

Theoretical & Historical Considerations of Healing with Electricity

By Ralph Zuransky

The current practice of medicine is based upon the Newtonian model of reality. This model is primarily a viewpoint which sees the world as an intricate mechanism. Doctors conceptualize the body as a type of grand machine which is controlled by the brain and peripheral nervous system.

A new viewpoint of healing sees matter as an expression of energy which has its base in the Einsteinian Paradigm. It can be called Vibrational Medicine. The Einsteinian model of reality as applied to Vibrational Medicine sees human beings as networks of complex energy fields that interface with cellular systems.

Vibrational medicine uses specialized forms of energy, such as electrical energy, to positively affect those energetic systems that are out of balance secondary to disease with the goal: restore homeostasis and cellular equilibrium by rebalancing the energy fields and energetic dynamics of the organism. The recognition that all matter is energy, forms the foundation for understanding how humans can be considered dynamic energetic systems. Through his famous equation, $E=mc^2$, Albert Einstein proved that energy and matter are dual expressions of the same universal substance.

In 1942, charge transfer, a process of transference of electrons from the occupied orbital of one molecule or atom to an empty orbital of another was discovered. Proteins also have strongly linked to them a great amount of electron donors and according to the extensive research of D.D. Eley, behave as semiconductors. It was in the 1950's that further evidence was demonstrated in support of charge transfer. In 1941, Albert Szent-Gyorgyi published an article entitled, "Towards a New Biochemistry," Which suggested that energy, in living systems, may be transmitted by conduction bands. In 1947 it was suggested that energy moves through proteins. In 1953, the existence of such conductance bands was experimentally demonstrated.

Semi-conduction was a laboratory curiosity in the 1930's. In our present time, modern computers, satellites and all the rest of our solid-state electronics would be impossible without semiconductors. Semi-conduction normally occurs only in materials having an orderly molecular structure, such as crystals, in which electrons can move easily from the electron cloud around one atomic nucleus to the cloud around another.

Within the structure of the living cell membrane, the bimolecular leaflet of phospholipids and sterols with a hydrocarbon interior and polar groups at the surface is well established. Although the structure is not certain, it seems likely to be that of liquid crystals. Szent-Gyorgyi pointed out that the molecular structure of many parts of the cell was regular enough to support semi-conduction. His ideas were almost completely ignored at the time. In the 1960's he conjectured that protein molecules, each having a sort of slot or way-station for mobile electrons, might be joined together in long chains so that electrons could flow in a semi-conducting current over long distances without losing energy.

Gyorgyi suggested that the electron flow would be similar to photosynthesis, in which a kind of waterfall of electrons cascaded step by step down a staircase of molecules, losing energy with each bounce. The main difference was that in protein semi-conduction, the electrons' energy would be conserved and passed along as information instead of being absorbed and stored. In 1972, Kenneth S. Cole, in his "Membranes Ions and Impulses," discussed the structure of living membranes. He suggested that the bio-molecular leaflet of phospholipids in the cell membrane assumed a structure that resembled that of liquid crystals.

In "Bioelectronics: A study in cellular regulation, defense, and cancer," Albert Szent-Gyorgyi postulated that the cell is a machine driven by energy. He stated that the living system may be permeated by an "invisible fluid," the particles of which the electrons, are more mobile than molecules and carry energy, charge and information, and act as the fuel of life. These electrons may help to connect molecules to meaningful structures and may also be responsible for the subtlety of biological reactions.

Gyorgyi, also the discoverer of Vitamin C, feels that the problem with cancer is not that cells are replicating themselves, since replication is natural. The abnormality may be within faulty bio-electronic switching mechanisms, which cannot turn off the replicating process. His studies of electrical effects, on implanted tumors in mice at the Mount Sinai School of medicine have suggested that electrical currents may enhance cancer-killing effects of conventional chemotherapy.

Mice with melanoma that were exposed to special electrical currents and chemotherapy survived nearly twice as long than cancer-ridden mice given chemotherapy alone. His mouse melanoma experiments suggests that electronic currents and electromagnetic fields may be able to manipulate these abnormal electronic switching mechanisms.

Other Internal structures, including mitochondria with their electron transport chains, can be viewed as tiny batteries or electrical power sources. The implication is that there may be electronic switching and transmission systems within and between cells.

Arthur C. Guyton, M.D. in his classic, 'Textbook of Medical Physiology,' discusses the cell membrane as a capacitor. Guyton states that the alignment of electrical charges on the two sides of the cell membrane is exactly the same process that takes place when an electrical capacitor becomes charged with electricity. "In the cell membrane, the lipid matrix of the membrane is the dielectric, much as mica, paper, and mylar are frequently used as dielectrics in electrical capacitors."

With Gyorgyi's idea in mind, **Becker** postulated an analog-coded information system that was closely related to the nerves by not necessarily located in the nerve fibers themselves. Becker theorized that this system used semi-conductive direct currents and that, either alone or in concert with the nerve impulse system, regulated growth, healing, and other basic processes essential in maintaining health.

Becker, an orthopedic surgeon, and twice nominated for the Nobel Prize, pioneered the application of electrotherapy to stimulate the body's innate capacity for tissue repair and regeneration. Becker developed the methods, which are used today for treating non-union fractures with electricity. Becker theorized that a naturally occurring "current of injury" is measurable in the body and hypothesized that this current was conducted by the nerve sheaths (myelin) surrounding neurons (nerves) to an area of injury, thus triggering tissue repair and regeneration.

Becker's work has also uncovered new mechanisms of information transmission within the nervous system that may be part of a healing feedback loop. This system seems to involve the Glial and Schwann cell network that surrounds most of the nerves throughout the body. Glial and Schwann cells were originally thought to be strictly nutritive to the nearby nerves. But Becker's work suggests that both types of cells may be information transmitters. Becker's studies also indicate that the information is transmitted along the Glial and Schwann cells, via slow analog changes in direct current rather than via rapid changes in the digital pulse code of action potentials as traditionally observed in nerve transmission.

Becker also looked at cellular mechanisms from the perspective of electronics and cybernetic systems. He found that at the level of the single cell, micro-crystalline and other cellular sub-elements may be involved in the modulation of intracellular electrical currents in a way similar to semiconductor circuitry. Certain cellular elements, such as membranes, can be seen to act as capacitors.

An understanding of the digital and analog systems of the body can be used to explain the differing effects of; milliamp and microamp therapy. The more primitive system, the analog system, consists of subtle direct currents, which exist in the brain and perineural (conductive) system of the body.

The digital system consists of alternating currents produced by activity of nerves and muscle. According to Dr. Becker, Salamanders, lizards, and other simple creatures, easily regenerate whole limbs and organs due to the analog system, which controls healing. This system also allows birds and other migratory animals to guide themselves by direct contact with the magnetic fields of the earth. Humans have limited powers of

regeneration because our bodies favor a highly developed digital nervous system, which allows greater abilities in complex motor skills and conscious thought.

A salamander can regenerate a third of its total body mass including brain, heart and spinal cord. Becker learned that if the same electrical parameters (which he had measured) were applied to other animals, a significant amount of regeneration could take place. Dr. Becker has been able to experimentally cause frogs and rats to regenerate amputated limbs through DC electro-stimulation, a feat they are unable to do in nature. The rat regrew half of its amputated front leg from shoulder to elbow, and a frog regrew its entire front leg right down to the individual digits of its webbed feet.

With current in the nano-ampere range (billionths of an ampere), Becker was able to clear up grossly infected wounds; osteomyelitis in just seven days, where antibiotics had failed completely.

Becker's most astonishing discovery was that, under the influence of an appropriately applied direct current, in the micro-ampere range, certain cells are capable of dedifferentiation. He found that, in frogs, mature, fully differentiated cells are able to retrogress to an embryonic form, then re-differentiate into whatever cell types are needed for complete regeneration.

The discrete pulses of milliamp stimulation resemble the digital activity of the nervous system and therefore can interact with it to temporarily suppress pain. Micro-currents, on the other hand, more closely match the analog systems of the body. If indeed it is the primitive DC systems of the body that modulate healing, this may offer an explanation for the documented healing acceleration effects of micro-current treatment.

In "Biologically Closed Electric Circuits" (1983) a 358 page book covering more than 20 years of research, **Dr. Bjorn Nordenstrom**, head of diagnostic Radiology at Stockholm's Karolinska Institute and Nobel prize winner for his x-ray guided needle biopsies explored the use of electric currents to treat cancer.

Utilizing specially applied electric currents, Dr. Nordenstrom was successful in producing complete remission from various types of cancers metastatic to the lung in a significant number of cases considered untreatable by other cancer therapies. Nordenstrom proposed that bioelectricity is conducted through the micro-capillary circulatory system in the body. When injury occurs, a positive charge builds up in the area and sets up the voltage potentials difference, which serves as a "bio-electric battery" waiting for the switch to be turned on.

This bioelectricity is then switched on by a change in the electrical insulation properties of the capillary membranes. As the membranes become less permeable to the flow of ions and more electrically insulated, the flow of intrinsic bioelectricity is forced to take the path of least resistance, which is through the bloodstream.

Dr. Nordenstrom feels that bioelectrical circuits are part of an undiscovered circulatory system in the body; these natural electrical circuits become switched on by injury, infections, tumors and even by the normal activity of the body's organs. Nordenstrom, like other bio-energetic researches, agrees that disturbances in the bioelectrical network of the body may be involved in the development of cancer and other diseases. This electrical system, says Nordenstrom, represents the very foundation of the healing process.

The Cellular Physiology of Healing with micro-current

Electrical resistance of tissue with pathology is higher than that of the immediately surrounding area, which is either normal or less pathological. Regeneration is a series of endothermic, electrochemical reactions. This means that electricity, in miniscule quantities, is needed by the cells to provide energy to fuel the regenerative process.

The tissue in the area of pathological involvement needs energy in the form of electricity. The patients' body contains more than a sufficient quantity of energy to produce the desired effect. Unfortunately, the electrical resistance in the area of involvement is so high that the body's energy flow will not enter the area because the primary laws of physics require that energy travel only via the path of least resistance.

As a result, the electrical energy traveling in the body will circumvent the area of pathology. It will always take the path of least resistance, which is around, rather than through, the area of involvement. We must enable the energy to pass into the area of pathology while still obeying these laws. We can do this by increasing the body's ability to actually produce and store energy in the area of involvement.

This is done, by charging the tissue in a manner similar to a battery. Tissue cells, just like battery cells, have the ability to hold an electrical charge. The greater the charge on the cell, the less resistant it is to the flow of electrical energy. As the cell charge increases, the molecular kinetic energy in the cell increases. The electro-vibratory rate (EVR) of the cell's molecular structure must increase with the increased kinetic energy (energy of movement).

An increased EVR will be coupled in direct proportion with an increased electro-conductivity (decreased electrical resistance). While functioning as a battery, the charged cell provides some of the energy which is involved in the energy flow equation. In other words, the addition of electrical energy to an area of pathology increases the electrical conductivity of the area and hence allows the body's own energy to enter the area and affect the tissue.

The term for the quantity of charge that a cell can maintain is "capacitance." As the general health of the cell improves, the capacitance increases. Biologically, the capacitance of the cell is directly proportional to the concentration of ATP in the cell and ranges from about .1 to 3 microfarads. ATP is at least partially responsible for binding electrons, which cumulatively represent the electrical charge and usable energy of the cell. Areas of the body, which manifest pain, are often deficient in ATP. It follows then, that the electrical energy of these areas must be below standard because the body's electrical flow cannot penetrate the resistance.

ATP concentration serves a direct vital function in the active transport mechanism known as the Sodium pump. Active transport means that this system, which is directly responsible for the transmembrane movement of sodium, potassium, calcium, metabolic waste and metabolites, requires large amounts of energy to move vital ions in and out of the cell. Metabolic waste builds up in toxic concentrations when a cell is not respirating properly. The energy which is released when ATP breaks down to ADP fuels the reactions which establish balanced membrane potential gradients and which bring vital metabolites into the cell in exchange for metabolic wastes which are dumped into the general circulation to be detoxified and excreted. What we have when the sodium pump is not functioning is a hypo-polarized, toxic, starving cell.

Re-establishment of the sodium pump occurs when the increase in intracellular current increases mitochondrial function. The increased EVR of the mitochondria enhances the production of ATP in the cytoplasm. The ATP provides the fuel for the transmigration of metabolite and metabolic waste across the cell membrane as well as the reestablishment of cellular bio-electronic ionic concentration gradients.

What this means is that cell membrane potential, normally .85mv in healthy tissue, is reestablished, levels of intracellular metabolic waste (ie; lactic acid) are reduced and fresh concentrations of usable cellular metabolites are introduced into the exhausted cell. At this point the cell can enter its regenerative phase, pain levels are noticeably reduced and tissue regeneration functions are reestablished.

The investigations of living cells based on electrical concepts and using electrical techniques have been amazingly successful. For over a half-century, the membranes of cells have been discovered and described. The electrical parameters of cellular metabolism are well known facts and include: resting potential, capacitance, resistance, conductance, impedance, polarization capacity, current density, inductive reactance and electrical phase angle, to name a few.

According to Biophysicist **Mark Biedebach, Ph.D.**; if the integrity of the epidermal tissue is broken by a wound, there will be a net flow of ionic current through the low resistance pathway of the injured cells and the fluid exudate which lines the wound. Therefore, it is tempting to hypothesize that the ionic current flow pattern between normal and insulted tissue plays an important role in stimulating plasma membrane repair processes, essential to the restoration of that tissue to a normal functional state. It follows logically that the rates at which these processes occur may be accelerated by judicious imposition of an electric current from an outside source.

Cellular physiologists are now recognizing that stimuli which activate most energy-requiring processes within cells, do so via an increase in intracellular calcium. An increase in intracellular calcium following membrane depolarization occurs because: (1) voltage sensitive Ca channels allow extra-cellular Ca to enter (2) current entering the cell can cause Ca release from cellular organelles.

Biedebach suggests that the best way to alleviate pain and inflammation would be to accelerate the rate of repair of the damaged tissue cell membranes that are responsible for releasing pain-producing substances. Damaged plasma membranes release arachidonic acid, a component of the phospholipid structure of the membrane itself. From this, prostaglandins are synthesized, triggering a cascade of reactions resulting in the release of histamine and bradykinins - which can stimulate pain endings as well as partake in the inflammatory response.

Current that does eventually enter a cell alters the cell membranes voltage in such a way that it allows influx of ions, which can turn on and accelerate biochemical processes, essential to cellular repair. If we used only DC current, the intracellular current would flow only through discrete pores or ion-channels, through a low resistance pathway called tight junctions. If we use pulsed current, there will be an additional pathway for current to enter a cell through membrane capacitance. Current flow through this additional pathway increases the ratio of intracellular to extra-cellular current flow, making the current more effective.

Pulsed current with a rapid voltage rise-time is more effective because: (1) pulsed voltage must rise to its maximum value before membrane capacitance has had time to "Charge up." The time it takes for membrane capacitance to charge up is a fraction of a millisecond. Therefore, it is desirable for the loaded stimulus pulse voltage to rise to its maximum in 50 microseconds or less. (2) Voltage sensitive Na and Ca channels stay open only (0.5) milliseconds after they have been opened, and they don't re-open for a brief time following closure. The stimulus pulse needs to stay on long enough so that cell membrane capacitance can charge to its maximum value before the pulse turns off. Therefore, duration should last several milliseconds to meet known cellular time constraints. **These parameters are appropriately addressed by the Electro-Acuscope and Myopulse.**

The Discovery, Research and Role of micro-currents

In the 1830's, **Carlos Matteucci**, proved that an electrical current was generated by injured tissue. Existence of wound currents was first experimentally observed by Dubois-Reymond in 1843, where approximately 1 microampere of current was measured from a wound in human skin. Illingsworth and Barker, (1980) some 120 years later measured the current generated by the amputated stump of a child's finger tip. These stump currents were found to be within the range of 10-30 microamps per square centimeter. Their findings were repeated by several researchers (Borgens et al 1980; Barker, Jaffe, and Venable 1982;) although only recently have we been able to understand the implications of these findings and to therapeutically apply these micro-currents.

Micro-current first gained popularity in treatment of wounds, nonunion fractures and bone implants, where it has become an accepted procedure with orthopedic surgeons. Most of the published research on the effects of micro-currents on soft-tissue injury have described the accelerated healing of skin ulcers and associated suppression of bacterial growth.

One of the first studies documenting the positive effects of micro-current stimulation on wound healing and bone fractures was the team of [Wolcott, et al](#), in 1969. These researchers applied stimulation in the range of 200 - 800 microamps to a wide variety of wounds.

A control group was treated with ordinary wound care methods. The treated group showed 200 - 350% faster healing rates than controls, with stronger tensile strength of scar tissue and antibacterial effects in infected wounds. Gault and Gatens used a similar procedure in 1975 - 1976 on patients with diagnosis including quadriplegia, CVA, brain tumor, peripheral vascular disease, burns, diabetes, TB, fracture and amputation. Their results demonstrated healing times in the treated group about half that of the controls. Many other researchers followed variations of these models and published similar results.

Microamp stimulation has also been called "bio-stimulation" or "bio-electric therapy" because of its ability to stimulate cellular physiology and growth. In a study with important implications for micro-current electrotherapy, [Cheng et al \(1982\)](#) studied the effects of electric currents of various intensities on three variables critical to the healing process:

At 500 microamps, ATP generation (or cellular energy production) increased about 500% and amino acid transport was increased by 30 to 40 percent above control levels using 100 to 500 microamps. When currents were increased to the milliamperage range, ATP generation was depleted, amino acid uptake was reduced by 20-73 percent and protein synthesis was inhibited by as much as 50%. These findings suggest that the higher milliamp currents inhibit healing whereas the lower microampere currents promote healing.

Additional studies with isolated tissue or cultured cells provide compelling evidence that the intracellular rates of ATP re-synthesis, protein synthesis and DNA replication are increased as a result of direct electrical stimulation of human fibroblasts.

"Weak stimuli increase physiologic activity and very strong stimuli inhibit or abolish activity." Arnold-Shulz Law (Dorland 1985)

Other studies have demonstrated the effects of micro-current in accelerating healing of bone, tendon repairs, and collagen remodeling. [A Nobel prize went to two German scientists in 1991](#) for their work in detecting subtle electrical currents in all types of cell membranes throughout the body. This study opened the way for greater understanding of the mechanisms through which externally applied currents can affect organic functions.

William Stanish, M.D., physician for the Canadian Olympic team, found that implanted electrodes delivering 10-20 microamps of electrical current hastened recovery from ruptured ligaments and tendons. Using micro-current stimulation, Stanish shortened the normal 18-month recovery period to only 6 months. ([Stanish 1984](#)).

The first commercial device outputting micro-current stimulation was the Dermatron, developed in the 1960's by Dr. Reinhold Voll of Germany. Although this device was primarily used for electro-diagnostic testing, it was also used to apply therapeutic micro-current stimulation to the body.

Through the research of [Dr. Voll](#) and his colleagues, the following effects of micro-current on the body were documented: 1) Spasmolysis of smooth muscles of the circulatory, lymphatic and hollow organ systems. 2) Tonification of elastic fibers, for example, increasing lung capacity in emphysema patients. 3) Reduction of inflammatory processes through reducing infiltrative, proliferative, and exudative processes. 4) Reduction of degenerative process by restoring diffusion-osmotic equilibrium. 5) Restoration of polarization to the nerves. 6) Stimulus of ATP function in freshly injured striated muscle.

To obtain these effects, micro-currents in the 0.5 - 1.0 Hz range were applied to whole limbs or selected acupuncture points. Voll and his colleagues were able to chart specific frequencies in that range that had pronounced effects on different tissue systems. [This very low frequency range, which is resonant with the](#)

normal electrical activity of the human body and the frequency of the earth, is the main domain of modern micro-current therapy.

Another explanation of the efficacy of micro-current is through comparison to acupuncture. Many of the effects of acupuncture have been documented in the *Journal of the American Medical Association*. A "meridian", or energy communication system connecting all parts of the body, has been described by traditional Chinese and Japanese acupuncture. The work of Becker and Nordenstrom in particular recognize the action of subtle electrical currents, via the perineural cells and circulatory system, respectively, in explaining at least part of the meridian phenomenon.

Needle acupuncture is the original micro-current therapy, as traditional acupuncture needles generate measurable electrical charges when twirled in the skin by a doctor's fingers, and needles left "in situ" tend to drain of excess electric charge from tense or inflamed tissue. Modern micro-current therapy offers a simplified and non-hazardous method for practitioners to offer the benefits of acupuncture stimulation to their patients.

Micro-current Therapy with the Acuscope and Myopulse

It was in the early 1980's that brought the development of the Electro-Acuscope and Myopulse system; the first in a line of intelligent neural micro-amperage technology. It is a multidimensional analytical microprocessor, constructed electronically to evaluate the transient electrical behavior of the living cell membrane.

By application of advanced bio-processor technology, the Acuscope and Myopulse system has the capability of providing instantaneous, moment by moment, feedback-assisted computer-modulated electronic pulse trains of infinite variation to induce bio-electronic harmony in disrupted tissue.

The heart of the system is an analog to digital conversion processing unit assisted by P.A.L. (programmable-array-logic-gates) technology. The input-output loop is the key feature that sets it apart from all other electro-therapeutic instrumentation. This feature utilizes "space-age" technology to integrate electronics with feedback, allowing for two-way communication between tissue and instrument. In other words, biofeedback mechanisms combined with solid state circuitry (computer microprocessors with preprogrammed memory of tissue equilibrium values) enables the body to automatically control the necessary treatment parameters required for healing by regulating output voltage levels from the instrument based on amplified and filtered input of biological events.

All biological events observed within the input-output loop are defined in accordance with the master program--a neural network thermodynamic model which performs high-speed formulations. This technology communicates with the body by monitoring and transmitting corrective treatments based on existing conductivity and other electromagnetic events.

This is accomplished by the design of equilibrium principles, stored in a unique circuit microchip and other discrete components. These complex units acquire the actual value of the treatment area through the input electrodes and then compare them to the desired value. If there is any difference between the actual tissue value and the preset equilibrium principles, a digital signal is sent out to another component to process and initiate appropriate responses to achieve a steady state and promote normal cell membrane resting tension. By normalizing cell membrane resting tension, other cellular dependent electrical characteristics such as capacitance, polarity, resistance and ph can be normalized.

Using a computerized procedure such as fast Fourier Transform Analysis, it is possible to determine numerous parameters from current and voltage waveforms. The Acuscope and Myopulse samples a series of data values from the waveforms of the stimulus current as well as the voltage between the electrodes.

Analog-to-digital conversion circuitry continuously computes magnitude and phase angle of the impedance characteristics over the range of frequencies that they vary. If these characteristics are different than those found in normal tissue, or if changes occur during stimulation, the digital program then adjusts the delivery of pulses and current to deliver optimal intracellular current to stimulate intracellular repair processes in a most effective way.

If adjustments are not made in magnitude and waveform, there is no assurance that the current, which flows intra-cellularly, is maintained at optimal value during treatment. This makes monitoring of the impedance values (or tissue conductance) highly desirable and necessary in order to promote cellular repair and the advantage of using computer-assisted circuitry (such as that found in the Electro-Acuscope and Myopulse) to regulate and continually adjust the magnitude and / or wave-shape of the stimulus pulses.

Electrosleep Mode of the Electro-Acuscope

Attention should also be directed on the Acuscope's capacity to manage stress-related imbalances. By placing special electrodes on the ear lobes or the frontal bone of the head, the instrument, when set at the appropriate frequencies, will induce a relaxed concentration in the client within 20 to 30 minutes. This procedure, also known as "Electro-Sleep" or "cranial electric stimulation" or CES has been applied successfully by medical specialists ranging from dentists to psychiatrists.

This procedure is recommended to reduce mental fatigue, enhance autonomic stability, improve concentration, and, as a general procedure, to prepare the patient for treatment, including surgery. This procedure can also be helpful with hyperactive children, depression/manic depression, insomnia, anxiety, headache, migraines, visual disturbances and head trauma. Other research investigations demonstrate the promise of electro-sleep in other lifestyle stress-related areas such as obesity, addiction, compulsion, alcohol and drug detox, mood/food, etc. Unlike drug therapy, there is no dependency, adverse side effects, and benefits are sustained for progressively longer periods of time permitting increased conditioning to behavior modification methods.

The electro-sleep phenomenon occurs when a relaxed state is induced by the transcranial application of low intensity current such as is produced by the Electro-Acuscope. Actually, the word "electro-sleep" is misleading in that patients are not forced into sleep; but rather guided into a relaxed, conscious state.

Most of the research and scientific investigations on electro-sleep have been conducted in the Soviet Union for the past few decades. There has been very limited research conducted here in the United States. A great deal of this hesitancy is probably due to the traditional mistrust of the use of electrical devices in clinical psychiatry. A few studies conducted at certain universities have produced interesting results.

Groups of patients with chronic anxiety, depression, and nocturnal insomnia were selected on the basis that they have had little or no positive response to orthodox methods of treatment. These patients had all utilized various types of sleeping medications for long periods of time with poor results. The use of electro-sleep with these same patients, however, showed significant improvements in their conditions. The most marked result was an increase in sleep.

More on Brainwaves

Brainwaves, as they are received by an electrode on the surface of the scalp, are the sum of electro-chemical language passing through a very large group of nerves (hundreds of millions) situated below the electrode. This sum generates two primary characteristics: Amplitude and Frequency. Amplitude is an extremely weak signal and is measured in microvolts - frequency is measured in Hertz (Hz) or cycles per second. These basic characteristics are believed to be determined by the degree of synchronized activity inherent in the group of brain cells being monitored. When this activity is synchronized, the amplitude is higher and the frequency is lower.

Brainwaves have been categorized into four basic levels on the basis of frequency: DELTA: 0.1 to 3.5 Hz, THETA: 3.5 to 7.5 Hz, ALPHA: 7.5 to 14 Hz, and BETA: 14 to 30 Hz. The BETA spectrum represents relatively unsynchronized activity. This activity appears to be chaotic, rapidly changing in frequency and amplitude. It is associated with normal, outward awareness, for example; taking in, evaluation, and filing away of various forms of information received through the senses. It is usually the state when an individual experiences anger, hunger, anxiety, tension and surprise.

The DELTA (0.1 to 3.5 Hz) is opposite to BETA and would be the result of high synchronization. Its slow rate of change is associated with relatively unconscious states such as deep, dreamless sleep. The ALPHA (7.5 to 14 Hz) spectrum is usually produced as rhythms of steady frequency and amplitude. It is associated primarily with pleasant inward awareness, a non-drowsy but relaxed state, a tranquil state of mind. Outside stimulation usually interrupts this alpha rhythm.

The THETA (3.5 to 7.5 Hz) level is associated with an access to unconscious material, drowsiness, fantasy, imagery, dreaming recall, problem solving, inspiration, and creativity. Advanced students of Yoga, Zen and other forms of meditation or inner awareness appropriately display an ability to produce enhanced (high amplitude, low frequency) states such as ALPHA and THETA activity.

It is the ALPHA and THETA areas that are increased with the use of the Electro-Acuscope. In most cases, after 10 to 30 minutes of treatment, the patient will enter the THETA state. There are a great many benefits to anyone that uses the Electro-Acuscope for this purpose. One 10 to 30 minute treatment with the instrument can replace many hours of rest. It is common for people to need much less rest per night.

Even if you wanted to continue getting as much rest per night as before, patients report that the quality of rest improves. In cases where the sleep cycle is completely disturbed such as trans-continental flight, you can eliminate any jet lag effects with a short session on the Electro-Acuscope, either during flight or upon arrival.

People that work nights and sleep days or have to sleep in a noisy environment, find that they obtain better quality of rest and do not suffer any detrimental effects because of the poor sleeping environment. Executive, students or anyone that works in a high-stress environment obtain great results from the treatments. Many people find that during the day when they feel stressed, they simply find a comfortable reclining chair or bed and take a 10 to 30 minute Electro-Sleep break, which simulates a long nap.

Thermography and Electrical Stimulation in the Diagnosis and Treatment of Pain

By Harold Bess, A.B., D.O., F.A.P.M., Levittown, Pennsylvania

A study of 2,440 liquid crystal thermograms was performed on 206 patients over a period of 26 weeks. Treatment involved the use of the Electro-Acuscope 80 which provides low frequency, galvanic, alternating current to areas demarcated by both the thermograms and the Electro-Acuscope. In myofascial pathology, electrical resistance is increased which delays the healing process and prolongs pain.

Regeneration by the Electro-Acuscope is a succession of endothermal and electrochemical biologic reactions. Microscopic amperes of electricity are directed to areas of pain involving tissue pathology to catalyze the regenerative process. The correlation of objective clinical examination findings and liquid crystal thermography was 93%. The correlation between thermography and subjective complaints was 90%. A high correlation of results in identifying areas of injury was noted between thermograms and the Electro-Acuscope. Serial thermograms showed a high correlation with electro-conductivity in response to treatment.

Conclusion: Thermography in conjunction with the Electro-Acuscope 80 offers an effective means of diagnosing and treating acute myofascial injuries.

Electro-Dermal Therapy

The concept of viewing and treating the body from an energetic perspective has evolved as a result of recent discoveries in quantum physics, even though Eastern traditions have included these concepts in their medical system for thousands of years. The meridian system of energy flow is a basic principle within these ancient traditions.

The meridians are a network of energy tracks which extend over the length of the entire body and are considered by some scientists to be the biophysical manifestation of the body's internal organs and the pattern along which the body's bio-energy moves. It is along these meridians where numerous acupuncture points are found.

Modern energetic medicine was strongly influenced by Reinhold Voll, a German physician who, in the 1950's, engineered one of the first devices that measured the electrical charges at acupuncture points. Voll discovered that the electrical parameters of these points were different in healthy and sick people and documented the changes that occurred at those points after medical intervention.

Dr. Voll treated thousands of patients with his electro-diagnostic techniques and discovered additional acupuncture points previously unknown in classical Chinese medicine. Voll correlated many of these points to organ systems and proved that the electrical nature of those points did indeed reflect the health of the organ system to which those points referred.

Dr. Voll also discovered that changes would occur in the readings of points when medicinal substances, particularly homeopathic solutions, were given to the patient. This discovery allowed Voll a way to determine the compatibility of those substances when introduced into the patient's energy field. This approach later became known as *Electro-acupuncture According to Voll* or EAV.

The emergence of EAV has resulted in a progressive method that provides information related to the vital state of an individual, and at a sensitivity that allows disturbances to be observed long before the onset of clinical pathology.

By detecting energetic imbalances of the body's organs at early stages of dysfunction, EAV can warn the patient of potential future health hazards long before they appear, thus decreasing the possibility of late discovery of a medical condition. Consequently, the results obtained with EAV cannot always be confirmed through clinical methods of examination or laboratory tests since the energetic changes observed with EAV precede the changes in the cells or organs for which evidence can be supported by traditional medical means.

Numerous research articles in professional journals attest to the clinical usefulness of EAV; however, more persuasive documentation is provided by university-based controlled experiments. In 1985, researchers at USC and UCLA demonstrated, in a double-blind study, an 87 percent correlation between EAV measurements of the lung meridian and X-ray diagnosis of patients with lung cancer.

Similarly, researchers at the University of Hawaii compared a diabetic population with a control group and demonstrated a 95 to 97.5 percent correlation between EAV and the conventionally confirmed diabetic group.

EAV will not only prove to be of value alongside the diagnostic methods used in conventional medicine, but will likely acquire further recognition as our knowledge increases and as we learn more about the

phenomena associated with the energetic information transfer methods by which the human system is regulated.

The ability to detect and interpret signals from internal organs at acupuncture points offers exciting medical possibilities. With a greater scientific understanding of the meridian system, this concept could conceivably apply to Western medicine for early detection and identification of health problems and help prevent the progress of many degenerative diseases.