Electromagnetic Energy Forces - A Historical Perspective

I. History of Colored Light Therapy

Light therapy has a long history, dating from ancient Egypt up to now.

The efficacy of phototherapy has long been known, even though its' mechanism of action was not understood. From 1500 BC Indian Sanskrit documents, through the histories of the ancient Egyptians, Greeks and Romans, one finds references to the healing powers of light. The Egyptians utilized sunlight as well as color for healing. It was also practiced in ancient Egypt, Greece, China, and India.

Henri de Mondeville (1260-1320 AD) used red light to treat smallpox. John of Goddesden, physician to Edward II of England, in 1510 treated a prince with smallpox, using red dyes, red bedclothes and red curtains (diffuse red light), and cured him without a vestige of pock marks.

In the past 120 years, advances in have been made in research and development of colored light, as well as full-spectrum, light therapy.

In 1876 Augustus Pleasanton stimulated the glands, organs, and nervous system with bluelight; in 1877 Seth Pancoast used red and blue light to balance the autonomic nervous system.

In 1878, Dr. Edwin Babbitt published The Principles of Light and Color, considered a classic study on the healing powers of color. He elucidated a system for applying colored light to the body, and used "solar elixirs" — colored bottles containing water charged by the sun. He was able to successfully treat many stubborn medical conditions, unresponsive to conventionaltreatments of the time.

Dinshah Ghadiali, PhD, MD (India), (1873-1966) a naturalized American originally from India, was highly influenced and inspired by Babbitt's work. In 1897, the course of his life and views on medicine were forever changed when he saved the life of a woman dying from intractable dysentery. Under conventional treatment she continued to have 100 diarrheal stools per day. As a last resort, Dinshah proceeded to shine indigo light on the patient's body. By the end of the first day, the number of evacuations was reduced to ten. By the third day the evacuations were minimal and she had regained strength sufficient to get out of bed.

In 1903 a Danish doctor, was awarded a Nobel prize for treating tuberculosis and smallpox with red light to abolish suppuration and lessen scarring (Kleinkort and Foley 1984).

By 1920, after 23 years of research and clinical observation, Dinshah, as he was known in America, had refined a sophisticated system of color phototherapy he called Spectro-Chrome. Influenced by a strong background in mathematics and physics, he reasoned that thephysiologic effects of individual colors would correspond with the action of the mineral which exhibited that color on spectometry. He thereby determined in detail, specific "attributes" of the colors, i.e., the specific effects of colors on human physiology.
He further determined precise and predictable formulations of applying colored light directly to the body for the gamut of physical injury and illness. He was the first to develop a system of healing utilizing all the colors of the spectrum: red, orange, yellow, lemon, green, turquoise, blue, indigo, violet plus purple, magenta, and scarlet.

Spectro-Chrome is based on three basic principles:
✓ That the human body responds to light;
✓ That colors relate to physiologic function; and
✓ That color tonation (broadcasting specific colors to the body surface) aids bodily function.

During the 1920s, Kate Baldwin, a highly respected physician, AMA member, and chief surgeon of the Women's Hospital of Philadelphia, became a student, practitioner, and strong proponent of Dinshah's techniques both in her private practice, and within the hospital setting. Dinshah system of color therapy, Spectro-Chrome, survived and is today, 37 years after his death in 1966, beginning to enjoy a renaissance. Dinshah, though little recognized to this day, is without a doubt one of this century's great luminaries.

Internationally, Danish physician Niels Finsen pioneered light therapy in the 1890s. He noticed that tubercular skin lesions were much more common during the long dark winters, but rare in summer. In 1892 he began treating this condition, lupus vulgaris, with light. Later he would use red light to prevent scar formation from smallpox, and eventually established a light institute for the treatment of tuberculosis. His work was so successful in the treatment of skin tuberculosis with ultraviolet light, that he was awarded the Nobel Prize in 1903.

In 1923, Russian biologist Alexander Gurwitsch first detected in every living cell a non-thermal, electromagnetic energy. He called it "mitogenetic radiation" to describe it's effect of stimulating growth. In the 1930's widely researched in Europe and the USA, "mitogeneticradiation" later called "Biophotons" have been rediscovered in laboratories throughoutEurope and the U.S and backed since the 1970s by ample experimental and theoreticalevidence by European scientists.

When lasers were discovered in the late 1950s, the observed biological effects wereattributed to the uniquely high coherence of the radiation (Mester et al 1985), however, Karu (1987), conclusively demonstrated that there was no scientific or physical basis for such a belief .

By the early 1974s, biophysicist Fritz-Albert Popp and others had developed extremely sensitive equipment, which made it possible to quantify this energy and has proved their existence, their origin from the DNA and later their
coherence (laser-like nature), and hasdeveloped the advanced and revolutionary biophoton theory of startling simplicity and power to explain their possible biological role and the ways in which they may control biochemicalprocesses, growth, differentiation etc.

According to his calculations, whatever controls our biological processes must operate at thespeed of light. Anything LESS would be far too SLOW to account for the pace of cell-to-cell communication necessary to sustain life. Popp showed how an organism, depending upon biochemical or molecular means of control, must inevitably fail to regulate metabolism and growth. He proposed that biophotons activate and direct MOST, if NOT ALL, physiologicalprocesses!

Popp's biophoton theory leads to MANY startling insights into the life processes and may well provide one of the MAJOR elements of a future theory of life and holistic medicalpractice based on such an approach.

The significance of this theory is ENORMOUS ! The importance of the discovery has been confirmed by eminent scientists, such as Herbert Froehlich and Nobel laureate Ilya Prigogine. Since 1992, the International Institute of Biophysics, based in Germany, and scientists in more than a dozen countries have felt STRONGLY enough about the importance of Popp'swork to form an international network of research laboratories to investigate biophotons.

In 1998 G.J. Hyland, of the Department of Physics at the University of Warwick (UK) published research also demonstrating that living systems spontaneously emit biophotons.

Findings of this type seem natural and expected to those who accept the energetic nature of reality.

II. Physics and bio-physics of Colored Light Therapy

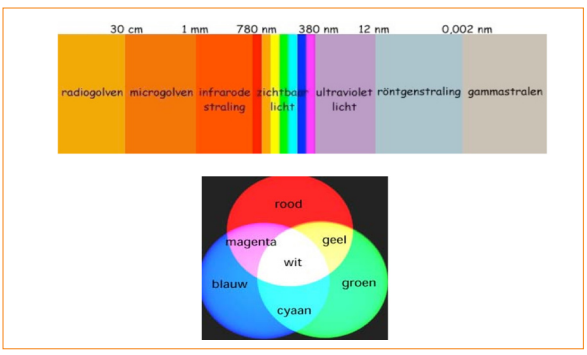
Doctors Babbit, Pancoast, Pleasanton, Baldwin, Finsen and Dinshah have contributed ample empirical evidence of the value of colored light in medicine. The scientific explanation for this rests in quantum physics and color theory: the photoelectric effect first discovered by Heinrich Hertz (circa 1886), and the theory of light was elucidated by Albert Einstein. By the photo-electric effect, when light strikes any material substance, electrons are discharged, creating a current. In other words, light interacts with matter as the energy of the light is transferred to electrons.

In 1905 Einstein offered an explanation for this phenomenon in his Corpuscular Theory of Light, for which he was awarded his only Nobel Prize. He proposed that light is composed of corpuscular units, later called photons. A photon is the smallest unit of light and has a dualnature, being both particle and wave simultaneously. A photon travels at the speed of light, has NO Electrical Charge or Mass (but has Energy and VERY LOW Momentum), can COLLIDE with other Particles (such as Electrons), and its energy is related to the frequency of its radiation. The energy of the photon is transmitted to the electron, EXCITING them to aHIGHER Energy Level. The shorter the waves of light, the greater the energy of the photon, which results in stronger acceleration when that energy is transferred to the electron. The intensity of the light determines how many photons strike a given surface, and likewise, how many electrons are discharged. The higher the intensity, the greater the quantity of photons and the greater the number of electrons activated. The wave theory of light, held prior to this, was unable to account for the photoelectric effect. MOST Photons are invisible to MOST Humans and the Photons, which are visible, aresituated in the Visible Light Spectrum. In approximate terms the smaller the wavelength (in space), the higher the energy contained in each photon. White light is a mixture of all 300 wavelengths, and is equivalent to visible static as each wavelength interferes with theothers.

Color is the emission and reflection of frequencies (Photon emissions) within the visiblespectrum of light, which composes a very small band of the total electromagnetic spectrum, from violet at 400 nanometers (higher energy photon) through red at 780 nanometers (lower energy photon). Beyond violet in increasingly shorter wavelengths, are ultraviolet light. Thespectrum ultra-violet light (200-300nm) does not penetrate the skin deeply but can cause cellmutation, skin cancer. Beyond ultraviolet are x-rays, and gamma radiation which contain tremendous amounts of energy. At those small wavelength the like atomic radiation can bequite damaging to tissue.

Moving up. In the opposite direction, infrared and radio waves are longer wavelengthsbeyond the red end, with relatively very little energy. Color is the human eye's perception ofthe energy level in each group of wavelengths. The small wavelength, high energy lightcauses a sensation in our eyes which we recognize as "blue" light. The medium wavelength, medium energy we see as "green" light, and the longer wavelength, lower energy we see asred light. Infra red light and microwaves are beyond the human eye's capacity to see or interpret.

Each color of the spectrum is composed of a band of frequencies, a electromagnetic radiation or EMR.



The scientific community is just starting to recognize, investigate, and understand the integral and profound role that light plays in regulating and maintaining health in the body/mind. The manner in which the application of light may interface with the practice of medicine is also emerging. In recent years, there has been much work in the use of full spectrum and colored light for mind/body healing. There is no doubt that light is necessary for health, and even lifeitself. There term "mal-illumination syndrome" has been coined to explain the deleteriouseffects of decreased exposure to light. It is now accepted that individual sensitivity to diminished full-spectrum light underlies seasonal affective disorder (SAD). Daniel Oren, atthe National Institutes of Mental Health, has brought colored light into this equation, finding that green light is more effective than red in the treatment of SAD.

Colored light has a particular ability to balance the autonomic nervous system, which iscrucial in most chronic and functional disorders as it regulates all of the automatic processes of the human body: breathing, the beating of the heart, the functioning of the digestive tract, the stress response. Light as an environmental stimulant, is second only to food in its impacton controlling bodily functions. Interestingly, light through the eyes reaches not only the visual centers of the brain, but also the hypothalamus. The hypothalamus is the brain's brain. It organizes information from the body's external and internal environments, initiates the stress response, regulates immunefunction, reproduction, thirst, hunger, temperature, emotions, and sleep patterns. It houses thebiological clock, controls most of the functions of the pituitary gland, and controls theautonomic nervous system. Light energy is converted to electrochemical impulses which are then sent to the pituitary and pineal glands. The pineal gland is the body's light meter, and only gland in the body notcontrolled by higher neurological centers. It transforms retinally perceived light waves into neuronal impulses and hormonal messages through melatonin production. Melatonin is both created and released by the pineal gland in response to light and darkness. The pineal gland and melatonin provide the physiologic and hormonal connection to the environment and theuniverse.

While biophysicist Fritz-Albert Popp and his colleagues in laboratories in a dozen countrieshas continue to study biophotons and the human energy field, they have made some startling discoveries and came to the conclusion that "EVERY living cell" transmits and receivesenergy across the electromagnetic spectrum from radio waves through infrared, visible and ultraviolet wavelengths.

Biophotons provide the means for near instantaneous communication throughout our bodies, and create an intricate web of energy within ALL living systems. We offer the hypothesis thata high energy continues to enter the formed human body through the pineal organ in the formof light

Biophotons, or ultraweak photon emissions of biological systems, are WEAK electromagneticwaves in the optical range of the spectrum - in other words: light. ALL living cells of plants, animals and human beings emit Biophotons, which can NOT be seen by the naked eye, butcan be measured by special equipment developed by German researchers.

This light emission is an expression of the functional state of the living organism and it's measurement, therefore can be used to assess this state. Cancer cells and healthy cells of thesame type, for instance, can be discriminated by typical differences in Biophoton emission.
After an initial decade and a half of basic research on this discovery, biophysicists of variousEuropean and Asian countries are now exploring the MANY interesting applications, which range across such diverse fields as cancer research, non-invasive early medical diagnosis, food and water quality testing, chemical and electromagnetic contamination testing, cellcommunication, and various applications in biotechnology. According to the Biophoton theory developed on the base of these discoveries the Biophoton light is stored in the cells of the organism - more precisely, in the DNA molecules of their nuclei - and a dynamic web of light constantly released and absorbed by the DNA may connect cell organelles, cells, tissues, and organs within the body and serve as the organism's main communication network and as the principal regulating instance for ALL

life processes. The processes of morphogenesis, growth, differentiation and regeneration are also explained by the structuring and regulating activity of the coherent Biophoton field.

The holographic Biophoton field of the brain and the nervous system, and maybe even that of the WHOLE organism, may also be basis of memory and other phenomena of consciousness, as postulated by neurophysiologist Karl Pribram an others. The consciousness-like coherenceproperties of the Biophoton field are closely related to it's base in the properties of the physical vacuum and indicate it's possible role as an interface to the non-physical realms ofmind, psyche and consciousness.

As a possible result lends the discovery of Biophoton emission also to scientific support to some unconventional methods of healing based on concepts of homeostasis (self-regulation ofthe organism), such as various somatic therapies, homeopathy and acupuncture. The "chi" energy flowing in our bodies' energy channels (meridians), which according to Traditional Chinese Medicine regulates our body functions may be related to node lines(meridians) of the organism's Biophoton field. The "prana" of Indian Yoga physiology may bea similar regulating energy force, that has a basis in WEAK, coherent electromagneticBiophoton fields.

Russian researchers at the Institute for Clinical and Experimental Medicine have shown that light applied to the human skin penetrates the body to a depth of between 2 and 30mm, depending on the color frequency (further support for the individual color attributes). Using state-of-the-art technology, they were able to track the light penetration and measure its strength. The researchers found that only certain areas of the body were able to transfer light beneath the surface, and that these areas corresponded to locations of specific acupuncture points. Not only that, they showed that light was conducted within the body along the acupuncture meridians.

Although light penetration may be superficial, stimulation of deeper physiological processes have been reported; for example, laser light therapy has been shown to decrease healing time of wounds and ulcers, decrease edema, and facilitate bone remineralization.

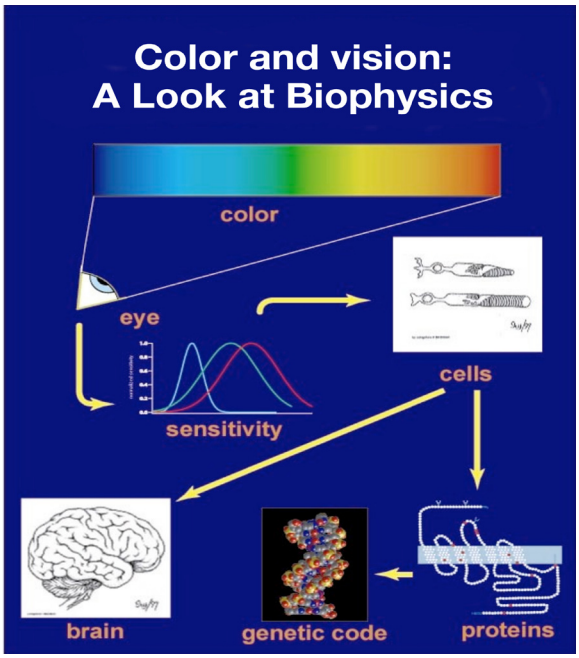
Extrapolating from these findings, some provocative questions arise: Could the meridiansfunction as a light (photon) transferal system within the body, not unlike optical fiber?
Just as light through fiber optics is used to store information in computers and transfer it almost instantly around the globe, perhaps the meridian system as a conductor of light provides subtle energy information system with the body. Could this be the missing link uniting materialistic medicine with the "subtle energy healing modalities," and bridging the gap between physics and metaphysics?
Could the meridian transmission of photons (traveling at the speed of light) be a more fundamental aspect than of electromagnetic energy which involves relatively inert ions or electrons? (It compels one to stop and reconsider what our true nature is--that we are in a very literal sense "light beings" as ancient mystical teaching profess. There is new scientific evidence to support this.)

Tiina Karu, PhD, at the Laser Technology Center in Russia and affiliated with the University of California at
Berkeley, had research the effects of light on the cell since the 1980s. She has found that there are photo-receptors at the
molecular-cellular level which, when triggered, activate a number of biological reactions: DNA / RNA synthesis, increase cAMP levels, protein and collagen synthesis, and cellular proliferation. The result is rapid regeneration, normalization and healing of damaged cellular tissue. In essence, light is a trigger for the rearrangement of cellular metabolism.

Surprising new research from Cornell University also supports this supposition that the body absorbs light through the skin, and that this light has physiological action. Chronobiologist Scott Campbell found that the biological clock could be reset by shining light on the back of the knee. Prior to this it was believed that the light had to be transmitted through the eyes. This has important implications for the treatment of seasonal affective disorders linked to aberrations in circadian rhythm. John Ott's work on the benefits of full spectrum light, and conversely, the deleterious effectsof fluorescent lighting on both physical and mental health and well being is well documented and prolific. Psychologist Warren Hathway investigated the effects of full spectrum lighting on the performance of 300 ten to twelve year-olds in the Canadian school system. Compared to those exposed to cool white fluorescent or sodium vapor lamps, the full spectrum groupexcelled physically and academically.They had fewer sick days, greater gains in height and weight, and made greater academic progress. His findings were reported at the 1992 meeting of the American Psychological Association.

Empirical work in applying colored light to acupuncture points/ meridian systems has been ongoing since at least the 1980s. In Germany, Peter Mandel has developed a sophisticated system known as "colorpuncture" for rebalancing the body's energy and treating specificdisorders. He uses a battery operated penlight with interchangeable colored tips for applying light to the points. In Practical Compendium for Colorpuncture he explains his approach which involves analysis of vertical, horizontal and diagonal energy flows which correspond with functional illness/endocrine deficiency, inflammatory processes, and degenerative diseases, respectively.

The latest research indicates that light has positive or negative effects depending on which frequencies of the electromagnetic spectrum are present. In the book entitled Light, author Peter Bros goes a step further. He postulates that light is actually made of "what gives it off" by emission of electrons from the source. So the light emitted from a full spectrum fluorescent bulb would be different in nature from the full spectrum light emitted by one of the noble plasma gases.



III. Coherent vs. Incoherent Light

Light therapy is actually quite common, interfacing through the use of laser technology. Laser, an acronym for "light amplification by stimulated emission of radiation," is simply light which is coherent. Coherent light beams have minimum divergence and maximumparallelism over distance, as opposed to incoherent light consisting of regular visible light beams which scatter. Hot lasers are used in surgery to cut, cauterize, and destroy tissues. Lower power lasers, referred to as "soft" or "cold" lasers, are used in place of acupuncture ("needleless acupuncture") in clinics, research facilities and hospitals around the world to produce therapeutic effects through photobiostimulation. Soft lasers are classified by the FDA as Class III, nonsignificant risk medical devices for investigational purposes only.

There is a vast amount of research documenting the biological responses and efficacy of laser biostimulation, much of which is applicable to incoherent light. Laser stimulation has ahomeostatic effect: promoting skin regeneration or reducing scar tissue, decreasing pain or promoting enhanced sensitivity in numb areas, reducing swelling and irritation or improving circulation and enhancing the immune system. However, soft laser treatment is not withoutrisk. It can be harmful if it comes in contact with the eyes. There is also concern that if used for a prolonged period, it can damage acupuncture points, leading to reduced effectiveness.

Despite the excitement over laser, in Israel, medical doctors utilize incoherent lighttransmitted by light emitting diodes (LEDs) in the practice of neurology, dentistry, dermatology, physiotherapy, and in cosmetic applications to promote collagen and elastin formation. Infrared light is frequently used in muscle and sport injuries for pain reduction.

IV. Polarization of Light

Sunlight and almost every other form of natural and artificial illumination produces lightwaves whose electric field vectors vibrate in all planes that are perpendicular with respect to the direction of propagation. If the electric field vectors are restricted to a single plane by filtration of the beam with specialized materials, then the light is referred to as **plane** or **linearly polarized** with respect to the direction of propagation, and all waves vibrating in a single plane are termed **plane parallel or plane-polarized.**

The human eye lacks the ability to distinguish between randomly oriented and polarized light, and plane-polarized light can only be detected through an intensity or color effect, for example, by reduced glare when wearing polarized sun glasses. In effect, humans cannotdifferentiate between the high contrast real images observed in a polarized light microscopeand identical images of the same specimens captured digitally (or on film), and then projected onto a screen with light that is not polarized. The first clues to the existence of polarized lightsurfaced around 1669 when Erasmus Bartholin discovered that crystals of the mineral Iceland spar (more commonly referred to as **calcite**) produce a double image when objects are viewed through the crystals in transmitted light. During his experiments, Bartholin also observed aquite unusual phenomenon. When the calcite crystals are rotated about their axis, one of theimages moves in a circle around the other, providing strong evidence that the crystals aresomehow splitting the light into two different beams.

Polarized Light Waveforms - The ordinary and extraordinary light waves generated when abeam of light traverses a birefringent crystal have plane-polarized electric vectors that aremutually perpendicular to each other. In addition, due to differences in electronic interaction that each component experiences during its journey through the crystal, there is usually aphase shift that occurs between the two waves.

Polarization of Light - When light travels through a linear polarizing material, a selected vibration plane is passed by the polarizer, while electric field vectors vibrating in all other orientations are blocked. Linearly polarized light transmitted through a polarizer can be either passed or absorbed by a second polarizer, depending upon the electric vector transmission azimuth orientation of the second polarizing material.

Max Berek (1886-1949) - Max Berek was a German physicist and mathematician, associated with the firm of E. Leitz, who designed a wide spectrum of optical instruments, in particular for polarized light microscopy and several innovative camera lenses. Professor Berek iscredited as the inventor of the Leica camera lens system at their Wetzlar factory

Sir David Brewster (1781-1868) -Sir David Brewster was a Scottish physicist who invented the kaleidoscope, made major improvements to the stereoscope, and discovered thepolarization phenomenon of light reflected at specific angles. In his studies on polarized light, Brewster discovered that when light strikes a reflective surface at a certain angle (now known as Brewster's Angle), the light reflected from that surface is plane-polarized. He elucidated asimple relationship between the incident angle of the light beam and the refractive index ofthe reflecting material.

Shinya Inoué (1921-Present) - Shinya Inoué is a microscopist, cell biologist, and educator who has been described as the grandfather of modern light microscopy. The pioneering microscopist heavily influenced the study of cell dynamics during the 1980s through hisdevelopments in video-enhanced contrast microscopy (**VEC**), which is a modification of the traditional form of differential interference contrast (**DIC**) microscopy. Inoué also madesignificant contributions to the investigation of biological systems with polarized lightmicroscopy. His seminal work, "**Video Microscopy**," was published in 1986, and a second revised and updated edition, co-authored with Kenneth Spring, followed in 1997. The book isa cornerstone of microscopical knowledge and is highly regarded throughout the scientificcommunity.

Edwin Herbert Land (1909-1991) - The founder of the Polaroid Corporation, Edwin HerbertLand was an American inventor and researcher who dedicated his entire adult life to the study of polarized light, photography and color vision. Perhaps Land's most famous contribution to science, however, was his development of instant photography. The invention was inspired by his three-year old daughter when she asked him why she could not instantly see a picture hehad just taken of her on vacation. The one-step dry photographic process took Land threeyears to perfect, but his success was phenomenal.

Henri Hureau de Sénarmont (1808-1862) - Sénarmont was a professor of mineralogy and director of studies at the École des Mines in Paris, especially distinguished for his research on polarization and his studies on the artificial formation of minerals. He also contributed to theGeological Survey of France by preparing geological maps and essays. Perhaps the mostsignificant contribution made by de Sénarmont to optics was the polarized light retardation compensator bearing his name, which is still widely utilized today.

Brewster's Angle - Light that is reflected from the flat surface of a dielectric (or insulating) material is often partially polarized, with the electric vectors of the reflected light vibrating in a plane that is parallel to the surface of the material. Common examples of surfaces thatreflect polarized light are undisturbed water, glass, sheet plastics, and highways. In theseinstances, light waves that have the electric field vectors parallel to the surface are reflected to a greater degree than those with different orientations.

Double Refraction (Birefringence) in Iceland Spar - The first clues to the existence of polarized light surfaced around 1669 when Erasmus Bartholin discovered that crystals of themineral Iceland spar (more commonly referred to as **calcite**) produce a double image when objects are viewed through the crystals in transmitted light.

Nicol Prisms - Several versions of prism-based polarizing devices were once widely available, and these were usually named after their designers. The most common polarizing prism (illustrated in the tutorial window) was named after William Nicol, who first cleaved and cemented together two crystals of Iceland spar with Canada balsam in 1829. Nicol prismswere first used to measure the polarization angle of birefringent compounds, leading to newdevelopments in the understanding of interaction between polarized light and crystallinesubstances.

Electromagnetic Wave Propagation - Electromagnetic waves can be generated by a variety of methods, such as a discharging spark or by an oscillating molecular dipole. Visible light isa commonly studied form of electromagnetic radiation, and exhibits oscillating electric and magnetic fields whose amplitudes and directions are represented by vectors that undulate in phase as sinusoidal waves in two mutually perpendicular (orthogonal) planes.

V. History magnetical Therapy

The use of magnetic therapy for health and well-being has an ancient history dating back thousands of years. Ancient Egyptians used 'loadstones' to prolong life and improve health. It is said that Cleopatra wore a polished lodestone on her third eye and magnetic bracelets and necklaces for healing, in the belief that it helped maintain her youth and beauty. In fact, the earliest written medical text, The Yellow Emperor's Book of Internal Medicine, published in China around 2,000 B.C., mentions the application of magnetic stones to correct health imbalances. In India it is said the builders of the pyramids were well acquainted with magnetic forces and used it in the preservation of mummies from natural decay.

In more recent times, Paracelsus (1493-1541) a Swiss alchemist and physician, considered to be the father of modern medicine, believed that the life force of the body was most influenced by the force found in magnets. He brought its healing powers to light. He travelled to Africa, Asia, and Europe making discoveries and learning different facets of medicine. He observed, "that which constitutes a magnet is an attraction force which is beyond our understanding, but, which, nevertheless, causes an attraction of iron and other things. Magnetic treatment wasuseful in all inflamations, influxes, and ulcerations, in diseases of the uterus and bowels, in internal as well as external diseases." His opinion was that any diseased part of the body, when exposed to a magnetic force, will be cured better and more speedily than by any medicine. Dr. William Gilbert of Colchester, England (1540-1603) was the first Englishman to make astudy of electricity and magnetism. He believed the world was one large magnet. Hediscovered that substances such as paper and cloth do not effect the force of attraction between magnet and iron.

Father Hall, an Austrian Professor of Astronomy, in the eighteenth century took the cue fromParacelsus and treated nervous men and women with magnets. Magnetic treatment by Hall was closely watched by Dr. Messer (1734-1815) who pioneered Hynotism. He applied magnetic treatment to his patients and succeeded in curing a number ofserious and complex ailments. The work of Hall and Mesmer was witnessed by Dr. Samuel Hanneman (1775-1843), theFather of Homeopathy. He is the first to use magnet therapy for treatments of disease. Heprepared three medicines by exposing milk and water to the magnetic force, using north and south pole magnets. Through the use of magnetic water and application of magnets (north and south poles), Dr. Hanneman found that he could treat 1243 symptoms in aiding recovery ofdiseases.

Although the discoveries of Paracelsus, Mesmer, and hanneman in magnets as a therapuetictool was recognized, it continues to be used by physicians convinced of its healing powers.

Michael Farraday (1791-1867) laid the foundation for Biomagnetics and magneto-chemistry and established all matter is magnetic in one way or other.

In 1819, an important discovery was made by Danish physicist Hans Christian Oersted, who found that a magnetic needle could be deflected by an electric current flowing through a wire. The discovery of a connection between electricity and magnetism was further investigated by French scientist Andre Marie Ampere, who studied the forces between wires carrying electric currents. Based on this study, French physicist Dominique Francois Jean Arago was able to magnetize a piece of iron by placing it near a current-carrying wire. And the discovery that electricity can be used to create magnets is significant.

Louis Pasteur in 1862 discovered the earths magnetic field exercised a positive effect on thegrowth of plants.

Though actively employed by medical doctors in America in the 1800's and early 1900's, magnetic therapy eventually fell out of favor.

Since the late 1950's, numerous studies have been done in Japan which have demonstrated the effectiveness of magnetic fields for treating various human complaints and a number of medical papers have been published on this subject. Magnetic necklaces and bracelets are sold in Japan, Korea, China, and in Europe for the relief of neck, shoulder and back pain and stiffness as well as to improve circulation. Magnetic back and knee supports are used to help relieve pain and stiffness in those areas. Although the foreign studies do not specifically mention the use of these items for relief of arthritis pain and stiffness, most users report excellent results for this application. The small magnetic patches are very popular for the relief of muscle pain and soreness and are applied to the painful area like a spot "bandaid," or in some cases are applied to acupuncture points to stimulate them magnetically instead of with needles. Numerous theories and hypotheses have been proposed to explain the observed effects, but at this time there is still no ingle explanation, which is accepted as definitive.

The use of magnets in therapy is attracting a lot more attention these days as ongoing research proves magnetic fields do have an effect on the body.

In Europe, Russia, China, Japan and many other countries, convinced of the benefits, millions of people continue to use magnetic therapy. In this country magnetic therapy has long been used as an effective healing tool in China, France, India and Japan, especially in repairing soft-tissue injuries. Scientific research is still in its infancy regarding magnets as medical devises.Research is being carried out in various countries around the world on the effect of magnetism of bacteria, flies, mice, rabbits, as well as plants and tissue cultures ,to learn what may become in the medical realm. "Biomagnetism" is a term used in research of magnetism on the human body.
Magnetotherapy comes into this category. Multiple studies at major US Universities all show limited, yet potentially important, medical uses for magnets on a host of ailments. Investigators in 3 studies at Brown University, (Providence, Rhode Island) Baylor College of Medicine, (Houston, Texas) and the University of Virginia all report that static magnets (magnets that are fixed to one place on the body), can relieve pain and heal wounds faster.

Physicist/Psychologist Dr. Buryl Payne, is a scientist whose comprehensive studies ofmagnetic fields and healing have been widely published. He is the inventor of the firstbiofeedback instruments and former professor at Boston University and Goddard College. Hisrecent books, "The Body Magnetic", and "Getting Started in Magnetic Healing" , have served as authoritative handbooks for professionals and lay people alike.

Dr. E. K. Maclean of New York, New Your, USA, has succeded in relieving pain of every kind by the use of magnets. He has succeessfully treated advanced cases of cancer with an electromangetic activator. There is research going on to prove how magnetism worksthroughout the world. Many more people could be mentioned here. This is a birds eye view ofthe pioneers of Magnetotherapy. Whether you agree with this form of treatment or not, it ishere to stay. Books on Magnetotherapy can be found in specialty book stores dealing with "alternative medicine" and "natural medicine". B. Jain publishers from India has excellentbooks on the subject. You may find other avenues through reseach centers dealing with magnets also. The Indian Institute of Magnetotherapy, New Delhi, India has acorrespondence course that aids in the use and effectiveness of magnets as a health aid. Magnetotherapy is a valid health aid for treating ailments and as a preventive to poor health.

Although it is not widespread, it is, in this authors opinion, a great tool to maintaining and helping in the health field.

With the advent of Magnetic Resonance Imaging which has been heralded as one of the major medical diagnostic advancements of recent history, more people have come to realize thatthe force of magnetism is more than a curiosity. The recently published (1990) book on magnet therapy by William Philpott, M.D., Biomagnetic Handbook (A Guide To MedicalMagnetics The Energy Medicine of Tomorrow) is also indicative of the increased awarenessof and interest in magnetism as a beneficial and healing force.

VI. History of electro-therapy

Electrical Frequency Devices are not new, and are in fact in widespread current usage in Traditional Medical Practice.

Electro medicine, or the use of electrical modalities to treat physical ailments, is considered one of the oldest and most documented sciences known. Medical professionals of ancientGreece learned that the electrical impulses emitted from electric eels in clinical foot bathsrelieved pain and produced a favorable influence on the blood circulation. Doctors Largus and Dioscorides documented substantial therapeutic results with electrical currents in circulatory disorders and in the management of pain from neuralgia, headache, and arthritis.

In the 1700s, European physicians used controlled electrical currents from electrostaticgenerators almost exclusively for numerous medical problems involving pain and circulatory dysfunction. During that period, Benjamin Franklin also documented pain relief by using electrical currents for “frozen shoulder”.

Galvani, a professor at the university of Bologna, observed in 1780 the twitching of themuscles of a frogs legs under the influence of electricity. Functional machines and thegalvanic battery served as the early sources of electro-therapy. Following the discovery of theinduction coil by Faraday, the principle of electro-physiology or stimulation of muscles and nerves by galvanic and faradic currents were developed in the middle of the last century.

Various currents have been used for the last several decades: Galvanic (DC) Alternating (AC) Faradic Pulsatile Rectangular pulse Interferential

While differing considerably in waveform, all currents obtain the same physiological effects.

The limits of electrical stimulation have not been reached, and even its current sophisticated use will be as antiquated as the methods of the past.

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 Vanable 1982;) although only recently have we been able to understand the implications of these findings and to therapeutically apply these microcurrents. Microcurrent first gained popularity in treatment of wounds, nonunion fractures and bone implants, where it has become an accepted procedure with orthopedic surgeons.
Ugo Cerletti, professor of neuropsychiatry at the University of Rome, conceived the method by which shock treatment is given today - electric shock. Cerletti accepted the idea that convulsions were good for schizophrenics and in 1938 started using electric shock to produce the convulsions. Electric shock treatment quickly replaced insulin and Metrazol as the favorite form of shock treatment, and became the most effective method of controlling troublesome asylum inmates.

It is just that few tend to think of these as frequency instruments.

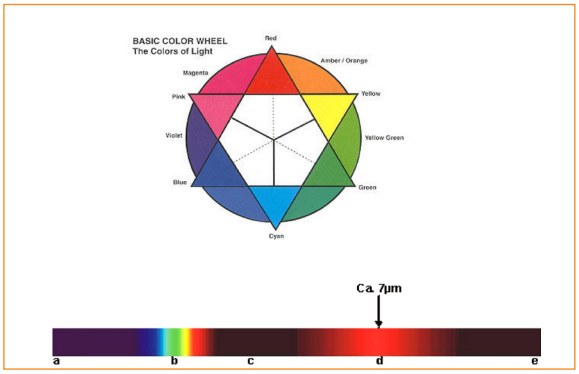
The following are just a fewof the electrical frequency instruments in present therapeutic medical use.
Muscle stimulators which relieve pain, reduce spasms and edema, tonify weak muscles, and assist the healing process, run at from 1 to 130 Hz. TENS units are used to block pain run at about 80 to 100 Hz.

Interferential Therapy units are a type of muscle stimulator run at 3000 to 4000 Hz. Bio Feedback instruments used to modify behavior and retrain the nervous and muscular systems, run from below 1Hz to about 40 Hz. Bone Growth Stimulators, used to heal broken bones run at frequencies from about 40 to 80 Hz. Deep Brain Stimulators - use implanted electrodes to impart electrical pulses from between 120 and 160 Hz directly to the brain to control involuntary muscular tremors in Parkinson’s disease. Heart Pacemakers use an electrical impulse to regulate the hearts rhythm. Ir-stimulating device to reduce muscle pain. These are just a few of the current electrical frequency devices in use.

Most of todays marketed devices are used for muscle stimulation or electro accupuncture.

Technical stand today

Most light device on the market today are based on either coherent OR incoherent light. Mostof those devies are using laser technology or full spectrum technology. The biggest disavantage of the laser devices is there destructive power. Coherent LED devies are only used the Infrared spectra and most of them are very weak and they have a very smallbandwidth. Incoherent light is widely used in the so called full spectrum lamps. Other special devies are using a most of the time very small and dangeroous part of the spectrum, like Puva devies. Non of those devies are using a pulsing technique.



A. L.E.D. Phototherapy & Cold/Soft Laser Therapy

All of the latest medical therapeutic methods seem to have a common target: to increase and stimulate blood circulation in the area being treated by using various stimulants, steroids, etc.
A Light Emitting Diode (L.E.D.) Light Therapy Unit, however, improves and stimulatesblood circulation using a completely natural method . . . a Light Beam. Light being absorbed by the skin and underlying tissues, stimulates cell activities and metabolism, promotes musclerelaxation, accelerates all repair mechanisms and, of course, increases blood circulation. The result is that all toxins and metabolism by-products are taken away from the suffering tissue, while at the same time, food/energy and vitamins are supplied through the increased blood current.”

L.E.D. Light Therapy is a conscious move towards a natural method of healing. The principaland application of this is through biostimulation of the cells by pure Monochromatic Light.In the healing process, Light is absorbed by the cell, accelerating tissue repair, thus speeding up recovery time. This method of biostimulation is particularly successful in the fields ofDentistry, Dermatology, Neurology, Physiotherapy and is a must in the world of beauty and fitness.”
“From a nutritional point of view a lack of Sunlight can cause defi-

ciencies. Without Sunlightvitamin D cannot be metabolized in the human body, which can result in rickets. Most enzymes need Light for proper functioning. Hormones and vitamins as well. Studies have shown that different Lights affect different enzymic reactions for healing purposes. For example, babies who suffer from jaundice and are placed under a blue light are termed 'bluebabies.' "Space Age in Medicine"Professor Mester of Budapest University has made many experiments with animals and human cells to be able to explain to us the function of Light on the cell. The Monochromatic Light influences the DNA to use the lipoprotein in the area, so the cell has better function, aswell as to produce collagen and elastin. According to Dr. Mesters' experiments, it was the Monochromatic Light and not the coherence of the Light. Therefore, in later days when companies started to manufacture L.E.D.s, experiments showed that this Monchromatic Lightalthough non-coherent has the same biological function on cells. "Light Attracts Life"In a study conducted at the Phototherapy Clinic of "Shmuel Harofe" Geriatric Medical Center from October 1989 to March 1990, researchers wanted to find out "the effects of Low-Power Light Therapy on pain and disability in elderly patients with degenerative osteoarthritis of theknee." Their findings were published in the January issue of the "American Geriatrics Society They found that "pain and disability before treatment did not show statistically significantdifferences between the three groups (tested).Pain reduction in the red and infrared groupsafter the treatment was more than 50% in all scoring methods. We observed significantfunctional improvement in red and infrared-treated groups, but not in the placebo group. "They concluded, "Low-Power Light Therapy is effective in relieving pain and disability in degenerative osteoarthritis of the knee."

A Synopsis of the Therapeutic Effects of Monochromatic Single-Wavelength Red LightIn Europe, during the 1960's, it was discovered that certain Monochromatic Single-Wavelength Light Beams had an excellent therapeutic effect on afflicted cell tissue. This occurs through a process called "Photo-Stimulation." Various Single-Wavelengths in the red and infrared color spectrums (630 to 950 nanometers) have been used extensively, becausethey fall within the cellular frequency range of biological tissue. However, the most widely used is the 660 nanometer red wavelength, which appears to be the most effective, as it iscloser to the actual Resonance Frequency of the healthy cell. A single Light Wave is essential, because the cell tissue will not respond, if more than one wavelength is present.

Depending upon whether the Light Beam is continuous or pulsed (turned on and off very rapidly), the Single-Wavelength Light photostimulates the afflected cell tissue differently. "Continuous Light" sedates the tissue, resulting in relief of pain, relaxation of tense musclesand reduced swelling. This is accomplished by an increase in cellular blood flow (which causes a warm feeling deep within the tissue) and by actual physical tissue relaxation. "Pulsed Light" stimulates the DNA within the afflicted cell, causing the cell to produce an increased quantity of protein and calcium, which results in an accelerated healing of the tissue from 3 to 5 times faster than normal. To reach the problem areas, the Light Beam can either be applied directly to the skin, where itpenetrates about one inch into the soft tissue, or for deeper penetration into the body, it can beapplied to the acupuncture points. A Single-Wavelength Light Beam will travel through thebody's acupuncture-meridian channels like an optical fiber, to reach internal areas within thebody. The light also acts as an extremely effective Acupuncture-Point Stimulator Device. Therefore, using a combination of both direct application and Acupuncture/Acupressure-PointTechniques, any problem area within your body may be reached by the light. There are only two available methods of producing this desired Monochromatic Single-Wavelength Light Beam without introducing other wavelengths or impurities. The first is with a "Laser" and the second is with a "Light-Emitting Diode," or L.E.D.. The choice of materialused in the construction of both devices determines with specific wavelength is produced. Both devices produce a Monochromatic Single-Wavelength, but the Laser produces CoherentLight (in-phase) while L.E.D.s provide Non-Coherent Light (out-of-phase). This type of Laser uses very Low-Power, compared to the normal High-Power Lasers used in surgery and advanced technology applications. These are referred to as "soft, Cold or weak Lasers," and they produce only enough Light power to stimulate damaged cell tissue. Soft-Lasers havebeen well researched and used over the past 25 years.

They are available in many clinics, hospitals and doctors' offices around the world. The most extensively published uses havebeen for relief of pain, accelerated healing of wounds, treatment of skin conditions, wrinkleremoval and acupuncture-point stimulation. Soft-Lasers are NOT readily available for homeuse. They are expensive and are approved for use ONLY by Licensed Physicians, Health Professionals and Clinical Technicians. They can be harmful, if over-used or if they come into contact with the eyes. Therefore, individuals must go to a Licensed Health Practitioner, if they desire treatment with a "Soft Laser." Today, however, thanks to the technological development of L.E.D.s, an individual may takeadvantage of this Phototherapy concept in the home. L.E.D.s have changed from a simple 15 millicandle "indicator-type light," used in electronic equipment, to the 500-times brighter (8000 millicandle) Light now used in medical applications. Photo-Stimulation by an L.E.D. Unit is now 90% as effective as the "Soft Laser" unit. This means, for example, that arthritispain, which is relieved by a "Soft Laser" in 6 minutes would be relieved by an L.E.D. unit in about 7 minutes! The advantages of using L.E.D.s is tremendous. The cost of L.E.D.s is one-tenth of the cost ofthe "Soft Laser" and their life-expectancy is 20 times longer (l00,000 hours of use). Better yet, an L.E.D. is completely harmless, cannot be over-used, has NO side effects and can even beused on the eyes. Therefore, you can do nothing wrong with it! This allows the L.E.D. Phototherapy Unit to be used on a much wider range of problems than the "Soft Laser." Theresults show that when using "Photo-Stimulation" on afflicted cell tissue, it is the"Monochromatic Single-Wavelength" feature that is more important to cellular response than is the "Coherent" (Laser) or "Non-Coherent" (L.E.D.) aspect of Light.

Simple light emitting diodes (LEDs) became available in the early 1970s, with the first Gallium-Arsenide diode laser developed in 1979, but only in the last five years have superbright or superluminous diodes (SLDs) been commercially available. A recent survey amongst physiotherapists showed 94% of respondents were dissatisfied with the amount and quality of information available on laser therapy (Baxter 1994). Due to a lack of basic understanding, controversies surround the stimulation of tissue with light, and whether or notcoherent, collimated, and narrowly mono-chromatic, laser generated light, produces different effects from non-coherent broad band light (Pontinen 1992, Baxter 1994).

Both laser diodes and modern SLDs are now made from a Gallium-Aluminium-Arsenide (Ga-Al-As) alloy formed into a double heterojunction chip. This means that there are two junctions of dissimilar crystalline alloys, not just one junction as in the older style LEDs. The SLD has the same chip structure as a solid state laser, but it lacks the thin films of reflective aluminium to form a resonant cavity, which would technically make it a laser.

B. Pulsing light devices

B1. Only a old description from 1975 where Paul Nogier and his colleague Rene Bourdiol, co-authored a book on the subject--Treatise on Iridodiagnosis. Later, Bourdiol, in his book Auriculo-Somatology, described how Nogier used colored and pulsed light on the ear to affectthe body's energy systems by photostimulation of acupuncture points with the widely used color puncture pen, a penlight device for applying colored light to acupuncture points, butmost devices are clumsy and the light intensity is not sufficient. Later on led this to the development of the Photon Stimulator (US patent approved in 1998). Over the last several years it has been used by practitioners in clinical practice to apply colored light to acupuncture points, either on its own, or in conjunction with standard acupuncture treatment. The PS is a plug-in unit comprised of a xenon plasma gas tube which provides full spectrum light. The light is pulsed and transmitted through high-grade optic fiber to the handpiece with a precise tip where the light is focused. The combined aspects of being a plug-in unit vs. battery powered, the high wattage xenon bulb, and the optic fiber which transmits 99.4% of the light to the tip, insure high intensity stimulation of the skin. The benefits of higher intensity mean a greater number of electrons discharged. In practice, this translates to shorter treatment times.

Some of the problems we encountered in those machines were the lack of color specificity. The PS utilizes color gel filters manufactured by Rosco Laboratories (Stamford CT, USA), the world's top photographic filter company. Roscolene gel filters minimize dye migration and pigment fading; they duplicate the same precise frequencies researched for over 50 years by Dinshah. Each color gel filter comes in a 35mm slide casing, making it convenient and quick to change colors by dropping them in and out of a slot. The light is pulsed, reinforcing the stimulation. The "flicker" rate is adjustable between 0 - 10 hertz; we usually set it around 5 hz. The colors are following the "Dinshah system of color therapy" dovetails nicely with traditional Oriental medicine theory, relating colors to the internal organs and meridian system.Yellow builds the pancreas and improves digestion, red is hot and stimulating, magenta strengthens the kidneys and adrenals, the warm colors (red, orange, yellow, lemon, scarlet) strengthen and tonify, while the cool colors (turquoise, blue, indigo, violet, purple) sedate, calm, ease pain and inflammation. The decive has only a tip-pen to work on specified acupuncture points.

B2. In the West Indies, Charles McWilliams system known as "chromopressure" employs use of the colors of the spectrum. His ChromoPressure Unit is solar powered, concentrating sunlight over the points, and filtered through interchangeable colored slides. He utilizes combinations of three types of innovative points which represent reflex systems:Chromopressure points are located on the face and hands, and represent organ-tissue-gland systems. Point selection and protocol is determined by his "symptom survey evaluation."Contact healing points" are points on the trunk which, when tender, indicate stress in arelated tissue or glandular system. Color irradiation of these points gives symptomatic relief. Lastly, the "Chapman neurolymphatic reflexes" are useful in obesity and chronic toxicity by stimulating lymphatic drainage. Unfortunately, the Chromopressure Unit requires a good source of sunlight which limits its use to certain time of the day and prohibits its use in some climates. The biggest disadvantages is the discussion of the used reflex point system.

B3. SYNTONIC

Since the 1920's it has been used effectively by optometrists to treat patients who have inefficient visual function.

Since eighty percent of learning occurs by way of the eyes, inefficient visual function can adversely affect all aspects of one's life, including academic achievement, athleticperformance and proficiency at work.

Patients are diagnosed by symptoms, vision evaluation, visual/motor performance and peripheral vision sensitivity. They may have blurred vision, a crossed or lazy eye, doublevision or poor academic achievement. If appropriate, they are treated by way of their eyeswith selected visible light seen as colors.

Not all retinal (light-sensitive) nerves in the eyes serve vision. Some connect the retinadirectly to non-visual brain centers such as the hypothalamus and pineal gland.

These centersinfluence electrical, chemical and hormonal balances which affect all body functionsincluding vision. Years of clinical application and research have demonstrated that certain selected light frequencies (colors), applied by way of the eyes to these centers, can producebeneficial results in the body.

Interest in the effect of light on the body intensified earlier this century. Most of the currenttherapeutic techniques used in syntonics are based on the work fone by Dr. Harry Ridley Spitler in the 1920s and 1930s. Dr. Spitler, who had both optometric and medical defrees, began researching and using phototherapy in 1909. Spitler, the author of "The SyntonicPrinciple", conceived the principles for a new science that he called "Syntonics". Syntonics, refers physiologically to a integrated nervous system.

Controlled clinical studies by Dr. Robert Michael Kaplan and Dr. Jacob Liberman proved thatthe usual result of this relatively short-term treatment is improvement in visual skills, peripheral vision, memory, behavior, mood, general performance and academic achievement.

They confirmed that large numbers of children with learning problems have a reduction in the sensitivity of their peripheral vision. During and after phototherapy they demonstrated improvement of peripheral vision and visual skills. Control subjects who did not receive therapy showed no improvement in their peripheral vision, symptoms or performance.

In 1985 psychiatry discovered light therapy. In medical clinics throughout this country and around the world, many individuals are now receiving exposures to bright light as treatmentfor Seasonal Affective Disorder (SAD).

Syntonics or optometric phototherapy, is the branch of ocular science dealing with the application of selected light frequencies through the eyes. It has been used clinically for over 70 years in the field of optometry with continued success in the treatment of visual dysfunctions, including strabismus (eye turns), amblyopia (lazy eye), focusing and convergence problems, learning disorders, and the aftereffects of stress and trauma. In recent years, Syntonics has been shown to be effective in the of brain injuries.

B4. The cranial electric stimulator CES 100Hz
The Health Pax is a CES instrument (cranial electrotherapy stimulator) that offers a non-drug therapy for the treatment of ANXIETY, PAIN, DEPRESSION and INSOMNIA. The Health Pax produces a mild microcurrent electrical impulses to the head via electrodes applied behind the ears or by means of ear-clip electrodes.

Pulse Rate Selection and Timers Health Pax features two pulse rate frequencies - 0.5 hertzand 100 hz. These are selected by sliding a switch in the battery compartment. Individualsmay use both settings to determine which frequency provides the best results. These two pulserates have been used historically in other CES devices over the past 30 years.

Unit offers three timer selections of 30 minutes, 45 minutes or continuous operation. In our review of over 100 clinical studies with CES, a treatment time of 45 minutes seems most common.

Other simular devices are market under names as the Alpha Stim and Brain Tuner.

Health Pax Primary SpecificationsFrequency: 100 Hz. and .5 Hz. Power Source: 9V Battery (Incl.) Low Battery indicator Led Amplitude: 10-600 micro amps (continuously adjustable) Wave Shape: Modified SinusoidalWaveform: Bipolar asymmetric rectangular Amplitude: 0-1.5 Ma. (skin resistance considered) Duty Cycle: 50%Pulse Duration: 2 milliseconds (20% duty cycle) Timer Control: 30 & 45 min.

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