Whole-Body Magneto-Therapy Speeds Wound and Disease Healing

by Prof. Bruno Brandimarte

Above: the All Body® apparatus developed by Brandimarte to deliver magneto-therapy. At left is rat bone tissue healing after experimental treatment.

The use of magneto-electric fields for non-orthopedic ailments goes back more than 30 years. From the time that magneto-therapy began to be used for rehabilitation and post-traumatic treatment, beneficial effects were noted also on inflammatory ailments, bacterial infections, vasculopathies (of various origins), fluid retention, and on the general condition of patients afflicted with viral infections such as hepatitis, and later, HIV.

Over the years, there has been a massive increase in the use of magneto-therapy in physiotherapy and orthopedics, specifically in the prevention and cure of retarded fracture consolidation. Many types of research were undertaken. The Europeans focussed especially on various kinds of arthropathies (joint diseases), but the entire world tried to gain a better understanding of the interaction between magneto-electric fields and living matter.

Scientific works by various authors (the most significant of which are referenced in a brief bibliography below) showed that this interaction stimulated some fundamental metabolic functions.

In the process of their pioneering work on bone formation in induced tibial fractures in rats, Prof. G. Marinozzi and this author began to notice that magneto-electric fields not only accelerated the formation of bone callus (the healing tissue in a fracture), but also increased the resistance to infection of the animals being treated, compared to non-treated controls.

In the attempt to find an explanation, experiments were done subjecting human lympho-

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Brandimarte received his degree in nuclear physics at the Enrico Fermi Center in Rome, where he developed a biological model for the application of physical forces. This article was adapted from his scientific papers and translated from Italian by Richard Sanders.

cyte cultures to magnetic fields, with the effects reported in the works referenced in the bibliography below.

Studies of the formation of bone callus led to the discovery that the application of different types of fields had different effects. For example, an alternating sinusoidal field caused an increased rate of tissue growth (verified in a separate experiment on the rate of fibroblast reproduction), while the semi-sinusoidal field with a double half wave, caused microangiogenesis (the process of developing new blood vessels), Table 1 and Figure 1.

These experiments clearly showed that magneto-therapy could be applied with good results in various other fields of medicine besides orthopedics and physical rehabilitation.

Notable progress was made from a clinical standpoint, even though all the biological mechanisms were not yet completely understood. Significant results were obtained when magneto-therapy was used along with standard pharmacological therapies to treat various pathologies, especially in mitigating the side-effects of standard protocols. For example, low-intensity, anti-inflammatory signals were applied for cervical arthrosis, with repeatable sedative effects—whereas high-intensity signals caused states of excitement.

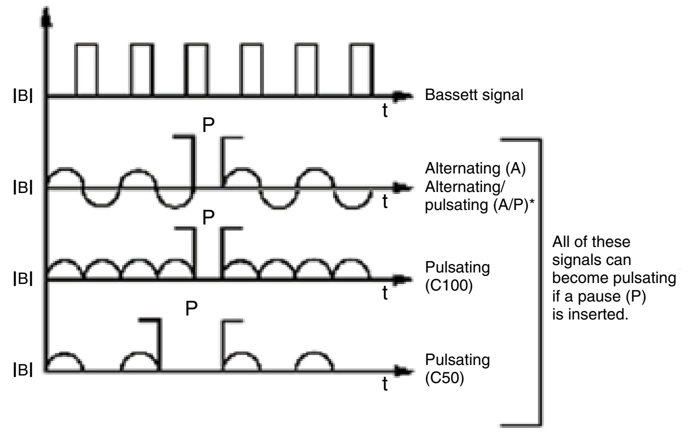
Next we wanted to tackle less localized problems, such as the spinal marrow, and therefore we studied technical systems which would deal with larger volumes. We began to use magnetic induction technologies delivering low power but over a large spatial volume, rather than just indiscriminately increasing magnetic induction intensity. This led to the best results when treating systemic pathologies, while virtually eliminating contraindications.

We recommend magneto-therapy as a primary co-adjuvant in association with standard pharmacological therapies, alerting the relevant physician that the effect of the pharmaceutical is usually enhanced (such as during chemotherapy) and should be monitored, because the patient usually becomes more capable of tolerating the therapy, and as the magnetic- or electric-field therapy takes effect, the pharmacological dosages can be gradually reduced.

Table 1
DIFFERENT FIELDS LEAD TO DIFFERENT EFFECTS

Type of Field	Intensity 5-20 gauss	Intensity 30-50 gauss	Intensity >60 gauss
A	Anti-inflammatory* Sedating	Anti-inflammatory** Encourages cellular reproduction*	Encourages cellular reproduction** Hyperemia*
A/P	Myorelaxing	Increased diuresis (kidneys)	Muscular tropism
C100	Sedating** Microangiogenesis*	Microangiogenesis**	Microangiogenesis*** Hyperemia**
C100/P	Myorelaxing		
C50		Local liquid intra-cellular mobility	Local liquid intra-cellular mobility

Notes
* Phenomenon perceptible but of low intensity
** Phenomenon clearly present but of medium intensity
*** Phenomenon dominant and of high intensity



* This signal is substituted for the signal discovered by Warnke.

Figure 1
FUNDAMENTAL SIGNALS AND THEIR PRINCIPAL BIOLOGICAL EFFECTS
The principal effects of sinusoidal or derived magneto-electric signals.

The All Body® Apparatus

The aforementioned research led us to design a new apparatus which we called "All Body," because it can treat the whole body using a method which is completely new, and which has been used successfully on the following:

- Immunosuppression
- Immunosuppression resulting from chemotherapy and radiotherapy
- Post-cancer surgery treatment in support of chemotherapy and radiotherapy
- Immunosuppression caused by HIV and full-blown AIDS
- Hepatitis and hepatopathologies
- Herpes zoster
- Fibroids
- Autoimmune diseases
- Rheumatoid arthritis
- Muscular dystrophy
- Generalized arthrosis
- Diabetes
- Diabetic ulcers
- Vitiligo and scleroderma
- Burns, wounds, and bedsores
- Fluid retention
- Renal insufficiency resulting from high doses of chemicals, cortisone, and pharmaceuticals
- Neuralgia, ischialgia, lumbago, paresis
- Age-related neurological disturbances.

The All Body® method consists of immersing the entire body in a low-intensity magneto-electric field for long periods of time, with the utmost regularity (daily treatment for at least 45 days).

The Evolution of Magneto-Therapy

In the 1970s, C.A.L. Bassett, with earlier French experiments on bone healing in mind, asked Columbia University technicians to design a machine capable of generating a current near the bone, without using needles.

The machine they designed used oppositely wound solenoids to induce a current with an average value greater than zero in the region in question; the geometric arrangement of the applied solenoids was of fundamental importance for achieving the desired effect (Figure 2).

In the second half of the 1970s, Dr. Ulrich Warnke of the University of Saarland, conducted another type of magneto-electric field experiment. The hypothesis on which he based his experiments, was that varying the potential of a cellular membrane around a normal value, even over a very narrow range, for example 100±1 mV), would facilitate and accelerate the entry and exit of polarized ions in the cell (Figure 3). To get this effect, Warnke used sinusoidal signals, which later proved to have an excellent effect in stimulating the metabolic-nutritional aspects of cell function. Thus Warnke took advantage of the pump effect—relative to a type II (paramagnetic) conductor—and of the fact that if subjected to a variable magnetic field, a polarized electrolytic membrane, unlike a copper conductor, will not take on an average potential value of 0 (of induced electric charge), but charges will accumulate on both sides of the membrane, creating a difference of potential.

The phenomenon described, in addition to its metabolic-nutritional aspects, has a significant influence on the transport of the active agent of a drug into the cells—for example, increasing the amount of a drug reaching certain regions, such as those in the brain. That is, the magnetic field acts as a catalyst for some drugs.

Between the close of the 1970s and the beginning of the 1980s, this author noted a tendency to interpret the effects of the magneto-electric field on biostructure as merely the result of electrical induction and conduction, without considering the possible effects of a magnetic force. Such an effect was ruled out, because it was said that since biological tissue did not have large amounts of ferrous material, a magnetic field could not have any effect upon them.

For this reason, the author researched the differences between the abiotic and the biotic (Table 2). Based on this classification, he identified a molecular reference model which clarified the conceptualization of micro-mechanical effects.

Consider two ions, one diamagnetic (with a weak negative magnetic susceptibility) and the other paramagnetic (with a small positive magnetic susceptibility), moving about freely in space each looking for its homologue, joining each other for an instant and forming a molecule, and then separating to once again go on searching for a homologue. In nature, these ions move freely in temperature-related Brownian motion, and it is precisely these motions which regulate exchanges.

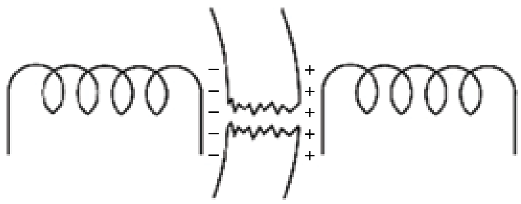


Figure 2
APPLICATION OF THE BASSETT SIGNAL
In Bassett's experiments in the 1970s, oppositely wound solenoids are used to induce a current with an average value greater than zero in the region in question. The passage of current through the fracture zone resulted in the deposit of Ca^{++} ions in the region near the negative pole.

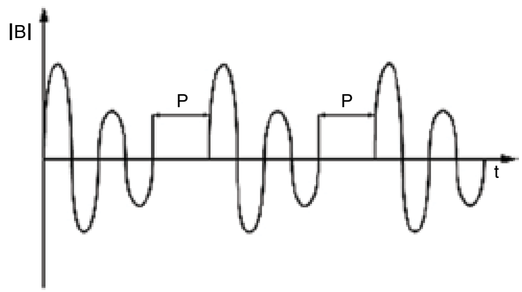


Figure 3
THE WARNKE SIGNAL
Warnke's experiments in the 1970s used sinusoidal signals, punctuated by pauses, to stimulate the metabolic-nutritional aspects of cell function. In his design, charges accumulated on both sides of the membrane.

The Brandimarte model (Figure 4) seeks to demonstrate that the presence of an external magnetic field increases the probability of an encounter between these ions, and hence acts as a physical catalyst. When a magnetic field is applied to diamagnetic or paramagnetic ions, the pre-existing field is deformed, and they are constrained to follow a trajectory coherent with

Table 2
RESPONSE OF ABIOTIC AND BIOLOGICAL SUBSTANCES TO A MAGNETIC FIELD

(μ = magnetic permeability)

Abiotic substances	Biological substances
(1) Ferromagnetic 200 <μ<400	(1) Weak paramagnetic 1 <μ< 10
(2) Paramagnetic 1 <μ<20	(2) Amorphous μ = 1
(3) Diamagnetic –1 <μ< –20	(3) Weak diamagnetic –1 <μ< –10

This classification has served as the basic premise for Brandimarte's studies of magneto-therapy.

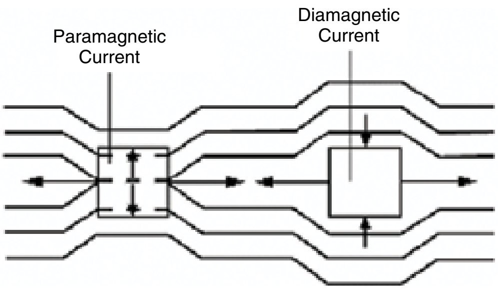


Figure 4
BRANDIMARTE'S MODEL OF FIELD EFFECTS
Motion in the direction which is coherent with the magnetic field is favored, while motion on the perpendicular axis tends to be slowed down.

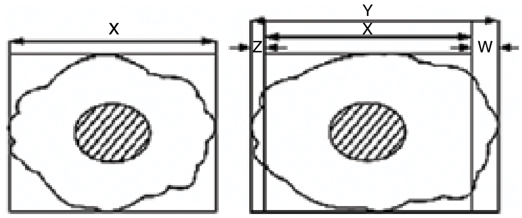


Figure 5
GROWTH OF BONE FRAGMENT AFTER EXPOSURE TO MAGNETO-ELECTRIC FIELD
Measurements are shown for the cross-section of a bone fragment in one of Bassett's experiments. X = the dimensions of the bone fragment before exposure to the magneto-electric field. Y = the dimensions after exposure to the magneto-electric field. Z = the quantity of bone accrued across from the positive pole. W = the quantity of bone accrued across from the negative pole. Bassett could not explain why bone was deposited on both poles.

the direction of the magnetic field.

This model, which takes the molecular level as its reference, is also valid on the cellular level.

If, in fact, we apply magnetic forces to the motion of molecular ions, there is an elastic change in the cell's shape, and, in particular, we observe a "lengthening" of the cell in the direction of the magnetic field. Such "lengthening" has been demonstrated using an electron scanning microscope (see "Experimental Considerations" below). The considerations introduced there make it clear that the biological effect of a magneto-electric field varies according to the type of signal used, and according to its intensity. (It is not to be forgotten that Lorentz forces need a certain intensity in order to act.)

Bassett's Experiment Using Pulsed, Rectangular Signals

It must be said, however, that within the parameters of form and intensity, the principle of superposition of effects rules. Bassett was the first to confront this principle, in the following experiment: He exposed the two ends of a fracture (*in vivo*) to a pulsed magneto-electric field, with the reasonable expectation that Ca^{++} (calcium $^{2+}$) ions would be deposited on the negative pole, and that nothing would happen at the positive pole, or perhaps erosion might occur there.

During his experiments, Bassett found that in addition to a bone deposit on the side exposed to the negative pole, there was also a bone deposit on the side exposed to the positive pole (Figure 5). At that stage, Bassett was unable to explain the why and wherefore of this second deposit, because Warnke's experiments on stimulating fibroblast reproduction had not yet taken place. In reality, since a rectangular signal (as used by Bassett) can be decomposed into its fundamental components (see section on Fourier analysis), you can see that the harmonic composition, first harmonic, third, and so on, of the said signal, constitutes a sum of the alternating signals as used by Warnke (Figure 6).

In practice, by the principle of the superposition of effects, Ca^{++} ions will be deposited as determined by the induced Bassett macro-current, which is strictly dependent upon the orientation of the plane solenoids, and by their position as seen by X-ray.

Physical Principles of Magneto-Therapy

A conductor with an electric current running through it, generates a magnetic field in the space around it. The term magnetic field is a theoretical one. When we speak of a magnetic field that is present within a physical entity, be it in air or in biological tissue, we are referring to magnetic induction, whose strength is denoted by the letter *B* rather than by *H,* which is the

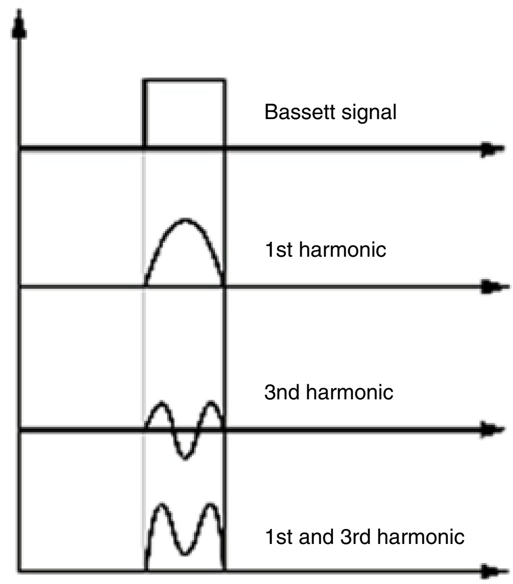


Figure 6
ANALYSIS OF A BASSETT SIGNAL IN A FOURIER SERIES
Brandimarte accounts for the deposition of bone at both poles by showing that Bassett's square wave signal, when broken down into its harmonics, consists of the sum of the alternating signals used by Warnke (Figure 3).

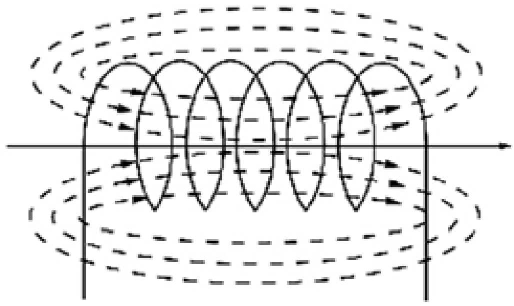


Figure 7 (a)

BELOW 10,000 Hz, THE MAGNETO-ELECTRIC FIELD CONSISTS OF CLOSED LINES OF FORCE

The current enters one end of the coil or solenoid and exits the other, creating an elongated magnetic field. Below a frequency of 10,000 Hz, the field is nonpropagating. It is a mistake to speak of Maxwellian waves and wavelength at this low frequency.

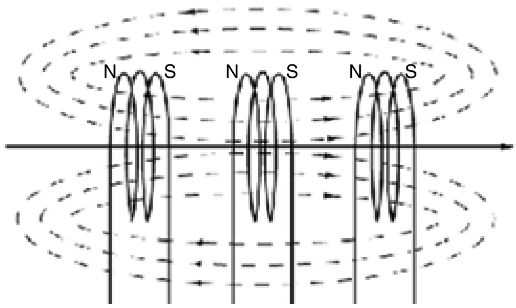


Figure 7 (b)

SCHEMATIC OF MAGNETIC FIELD IN THE ALL BODY® METHOD

The All Body® method typically used three solenoids, with the north and south poles placed end-to-end to form a single emitter in which the patient is immersed.

symbol commonly used to refer to the intensity of a magnetic field.

B is therefore a value which takes into account the medium within which the magnetic field is developed, i.e., it is a real value. If the conductor is wound into a spiral (a coil or solenoid), and if the current is conceived of as entering at one end and exiting at the other, the system of forces generated will no longer be circular, but elongated. The longer the spiral, the more elongated the shape of the magnetic field (Figure 7a).

The north and south poles are located at the ends of the solenoid, their polarity reversing when the current is reversed. If such reversals, rather than occurring only a few times per second, occur many times per second, the lines of force broaden and begin to occupy a much greater space. When the reversal frequency reaches 10,000 Hz, the lines are so spread out that they break up, energy is projected outward, and we can no longer call it a magneto-electric signal, but rather an electromagnetic signal. On this basis, we have made the following classification, where *F* is the frequency of the applied signal:

Magnetic field $F = 0$ Permanent magnet

Magneto-electric field $0 < F < 10{,}000$ Magneto-therapy

Electromagnetic field $F > 10{,}000$ Electromagnetic waves.

In electromagnetic waves, energy is propagated through space (a self-regenerating wave); that is, the field is projected, and the wave begins to travel at the velocity of light, out towards the infinite. However, it is a mistake to talk about wavelength when discussing a magneto-electric field, because the field is closed, and does not travel through space; hence the concept of velocity does not apply. It is a typical error to continue to talk about wavelength at frequencies below 10,000 Hz.

Magneto-therapy utilizes a magneto-electric field, and thus works with closed lines which pass through biological tissue without weakening (giving up energy), in fact often becoming stronger. The principle which makes magneto-therapy work is the presence of the field itself; and the only purpose of the magnetic forces is to orient the magnetic dipoles, which do not require any further consumption of energy once they are oriented, except for the energy necessary to maintain the field and the associated orientation of the dipoles. In many clinical applications, it is necessary to be specific about the area where the magnetic-electric field is to be applied, such as for example with dental or ocular implants; or alternatively, the field is applied to the whole body of the patient where the pathologies are systemic, for example, immuno-deficiency, diffuse osteoporosis, etc.

In the first case, we use solenoids consisting of flat-wound coils utilizing the outside of the emitter and the fact that the intensity of induction decreases rapidly. In the second case, such as in the All-Body® method, more than one cylindrical solenoid (typically three) is used, and the north and south poles are so arrayed that they essentially form a single emitter in which the patient is immersed. In such a case, the intensity is very low and the field is induced over a large volume (Figure 7b).

Different types of naturally occurring substances, both abiotic and biological, respond differently to magnetic fields (Table 2, p. 23).

The classification in Table 2 has served as the basic premise for our studies of magneto-therapy. Until the 1970s, it was thought that the magnetic permeability (μ) of biological tissues was so low that a magneto-electric field would have no effect. However, we discovered that biological materials do respond to a magneto-electric field, and we were able to classify biological materials as distinguished from one another depending on their sensitivity to a magnetic field at the molecular level, as described below.

Magneto-Electric Field Effects on Biological Tissue

1. Phase changes. In general, a phase change is accompanied by the phenomenon of opalescence: Bring a mixture near a magnetic field, and you will observe that it tends to become translucent. Another example: A mixture is brought near a magnetic field and begins to precipitate. Another phase change can be represented by a change in the orientation of the molecules, such as happens with some gels or ointments.

The proof that orientation is at issue here, is shown by the fact that often the active ingredients of pharmaceuticals are macromolecules whose minor and major axes are in a ratio of 1:600, or even 1:1,000. Since the substances containing the active ingredients have to pass through the cutaneous barrier which consists of dead and flat cells (arranged like the tiles in a tiled roof), it can be useful to orient the molecules in such a way as to increase the probability of their passing through the barrier. Obviously, the dimensions of one of the axes must be comparable to those of the spaces existing in the barrier.

Applying a gel increases this probability, and thus should be used in clinical practice before treatment with a magneto-electric field.

2. Lorentz forces. Lorentz forces are forces between electrical charges. Repulsive Lorentz forces can be brought into play between moving charges of the same sign inside a magnetic field. This is the principle, for example, underlying the magnetic suspension of a maglev train, where the friction is sharply reduced by the magnetic field. We can transpose this example into medicine, to the red blood cells and the capillaries. The red blood cell reaches the cells by passing through progressively smaller blood vessels, whose extremities are smaller than the red blood cell itself.

Keep in mind that blood vessel cells are elastic and create a conduit approximately 6-7 μm in diameter, while the red blood cell has a diameter of around 7-8 μm. That means that the motion of the red blood cells passing through the blood vessels to reach the cells is regulated by friction.

There are essentially three ways to increase blood flow:

(a) Increase the temperature. This can influence the flow in the large blood vessels (vasodilation), but it does not have much influence over the micro-circulation in the small vessels.

(b) Increase the oxygen demand of the cells, which results in the opening of the stomata. This principle is demonstrated, for example, by the laser.

(c) Use magnetic fields strong enough to cause the Lorentz forces to predominate, thus reducing friction in the micro-vessels and temporarily increasing blood flow.

The aforesaid three principles govern hyperemia (the increase of blood flow in the body—not to be confused with micro-angiogenesis), by acting on the velocity and quantity of blood flow.

3. Macro and micro effects of induction. The effects of electrical induction relative to a magnetic field were first studied in the 1970s. (See referenced works by Bassett and Warnke, who studied, respectively, the macro- and the micro-effects of electrical induction.) If a magnetic field, no matter how generated, is made to vary over time by electro-mechanical means, it will induce (generate) a current in an electrical conductor immersed in this variable flux, but the induced current will produce its effect in the direction opposed to that of the electrical or mechanical motion which generated it.

This law, well known to electrical engineers, but often ignored by biologists, turns out to be of fundamental importance, given that man is paramagnetic, because he is made up of water and salts. In 1960, French physicians experimented with a technique for solving bone healing problems, by inserting needles into the extremities of a fractured bone, and connecting these two needles (entirely insulated except for the point) to battery poles. The passage of current through the fracture zone resulted in the deposit of Ca^{++} ions in the region adjacent to the needle connected to the negative pole.

The function of the opposite polarities was to re-establish continuity between the two pieces of the fracture, thus re-establishing normal piezoelectricity between them. This technique, although slow and taxing, produced definite and calculable results, as the laws of electrolysis of Ca^{++} are well known.

Whatever type of signal is applied, the effect will always exhibit an alternating pattern, proportional to the percentage of the sinusoidal signal that is masked within it. The C100 effect is the only magneto-electric field that cannot be traced back directly by Fourier analysis. Being polarized, the C100 field superimposes upon the Fourier-analyzed wave an effect which is exquisitely linked to polarization—i.e., micro-angiogenesis, which is typical only of the C100 signal.

Experimental Considerations

Numerous authors have studied the effects of magnetic fields on various models of biological structures. The results obtained are various and discordant, depending strictly on the form of the wave, the intensity of the field, and the frequencies used. But other parameters, no less important, also seem to come in to play, such as the duration of the exposure to the field and the time chosen to begin applying the field to the selected experimental model. The results of exposing cells, cultivated *in vitro,* to various types of fields, can be quite diverse. Specifically, the work of R. Dixey (1982) demonstrated that pheochromocytoma (adrenal tumor) cells exposed to pulsating magnetic fields exhibited an increased secretion of noradrenalin. R.A. Luben et al. (1982) found that the exposure of osteoblasts cultivated *in vitro* to a magnetic field, blocks the parathyroid hormone's inhibiting action on the synthesis of collagen, while application of the field to the cells themselves does not block the effects of vitamin D3 on collagen synthesis.

Studies by Marinozzi et al. have shown that a continuous double wave is particularly effective in changing the morphology of the cell membrane of Hep 2 type of human skin cancer, and that the alternating sinusoidal wave is capable of increasing proliferative activity and decreasing synthetic activity in fibroblasts isolated from the bone and cultivated *in vitro*.

Studies by P. Conti et al., on human lymphocytes cultivated *in vitro,* would seem to indicate that the stimulating effect of some mitogens, which are chemicals, usually proteins, that encourage mitosis in the cell—ConA (concanavalin A), PHA (phytohaemagglutinin), PWM (pokeweed mitogen)—is strongly inhibited by exposure of the samples to a magnetic field with a square wave. There is a strict correlation between the frequencies used (1-200 Hz, 20-60 gauss), the duration of the exposure, the time when the application of the field to the sample was begun (72 hours, first 12 hours, last 48 hours, and last 6 hours), and the results obtained.

Note, however, that Conti et al.'s experimental conditions did not accurately reflect clinical reality. The best results with such cell samples can be obtained by using consecutive cycles of

Table 3
RESULTS USING ^{3}H THYMIDINE IN HUMAN LYMPHOCYTES

Experiment 1 incorporates ^{3}H Thymidine in lymphocytes stimulated and exposed to magnetic fields (cpm ± DS x 10)

Mitogen	No Field	Field
—	6.02 ± 0.75	17.3 ± 1.6
PHM	101.1 ± 6.1	192.8 ± 13.4
PWM	40.4 ± 8.8	131.5 ± 13.3
ConA	65.2 ± 6.0	145.4 ± 11.2

Experiment 2 incorporates ^{3}H Thymidine in lymphocytes stimulated and exposed to magnetic fields (cpm ± DS x 10)

Mitogen	No Field	Field
—	7.1 ± 1.3	20.3 ± 2.4
PHM	110.8 ± 11.7	204.1 ± 7.4
PWM	47.3 ± 6.4	145.3 ± 4.5
ConA	71.7 ± 8.6	153.9 ± 8.8

therapy, with an alternating sinusoidal wave, at frequencies between 50-100 Hz and 70 gauss, without overly long exposure times. These clinical results led us to study the blastogenesis of human lymphocytes exposed to an alternating sinusoidal magnetic field of 70 gauss, and 100 Hz for 1 hour/day for a number of consecutive days, trying to duplicate as closely as possible the conditions under which magnetic fields are applied in everyday medical practice.

Materials and Methods

Our investigations used human lymphocytes taken from heparinized venous blood from healthy young donors and isolated using the Ficoll-Hypaque density gradient. The cells collected were subjected to three washings in the RPMI 1640 medium, with added 2nM glutamine, FCS at 10 percent and antibiotic-antimycotics at 1 percent. The lymphocytes thus obtained were placed in micro-wells (Falcon) at a concentration of 2×10^5 cells in 0.2 ml of medium, and incubated in a humid environment, at 37°C, in the presence of CO_2 at 5 percent, with and without the addition of mitogens (PHA Difco at a concentration of 20µg/ml; with concavalin A Calbiochem at a concentration of 5 µg/ml; PWM Calbiochem diluted 1:256 with the stock solution).

Each experiment was done in quintuplicate, and the plates thus obtained were subdivided into two groups, one of which was a control, and the other was subjected to an alternating sinusoidal field, 70 gauss, 100 Hz, 1 hour per day for three consecutive days of incubation. On the fourth day, ^{3}H Thymidine was added at a concentration of 3 µCi/ml to the plate of both groups, and then after another six hours of incubation the samples were scarified (that is, slit with shallow cuts) and the radioactivity was measured with a beta counter.

Results Obtained

Table 3 shows the results of incorporating ^{3}H Thymidine in human lymphocytes, both normal lymphocytes and lymphocytes stimulated by various lectins (PHA,Con-A, PWM), when exposed to a sinusoidal alternating magnetic field for 1 hour per day for three consecutive days, compared to the figures for lymphocytes, incubated and stimulated the same way, but not subjected to any kind of field. The results show that the exposure of the lymphocytes to the field has a stimulating effect on their blastogenesis, as can be seen from the values of the samples where no lectins were added.

It is shown that the reactions of samples treated with various mitogenic agents and exposed to the field, vary depending upon the mitogen used.

In fact, the lymphocytes that were stimulated most in an absolute sense, were those which were put into the culture with the PHA, perhaps because the lectin seems to act on both of the

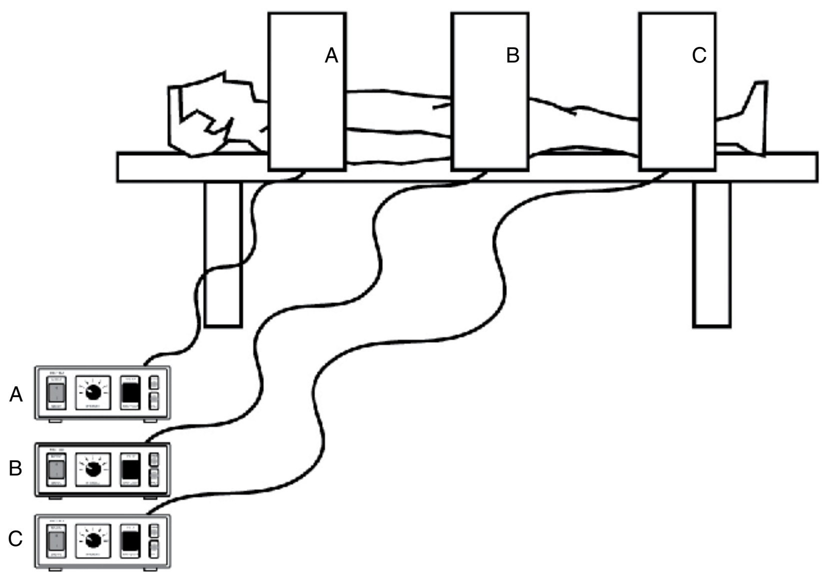


Figure 8
PLACEMENT OF THE SOLENOIDS IN THE ALL BODY® METHOD
The schematic shows the positioning of the solenoids on the plane of the bed and also relative to the patient. If the patient is being treated for problems affecting the entire body, all three generators are turned on; otherwise, one generator at a time is turned on depending upon the parameters reported.

Figure 9
RESULTS FOR TREATMENT OF DIABETIC VASCULOPATHY
The photos show the progressive healing of diabetic wounds treated with the magneto-therapy protocol, from June 28, 1984 (a), to August 30, 1984 (b), to May 2, 1985 (c). The patient was treated by Dr. Mauro Martinelli at the S. Pietro di Roma Hospital.

lymphocyte populations (B and T).

On the other hand, the samples stimulated with PWM show a greater increase of blastogenesis as a percentage, while the stimulating effect of the Con-A's is intermediate between the other two lectins.

All Body® Magneto-Therapy for the Immunosuppressed

First, we look at the general case of immunosuppression resulting from AIDS treated with chemotherapy. (The All-Body® configuration is shown in Figure 8.)

In current practice, after a patient has been tested and confirmed to be seropositive for the HIV retrovirus between two months and one year after the suspected contagion, the patient is given pharmaceutical cocktails such as AZT or others less toxic. In many cases, the choice of active principles is determined by the reaction of the patient. The purpose of administering such drugs is to slow down as much as possible the transition from the simply seropositive phase to full-blown AIDS. In a patient who already has "full-blown AIDS," the purpose of the treatment is to increase the survival period and to improve the quality of life.

In both phases the ultimate object is to stabilize the illness, causing it to return to the latent stage.

Along with the primary treatment, all available treatments are used in order to maximally limit opportunistic infections, which are often the actual cause of death.

In the case of cancer, after surgery and/or during chemotherapy, there is a significant reduction in the immune defense system of cancer patients.

It is therefore completely coherent with the general method

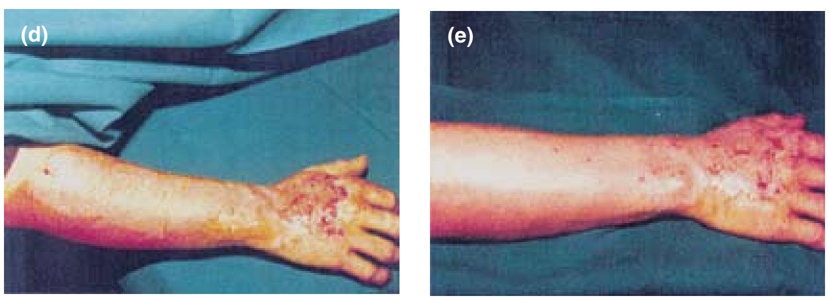
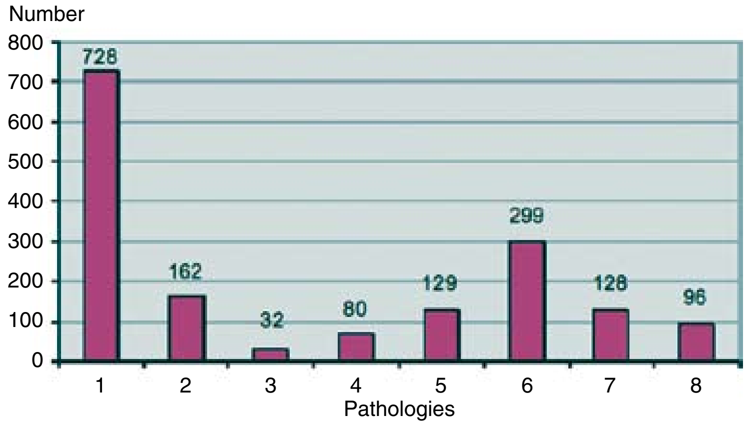


Figure 10
RESULTS WITH TREATMENT OF BURNS
Shown in this series of photos is the progressive burn healing under magneto-therapy. The patient was treated by Professor Donati at the Niguarda Hospital of Milan.

Figure 11
NUMBER OF CASES TREATED (2000-2009)



The total number of cases treated with magneto-therapy for eight different pathologies. The results for each pathology are shown in Figure 12.

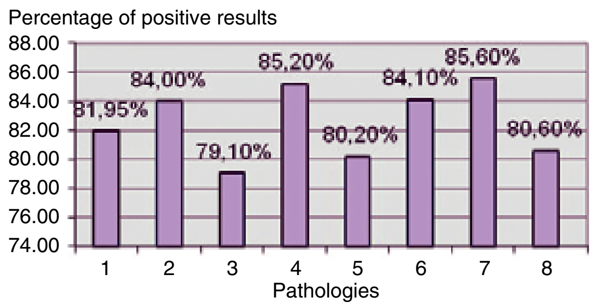
the organism afflicted with inflammatory illnesses, can be sedating or stimulating depending on the type of signal applied.

It is evident that magneto-electric fields have significant effects on opportunistic illnesses, when combined with standard treatment of the primary syndrome, as well as such co-adjuvant effects as increasing the effect of basic therapeutic drugs, strengthening the immune defenses, increasing the latency time, improving toleration to drugs, and survival time, outlined above and the principles researched in recent years, to recommend supporting pharmacological therapy with various types of magneto-electric fields (Marinozzi et al.). This would include the use of the All-Body® apparatus, specifically studied and tested, including for home use, for treating the whole patient with specific, low frequency magneto-electric fields (see tables). The fields are low intensity and practically without contraindications for even debilitated patients.

Furthermore, it has been scientifically demonstrated that magnetic fields can increase the rate of reproduction of human lymphocytes, one of the primary components of the phagocyte flora which defend the organism against infections (Marinozzi et al. DATE).

The effect of specific magneto-electric fields on the rate of cellular reproduction (fibroblasts) and on the general tone of

Figure 12
PERCENTAGE OF POSITIVE RESULTS (2000/2002-2009)



Shown are the percentage of positive results when checked 7 to 9 years later, for persons treated with magneto-therapy from 2000-2002 to 2009, for eight different pathologies identified in the text.

Hundreds of Patients

Successful application of magneto-therapy to support traditional treatment with hundreds of patients convinced us to continue such treatments methodically, in pursuit of objectives such as increasing the immune defenses, eliminating drugs remaining in the body from previous treatments, facilitating the transport of chemotherapeutic drugs across cell membranes, increasing the efficacy of chemotherapy (especially useful in the treatment of cerebral pathologies), and improving tolerance to chemotherapy treatment.

More than three years ago, a service was started at S. Camillo di Roma Pad. Marchiafava Hospital, initially run by Dr. Paola Dionette, and later by Dr. Daniella Ingletto, to treat all the afflictions requiring the All Body® apparatus. The program was run in coordination with the IATREIA S.r.l., which provided the specific apparatus and technical-scientific consultation.

Numerous patients were treated at home, in coordination with Prof. Francesco Silvestri from Modena, who gives master classes at the University of Aquila on "Physical Methods Combined with Drug Therapy."

The magneto-electric fields generated by the All Body® apparatus can be applied to many rheumatological and other illnesses requiring physical rehabilitation, as well as to pain therapy for patients with metastasized cancer, or to pathologies affecting a large portion of the body, such as diffuse osteoporosis. We have selected results obtained with groups of patients on whom All Body® low-frequency, low-intensity magneto-electric therapy was used as the primary coadjuvant.

The principal groups were patients

(1) recovering from cancer surgery, including those being treated with chemotherapy and radiotherapy

(2) with hepatitis and hepatopathologies

(3) who were seropositive, some of them with full-blown AIDS

(4) with rheumatoid arthritis

(5) with fibroids

(6) with generalized osteoporosis

(7) with autoimmune diseases

(8) with diabetes

Some of our results can be seen in Figures 9-12, and more details are available in the papers cited below.

Based on these successes, we recommend magneto-therapy as a primary co-adjuvant in association with standard pharmacological therapies.

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