Adam's apple at the base of the neck.

Rarely a condition develops where the eyeballs protrude beyond their normal protective orbits due to swelling of the tissues behind the eyes. This gives the appearance of bulging eyes, and is called Graves' ophthalmopathy. It leads to red or swollen eyes, excessive tearing or discomfort, light sensitivity, blurry or double vision, and reduced eye movement.

Common medical treatments include the use of radioactive iodine to shrink the thyroid gland, anti-thyroid medications, beta-blockers to normalize the heartbeat, and surgery to remove the thyroid gland (thyroidectomy).

Settings and application

Important Note: Uncontrolled hyperthyroidism is a contraindication to the use of the MRS 2000 due to the improvement of circulation and a condition where the circulatory rate is already too high.

Once hyperthyroidism is under control, magnetic resonance stimulation can be used beneficially to promote calming and autonomic nervous system balance. In many patients radioactive thyroid ablation or surgery have removed the possibility of hyperthyroidism permanently and, of course, no further contraindication exists.

With good control of thyroid hormone levels, use the whole body mat applicator twice daily for 16 minutes. Begin with the morning intensity level at 25 and the evening intensity level at 10. Adjust the intensity settings as desired.

GYNECOLOGY

Many of the conditions presented in this book affect women to a disproportionately greater degree than men. Examples include CFIDS, fibromyalgia and the rheumatic diseases we've discussed.

Here we address the benefits of magnetic resonance stimulation for disorders of the female reproductive system. In some cases these benefits may be profound. For example, Jorgensen and co-workers found that women with pelvic pain from ruptured ovarian cyst, dysmenorrhea, endometriosis, acute lower urinary tract infection, post-operative hematoma, and persistent dyspareunia (painful intercourse) responded with marked or even dramatic relief of pain in 90% of cases. *(Jorgensen 1994)* These authors noted that the treatments are "short, fast-acting, economical and in many instances have obviated (eliminated the need for) surgery."

Description

Ovulation disorders account for 25% of infertility cases. The causes of ovulation disorders are manifold. However, the more common causes include abnormal FSH (follicle-stimulating hormone) and LH (luteinizing hormone) secretion, polycystic ovary syndrome, luteal phase defect (low progesterone), and premature ovarian failure (an autoimmune response where your body mistakenly attacks the ovaries).

Female infertility may also result from damage to the fallopian tubes, endometriosis, narrowing or blockage of the cervix, uterine fibroids or polyps, and uterine scarring or congenital malformation.

Recently the scientific community has accepted acupuncture as significantly beneficial in treating infertility in relation to ovulation disorders. Acupuncture is a form of energy medicine that promotes hormonal balance, as well as energetic balance throughout the body. Experience in our clinic with female infertility has demonstrated the capacity of acupuncture to enhance fertility among women with ovulation disorders as well. Though preliminary, magnetic resonance stimulation has resulted in the ability for one patient in our clinic to conceive in a manner similar to acupuncture. Her story is reported below.

Neither acupuncture nor magnetic resonance stimulation can provide a guarantee of normal physiologic conception. However, there is great hope for the future through the complementary use of energy medicine with other fertility interventions to maximize the chances of conception.

As noted above, one of our patients was told she did not need to use any form of birth control since it would be impossible for her to conceive children. We began using the MRS 2000 in conjunction with our treatment for her low back pain. After approximately 4 weeks of treatment she and her husband conceived a child, quite to their surprise and delight. The only difference was her use of the MRS 2000. Today they have a healthy baby girl through normal, physiologic conception *without in vitro fertilization or any other means.* It should be noted that the patient gave birth to twins by in vitro fertilization several years earlier. One of her twin daughters had prayed diligently for a baby sister. It is without question that God answered her prayer, and He appears to have used the MRS 2000 to do it!

Settings and application
Use the whole body mat applicator 1-3 times daily for 16-24 minutes at an intensity setting of 10.

Some attention must be given to why infertility is on the rise in our culture to begin with. Some believe that synthetic estrogens in certain plastics alter hormone balance. Others suggest that a high level of testosterone (used in beef production) is the culprit. Others point to stress, smoking, obesity and caffeine intake. All of these factors should be considered and addressed in cases of female infertility. Exercise and a healthy diet, together with stress management, cannot be overemphasized. The MRS 2000 can play a key role in stress management.

Description
Amenorrhea is the absence of menstruation. This can happen during puberty or later in life. It can also happen in response to high levels of aerobic training. This is called athletic amenorrhea and it is of critical concern among adolescent and college-aged females involved in sports.

An endocrinologist or gynecologist should identify the exact cause of amenorrhea. Causes of primary amenorrhea (menstruation never starts) may include chromosomal abnormalities,

problems with the hypothalamus, pituitary disease, abnormal development of reproductive organs, and structural abnormality of the vagina. Primary amenorrhea affects less than 1% of adolescent girls in the United States.

Secondary amenorrhea is much more common than primary amenorrhea. This is defined as the discontinuation of a menstrual period once it has started. Causes include pregnancy, the use of certain forms of contraception, breast-feeding, stress, medications such as antidepressants, antipsychotics, chemotherapy or oral corticosteroids, illness, hormone imbalance, low body weight, excessive exercise (athletic amenorrhea), thyroid malfunction, uterine scarring, premature menopause, and benign (non-cancerous) pituitary tumor.

Since certain forms of amenorrhea involve hormone imbalance and high levels of stress, magnetic resonance stimulation may be of benefit. The balancing and calming effect on the autonomic nervous system, and the stress reduction afforded through magnetic resonance stimulation represent strong support for normalizing menstrual functions. The MRS 2000 may also enhance the effectiveness of medications and hormonal supplementation through improved membrane transport mechanisms.

Settings and application

Use the whole body mat applicator 1-3 times daily for 16-24 minutes at an intensity setting of 10-25 initially. Increase the morning and midday intensity settings gradually for higher levels of energy during the day if necessary. Make sure you drink plenty of water, improve your nutrition plan and plan for plenty of sleep. (See the discussion on insomnia.)

Description

During a menstrual period, the uterus contracts to expel the uterine lining. Prostaglandins are a hormone-like substances that are necessary to initiate contractions of the uterine muscle. Unfortunately prostaglandins are also involved in the perception of pain, and in the inflammatory response. Together with leukotrienes – other chemicals involved in inflammation – prostaglandins are believed to be responsible for primary dysmenorrhea.

Secondary dysmenorrhea is defined as menstrual cramping that can be linked to a separate cause. These causes include endometriosis, adenomyosis (thickening of the inner uterine lining), pelvic inflammatory disease, the use of an IUD, uterine fibroids and uterine polyps.

Menstrual cramping is more common in women below the age of 20, in those with early onset of puberty (age 11 or younger), in women who smoke and who have never delivered a baby, in women with heavy menstrual periods, and in women who suffer with anxiety, excessive stress or depression. Clearly the underlying cause must be identified in all cases of menstrual cramping.

Regular exercise, adequate stress, stress management, and a healthy diet can limit menstrual cramping. Prostaglandin synthesis may be reduced through the avoidance of sugar, salt, and fatty foods. A heating pad over the abdomen and hot baths can relieve cramping symptoms.

The MRS 2000 may have a profoundly relaxing effect on the smooth muscle of the uterus. A study by Sandyk indicates that weak magnetic field therapy applied to the head abates hormonally-related premenstrual worsening of MS symptoms. *(Sandyk 1995b/271)*

Of 17 female patients presenting with a total of 20 episodes of pelvic pain of gynecological origin (11 acute episodes, 7 chronic, and 2 combined) 16 patients representing 18 episodes (80%) experienced marked, even dramatic relief, while two other patients reported less than complete relief. *(Jorgensen 1994/272)*

Settings and application
Use the whole body mat applicator 1-3 times daily for 16-24 minutes at an intensity setting of 10-25 initially. The morning and midday intensity settings may be increased as tolerated.

Use the pad applicator over the lower pelvis at 50-150 for 16-24 minutes for cramping pain, once or twice daily.

If you experience pre-menstrual cramping 4-7 days prior to the onset of your menstrual period, use the pad applicator to the head and neck for 16 to 24 minutes at a "Sensitive" setting 1-3 times daily.

Description
The endometrium is tissue that normally lines the inner cavity of the uterus. In some cases this specialized tissue may begin to grow elsewhere within the female reproductive system, such as on the fallopian tubes or ovaries. This condition is known as endometriosis. This tissue is sensitive to hormonal changes. When the normal endometrium thickens during the menstrual cycle, endometrial tissue that is growing elsewhere also thickens, producing symptoms.

Displaced endometrial tissue can form cysts, lead to scarring and adhesions, or irritate surrounding tissues. This can lead to fertility problems. Contrary to what some may believe, literature has not shown that endometriosis increases the risk of uterine cancer or ovarian cancer.

While some women experience symptoms, other women may experience no symptoms at all. Menstrual cramping, pelvic pain, excessive bleeding and infertility are the most common symptoms. Endometriosis may be misdiagnosed as pelvic inflammatory disease, ovarian cyst disease or irritable bowel syndrome.

In my experience acupuncture can be a profound benefit in managing symptoms associated with endometriosis. It appears that the MRS 2000, when used over the long-term, may have similar or complementary results to acupuncture. Sukhikh and co-workers noted a reduction in inflammation of the endometrium as monitored (by matrix metalloproteinase activity) over the first days after applying electromagnetic field therapy. *(Sukhikh 2007/273)*

Traditional medical therapy includes pain medication, hormone therapy, and laparoscopic surgery. In severe cases as a last resort hysterectomy (removal of the uterus and displaced endometrial tissues) may be recommended.

Settings and application
To promote autonomic balance, relaxation and pain control use the whole body mat applicator for 8 to 16 minutes at low intensity settings for the sedative effect delivered to smooth muscle. The mat can be used 2-4 times daily at "Sensitive" to 25 in morning to late afternoon, and at "Sensitive" to 10 in the evening before bed.

Description
Heavy menstrual bleeding is called menorrhagia. It is commonly caused by hormonal imbalance, the use of an intrauterine device (IUD), adenomyosis (thicking of inner lining of uterus), uterine fibroids or polyps, and failure of the ovaries to release an egg (anovulation). Complications with pregnancy, cancer, and certain medications can also cause excessive menstrual flow.

The excess loss of blood often leads to iron deficiency anemia. Iron supplements are recommended. For pain associated with excessive menstrual flow, nonsteroidal anti-inflammatories can be used, together with a heating pad over the lower abdomen, hot baths, and plenty of rest. Oral contraceptive medication and progesterone may help with hormonal balance to regulate menorrhagia.

Alternative therapies include acupuncture, massage for stress management, chiropractic care, and magnetic resonance stimulation. All of these therapies used alone or in combination may have a significant impact, though the mechanisms are not well known aside from autonomic nervous system regulation. A healthy diet and exercise are always recommended, and dietary sources of artificial hormones should be identified, if any.

Settings and application
To promote autonomic balance, relaxation and pain control use the whole body mat applicator for 8 to 16 minutes at low intensity settings for the sedative effect delivered to smooth muscle. The mat can be used 2-4 times daily at 10-25 in morning, 50-100 at midday and in late afternoon, and at 10 in the evening.

The pad applicator can be placed over the lower pelvis and used at 50-150 for 16-24 minutes for cramping pain.

Description
The ovaries are a pair of organs located on each side of the uterus, about the size and shape of an almond. Each month one ovary releases an egg, which travels down the fallopian tubes and, if fertilized, implants into the thickened uterine lining. When fluid filled sacs or pockets

develop within or on the surface of an ovary, these are called ovarian cysts. Cysts can rupture, producing serious pain and other complications.

Ovarian cysts may be asymptomatic, or may produce menstrual irregularities, pelvic pain, or even symptoms that may mimic a ruptured appendix or diverticulitis. The pain from an ovarian cyst may radiate a dull, constant ache to the low back and thighs.

Ovarian cysts can produce a fullness or heaviness in the abdomen, pressure in the rectum or bladder (with difficulty emptying the bladder completely), painful intercourse, nausea or vomiting, breast tenderness, and cyclical pelvic pain related to menstrual periods.

A ruptured ovarian cyst is considered a medical emergency in the U.S. Symptoms involve the sudden onset of severe abdominal or pelvic pain, usually with fever or vomiting.

Diagnosis of ovarian cysts requires consultation with a qualified physician or gynecologist. Specialized tests, including pelvic ultrasound, laparoscopy, and blood tests may be necessary.

Standard treatments include the prescription of birth control pills and surgery. Some adopt the approach of "watchful waiting," which includes regular monitoring with abdominal ultrasound. Specific criteria are used to determine whether this approach can safely be continued, or must be abandoned. Some cystic masses around the ovaries may be cancerous. In such cases, total hysterectomy (removal of uterus and ovaries together) is recommended.

No measures have been identified to prevent the development of ovarian cysts. Regular checkups with your gynecologist increase the likelihood of identifying irregularities.

The role of magnetic resonance stimulation is to maintain cellular health and autonomic balance at optimum levels.

Settings and application

To promote autonomic balance and normal cellular function in the female reproductive system use the whole body mat applicator for 8 to 16 minutes at an intensity setting of 25 in the morning and 10 in the evening.

Description

Menopause is defined as the normal cessation of menstruation and fertility in women in mid-life. It is associated with significant hormonal changes. It is these hormonal changes that produce the physical symptoms associated with menopause. On average, menopause occurs by the age of 51 in the United States.

Perimenopause begins naturally in many women by the late 30s. By the mid to late 40s, menstrual periods become variably longer or shorter, heavier or lighter, and more or less frequent. Eventually menstrual periods are less frequent, and then they cease altogether. Once 12 months have passed without a menstrual period, menopause has officially arrived.

The symptoms of perimenopause and menopause include irregular menstrual periods, decreased fertility, loss of breast fullness, thinning hair, increased abdominal fat, mood swings, hot flashes, vaginal dryness, and sleep disturbance.

At our clinic, The Center for Spine Pain & Wellness, we are fortunate to have a skilled team of Doctors of Chiropractic, acupuncturists, and a naturopath who combine their skills to great effect for the untoward symptoms of menopause. While we can't reverse the aging process or the hormonal changes that occur with it, using the skills of our team in conjunction with energy medicine we have been able to help make life easier and more comfortable for menopausal and perimenopausal women.

Settings and application

To promote more restful sleep, promote stable moods and improved energy use the whole

body mat applicator for 8 to 16 minutes at an intensity setting of 25-50 in the morning and 10-25 in the evening.

Supportive multidisciplinary therapy including acupuncture, massage and chiropractic care is highly recommended. Consider using a Chinese herbal compound known as True Yin Formula (available by specific request at info@center4spine.com).

Here are some more tips for a healthy menopause: Identify triggers to hot flashes, and avoid them. This can include the ingestion of refined sugar, hot beverages, spicy foods, alcohol, hot weather or a warm room. Vaginal dryness can be remedied by staying sexually active and by using vaginal lubricants. See the chapter in this book on insomnia and observe a restful bedtime routine to ensure optimum sleep on a regular basis. Eat a balanced diet including healthy fruits, vegetables and whole grains. Stop smoking and exercise regularly. Avoid excessive calories and observe healthy portion control.

PREMENSTRUAL SYNDROME (PMS)

Description

Premenstrual syndrome (PMS) is a clinical entity with no particular objective physical findings or specific laboratory tests. It is a regularly recurring pattern of symptoms that lead up to the onset of menstruation. It is comprised of both emotional symptoms and physical symptoms.

Emotional components a premenstrual syndrome include mood swings, irritability, anger, depression, social withdrawal, poor concentration, crying spells, tension or anxiety, and

insomnia. Physical symptoms include abdominal bloating, constipation or diarrhea, breast tenderness, headache and fatigue, joint or muscle pain, increased acne, and weight gain from fluid retention. For some women, emotional and physical symptoms combine to disrupt productivity and/or relationships at work. A small number of women are incapacitated, and have a more severe condition known as premenstrual dysphoric disorder (PMDD). This includes feelings of hopelessness, low self-esteem, irritability, and more severe depression. It may indicate an underlying psychiatric disorder.

Standard medical treatment may include the use of antidepressants such as selective serotonin reuptake inhibitors (SSRIs such as fluoxetine (Prozac or Sarafem), paroxetine (Paxil), or sertraline (Zoloft)), nonsteroidal anti-inflammatory drugs (NSAIDs) to ease cramping and breast discomfort, diuretics and limited salt intake to reduce fluid retention, oral contraceptives to stabilize hormone swings, and Depo-Provera to temporarily arrest ovulation completely in severe cases. These medicines are not without side effects, and Depo-Provera may actually worsen some symptoms of PMS, such as depressed mood, headache, weight gain and increased appetite. In some cases these drugs work. In many cases they do not. In any case, if a non-drug alternative can be effective without side effects, this qualifies, in my opinion, as a superior treatment. Hence the growing popularity of complementary and alternative medical approaches.

Complementary and alternative medicine interventions include natural hormone balancing using progesterone creams, herbal remedies, acupuncture, naturopathy and homeopathy, vitamin E and B6, calcium and magnesium.

Magnetic resonance stimulation can be highly beneficial in supporting restful sleep, decreasing fluid retention, stabilizing mood swings and improving overall mood, and combating stress.

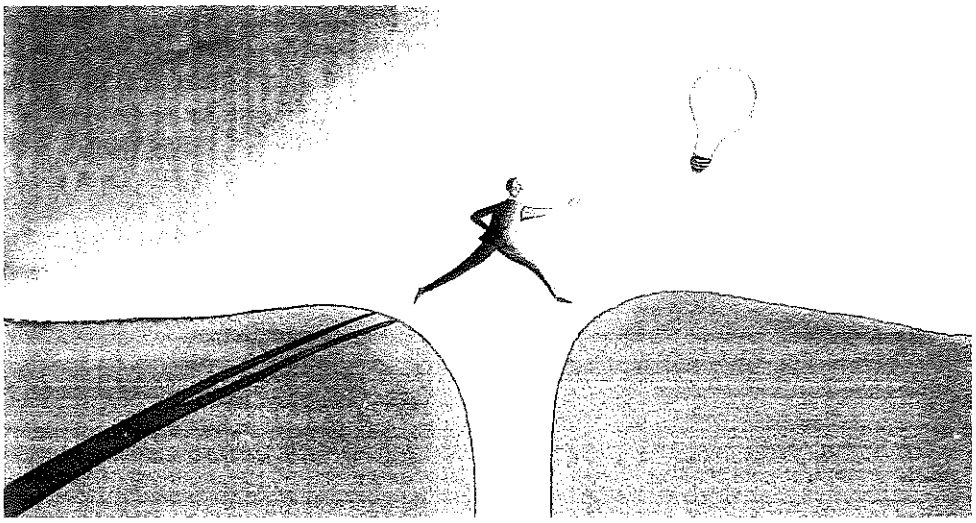
Settings and application
To promote more restful sleep, promote mood stability, and fight stress use the whole body mat applicator for 8 to 16 minutes at an intensity setting of 25-50 in the morning and 10-25 in the evening. In severe cases add 1-2 more sessions at 25-50 for 8 minutes. Drink plenty of water.

The pad applicator can be used for local pain or cramping at 100-200 for 8-16 minutes per application.

Additional tips for PMS: Eat smaller portions and more frequent meals to reduce bloa-ting and the sensation of fullness. Avoid salt, refined sugar, caffeine and alcohol. Make sure the calcium supplement you use is being absorbed. Electro-Interstitial body fluid scanning (EIS) can test this for you. Eat foods that are high in complex carbohydrates such as whole grains, fruits and vegetables. Keep a food diary to identify nutritional triggers for increased PMS symptoms. Exercise 4-5 times per week to burn calories, improve your overall sense of wellbeing, and stimulate healthy hormone balance. Reduce stress by ensuring proper sleep and practicing stress reduction techniques such as muscle relaxation or deep breathing. Schedule a massage for yourself regularly.

SUMMARY

AUTHOR'S AFTERWARD – A New Clinical World View



When I was first approached to consider magnetic resonance stimulation as a supportive device for human wellness and health, I was quite skeptical. I did not want to know about it. I did not want to hear about it or read about it. My view of life and health and healing was tidy, nicely compartmentalized, and squarely Newtonian. Black was black. White was white. Health and disease could be determined through command and control. The right drug, therapeutic maneuver or intervention could force tissues to obey. If only we could find the key! I did not have time to be bothered with talk about goofy, marginal, unscientific magnetic fields. In North American culture, when you hear the word "magnet" in the same sentence as the word "therapy" you start to roll your eyes, back-pedal and "shut 'R down." I've done my share of back-pedaling and eye rolling. I've fended off some of the most compelling overtures to try the latest and greatest fad.

"Magnetic field therapy" was just another one of those things – right up there with snake oil. My standard answer to questions about magnetic bracelets, pillows, insoles and blankets was: "Some swear by 'em, some swear at 'em. If it works for you, go for it!" That was a nice way to keep the conversation moving along while, at the same time, dismissing myself from any serious consideration of the topic.

Perhaps you're a skeptic like me. I hope so![29] If you're in the healthy skeptic's camp like me, why are we this way? In my case, it goes back to the days of clinical training. Internship

[29] You can be a skeptic as long as you're not a grump." Nay-saying" for its own sake is a dismal career. It furrows the brow and adds premature wrinkles! On the other hand, healthy skepticism is critical to advancing knowledge by requiring adequate evidence to establish cause and effect relationships.

and residency is where the physician's "world-view" is formed. In my case, I completed a one-year residency in medical hospital – almost unheard of for a chiropractor in 1986 in the United States. It had only been done once before (by my predecessor, Dr. John Buriak). My training environment in the medical hospital was uncharted territory for a chiropractor. I found myself having to explain, in understandable terms, the science of chiropractic to the medical world. I had prepared for it. I had graduated valedictorian of my class from my chiropractic college, and I was already in the process of getting my first paper accepted for publication in a respected scientific journal.

Bridging the Gap

Due to early success among the medical physicians and nurses at my hospital, I decided I'd bridge the gap between chiropractic and medicine. My clinical world-view became battle-hardened. Almost daily I was trafficking in medical journal articles deemed to be "credible." I memorized catalogues of literature citations for randomized controlled clinical trials that showed the medical world that chiropractic methods were, in fact, rational if not preferred treatments of choice for the bane of modern man, back pain. Within about a decade my efforts began to pay off. Scientific consensus that the chiropractic and medical approaches to spine pain could co-exist and actually benefit patients was mirrored by the referrals I received from medical physicians in Denver. I was on the cutting edge, blazing a trail that would advance my profession into healthcare orthodoxy.

Now, looking through a different lens, I see that I embraced two and only two clinical world-views in relation to back pain: the chemical world-view and the mechanical world-view. (Eighty percent of all back pain is mechanically mediated.) My medical doctor friends embrace a predominantly chemical understanding of health and healing, and of course this extends to their treatment of back pain. Drugs are their modus operandi. The chiropractic view, to me, is broader. Chiropractors appreciate the chemistries of the body and seek to change them through nutritional means first (when safe and appropriate to do so). But chiropractic also seeks to restore and improve the movement of the human frame – the mechanics – through direct manipulations of the muscles and joints as well.

So, when approached to consider "magnetic resonance stimulation" I was just not interested. There was no room in my 2-compartment world-view for magnets. There was no placeholder; there was no box.[30] It took three months for me to finally grant an audience for a demonstration of a magnetic resonance stimulation device. It must have gone well: here I am writing this book!

I want to encourage the reader to explore the new paradigm of energy medicine presented herein. If you are a critical thinker with a scientific mind, the deeper you delve into this

30 This will be the challenge for healthcare providers in the 21st century. They will need to find a philosophical and/or scientific "placeholder" where therapeutic energies do not threaten closely held paradigms of health and disease. A new, unified paradigm of health and wellness must replace the old, and must contain comfortable spaces where as yet unknown connections between the old and new can be made. The findings of physics, whether derived from a quantum mechanical model or new attempts at grand unification theory, need to inform the world-view of doctors and everyone who delivers healthcare.

subject, the more satisfied you will become. Search the references – and their references – and see for yourself. Having said that, the best evidence of all with respect to magnetic resonance stimulation is observing its effects on other people and on yourself.

I have had the privilege of witnessing the restoration of burned out salivary glands in a patient who had undergone radiation therapy for throat cancer. You've read her story in the preceding pages. I have had the privilege of assisting patients to avoid surgeries through full and complete resolution of their symptoms using applied magnetic resonance for cellular health and wellness. And I have personally experienced the stress release, markedly enhanced sleep, and improved circulation that comes through regular use of the MRS 2000+ designo® MED system I use at home.

Candace Pert, Ph.D. said that, in the future, medicine would involve a consideration of three things: "what we eat, how we move, and what we think." This is an example of a departure from Newtonian medicine to a medicine rooted in quantum mechanics. Quantum mechanics states that just one particle in a field can influence the entire field in a profound way. (Do we require any more proof than that of a nuclear bomb?) Dr. Pert's vision of the future of medicine hints at the concept of "the field" as being the most important consideration in restoring health. I would add "the field" as a fourth consideration to Dr. Pert's list, hence making it an explicit, fundamental consideration for our health and wellness. To restate it: "The future of medicine will involve four things: what we eat, how we move, what we think, and 'the field' we live in."

Traditional allopathic medicine in North America is rooted in chemistry, as is the entire nutritional industry. Chiropractic, massage and rehabilitative approaches are rooted in mechanics. There is a third box, placeholder, or paradigm of understanding for health and wellness: ENERGY. "Energy medicine" is not new – it is as ancient as acupuncture. But because it is unfamiliar and not well understood, we tend to fear it. We reject out of hand things we don't understand, or like me, things you're quite sure you don't want to understand.

Presupposition, Science and the Healthy Skeptic

Prior to my investigation of the intersection point between biology and electromagnetic energies I believed my clinical worldview, as a chiropractor, was broader than most of my allopathic counterparts. What I've realized, now that I'm "midstream" in the discovery process, is that my clinical worldview was (and still is, I'm sure) sorely lacking!

The widening of my perspective was precipitated by first entertaining the painful idea that there possibly existed frameworks of accurate understanding beyond my traditional biochemical and biomechanical training. The journey gained momentum as I reflected on my experiences with acupuncture and then by experiencing magnetic resonance stimulation myself. Next I was starkly amazed by results observed directly in my patients. "What an amazing, wonderful thing!" I said to myself. Almost immediately afterwards, I was chagrined: "Why haven't I heard about this before? Why didn't anybody teach me about this?"

Now, having reviewed a generous smattering of the world's literature on the power of electromagnetic fields to better understand why patients were responding and why I

was observing what I was observing, my clinical worldview is forever changed. I cannot recover from this foray into energy medicine. It's changed too many lives for the better!

Again, I encourage readers to maintain healthy skepticism. I also encourage you to be open to the possibility that your presuppositions and "worldview" are in need of expansion. Mine were – and I've told you briefly about my journey. Presuppositions form an interpretive grid that either allow us or prevent us from considering health and wellness from an energetic perspective. The facts are there. (Of course knowledge will always be imperfect, incomplete and progressive, but hear me – the facts are there!) And these facts are brought to us in ways that are meaningful and relevant to our scientific culture: credible, reproducible, and verifiable. The question is whether our presuppositions are elastic enough to allow us to consider these facts.

The Future of Energy Medicine

My colleagues and I continue to practice rigorously evidence-based chiropractic at The Center for Spine Pain & Wellness in Denver, Colorado. We are passionate about seeing an ever-greater percentage of our community avail themselves of the tremendous benefits of chiropractic care. While we're succeeding in this endeavor, we've always seen a persistent, ever-increasing need to cooperate together with our medical counterparts. It is the patient whom we serve together, not our paradigm, presuppositions, philosophy or our turf. We are grateful for our medical colleagues' openness – a willingness to engage in ongoing conversation and partnership for the benefit of people in need.

And now, beyond chiropractic, we embark on the introduction of energy medicine to North American culture. Another gap that needs to be bridged. Electromagnetic fields, the world of magnetic resonance stimulation, and evidence-based energy medicine simply provide the opportunity for another conversation, more cooperation, and new partnerships to form.

Here are just a few things we have to look forward to in the future:

1. Pre-surgical and intra-operative treatments with pulsating magnetic fields to induce the expression of heat shock proteins and other regenerative phenomena at the cellular, molecular, and submolecular levels.
2. Using energy and frequencies, instead of drugs, to handle the daily stress of life at home.
3. Nutrient pre-loading prior to magnetic resonance stimulation as a way to supply significantly greater amounts of a given set of nutrients to the body. Once ingested, using electro-magnetism to draw these tagged medicines or nutrients to a target area for absorption and utilization.
4. Using metalloproteins or other magnetically reactive molecules to tag medicines or nutrients prior to ingestion.

5. Cataloguing a variety of illnesses, diseases and ailments according to their energetic (electron, ion and submolecular) behavior. What happens, for example, with the flow of electrons within the pancreas of someone with pre-diabetes? Can we intervene, energetically, to thwart the onset of diabetes? Can gene expression in Type I diabetes be turned on or off with the use of energies in the future?
6. Athletic performance enhancement using drug-free, doping free energy medicine. Can we improve training, reduce missed days of training, and improve overall wellness of athletes who endure the stresses of heavy training, by providing enhanced post-exercise recovery with autonomic balance through magnetic resonance stimulation?

And the list goes on.

As you've hopefully realized in perusing this volume, we need to get moving. People need to know how they can achieve wellness at the speed of light, using the field to optimize their health!

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Stressed Out? In Pain? Chronically Ill? Your Problem May Be ELECTROSMOG.

The human body has vital needs for daily sustenance, vitality and health. Life cannot persist long without food, water or oxygen. As you'll read within these pages, there is a fourth vital need: low-level electromagnetism. The primary mode of delivery for this gentle energy is the Earth's electromagnetic fields. These fields have extremely low frequencies and intensities and, as regards our health, have largely escaped our notice. But in the last 130 years, with the advent and proliferation of biologically incompatible man-made energetic frequencies and intensities (referred to as "electrosmog"), our health has come under siege. In absolute terms there is a worldwide increase in stress, depression, insomnia, autoimmune disease, chronic pain, and cancer, just to name a few. The ever-increasing presence of electropollution in our environment is, at a minimum, interfering with the low-level, natural electromagnetism our bodies need to thrive in the fullness of health.

Restoring Health and Balance Using Magnetic Resonance Stimulation

Using the full spectrum of natural frequencies and intensities of the Earth's fields, Magnetic Resonance Stimulation (MRS) is the means of re-supplying vital low-level electromagnetic energy to all cells of the body simultaneously. Magnetic resonance stimulation, a refined form of pulsating electromagnetic field (PEMF) therapy, "charges" the membrane of every cell with energy to improve health by supporting normal cellular function. Oscillating in resonance, the cells communicate better.

In this textbook Dr. Joel Carmichael reviews the fundamentals of energy medicine and the latest science underlying MRS and PEMFs. At the same time he provides clear, practical guidelines for applying powerful electromagnetic wellness technology in the home, training room or clinical setting using the MRS 2000+ designo® Systems (MediConsult GmbH, Germany).

About the Author

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