HEALTH AND STRESS

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ELECTROMAGNETIC THERAPY AND 21ST CENTURY MEDICINE

Long before the existence of any known writings, it seems clear that a well developed system of medicine existed based on the premise that health depended on the circulation of vital energies in the body through prescribed pathways. In Chinese medicine, this internal strength was called *Qi*, and was derived from two opposing influences, *yin and yang*. Illness resulted when these were not balanced, the natural flow of *Qi* was blocked, or there was some disturbance in the normal equilibrium between this and what appeared to be analogous forces found in Nature. *The Yellow Emperor's Book of Internal Medicine*, the earliest written record of medicine, which dates back to 2000 B.C., describes how such imbalances could be corrected by means of acupuncture, moxibustion (heat) and magnetic stones applied at specific sites. One must assume that these recommendations were based on supportive evidence that had accumulated over previous centuries. Inserting needles and applying heat are understandable, since these can be felt. But why would anyone be prompted to try a stone with magnetic properties that could not be sensed? The most likely explanation is that the ancient Chinese were impressed by their apparent ability to cause things to move, possibly signifying that they also possessed some potent life force that could be utilized to fortify human *Qi*. The ancient religious scriptures of the Hindus, known as the *Vedas*, also believed to be 4000 years old, mention the treatment of disease with *ashmana*, and *siktavati*, "instruments of stone", which were almost certainly lodestones.

Magnets And Lodestones

Large accumulations of magnetite or magnetic oxide, were referred to by the ancient Greeks as live-stones (*lapis vivus*), since they moved for no visible reason when placed close together, and would also attract anything containing iron. The 7th century philosopher and mathematician, Thales, also noted that when amber, which was fossilized tree resin the Greeks used to make beads, could also attract certain things. If amber was rubbed with a piece of wool, it would pick up light objects such as feathers, straw, or dried grass, but not iron or other metals. He concluded that rubbing the amber imparted some human energy that had now made it magnetic. Magnet is said to be derived from *Mágnes líthos*, "stone from Magnesia", a region of Greece rich in magnetic stones, which later became *magneta* in Latin. Another version attributes it to Magnes, a shepherd who discovered mysterious iron deposits and lodestones attracted to the nails of his sandals. Lode or load originally meant "way" or "course", from ancient German *laithō*, which is also the basis for our verb lead, or to conduct. The present meaning of load comes from *lade*, a later verb for burden, and is retained in the past participle, laden. Load's

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original sense is still preserved in lodestar (leading star) which early sailors used to steer their ships. Lodestone (guiding stone) came from its use as a compass, centuries later.

The Egyptians ascribed a variety of therapeutic effects to lodestones, Cleopatra allegedly wore one on her forehead while sleeping to prevent aging. That may not be as asinine as it seems. Melatonin, which is secreted at night by the pineal gland, is a powerful antioxidant with potential anti-aging properties, and its production has recently been shown to be significantly influenced by feeble electromagnetic fields. According to one report, a negative magnetic field induced by a magnet applied to the top of the head helps to promote sleep and reduce stress by stimulating melatonin production. Tibetan monks use bar magnets placed on the skull in accordance with a particular protocol to influence the minds of novitiates during their training, allegedly derived from an ancient practice that utilized lodestones. Today, there is good evidence from human, animal and bacterial studies, that the body's orientation to the earth's magnetic poles can influence behavior and physiology.

Paracelsus

Electric eels and fish were used by Roman physicians to treat arthritis and gout. However, medieval doctors reported that magnets cured these, as well as other conditions, including melancholy, arthritis, baldness and some poisonings. Their greatest proponent was Paracelsus, who was born Philippus Aureolus Theophrastus Bombastus von Hohenheim in Switzerland, the year after Columbus discovered America. He adopted the name Paracelsus to acknowledge his debt to Celsus, the Roman physician and author of *De Re Medecina*, one of the first books published after the invention of the printing press, and our major source of information on early Greek and Roman medicine.

Paracelsus gained fame as a remarkable physician, but was also skilled in chemistry and metallurgy. In many respects, he brought medicine out of the Dark Ages by developing the concept of disease. He believed that illness resulted from external agents that attacked the body, rather than some internal imbalance of humors, as Galen had taught. Paracelsus was the first to recognize a hereditary pattern in syphilis, the association of cretinism with endemic goiter, and the paralysis that sometimes followed head injuries. He advocated the use of mercury, sulfur, iron, arsenic, and other chemicals to fight different disease-causing agents. He also provided the basis for modern homeopathy, by proposing that some diseases could be cured by minuscule doses of "similars", or substances that could produce similar symptoms.

While Paracelsus knew nothing about the Chinese concept of *Qi*, he also believed that there was some ethereal, esoteric force in nature that could energize people. He wrote that this internal energy was pervasive, unifying body and mind, and that although the body consisted of many separate parts, they all influenced one another.

> "The power to see does not come from the eye, the power to hear does not come from the ear, nor the power to feel from the nerves; but it is the spirit of man that sees through the eyes, hears through the ears, and feels by means of the nerves. Wisdom and reason and thought are not contained in the brain, but belong to the invisible and universal spirit which feels through the heart and thinks through the brain."

> "Even the ignorant know that man has a heart and lungs, brain and stomach; but he thinks that each of these organs are separate and independent things that have nothing to do with each other."

In the healthy person, these structures acted in synergy, such that the total effect was greater than the sum of their individual contributions. Not only was there no separation of mind and body, but Paracelsus believed that thoughts or feelings could produce physical effects, thus anticipating by four hundred years, the concepts of holis-

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tic and psychosomatic medicine, psychoneuroimmunology, and the placebo effect.

> "The spirit is the master, the imagination is the instrument, the body is the plastic material. The moral atmosphere surrounding the patient can have a strong influence on the course of his disease. It is not the curse or blessing that works, but the idea. The imagination produces the effect... To think is to act on the plane of thought, and if the thought is intense enough, it may produce an effect on the physical plane."

As the psychiatrist Carl Jung wrote, "We see in Paracelsus not only a pioneer in the domains of chemical medicine, but also in those of an empirical psychological healing science." The glue that bound all of these different parts of the body together, and the medium through which their effects were made manifest, was this mysterious life force. Paracelsus called it *archaeus*, from the Greek word for ancient, or first. Much like *Qi*, it might be replenished by natural energies found in certain herbs and foods. However, Paracelsus believed that *archaeus* was most influenced by the mysterious force found in magnets, which could energize the body and promote self-healing.

Where did this *archaeus* energy so essential for life originate? Paracelsus explained that "the human body is a vapour, materialized by sunshine mixed with the stars". While this may seem like a somewhat mystical concept, one of the current theories of the origin of life, is that its energy came from the gigantic thermonuclear explosions of stars that resulted in the supernovas. In addition, all life on earth evolved under the influence of persistent and powerful environmental magnetic forces, and the earth itself is a giant magnet. Scientists have just discovered that its inner core, which is a molten iron mass 1500 miles wide and heavier than the moon, is spinning independently and slightly faster than revolution of the planet itself. This helps to explain the changes in the earth's magnetic field that are known to have taken place over long periods of time, including a complete reversal of its magnetic poles every 500,000 years.

Strictly speaking, all matter seems to be magnetic. Physicists can measure the magnetic properties of salt, glass, plastic, copper and living tissue with sufficiently sensitive devices. Each of us has magnetic energy characteristics that not only differ, but may vary in different parts of the body, as well as with changing states of health. Although Paracelsus didn't know any of this, he was firmly convinced of the power of magnets, and the ability of magnetism to replenish *archaeus* energy, and to correct disorders due to its deficiency.

Magnets had been employed to retrieve shattered arrowheads, parts of knives, and other iron foreign bodies embedded in tissues. Paracelsus used them to treat everything from diarrhea and epilepsy, to various types of hemorrhage. Lodestones were ground up to make powders that could be applied as a magnetic salve, or ingested, and quack medicinal applications of magnets quickly became popular. Magnets also generated considerable interest because the compass had now made it possible to more accurately establish trade routes or explore the world, than was possible by steering ships based on the position of certain stars. The Chinese were probably the first to do this, but centuries later, Christopher Columbus and others noted that the magnetic north of the compass was not the true north according to the stars, and that this magnetic deviation also varied in different parts of the world. Equally curious was the fact that all magnets had two opposite poles at their ends. The ends of magnets that faced the same way would repel each other if you tried to push them together, but opposite poles strongly attracted one another. In addition, if you kept cutting a magnet in two, these two opposite poles persisted, no matter how small the resultant segment. It was also difficult to explain how magnets could cause iron filings to move, even though they were separated by pieces of paper, or how ordinary iron could be temporarily magnetized to behave like a permanent magnet.

Gilbert And Mesmer

All of these magnetic phenomena were intensively investigated and clarified by William Gilbert, a mathematician who became a prosperous London physician. He debunked lodestone salves and powders, pointing out that only the stone, which he found to be "beneficial in many diseases of the human system", could attract iron. (He did not know that most of the iron in the body is found in hemoglobin, which is essential for carrying oxygen to all cells.) He also demonstrated that steel retains its magnetism better than iron, and that there was a difference between magnetism, and the static electricity which developed when amber was rubbed. He called this "electrica" from *élektron*, the Greek word for amber, and showed that other substances could also produce this. He explained the variable magnetic deviation of compasses in different parts of the world, the inclination to a vertical position when a magnet was not in a horizontal plane, and the revolution of the earth in relation to the stars in his major treatise, *De Magnete*. Published in 1600, shortly after England had defeated the invincible Spanish Armada, it proposed for the first time, that the earth was actually a large lodestone. Queen Elizabeth had a strong interest in science, and supported him, since she recognized that

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navigation would play an important role in commerce, establishing new colonies, and maintaining the supremacy of her fleet.

Gilbert's interests in the medical and scientific uses of magnetic energy had a powerful influence. A magnetic cure for strangulated hernia was developed, in which patients were fed iron filings, and the trapped intestine was freed from the surrounding sheath of tissues by the external application of a strong magnet. By the middle 1700's, more powerful carbon-steel permanent magnets had become available in Europe that heightened interest in their medical applications. These were intensively investigated by a highly respected Jesuit priest, Maximilian Hell, who was chief astronomer at the University of Vienna. He tried treating patients with steel magnets made into different shapes to correspond to the structures in the body that required healing, and recounted his numerous successes in a treatise published in 1762.

He had a profound influence on one of his younger academic colleagues, Franz Anton Mesmer. Mesmer has been described as being brilliant and quick-witted, with riveting eyes, and a flair for the theatrical. Well trained in mathematics, medicine, and law, his doctoral thesis dealt with the effects of gravitational fields and cycles on human health. It proposed that an invisible magnetic energy permeated the universe, as well as all body fluids, and that the human body contained poles similar to a magnet. If these poles fell out of alignment with this universal flow, it could cause a variety of physical and emotional effects. He was also strongly swayed by Paracelsus, and equally convinced that magnets could cure such problems. In a 1775 report entitled "*On The Medicinal Uses of the Magnet*", he vividly described how he had cured a patient with uncontrollable seizures and numerous other nervous system problems, by feeding her iron filings, and applying Hell's specially shaped magnets:

> "when my patient had another attack, I fixed two magnets of horseshoe-shaped type to her feet and a heart-shaped magnet to her breast. Suddenly she felt a burning sensation spreading from her feet through all her joints like a glowing coal... and likewise from both sides of the breast to the crown of the head... the pains gradually went away, she became insensitive to the magnets. The symptoms disappeared and she recovered from the seizure."

Mesmer subsequently experimented with placing the magnets on different parts of her body, and she gradually improved. He was certain that the cure had resulted from his control of the flow of the "universal fluid" within her body, explaining in his memoirs that

> "certain properties analogous to those of the magnet reveal themselves, especially in the human body. It is possible to distinguish different and opposite poles that may be changed, linked, destroyed or reinforced . . . This property of the human body, which makes it responsive to the influence of the heavenly bodies and to the reciprocal action of the bodies around it, made me, in view of the analogy with the magnet, call it "animal magnetism" (*magnetisomum animalem*).

He distinguished this energy from that in iron and steel, which he referred to as "mineral" magnetism. He believed that he could "magnetize" wood, paper, water or anything by virtue of his own animal magnetism, and that regular magnets simply served as conductors to facilitate the flow of "universal fluid" from him to the patient. Mesmer's animal magnetism produced some miraculous cures. One deaf patient had his hearing restored after Mesmer held his hands over his ears. Others had instant relief of persistent chest or stomach spasms when he stroked these parts of the body. He traveled throughout Europe for the next two years, and his fame as a healer skyrocketed. In retrospect, it would appear that he had really discovered hypnosis, which we still refer to as mesmerism.

His good friend Mozart gave him a plug in his popular comic opera *Cosi fan tutte* (Women are like that), which premiered in 1790. Near the end of the first act, when two men pretend to take poison to test the loyalty of their fiancées, a maid speaks of seeking a marvelous doctor who cures people without a knife or a pill. She returns disguised as a doctor, and pulling out a giant magnet from under her costume, she touches the foreheads of the two faking invalids, then strokes their bodies with it, following which they magically recover. Her accompanying song is "Here and there a touch of the magnet, the stone of Mesmer, who was born in Germany and became so famous in France."

Mesmer had indeed become one of the most famous and controversial figures of his time, especially in France. He was unable to accommodate the increasing number of patients that flocked to him, and sought ways to treat several simultaneously. His popularity and unorthodox treatment was not received well by Vienna's conservative medical community, who viewed animal magnetism as a hoax. Consequently, Mesmer moved to Paris, where he established a salon of magnetic paraphernalia. Patients sat by wooden tubs known as *baquets*, which contained

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magnetized water and iron filings, and had projecting magnetized iron rods. Patrons poured magnetic water on affected parts of their bodies, or rubbed them against the rods, or simply grasped the rods. They also periodically joined hands to facilitate the flow of Mesmer's magnetic "universal fluid". "Assistant magnetizers" were on hand to provide help and instructions in these activities. All of this was conducted in a highly theatrical setting that included numerous mirrors, colored fabrics and lights, and dramatic music. Everything was orchestrated and presided over by the maestro, who would intermittently appear with a long iron rod, using either this or his hands to perform healings. It was not unusual for a patient to faint or have a convulsive fit, and such a climax was viewed as a sign that healing would soon follow.

Mesmer's animal magnetism was hailed as a new force analogous to Newton's gravity, and Parisians waited in long lines to get into the salon. French physicians also considered him to be a fraud, but didn't know how to prove this to the hordes who wanted to be healed by Mesmer. Many of his most ardent followers were rich and famous, including Lafayette, the Revolutionary War hero, who wrote to his friend George Washington, extolling the virtues of animal magnetism. As a result, The French Academy of Sciences finally convinced King Louis XVI to establish an unbiased royal commission in 1784, to determine whether Mesmer's treatment had any scientific validity. It included Antoine Lavoisier, who first demonstrated the role of oxygen in respiration and fire, J.I. Guillotin, famous for inventing the decapitation device, and Benjamin Franklin.

They observed blindfolded patients who sat in front of powerful magnets, and asked them to describe their sensations, comparing these to their responses when fake objects were substituted without their knowledge. The panel concluded that magnetic healing was entirely due to the belief of the patient and the power of suggestion. Their opening statement pointed out in a rational fashion that "Animal magnetism might well exist without being useful, but it cannot be useful if it does not exist." Mesmer countered by requesting that they select patients with various stubborn neuropsychiatric problems, and contrast the results of his treatment, with those that the best conventional treatment could provide. The panel wisely refused, recognizing that many patients with such stress related complaints might well improve, but not through any objective, biophysical energy that could be measured.

Magnets Come To America

Mesmer faded away, but magnetic therapy became extremely popular in the U.S., possibly spurred on by Benjamin Franklin's experiments with electricity. Elisha Perkins, a Connecticut physician, got a patent in 1795 for his "magnetic tractor" device that could "draw off the noxious electrical fluid that lay at the root of suffering", and made a fortune selling them for $25.00. A book entitled, "The History and Philosophy of Animal Magnetism", was published by a "Practical Magnetizer" in Boston in 1843. Around the same time, Phineas Quimby, another follower of Mesmer, established his magnetic healing practice in Portland, Maine, which also used touch and the power of suggestion. One of the patients he cured was Mary Patterson, who became Mary Baker Eddy, and founded Christian Science. Although originally a proponent of mesmerism, she subsequently believed that the only source of healing was prayer, and in later life, derided animal magnetism as being "malicious", and "the action of error in all its forms".

Mary Shelley's, *Frankenstein*, published in 1818, stimulated interest in electricity as a source of life. Since limbs or other body parts would jump when electrical shocks were administered to animal and human cadavers, it was believed that electricity could bring the dead to life. There were various reanimation chairs, devices and techniques, some of which may possibly have acted as defibrillators. One induction coil with sponge-tipped electrodes was successfuly used to treat angina and arrhythmias in 1853, and around the same time, another was used to treat curvature of the spine, a treatment for scoliosis which has now also been revived.

The use of permanent magnets soared after the Civil War, particularly in the newly industrialized farm belts in the West. The Sears Roebuck mail-order catalogue advertised magnetic boot soles for 18 cents a pair, and offered all sorts of genuine magnetic rings, belts, girdles, caps, and other apparel that could be used for everything from menstrual cramps and impotency, to baldness. Magnetic salves and liniments were popular over-the-counter products, and were dispensed by traveling magnetic healers. Towards the end of the century, Daniel Palmer opened Palmer's School of Magnetic Cure in Davenport, Iowa, which emphasized the laying on of hands, massage, and manipulation, and later became chiropractic therapy.

The king of magnetic healers was Dr. C. J. Thacher, whose Chicago's Magnetic Company promised "health without the use of medicine". His mail-order pamphlet explained that the energy responsible for life comes from the magnetic force of the sun, which is conducted through the rich iron content of the blood. Disease resulted when stressful lifestyles and environmental factors interfered with these healing forces. However, "magnetism properly applied will cure every curable disease no matter

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what the cause". The most efficient way to expedite this ability of iron in the blood to transmit healing magnetic energy, was by wearing magnetic clothing, and almost every conceivable garment was available. A complete costume, which promised "full and complete protection of all the vital organs of the body", contained 700 magnets. When interviewed in his State Street office, Thacher was wearing "a magnetic cap, a magnetic waistcoat, magnetic stocking liners, and magnetic insoles". As he explained to the reporter:

> "My object is to spread the light, to rescue humanity. I can cure anything. I will compel the authorities to take notice of my methods. . . Let the authorities turn over ten cases to me. I'll put my magnetic shields on 'em and restore the harmonious vibrations of the brain, and everything will be well! Paralysis? an easy problem. Had five cases . . . Cured 'em right off. Winked. Spoke. Got up and walked. Paralysis? Pish!"

Electromagnetic Devices

By the turn of the century, medical textbooks were devoting chapters to the use of magnetism and electricity for the treatment of neurological and emotional disorders. Electrotherapeutics was viewed as a legitimate subspecialty, much like the rapidly expanding fields of radiology and radium therapy. Electromagnetic therapy was used to treat anemia, convulsions, hysteria, insomnia, migraine, neuralgia, arthritis, fatigue, numerous emotional disorders, and any type of pain. There were numerous devices, with names like the "dynamiser" and "oscilloclast", based on theories that each organ and person were "tuned" to specific electromagnetic wavelengths, that could rejuvenate them. There were all sorts of theories and contraptions making extravagant claims for cures, most of which were clearly worthless. In addition, following World War II, the advent of antibiotics, cortisone and other medical advances provided predictable scientific remedies for many conditions, and magnetic therapy lost its allure.

However, Wilhelm Reich, a student of Freud and a respected psychoanalyst, had developed a box-like device which allegedly attracted and accumulated a basic primordial energy from the atmosphere. By sitting in the box, it was possible to become recharged by this energy, which he called "orgone". This restorative environmental energy was similar to the *archaeus* of Paracelsus, and is described in an identical fashion by many healers, who claim that the laying on of the hands facilitates their ability to transmit it to those they touch. Reich attracted numerous enthusiastic followers, and a decade after the first atomic bombs, claimed that the earth was becoming so polluted, that it was starting to affect orgone activities. In one experiment, he purportedly demonstrated that the radiation emitted by radium affected orgone, and those close by claimed they could feel powerful effects as a result of this interaction. The FDA issued an injunction ordering him to stop all research on life energy, and he was sentenced to jail for two years, where he died.

Some scientists still feel he was far ahead of his time. Over the past few decades, there has been a resurgence of interest in environmental energy effects, as sophisticated scientific studies have confirmed that very weak electromagnetic fields can have profound biological effects. While some might be harmful, remarkable results have been obtained in speeding up the healing of wounds and bone fractures, inducing anesthesia, treating anxiety, depression, insomnia, and curing certain cancers. We know much more about the mechanisms of action involved in these and other effects of feeble electromagnetic fields and forces having certain specific characteristics. In addition, we are able to deliver the different energy parameters required for each of these with unprecedented precision.

Magnet Mania Resurgence?

There has also been a revival in the use of permanent magnets, particularly for the treatment of various pain syndromes, and there is good evidence that these are not simply placebo effects. However, much less is known about how these benefits are achieved, or how this energy can be measured. The strength of permanent magnets is described in units of gauss, or tesla, with one tesla equaling 10,000 gauss. Every magnetic device has a manufacturer's gauss rating, but its power at the body's surface is usually much less, and a 4000 gauss magnet transmits only about 1200 gauss to the patient. The actual strength of a magnet also depends on its size and composition, making many gauss ratings meaningless and misleading.

Magnets can be made of metal, ceramics, or neodymium, a rare earth chemical, and each of these are claimed to be superior for certain situations. The most popular forms are rubberized permanent magnets which can be cut into different sizes and shapes to apply to different parts of the body. Some believe that magnetic energy may activate acupuncture points and meridians, and that it is just as effective as acupuncture for certain conditions. In Japan, tiny *tai-ki* magnets have been designed to deliver this to acupuncture sites with pin point precision. However, magnetic field strength falls off very rapidly with

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increasing distance from direct contact. Magnets in blankets, pillows and beds are relatively far away from the surface of the body, and their relationship to any acupuncture points keeps changing, suggesting that their benefits do not depend on precise placement.

Magnets are riding the crest of the alternative medicine wave, as illustrated by the following case reports in one large text, which is based on the experiences of over 300 physicians and health professionals. A forty-six year old man had "suffered for years from severe heart flutter, diarrhea, and nausea". No treatment seemed to help, but when a weak magnet with less than one gauss strength was placed over the region of his solar plexus for only three minutes, his symptoms immediately ceased, and had never recurred on two year follow-up. Another doctor cited the case of a seventy year old man who continued to suffer from chest pain following cardiac bypass surgery, was chronically depressed, had slurred speech, and walked with a shuffle. A magnet was placed over his heart, and "Within ten minutes, the pain disappeared. Magnets were applied to the crown of his head while he slept, and within a month, his depression was gone, his speech became clear, and his walking returned to normal."

These and numerous other reported unusual therapeutic responses are difficult to explain or comprehend. However, cranioelectrical stimulation has been shown to improve depression, as well as Parkinson's disease, in which slurred speech and shuffling gait are also common. It is important to appreciate that unlike heat or electricity, the penetration of magnetic fields is not hampered by skin resistance or weakened in any way by passage through intervening soft tissue, muscle, or bone, nor is skin contact required, as with other types of therapy. Magnetic energy could thus readily stimulate deep lying neural structures, such as the sciatic nerve, solar plexus, and all of the brain, without interference, or inducing any sensation. Some believe that permanent magnets may increase the flow of blood and oxygen to affected areas by its effects on the iron contained in hemoglobin. Others suggest it can restore abnormal acid base balance and the flow of certain ions, or stimulate various enzymes, neurohumoral transmitters and immune system components, to promote homeostasis. It is claimed that negative static magnetic fields favorably affect "all the metabolic processes involved in growth, healing, immune defense, non-immune microorganism defense, and detoxification". These fields are also allegedly "anti-stressful", promote rest, relaxation and sleep, relieve addictive withdrawal symptoms, stimulate melatonin and growth hormone, and block free radical activity. On the other hand, stressful positive magnetic fields of more than 150 to 200 gauss presumably oppose such activities and might prove harmful.

Unfortunately, there is scant scientific research to support these claims, and little financial incentive to do so, since it is unlikely that protective patents could be obtained. There is absolutely no regulation in the field, and legitimate efforts are apt to be drowned out by a plethora of worthless wares promoted by entrepreneurs anxious to cash in on the growing popularity. Magnets can be found in the vast majority of Japanese homes, and some types of magnetic therapy are reimbursable by medical insurance in Germany. Nikken, a Japanese company formed in 1975, markets all kinds of magnets. In addition to those applied to various body parts, there are mattresses, pillows, chair seats and insteps, where magnets are arranged in a checkerboard fashion with alternating polarities, to insure a uniform field. Sales in the U.S. jumped from $3 million in 1989, to $40 million in 1993, and have been climbing ever since. Magnetherapy, Inc. makes similar unipole products that deliver only a negative magnetic field. Although in existence for only a few years, their Tectonic™ magnets are currently used by over 30 touring golf professionals, who are said to receive no compensation for their enthusiastic endorsements. These range from relief of previously persistent pain, to markedly increased mobility.

21st Century Electromagnetic Medicine

Many scientists are concerned about the long term consequences of magnets, similar to the current controversy surrounding electromagnetic fields from high power lines and electrical appliances, that have been implicated in birth defects and certain cancers. However, the use of magnetic and especially electromagnetic energies for the diagnosis and treatment of disease has immense potential. Magnetic resonance imaging (MRI), has already resulted in remarkable advances because of the ability of magnetic energy to pass freely through bone and other impediments. Magnets are increasingly being used for the treatment of dental disorders, and magnetic pellets the size of a grain of rice can now be inserted in a tiny hole in the brain, to steer a catheter, electrode or other device to deep tissues with minimal trauma. This is accomplished by placing the patient's head in a small housing containing six powerful superconducting magnets, whose strength can be varied as needed, based on MRI feedback of the changing position of the minute magnet. There is also considerable excitement over recent scientific reports of significant relief of symptoms in multiple sclerosis and Parkinson's disease using electromagnetic approaches that have none of the side effects associated with medication or surgery.

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Many medications are now administered by patches applied to the skin. However, weak electrical stimulation can remarkably facilitate this iontophoretic transfer. Electrical iontophoresis can deliver doses of chemotherapy drugs directly into tumors, achieving concentrations thousands of times higher than by other means, with no systemic effects. A host of "electronic band-aids" may be in our future. Companies with names like "Electropharmacology Inc." and "Electronic Pharmaceuticals" already exist.

Transcutaneous nerve stimulation (TENS) has long been an accepted treatment for the relief of pain. More powerful GigaTENS™ stimulation to selected acupuncture points has now been shown to remarkably increase levels of the anti-aging hormone dehydroepiandrosterone (DHEA). An unanticipated improvement in patients with pain and other symptoms of diabetic neuropathy not related to DHEA increases suggests other important actions that are being intensively investigated. The Liss Cranial Electrical Stimulator has been successfully used for the treatment of depression for two decades, quite likely because of its ability to increase serotonin levels. Neuroelectric therapy, which evolved from experiences with electroacupuncture, has produced promising responses in patients addicted to heroin, cocaine, morphine, and amphetamine. Research studies suggest that each of these substances apparently responds optimally to different parameters of amplitude and frequency. Fine tuning of these, and correlation of cures with changes in brain neurotransmitters will likely further improve results.

The addictive pathway from the limbic system to the frontal lobes has recently been delineated, and found to be lined with dopamine receptors. In animal studies, the ability of addictive drugs to provide pleasure and cause cravings disappears when dopamine containing neurons are destroyed, or drugs that block their entry into dopamine receptor sites are administered. It is possible to stop an enraged, charging bull dead in his tracks, by remote stimulation of an electrode placed in a pleasure center. Could similar, safe, non-invasive strategies be devised to treat drug addiction, to stop people from eating or smoking, or help them to sleep? Low energy emission therapy (LEET) with the Symtonic device, which creates a weak electromagnetic field in the hypothalamus, already appears to be the most effective and safest treatment for insomnia. Symtonic LEET has also proven beneficial for the treatment of valium addiction, anxiety, and other stress related symptoms, using different emission energies. The mechanism of action is believed to be mediated by modifications of stress related neurotransmitter and ion activity.

Further progress in these areas may provide additional insights into how subtle natural or artificial environmental energies can produce profound psychophysiologic changes. Such advances may also elucidate the potential for feeble electrical forces from the brain, heart, and other structures, to send signals to other internal tissues that have similar effects. We will again be exploring this subject with presentations and demonstrations during our Ninth International Montreux Congress on Stress, February 16-21, 1997. Will such research enable us to explain the power of the placebo, the salubrious effects of a strong faith and religiosity, or support the possible existence of magnetic "universal fluid" and animal magnetism, *archaeus, Qi*, "orgone", or some atmospheric life force that so many healers describe? Your gauss is as good as mine.

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