EXPLORING THE BIOFIELD HYPOTHESIS

Biofield: A holistic organizing field of life.

People skilled in detecting and working with subtle energy fields for healing purposes are often referred to as "energy healers," and are said to practice "energy arts." Their work is now gaining support from scientific research in the United States, Europe, and elsewhere. In this article, biophysicist Beverly Rubik reports on research that provides scientific evidence for the existence of biofields.

— EDITOR

Many physicians have been trained to view your body as a machine, and thus treat you, the person, as if you were simply a collection of parts. Another approach to healing recognizes you as a *holistic* living system, exchanging energy and information with your environment. These two modes reflect a long-standing contrast between two very different types of healing. One is the standard "biomedical" model; the other is the "biofield" or "energy" model typical of many alternative or complementary healing practices.

During the past few decades, biochemistry and molecular biology have dominated medicine, resulting in a view of the body as a complex chemical machine made of molecules. Treatment relies on a sophisticated array of drugs, surgeries, and nuclear radiations to fight disease.

Biofields

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Today, some complementary and alternative medical (CAM) therapies challenge this dominant biomedical paradigm. Rather than viewing the body as a collection of parts, CAM practitioners view the patient holistically. CAM therapies known as "energy medicine" include: *homeopathy, acupuncture, traditional Chinese medicine, magnet therapy, bioelectromagnetic therapy, electrodermal therapy, and certain other modalities including chiropractic.* They rely on a "vital force" as the basis for a person's health and healing. Such references to a vital force, however, were removed from modern biology long ago in the late 19th century, and the molecular paradigm continues to dominate biology. Thus it is not well understood how CAM modalities work, which is one reason they remain outside mainstream science and medicine.

To advance the research, application, and acceptance of CAM practices, a scientific foundation supportive of a "biophysical" view of life is required. We now know from mainstream science that living organisms are complex, nonlinear, self-organizing systems. They constantly exchange energy and information with their surroundings in a dynamic process in order to maintain themselves. These in turn have effects on health, disease, and healing. This biophysical view of life provides the rudiments of a scientific foundation for CAM. It involves the transfer of bio-information carried by subtle energy signals—a view that goes far beyond conventional notions of bioinformation carried only by molecules.

The term "biofield" has been accepted by the US National Library of Medicine as a medical subject heading search (MESH) term. In 1999, the National Center for Complementary and Alternative Medicine at the United States National Institutes of Health (NIH) issued a Request for Application for grant proposals dealing with biofield therapies such as Reiki, Therapeutic Touch, external *ch'i* healing, and other subtle energy interactions. These NIH-sponsored research centers for "frontier medicine in biofield science" were established in 2002. For more information, go to http://www.nih.gov/health/whatiscam/

The Biofield Hypothesis

Recently, a small number of scientists, including the author, have reintroduced various versions of the concept of a vital force, using the term "biofield," hypothesized to be central to life. Physicist William Tiller proposes the existence of a new force to explain certain features of life, in addition to the other four known forces of physics. In Germany, biophysicist Fritz-Albert Popp and his colleagues propose coherent dynamic states in organisms' physiologies, whereby they display a high degree of order and stability, and emit coherent electromagnetic waves called biophotons. Engineer Savely Savva believes that the biofield is more than electromagnetism, and involves a nonphysical mental component that carries the information of intention and the psychic realm. Biophysicist Chang-Lin Zhang calls the biological field the "electromagnetic body" and considers it an ultraweak field of standing waves that form the energy anatomy, including the chakras and acupuncture meridians. G.R.Welch proposes metabolic field structures of space-time.

The biological field is regarded as a holistic or global organizing field of life by all these scientists. Just as a holographic plate distributes information throughout a hologram, the biofield conveys information throughout the organism and is central to its integration, and it regulates the body's biochemistry and physiology. However, there is no consensus on whether the biofield is simply electromagnetic or consists of additional, as yet uncharacterized, fields.

I suggest that, consistent with ancient wisdom, there are subtle bodies of the human being beyond the physical body that involve realms of mind, soul, and spirit. A full scientific model of the human being may indeed require elements that go beyond space-time, matter-energy, and require multidimensional geometry or other novel concepts. The biofield hypothesis—based on known scientific concepts from bioelectromagnetics and biophysical systems theory—provides only a first step in establishing a potentially fuller scientific model of the human being. I define the biofield in part as the endogenous, complex dynamic electromagnetic (EM) field resulting from the superposition of component EM fields of the organism. This biofield is proposed to be involved in self-organization and bioregulation of the organism. [*The components of the electromagnetic biofield are the EM fields contributed by each individual electrically-charged moving particle or ensemble of particles of the organism (ion, molecule, cell, tissue, et cetera), according to principles of conventional physics.*]

The concept of the biofield offers a unifying hypothesis to explain the interaction of objects or fields with an organism—for example, those used in certain CAM interventions. All objects radiate a unique composite of EM resonant frequencies. If an object (such as a nutritional supplement, homeopathic substance, or drug) or externally applied EM field (such as that produced by a therapeutic electromagnetic device) is brought near to or inside the body of an organism, the frequencies radiated by it would, in theory, interact with the organism's biofield.

Evidence from Bioelectromagnetics

Research in bioelectromagnetics has experimentally demonstrated various biological effects of extremely low-level nonionizing EM fields applied to organisms, ranging from small to robust. The technology of applying certain beneficial EM fields to the body to stimulate the natural healing response, known as bioelectromagnetic medicine, is a new form of CAM therapy. Specific EM fields have been identified that stimulate therapeutic effects such as osteogenesis, soft tissue regeneration, psychophysiological modulations, and immune system enhancement. One specific application involves extremely low-level EM fields in the extremely low-frequency range (less than 100 Hz) being applied successfully to treat Parkinson's disease. Another more widely used application is pulsed magnetic stimulation at 7 Hz, useful to promote bone tissue regeneration. This noninvasive treatment for bone fractures has been approved for more than twenty years by the US Food and Drug Administration. Such research has uncovered a surprising fact: Extremely low-intensity, nonionizing EM fields can produce biological effects. At such extremely low levels, the energy content of an applied signal is even less than the random energy of molecular motion at body temperature. This means that such extremely low-level fields cannot act energetically on organisms, because the energy content is negligible. Thus, it has been proposed that they are acting informationally. Fields carrying biologically relevant information have been called "electromagnetic bio-information."

Therapies involving the application of extremely low-level EM signals may be providing electromagnetic bio-information. This may occur through resonance or entrainment of specific frequencies in the biofield. Some of the extremely low-level fields that have therapeutic action in bioelectromagnetic medicine are indeed similar in frequency and intensity to the components of the biofield. For example, many natural frequencies are emitted by the brain and heart, and externally applied fields at these same frequencies can cause entrainment and physiological, psychological, and behavioral changes.

A New Communication System

The term "information" has taken on a mechanistic meaning in our age of computers, appropriate for machines, but is severely limited for describing life processes with their features of self-reference, self-organization, and consciousness. Machines have only a few critical internal interconnections, whereas living systems have an immense network of interconnections that are influenced by their history, habits, and dispositions they have inherited or acquired. In living systems there are numerous pathways for information flow between the multiple levels of order, from the "top-down" as well as the "bottom-up." From a nonmechanistic viewpoint appropriate for living systems, information is neither energy nor matter in itself. Energy or matter is simply its carrier.

Information is that which exists only in relationship, and like energy, always involves at least two entities, a sender and a receiver. Information also depends upon the context. It is that which "in-forms"—it conveys meaning, although the meaning to the organism may not always be conscious. ➢

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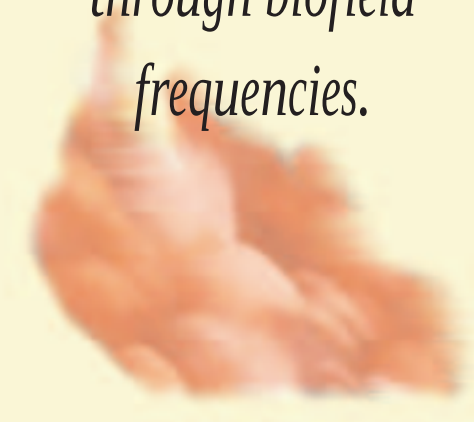
The history of biology reveals different philosophical perspectives that have shaped biology and medicine over the centuries. I believe the present dominant paradigm of molecular reductionism falls short of explaining the dynamic, self-organizing and self-restoring properties of living systems and their responses to many CAM therapies, especially those involving field principles. I see that a biophysical view of life is currently emerging from a nonlinear systems theory of open dynamic systems at all levels of order. It offers a complementary perspective and embraces the complex, holistic, dynamic features of life as well as new electrodynamic and bio-informational interactions.

The biofield hypothesis is developed from this holistic perspective. It has implications for the life sciences in general, predicting a new communication system in organisms that involves electromagnetic bio-information. It holds explanatory power for CAM, predicting that many CAM modalities act dynamically on bioregulation. Moreover, it provides the rudiments of a scientific foundation for energy medicine. The first stage in the *modus operandi* of these modalities is predicted to be an interaction with a person's biofield. The result is an effect on the person's homeodynamics, by which one achieves a new dynamic balance in self-regulation.

As the "flame of life," the biofield is very complex and dynamic. Unlike biomolecules, the biofield cannot be isolated or studied easily. However, we can be heartened that modern physics deals with many unobservable aspects of nature known only indirectly by their effects. Fields are one example of this phenomenon. Another is the curvature of space-time. That being said, some aspects of the biofield can be directly measured, whereas others can be ascertained only indirectly.

In order to learn more about the human biofield and its proposed major role in health and healing, I propose that we need a "human energy project," akin to the Human Genome Project, with substantial funding and the full commitment of the research community. The new Centers for Frontier Medicine in Biofield Science recently funded by the NIH—at the University of Arizona, Tucson in consortium with the Institute for Frontier Science, and at the University of Connecticut—mark an important step forward. The development of biofield science and its relationship to emotional, physical, mental, and spiritual wellness is only just beginning.

Effects of bioelectromagnetic medicine—such as promoting bone tissue regeneration—may occur through biofield frequencies.



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