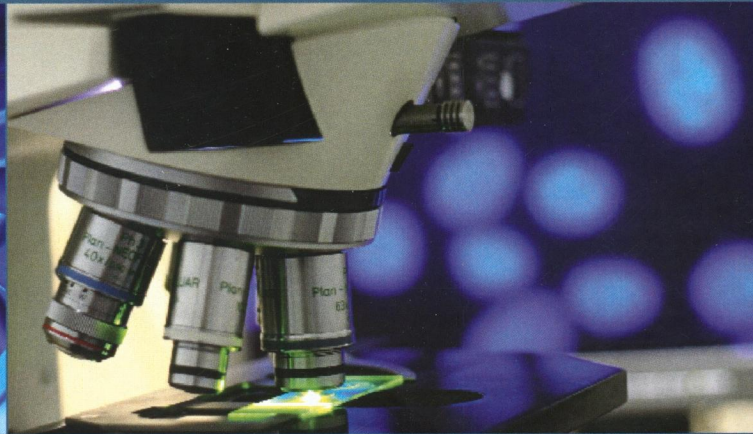


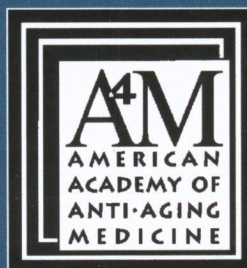
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Dr. Ronald Klatz

Dr. Robert Goldman



Chapter 27

Energy Medicine and Longevity

James L Oschman, Ph.D.¹
President, Nature's Own Research Association

ABSTRACT

After much skepticism, energy medicine and the science behind it are emerging as rich and fascinating topics with major implications for anti-aging medicine. The public is attracted to energetic techniques because they are cost-effective, are relatively non-invasive, and have few if any side effects. Those who follow the emerging field of energy medicine are exposed to entirely new vistas about how the human body works in health and disease. Some of the major new perspectives will be considered here: the cell is not a "bag of solution"; biochemistry in living cells is very different from biochemistry in a test tube; because of resonance, molecules do not have to touch to interact; and bioenergetic fields are real and important in the healing process. The "bag of solution" model has been replaced with a matrix model that incorporates the latest findings of cell biology: the trans-membrane proteins or integrins are key elements in a continuous molecular fabric or living matrix that extends throughout the living body in the form of connective tissue and throughout the cell as the cytoskeleton and nuclear matrix. Many biochemical reactions take place in highly ordered systems called metabolons, sequences of enzymes ordered along the matrix. Regulation by signal molecules randomly diffusing to receptors must be very slow, and is undoubtedly supported in life by non-contact resonant electromagnetic interactions between regulatory molecules and their receptors. Energy fields are measurable in the spaces around the body using technologies such as magnetocardiography and magnetoencephalography. Taken together, these concepts help us understand new diagnostic/therapeutic technologies. Well-documented and widely used examples include: scanning the body with microcurrents to evaluate the condition of organs and systems and even to image tiny tumors; the use of pulsing electromagnetic fields (PEMF) to stimulate bone growth and the healing of soft tissue injuries; and a technology called ONDAMED[®] that combines PEMF with pulse biofeedback to establish treatment frequencies on a patient-by-patient basis. The system is extremely sensitive for detecting elusive pathologies and serious medical conditions in the earliest stages of development. The implications for prevention and longevity are profound.

Keywords: connective tissue, longevity, energy medicine, regulation, living matrix, resonance

INTRODUCTION

After much skepticism, energy medicine and the science behind it are emerging as rich and fascinating topics with major implications for anti-aging medicine. The public is attracted to energetic techniques because they are cost-effective, are usually non-invasive, and have few if any side effects. This article begins by updating some long held and widely taught concepts of communication and control in living systems and what modern science is revealing about them. We then move on to consider some of the remarkable technologies that are emerging from this established scientific base.

The reason energy medicine has been so controversial is a lack of appreciation of the research that has gone into the subject over the past century. With a little background in physics and biophysics, energy medicine ceases to be a mystery. In fact, it is an exciting area of research and clinical practice that has opened up new vistas in patient care and longevity.

The author was introduced to this subject through the work of Albert Szent-Györgyi, MD, PhD, who received the Nobel Prize in 1937 for the synthesis of vitamin C and for his fundamental research on biological oxidation. His work was instrumental in establishing the dominant paradigms of western biomedicine, biochemistry, and molecular biology, and their practical applications provided by pharmacology. In spite of this success, Szent-Györgyi continued to recognize that chemistry is but one piece of a much larger puzzle, and that energy provides the key to unraveling the mysteries of life and health.

The cell is a machine driven by energy. It can thus be approached by studying matter, or by studying energy.

~Albert Szent-Györgyi, MD, PhD

Others who stepped back to look at the organism and its environment in their entirety arrived at similar perspectives. From a leading German scientist:

...the materialistic views of the world only deals with...one billionth of reality.

~Dr. Wolfgang Ludwig

And from a leading science educator:

Some say there is no such thing as energy medicine. They have not been listening to the physicists, who tell us that there is nothing but energy in the universe.

~Deane Juhan

Those who follow the emerging field of energy medicine are quickly exposed to entirely new vistas about how the human body works in health and disease. Some of the major new perspectives we will consider here:

- The cell is not a "bag of solution".
- Biochemistry in living cells is very different from biochemistry in a test tube.
- Because of resonance, molecules do not have to touch to interact.
- Bioenergetic fields are real and important in the healing process

REGULATION BY RANDOM DIFFUSION OF SIGNAL MOLECULES

A theme for looking at living processes emerged from Szent-Györgyi's realization that life is much too rapid and subtle to be explained by slow moving chemical reactions and nerve impulses. For example, our conventional chemical models of biological communications and regulations are based on the activities of a variety of types of messenger molecules. These include hormones, neurohormones, neurotransmitters, antigens, cytokines, growth factors, and intracellular messengers such as cyclic AMP. The extracellular messengers are viewed as being transported throughout the body via the circulatory system, and then through extracellular fluids by diffusion. The latter is a slow and random process because there is no motivation for the molecules to move in any particular direction, i.e. toward or away from their respective receptors, so they tend to bump and stagger about in all directions. Eventually, after a long and irregular journey, signal molecules may encounter receptors on the surfaces of cells (Figure 1). Given the randomness of the process, it has to be a matter of luck for a signal molecule to actually encounter its respective receptor. Once this fortunate and rare coincidence occurs, it triggers changes in cell behavior mediated by randomly diffusing intracellular "second messengers" which, in turn, regulate enzymatic processes. Processes are regulated up and down, depending on the concentration of the messenger molecules. Similar processes are thought to take place within cells, which are often inaccurately viewed as bags filled with a solution of dissolved enzymes and substrate molecules which are envisioned to diffuse about until they have a random chance collision which brings them together so that a reaction can take place.

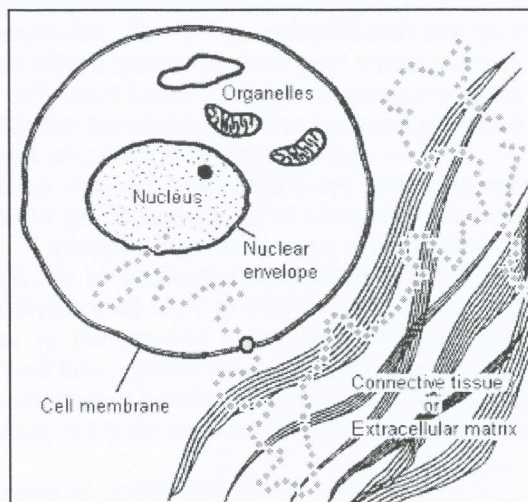


Figure 1. The theory that cellular regulation is controlled by the random diffusion of signal molecules.

THE “LOCK AND KEY” MODEL

The interaction of messengers with receptors, enzymes with substrates and antibodies with antigens has been analogized with a simple lock and key model (Figure 2). The messenger is the key and the receptor is the lock. Within the cell, the metabolic substrate is the key and the enzyme is the lock. Since everyone has used keys and locks, the image is easy to grasp. But is it a complete and accurate image?

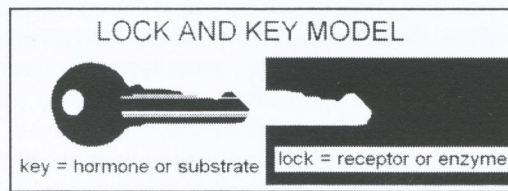


Figure 2. The lock and key model.

With the molecular lock and key model we are dealing with entities that we cannot see because they are too small, so we have to infer the reality from various kinds of evidence obtained with molecular and biochemical techniques. We can isolate hormones and receptors, and we can isolate enzymes and substrates, for example, and we can determine that their molecular structures physically match in ways that allow them to bind together. But we must always remember that when we isolate the components of a living system we are no longer dealing with an intact living system. And when we study the behavior of the components in a certain way, other modes of behavior become invisible. We always need to ask if the intact living system really behaves the way we think it does from study of the parts in isolation; we must always ask if our method of observation limits our perspectives on the process. The mature scientist knows the answers to these questions.

What the lock and key model leaves out is another level of interaction that arises because all molecules at a temperature above absolute zero, -273.15°C , are vibrating intensely. The components of molecules are charged particles, and when such particles vibrate they inevitably give off electromagnetic fields. We know this because it is the basis for spectroscopy, a well established and highly refined technology that enables us to determine the detailed structure of atoms and molecules. Spectroscopy is so refined that we know the wavelengths of the emission spectra of the various elements to a hundredth of an Ångström, a unit of measure that represents one ten-millionth of a millimetre, or 1×10^{-10} metres. If you ask a chemist to identify an unknown material, their first step will be to obtain an absorption or emission spectrum of the substance and determine the molecular/atomic structure from the frequencies emitted. Each peak in the spectrum is indicative of the presence of a particular element or a particular type of chemical bond.¹

What this means in terms of communication and control in living systems is that the well-characterized regulatory molecules, second messengers, metabolic substrates, and antibodies, and their respective receptors, enzymes, or antigens, can interact at a distance through electromagnetic resonance.

*Molecules do not have to touch each other to interact.
Energy can flow through the electromagnetic field...*
~Albert Szent-Györgyi, 1988¹

In other words, there can be no doubt that organisms possess another matrix or web of molecular intercommunication employing electromagnetic interactions rather than direct physical contact between molecules. Here we are talking about the mechanisms involved in the major regulatory and biochemical pathways in the organism.

Hence we see that the “lock and key” model is accurate but incomplete because it leaves out electromagnetic biocommunication and its subtle aspects. It is obvious that if regulatory processes and chemical reactions depended completely on such a slow and random process as diffusion, we could simply not respond to the world around us rapidly enough to survive.

The problem has been eloquently stated by Professor Guenther Albrecht-Buehler from Northwestern Medical School in Chicago in a classic paper entitled, “In defense of ‘nonmolecular’ cell biology.” Albrecht-Buehler asks us to take a close look at the space around a cell. If one makes the reasonable assumption that the extracellular volume around the cell is about 26 times the volume of the cell itself, a signal molecule with a concentration of 1 pM (6×10^{-11} molecules/liter) will have a concentration of about 8 molecules in the region adjacent to the cell. In the region around the receptor, the hormone concentration will be essentially zero. Albrecht-Buehler concludes that our usual concept of concentration is virtually meaningless.² For regulatory

molecules to interact with receptors in a timely fashion, and regulate cell behavior in a concentration-dependent manner, electromagnetic communication must be present, and is probably the dominant mechanism. Hence we suggest the electronic car key (Figure 3) as the appropriate analogy for regulatory interactions. Yes, you can insert the key into the lock on your car door; and a hormone can activate a cell by touching the receptor. But you can also unlock the door from a distance of 30 or so feet by pressing the button on the key. And cell behavior can be changed with a tiny field of the appropriate frequency, delivered by a vibrating molecule a distance from a receptor or even a distance from the organism. And metabolic pathways within cells must be explored in terms of highly specific and extremely rapid (possibly instantaneous) resonant interactions between enzymes and substrates.

Figure 3. For regulatory molecules to interact with receptors in a timely fashion, and regulate cell behavior in a concentration-dependent manner, electromagnetic communication must be present, and is probably the dominant mechanism. Hence we suggest the electronic car key (Figure 3) as the appropriate analogy for regulatory interactions.



To complete the analogy, your electronic car key opens your car only, and not other cars that are nearby. What is the basis for this specificity of interaction? It is the specific frequency signature encoded in the electromagnetic field. The equivalence of molecules and their fields has been well worked out by Cyril W. Smith. There is no difference between the biological effects of a molecule and the biological effects of the energy field emitted by that molecule. Smith calls upon us to identify the specific frequencies that regulate biological processes:

What is urgently needed is to be able to read the language of electromagnetic biocommunication to complement our understanding of the genetic code.
~C.W. Smith, 1994²

Research in energy medicine is exploring this fascinating concept, and is leading to highly effective diagnostic and therapeutic tools.

LIVING CELLS VERSUS REACTIONS IN TEST TUBES

Cells are not bags of solution. Instead, they contain a pervasive framework, the cytoskeleton. The cytoplasm is not a solution of reactants. It is a special form of gel where reactions are highly ordered and extremely rapid, rather than rate-limited by slow and random and non-directed diffusion. Key research by Ahmed Zewail, who received the Nobel Prize in Chemistry in 1999, showed that metabolic sequences operate as fast as a rifle bullet. For this kind of metabolic velocity, the enzymes have to be organized close together in sequence so substrates and reaction products are passed from enzyme to enzyme in rapid succession. These enzymatic units have been characterized; they are called metabolons.³ In other words, the rates of biochemical reactions in cells vastly exceed those *in vitro*. Extreme caution should be taken when extrapolating experimental results acquired in dilute solutions *in vitro* to function in the intact cell!

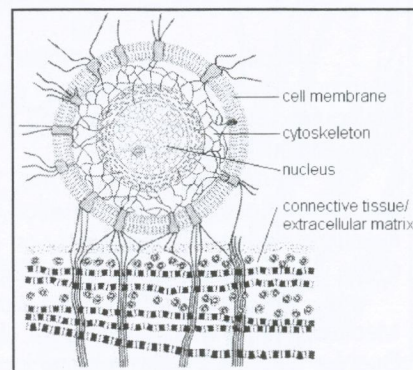


Figure 4. A cell and its surrounding matrix.

A key study by Mark Bretscher showed that some of the membrane proteins actually span the membrane from the inside to the outside.³ It has been discovered that such trans-membrane proteins are widespread, and that they have vital roles in communicating energy and information between the cell and its environment and *vice versa*. Hence we have a new image of the cell and its environment (Figure 4) that includes the well characterized extracellular matrix elements, primarily collagen and hyaluronin, and equally thoroughly studied intracellular scaffolds called microtubules, microfilaments and microtrabeculae. Termed the living matrix, this all pervasive system is composed of semiconducting molecules with remarkable properties. With its extensions into every cell and nucleus, the living matrix is the largest organ-system in the body, as it is the material that forms all biological structures. The connective tissue is composed primarily of collagen, the most abundant protein in nature. It is a triple helical molecule, and has a helical layer of water associated with it. And the collagen molecules are highly organized into molecular arrays that can best be described as crystals. Likewise, muscles are composed of extended arrays of the helical proteins, actin and myosin. Finally, cell membranes are molecular arrays best described as being crystalline. The connective tissue, muscle and cell membranes are all, in fact, liquid crystals, making them among the most remarkable and mysterious and fascinating materials found in nature. The materials making up these structural components are piezoelectric semiconductors, enormously amplifying to their biophysical agility.

BIOENERGETIC FIELDS ARE REAL AND ARE IMPORTANT IN THE HEALING PROCESS

Physicians are familiar with the electrocardiogram, electroencephalogram, and electromyograms. These are technologies that measure the bioelectrical fields of the heart, brain, and muscles, respectively. When the heart muscle contracts, for example, electrical currents flow through the tissues and can be picked up with electrodes on the skin surface.

It has been known since the work of Hans Christian Ørsted in 1820 that electric currents create measurable magnetic fields in the surrounding space. The principle has led to a fundamental law of electromagnetism known as *Ampère's Law*. On the basis of this law, the electrical currents within organisms must create magnetic fields around the body.

A few years after Ørsted discovered that electric currents in conductors produce magnetic fields, Faraday in England discovered the opposite effect: magnetic fields can cause currents to flow in nearby conductors. This is known as *Faraday's Law of Induction*, and is another fundamental law of electromagnetism. The phenomena discovered by Ampère and Faraday provide the basis for a variety of electromagnetic therapy devices. These two laws of physics account for many of the phenomena taking place in complementary and alternative medicine and are the basis for a number of devices.

For a long time, sensitive therapists had been talking about a palpable energy field that surrounds human beings, but the idea was generally met with disbelief. However, in the early 1960's, scientists at the Massachusetts Institute of Technology began measuring these fields with sensitive magnetometers.³ We now know that biomagnetic fields can be measured and that they contain information on the condition of the organs that generate them. For each bioelectrical measurement there is now a corresponding biomagnetic measurement:

- Electroencephalogram / Magnetoencephalogram
- Electrocardiogram / Magnetocardiogram
- Electromyogram / Magnetomyogram

Harold Saxton Burr (1889-1973), Professor of Anatomy at Yale University School of Medicine, researched the energy fields of organisms, and published 93 papers on biological electricity between 1932 and 1956. He discovered that measurable imbalances in the electrical field of an organ precede the onset of pathology and that if the electrical imbalance is corrected, the disease does not manifest. While little attention was given to this remarkable discovery, subsequent research has confirmed it. Modern therapeutic technologies are able to detect and correct energetic imbalances. The implications for disease prevention and longevity are obvious and profound.

ENERGY MEDICINE IN ACTION

Now we look at examples of technologies incorporating the concepts described above. Electrical interstitial scanning, shown in Figure 5, involves passing tiny currents at different frequencies between sets of

points on the body surface to determine the conductance of various tissues and organs. The physiological condition of a wide range of systems can be determined in this manner.

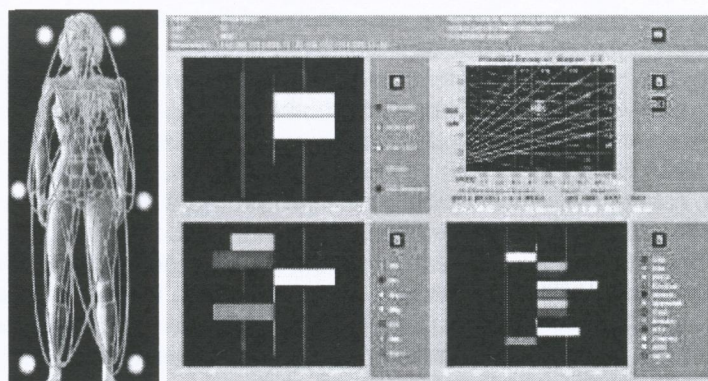


Figure 5. *Electrical interstitial scanner*

Figure 6 shows an application of this concept, the Trans-Scan 2000. This scanner can develop an image of a tiny breast tumor on the basis of the discovery that the conductance of tumors is seven times (7x) higher than normal tissues at 106-108 Hz. The technology shows the potential of frequency-based medicine in diagnosis.

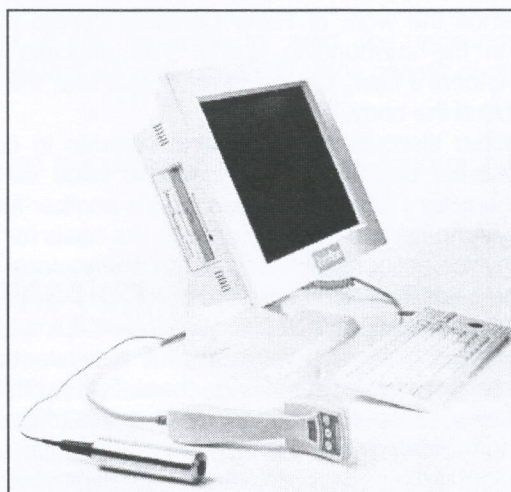


Figure 6. *Trans-Scan 2000*

Figure 7 illustrates pulsing electromagnetic field therapy, an established procedure used by orthopedic surgeons for stimulating the repair of bony non-unions. The method has been in use since the 1980's and has been proven to be safe and effective. A frequency of 7 Hz pulsed from a coil into a fracture site induces a tiny current flow through the bone and "jump starts" the healing process.³ The method was so successful, and its scientific basis so well established, that researchers began applying it to soft tissue injuries as well. It was soon discovered that each tissue responds to a specific frequency, i.e. nerves to 2 Hz, ligaments to 10 Hz, and capillaries and skin to 15 Hz.⁴ Subsequent research revealed therapeutic frequencies between 0.5 and 27,000,000 Hz. Remember from above the significance of molecular resonance. Many difficult disorders arise because of problems with regulatory systems, which involve a variety of signal molecules and their receptors. A problem is that the optimal therapeutic frequencies must be determined individually.⁴

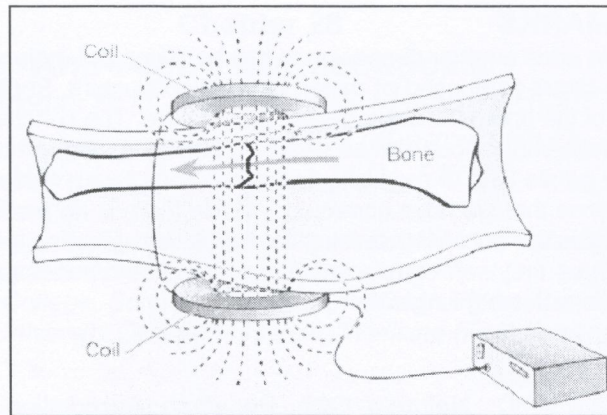


Figure 7. Pulsing Electromagnetic Field Therapy for treating bone non-union.

This issue is resolved with the technology shown in Figure 8. This is the ONDAMED®. The device scans the body with different frequencies and determines which ones are appropriate for the individual. This is accomplished through the use of pulse biofeedback, a very sensitive indicator of changes inside or outside of the body. The arterial pulse gives rise to the vascular autonomic signal, or VAS, which can be used for a variety of purposes:

- Optimize treatments for each patient
- Detect very early stages of serious medical conditions
- Detect elusive pathologies
- Locate blockages to the healing response
- Detect layers of pathology
- Determine the appropriate priority for treatments
- Determine the success of interventions

Pulse biofeedback determines which systems are imbalanced. The device remembers the relevant frequencies and delivers the corresponding resonant therapeutic frequencies, selected on a patient-by-patient basis. The frequencies are delivered using pulsing electromagnetic fields that induce minute currents flows in the tissues. A hand applicator locates which area of the body is responding to the stimulus. This is another form of biofeedback, since it reveals to the patient the real location of their energetic imbalance. ONDAMED® is being used by many physicians in the USA and elsewhere. The outcome: healthier patients with even more respect for their doctors.

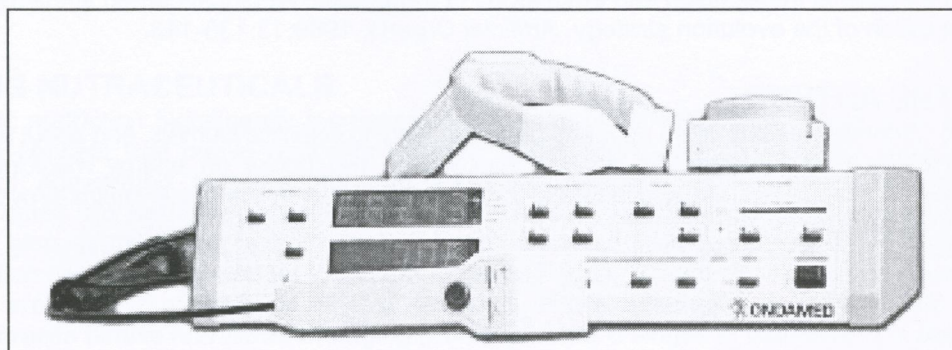


Figure 8. The Ondamed® system, with the hand-held applicator (front), the neck applicator, and the frequency regulator.

CONCLUDING REMARKS

Energy medicine adds another dimension to biochemistry and molecular biology: the body can also be viewed as an electronic circuit composed of molecular semiconductors. Sophisticated technologies have been developed on the basis of the energetic concepts presented here. The condition of the systems and organs can be evaluated and energetic imbalances can be detected and corrected without reference to specific diseases. This is a new and more gentle kind of medicine, in which "You have a disease that we can treat," is replaced with "You had an imbalance that we have corrected." While there is no medical approach that can treat every problem, these technologies are achieving success for the patient who has tried every other method and simply run out of options. Because they can correct imbalances long before disease has developed, these methods are profoundly effective in promoting longevity.

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ABOUT THE AUTHOR

Jim Oschman has published about 30 papers in leading scientific journals, and about an equal number in complementary medicine journals. He has also written two books on energy medicine, and lectures internationally on this subject. Jim's investigations of the living connective tissue matrix provide the basis for powerful anti-aging techniques.
