

Component features and influential factors of the magnetic field therapy

A compendium for doctors and interested circles of experts

I. introduction

Despite of some thousand years tradition and millions of successful practises, the magnetic therapy has not managed to lose the alternative medical image yet. Whether it lays on Anton Messmer, who mixed up the magnetism with the hypnosis 200 years ago or was it Amadeus Mozarts ironic opera “Cosi fan tutte”, can not be clarified these days. Rather encouraged are the fast commercial successes to take it not that serious with the argumentation and not to lose the conglomeration of hundreds of fields of application on seriousness.

The electro physical magnetic field therapy is still young and had to fight with all kinds of acceptance problems. In the middle of the ‘70’s when the message heaped itself over the use of artificial magnetic fields at the Californian horse race, the magnetic field therapy experiences as a “pulsating system” in the human medicine an overdue renaissance. Then what helps horses, that do not stand under placebo errors, must also be useful in the human medicine.

What most people do not know is that the magnetic field therapy counts to an actual extremely analyzed procedure. That surprises even more, that apparently the knowledge under the therapist has not spread around yet. Even books and specialized compendiums have not managed to transfer the study treasure and to bring a necessary revision of illogical cause models. Rather in substance mistakes have copied themselves a million times over the internet and left the magnetic field therapy in the atmosphere of the alternative medicine.

Just laymen misjudge the additional danger that results from an apparently problem free disclosure via internet. After estimation of the American medical association (AMA) the people get rarely wiser through the famous mouse click. Numerous medical web sides are “incorrect, misleading, deceitful and therefore are a threat to the public health“¹. Internet contents are neither controlled nor censored. Through permanent copying and writing of mistakes and a missing plausibility inspection, it misleads the reader and gives him the incorrect impression to think that what is written must be correct. And also if the information comes from a solid scientific work, the knowledge often gets incorrectly interpreted by layman.

Frightening is the ignorance over the required achievement data. Somehow everything seems to work. The one sets on intensities of solid Mille Tesla (mT), as this corresponds to the power of the natural magnetic iron stones, the Tran cranial magnetic stimulation (through the head) with a radiation of as much as 1,5 – 2,5 Tesla^{2,3} and others swear on the field strengths of the earth magnetic field (50 μ T), with the establishment that we possess biological antenna.

1 www.ama-assn.org/

2 George M.S. NeuroReport 6, 1995, 1853

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A minority of people see a special effectiveness already in the height of Nano (nT) – or even Piko (pT)⁴ and refer to the branch of science of the so-called „stochastic resonance“. That these fields intensities differ themselves by 1 billion doesn't seem to disturb anyone.

Also the frequency adjustments are chaotically in a mess. There are some details, that only extremely low frequencies („under 200 Hz“) have a therapeutic effectiveness, on the other hand the science knows about “biological windows”, and, that they also have the same effect, if not stronger, in highly frequent areas. So the magnetic field manufactures show off with their amount of programmed single frequencies, which lay between 5 000 – 10 000 in advanced devices. And they hope accidentally to address the defined cell resonances. What appears problematically to this extent is that there are no secure data available on the cell resonance. ⁵

Through the development of the statistic to the pulsating magnetic field therapy, it has established itself, a standard that dissociates itself from the elitist mannerism of the alas so primitive origin of the static field. Due to cost saving reasons of these “modern” devices they only serve however the lower Micro –Tesla area, it concerns –strictly speaking- only a pure frequency generation. One uses therefore solely an oscillation repertoire and forgets that the static magnetic field powers (of about 1 mT) develops inherent therapeutic powers.

The existing specialty formation intentionally wants to clean up the prejudices and mistakes. For this they took results out of medical databases (Medline, Embase) and analyzed controlled relevant studies. “Controlled in that respect means in the scientific sense “ double blind, randomized and where appropriate prospective”. Also helpful were the base studies to electromagnetic fields, because they provided with their negative headlines important references to the cause model.

With the summary and estimation of the molecular and physiological effects, the magnetic field therapy can take the credit for itself to be the scientifically substantiated method.

II. basic Principals

It is necessary for the understanding of the magnetic field effect firstly to define always reoccurring concepts and respectively components features. So a magnetic fields causes field intensity, frequency and pulse form. Expressions like “biological windows”, “resonance”, “Schumann- frequencies” or “stochastic resonance” and so on need a basic clarification.

1. field intensity / flux density

The field intensity describes a magnetic field quantitative after intensity of current and direction and is measured in A/m (Ampere / meter). This doesn't however describe sufficiently the magnetic field power. In fact the material characteristics of the current flow are to be multiplied. The outcome of the magnetic field intensity is called flux density and has the unit Tesla (T).

³ Padberg F. doctors Gazette 10.09.2001

⁴ Sandyk R. Int J Neuroscience 1996, Nov; 88(1-2):75-82

⁵ Dertinger H. research centre Karlsruhe, Inst. F. Medical technology and Biophysics, 03/2002
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The material characteristics is all about the inductor length (meter) and the intensity of currents (Ampere). Together with the so called induction constants and the specific resistance of the material the flux density of the magnetic field can relatively simply be calculated.

High flux densities need consistently thicker copper inductors and therefore influence considerably the higher production costs of a magnetic field system. This was the main reason, why some manufactures in the middle of the nineties, used lighter inductors to have a cost advantage and therewith sold the maximally attainable 100 micro Tesla, marketing guidelines as the largest acquisition since invention of the magnetic field therapy. Lured through the large commercial success of these systems, the imitators and copier took over the style and set therewith an alleged standard under the easily remembered message “Magnetic field intensity in the height of the natural earth magnetic field”: To what extent this corresponds to the requirements of the optimal therapy requests, remained unchecked up to the present day and nourishes the suspicion that the success does not always correlate with the contents.

In order to make the proportion clear:

Diagnostics systems such as the magnetic resonance tomography (MRI) serve with enormous flux density between 1,5 – 3 Tesla and show therewith simultaneously that the “origin anxieties” of the magnetic fields was caused by disinformation.

1 T = 1 000 mT (Milli-Tesla)

1 mT = 1 000 μ T (Mikro-Tesla)

1 μ T = 1 000 nT (Nano-Tesla)

1 nT = 1 000 pT (Piko-Tesla)

By the way the unit Gauss is an old description. But it is still used In the Anglo Saxon area.

The conversion is : 100 μ T = 1 Gauss

The procedure of transcranial magnetic stimulation (1,5 – 2,5 T), that is used successfully by heavy depressions, which has actually only a little relation to the magnetic field therapy. Based on the high flux density, it produces a secondary electric field, that brings the brain cells to „fire“ and re-adjusting ⁶

2. frequency

with the frequency-in the figurative sense–the flux density is transported in the organism and defined as an oscillation per second. That means the higher the frequency the more energy it delivers. But not only that. The higher the frequency the harder it is to estimate the effect on the cells.

*This applies mainly for „unnatural“ frequencies in the KHz- and MHz-area,,
For example cordless phones or even for radio waves.*

A frequency is comparable with the waves of the sea, that rustle contrary at the beach. The rhythm, as often as they come, describes its frequency that lasts in this matter a few seconds. Is the wave extremely high („Amplitude“), is comparatively a lot of energy transported. The same quantity of energy can also however be reached through a rhythm or a frequency increase.

⁶ Padberg F. TMS-reasearch group of the psychiatric clinic of LMU Munich

Obviously a magnetic field and the flux density serve reverend like a vehicle, to bring generally first frequencies without „friction loss“ (electric resistance) in the organism. In contrast to the electric fields, a magnetic field permeates namely the organism almost unhindered – and without leaving any energy behind.

Loss of energy always implies that in the passage way it absorbs matter. Magnetic fields can interact however exclusively only with the magnetic matter, i.e. with ferromagnetic particle or connections. These do not occur however in biological fabric tissue of all types or only in very slight concentration. Fabric tissue remains therefore to the magnetic fields extensive “transparent”⁷.

In fact a magnetic field decreases rapidly with increasing distance – strictly speaking quadratic in the distance to the source. That does not apply in organic materials. It is actually all about an acceleration of ions and/or electrolytes in the magnetic field effect, high electrolyte volumes reinforce the “electric current”, that means also that a magnetic field in the chest and stomach area have a stronger effect as for example on the wrists or ankles although the intensity of magnetic field waves source remains identical. Therefore theoretically speaking - to see it in the eye of a therapist – a mouse has a higher flux density than an elephant.

In the current pulsating magnetic field therapy devices, it is all about pure Frequency applicators, that can carry an extremely low flux density (μT) without losing its pulsation in the organism. Therefore one should not speak in most devices of a magnetic field therapy but only from a frequency therapy.

The actual magnetic field power has the inspired and justified question whether a frequency therapy alone does not produce a far better therapy result and a magnetic field effect.

3. impulse form

To most of us it is the typical form of frequency – namely the sinus wave – well known from our schooldays. A sinus wave is however not God-given, but can also appear – through variations of the electric impulse – in a totally different form. The form of the magnet impulse is however decisively for the effectiveness of the signal. Lets take an example of a sea wave: A consistent round sinus wave has rather the tendency to ebb away, without subsiding special power, while an almost vertically standing wave can transmit the full energy and possesses therewith a "surprise effect". Then rectangle impulses possess for example a promotion phase and a relegation phase with the result of powerful power transmission. Furthermore it offers – just as sinus waves do – the quality to use the phenomenon of the harmonic vibration.

Harmonic vibrations are frequencies, that develop in multiple of the basic oscillation, similar to the harmonics of the music. While the basic oscillation of an instrument, for example produces a tone, the harmonics determine the timbre. The first harmonic vibration corresponds for example the double fundamental frequency, the second harmonic vibration the triple fundamental frequency and so on.

For example rectangle impulses produce with a basic oscillation of 1 Hz simultaneously also a harmonic vibration of 3,5 and 7 Hz and so on

⁷ Hermann Dertinger, research centre Karlsruhe, Email from 02.03.2004

⁸ Ulrich Warnke, Der Mensch und die 3. Kraft, Popular Academic Verlag Saarbrücken, S. 25

⁹ Siehe Fourieranalyse

Also harmonic vibrations cause at least, till the 2. harmonic vibration as much power as its mother oscillation and generate therewith a two to three times frequency multiplication

Thanks to the possibility, to multiply frequencies through harmonic waves, the thought suggests itself upon naturally of using this strategically. If therapeutic effective frequencies are not yet completely scientifically investigated and therefore are not programmable, it is indiscriminate to use some thousand of these frequencies in the hope that "by chance" a frequency arises, that pleases the organism.

Unfortunately it is so that triangle impulses and right impulses exclusively produce only uneven harmonic waves. One reaches additionally even harmonic waves through the so called „saw tooth oscillator ” which is today throughout the land and also the most modern and effective impulse shape.

The History to the saw tooth oscillator is however more unspectacular than one thinks. As „expression of all livings“ the exponential function curve already stood at the beginning in the eye of the equipment developers. Attempts to do their programming became however more difficult than expected. Since only low-power condensers were available, which had to be loaded and short circuit, it came to discharge of rather stair-like formations, which one describes creatively as saw tooth. Experiments at the research centre in Karlsruhe had resulted, that only the parabolic garland (Integral of the saw tooth) is able to appear in the fabric (and not only in the controller). A garland resembles thereby in its silhouette a rope, which arches downward on two laundry clips.

Saw tooth oscillators, which possess a parabolic garland shape, make also a double harmonic wave around the additional even-numbered range.

4. Resonance

Resonance is a principle, to exactly use this oscillation, with which a somatic cell or the total organism swings independently. If this succeeds to some extent - one spreads in such a way - then it strengthens their basic frequency. However who believes now, this can lie in the therapeutic sense of our organism, is mistaken enormously. To that effect on interpretations displace, that this reinforcement holds finally the danger of possible destruction.

The force of a periodic resonance can be described impressively by the example of a bridge, over which a company of soldiers marches in ramming rhythm. If this rhythm corresponds to the natural oscillation of the bridge, then it will simply collapse.

The resonance term is a prime example for the unchecked assumption of one Mental image, which causes similar in content rather nonsense. Resonance is described as a Phenomenon, that in the hormone effect or the pharmacology plays an outstanding role.

¹⁰ Bronstein, Semendiajew: paperback of mathematics 2001, Verlag Harri Deutsch

¹¹ Eduard David, Reißerweber J, Wojtysiak A., University Witten-Herdecke, discussion of 20.03.02

¹² Jürgen Waldmann, Chemnitz, discussion of 07.03.02

¹³ E.G. Fischer, Weiterstadt, discussion of März 2005

¹⁴ Hermann Dertinger, research centre Karlsruhe, discussion notes of 03 - 06/2002

It is meant that the receptor theory, which points out, that chemical messengers, but obviously also frequencies, only then unfold their perfect effect „all or nothing“, if the signal receiver (receptor) correlates at a somatic cell. With receptors it concerns protein complexes on a cell. If materials (e.g. hormones) or oscillations fit like a key in a lock, then they wake up and send a message to the inside of the cell.

In order to find resonances and harmonious frequencies, of magnetic field inventors „tones of the cosmic Octave“ and „the platonically sphere sounds“ were already endeavoured. There is „a biological“ matrix rhythm more comprehensible, vibrating with the muscles (7–13Hz) 15, frequencies of the Russian V Nazarov (18 - 36 Hz) 16, Dertingers modulating frequencies for cAMP (50 and 100 Hz) 17 or high frequencies of the American diapulse therapy (27.12 MHz) 18. Altogether the study-moderate proofs remain rare, so that individual investigation from Austria is to be rated as a highlight.

Notes for the superiority of extreme low frequencies: Sleeping disorder 4 Hz, meteor sensitivity 10 Hz, *rotator-cuff-tear* 15 Hz, spinal column syndrome 19.5 Hz.

A few years ago some popular-scientific investigations were surprisingly made about the purring of the cat. Purring of the cats are not just simply an expression of comforting satisfaction, rather healing accelerator, if she is injured. According to the opinion of an American animal research institute show that e.g. vibrations between 20 to 50 Hz is a higher bone density, a faster bone growth or a shorter healing duration by injuries.

The dominant factor frequency by domestic cats is between 23 - 30 Hz, with Ocelots, Pumas or cheetahs 25 - 50 Hz and/or rises up to 140 Hz. In the magnetic field literature so strongly disparaged the 50 Hz frequency even represent by cats a harmonically oscillation, which proves again, what is to be held of estimates of some magnetic field Popes.

To what extent purely mechanical oscillations 1: 1 are transferred to a magnetic field frequency, remains undecided. In any case there is proof that purring cats alleviate also with humans pains as well as lowers blood pressure, heart frequency and also the cardiac infarct risk

5. Stochastic resonance

Realizations from the stochastic (probability calculation) have made the search after ideal intensities and frequencies substantially simple. Background for this assistance is that so-called „biological hissing“, which is inherent in each organism. If the innumerable metabolic procedures or if whirr signalling and information in our body make themselves audible, that would sound like that „hissing noise“ in the radio, if one is on the station search between two transmitters.

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15 Jäger A, Inaugural-Dissertation, Uni Hannover 2005

16 Thomas Klyszcz, Gernot Rassner, Springer Berlin, Vol 48, Number 5, Mai 1997

17 Sontag W, Dertinger H. Bioelectromagnetics. 1998;19(8):452-8.

18 Badea MA, Comorosan S, Rom J Physiol Jan;30(1-2):65-71

19 Fischer G, Kokoschinegg P, Barovic J. – not published -

20 Fauna Communications Research Institute (Hrsg.): *The Felid Purr: A bio-mechanical healing mechanism*. 2001, North Carolina, USA

21 Rouiller E, de Ribaupierre F, Exp Brain Res 1982;48(3):323-6

22 Leo Brunenberg, FU Berlin, Klinik for small domestic animals, 2002.

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Hissing is a non directional energy with the consequence, whose „support “ exponentiates an external weak signal. The phenomenon is easily compared with a marble in a egg carton: If the marble is carefully swung by reciprocating energy, then it knows it can not overcome the threshold to the neighbouring hollow. If this movement is overlaid however by additional shaking, then the marble can sometimes - with a coincidental „Kick “- elevate over the threshold. Or another example: We want to make audible a minimum Speech sound with an acoustic amplifier, so this will usually fail. If we however feed additional environment noise into the amplifier, then an understandable language output is to be expected. That means the energy of the environment noise strengthens the minimum speech energy.

Transferred on the magnetic field therapy this means that weak magnetic field impulses can change and be strengthened by body's own biological noise. Therefore is to understand under “weak” a range between pT - about 5 mT. Higher flux densities, which lie above the intensity of the biological noise, do not profit any longer of the body's-own energy convolute. In the consequence thereby not only becomes an intensity reinforcement, but also a frequency multiplication, which come to meet the aforementioned intention to the frequency multiplication.

6. Biological window

Hereunder are to be understood an intensity and a frequency range, for that the fabric is particularly accessible. This corresponds - as at point 4. resonance implemented – actually appoints to certain cell receptors, which can react only to defined frequencies. In the consequence lays this “resonance effect“ in a meaningful reinforcement or deblocking of natural signals, those are indispensable for metabolic processes, blood circulation, cell regenerations, Energy production or immune defence etc. The name „of the biological window “comes from the California neurologist William Ross Adey. He could demonstrate on the calcium out stream of rabbit brain cells that this effect releases only with certain magnetic field intensities and a frequency of 16 Hz.

Decided frequency spectra of a biological window are usually unknown. In fact there exists a multiplicity of empirical values, these are however far to be scientifically appreciative and/or cover the entire dimension of possible variances. However Magnetic field manufacturers did not have to resign. Because obviously our organism is not content to hold itself ready for a certain effect on a single biological window. Rather whole batteries exist on „access windows “- even within the high frequency range.

The reason for this lies in our history of the development: Life developed in an extremely hostile environment. Sun turbulences, ionizing rays, the absence of a protecting ozone layer and the periodic omission of a protecting earth's magnetic field leaves it almost appear a miracle that life took at all this development.

²³ Hänggi P., Chemphyschem 2002, 3, 285-290

²⁴ Hänggi P. phsically pages 57 (2001) Nr. 1

²⁵ Adey WR, Neurological Research 4, 115-153, 1982

²⁶ Adey WR, Bawin SM, Proc Natl Acad Sci USA 1976 June; 73(6):1999-2003

On the other hand there are clear references (see chapter Zero field) that organisms activated themselves for its energy production, hormone production and metabolic procedures certain external signals, in order to remain in the savings mode. The Smithsonian institutes estimates, Washington that e.g. insects refer a majority of their energy from the earth's magnetic field. For this purpose they embossed receptors for favourable „rays “and tried to shield themselves against all hostile rays. In the course of millions of years thereby were formed the most different receptors, all with the goal of increasing the probability for an important signal reception.

If organisms exist of a multiplicity of frequency windows, magnetic field equipment must have just evenly as high a number of frequency offers as possible, which find then purely „coincidentally “an aditus.

7. Schumann waves

Global seen, a continuous thunderstorm prevails on the globe. Any lightning in the Tropics is passed „frequency-moderately “into speed of light and also into our degrees of latitude.

Beginning of the 50's placed the physicist W.O. Schumannfest, that those Earth's surface and the upper atmosphere layer (ionosphere) form a ball condenser. One hundred lightning's, which occur somewhere in the world each second and the so-called Spherics, reflect thereby in a basic frequency of 7,83 Hz. The earth seems obviously capable of resonance for this frequency, i.e. such waves prove as extraordinarily stabile. As in each oscillation, harmonic waves develop itself, right up to the kHz range.

Resulting from its inaudible oscillations (7.83/13.8/19.7 Hz etc.) it seems to be essential for our body. Weakening of these natural waves, as they result daily and seasonally, have an affecting block out to our organism. Due to static references, one assumes, that frequency fluctuations lead to increased accidents, cardiac infarcts, Thrombosis and altogether for a compression of the death rate. The integration of Schumann frequencies appear therefore a logical consequence into a magnetic field system.

8. Static/pulsating magnetic field

Static magnetic field

A magnet has the characteristic to adduct iron. Its poles are the places with particularly large energy. The magnetic field is the area itself, in which magnetic forces are effective. The Magnetic energy –or flux lines are thereby „fictitious“ lines, which describe the direction of the magnetic energy. With solenoid coils one amplifies e.g. a magnetic flux density increase, if one amplifies the number of turns.

A bar magnet e.g. forms a typically static field. Static fields are able to affect „moved loads “like e.g. blood ions, specially and intracellular ions in motion etc. Even transfers on the cell membrane are possible, if those Flux density are very high. One calls this induction.

Pulsating magnetic field

Pulsating magnetic fields result simply from rhythmic switching on and off the electricity.

Pulsating magnetic fields affect with it also „resting loads “.

²⁷ Schumann WO, gazette for environmental research 7a, 149-154 (1954)

²⁸ Koenig HL 1962, gazette for applied spa-climate medicine 9, 481-501

²⁹ Beck R, Nexus Magazine 1992, ½

More than efficient are for an induction substantially smaller intensities (flow densities) than with a purely static field. The ionic transfer in the body is actually nothing different than electric currency. As long as ionic move into the cell or from the cell, they are powering through a static field. If they don't move for a short instant, then it creates only a pulsating field to move them. This is also the reason, why medieval healer moved the magnet iron stone back and forth the magnet quite fast across the bodies of their patients.

One of the largest mistakes in the magnetic field therapy is the early splitting into the two competing „religious communities“ of the static and pulsating supporters. Purely static magnetic fields can be manufactured reasonably prized thanks to the missing technique and electronics requirements and found beside mats also as dubiously seeming bracelets or shoe inserts a successful niche in the treatment of sleep disturbances and Pains.

Manufacturers of pulsating fields set instead on a various frequency spectrum and varying impulse curves and those sacrificed allegedly, it is no longer so important for field strength of necessary rear-Tech on the extension of the application type. Static fields became outdated in their elitist primitively eyes, and therapeutically doubtful and let them displace that the entire magnetic field therapy descends finally from static fields. If in the plastic surgery Munich of the clinical centre on the right of the Isar, admires with simple magnets an outstanding scar result, then it should be valued, to look over that Potential static fields again.

Also to the therapy with static fields there is a study situation, which does not need to shrink from the comparison to the pulsating magnetic field therapy. In that more recent time rises the interest in static fields and shows effects how Bone healing, cicatrisation, blood circulation increase or pain treatment from the traditional pulsating range. Static magnetic field with a field strength of 50 mT helps to clear pain reduction of muscle and fascias pain.

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30 P. Kokoschinegg, over the effect of statistic, magnetic field on humans, Dtsch.

Zschr. Akup. 6: 135-141 (1984)

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37 Qiu LH, Zhong M, Tang XN, Wang ZY, Shanghai Kou Qiang Yi Xue. 2007 Feb;16(1):33-5

38 Chater S, Abdelmelek H, Rhouma KB, Electromagn Biol Med. 2006;25(3):135-44

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42 Sándor K, Helyes Z, László J, Life Sci. 2007 Jun 20;81(2):97-102.

43 László J, Reiczigel J, Gyires K, Bioelectromagnetics. 2007 Dec;28(8):615-27

44 Worthington WB, McCullough BA, McLean MJ, Pediatr Neurol. 2000 Sep;23(3):261-4

45 Carlos Vallbona, MD, Carlton F, Response of Pain to Static Magnetic Fields in Postpolio Patients: A Double-Blind Pilot Study, Archives of Physical Medicine and Rehabilitation Baylor University, College of

Medicine Houston, Texas

46 Brantley M, 26. anniversary of the bioelectromagnetics Society, Hawaii 2003, BEMS 3/2004

With the magnetic field it concerns actually not either - nor, but a clear combination of both directions through simple increase of the field strengths and/or Flux densities. Unfortunately this insight did not arrive with the majority of the magnetic field manufacturers yet and prevented with it a still clearer therapeutic and concomitantly commercial success.

9. Earth's magnetic field/Zero field

All organisms are affected by the natural magnetic field of the earth. This results in approximately 2,900 km depth and according to the principle of an exciting direct current generator of the movements of the liquid is formed outside the earth core.

We can regard the earth as an enormous magnet, which forces the compass needles in the whole world to align itself after its lines of magnetic flux. Both magnetic poles north and south carry out an energy on each other. This is with increasing distance explained more weakly and, why the field strength amounts to the Poles about 70 μT , at the equator about 35 μT and in our widths about 50 μT .

If the earth's magnetic field added up to a proud 200 μT some hundred thousand of years ago, then it offers today just about scarcely 50 μT . 2,000 years ago the field strength lay roughly around 100 μT . This is a non overlooking reference and a fact that it in the next 500 - 2,000 years comes to a natural pole reversal again.

In geologic history a pole reversal takes place on the average every 200,000 - 500,000 years. The last pole reversal was nevertheless 780,000 years ago, lasted 5,000 years and prophesies a one long due repetition.

Like already explained in the chapter „biological window“, animals seem to use the natural magnetic fields of the earth. Strengthens we this realization by results to the Zero field research.

A Zero field is an area, which becomes shielded as far as possible from natural or artificial sources of magnetic field by means of a nickel iron alloy (Mu-metal).

Studies for the effect of a stay in a magnetic field-free area brought realizations, which would have to actually shake at the foundations of our physiological conception of the world. It is the more incomprehensible that they never found entrance into the medical text books.

After a four-month stay in the Zero field attempt mice aged rapidly (in Contrast to the control group). It showed pathological changes in the liver, the leukocytes, kidney and blister as well as a increased Tumour formation. The fur became shaggy, the mice lay apathetically on the back and the sex impulse reduced rapidly. Altogether their Number of deaths increased.

⁴⁷ Gubbins D, Geo research- centre Potsdam, Hauptvortrag Leibniz-Kolleg 11/99

⁴⁸ Halpern M, 1967, Biomagnetics: Considerations Relevant to Manned Space Flight Washington D.C; National Aeronautics and Space Administration (Contractor Report CR-889)

Human test candidates, who for precaution reasons are only allowed to stay in the Zero field for a few weeks, within this short time, those Cilium fusion frequency sank to only 8 pictures per second 49 – contrary 14 frames, those are normal and a reliable yardstick for the processing ability from external attractions.

Also regarding a direct pain influence, the Zero field supplied surprising results. Animals and humans have by nature a body-own Opiate system. Opiate are substances with euphoriant and strong pain killing characteristics. Their most important representatives are Morphine and heroin. In the pain or in emotional or psychological stress situations, a large quantities of these Endorphins are produced. This is the only logical explanation. e.g., why humans in accidents – despite heaviest injuries - often feel no pain:

In animal experiments were mice, which were in a Zero field over longer period of time, not able to bear the pain impulse of middle strength during the influence on normal magnetic field conditions of the earth.

On the other hand flux densities of only 0.5 μ T, raise up the apperception – barrier for pain, that means it only had a minimum (normal) pain feeling.

The important conclusion hence: The earth's magnetic field is obviously the exclusive Initiator for the production of Endorphins. The harmoniousness of this model has been proved through the Opiate remedy Naloxone, that can neutralize pain reductions with one Magnetic field.

Thus, it is not surprising that the American NASA and the Russian space agency equip their space suits and also ISS with earth similar magnetic fields. That a missing and/or a reduced earth's magnetic field being responsible for a multiplicity ailment of civilization, caused the Japanese hospital boss Nakagawa to conduct an extensive observation study on over 11,000 study participants.

He came to the conclusion that a large part of the western population suffered on Magnetic field-deficiency-syndrome (MMS), which is as a result of the weakening of the Earth's natural magnetic field. A MMS expresses itself among other things in chronic tiredness (CFS), insomnia, back and headaches as well as energy deficiency. To what extent this corresponds to the criteria of scientific study observation, must however, be doubted.

In a general survey, to what extent the acceptance of the earth's magnetic field Influence the organisms, should remind us again of our development history. This can be proved quite easily.

While for example bacteria reduplicate itself every half hours and get quickly used to the hostile conditions, after an antibiotic attack („resistance development“), the adjustment mechanisms runs substantially more slowly with humans.

49 Warnke U, Der Mensch und die 3. Kraft, Popular Academic Verlagsgesellschaft, S. 136

50 Choleric E, Del Sepia: Proc R Soc Lond B Biol Sci 2002 Jan 22;269(1487):193-201

51 Stewart L, Persinger M Int J Neurosci 2000; 100 (1-4):91-8

52 Prato FS, Carson JJ, Ossenkopp KP, Kavaliers M 1995 Jun; 9(9); 807-14

53 Thomas A et al, Neurosci Lett 1997 Jan 31; 222 (2):107-10

54 Kyoichi Nakagawa, M. Isuzu Hospital Tokyo, Japan. Japan Medical Journal No. 2745 December 4th, 1976

55 Worm N. Deutsche Zeitschrift für Sportmedizin, Jhrg. 52, Nr. 4 (2001)

One assumes that in every 100 years only 5 human races are developed, the humans genes had only the 5000 times the possibility to adapt to the changing conditions in the last 100.000 years

(e.g. conversion of the fat/meat food to grain). These 5 000 times, bacteria already reach at most after one quarter of a year.

The human genes had therefore no time to offer the gradual dropping of the earth's magnetic field to defy by adaptation. If metabolic procedures require Power production or the hormone production of the booster detonation of a magnetic field intensity of e.g. at least 100 μT then it becomes understandable, why a part of the civilization company has considerable trouble, to keep upright its physiology within all ranges. Compensation mechanisms like a hardening of the musculature, Energy weakness, tension headaches or an up-whipped Vegetative (Insomnia) alone, cannot be proven nor can it be seen as a fantasy.

Why Magnetic field-deficiency-syndrome is to meet only civilization people, may be surprising at first. One should focus on that sluggish adaptation possibilities not only refer on magnetic field attractions or Nutrition, but also to the value of movement impulses. There are computations, that the civilization person is having only 5 % of the Movement expenditure of a Stone Age person operating now. Humans of the third World, who live in miserably poor conditions, however have more intensive body activities, are subject with the acceptance of the earth's magnetic field only one part of the genetically caused failure potential.

Therefore, it is also a fallacy, from the acceptance of the earth's magnetic field to make a simple subtraction calculation. Genetically optimal 200 μT and/or bearable 100 μT are contrary to existing 50 μT not reliably to adjust by a balance of 50 - 150 μT . The earth's magnetic field is by static nature, developed however by one simple "local change" a natural pulsation, - depending upon mobility and physical movement urge – whose intensity multiplies by height.

10. Homogeneity

As some years ago a magnetic field trade surprises its partners with the novelty of "homogeneous" magnetic field, seems to start a new era of Austrian and German engineering art. Then it defines finally a certain logic that those Homogeneity of this new mat was better as the in-homogeneity isolated lying inductor.

The Applicators of a magnetic field system are like, a snail inductor, let in a Magnetic field mat. Through different inductor sizes, of which localization and itself resulting the gaps, can a magnetic field distribute, spread itself only unevenly (in homogenously). So it was obvious, to create by simple rolling the wire a solely toroidal coil, which rectangle and evenly lead up to the centre of the mat.

However the developers had not realized that a magnetic field works not by SE, but exclusively by the eddy (ion river), which induces it in the fabric. Those electrical current density run thereby always circularly around the lines of flux of a homogeneous Magnetic field. One must take notice that the current density in a ring or cylinder inductor is used, like for the production of a homogeneous magnetic field, which amounts to zero in the centre and linear rises with the distance of the inductor centre. That is, one always receives an inhomogeneous electrical field to a homogeneous magnetic field. The exact opposite was reached, what one wanted to actually to cause in the first place.

The homogeneous magnetic field develops an extremely inhomogeneous electrical field, that has no current density in the middle of the centre – however increase on the edge.

It is like this, the current density rises with the electrical conductivity of the Medium i.e. the greater the liquid content of a medium is, the stronger its current density grows. Like already under chapter frequency implemented, if the body trunk possesses a larger liquid volume e.g. the arms or legs, so that one would need less current density. Only - the bones of the body trunk e.g. the spinal column or the pelvis do not profit from this physiological condition. Those missing central current density of a homogeneous magnetic field does not absorb under any circumstances higher conductivity in the corpus.

These admittedly somewhat theoretical remarks, that however are fully confirmed by the research centre Karlsruhe, have themselves confirmed in the meantime by those disappointing experiences of users of homogeneous magnetic fields.

11. Pulsing

To the important work of magnetic field manufacturers belongs also the programming of Frequencies.

It is however not at all necessarily to actually fix each individual frequency, it is sufficient, by a "pulsing" at the same time and equivalently to develop a number of further frequencies.

Assumed, the basic frequency is adjusted to 200 Hz, which in this case corresponds to a pulse time of 5 ms. Accepted, the basic frequency is adjusted to 200 Hz, which in this case corresponds to a pulse time of 5 ms. If now 5 of these impulses bundled ($5 \times 5 \text{ ms} = 25 \text{ ms}$), then from it develops a simultaneous frequency of 40 Hz ($1,000: 25$). One switches then a break from e.g. 15 ms, before a new bundle begins, then a frequency reaches of 25 Hz ($25 + 15 = 40$ and $1,000: 40 = 25$). In the result we obtain in only one partial procedure the frequencies 25, 40 and 200 Hz. On this example, it becomes evident that with a multiple pulsing almost any desired repeating frequency is programmable.

Pulsing is thereby a popular procedure, the approach the goal of high number frequencies. Then the higher the frequency number, the higher is the Probability to open coincidentally a biological window.

III. The optimal magnetic field

An optimal magnetic field therapy system would create itself problem-free over the above fundamentals. Based on it, the past magnetic field scene takes out itself rather modest:

a. Intensity

It borders on shrewdness, the flux density of a magnetic field in the low μT and to down-regulate even nT range (does not lie over the natural environment noise). One leaves themselves by the reduced requirement of technology and substances to save an amount of expenses, which was the whole mainspring. But thereby inevitably minimizes the actual magnetic field energy. With the argumentation, both Study situation and hundred thousands of success reports would prove the effectiveness of extremely low flux densities, are forgotten that the effectiveness of such devices actually result of their frequencies.

Only in second line, one can take for itself in requirement, by means of "stochastic resonance" coincidentally to generate considerable magnetic field intensity, that they earn to some extent their name "magnetic field therapy". It opposes that "stochastic resonance" is not common under most manufacturers and/or served as basis for the respective system development.

b. Pulse envelope/frequency swing

The explanations seem themselves just as strangely to the selected pulse shapes. If manufacturers decide already in addition, to favour a rectangle form, a saw tooth or one system creation, should be also be clear to them, why.

To obtain Positive statements with the highest possible effect or that it itself thereby over the optimum biological signals, are nothing as wishful thinking and only examines from the basic conditions.

In principle: If the frequency is to some extent secured for reaching a certain effect, then the simple however quite effective simplicity of a sine wave is sufficient. Concerning this however uncertainty exists- which is rather the rule than the exception - then a pulse shape is to be selected, which obtains a number of frequencies as high as possible. In order to meet it coincidentally one of the hundreds of unknown biological windows and therefore to energize a receptor.

In principle this (to limited extent) is always reached by a frequency bundling, into a higher extent however by harmonic waves, which well-known-prove at least into the second power of this harmonic just as strong as the origin wave works. This is set however a consciousness for the different production of even or odd-numbers harmonic waves ahead, which became to omit obviously so far. If a manufacturer struggled through itself in the case of ideal to the saw tooth impulse, then the flat aftertaste remains to avail itself of an exponential accidental e-function curve. This, whether their later special superiority, over touched itself the radiating winner garb, as the condensers failed at that time.

Also the pitfalls of a strategic pulse shape construction are exactly hidden here. If the Institute for biophysics of the research centre Karlsruhe states lapidary that only the integral of a saw tooth, also its application in the organism (and not only in the Controller) guarantees, then it is useless, when the high engineer art in one creative silhouette formation of a saw tooth sheet is affected, because integral remains now mathematically an integral.

A magnetic field system is commercially successful on the market and it seems to be overcoming the stage of a normal saw tooth curve. It presents a self-creation, which reminds to the prehistoric wish of a desired exponential function and for safety's sake still integrates one immense number of saw tooth-like points/teeth. According to the principle, much is always better than those pure singularity and/or " tautologies " is better than one.

Now it is unfortunately like that in nature, that it improves itself universal of an exponential function curve by the additional advantages of another phenomenon (saw tooth), but destroyed simply the principle. Saw tooth curves serve – disillusioning it is- an instrument of elegant optimization of harmonic waves. While e-function curves represent the principle of the living and are generated with difficulty and even more difficult to exhibit. In the current stage of the development nothing passes on a "parabolic garland" unless one goes without a "garland", as one trusts on the potential of the e-function and its preference by our receptors.

C Homogeneity

The understandable obligation to stand out against the competition has relatively fast discovered Homogeneity for itself. Homogeneity sounds so reassuring balanced and forwards everything consider in relation to the unilateral nature and the deficit resulting from it past systems. Physical principles of electromagnetism are however now cruelly and not only of non-professionals heavily inserted into the wealth of experience of past experiences. If a homogeneous magnetic field produces a very inhomogeneous electrical Field and magnetic fields concerning their magnetic strength (outside of that Frequency strategy) only by producing "ion and/or electrical current flow", works, then it is naturally foolish, to celebrate its homogeneous magnetic field system as that break-through in magnetic field history.

D Adaptation

A further innovation, which applies to evaluate it, are the so-called adjusting Magnetic field systems. They are based on realizations to the autonomous nervous system, that under its ability to respond can give an important note for the change necessity more adjusted Equipment parameter. It is obvious, to use the knowledge of the so called Biofeedback and to combine with magnetic field therapy equipment.

With the biofeedback, it concerns a procedure, that brings autonomous i.e. vegetative steered bodily functions such as heart impact, blood pressure or respiration in consciousness. One reaches this, by one e.g. the current tensile state of the musculature or the blood pressure via electrode derivative make visible on a screen. In this therapeutic consequence, then one tries, with an exemplary Hypertonic, to let the blood pressure over purposeful "trying out" more exciting and/or reassuring thoughts rise and/or sink. Drops, now through favourable thoughts and imagination, the blood pressure levels, then this has a lot to commend, to keep this self suggestion and/or use again in high pressure crises. A total goal of the biofeedback method is, to make stress reactions of the body conscious and correct deliberately.

So plausibly and logically, the installation of a biofeedback device sounds, so difficult and complex it gets in reality. The task would actually have to be, to measure the different vegetative parameters at the beginning of the magnetic field treatment and to bring their therapeutically caused reaction each minute by further measurements and readjusting the equipment attitudes toward "vegetative relaxation". Unfortunately, one is miles away from this target. Bio feedback devices cost a lot more than a magnetic field therapy equipment and additionally necessities Technology for readjusting the adjusting parameters of the magnetic field and leave any relevant venture to a priceless disaster. Nevertheless there is a well-known magnetic field selling, that proudly refers on the equipment feature of its adjusting magnetic field via Biofeedback. That it is here all about an actual Marketing gag, is clearer when you look closer: It has only a finger sensor ("finger tie-clip"), that uses the pulse, but not the technology of the finger sensor, to measure at the same time the arterial oxygen content. Thus exists as "bio feedback parameter" only the heart impact (pulse), which is completely insufficiently.

Assume the business proves correctly that can adjust with a magnetic field, the vegetative operational sequence in the sense of a sympathicolysis (stress reduction). The problem only begins exactly here. Begins a Sympathicolysis to draw with application(which appears valid on measurement of only one Biofeedback parameter), then it would be logical, to maintain those so far used frequency and flux density.

Now it seems to be, by the mentioned manufacturer, that by programmatically dropping the pulse, the intensity/ frequency changes simultaneously. This appears unreasonable and counter productive.

Compared to the above example: If a degradation of the heart frequency can be reached by visualization of a low-green meadow, then probably everything suggests to maintain these „low-green “thoughts. It would be paradox, despite of the success, to think about a grey meadow.

A self adjusting adaptation mechanism might remain still another dream in the future.

e. Polarity

The magnetic field literature describes effects again and again, that it comes off the different Polarity of a magnetic flow. So a north adjustment attaches more „positive “,and a south adjustment more „negative “forces. One supports oneself thereby on the scientists Davis and Rawls (around 1930), who missed it however, to submit study-moderate proof. Also other studies are not to be elicit.

The University of bipolarity might be playing a role in the effectiveness of a magnetic field.

This can be described best on the basis of an impulse curve, which reciprocates around a zero point. If the amplitude is only in the positive (or negative) range, then one speaks of a unipolarity. If the amplitude moves from negative into positive and vice versa, then it is bipolar.

The fact is in any case, that by unipolar pulsing only a nerve provoking (sodium-steered transmitter release) takes place, while a bipolar oscillation also the Ca^{++} in the (muscles) the cell is activated. Magnetic field systems should therefore always have a bipolarity.

f. Factors of influence according to study situation

Searches in a medical data base confirms to the surprise of many critics, that it does not lack on clinical, therefore placebo-controlled studies to the magnetic field therapy.

The world-wide largest medical data base is Medline (Medlars online), and can be looked over by the Pub Med service of the U.S. national LIBRARY of Medicine. The second largest data archive can be read up on Embase..

However ,is to be believed a mistake, that all of Medline technical periodicals published studies of the magnetic field therapy ,are indexed. Rather show up substantial archiving deficits, which refer surprisingly also to other specialist areas.

Specific Field	indexation Medline	indexation Embase
general medicine	19.5%	19.6%
Alternative medicine	6.5%	4.3%

David E, Reißeweber J, Institut for normal and pathological Physiology Witten-Herdecke.

Speech of 20.03.02

⁵⁷ www.ncbi.nlm.nih.gov/PubMed

⁵⁸ www.elsevier.nl

⁵⁹ www.dimdi.de/dynamic/de/index.html

Surgery	32%	20.8%
Orthopaedic	20.5%	20.8%
pharmacy	16.0%	20.5%
physiology	42.2%	36.3%
sport medicine	16.9%	20.6%

The average cover degree therefore is (statistically) for Medline by 24,7% and Embase by 24,7%⁶⁰.

After even Internet experts come only to a success rate of 70% (untrained maximal 50 %), only an average of 12% by layman are published world-wide in the medical literature. The practical search yield of the magnetic field therapy, which is indexed with approx. 6.5%, is thereby about 3,25%. This means, that only scarcely over 3% of the studies published world-wide are ever available for the magnetic field therapy. Study researches supply therefore far to inaccurate statements to the effectiveness.

An overview work, made in Austria, undertook the attempt some years ago, to bring some light in the dark magnetic field therapy. For this, 31 studies, with controlled Design, were evaluated. 20 studies showed a double-blind, placebo-controlled Design, 15 of it with a positive effectiveness. Surprisingly the flux densities lay in a relatively wide range between 0,2 mT - 10 mT and the frequencies between 12 – 100 Hz. The authors could not recognize therein any preferences for any intensities or frequency ranges, whereby, however negative studies seemed to accompany tendentious with shorter treatment times.

One puts the therapy recommendations of commercial magnetic field therapy devices on the basis, then the recommended 8 minutes per treatment might be far under dosed. A magnetic field-conditioned cAMP rise already turns round latest after 8 minutes, only the cAMP activation refers to a receptor activation by means of suitable frequency. It is easy to overlook that the intensity with the magnetic field - as described – plays an important role. The problem of a study evaluation lies however in a wide-spread frowzy handling of material and methodology, i.e. equipment parameter are culpable not indicated and prevent thereby, to pull conclusions from intensity/frequency on the therapy success or failure. If however important factors of influence cannot flow into an evaluation, then even the best study Design neutralizes itself.

IV. Equipment evaluation

What can be done, therapists, future users and sales people will ask themselves. Where exists a magnetic field system, which orients itself at the optimal equipment parameters.

⁶⁰ www.wfi.ch

⁶¹ Quittan M, Schufried O, Fialka-Moser V, clinical effectivenesses of the magnetic field therapy – a bibliography. Acta Medica Austriaca, 27. Jhg. Heft 3, S. 61-68, 2000

⁶² Farndale RW, Murray JC, Biochem Biophys Acta 1986 Mar 19;881(1):48-53

In order to make it short: Not any ingenious developer, visionary scientist or learn-willing manufacturer created a new equipment generation, but rather the principle „comfort“ and the motivation to set an end to always-lasting discussions to for and against possible equipment features of competition systems. Because somewhere it finds itself an favourable equipment by physicians, which has to offer substantially higher flux densities than the majority of the minimalist μT Fetishist. And then a cunning producer thought, why not insert both „ μT “ and mT “ at the same time. Particularly as such an equipment with 20 - to 100 times higher intensity, leaves substantially more lucratively (after GOÄ⁶³) to settle accounts than those of lower intensity.

And somehow one is it also suffering to invent arguments whether now a rectangle, a saw tooth and an exponential function curve are correct. So the same producer decided to pack simply everything in an option, so that a therapist or a user can decide, which mode of motion he wants the preference/advantage to be. And made also equal conclusion with the question, whether one needs now 100, 1000, 5000 or 10000 different frequencies and programmed (over frequency multipliers) inside more than 10,000. Annoying are also the recurring questions, whether these or those frequency found consideration. Because many physicians had a great success with a special frequency of earlier equipment in their practice. Our producer created an equipment feature, which made it possible for each user to be able to program its favourite frequency.

And soon stopped the constant arguments whether there are studies to the effectiveness of the magnetic field therapy. Our producer programmed equal a whole data base with intensities and frequencies, which had proven their effectiveness in controlled studies. With the fictitiously described system, it is in fact, an equipment made in Austria (MAS), which fulfils all requirements in an ideal way to broadly apply and optimal effective working magnetic field therapy equipment. If it concerns still the 1. generation of the static magnetic fields of the static magnetic field treatment and pulsating magnetic fields can be called the 2. generation, is with the MAS - probably unintentional - succeeded an equipment to the 3. generation, which unites meaningfully all at present possible features. Some equipment features are to be compared here, for the sake of simplicity, in tabular form with common market devices.

Equipment feature	MAS	usual market devices
Intensity	3.5 μT - 8,500 μT	0.03 μT - 70 μT
Intensity gradation %	yes	yes
impulse shape	sinus, rectangle and saw tooth	saw tooth
Sine wave f. Single frequency	yes	no
Frequencies	over 60,000	400 - 10,000

⁶³ GOÄ = regulation of charges for doctors (BRD). Z.B approved by the general medical association Analog number 838 A (Electromyography), those of the usual number 555 A (low frequency treatment) with 57,24 € (1,8-times) instead of 12,50 € billable per meeting.

Free frequency choice	yes	no
Coils per mat	18	6
Inhomogeneous magnetic field	yes	yes/no
Schumann frequencies	yes	no
harmonic wave formation	yes	yes
Stochastic resonance	yes	yes
Programs	142 - 160 programs	3 programs
Study-based programs	yes	no
Reflex zones	yes	no
Therapy/physician programs	yes	no
North south option	yes	no
Bipolarity	yes	differently
Time switch clock	1 minute until infinitely	max. 8 minutes
Equipment variance	5 different types of device	2 - 3 types of device

Of course this short comparison cannot refer to all in Europe distributed devices. Surely exist a handful of magnetic field systems, which have shown an intensity between 1 - 10 mT . However here are more important equipment parameters usually strongly reduced, such as frequency number, impulse shape, program variety or equipment variance, because here the manufacturer rely mainly on the magnetic field energy. In the rarest cases the technically and systems inbuilt are conditionally in a position, to still manufacture apart from an mT-intensity also an μ T, which must naturally have a negative affect of the stochastic resonance. The chief difference characteristic lays in one more than 100-times intensity reinforcement during lasting cover of the activation range for the stochastic resonance, a free choice of certain single frequencies between 0,1 - 9,999, the free choice of the impulse shapes and as well as the intensities of the study-based programs, which offer a protection to the medical colleague of a scientific security. Therefore the MAS-system might be - also seen internationally - the first and only magnetic field therapy system, which covers all effect parameters of a magnetic field therapy.

V. Biological changes of magnetic fields

The understanding for physiological activities and/or an introduction into the physiology of receptors and chemical messengers, appears on first sight complicated and laborious. Despite everything it facilitates the understanding for the operational areas and increases the self-assertion in possible argumentation.

Molecular biology

1. Receptor effect/chemical messenger cAMP

A receptor is comparable with a keyhole, in which only a certain key fits. So that a cell receives the desired information, at which time and for what purpose it has to do something. It was equipped by nature with on the spot special receptors, so that it be guaranteed, that a chemical messenger only gives her and not any other adjoining cell the intended message. Chemical messengers can be hormones or enzymes - in addition also an electromagnetic impulse. These represent the key or „the code“, in which the receptor activate itself.

If the receptor is animated by these „primary chemical messengers“, then „a secondary chemical messenger“ is formed inside the cell, named cAMP. Cyclic adenosine mono phosphate (cAMP) is a jack of all trades in the Hierarchy of the different chemical messengers. It does thousands of things and always that, for which it is intended, in the individual cell. Is it about, e.g. adenocyte, then it commissions a gland product. If its about a diseased skin cell, which is based on a psoriasis (Psoriasis), then a message is sent to generate itself to normality.

One of its universal main functions exists in

- increase of the protein synthesis. This affects itself e.g. in such a way, that these nutrients for muscles, sinews, connective fabric tissue etc. are available in sufficient quantity
- cell differentiation. It corresponds to the interior fittings of a cell. The more differentiated the better she works. In contrast there is cell proliferation, as it is typical for carcinomas. Here it affects the expansion of a cell with a loss of quality.
- synthesis of mRNA and DNA. This means that somatic cells “reduplicate” themselves and/or can renew faster and better. With Lymphocytes it adds up to 62%⁷².

The information of producing proteins (muscle, enzyme, anti-body protein etc.) lies in the DNA. Their manual must get to the so-called Ribosome, another cell organelle. For this the cell core avails itself of a messenger. That is called mRNA („messenger RNA = Boten RNA). By the way: Magnetic fields, as proven, work on genes not harmful (genotoxic)⁷³. The Lymphocyte profit *on* the increased cell division. As a kind of the white blood cells, which rank among the body-own defence. Lymphocytes are normally no longer divisional in a cell culture. Under a pulsating magnetic field their number rises substantially, particularly, if it originates from older Humans. From this it cannot be derived however that magnetic fields generally stimulate the immune system, as is often stated.

Summarisation /effectiveness:

cAMP (cyclo-AMP) also called as „second-messenger (Zweiter Bote)“.

⁶⁴ Mandler D, Mikus EWJ, Tietz JU. How frequency-modulated alternating currents work of low intensity.

In: www.cellvas.de/cellvas/publikat_2_6.html

⁶⁵ McCleary VL, Akers TK, Biomed Sci Instrum 1991;27:205-17

⁶⁶ Knedlitschek G, Schimmelpfeng J, Dertinger H. Radiat Environ Biophys 1994;33(2):141-7

⁶⁷ DeMattei et al. Bioelectromag 1999;20(3):177-82

⁶⁸ Ozawa et al, Cell Physiol 138, 477-483, 1989

⁶⁹ Bodamyali et al, Biochem Biophys Res Commun 1998 Sep 18; 250(2):458-61

⁷⁰ Litovitz et al, Bioelectromagnetics 1990, 11(4):297-312

⁷¹ Chiabrera et al, 1979 + 1980, Boodman et al 1983

⁷² Chibrera et al, 1985, Interactions between EMF and Cells, pp. 253-280, Plenum New York

⁷³ Pool, 1990 +1991 / Manson 1990 / Savitz ert al. 1990, Chibrera et al 1994

⁷⁴ Whitney + Sutherland, J Cell Phys 1972, 80:329-32

⁷⁵ Cossarizza et al, Biochem Biophys Res Commun 1989, 160:692-698

The first messenger and/or the first signal is a magnetic field impulse, which must fit into a receptor. In this case a second chemical messenger develops itself on the inside of the cell, namely cAMP and commands the production of certain substances. With these substances it's all about Proteins, new cell components or completely new cells. Altogether a cell activation takes always place with cAMP.

2. Receptor effect/chemical messenger calcium (Calcium++)

Understandably this „technical jargon“ like „Calcium++“ discourages many readers. Everything could be so simple. The high ranking ++ only actually means that it is all about the ionized, escharotic's variant of calcium, which are above and beyond positively charged, as it possesses fewer electrons („these are always negatively charged“).

Calcium ions are the most important chemical messenger inside all somatic cells. Outside of the cell Ca^{++} is a 1000 times higher concentrated. Now if a cell is provoked by an electrical nerve impulse, a hormone or even by a magnetic field, then special passages are extended in the cell wall (ion channels).

These passages are similar as piping at a dam - with the only difference that it has “electrical strips” in the tube, on which electrically charged particles (ions) can hold on to them.

If these open and/or place their electrical line system on „green“, then the calcium ions flood quickly the lower located and/or “calcium less“ regions and release - cell-specifically - the most different reactions. Calcium ions discharge additional through cell organelle, actually certain functional elements in the cell, and are also available as „chemical messenger. If the calcium concentration in the cell increases, then it comes to the following changes:

- the conversion of nerve impulses to muscle activity
- the release of hormones
- the increase in the activity of enzymes
- an anti-inflammatory as well as anti allergic effects
- an additional activation of cAMP

This enzyme activation has immense consequences in the sport medicine, which are not fully realised. This is described with a short example:

Who goes jogging at least once a week, automatically increases his numbers of Mitochondrion. For the memory: Mitochondrion are productive energy producers with the aid of oxygen („aerobe“). Only some years ago the mechanism has found an increase.

www.oc.chemie.tu.darmstadt.de „Calcium als second messenger“

77 Huang C, Ye H, 2000 March; 17(1):63-5,94

78 Yost MG, Liburdy, FEBS Lett 1992 Jan 20;296(2):117-22

79 Barbier E, Dufy B, Bioelectromagnetics 1996; 17(4):303-11

80 Fitzsimmons RJ, Baylink DJ. Calcif Tissue Int 1994 Nov; 55(5):376-80

81 Adey et al 1982; Lin-Liu + Adey 1982

82 Carpenter DO. Ayrapetyan S, Biological Effects of Electric and Magnetic Fields, vol. 1, Academic Press, San Diego, 1994

83 Science Bd. 296, S. 349, 200

A particular enzyme, namely the “calmodulin dependant protein kinase“ is activated through calcium. Calcium again is normally discharged, if muscle cells receive the nerve order for contraction. The protein kinase is an enzyme catalyses, which brings Mitochondrion to a multiply increase of the muscle cell.

If one considers, the fact that magnetic fields promote the calcium influx to the cell and therefore - via protein kinase – to increase the Mitochondrion to stimulate, its understandable, why magnetic fields are valid as a insider tip in sportsman circles.

Admitted: An half hour magnetic field treatment is not going to be equally replaced like a reliable intensive Muscle or perseverance training. On the other hand there is estimated 10 - 15% magnetic field equivalence over Olympia victory or circle class.

Summary/effect:

Also Ca^{++} acts as a magnetic field („first messenger “) more stimulated as „second messenger “. It starts thereby in a cell the necessary different metabolic processes and improves the energy production due to increase of the Mitochondrion at the same time.

3. membrane potential and ATP synthesis

The simplest way, to mass transfer a cell, is diffusion. That is however exhausting, and this appears impossible for loaded molecules (ions), of reasons for the molecule size. Since ions are however vitally necessary for a cell, there exists a multiplicity of „ion channels “in which electrically charged guide rails are selected, and how often and who they let ,through. We already became acquainted with this principle of the Ca^{++} . In addition there are ion pumps, which provide optimization according to a similar principle.

Strange to say ion channels and - pump function, according to a principle, that it lets only so many ions to go inside or out that the cell contrary to the Outside space, has a difference of potential of 70 - 90 mVs (mill volts). That means that the inside of a cell, is in relation to the environment around, exactly negatively charged for this amount.

At first sight this complex transportation mechanism appears to be somehow idiotic. Because ion pumps eat regularly between 30 - 50% from the energy, which produces the cell. If we speak about energy, then we mean ATP (adenosine actually is triphosphate). He is the actual fuel and those Coal hydrates, fats or proteins, which we eat, e.g. produced in the Mitochondrion. Food ions swim therefore, over channels and pumps to the inside of the cell and serve there in the power production. A muscle moves not directly assistant by a butter bread, but rather by ATP alone.

Obviously exists a reason well-thought-out of nature: If a cell would be without difference of potential in the equilibrium to the outside space, the transport of food ions into the cell would be slow-acting and/or almost impossible in the sudden case of need. The sudden case of need may not be imagined by any means as a situation, that after some hours the supplies come to an end after a highest energy achievement. Rather likely is, that ATP is practically not to be stored. ATP supplies, if one may call them at all that way, sufficient enough for an average of 3 -to 4 muscle strands, that means ATP is used up after 2 – 3 seconds.

Sudden requirements situations like an arm movement, walking, walking up the stairs also thinking procedures, are, the everyday rule and don't forgive any restricted access or a temporally delay. However „if a negative “downward gradient exists in the inside of a cell, then it only needs to open the personal air-locks („ion channels “) and the necessary inflow is effected in the millisecond range.

Summary/effect

Magnetic fields affect in principle of the cell level. Therefore connections of the cell environment should be common. Energy exists in our body only in the form of so-called ATP. ATP is hardly storable. In order to meet this circumstance, it has developed itself a so-called membrane potential. This is defined as potential gradients between Inner and outer space of a cell. This lies with the healthy adult between minus 70 - minus 90 mVs. With the aid of „electrical beams “ the cell can transport important food ions within the millisecond range through so-called ion channels.

4. Phenomenon energy stimulation

If our organism is exposed to a magnetic field, then this resembles rather in a „worst case “(accident), than in a beneficial therapy. Ions rush around wildly, the cell environment imbalances and ion pumps try somehow to arrange the damage. The power requirement rises for some minutes in the endless, using ion pumps - as implemented above - in relaxing phase at least 30% of the cell energy. In this emergency situation signal substances are produced, which go to the Mitochondria, with the help call, to make the additional few billion ATP units immediately available.

For the energy production two ways exist. First one (A) by production without oxygen (anaerobic) in the prickle cell, also called Cytoplasm. She is the simplest, primitive way with the advantage, to produce ATP from the quantity, however completely insufficiently. A second way (B) takes place over the Mitochondria and requires added oxygen (aerobe). This lasts substantially longer, however, it produces far more as the aerobic way. By the way the aerobic way is required only in perseverance situations. It's usual performing of the daily life takes usually place only anaerobic.

With „the accident “magnetic field develops the stimulation of an energy manufacture system (Mitochondria), it is normally only in perseverance situations and/or with heavy physical burden, it goes into action. The consequence is that it develops enormous quantities of ATP, which benefits only the ion pumps for the time being. Now it comes, however, to a crucial point: Cells furnish themselves in moderately ion-channel, within a few minutes, to the new condition of a magnetic field treatment and make the increased need of ATP, for the ion pumps dispensable after 10 Minutes. The Mitochondria however work still substantially longer and produce a multiple normal Energy. In the result of a magnetic field treatment, it changes itself into the aerobe ATP production for a longer period and produces additional energy.

By the way: The activation of the so-called sodium potassium pump of magnetic field, described in the literature, million fold copied activations and lacks any scientific logic. The occurrence on the cell membrane is extremely complex and it is understood, of the science, as a basic model.

It not unusual, that the work of the cell membrane still regularly gets the Nobel Prizes for biology. A selective interference by a magnetic field is therefore purely wishful thinking and belongs into the kingdom of the myths.

The phenomenon of additional energy production posed by magnetic field users ,sometimes, in agreement with the reference, to feel after a magnetic field treatment not more energy than before. The reason is relatively simple: Energy and thus ATP are not storable (see above). The stimulation of the aerobes power production deflagrates, whenever one rests after a magnetic field treatment, i.e. leaves itself in a sitting or lying position. If one is subject to a physical activity, after the treatment, then the power production becomes noticeably. Also here is pointed that with Restriction, that it is not doubled, but ranges from additional 5 - 20%. These depend, again on the fact, that in the muscle cells lie a sufficiently amount of Mitochondria and that the musculature is present in a certain development. After Mitochondria increase of Ca^{++} (see chapter Ca^{++}), better results are to be expected of magnetic field therapy after several months.

Summary/effect

A magnetic field therapy increases the energy level over an indirect mechanism. However not in a purposeful action, but in „the repair of an accident “. As ion pumps require more of ATP, the aerobe energy production starts. Because the cell arranged itself against the influence of a magnetic field therapy after a short time, remains an exceeding ATP production, which still persists longer. Because of the Problem, of the non storability of ATP ,this energy must ,however, be taken up through movement, otherwise it deflagrates ineffectively.

Physiology

1. Piezoelectric effect and Osteoblasts effect

Piezo “originates from Greek and means as much as push or press (peizein). A piezoelectric effect is an electrical loading of crystals, which stands under pressure, torsion or tension. We use this effect e.g. whenever we rub a flint and it thereupon sprays sparks. 1892 a “Wolff” law was defined that bone trabeculae are not genetically, but develop according to its mechanical impact. Only 1953 a confirmation took place, via the Yasuda working group, which measured flow potentials on bending the bones. With Fukuda 1952, was finally proven, that a bone reacts piezoelectrically. So it shows the lightest bending of the bones (0.05 - 0.1%), to initiate flow of the liquid filled gap between cell membrane and the bone matrix. Although it is still unclear whether these currents start now directly determined cellular signals or only over the detour of the electrical flow potentials resulting from it, exists clarity over the stimulation of so-called Osteocytten.

⁸⁵ Int J Radiat Biol Relat Stud Phys Chem Med. 1974 Mar;25(3):i-ii. Obituary: Karl Sax, 1892-1973

⁸⁶ YASUDA T, KISHIMA H, HASEGAWA Y. Gan. 1953 Sep;44(2-3):113-4

⁸⁷ O. Schmitt, Springer Berlin, Vol 93, No.1, März 1978

⁸⁸ Fukuda, E., Yasuda, I., J. of Physiol. Soc. Japan, 12 (1957) S. 1158; Bassett, C.A.1", Becker, R.0., Science, 137 (1962), S. 1063

⁸⁹ Yang ZJ, Qu S, Zhang XD, J Mater Sci Mater Med. 1997 Nov;8(11):697-701

⁹⁰ Hung CT, Allen FD, Pollack SR, Brighton CT, J Biomech. 1996 Nov;29(11):1403-9

Osteocyten are the actual „living“ bone cells, which are surrounded by extra cellular hard and/or bone mass. „The bone mass“ (bone matrix) consists of collagen connective fabric tissue, into which plentifully calcium and phosphate are stored. Osteocyten possess finest extensions, and use the bone channels of the matrix, in order to connect itself among themselves and with the blood capillaries.

A functional bone requires an extremely high printing and tensile strength. In order to become fair on this task, it exists (seen macroscopic) from one „outside“ firm mass (spongiosa) and sponge like interior fittings in form of a beam structure. The fine development is comparably with a stealing Concrete construction. „The steel girders“ correspond to the Bone beams and the collagen fibres used thereby. As „concrete“ pressure resistant function Lime salt deposits such as calcium and phosphate.

The bone substance is subject to constant change processes. The so-called Osteoblasts takes up in addition calcium and other minerals, the Osteoclasts have again the task to prevent an exceeding bone growth and reduce bone substance. In a healthy bone rule itself the developing forces (Osteoblasts) with the reducing forces (Osteoclasts) in the equilibrium. A predominance of the Osteoclasts leads e.g. to one Osteoporosis.

The Osteocyten pays now for their part growth factors (IGF), which steer the equilibrium between Osteoblasts and Osteoclasts.

According to another theory of the free University of Amsterdam everyone presses Bone impact liquid through the bone small channels and stimulates small hair, which are the Osteocyten. Thus it comes to the influx of calcium ions (Ca^{++}), which release messenger material as „second more measuring closely“ a cascade. With the chemical messenger it is to concern nitrogen monoxide (NO), which by the way plays a paramount role of blood vessels. NO, again diffuses by the bone and adjusts - just like with growth factor the model - the Osteoblasts and Osteoclasts.

Altogether it remains noting thus that each knee bend and each stair rise activate the Osteoblasts and Osteoclasts via electrical current flow and so strengthens the bone or in case of a fracture forces the callus growth. What more beautiful final speech for more movement can actually be given. The callus growth is part of the body-own repair system. It consists at first of connective tissue and fills the area between the two break ends. After a cartilage stage lime finally stores itself („calzifizierung“) and fossilize .

Now, however, the crucial point comes: Magnetic fields simulate obviously the bend and thrust forces at the bones, resulting from natural movement, and confirms to the estimate of Munich, the magnetic field pioneer Kraus, that already 1974 one Fracture and described dressing of magnetic fields.

⁹¹ Süddeutsche Zeitung vom 29.05.05. „Stärker als der Eiffelturm“

⁹² Dealer SF, J Med Eng Technol 1981 Mar; 5(2):73-9

⁹³ Indouraine A, Petersen JP, Pförringer W, Sportverletzung Sportschaden 2001; 15:22-27

⁹⁴ W. Kraus, Institut für techn.- phys. Entwicklung, Springer Press Berlin, Volume 337, Number 1 / Dezember 1974

Alone in the test tube, the magnetic field-treated ,produce more Osteoblasts collagen than untreated control cells. As main protein of the bone collagen is needed in large quantities e.g. in the healing phase or after an implantation of an artificial hip joint.

The consequence is an intensified hardening by precipitation of the bone with an improved Bone structure. By the way also cartilage cells (Chondrocyten) show of one profit Magnetic field stimulation and multiplication by the factor 3

One should leave the church in the village and not think that laborious movement and sporty manipulation could be unnecessary now, elegantly by magnetic field employment. Because the magnetic field effect lies somewhere between 10 - 30%, which brings a natural impact.

Summary/effect

The mechanical impact of a bone forms it also. The energy behind it is the piezoelectric effect, which lets growth factors or signal materials develop, which the Osteoblasts finally benefit. Magnetic fields can simulate the mechanical impact of a bone and function on the bone after that piezoelectric model. Independently Osteoblasts and cartilage cells react, also directly to magnetic fields and have a faster increase.

2. Endorphin stimulation

By Endorphin one understands body-own Opiate, which pay themselves in extreme situations as e.g. during an accident, a sudden pain, a heavy offence, Mobbing or psychological impact. They are responsible in addition, for euphoria (Bungee Jumping, Sex) and produce the so-called „Runner's High “with Jogging and marathon runners.

Those only 1977 discovered β -Endorphins and/or Enkephalin work just as strongly, like Morphine and heroin and also possess their addiction potential. As already explained in the chapters earth's magnetic field/Zero field production, it is connected by Endorphins inseparably with the earth's magnetic field. Conversely it would be speculated in the fact that a missing earth's magnetic field makes the life for mammals and humans intolerable. If with humans, in a calm way, a considerable Endorphin Spiegel is to be measured, then synthesis disturbances might draw the pain and suffering threshold very clearly downwards.

To what extent ,the dropping of the earth's magnetic field intensity affected so far our Endorphin Spiegel, was, scientifically yet not examined. Effect models to the pain therapy by means of magnetic fields, should itself ,in any case, also refer to a Endorphin stimulation. In any case there are sport-medical references that in the professional sport a substantially more intensive training over the pain barrier is made possible under one Magnetic field employment.

⁹⁵ Guldner HH, GSF Forschungszentrum f. Umwelt und Gesundheit, Neuherberg 1999

⁹⁶ Heermeier K et al, Bioelectromagnetics 19(1988) S. 222-231

⁹⁷ DeMattei M, Caruso A, Connect Tissue Res 2001; 42(4):269-79

⁹⁸ Sakai A, Suzuki K, Int Orthop 1991; 15(4):341-6

Endorphins belong to the body-own Opiate system. They facilitate pain and Conflict compatibility and produce euphoria. The synthesis of Endorphins depends on the existence of the earth's magnetic field. A substitution of magnetic fields seems to lie on the hand.

3. growth hormones

The growth hormone HGH („humanly Growth of hormones“) moves more in the focus of the public interest because of favourable effects on the aging process. Whether Muscle growth, Libido or skin smoothing - there is nearly nothing that cannot carry HGH out for aging humans.

HGH works not directly, but over the formation of growth factors, which present the synthesis in the liver. They are called IGF-1 and IGF-2 („insulin Like Growth Factor“) and are present, also in the colostrums of cows. Under a magnetic field above all the IGF-2-Syntheses and the education are delivered for necessary receptors So far an effect rather neglected, which awaits still to the discovery by „the anti- aging industry“. Since it concerns a stimulation of the body-own synthesis, are side effects, expected by injections or Sprays, are quasi impossible.

Summary/effect

Magnetic fields affect also the strengthened production of growth hormones. These are particularly in the sport and also in their anti- aging effect in demand. Side effects as with HGH substitution are not to be expected.

4. Immune stimulation, Interleukins

By magnetic fields also the Interleukin production raises IL-1 and IL-6. At the same time the T-helping cells increase and it comes to an increase of the Phagocytes activity, it means intruders are eaten mainly by so-called macro phage „“. Interleukin (Cytokine) are chemical messengers of the immune defence. Thus stimulates e.g. IL-1 the Lymphocytes. However IL-1 and IL-6 increase also the activity of Bone and cartilage cells, which may be a reason, why magnetic fields possess a direct effect on bone cells (see chapters piezoelectric effect). Also IL-1 is a signal material for inflammatory processes in the Frame of a chronic Polyarthritis, while IL-6 is a chemical messenger, which plays a priority role with bacterial infections. One should meet the immune stimulation described in the magnetic field literature however rather with restraint. But the effect spectrum of the Interleukins are much too wide.

⁹⁹ Fitzsimmons et al, J Cell Physiol 139, 586-591 + 150, 84-89, 1989/1992

¹⁰⁰ Fitzsimmons et al, J Bone Miner Res 1995 May; 10(5):812-9

¹⁰¹ Cosarizza A, Franceschi C, Exp Cell Res 1993 Feb;204(2):385-7

Summary/effect

Interleukins actually belong to the immune defence, have, however, also an effect spectrum, which refers to the bone formation and inflammations. In the case of a stimulation of IL-1 and IL-6 one should not speak therefore of a general immune stimulation.

5. Prostaglandin

Prostaglandins are hormone-similar substances, which adjust only once the tonus of the smooth musculature (blood vessels, intestine) and the cardiovascular system. On the other side Prostaglandins are very closely linked with the inflammation reaction. Against earlier estimates that Prostaglandins increase themselves under a magnetic field, shows the study situation a reduction of the Hormones. From this, concludes an inflammation inhibition and a reduction themselves Panel aggregation of thrombocyte („anti- thrombotic “). While the inflammation inhibition is important particularly for the treatment of injuries, the Thrombocyte Aggregation blocking („anti-clumping “) improves the blood flow similarly as acetylsalicylic acid (Aspirin®).

Summary/effect

A magnetic field reduces the inflammation material Prostaglandin and provides at the same time for „liquid “blood.

6. Nerve growth/NGF

In order to anticipate it: Disconnections caused by an accident of peripheral nerves are in principle operationally to do therapy with a nerve seam. An accompanying Magnetic field treatment on squeezing, overstretching or in the operational subsequent treatment improves however the recovery period is between 22 - 200%. The effect mechanism is so far, not yet enlightened, because strange-proves degrades itself the measurable nerve growth factor NGF („nerve Growth Factor “) instead to increase itself . One interprets this as reference, that NGF is bound to increase nerve receptors with the consequence of an intensified nerve growth.

Summary/effect

A magnetic field promotes the growth of injured nerves after accidents or operation.

7. Dopamine/dopamine receptors

Dopamine is a transmitter (chemical messenger) in the brain. Apart from its characteristic, it is responsible for the motor function of humans, it also called the so-called „luck hormone “.

102 Kawzyk-Krupa A, Krol, Electromagnetic Biology and Medicine, Vol. 21, Iss 2

103 Lohmann CH, Schwartz Z, Boyan BD, J Orthop Res 2000 Jul; 18(4):637-46

104 Vasil'eva EM, Gordeeva GF, Vopr Kurortol Fizioter Lech Fiz Kult 1994 Mar-Apr;(2):18-20

105 Sisken BF, Kurtz W, Brain Res. 1989 Apr 24;485(2):309-16

106 Raji AM, J Hand Surg 1984 Jun;9(2):105-12

107 Longo FM, Sisken BF, J Neuro Res 1999 Jan 15;55(2):230-7

108 Walker JL, Sisken BS, Exp Neuro 1994 Feb; 125(2):302-5

109 Ito + Basset, Clin Ortho 1983 Dec;181:283-90

110 Zienowitz RJ, Orgel MG, Plast Reconstr Surg 1991 Jan;87(1):122-9

111 Kim SS, Chung SM, Exp Mol Med. 2002 Mar 31;34(1):53-9

The fall of dopamine-forming cells is the cause for the disease Parkinson. An increased release is effected e.g. in one „work intoxication “or an extremely fulfilling activity and is also called „flow “.

Already, more than 30 years ago it showed up in the animal experiment, that a pulsating magnetic field can reduce the Parkinson symptomatology, with similar results also in the Human medicine.

Magnetic fields increase obviously the dopamine conversion and stimulate obviously also the dopamine receptors. Interestingly, that is also connected to the subject sexual mannerism (Libido increase) of a dopamine control. So male Parkinson disease patients suffer also, always on a disturbed sexual life. After several therapy meetings with a pulsating Magnetic field it came, with a part of the male Parkinson test persons, to spontaneous erection.

Yawning or the urgent feeling, to expand and to stretch oneself, is not connected as often as accepted - with an oxygen deficiency, but owed this impulse likewise to this tiny chemical messenger .

If one is just in a yawning phase, then this phenomenon can even strengthen itself under a magnetic field therapy.

To what extent these results can be transferred, also to excluding impotent men, is to be reread in the chapter „potency problems “. A strange thing, it is to be reported ,that a user had to extensively yawn after a magnetic field therapy of over 50 minutes.

Summary/effect

Pulsating magnetic fields stimulate the dopamine secretion and sharpen Dopamine receptors. They are offered as therapy options, with a Parkinson disease and Sexual problems

8. blood circulation

The blood circulation-increasing-effect of a pulsating magnetic field documented sufficiently, by thermal image camera. However, these pictures, can in scientific sense not prove it. After a current Literature diagram the results are non-uniform, even if the effect of a blood circulation increase outweighs. Independently of it, animal studies prove an extension of the cerebral vessels and increase of the blood flow. Obviously „the Second Messenger” model already described, is appropriate for that at the basis: (A) Increase of Ca^{++} in the blood vessel cell, (B) of this is bound, to the enzyme Calmodulin - which (A) again the modulator nitrogen monoxide (NO) activates, widens then the blood vessels.

112 Sakharova SA, Ryzhov AI, Udintsev NA, Nauchnye Doki Vyss Shkoly Biol Nauki. 1977;(9):35-9.

113 Siéron A, Brus R, Bioelectromagnetics. 2004 Sep;25(6):426-30.

114 Sieron A, Cieslar G, Bioelectromagnetics. 2001 Oct;22(7):479-86

115 Sandyk R, Int J Neurosci 1999 Aug;99(1-4):139-49

116 Sandyk R, Int J Neurosci 1999 May;97(1-2):139-45

117 Krapf RR, Gespräch vom 07.05.2003

118 McKay JC, Prato FS, Thomas AW. Bioelectromagnetics. 2007 Feb;28(2):81-98

119 Wang L, Yushmanov VE, J Cereb Blood Flow Metab 2002 Mar;22(3):253-61

120 Gmitrov J, Ohkubo C, Bioelectromagnetics 2002 Apr;23(3):224-9

NO is the molecule, which has developed itself to the biological child prodigy, in the last years and probably the most important intercellular chemical messengers for practically all organ systems. The short-lived NO, is formed particularly in the endothelial fabric tissue, a cell layer at the inner surface of the blood- and lymphatic vessels. It gets strongly vasodilating from veins and in smaller amount from arterioles and capillaries. Concentration increase of NO means always, increase of the fabric tissue blood flow.

Summary/effect

A blood circulation increase seems to function over an indirect stimulation of the NO system. The study situation for this is not consistent. Vegetative basic factors seem to play a role with the result.

9. Vegetativum

The autonomous nervous system (Vegetativum) is based on innate shortening- and Combat reaction and it is „a life support system “. It adjusts and/or directs nearly all organ functions and is independent of understanding, will and desires. Stress stimulates, the Vegetativum ,in an identical way. Pressure to perform, social tightness, noise, Mobbing etc. activate thereby the activating part (Sympathetic nervous system). As an opponent, the Parasympathetic nervous system, steers relaxation, digesting and regeneration procedures.

The modern stress research assumes, a large part of all chronic illnesses are connected with an misdirected stress processing. Turned around also healing and regeneration procedures are linked closely with the Vegetativum. If humans are subject to e.g. a permanent pressure to perform and social pressure, then remains the activated Sympathetic nervous system in a „constant attention position “. That Regulation of the sympathetic nervous system, does not replace the “sympathicus duration”, i.e. it comes to a permanent sympathetic cycle. The overall system reacts no longer adequately on external influences and internal requirements. A frame of so-called „regularization rigidity “develops. cardiovascular disease and/or cancer always gets ahead of regularization rigidity.

There are clear references, particularly from the Russian literature, that a Vegetativum by pulsating magnetic fields ,can be positively affected. Here it would bring out an improvement of the heart frequency variability. The heart frequency variability is relatively more again „a star “in the diagnosis vegetative Disasters. A check of cardiac infarcts revealed that a second infarct becomes more likely, the evenly the heart action runs. This realization can be transferred also to apparently healthy humans: The Accurate, reasonable and deadlocked a life is (and thus the heart frequency variability), the more obvious endangered it is then that humans get suddenly sick.

121 Paul Rosch, American Institute of Stress, Is cancer another “disease of adaption?” Some insights into the role of. **stress** and civilization. Compr Ther 1993; 19(5): 183-71

122 Annan'in NN, Levitskii EF, Vopr Kurortol Fizioter Lech Fiz Kult 2001 Nov-Dec; (6):18-20

123 Razumov AN, Minveeva EN, Vopr Kurortol Fizioter Lech Fiz Kult. 2006 Mar-Apr;(2):3-5.

124 Okano H, Ohkubo C, : Bioelectromagnetics. 2005 Sep;26(6):469-80. Erratum in:

Bioelectromagnetics. 2006 Apr;27(3):245

125 Konova OM, Khan MA, Vopr Kurortol Fizioter Lech Fiz Kult. 1996 Mar-Apr;(2):8-10

126 Nikulin MA, Gonchar NV, Klocheva EG, Pediatriia. 1989;(9):59-62

127 Kravtsova Tiu, Rybolovlev Ev, Klein Med (Mosk) 2000;78(12):34-6

128 Grote V, Lackner H, Moser M, Eur J Appl Physiol. 2007 Nov;101(4):495-502. Epub 2007 Aug 3

As a magnetic field affects the autonomous nervous system, is only examined insufficient. One assumes an activation in the same direction of all vegetative receptors, which leads to readjustment of "rigid operational sequence",

Interesting on this connection is a further phenomenon, which is not enough on the Focus of the effect research. A magnetic field heals not only in study-moderately with controlled operational areas, like e.g. the pain and Arthrosis therapy or wound and bone healing etc., but e.g. also with Sinusitis („frontal sinus inflammations“), chronic Infection, liver inflammations or even allergies. For the possible critics of the magnetic field therapy this is a regular welcome cause, to refer of the method of those „Lack of scientific accuracy“, it is nevertheless dubious to hold ready, almost any suffering, a magnetic field remedy. Behind is a fundamental misunderstanding, that is connected with a missing consciousness for vegetative procedures.

So there are concrete realizations that diseases can develop in principle only with an activated Sympathicus („stress phase“). One speaks here of the two-phase ness at an illness. Scolded the Parasympathicus in a normal disease cycle, recognizably on tiredness, appetite, warm hands, possibly night sweating - then this represents completely the starting signal for healing the illness.

When all illnesses, which becomes chronicle, a continuous activated Sympathicus can always be measured. As long as the regulations employment of the Parasympathicus is omitted, no chance insists on changing an illness.

Magnetic fields „booster“ obviously - as already above implemented - the vegetative nervous system. Not purposefully perhaps, as one would wish it, but Sympathicus and Parasympathicus unite at the same time. Since an over-activated Sympathicus, which holds the illness at running, but hardly increases it more further, an activation benefits alone the Parasympathicus. From this general „tilting results“ in the parasympathic direction, which is indispensable for a beginning of healing.

Summary/effect

The Vegetativum commands organs and metabolic procedures and it is also the main initiator for chronic illnesses, with its Deregulation. Pulsating magnetic fields affect the vegetative nervous system, in the sense of one „readjustment“, and makes it possible in the case of a deal dissolution of a regularization rigidity. Also healing procedures can be pushed, if magnetic field-therapeutically strengthens parasympathic phase.

VI. Therapeutic consequences

Conditions for study

The magnetic field therapy does not lack under any circumstances on positive empiric reports („Testimonials“) or a multiplicity of study proofs, but at the quality of the accomplished studies. The public is not usually oblivious of that pure „user studies are not strongly proofed“.

In order to prove the effect from medicines or medical procedures, valid Studies are gold standard. Unfortunately the meaning of the word „study“ is held much too generally and it leads to a fundamental misunderstanding. Studies are subject to the value system of the so-called Evidence Based Medicine, i.e. the “proof supporting” by statistic procedures. This standard goes back to the British physician and Epidemiologist Archie Cochrane. The lowest „evidence“ possess thereby personal experiences and so-called user studies, because no objectivity is given here. The highest evidence have so-called prospective, randomized and controlled Double-blind studies against a placebo.

a. prospective

With prospective the study aim is to be set as accurately as possible. For example: The effect of a medicine on the perseverance is to be examined. For this, one already selects sportsman at the beginning and gives them to the group 1. a further group 2 contains only non--sportsmen. Both groups are divided now again into placebo and into Verum.

b. randomized

Randomized (English: random = coincidence) is the coincidental selection of a patient, e.g. assistance of a random generator

c. Placebo

Under placebo („I want to please“) one understands „an illusory medicine“ or an illusory procedure. Knows the therapist or director of studies, that in the Placebo medicine contrary to the real medicine (Verum) only finds sugar or flour („single blindly“), then it seems to communicate obviously over its body language - even if it is not at all aware of it. So there are estimations that a placebo effect generally moves between 30 - 60% (!)

In the year 2002 a locked placebo experiment, that is characteristic as the largest study over feint actions ever undertaken. Participant and director of studies was a certain Bruce Moseley, who is considered as Coryphée for knee operations in Houston Texas. For this Arthrosis patients, were divided into two groups. The one actually received a knee joint operation, the other group only had a superficial cut and sewn up again. All patients assumed that they received a cartilage operation. Result: After two years 90% of both groups were highly contented with the result, whereby among the absolutely pain-free patients „illusory operated“ were even in the majority.

From the placebo effect it becomes clear that user studies from the practice of a physician or a alternative practitioner are to be very cautious. The temptation to help a favoured method by manipulating the break-through, is enormous. For example if a physician convinced of the magnetic field therapy decides to prove the effectiveness of the magnetic field therapy by means of one „study“ at his patients then fundamental errors already exist in „the study arrangement“.

129 Archibald Cochrane: Effectiveness and Efficiency - Random Reflections on Health Services" (1972)

130 Online Pressearchiv Jochen Kubitschek. www.online-hausarzt.de

131 J. Bruce Moseley, Kimberly O'Malley, Nelda P. Wray, A Controlled Trial of Arthroscopic Surgery for

Osteoarthritis of the Knee. N Engl J of Med 2002 July 11; 347(2):81-88.

He only accepts patients, of whom he is convinced for the study group e.g. that they react to the procedure well or he sorts the patients later, because he believes that these falsify the result.

d. Double-blind

Double-blind means that neither patient nor therapist know, whether it concerns a placebo.

e. in-vivo against in-vitro

Completely different viewpoint is the comparison between one „in principle“ and in actual, as on the subject accomplished experiment („in-vivo“). Thus „in-vitro-studies supply „important reference points in the test tube, are not however accepted as scientific proof for a serviceability with humans.

The following discussed operational areas are nearly complete covered by controlled Studies. Understandably not the complete study situation is shown, but grants a short, but correct view.

With the multiplicity of evaluated studies also negative results emerge again and again, which blur the relatively clear picture of a magnetic field effect. Here it is to be considered that already mentioned in the chapter „the factors of influence according to study situation“, that Carelessness in „methodology and material“ sometimes leads to fatal errors. Then, what is to expect, if the used equipment possesses high intensities, but otherwise only a reduced frequency potential. Or how is it to be rated, if sophisticated Frequency generators only with minimum magnetic field intensities work or sold under value small application duration in the pure magnetic field strength.

VII. Operational areas

The operational areas are based on the one hand on the descriptive physiological effect models, on the other hand they are secured by appropriate study results. Negative study results remain mainly unconsidered, since they would falsify clear result of the consideration, only a small part of the positive study results.

1st bone, fracture and dressing

After an older publication from the year 1993 were up to now with one Magnetic field therapy alone 250,000 patients successfully on bone and wound healing disorder treated. The pulsating magnetic field therapy in the USA counts regarding bone healing disturbances around a defined method, which overcame the high hurdles of a FDA permission. Contrary to the German medicine product law, which covers only the quality of a medical-technical instrument, the American FDA (Food and Drug administration) demands explicitly also one Effectiveness proof. According to an American overview work it acts around one „proven therapy with the potential with arthrosis, bone necroses, osteoporoses and wound healing disorder“

Trock DH, Rheum Dis Clin North Am 2000 Feb;26(1):51-62

a. Osteoporosis

The osteoporosis ranks among civilization the most common illness. One estimates that up to 15% of the population - which is in Germany 12 million humans - more or less holds an extensive osteoporosis. Apart from hormonal causes the increasing akinesia (television, car, elevator) becomes more noticeable.

By definition, one speaks of osteoporosis, if the bone density - measured with the standardized procedure of the Densitometries - lies underneath a certain average value (30 - 40%) of young healthy adults. Warnings, however 50% of all women over 50 years would have manifest osteoporosis, belonged however into the range of myths and legends. Investigation medical examinations suppress in their evaluation, that not the bone density, but the bone firmness plays the most important role. Also bones, which order only over 30% of the age correlated density, can be still so flexible and firm that never one osteoporosis caused "fracture" is to be expected.

Study examples:

Osteoporosis female patients. 12-weekly magnetic field treatment. Result: Significant rise of the bone density during the treatment. After 36 weeks the bone density increased again. An impressive result documented is also the immobilization osteoporosis due to bedridden: Bone mass loss under placebo 54% against 13% without Intervention. Further study examples. Also the comparison from a local to a total body magnetic field therapy, showed in surprising phenomenon: With osteoporosis e.g. if only one arm is treated, then also the bone mass raises in the untreated limb even if it is not really so strong.

b. Fractures and Pseudarthrosis

One speaks of a retarded fracture healing (Pseudarthrosis), if the fracture has not healed after 20 weeks yet.

Reasons, are blood circulation disturbances around the affected range, very large bone defects, infections or an insufficient immobilizing. Those Frequency data to the Pseudarthrosis differ substantially, cause those Localization play a role. The Pseudarthrosis rates, lies higher with the average of more than 10% of the cases, in particular for „High Risk Fresh Fractures“ with large soft part damages.

Study examples:

An extensive literature search refers to the Tibia fracture alone to 44 studies

133 Tabrah FL, Basset CA, J Bone Miner Res 1990 May;5(5):437-42

134 Tabrah FL, Gilbert F jr. Bioelectromagnetics 1998;19(2):75-8

135 Eyres KS, Kanis JA, Bone 1996 Jun;18(6):505-9

136 Zhang XY, Xue Y, Zhang Y, Bioelectromagnetics. 2006 Jan;27(1):1-9

137 Stanosz S, Stanosz M, Wysocki K, Pol Merkur Lekarski. 2004 Sep;17(99):229-31

138 Minne H, Magnetic field in osteoporosis. Bone density promotion or quackery?

(interview by Dr.

Judith Neumaier, MMW Fortschr Med. 2003 Sep 11;145(37):24

139 Xu S, Tomita N, Ohata R, Yan Q, Ikada Y, Biomed Mater Eng. 2001;11(3):257-63

140 Mishima S, J UOEH. 1988 Mar 1;10(1):31-45

141 Tabrah FL, Basset CA, J Bone Miner Res 1990;5(5):437-42

142 Gossling HR, Abbott J, Orthopedics. 1992 Jun;15(6):711-9

In this, the average success rate, amounts to ,with a retarded healing process under magnetic field 81% against 82% by surgical intervention. This is, to that extent remarkably, when without surgical interference no healing is actually possible. During open fracture, that alone the surgical therapy in relation to an exclusive magnetic field therapy (89% to 78%) is superior, was it the opposite ,with infected bones (81% to 69%). Generally closed fractures are ,with exclusively magnetic field therapy to OP (85% to 79%) outclassed. In a further study over 40 months, old unhealed Scaphoid fractures (carpal bone), was the healing under magnetic field after further 4.3 months complete. With a ischemic necrosis („blood circulation-causes “) 8 of 9 cases healed completely.

Or: 91 Pseudarthrosis of the cnemis. Healing rate under magnetic field average of 72%, type 1 (easiest case) with 88%, type 2 with 80% and type 3 with 19%.

Or: Metatarsal v (foot bone) - fractures. Healing completely after an average of 3 months. Also 39 months later no Re-fracture occurred at the same place.

c. spondylosyndesis (eddy body fusions)

A **spondylosyndesis** is the artificial reinforcement of a spinal column section. It is considered as ultimate reason for illnesses such as Scoliosis, Bechterew disease, spondylitis, eddy sliding, volume disk incident, tumours, nerve pain or a heavy osteoporosis. Those later acceptance of this treatment is predictable.

Study examples:

61 fusions because of chronic pain and because of Lumbago. Success rate, i.e. complete pain relief in the group of magnetic fields of 97.6% against 52,6% in that comparison group.

48 high risk patients after posterolateral lumbago spinal column fusion. Success ratio, i.e. complete pain relief under magnetic field with 97,9% (no group of placebos). 59% of the patients returned to their jobs. None of the patients indicated that they were dissatisfied with this fusion

195 patients with a lumbar „Inter body fusion “. Success ratio under magnetic field 92%, under placebo 65%

d. Chronic wounds (Decubitus, leg ulcer)

A Decubitus is a so-called pressure ulcer, that occurs with motionless patients due to a hold of the tissue blood circulation. A complete healing is very difficult, because the Ulcer is further under a periodic resting load. Leg Ulcer occur e.g. as consequence of a diabetes mellitus, an arterial obstructive disease or a chronic-venous insufficiency and persists through the basic illness.

143 Frykman GK, Wood VE, Unsell RS, J Hand Surg (Am). 1986 May;11(3):344-9

144 Basset CA, Schin-Ascani, Calcif Tissue Int 1991 Sp;49(3):216-20

145 Holmes GB jr. Foot Ankle Int 1994 Oct;15(10):552-6

146 Marks RA, Adv Ther 2000 Mar-Apr;17(2):57-67

147 Bose B, Adv Ther 2001 Jan-Feb;18(1):12-20

148 Mooney V, Spine 1990 Jul;1(7):708-12

Study examples:

31 patients with chronic leg ulcers. Result: After 8-weeks of magnetic field treatment significant advantages concerning wound deepness, wound size, pain and Granulation contrary comparison group.

72 diabetics with open legs. Under a magnetic field treatment the treatment time shortened with 58% of the test persons in relation to a standard treatment. It came to a faster necrolysis („dissolution of dead fabric“) and epithelialization („closing up the skin“).

20 patients with Decubitus. Only under a magnetic field therapy it came to a clear healing.

400 patients with badly healing wounds through wrongly intravenous applied Chemotherapy. Under a magnetic field the wounds healed 3 - 3.5 times faster than under conventional therapy. The entire treatment was 2-3-times faster

30 patients with cross section paralysis and Decubitus (20 stage II, 10 stage III). Magnetic field therapy over 13 weeks, 2-times a day for 30 minutes. Result stage II: Significantly faster healing than placebo. Result stage III: Significantly faster healing as placebo, however, with limited ulcer size

2. Pain treatment**Headache and migraine**

In Germany about 10 - 15% of the adults suffer from migraine and 20 - 30% suffer at least once a month from tension headache, 3% even chronically. For instance those half of the Migraine patient and 83% of the tension headache patients are not in medical treatment. They do not count on the fact that a physician can help them effectively.

Study examples:

12 Migraine patients with an average of 3.32 attacks per week. Cross-over Study Design, i.e. the placebo patients get the second time round an actual magnetic field treatment and vice versa Result: The accumulation frequency was reduced substantially after 14 days magnetic field treatment to 0,58 attacks per week. 42 Migraine patients. Application place thigh (!). Result of a 4-weekly magnetic field therapy: 45% good improvement and 15% excellent improvement. Group of comparisons: 15% good improvement, 15% degradation. Follow up examination after 1 month: Group of magnetic fields improved to 43% excellent improvement

149 Stiller MJ, Jondreau L, Br J Dermatol. 1992 Aug;127(2):147-54

150 Kuliev RA, Babaev RF, Vestn Khir IM II Grek 1992;148(1):33-6

151 Comorosan S, Stelea S, rom J Physiol 1993 Jan-Jun;30(1-2):41-5

152 Kiselev AV, Grushina TI, Vopr Onkol 2000;46(4):469-72

153 Salzberg CA, Byrne DW. Ostomy Wound Manage. 1995 Apr;41(3):42-4,46,48 passim.

154 Sherman RA, Robson L, Marden LA, Headache. 1998 Mar;38(3):208-13

155 Pelka RB, Jaenicke C, Gruenwald J. Adv Ther 2001 May-Jun;18(3):101-9

3. Arthrosis/degenerative joint illnesses

Under an arthrosis, one understands the abrasion of the joint cartilage. It is world-wide one of the most frequent joint illnesses. In Germany approx. 8 - 10 million people suffer from it. Due to bad positions, extreme overloading through sport or blood circulation disturbances, which should be taken into account. Also young people can suffer e.g. one hip joint arthrosis. Here, the blood circulation and a nourishing disturbance of the cartilage play a role, why, is inexplicably. And for many arthrosis no cause can be declared.

In the rarest cases the strong „arthrosis pain” are connected with a rubbing of bones, if the cartilage has gone. Rather a universal protective mechanism begins an imbalance. By pulling together muscles and volumes of the retaining apparatus it comes to an immobilizing of the joint. The hardened retaining apparatus leads to nerve squeezing and inflammations and produces „the typical “arthrosis pain.

Although pulsating magnetic fields provide Chondrocyten stimulation and can be able to produce cartilage, this is not an answer to a fast Pain reduction. Cartilages need to possess many months for growing and therefore provide a perfect alibi. The immediate effect, which astonishes again and again on a treatment of arthrosis, is connected obviously with a blood circulation increase in the retaining apparatus, which leads to a softening muscles and ligaments. Also it is not impossible that vegetative signals provide a relaxation impulse. The consequence is a pressure relief of squeezed nerves and a decrease of Inflammation reaction.

a. knee osteoarthritis

From a Knee arthrosis suffer world-wide approx. 20% of all people over 65 years. The treatment takes place usually symptomatically and covers pain killers, cortisone and hyaluronic acid

study examples:

176 patients. Pain reduction via magnetic field 48% contrary placebo 8%

27 patients. Pain reduction via magnetic field 23-61% contrary placebo 2-18%

86 patients. Pain reduction via magnetic field 27% contrary placebo 14%.

Follow up after 1 month: magnetic fields group had improved itself in mobility in relation to the group of placebos.

b. osteoarthritis of the hip

hip joint arthrosis are likewise an illness of the higher age. They are to be proven after the knee osteoarthritis the most secondary frequent form and with approx. 15% over 65-year old. It is particularly remarkable that also accumulated alcoholics are affected by it. Ultimo Ratio is an artificial hip joint.

156 Van Sasse JLCM, van Romunde LK, Valkenburg HA: Ann Rheum Dis 1989; 48: 271–280.

157 Jacobson JL, Altern Ther Health Med 2001 Sept-Oct;7(5):54-64 und 66-9

158 Trock DH, Engstrom BF, J Rheumatol 1993 Mar;20(3):456-60

159 Trock DH, Bollet AJ, Markoll R. J Rheumatol. 1994 Oct;21(10):1903-11

Study examples:

66 patients. After 4 weeks application of magnetic fields significant pain reduction and Mobility improvement, also still after 6 months.

Hip joint necroses . Pain and mobility improvement with 68% contrary to 44% in the group of placebos. Still after 5 years improved function under the magnetic field therapy

90 patients after implantation of an artificial hip joint (cement less). Magnetic field over 3 weeks. Result: If magnetic field-treated patients had clear less pain than the Placebo group in the first post mortal week. They were on 10-meter distance running faster and had after 3 weeks a higher Harris Hip Score. Success was thereby dependent on the dose.

c. Spondylarthrosis

Spondylarthrosis are arthrosis of the small eddy joints. The pain symptomatology is not usually to be directed abrasion. Rather it comes to loosening and shifts in the joint, so that the back musculature must take over more work. These tensions produce partial violent pain.

Study examples:

228 patients. Spondylitis in the Cervical region. Significant improvement contrary to Placebo.

34 patients. Spondylitis in the Cervical region. Treatment over 3 weeks. Result: Significant pain reduction in relation to group of placebos. Just as significant Improvement in the NPDS Score („neck pain/disability scale “)

d. ankylosing Spondylitis (Bechterew disease)

M. Bechterew is a chronic-inflammatory illness of the spinal column joints. It leads without inflammation therapy and intensive movement training to an eddy reinforcement and typically to an extremely bent attitude. Due to the muscular adjustment mechanisms it is very painful in the active phase.

Study example:

50 Bechterew patients of the stage I and II (after Steinbrocker). Constant Magnetic field therapy with ambulatory equipment over 4 weeks (1 mT, 2.5 - 3 Hz).

Result: 80% of the patients experienced subjective improvement. Objectively the so-called Severity index improved with 50 % of the patients. The Men ell indication disappeared with 30% of the Patients

160 Dal Conte G (1983) Studio controllato nella capacita die campi magnetici pulsati ad alleviare i sintomi della

coxartrosi. Atti 13 Congresso. Naz Simfer Verona 11: 98–104

161 Aaron RK, Lennox D, Bunce GE, Ebert T, Clin Orthop 1989; 249: 209-218.

162 Djurovic A, Zivotic-Vanovic M, Popovic D, Srp Arh Celok Lek. 2006 Sep-Oct;13. 4(9-10):414-9

163 Pages ICH, Hermann H, Conradi E, Z Physiother 1985;37: 21–24

164 Sutbeyaz ST, Sezer N, Koseoglu BF. Rheumatol Int. 2006 Feb;26(4):320-4. Epub 2005 Jun 29

165 Turk Z, Barovic J, Flis I, Z Phy Med Baln Med Klim 19 (1990) S. 222

e. Loosening of artificial hip and knee joints

In Germany, annually at least 170,000 Arthrosis patients decide for an artificial hip joint (total endoprosthesis TEP), European-wide even 550,000, with annually rising tendency (2%). The life span of such hip TEP amounts to an average of about 10 - 14 years. The cause is a prosthesis loosening, which becomes noticeable over an increasing pain symptomatology. Implant renewals can not be repeated arbitrarily, cause for the secondary implantation there is not enough sufficient bone material available.

Therapy results are evaluated after that so-called Harris Hip Score, that covers Pain sensations and the mobility with certain activities.

Study results: According to older Japanese studies, a necessary revision OP of TEP loosening after many-month magnetic field therapy can be postponed for an average of 1.7 years.

40 patients with TEP loosening. Magnetic field therapy over 6 months. Result: Clearly improved Harris-Hip-Score* with 53% of the patients contrary placebo (11%). However the relapse ratio amounted after 14 months subsequent treatment 60% and/or 90% after 3 years.

24 patients with TEP loosening. Magnetic field treatment over 18 months. Result: Significant improvement after Harris Hip Score concerning pain and hip movement, no improvement concerning diffraction and stretch in the comparison to the Placebo treatment.

* Harris Hip Score: judged are pain, function, Deformation and movement extent. Maximally attainable score 100.

4. Tendopathology (tennis elbow, shoulder arm syndrome, Fibromyalgia)

By Tendopathien one understands degenerative or spontaneous changes of the sinews and sinews onset, which are mainly noticeable as concentration and hardening of these structures with movement-dependent pain apparent. Tennis elbow, Shoulder arm syndrome, Impingement syndrome, Biceps syndrome etc. are the pertinent disease pictures, with which all of us made already an unpleasant form of acquaintance. It is to be assumed that those as „chord sheath inflammation“ diagnosed, acute pain conditions on arm and hand correspond to a large extent to a genuine Tendopathology.

A special case of the Tendopathology is „the generalized Tendopathology“, also named as Fibromyalgia syndrome. It is all about a multiplicity of muscle and sinews starting points - where they pull on the bone. The illness „walks“. So back pain lasting for weeks can suddenly stop and wonder in the chest or the hip region.

166 The Harris hip score. Comparison OF patient self report with surgeon ate. The journal OF Arthroplasty, 1969, volume 16, Issue 5, Pages 575 - 580 N. Mahomed

167 Kennedy WF, Zuege RC, Dicus WT. Clin Orthop Relat Res. 1993 January; (286): 198-205

168 Konrad K, Sevcic K, Molnar E. Clin Rheumatol 1996 July; 15 (4): 325-8

On the Fibromyalgia are unexplainable only woman affected, in Germany about 800,000 - 1,600,000. Some hospitals for rheumatic diseases have a part of Fibromyalgia of 30 - 40%. There is no existing effective therapy. Therefore this illness leads often to the early retirement.

On the effect of blood circulation increase and vegetative signalling, counts the Tendopathology among the parade operational area for the magnetic field therapy. With the special case Fibromyalgia, one should be however rather sceptical.

Study examples:

29 patients with shoulder arm syndrome. Result: Significant improvement after 4 weeks contrary placebo. At the end of the study 65% of the patients were symptom-free and further 14% described an improvement of the troubles. This is important, as the success ratio conservative treatments only lies by a small percentage.

60 patients with tennis elbow. Examination with VAS Score (visual analogue scale). Result after 3 months: The VAS Score was under a magnetic field therapy significantly lower than in the group of placebos, i.e. fewer pain in resting, with movement and night.

94 Fibromyalgia patients. Divided into a group of placebos, group more conservatively Treatment and two groups of different static magnetic field treatment. Treatment time 6 months. Result: Significant general pain improvement and improvement of the pain on „the tender POINTs “contrary to placebo and conservative treatment.

29 patients with Rotatoren seal syndrome. Result: Significant improvement contrary to Placebo

22 patients with Periarthropathia humeroscapularis („shoulder arm syndrome “). Result: Highly-significant intensive pain in the group of placebos. Significant reduction of total pain and movement pain in the Verum group Further studies see to ^{175,176}

5. Neurology

a. Sleeping disorder

Whoever suffers from sleeping disorder has often the feeling, to be the only one, who tosses himself through the night. This subjective impression is deceptive: In the western industrialized countries suffer 20 - 30% of the population on sleeping disorder. 10-15% of them are in need of treatment. One differentiates between falling asleep and sleeping through problems. The sleep quality depends again on the sleep typology of the REM (dream sleep) or the deep sleep.

¹⁶⁹ Richards, J Alternat Compl Med 1997;3(1):21-9

¹⁷⁰ Binder A, Parr G, Lancet 1984 Mar 31;1(8379):695-8

¹⁷¹ Uzunca K, Birtane M, Tastekin N, Clin Rheumatol. 2007 Jan;26(1):69-74. Epub 2006 Apr 22

¹⁷² Alfano AP, Taylor AG, Gillies GT, J Altern Complement Med. 2001 Feb;7(1):53-64

¹⁷³ Binder, A, Fitton-Jackson S, Lancet. 1984 Mar 31;1(8379):695-8

¹⁷⁴ Ammer K, Mayr. K, Z Phys Med Bain Med Klim 19, 1990, 222

¹⁷⁵ Binder A, Vancet 1984 March 31:695-698

¹⁷⁶ Chard MD, Lachmann SM. Br J Sports Med. 1987 Dec;21(4):150-3

In a dream memory, contents are tightened, i.e. are transferred to the long-term memory. The deep sleep provides the physical regeneration and the immune system. Also the growth hormone HGH, that only develops in the deep sleep, is considered as an important anti- Aging remedy today. While one has problems falling to sleep or sleeping through the dream phases cannot be suppressed, the deep sleep phases shorten and become "shallow". Problems sleeping through are usually connected with an internal problem, which lets one wake up early again. Statistically seen 44% of the people with sleeping disorders take sleeping drugs.

Study example:

101 patients with difficult falling asleep, night waking up or nightmares. Apart from the sleep improvement, also daily tiredness, headache and those Concentration ability were examined. Result: After 4 weeks magnetic field treatment there was a strong improvement of 70%, clear improvement of 24% and an easy improvement of 6% contrary to placebo (2% strongly, 49% easily or clearly, 49% no improvement)

b. Nerve injuries

Nerve injuries after accidents, herniated discs, sequence of operation etc.

study example: After surgical nerve seam, faster nerve growth under magnetic field therapy contrary to Placebo

c. Parkinson diseases

The conservative treatment of the Parkinson disease exists in the gift of L-dopa, which does not prevent a progressing of the illness.

Study examples:

Under a magnetic field therapy the fall inclination of the M. Parkinson-Patients are clearly lower e.g. (80 - 90%). At the same time the general Parkinson symptoms improved. It partly came too long continuing improvements of the so-called Dysarthry (speech disturbance). Also the cognitive achievements improved tremendously .

Patient with L-dopa-induced Dickensian. Result: A 6-minutes magnetic field treatment led to a nearly complete Remission Parkinson patients with smell problems (Olfaktori Dysfunktion). Result: Improvement only when 7 Hz, i.e. dopamine dumping and activation of the D2-Receptor specially only with this frequency

177 Pelka RB, Jaenicke C, Gruenwald J., Adv Ther. 2001 Jul-Aug;18(4):174-80.

178 Raji Am, J Hand Surg (Br) 1984 Jun;9(2):105-12

179 Sandyk R, Int J Neurosci 1996 Feb;84(1-4):165-75

180 Sandyk R, Int J Neurosci 1997 Nov;92(1-2):63-72

181 Sandyk R, Derpapas K. Int J Neurosci. 1992 Mar;63(1-2):141-50

182 Sandyk R, Int J Neurosci. 1999 Apr;97(3-4):225-33

2 Parkinson patients with sexual Dysfunction. Brief magnetic field treatment (pT) led to Libido increase and to spontaneous night erections. The assigned magnetic field intensities gravitate most studies exclusive within the pT-range. Therefore the assigned frequencies are solely crucial.

d. Multiple sclerosis

The MS is a so-called autoimmune illness, where the body-own defence system goes against a kind of protective layer (myelin sheath) of the central nervous system. The nerves die. Muscles reduce themselves because of the missing impulses. Paralysis and spastics concentrations of the remaining musculature are part of these cruel tale of woe. In order to anticipate it: Magnetic fields cannot heal the reason of the disease, but facilitate only the symptomatology. However, in an impressive way.

Study examples

38 MS patients. 1-week treatment, 2-times daily. Result: Clear anticlastic Effect.
30 MS patients. 2-monthly treatment. Result: Clearly positive effect on Spastics, blister control, cognitive abilities, mobility, tiredness and eyesight. Magnetic field treatment 2-times daily 16 minutes over 4 weeks. Result. Tiredness improvement with 18% of the participant (group of placebos of 7%). Because of a small drop in number this result is however not significant..

76 MS patients. 3-weekly treatment. Result: No improvement of the motor activity . Clear improvement of muscle tonus, measurement feeling, pain, more emotional Control, fear and depressive thought contrary to placebo

e. stroke/Apoplexy

80% of the strokes are based on an acute blood circulation disturbance of the cerebral vessels, 20% are due to a cerebral haemorrhage. Special „Stroke unit “in hospitals occupies the necessity to prevent late damage by as early a perfusion therapy as possible (2-hour window). After the acute therapy a rehabilitation should be taken place as intensive as possible.

Study example:

Patient of a ischemic stroke , 1 - 8 weeks magnetic field treatment in the sub acute phase. Result: Also after 12 months clear functional and neurological improvement contrary to placebo

183 Sandyk R, Int J Neurosci. 1999 Aug;99(1-4):139-49

184 Jacobsen JI, Panminerva Med. 1994 Dec;36(4):201-5

185 Nielsen JF, Jakobsen J, Mult Scler 1996 Dec;2(5):227-32

186 Richards TL, Lapin MS, Cunningham CA, J Altern Complement Med 1997 Summer;3(2):205

187 Mostert S, Kesselring J, Mult Scler. 2005 Jun;11(3):302-5

188 Broła W, Węgrzyn W, Czernicki J. Wiad Lek. 2002;55(3-4):136-43

6. Stress treatment

Stress one reacts-out over the Vegetativum (see appropriate chapter). One Prime example is hypertension, that roughly in 90% of the cases develops itself over „False processing of “outside requirements and internal attitudes by an over-activated Sympathicus. Another example would be diabetes Type-2, the so-called insulin resistance. If a cell is not sufficiently supplied with glucose, it develops „Cell stress “. This expresses itself in internal unrest, increased blood pressure and an increased heart frequency.

Pulsating magnetic fields possess the potential to repair the natural equilibrium between Sympathicus (activation) and Parasympathicus (relaxation). Not on purpose, but by a readjustment of a sympathetic duration. For this, however, rather higher field domains are necessary. With this regularization ability opens a multiplicity of operational areas, which do not lie by SE in the actual effect strength of a magnetic field.

Study examples:

Clear improvement of a vegetative Dystony /Hypotony
 Clear improvement of a vegetative Dysregulation /Hypotony
 Clear improvement of a hypertonia (animal experiment)
 Faster healing completely of peptical Ulcer/gastric ulcer
 Faster healing completely of duodenale peptical Ulcer/duodenal ulcer

There is, however, a warning , the operational areas of a magnetic field should be set broadly. Indications like a bone or a cicatrisation, arthritis and pain syndromes are always covered over a comprehensible study situation. Vegetative influences, to which even another stronger influence approaches to welfare mechanisms, are usually still too vague and give the Magnetic field therapist a more difficult argumentation. Obvious operational areas such as hypertension, sexual disorder, fears, an increased pain feeling, the Restless Leg syndrome, heartbeat disturbances etc. should be tackled therefore always without much waiving „EN passant “. And a further recommendation: If a magnetic field already possesses a high vegetotherapeutical potential, global complete body treatments (e.g. with a mat) should in relation to a local therapy (e.g. at the knee with a Knee arthrosis) the preference/advantage, always be given.

7. Immune system

The body-own immune defence is a very complex structure. Like it suddenly activates themselves or does not switch off is not completely clarified yet. If we are infected with viruses or bacteria, it is not sure whether we become an illness. With an intact immune defence an intruder would not impossible survive. It is therefore to be concluded that a banal cold, lyme disease, for hepatitis etc. only by a momentary function unfitness of the immune defence.

189 Woldanska-Okonska M, Czernicki J. Przegl Lek. 2007;64(2):74-71

190 Razumov AN, Mineeva EN, Vopr Kurortol Fizioter Lech Fiz Kult. 2006 Mar-Apr;(2):3-5

191 Anan'in NN, Vopr Kurortol Fizioter Lech Fiz Kult 2001 Nov-Dec;(6):18-20

192 Gmitrov J, Gmitrova A, Physiol Bohemoslov. 1990;39(4):327-34

193 Kravtsova TIu, Golovanova ES, Rybolovlev EV. Klin Med (Mosk). 2000;78(12):34-6

194 Kravtsova TIu, Kochurov AP, Vopr Kurortol Fizioter Lech Fiz Kult. 1994 Jan-Feb;(1):22-4

In the match preparation, have athletics, up to 6-times a year, to fight with an infection of Herpes. Likewise rises with high training intensity Risk of a respiratory tracts infection.

In the meantime the theory was confirmed in the animal experiment as „open window“, that worsened itself under stress for the immunity situation for the period of 1 - 3 days - with the consequence of a increased viral and bacterial infection risk. Because of the obviously adjusting influences on the autonomous of nervous system, results the immune-increasing effect of a magnetic field not only in a direct activation, but in a protection of the originally intact immune defence.

Study examples:

Mice with cancer tumour. Magnetic field treatment over 16 days. Result: Decrease of the tumour weight of 54% in relation to the group of placebos. Simultaneous rise of tumour necrosis factor alpha (TNF alpha)

Women. Magnetic field therapy stimulates the non-specific immune system.

For the immune-stimulating effects, thereby, crucial proofs are missing to a magnetic field therapy. The operational areas usually specified like increased infection sensitivity, chronic tiredness syndrome (possibly due to virus infection), stress-induced infections, as well as prolong Infects, can be recommended only to a certain extent.

8. Blood circulation increase

Under a blood circulation increase one understands, an increase of the tissue blood flow, which comes over an increase of the blood flow in the capillaries. Blood vessels branch out like a tree. From large Arteries they become arterioles. From the arterioles split again millions of capillaries, which only have a diameter of 3 - 8 μm . Unfortunately the diameter lies usually over a red blood corpuscle (erythrocyte). Erys get through only if they “stretch” themselves.

In each stress situation, the fabric tissue blood flow is reduced on wide ranges in our Organism. For this purpose the capillaries pull together and prevent additional swelling of the endothelium, a coming through for the oxygen-basic erythrocytes. Thus e.g. a lowered liver blood circulation causes an automatically lowered metabolic and decontamination function in a longer stress period A pulsating magnetic field promotes the blood circulation in a double way. First, once over the mechanism of a NO increase (see chapters....) is made, by Ca^{++} and secondly over vegetative caused relaxation of the blood vessels.

195 Yamaguchi S, Ueno S, Bioelectromagnetics. 2006 Jan;27(1):64-72

196 Gerasimov IG, Tedeeva TA, Vopr Kurortol Fizioter Lech Fiz Kult. 1998 Sep-Oct;(5):30-2

Arterial catch illness (AVK)

The cause of a AVK lies in the changes of the vessel wall. Reason for this is a Arteriosclerosis, e.g. due to smoking („smoker leg“) or diabetes mellitus. Although one should assume, that magnetic fields have influence, on those vessel extension and not on an existing „lime deposit“, then there are, from the Russian study literature a number of proves against it.

Study examples:

Animal study with experimental Arteriosclerosis. Result: Under magnetic field clear reduction of the Arteriosclerosis situation (metabolism /Immunoreactions) on that vessel wall.

60 patients with AVK stage IIA - III. result: Improvement of the Homodynamic under Magnet field

AVK stage III. result: Improvement of the capillary blood circulation under magnetic field around 75 - 82%

b. General Arteriosclerosis /Cerebrovascular /cardiac infarct

The parade operational area of a magnetic field therapy ,Arteriosclerosis might develop, for reasons of movement lacking. This covers not only a Arteriosclerosis of the heart wreath/ring containers, but also the cerebral vessels.

Study examples:

Animal study with experimental Arteriosclerosis. 10 meetings a 3 minutes. Result: Improvement of the metabolic disturbances on the inner wall of the heart wreath/ring and Cerebral vessels as well as improvement of the Microcirculation.

Animal study, over influence of an high-intensive magnetic field therapy (18 mT, 15 Hz) on a Ischemic of the brain region. Result: Blood vessel extension higher than in the group of placebos. Smaller nerve cell fall in the Verum group 102 patients with Cerebrovascular disturbances with hypertonic. Result: Significant hamodynamic improvement contrary to Placebo

Animal study. Experimental myocardial infarction with 340 rats. Result: Significant reduction of fabric tissue necroses after heart attack.

197 Gubka AV, Klin Khir. 1983 Oct;(10):70-1

198 Zubkova SM, Maksimov EB, Vopr Kurortol Fizioter Lech Fiz Kult. 1998 Jul-Aug;(4):31-6

199 Kirillov IuB, Shashkova SN. Vopr Kurortol Fizioter Lech Fiz Kult. 1993 Sep-Oct;(5):22-5

200 Kirillov IuB, Karpov EI, Vopr Kurortol Fizioter Lech Fiz Kult. 1992 May-Jun;(3):14-7

201 Romashov FN, Alekseev GI, Baranovich VIu, Khirurgiia (Mosk). 1982 Feb;(2):93-6

202 Gabriélian SS, Annaklycheva NA, Vopr Kurortol Fizioter Lech Fiz Kult. 1987 May-Jun;(3):36-9

203 Zubkova SM, Luk'ianova TV, Vopr Kurortol Fizioter Lech Fiz Kult. 2000 Jul-Aug;(4):3-7

204 Zhao L, Wang Y, Zhao D. Space Med Med Eng (Beijing). 1997 Aug;10(4):259-62

205 Miasnikov IG, ZH Nevropatol Psikhiatr Im S S Korsakova. 1992;92(1):63-7

206 Albertini A, Pierangeli A, Bioelectromagnetics. 1999 Sep;20(6):372-7

c. erectile dysfunction / impotent problems

A cause of erection disturbances are either the psyche or a Arteriosclerosis in the penis vessel. For this reason the medicine Sildenafil (Viagra®) can only influences on the organically caused erection problems. Here, a magnetic field treatment could be an advantage, ensures it nevertheless - beside the anti- arteriosclerostical effect - for a vegetative relaxation.

Study examples:

105 men with erection problems Result: Under magnetic field a clear improvement of the symptomatology of 70 - 80% of the test persons contrary to placebo 33%

20 men with erection problems. 3-weeks magnetic field treatment. Result: Under a magnetic field there was an improvement of 80% of the test persons in the erection strengths and the erection duration contrary to placebo 30%. The test people, which did not react to the magnetic field treatment, had all a influenzal infection.

116 men with erection problems. Age 20 - 60 years. Combination therapy with negative pressure and pulsating magnetic field. Result: Improvement of erection strength and erection duration of 85,7% the probanden

32 patients with erection problems. Result: Clear improvement contrary to the control group

9. Anti- Aging

Under anti- Aging, one understands, measures to stop or even turn around the ageing procedure. With the past (relatively primitive) strategies to take with Antioxidants or sex hormones influence one is still miles away of an effective anti- Aging. Results from the stress research get close, that the ageing procedure is connected very closely with a balanced Vegetativum. At the same time, it was clear ,that our organism requires strong movement attractions, in order to be able to become fully fair, its metabolic and cell renewal tasks. From the various effect potential of a magnetic field (blood circulation increase, increase of the number of mitochondria extension of the deep sleep phases and synthesis of Growth hormones result completely new accents in the anti- Aging therapy. Necessary long-term studies are not present for this yet.

10. Sport and Fitness

Above all the achievement sport avails already itself for many years of the magnetic field therapy . Similarly as in the initially mentioned horse sport , the reasons might lie in a completely legal „Doping “.

207 Gorpichenko II, Lik Sprava 1995 Mar-April;(3-4):95-7

208 Pelka RB, Jaenicke C, Gruenwald J. Adv Ther 2002 Jan-Feb;19(1):53-60

209 Karpukhin IV, Kazantsev SN, Vopr Kurortol Fizioter Lech Fiz Kult. 2007 Jul-Aug;(4):35-8

210 Shafik A, el-Sibai O, Int J Impot Res 2000 Jun>;12(3):137-41:discussion 141-2

a. Training optimization

Under a magnetic field treatment is an optimal or improved Endorphin cultivation to be expected. This leads automatically to an increase of the pain threshold, which permits again, a harder and more effective training in the achievement sport. Of same importance is the effect of the short term change-over into the aerobic phase. The reason is those already „forced“ exceeding ATP production, which come off by the strong recourse of the ion pumps. The bottom line is that a athletic has more ATP, with only a few minutes continuing application of magnetic fields. Simultaneous no further Lactate increase in the muscle is to be expected. Under aerobic phase, one understands, the power production with the help of oxygen. The energy output is substantially higher than in the anaerobic phase.

b. Sport injuries

this includes sinews inflammations, bruises, crush, compression, sinews cracks, muscle pulling, ligament tears, fractures etc. Each injury, i.e. tissue destroying follows generally to an inflammation, recognizably from the following cardinal symptoms: Over heating of the effected parts of the body, Turning red due to increased blood circulation, swelling by transferring liquid in the fabric tissue and pain by the fabric tissue pressure. The whole leads consequently to a function loss.

One differentiates between an acute phase (inflammation phase) and the proliferation phase, which begin approximately 48 hours after the injury. The acute phase, results in blood loss (Haematoma production) and on the release of inflammation mediator, which initiate the above motion. In the proliferation phase ,however ,begins the reconstruction of cell tissue, i.e. new capillaries sprout into the destroyed cell region. Between the 21. and the 60. Day begins finally the phase „of the Remodelling“. It serves the improvement of the new tissue

In the foreground of an acute injury always, also arises oedemas, which develop, because liquid penetrates fabric tissue increases. A magnetic field therapy is like a double edge sword. On one hand the fabric tissue blood flow increases and cultivates oedema, on the other hand a magnetic field reduces the inflammation reaction via lowering of Prostaglandin. If one takes however the experiences as a basis of the sport medicine, it seems recommended to begin with a magnetic field treatment in the acute phase. Operational areas, such as fracture treatment, cicatrisation, Tendopathien and vegetative Illnesses points out , very strongly to the indispensableness of a magnetic field in the Sport medicine. Experiences from the veterinary medicine seem to certify this. However a magnetic field element should always be individual

Study examples:

Animal study of an Achilles' tendon injury. 3-weeks magnetic field treatment. Result. Achilles' tendon growth around 69% faster than in a Placebo group

211 Canapp DA, Clin Tech Small Anim Pract. 2007 Nov;22(4):160-5

212 Nyland J, Nolan MF, Clin Sports Med. 2004 Apr;23(2):299-313, vii.

213 Strauch B, Patel MK, Pilla AA, J Hand Surg [Am]. 2006 Sep;31(7):1131-5

60 Professional players of the American football League (NAFL) with acute and sub acute Injuries of the movement apparatus. Result: 90% of the injuries improved pain reduction and function improvement after only one magnetic field meeting (60 minutes), i.e. pain relieving and function improvement. The Non Responder of 10% had chronic joint and ligament problems.

Animal study with injury oedema. Result: Static magnetic field reduces swelling by 20 - 50%. Extended vessels and narrowed blood vessels extended surprisingly under the magnetic field therapy

c. Co-ordination

Apart from technology, strength, patience and Stress resistant also the co-ordination ability plays a large role in the competitive sport . This get better obviously, by a pulsating magnetic field of high intensity in „the normal standing balance test “.

VIII. Side effects/contraindications

1. Side effects

Side effects are unknown during the magnetic field treatment. Humans also orthostatic problems („dizziness by getting up)should get up carefully , however, after a magnetic field treatment

2. Contraindications

A magnetic field should not be used:

Pregnancy

Babies

Electronic implants. Magnetic field intensities to 100 μ T are however harmless.

Study-moderately an influence border was drawn between 16 - 552 μ T with frequency width of 10 - 250 Hz, however, with the reference of a small practical Relevant.

Heavy heartbeat disturbances (starting from Lown IVb)

Heartbeat disturbances appear as tachycardia (acceleration) and bradycardia (Slowing down). They can attach the forecourts or the chambers of the heart. Tachycardia, or the heart can even stumble or interrupt. A special kind of the rhythm disturbance of the chambers (VES) is classified according to „Lown “. A repeating of more than 3 VES one calls it a salvo and/or than Lown IVb. Here it is, all about statement, as a potentially life-threatening illness which requires a cardiologic Treatment..

214 Ericsson AD, Hazlewood C, Markov M, Explore, Vol. 13, No. 6, 2004

215 Morris CE, Skalak TC, Am J Physiol Heart Circ Physiol. 2008 Jan;294(1):H50-7. Epub 2007 Nov 2

216 Morris CE, Skalak TC, J Appl Physiol. 2007 Aug;103(2):629-36. Epub 2007 May 3

217 Thomas AW, Prato FS, Neurosci Lett. 2001 Jan 12;297(2):121-4

218 Silny J, Arch Mal Coeur Vaiss. 2003 Apr;96 Spec No 3:30-4

A thyroid hyperactivity is released by uncontrolled production by thyroid hormones. It leads to internal unrest, hot flushes, heartbeats, weight loss despite increased appetite, sleeping disorder and exhaustion conditions. Since magnetic fields can motivate the blood circulation and the metabolism, it is considered here a relative contraindication.

Importantly: A Kropf (Struma) is the indication of the thyroid sub function. Here nothing is to be objected to a magnetic field treatment. The latest estimate that a magnetic field treatment can release a epileptically accumulation with Epilepsy patients, cannot be maintained any longer like this. In the meantime there are some references that extremely low flux densities (pT) with a weakening that accompany to accumulation frequency.

Study result:

150 epilepsy patients. Long-term study over 30 months. Result: Weakening of the frequency attacks. Restriction: It concerns a case study.

c. Doubtful contraindication tumour illness

Against different phrased publications, which bring in the course of a not emotion-free led electrical smog discussion, also therapeutic magnetic fields into the proximity of one Cancer endangerment : Magnetic fields do not cause cancer not even with continuous' application (24 hours).

A subsection of the WHO, the internationally Agency for Research (IARC), has published some numbers in the year 2001, that endangerment can not be left out. She had also forgotten to mention, that the genetically altered mice, which have already high-grade cancer sensitive by SE, with a Carcinogen („cancer-causing means “) were pre-treated. After a following long-term exposition with different magnetizing forces, it turned out, that the group developed, which did not get treated at all with a magnetic field, the highest, and the mice with magnetic field the smallest tumour frequency. From all that the IARC concluded that a cancer promotion is not impossible.

An endangerment is already impossible, because otherwise, the natural earth's magnetic field radiation would be a cancer promoter. Also one should consider, that e.g. a toaster, vacuum cleaner or a heating cushion have nevertheless a field strength of 100 μ T, a colour television 500 μ T, or a razor or a table lamp a full 1 mT,. Who thinks now, that he can save the investment of an expensive Magnetic field therapy equipment in favour of a household appliance multi-functional , will be disappointed: This device has definitely the missing frequency.

219 Weinstein S, Curr Neurol Neurosci Rep 2001 Mar;1(2):155-61

220 McLean, ,Engström S, Holcomb R, Epilepsy & Behaviour 2, 81-87 (2001)

221 Ossenkopp KP, Cain DP, Behav Brain Res 1991 Aug 29;44(2):211-6

222 Sandyk R, Anninos PA, Int J Neurosci 1992 Sep;66(1-2):75-85

223 IARC Monographs on the Evaluation of Carcinogenic Risks to Human, Vol 80, 19-26 June 2001

224 Veyret B. „Review of Animal Studies“, Laboratoire PIOM, University of Bordeaux, 33600 Pessac France

d. Magnetic field therapy on cancer

In-vitro-studies prove: Similarly, as for a standard cell magnetic fields for cancer cells ,represent a true inspiration and source of strength. This is valid definitely ,however, only for cell cultures in the Petri plate. As in the living organism („in-vivo“) cancer cells are subject to compellingly central and vegetative control mechanisms. Thus there are physicians, who achieved impressive results in the cancer treatment, with a pulsating magnetic field therapy. To what extent a maintained immune stimulation is the cause here, is undecided. And independently of this is, that each cancer tumour possesses „tumour-own defence“, which protect from a certain size („Pinhead“) against the body-own immune defence comprehensively.

e. Cancer therapy in connection with magnetic fields

The carcinoma treatment in connection with magnetic fields and/or frequencies took its beginning around 100 years ago. 1923 presented the Russian George Lakhovsky a magnetic „high frequency equipment“, which he had developed with the support of Nicola Teslas. Lakhovsky originally experimented with plants, at the well-known Paris hospital Salpêtrière. He was obviously able to heal artificially caused Tumour. Although there were shown in the Human medicine (hospitals in France, Italy and Sweden) quite convincing successes, it failed finally because of the conservative establishment.

Only some years late, built Royal Raymond Rife similar „high frequency equipment“, which in 1934 in San Diego hospital allegedly made a 100% cancer healing possible. In 1964 ,the Italian engineer Antoine Priore developed a further magnetic field therapy device. He had between 1964 and 1978 some amazing exciting cancer healings, which were published in the Comptes Rendus of the French Academy of Sciences.

In 17. Century created Parisians „Academy of the Sciences de l'Institut de France“ meets outstanding French and foreign scientists. With „the Comptes Rendus“ scientific work was spread in the form of proceedings in France and also internationally since 1835.

225 Govallo VI, Immunology of pregnancy and cancer. Nova Science Publishers New York, 1993

226 Acevedo HF, Human chorionic gonadotropin (hCG), the hormone of life and death: a review.

Journal of Experimental Therapeutics and Oncology 2:133-145, 2002

227 Lentz, MR, The phylogeny of oncology. Mol. Biother 1990, vol 2, Sept

228 Astra Zeneca Pressedienst 1995, Ausgabe 6, Artikel 4

229 Georges Lakhovsky, 1927: Contribution à l'étiologie du cancer (Gauthier-Villars et Cie)

230 Georges Lakhovsky, 1929: Les Ondes qui guérissent (Gauthier-Villars et Cie).

231 Georges Lakhovsky, 1931: L'oscillation cellulaire. Ensemble des recherches expérimentales (Gaston Doin et Cie).

232 Anastas Kotzareff, 1931: Traitements des cancers dits inopérables, incurables et abandonnés par la

radon-colloïdothérapie interne associée à des ondes électromagnétiques, "ondes ultra-courtes" (Vigot frères).

233 Lynes Barry: „The Cancer Cure That Worked. Fifty Years of Suppression“. Markus Books, P.O. Box 327, Queensville Ontario, ISBN 0 919951-30-9

234 Fr PS 1 342 772 "Procédé et dispositif de production de rayonnements utilisables notamment pour le traitement de cellules vivantes", angemeldet am 01.06.1962

235 Graille JM, „Dossier Priore“

236 C.R. Acad. Sc.Paris Bd. 259, S. 4895-97, 1964, Bd. 260, S. 2099-2102, 1965, Bd. 260 S. 2635-39, 1965, Bd. 262 S.2669-72, 1966, Bd. 263, S. 579-82, 1966, Bd. 268, S. 1889-92, 1969, Bd. 271, S. 877-

The entrance attempts took place with rats and mice, which died after an artificially caused cancer condition normally within 22 - 30 days. One treated now starting from the 10th day with Priore equipment, then it came to an involution, the tumour decreased and later healed completely. There took place a large part of the Priore research in the veterinary faculty of the university of Bordeaux and it grew to a political issue. Then they only spoke about of the so-called „Bordeaux machine“.

The descriptive frequency generators are absolutely comparable regarding the assigned intensities (60 - 120 mT) of the field strength of static magnetic field systems. They differ extremely, however, in their high frequency (300 kHz - 9.4 GHz) from the frequency circuit of newer devices - if one neglects that by means of pulsing also develop simultaneously extreme low frequencies. In the attempt to describe the effect of these frequency generators often, is a kind of „Re-programming“ of the cancer cell into the field. It would be much simpler, if the effect model of pulsating magnetic fields transfer also on the Lakhovsky to transfer Rife and Priore devices.

Cancer cells impress, on the one hand, by an uncommon vitality, on the other hand, they are, to a large extent, in a fermentation metabolism (anaerobic energy production), which come by a still unknown mechanism. Cancer cells crave for food and oxygen, but strange-prove exist an obvious obstacle, that oxygen does not arrive into the cell. Astonishing way is, the diaphragm potential of future and current cancer cells are far under what necessary one considers for a vital life. While the standard cell of a young healthy person Diaphragm has a potential of minus 70 mVs, and athletics can even reach up to minus 120 - 150 mVs, cancer cells bob up and down by around minus 20 mVs. If the trigger function of a magnetic field (see....) concerning ion pumps and Mitochondria-activation, get used, then an increase of the diaphragm potential would be expected. At the same time biological windows might exist, which correlate among other things even in the higher frequency range with receptors, which have responsibility for the cell function.

To what extent, one can again and again, can afford an immune stimulation with magnetic field of a crucial therapy contribution, is further open. Nevertheless the magnetic field treatment of the blood led by Mamma CA-female patients, and straight after to a re-infusion to a clear stimulation of the t, B and natural Killer cells.

Interesting also, are the results of a phase 1 study, to a magnetic field supported chemotherapy. The longer a magnetic field therapy, before and after the chemotherapeutic application took place, the stronger failed the cell protection for the liver, i.e. the side effects were reduced.

80, 1970, Bd. 272, S. 1003-6, 1971, Bd. 274, S. 488-91, 1972, Bd. 280, S. 1915-18, 1975, Bd. 286, S. 1487-92, 1978, Bd. 287 S. 575-78, 1978.

237 Lord Sally Zuckerman: „The great Bordeaux Magnetic Machine Mystery“. Sunday Times vom 07.01.1973

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239 Binggeli R, Cameron IL, Cancer Research, Vol 40, Issue 1830-1835, 1980

240 Cure JC, Cancer: An Electrical Phenomenon. The Human Dimensions Institute 1992

241 Cure JC, Sialic Acids, Chemistry, Metabolism and Function. A. Rosenberg / CL Schengrund, Plenum Press NY 1976

242 Zlatnik Elu, Starzhetskaia MV, Vopr Onkol. 2004;50(1):50-4

243 Salvatore JR, 26. Jahrestagung der Bioelectromagnetics Society, Hawaii 2003. BEMS 3/2004

IX. Practice of application

Therapists and users are to a large extent united: A sufficient Magnetic field effect can be reached after few minutes. In the course of a 8-minute treatment, time could establish itself as quasi irrefutable, basic rule for most equipment systems. A doubling on 16 minutes becomes only necessary on particularly persistent cases.

For an investigation transfers raises cAMP for a magnetic field stimulation, and after 8 minutes, falls again. The more deeply cAMP however sinks, the less the cell reacts.

However the entrance hypothesis is forgotten, when a magnetic field works not only over the receptor-stimulating frequencies, but also by its very own magnetic power. Accordingly, the study situation proves also, that in the bone, cicatrisation and pain treatment partly substantially longer treatment times supply much better therapy results than a short treatment.

Even if cAMP sinks after 8 minutes again, they are still after 30 minutes always estimated 20 - 30% of the original cAMP synthesis for those Receptor provoking available.

The ideal treatment time should lie thereby between 30 - 60 minutes, whereby one Bone healing can take longer treatment times. In practice, it can happen that a patient decides to several applications per day. This is however not recommended for imitation. One Magnetic field meeting of 30 - 60 min accumulates Ca^{++} in the cell. In a second or third treatment, which begins short time thereafter, the cell will not reacted any longer as desired and does not express itself in a kind „habituation effect. “Repeated releasing of the effect cascade is experimentally only 4 hour after the last treatment to full extent, possible.

Spirit workers should ease better during an application of magnetic fields, besides following important projects. Animal experiments occupy that Flux densities starting from 2 mT with a degradation of the cholinergic activity in the brain, are interconnected. This is, however, accurate for tasks of memory not favourably - only for the treatment time.

X. Summary/evaluation

Contrary to pulsating magnetic fields of low intensity (max. 100 μ T) magnetic fields with flux densities, which lie over 1 mT, possess a higher effectiveness with a similarly far range of application. The straight therapy width of magnetic fields is a danger for their reliability, since after life experience and logic, a system can never do everything. It appears, therefore necessary, to fasten the main indications on the basis objective criteria and a comprehensible effect model (e.g. receptors)

244 Ferndale RW, Murray JC, Biochem Biophy Acta 1986 Mar 18;881(1):46-53

245 Lai H, Carino M, Bioelectromagnetics 1999;20(5):284-9

The most scientific magnetic field studies exist in the area bones and cicatrisation, here particularly with bad healing fractures. The results are similarly secured in the pain treatment, whereby successes in the Migraine treatment are probably not only with a Endorphin stimulation, but also with one vessel change connected. Particularly to emphasize are successes with a erectile Dysfunction (Impotent), whereby the patient property of the relevant studies, originates surprisingly from a German Federal Armed Forces hospital (sic). To what extent a newer, yet not specified horse studies, to the so-called „Mare oestrus“, a general Libido stimulation suggest, are not finally examined yet.

Among the further „classical“ indications also count arthritis. It is completely no matter, whether it concerns arthritis of the small eddy joints or the knees or hip, where also all loosening of joint implants count.

Important is here, always the effect of a pain reduction and an improvement of the mobility. Data that magnetic fields are to increase the Melatonin production, cannot be occupied study-moderately. In that case it is rather the opposite. Melatonin takes a privileged position since the best-seller of the same name. The authors had the pineal glands of older mice transferred on boys and reverse again. The rapid retrogression of the old mice to juvenile Don Juan and the young mice to frail aged, it stimulated for conclusion to have discovered a young well hormone.

In the meantime one knows that other pineal gland hormones are responsible for this development. Melatonin lives however this very day of the earlier fame. Completely to injustice, because not in vain melatonin was for a long time in the visor of pharmaceutical industry to the development of one „pill for the man“. Cause were observations in the animal realm that a high Melatonin Spiegel lowers „the Oestrus“, thus the sex impulse.

A further important area of application is the form circle of neurological symptoms and illnesses. Here counts sleeping disorders of all kinds and a faster nerve regeneration after injuries. The successful prevention of a painful Neuritis might be after a belt rose, be secured. The spectacular results with Parkinson disease and multiple sclerosis are as far long not secured, as one and the same scientist publishes over it.

The much-considered depression treatment by means of transcranial magnetic field stimulation, has to do only very little with the magnetic field treatment, and is therefore , not ranked among the indication ranges. However the references increase themselves, that also with substantially low flux densities in the mT-range, a positive influence on mood is possible. But: Depressions impair much more strongly than a in a down mood.

246 Karasek M, Lerchl A, Neuroendocrinol Lett 2002 Apr;23 Suppl 1:84-7

247 Huuskonen H, Juutilainen J. Reprod Toxicol 2001 Jan-Feb;15(1):48-59

248 Regelson W, Pierpaoli W: „Melatonin. Schlüssel zur ewigen Jugend“. Goldmann-Verlag 1996

It should also be encouraged, to use magnetic fields also for an effective anti- Aging. As already explained, are metabolisms, Vitality and therefore the health inseparably with movement and physical training connected, which has genetic reasons. If magnetic fields increase the blood circulation, reduce stress and stimulate cells and have besides an unidentified potential in the Sexual medicine, a leading position of this procedure - even before the popular hormone and anti-oxide therapies.

XI. View

Some operational areas are already occupied experimentally or study-moderately, require however uncommon frequency circuits or flux densities, over as a general Therapy recommendation to be publicised. For this counts among other things the Psoriasis, an epilepsy, the incontinence and the Restless Legs syndrome.

1. Psoriasis

The Psoriasis could rank already soon among the operational area of the magnetic field therapy, discovered for the first time in a biophysical basic research Interference stream. The reason sounds logical: To skin cells of a psoriasis sufferer misses the important cAMP, which comes by means of magnetic field again to the synthesis.

Study example: 110 patients. Result: 100% healing completely in the head hair region, 73.7% (men) healing completely to the elbow (75% healing completely with women.)

2. Epilepsy

Even mentioned early as the contraindication epilepsy, one may make oneself in the meantime deserving hopes, that one profits from the magnetic field therapy. Altogether, however, such new indications represent more a view into the future, that they load the strong image of the magnetic field therapy unnecessarily. It remains hoping, that with it, one already begins long due discussion to the effect model.

3. Incontinence

Although to the stress and urge incontinence alone 54 studies exist and it is around one of the few of the FDA accepted themselves it indications, it does not appear legitimate to offer a reward them as general operational area of the magnetic field therapy. Because those, for this necessary flux densities lie with 118 mT - 500 mT (15 Hz) far over what can conventional μ T devices to master. It is however of the third equipment generation to be reminded here (e.g. MAS), which uses already higher intensities.

There are estimations that the load and urge incontinence concerns approx. 25 - 50% of all humans in the second half life. One understands by it, blister weakness, which is according to dominant doctrine due to a too weak pelvic floor. an incorrect closing muscle and with men by an increased prostate gland. Conservative therapy forms are a pelvic floor training, a bio feedback, electrical therapies and an operational re-development, which are disappointing in the long-term result. Contrary to the electrical therapy imported high-intensive magnetic field therapy stimulates the 1998 not the muscle, but the nerve cells, so that it comes clearly perceptible contraction of the transverse touched musculature of the pelvic floor.

249 Dertinger H. IMB. Nachrichten Forschungszentrum Karlsruhe Jahrg. 32, 1-2/2000, S.97-104
250 Castelpietra R, Dal Conte G. Minerva Med 1984 Oct 20;75(40):2381-7

Study examples:

27 female patients, of it half hysterectomy (with distant uterus). 2-times weekly treatment (20 minutes) over 6 weeks. Result: Symptom freeing and/or clear improvement with 63% ,

36 patient after radical Prostatectomy (distance of the prostate gland). 2-weekly treatment (20 minutes) over 2 months. Result: faster recovery of the Incontinent symptomatic, than improves clearly with the Placebo group.

50 female patients. 2-times a week treatment over 6 weeks. Result after 3 months: 32% were perfectly drying, 32% used thereafter only one PAD („a diaper “), 34% used more than one PAD per day.

The principle of the high-intensive magnetic field stimulation, is tested in the meantime also in the Sexual medicine and seems with women to improve the Orgasms efficiency. In similar ways also the treatment of men with a erectile Dysfunction (Impotent) might function: The nerve magnetic field stimulation prevents a blood discharge over the contraction of the pelvic floor and prevents an early Penis relaxation.

4. Restless Legs

Restless Legs is the feared syndrome „of the jerky legs and/or feet “. In bed or during a drive/a flight a kind of prickle and burning as well as an irresistible urge, of moving the feet and toes all night. It seems obvious to be connected with brief dopamine deficits. Following to the magnetic field results with Parkinson disease it is conceivable, to extend the indication in such a way. Unfortunately still no controlled studies are present.

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