



Some Biophysical Bases

for the

Human Energy System

By Wallace G. Heath, Ph.D.

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My interest in and use of the Energetic Fitness Systems (EFS) unit was the result of the diagnosis of my prostate cancer in October 2001, followed by a heart attack at age 70 on November 1, 2002. While I had used several alternative treatments for the cancer during the year without measurable progress (the PSA went from 6.5 to 12.5 during that year), it was only after the heart attack that I used the EFS daily for two months. In addition to an excellent rapid recovery from the heart attack with two stents, the PSA dropped from 12.5 to 7.4, with no additional therapies from before than the four heart medicines, which are not known to have any effects on PSA levels. On January 3, 2003 my wife and I left for an energetic two-month trip to Australia and returned with my PSA at 8 (not statistically higher than the 7.4 level), and with no prostate or cancer therapy during the trip. The EFS usage is now continuing.

This anecdotal experience led me to investigate further into the possible biophysical bases for the EFS and other electromagnetic therapies. My scientific background includes 12 years studying at two universities (UC Berkeley and UA Tucson) in physics and biology resulting in a Ph.D. in zoology with a minor in physics in 1962.

The most apparent initial discovery in reviewing biophysical information was that few physicists study biology, and even fewer biologists study physics seriously. By contrast, no medical biologists would expect to have less than a year of organic chemistry and at least a year of biochemistry (in addition to a year of general chemistry). Yet very few medical schools have even a single course in biophysics. And even second or third year physics are not required in the medical curriculum. This may help explain the apparent lack of popularity or acceptance of biophysical therapies.

While the EFS technology goes back more than 100 years to Nikola Tesla (1), the father of electrical engineering, and George Lakhovsky (2), an early pioneer in biophysics, only in recent decades is research catching up to where they left off. Thus, the modern version of the EFS is still on the leading edge. Tesla's experience convinced him that a high voltage field with low or no current energized the body and seemed to overcome illnesses with no side effects. Lakhovsky found that oscillating the high voltage over a wide range of frequencies greatly increased the curative powers of the system. He and Tesla worked brilliantly together to develop the Multi-Wave Oscillator (MWO), which was the prototype of the EFS. But in the early 1900's electromedicine was outlawed in the US and further research was greatly restricted for

most of the century. But thanks to a rather small group of dedicated physicists, biophysicists, biologists, doctors, and therapists amazing progress has been made in recent years.

In my quest for a more up-to-date understanding of how the rather simple EFS unit could have such wide ranging beneficial effects, I went to the university library and the bookstores for scores of books and papers on the “*new biophysics*”. Some of these are listed in the “Literature Cited” for this article. As I began reading I realized that I had to reconstruct most of what I had learned over the years in basic biology, and even in physics. After a few general observations, I will try to summarize some of the new insights into how the body works. Be prepared for some surprises.

A biophysical basis for healing and maintaining the health of the body would require a very high degree of communication between all systems. Yet until recently the immune system was taught to be an autonomous system without direct connections to the brain or nervous system. Thanks primarily to the work of Dr. Candace Pert (3) it is now known that dozens of different kinds of neuropeptides (chains of amino acids, e.g. endorphins, insulin, etc.) race throughout the body and coordinate biochemistry, energy flow, physical reactions, emotions, etc. They exist in all cells of the body and produce different effects in different areas, interconnecting physical and chemical functions—especially in the immune system. They are believed to be a physical aspect of the “Mind”. Biophysically the mind-body functions as a single unit.

A second area of discovery interrelating mind and body was the discovery by Drs. David and Suzanne Felten (4) that all the organs of the immune system were loaded with nerves interlacing them with the brain and the rest of the body, contrary to the results of previous studies that had overlooked them. Thus, with these two systems the mind, the emotions, the muscles, the glands, and all the organs are closely interlocked at all times with tiny electronic impulses and peptide molecules whirring about in approximately a 100-watt system (at rest—but rising to 600-watts on demand!). And yet it is so sensitive that incredibly minute changes in the magnetic field can vastly alter its function for good or bad. It is now known that our daily rhythms are set by a little gland near the center of the brain (the pineal gland), which releases melatonin (now also used for relief from jet lag). Only a few years ago this gland was thought to be nonfunctional. It is now considered to be the master endocrine organ for the entire body and right near it are minute deposits of magnetite crystals (also found near the adrenal glands) visible only to the electron microscope. With these the body can detect the very slightest changes in magnetic fields, and a percentage of people can detect the north direction blindfolded. And as noted below it is also the central point of the dowsing mechanism.

The gifted orthopedic surgeon, Dr. Robert O. Becker (5) (also a physicist), was puzzled by the failure of some fractured bones to heal, for no known reason. So he began studying amphibians--salamanders because they can perfectly regenerate a

severed limb--and frogs because they can't. It was found that adjusting the voltage and polarity of the injury potentials associated with the severed limb facilitated the regeneration of muscle, bone and cartilage, even in the frog (and later in the rat and human). But if the polarity was reversed, degeneration occurred. But an astounding key factor was discovered: In applying the negative current to stimulate regeneration only an extremely small current would work--only billionths of an ampere. Even slightly more would not work. Similarly, the EFS also give its effects with apparently NO measurable current, only high voltage with multiple oscillating frequencies. And here we have one more example of how extremely sensitive the energy systems of living things are. With these studies Dr. Becker was able to overcome the problems of healing the fractured limbs previously resistant, in spite of elapsed time--as much as 40 years!

In addition to his amazing array of pioneering successes in electrobiology Dr. Becker (6) predicted decades in advance three factors that he later proved to exist: In order for the body to maintain such incredible coordination of such hypersensitive systems with near-infinite numbers of components of miniscule size moving at astonishing velocities capable of responding to very faint resonant wave energies in such finite and prescribed spaces with perfect and nearly unlimited memories--there must be some computers involved--with some degree of radio control! In the 1960's this prediction was enough to get him laughed out of the seminar room, which it did! But by the 1980's (8) he proved the existence and function of both the more primitive analog computer (serving the slower, primitive, healing oriented, more methodical functions) communicating through the perineural cells (collagen fibers) outside of the nerves, and the more advanced digital computer (for rapid, multifunctional, highly coordinated functions) communicating through the central nervous system itself. But it was not until later that a sufficiently sensitive instrument was available to prove that the brain was a radio transmitter—over 20 years after his prediction! The instrument used is the **SQUID** (superconducting quantum interference detector), based on the work of Nobel Prize winning physicist and psi researcher, Dr. Brian Josephson, (7) who now heads the Mind-Matter Reunification Project at Cambridge University, and who in 1980 edited the ground-breaking book, "Consciousness and the Physical World".

But the idea that the human brain could be a radio transmitter seemed preposterous. After all it was only a century ago that Nikola Tesla (not Marconi!) invented the radio (and was so credited by the US Supreme Court in 1943). However, most people like to believe that human beings are the most advanced form of evolved life and perhaps the human brain's radio ability could be a unique exception. But some studies were done on one of the most primitive of all mammals, the duck-billed platypus (which still lays eggs) along with its only close relatives, the spiny anteaters, and it was discovered that the platypus has radio receivers in its bill (and they are also in the snouts of the anteaters). Why would a radio receiver evolve if there were no transmitters? And in the most primitive of mammals? But as Dr. Becker had established (8) -when a strong, concentrated muscle contracts quickly the sudden energy released emits a radio wave. Thus, when the platypus feeds in the dark, in muddy water with zero light waves

looking for little shrimp-like crustaceans, it can pick up the minute radio waves coming from its swimming food supply. Yes, to better appreciate ourselves, it sometimes pays to look around at our ancestors and other neighbors—without looking down our noses too far. After all we have a compass in ours (8)!

One of the most incredible examples of human hypersensitivity *scientifically* verified is found in the art of dowsing. Dowsing is generally discredited by American scientists and is usually near the head of the list of most professional “debunker” (whose papers seldom cite scientific information). The US Geological Survey supplies a six-page paper declaring dowsing to be a hoax (with no scientific references, in spite of several excellent papers by physicists from 30 years ago verifying dowsing as a biophysical phenomenon). Keep this in mind when lost and discovering discrepancies in USGS topographic maps.

Dr. Zboj Harvalik (9)(10) came from Yugoslavia to Virginia in the 1960's to work for the US military. To his surprise he found that US scientists rejected dowsing whereas in much of Europe it was a licensed profession, with dowzers being certified and rated after proving themselves with standardized tests. On his own time in Virginia he studied 14 dowzers. After 700 double-blind tests to determine the presence of magnetic fields of varying intensities and frequencies that he generated and controlled, they scored 97% correct. He then concentrated on a German master dowzer. By raising the field frequency so that it could be blocked by aluminum shielding, he discovered that two areas of the body must be open to the magnetic field. Yes, you guessed it—the center of the head and the adrenal gland area. And if a dowzer loses an adrenal gland, he can no longer dowse. It is now known that these two areas contain the magnetite crystals noted above (as do most of the migrating/navigating species studied so far). By using EEG (Electroencephalogram) monitors from the neck down to the hands it can be concluded that as the body enters a change in magnetic field, the head/adrenal axis (or antenna!) detects the change which is modulated presumably by processors in the brain which sends a signal down the arm causing a contraction in the forearm muscles, perspiration and heat release on the palms, and often tingling sensations in the fingers—very similar, if not identical, to the biofeedback response!

But the German master dowzer had another surprise in store. By testing his response to ever lower magnetic field intensities, Dr. Harvalik repeatedly verified that the dowzer could accurately detect a magnetic field change of one trillionth of a Gauss (the earth's field is about 0.5 Gauss)!! This seems impossible after realizing that Dr. Becker determined that the electromagnetic noise level due to man's EM (electromagnetic) impact on the earth is 250 million times the natural background level. Experiments with electronic equipment show that EM noise cuts instrument sensitivity to a small fraction of that. But the body can filter out signals down to an unbelievable level. And yes, this data has been verified by others. This study and others show that the human body can be millions of times more sensitive as a radio receiver than electronic equipment. So what can the explanation be? How can you hear a canary in a boiler factory?

It was suggested that the dowser's ability to filter such weak signals through such high noise levels was due to superconductivity—biological superconductivity. Josephson got the Nobel Prize for his work with superconductivity, which resulted among other things with Josephson junctions, essential in all high tech computers, etc. These facilitate nearly resistance-free transmission of current. Dr. Freeman Cope's (11) studies in the 1960's and 70's showed that cell membranes qualify for the function of Josephson junctions, which could account for biosuperconductivity and thus explain not only the hypersensitivity of the dowser, but also the many other extremely hypersensitive functions of the body. This may also be reflected in the ability of the EFS to affect massive systems of the body with very small amounts of energy using essentially no current.

But this did not go far enough for Dr. Cope (12). As both a biologist and a physicist, he wanted a deeper theoretical basis for these phenomena, and he had the capacity to develop some of it. He noted three phenomena that could not be easily explained by classical physics in spite of the accurate observations of their existence. One was dowsing, another was the aura of living things, and the third was the *orgone* energy as identified and used by Dr. Wilhelm Reich. He proposed that if all three were based on the monopole and dipole particle energy proposed by theoretical physicists, and with the properties assigned to them in order for them to function in accordance with the mathematics underlying them, then those phenomena and a great deal more could be explained with classical physics. However, no one has yet roped and branded a monopole or dipole and proved their existence under close examinations (but neither has there been an adequate search). Yet that is also true of a number of other physical entities that are "popular" in the physics world today (quarks, strings, neutrinos, etc., etc.). If these concepts were considered it could open many new and fruitful areas of research into the most subtle phenomena in biophysics. Cope's untimely death was profoundly unfortunate.

In considering the scientific basis for the interactions of the mind-brain-body-therapies it is appropriate to quickly peek at the mind-matter issue. This takes us to the nature of consciousness in relationship to the universe-as profound a topic as can be found, and perhaps worth at least a paragraph or two here. Fifteen leading scientific thinkers each wrote a chapter relevant to this subject in Josephson's book cited above, at some risk to their professional credibility on a subject not quite legitimate for them in 1980. But about 20 years later a second book has appeared, "The Conscious Universe", by Dr. Dean Radin (13) that clearly brings the subject into bright sunlight. Using fully accepted statistical methods of analysis, large groups of psi research experiments with sufficient sample sizes are shown to have real results at very high probability levels ($p < 0.000001$), even though the magnitudes of the effects are quite small. The ability of concentrating minds to alter the outcomes of mechanical or electronic random numbers generators was demonstrated beyond doubt, physically and statistically. It was quantitative in that the effects were greater as the number of participants increased

(even when they were unaware that they were participating), and apparently independent of space, whether confined to a room, a country (the US), or spread throughout the world. This could increase receptivity to the role of the mind in health and other matters.

Most of the cited examples above are aimed at stretching our awareness and imagination toward regarding the body primarily as a hypersensitive energy system of the greatest dynamic intricacy. But we should remember to broaden that view to the biosphere of the entire planet. Perhaps one of the more universal treatments to date of the all-pervasive effects of geomagnetism on life is, "The Geomagnetic Field and Life", by Dr. A.P. Dubrov, 1978 (14), including over 1,200 scientific references. In addition to clarifying the enormous complexity of the earth's magnetic field with all its components, as well as solar and lunar effects, and oscillations by the microsecond, it shows these effects on a very wide array of plants, animals, microbes, and even inanimate matter. It shows how each of the many reversals of earth's magnetic field polarity throughout geological time has been followed by considerable extinction of species. Even the effects of the lunar magnetic field are shown to have profound effects on behavior. This suggests all the more that regarding and treating the body as a biochemical bag of mindless molecules can only lead to more of the inadequate exclusively molecular therapies that now afflict us.

The fact that both simple and complex molecules can in some way communicate by radio frequencies and have memory was reported by Dr. Jacques Benveniste in the 1980's (15) amid controversy. He first showed that the homeopathic practice of putting a solute in a water solution, agitating it violently, and then keep diluting it until there are no more solute molecules left, resulting in the water behaving as if the solute were still present. Thus, water has a memory of the solute after it is gone and behaves accordingly. This series of experiments was highly controversial and cost Dr. Benveniste his job, his lab and his credibility. It was not until 12 years later that another group repeated the work and got similar results, contrary to their expectations.

Dr. Benveniste also found that the frequencies of identification for specific molecules could be obtained and used to communicate with those molecules. He proposed that VLF radio frequencies are used by molecules to communicate with each other rather than by direct contact. He was able to record the molecular frequencies, put them on a tape, send them around the world by the Internet to another laboratory, where they were received and used to carry out the expected molecular behavior. That has since been repeated by several laboratories, which should help restore his credibility. But it is absurd that the same journal that attacked him was the same journal (*Nature*) that first published the fact that the platypus can locate its food with radio receptors in its bill—communicating with the food via VLF radio signals! This could be done by the animal without its molecules being responsible?

Can therapeutic touch heal? John Zimmerman, M.D., University of Colorado School of Medicine, Denver, studied therapeutic practitioners using a SQUID to measure the biomagnetism from their hands before and during a healing session. He obtained the strongest fields he had ever experienced in years of work. The touch signal pulsed from 0.3 to 30 Hz with a peak at 7-8 Hz. This range is the range of the known healing responses of damaged tissues, based on other work. However a constant frequency in this range is not effective. Non-practitioners cannot generate these fields. The 7-8 Hz frequency is also the alpha brainwave frequency (prevalent in meditation), and also the Schumann resonance (known as the “earth pulse”, see below), which is also the frequency of geopathic fields (=ley lines) that have been studied extensively by German doctors in relation to people getting cancer who sleep on them. Both the therapeutic touch field and the Schumann resonance are a thousand times stronger than the alpha brainwaves (see below for geophysiological connections).

These examples show us how sensitive and well coordinated the body is, even under difficult circumstances. It is now time to summarize a few of the mechanisms and characteristics of cells and organisms that can account for these and many other amazing functions of the body at all levels.

INFORMATION SYSTEMS: It is difficult to think of any information system that is not based on vibratory energy. Reading, writing, talking, hearing, seeing, touching, feeling (emotionally), radio, telephone, fax, TV, computers, the internet, holograms, photographs, printed material, signs, signals—all of these are based on energy waves in some form, at some stage, in some medium at whatever frequency, amplitude, and involving whatever forms of transducers throughout the natural world. Can it be a surprise that living systems have evolved the ultimate forms of vibratory wave information systems at all levels, and perhaps some forms that have still escaped our awareness? Our nervous system involves trillions of cells, yet they cannot function as a system without complete coordination of information—in wave forms—brain, electric, magnetic, sound, mechanical, radio, heat, light, UV, gamma, cosmic, and possibly other energy forms (monopoles, dipoles, orgone, neutrinos, etc.) yet to be discovered. So what are some of the mechanisms and components now known to make up the information systems in living forms?

THE LIVING MATRIX: Scientists and professionals tend to think in the paradigms developed in their undergraduate studies. Thus, I was taught (in 1950) that the cell consisted of a nucleus filled with nucleoplasm surrounded by the nuclear membrane, outside of which was the cytoplasm contained by the cell membrane. There were some structures or “bodies” within these bags of fluid at which some essential functions took place. But the biochemistry operated rather randomly in these bags of molecules relying on mass action and probability functions; all rather messy but supposedly effective in overall results.

What a contrast to the present paradigm of “the cell”! (21) Describing the contents of the cell as “cytoplasm” is equivalent to describing the contents of a TV set as “teleplasm”. Rather, with its trillions of molecules all precisely structured, performing specifically as semiconductors (proteins), inductors (water in helical coils), (27) transistors, thermistors, diodes, conductors (collagen fibers), grommets (desmosomes), crystalline structures (membranes, muscle fibers, rods and cones, cilia, myelin sheaths, collagen, chlorophyll, etc.), Josephson junctions, an analog computer system conducting through the collagen fiber system – in fact every form of electronic component – all combine to produce superconductivity, resonances at many frequencies concomitantly, coherences, radio waves, magnetic pulses, electric pulses, memory, sensors galore, powerful but delicate electron transfers for energy production on demand, bioluminescence, electric shock (up to 700 volts), thousands of metabolic digital pathways (tailored to meet every functional need of the cell and the body beyond) – all this and much, much more – and self repair besides! Imagine a single building large enough to facilitate a trillion workers to produce all the needs of their community under all conditions and support themselves in the process. Reduce that in size to fit on the point of a pin. Now that’s a cell! (16)

But we are still thinking solid structures like a factory. Not so. Put all the workers in motion trying to go miles per second – and instead make them all vibrate at billions or trillions of vibrations per second off of each other – without touching! Now that is just a very crude glimpse of who you really are. We are still a very long way from seeing the full reality. And no human being can really conceive of it. You’re not alone. Don’t call 911. You’ll be OK.

But what is the *living matrix* and its significance? The parts of the cell are all connected with filaments, tubes and fibers from the DNA in the nucleus to the outer layers of the cell. Outside the cell the fibers join an immense network that spreads throughout the entire body such that every cell is connected to every other. These fibers are made of a wonderful protein called collagen, which is what makes up all the connective tissue of the body, giving it shape, flexibility, rigidity and its many complex functions. But the collagen is also the DC current network, which is controlled by the analog computer – which also controls the digital nervous system and its computer. Thus, information from the DNA from one cell is available to all other cells, if needed. The cell space is so fully occupied that there is even little space for liquid water. Nearly all the water is bound in particular ways to the “living matrix” (17)(18)(19). Even the enzymes so vital to all the cell’s functions are delicately attached to the living matrix within the cell and nucleus.

What are some of the properties of the living matrix that give it such fundamental significance? All the great systems – circulation, nervous system, musculoskeletal system, digestive tract, various organs and glands – all are everywhere covered with the collagen of the living matrix. This forms a great mechanical continuum throughout the body, which gives it its shape and architecture and its movement. Each movement

causes the crystalline lattice of the collagen tissues to generate bioelectronic signals that identify those movements precisely to the rest of the body. And the same collagen fibers are also a semiconducting communication network that can integrate the bioelectronic signals. And this facilitates the DC computer to regulate all the body functions.

THE EARTH PULSE AND THE LIVING MATRIX: There are about 200 lightning strikes per second (17 million per day) on the planet earth. This energy sets up a resonant wave that circles the earth about 7.9 times per second between the surface and the magnetosphere. This is called the Schumann resonance or the “earth pulse” (20). And this coincides with the frequency of the alpha wave of the brain causing entrainment between the two. The earth pulse is a thousand times stronger than the brain waves. Between 20 and 30% percent of pineal gland cells are magnetically sensitive, together with the magnetite crystals connected to it by neurons. The brainwaves regulate the overall tone of the nervous system partly through the release of melatonin, the hormone from the pineal gland stimulated by the Schumann resonance. During meditation the earth pulse and brainwave entrainment can result in an amplification of the hand wave signal from a practitioner of 1000 times. These signals are transferred throughout the living matrix and also set the diurnal rhythms of the body (21).

COHERENCE AND THE LIVING MATRIX: The laser is a prime example of coherence in which all the waves of the light beam are lined up with their peaks together at all times, which maximizes their energy. Thanks to the living matrix the body is able to do this in many ways with its various forms of the EM energy. Since the rotary vibration of a given amino acid on a protein molecule can cause another protein molecule some distance away to do the same through resonance, it is then possible to establish a “chain reaction” of resonance so that a very large array of such molecules can all be resonating together – greatly strengthening their EM field. This is a form of *coherence*. And some of the helical molecules in the living matrix are the best at doing it. These include DNA, keratin (nails and skin, etc.), collagen, actin, and myosin (muscle fibers). But these also are able to “line up uniformly” to form what some call “liquid crystals”. By combining the helix with the crystal in a coherent field very powerful EM fields are activated – under the control of the living matrix (21).

In the final pages of Dr. James Oschman's superb book (“Energy Medicine”, page 239) he gives a fine summary worth paraphrasing: A model for a relationship between DNA and heart coherence (22) is proposed.

“What has been unclear about the model of Rein & McCraty (1993) is the precise mechanism by which the heart rhythms interact with DNA. The resonant properties of DNA molecules are well documented (23), as is the response of DNA to pulsing magnetic fields (24)(25). Moreover it has recently been discovered that DNA molecules have a tendency to pack together in a crystalline array (26), which affects their

resonance. (Crystals are widely used in radio and other electronic devices to provide precisely tuned circuits.)”

“ A related and fascinating discovery is that the ventricle of the heart is actually formed of a single band of muscle that is *wrapped in a double helix* (27). Hence, the resonance that Rein and colleagues suggest can be envisioned as slow oscillations of a macroscopic double helix, the heart, measured in beats per second, resonating with rapid oscillations of DNA, on the order of a trillion per second”. Thus, the microfields of the DNA through the living matrix and the macrofield of the heart are synchronized through coherence. How fortunate for us!

SUMMARY: The foregoing are only a few highlights that hopefully will wet the thirst for “The rest of the story”! I think of it as only the first installment with many more to come – as part my own ongoing re-education. So many of my former students often expressed the disappointment that most of the great discoveries in science have already been made – to my astonished amusement. I can imagine at least three more careers from the little bit that has been written above – with far too much haste – and apology.

Now when I consider something as simple as the Energetic Fitness System unit and recall the many amazing anecdotal reports from its users that I have witnessed or heard, I have a very deep appreciation for the internal living systems that make the many effects possible. And I feel anxious to participate in helping the progress of biophysical knowledge and its multitude of applications. After all, we have a century of officially imposed neglect to overcome.

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