BIO MAGNETIC ENERGY FOR PAIN RELIEF AND PROMOTION OF HEALING

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Frequency specificity of pulsed electro-magnetic energy is one of the most important factors in obtaining maximum benefits for healing of damaged tissue and pain relief. The waveforms, the harmonics available, and the ON-OFF duty cycle must also be considered.

Background.

Pulsed magnetic fields have been used therapeutically for almost 70 years. Only during the past 25 years has serious research and development work resulted in extremely low frequency pulsed electro-magnetic fields (ELF-PEMF) for medical devices now being made and used in many countries around the world. Most of these varied devices are modelled on the original German design. They use power line frequency of 50 Hz or 60 Hz then produce a direct current (DC) output of 1 Hz or 5 Hz up to 100 Hz with a density of up to a claimed 100 Gauss. These products have proved to be beneficial in bone fracture healing [1], circulation improvement and alleviation of pain, in many cases [2]. The FDA in USA recognised and accepted the bone fracture-healing claim in 1978. Since then extensive investigation and clinical research have found many biological effects from different frequency segments of the electromagnetic spectrum, both the beneficial and also the potentially hazardous forms in the high to extremely high range [3, 4].

Research.

Our research has now focussed on the use of gentle oscillating or alternating currents producing extremely ultra low frequency (EULF) fields in the ELF spectrum of magnetic energy, from a specially designed coil, and presented to the body. Specific pulsed frequencies in the range of 0.5 Hz to 18 Hz, each have related biological responses at the cellular level. This system has been referred to as Magnetic Energy Resonance Induction Therapy, or 'MERIT'.

Two categories of devices with pulsing frequencies have been identified and established as beneficial in clinical work. The first, type A (*), uses 11 crystal controlled accurate frequencies in the 0.5 Hz to 18 Hz range, which have a 50% OFF period giving a duty cycle of between one second and 0.028 of a second ON. This system uses power line current and divides the frequency to provide an output of pulsed 12 volts alternating current (AC) r.m.s. with a spiked waveform into the applicator coil (20 cm diameter), which can be up to 2 metres from the body. This electro-magnetic energy field is not a continuous, standard sinusoidal, sawtooth or square waveform, but uses signals that are similar to the body's natural waveforms, that are more readily accepted by the cells in the body [5].

The second category, type B (**), uses only 4 selected frequencies, namely 0.5Hz, 4 Hz, 8 Hz and 16 Hz. Each of these is characterised by an ON duty cycle of only 200 microseconds (µ sec). The power source is 2x 1.5volt D.C. batteries, which via a microprocessor controlled oscillator circuit provides an alternating (oscillating) electro-magnetic energy field, with a negative bias, and with a very sharply spiked waveform from a 5 cm diameter coil. The effective range of the field is up to 20 cm and is beneficial in the relief of pain and other discomforts [6].

Both type A and type B systems are designed to allow specific harmonics occurring at the selected frequencies to be available. Normally in electronics the harmonics (hash) is carefully filtered out to avoid possible interference in the communication signals. The body's bio-chemical activity is directly connected with the bio-electromagnetic activity particularly at the cell wall membrane [7]. The correct forms of EULF energy act as regulators by changing the direction and intensity of the electrical and corresponding magnetic fields. Electron spin changes cause bicarbonate bonding to bend and break. The result is a production of hydroxides that create a negative (or alkaline) pH and the extra- cellular fluid capable of absorbing far more oxygen than a positive (acid) pH fluid. The potential difference between the external and internal cellular fluids allows the nutrient ion channel to open more readily and oxygen uptake and utilisation is improved [8, 9].

Basic function.

Generally, the lower frequencies are used for relaxation, calming, reducing pain, enhancing cellular nutrient uptake, where-as higher frequencies are used for improvement of circulation and stimulation of metabolic function. More specifically, with the type A system the 0.5 Hz setting is widely reported to have the greatest benefit, and is used also to inhibit tumorous and other faulty cell mitosis. At the 2 Hz setting the thymus output of T cells is stimulated to assist in the immune system response. When set on 4 Hz or below the release of enkephalin and endorphin raise the pain threshold and modulate the transmission of pain perception. At 5 Hz the DNA synthesis is enhanced and at 8 Hz the repair and toning of muscle tissue is improved. The 10 Hz is used to normalise hyper or hypo activity, whereas 12, 15 and 18 Hz improve circulation and speed up metabolic rate.

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The type B system is a new approach to the well-known Transcutaneous Electric Nerve Stimulation (T.E.N.S.) devices used in hospitals and clinics worldwide. Instead of electrical contact with the skin, this system sends electromagnetic energy signals through body tissue without electrical resistance. It operates repeating ON for 5 minutes and OFF for five minutes.

Magnetic Fields in medicine date back hundreds of years BC. Currently one of medicine's major diagnostic tools is Magnetic Resonance Imaging (M.R.I.) [10]. Several other medical instruments utilise magnetic and electromagnetic energy in investigational procedures. One newly developed assessment system***, as a result of 5 years work in our research centre, captures red blood cell activity and lymphatic movement associated with the capillary bed (under the finger nail). It then co-generates signals in conjunction with an oximetry based device to produce a graph on a desk top or lap top computer. These recordings are invaluable to show before and after treatment changes, indicate cardiac function, vascular responses, and oxygen saturation in terminal tissue and pulse rate. Several other variations are recorded representing bioenergetic feedback that confirms or questions a practitioner's considerations regarding treatment protocol and also to monitor the progress from time to time.

Used correctly, Electro-Magnetic Energy Fields are a proven therapeutic modality. We have established in our research and clinical experience that the very gentle, EULF, low power pulsed magnetic energy has improved results in the repair of damaged tissue and reduction of pain. Improved oxygen transport in the red blood cells, increased nutrient and oxygen uptake at the cellular level, greater elasticity of blood vessels, changes in acid/alkaline balance, altering of enzyme and hormone activity, all play an important role in the return to good health.

Uses and safety.

The type A (*) and also type B (**) devices described above have been used in clinics, hospitals and also in the home in many countries for several years. The reported success rate has been much higher than expected. An independent market survey showed a total satisfaction level of greater than 80% with both medical and veterinarian practitioners and also for people at home or in nursing care centres [12]. The wide variety of ailments treated ranged from, (and still does), general aches and pains from arthritis, rheumatism, hay fever, colds and `flu, to serious illnesses such as cancer and neurological diseases. Many have reported improvement of symptoms in epilepsy, Parkinson's, Huntington's, Motor Neurone disease, and particularly Multiple Sclerosis [13].

The safety issues have been tested in several government registered facilities over the past ten or more years. The biomedical engineers have accepted that there is no risk due to the extremely ultra low field intensity and frequency range (similar to the predominant brain wave frequencies), and no thermal effects are created during use. These two devices are often used in operating theatres and intensive care wards, including with electronic implants such as pacemakers, insulin pumps, and with metal implants and prostheses. If devices are used that operate at high frequencies and currents, there is the potential of heating of the tissue or implant, and therefore a danger of cell damage at certain frequencies.

In summary, the parameters of the specifics discussed in this paper, demonstrate the most effective results to date in clinical use of EULF Pulsed Electro-Magnetic Field Energy, over other previously accepted methodology. Further research and data collection from clinic studies are on-going to identify additional beneficial biological effects in this cutting edge of modern medical technology.

REFERENCES

[1] C.A.L. Bassett, A.A. Pilla, Clinical Orthopaedics # 124, USA: 1977, pp 128-143
[2] R.O. Becker, Cross Currents, New York: Tarcher 1990, pp 151-153
[3] A.A. Pilla, "Electrochemical & Electromagnetic Bioeffects," Modern Bioelectricity, A.A. Marino, Dekker, New York, 1988, pp 427-450
[4] E.M. Goodman, B.G. Greenebaum, University of Wisconsin, Modern Bioelectricity, A.A. Marino, Dekker, New York, 1988, pp 393-424
[5] R.J. Grace, "Health Implications of Magnetic Fields," 4th Oceania Symposium on Complimentary Med. Bio Concepts, Qld, Aust. 1992, pp 119-134
[6] M.A. Persinger, "Treatment of Pain," Modern Magnetotherapies, A.A. Merino, NY, USA, 1988, pp 599-627
[7] R. Pethig, "Electrical Properties of Biological Tissue," University College of North Wales UK, Marcel Dekker, NY & Basel, pp 125-179
[8] G.J. Washnis, R.Z. Hricak, "Magnetic Fields and Living Tissue," Nova Publishing, Maryland, USA, pp 92-403
[9] R.J. Grace, "The Role of Biomagnetic Fields in Nutrition Uptake," 5th Oceania Symposium on Complimentary Medicine, Bio Concepts, Qld, Australia, 1996, pp 60-75
[10] R.J. Grace, "Pulse frequency specificity in magnetic field energy treatments," Bioenergetic Therapies, Bemic Publ. Australia, 1993, pp 4-23
[11] Fred Rinker, "The Invisible Force," Traditional Magnetic Therapy, Mason Service Publishing, London Ontario, Canada, 1997, pp 10-25
[12] Morgan Research Gallop Poll, "Survey of users of Magnetic Field Therapy (by Magnacare)" Aust. 1993
[13] George J Washnis, Richard Z Hricak, Discovery of Magnetic Health, Nova Publ. Co., MD, USA, 1993, pp 262-268

Type A* - **Magnafield** MF998 / MF2000 device. Type B ** - **Magnatens** ***Comfortmate*** device. *** **Magnagraph** Data Collection

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Note: Successful double-blind, placebo-controlled clinical trials have now shown the scientific validity and efficacy of this form of magnetic energy induction system as referred to above, but only for the Magnafield and the Magnatens devices.

More detailed information is available from Magnacare Pty Ltd 103 Main North Road, Nailsworth SA 5083 AUSTRALIA.