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Study of a bionic system for health enhancements

Shujun Zhang^{1,3}, Michael Clark², Donghui Chen³, Luquan Ren³

¹*School of Computing and Technology, University of Gloucestershire,
the Park, Cheltenham, GL50 2RH, UK*

²*Magnacare Health Group, 20-22 Pemberton Street, Birmingham, B18 6NY, UK*

³*Key Laboratory of Bionics Engineering, Ministry of Education, Jilin University, 5988 Remin Street,
Changchun, Jilin 130022, China*

Abstract: It is believed that the health of our body is totally dependent on the health of our cells. The cell is the basic structural, functional and biological unit of all known living organisms. Cells consist of cytoplasm enclosed within a membrane. The membrane pulses at a certain frequency with certain magnitudes. More cell pulse activity there is, the more active, energetic and healthier cells are. Human and other animals live in an earth environment of extremely low natural frequencies (ELF). The earth produces these both high in the atmosphere (Schumann (7.83Hz)) as well as on and below the planet's surface (Geomagnetic (10 Hz)). Schumann and Geomagnetic frequencies are vital to the wellbeing of all living things. It is believed that if we are in an environment with bio-inspired electromagnetic signals generated by mimicking natural earth and body cells frequencies (ELF's), then our cells will be more energetic and active, providing greater health.

In this paper, an innovative bionic system will be presented. This system can be used to generate bio-inspired electromagnetic fields (BPEF) by mimicking natural Earth, body frequencies and strengths. This innovative bio-inspired system has been applied for the health enhancement of humans, equines and pets etc. A number of case studies will be present to demonstrate the efficiency and effectiveness of the system. Various experiments have been carried out. The experimental results have shown that this innovative bio-inspired system works efficiently and effectively in enhancing human and animal health. It has been proven that this bio-inspired system can be effectively applied to many areas such as (1) human health enhancement and illness treatment, (2) pet health enhancement, (3) equine health treatment and (4) reduction or elimination of 'jet lag'.

Key Words: Bionics system, health enhancement, bio-inspired electromagnetic fields

1 Introduction

It is believed that the health of our body is totally dependent on the health of our cells. We are in essence, cellular beings. Our 100 trillion cells intelligently communicate with each other at faster than light speed creating some 400 billion reactions every second which involve over 100,000 biomolecules. The cell is the basic structural, functional and biological unit of all known living organisms. Cells consist of cytoplasm enclosed within a membrane. The membrane of a cell pulses at certain frequency with certain magnitudes.¹⁻⁹ More the cell pulse is, the more active and energetic the cells are and the higher the cell health. Besides, our human and other animals lives in the environment on the earth with the extremely low natural frequencies (ELF) that the earth produces both high in the atmosphere (Schumann (7.83Hz)) as well as on and below the planet's surface (Geomagnetic (10 Hz)).¹⁰ Schumann and Geomagnetic frequencies are vital to the wellbeing of all living things. It is believed that if we are in an environment with bio-inspired electromagnetic signals generated by mimicking natural earth and body cells frequencies (ELF's) and magnitudes, then our cells will be more energetic and active, so we are healthier.

There have been many reports about the influences of electromagnetic fields on healthy conditions of human beings¹¹⁻²³. However, most of the previous research have been focused

*Corresponding author: Shujun Zhang, Email: szhang@glos.ac.uk.

on electromagnetic fields of wide range of frequencies and magnitudes. There have been limited reports on bio-inspired electromagnetic field and its effects on cells and health of human beings and animals. So it is necessary to investigate how to produce electromagnetic fields by mimicking natural Earth and body cell's frequencies (ELF's) and magnitudes and their effects on cells, human being and animals.

Following introduction, Section 2 discusses natural electromagnetic fields and its bio-inspiration for the bionic system design for generating pulsed electromagnetic fields, Section 3 presents the design, functions and the applications of an innovative bio-inspired electromagnetic field system and Section 4 presents a number of case studies. Section 5 draw the conclusions and discussion of the limitation of the study and suggestions for the future research.

2 Natural electromagnetic fields

Lipkova and Cechak found that human electromagnetic emission is in the extremely low frequencies (ELF) band.⁹ Though a cell measures about 10 microns, i.e. 10^{-5} m, it is still enormous to compare with particles carrying electrical charge (electrons) – there is place for at least 10,000 for them on the cell length and about 30,000 for them on the cell circumference. Cell interior is negative in respect to its surface and potential across the plasmatic cell membrane is reaching values between -20 mV and -200 mV. resting membrane potential (RMP) of the nerve cell is in range -40 mV to -90 mV, the sustained value is -70 mV. Aforesaid voltage values are really negligible; currents reach orders of magnitude of microamperes. Nevertheless, those values are not insignificant. Their experiment results shows that man is emitting electromagnetic energy in the frequency range of $0.5 - 30$ Hz and the currents in orders of magnitude of microamperes.⁹ There were harmonic components on frequencies of 2 Hz, 3 Hz, 4.2 Hz, 16.8 Hz and 21.3 Hz, incidental with the cardiac, breathing and cerebral functions in humans. As discussed above, the earth produces both high in the atmosphere (Schumann (7.83Hz)) as well as on and below the planet's surface (Geomagnetic (10 Hz)).¹⁰

Above scientific studies shows that (1) potential across the plasmatic cell membrane is reaching values between -20 mV and -200 mV, (2) man is emitting electromagnetic energy in the band of interest, deliberately to the frequency interval of $0.5 - 30$ Hz, within which, Schumann resonance of 7.83 Hz is.

These findings provide the bio-inspired motivation to design and develop a equipment that can be used to generate the similar electromagnetic fields by mimicking cell's potential, pulse frequency and magnitudes.

3 An Innovative bio-inspired electromagnetic field system

3.1 An Introduction to magnetic resonance induction therapy

Magnetic therapy is not a modern discovery. It was widely used by the Ancient Egyptians, Ancient Chinese and the Ancient Greeks. In 1773, Franz Mesmer began using magnets for healing. By 1884, about 10,000 physicians in the USA were successfully using various magnetic devices every day for therapeutic purpose. In 1900, a wide variety of therapeutic magnetic devices were offered to the public by Sears and other catalogues. In 1924, the Nobel Prize was awarded to W. Einthoven for the discovery of the heart's electrical nature. In 1929 Hans Berger discovered the brain produces a magnetic field of 7.83Hz, which led to another groundbreaking invention in medicine: The Electroencephalogram or EEG. In 1963 Bale and McFee discovered that the heart produces a magnetic field which is not surprising

as electric current always produces a magnetic field. In the USA doctors applied this discovery and saved lives every day by using the newly discovered Electrocardiogram. The latest discoveries show that each organ in the body has its own electromagnetic field and that this field covers the whole body. In Europe magnetic devices are used by private practices and in hospitals to speed up the healing process and to speed up recovery. We are subjected to magnetic effects in the environment every day of our lives and by our own magnetic energies generated at the cellular level and beyond. A force field of magnetic energy is created whenever a charged particle (e.g. an electron) moves. When billions of these electrons and other charged particles in your body move a multi-potential effect is exerted on you as a biological system. This effect is used by the Magnafield® unit in a positive way to assist in healing.

3.2 The Magnafield® and Magnapulse Development Background

Numerous types of electro-medical therapy systems for the treatment of injuries and painful conditions both in humans and in animals have been developed over recent years. Amongst these, Magnetic field therapy has been in use in the medical profession for over 60 years.^{14,15,18,20,23,24} Recent worldwide research into the effects of magnetic energy on body tissue has resulted in a clearer understanding of how and why magnetism plays such an important role in the balanced operation of every cell in the body. We have natural magnetic emanations from the earth itself at close to 10Hz and the outer orbit Schumann resonance at 7.83 to 7.96Hz both of which have a subtle but critical effect on all living matter.⁹ The last 18 years have seen several types of electro-magnetic therapy units come onto the market. Most of these utilise ‘direct, ‘uni-directional’ or ‘alternating’ modes of operation. All of these types have some benefit and have been used by clinics, hospitals and in the home.

Magnafield® and Magnapulse, a patented technology with extensive research and testing behind them, is one of the most advanced and effective units available. It has been successfully used in many situations and in many different countries.

3.3 System Design of The Magnafield®

Since Magnafield® and Magnapulse are the two different models of the same product based on the same technology, in this paper, only is the system design of Magnafield® presented. The Magnafield® was designed and developed by mimicking natural electromagnetic fields, as discussed in Section 2. The Magnafield mainly consists of (1) computer micro-processor for control the system, (2) signal generation unit that can produce bio-inspired electromagnetic fields in mV and mA with frequency range of 0.5Hz – 18Hz. There is one specific frequency at 7.83 Hz to mimic Schumann resonance and (3) output coil.

System Specifications

Model: MF2200

Input: 120V/240V AC +/- 10% ; 50/60Hz @ 0.1 Amp

Fuse: 2 x 20mm 5 Amp M205 Time Delay

Output: Pulsed 18V AC (13V rms)

Power: 10W pulsed, driving output coil

Induction: 0.4mV @ <0.2µT

Induced Current: In the micro Ampere range

Frequencies: 11 selectable in the range 0.5Hz – 18Hz

Timers: 20 minute standard duration;

‘Repeat Mode’ 20 minutes on followed by 20 minutes off then repeated until switched off.

Figure 1 shows the approximate shape of the predominant enclosed electromagnetic fields

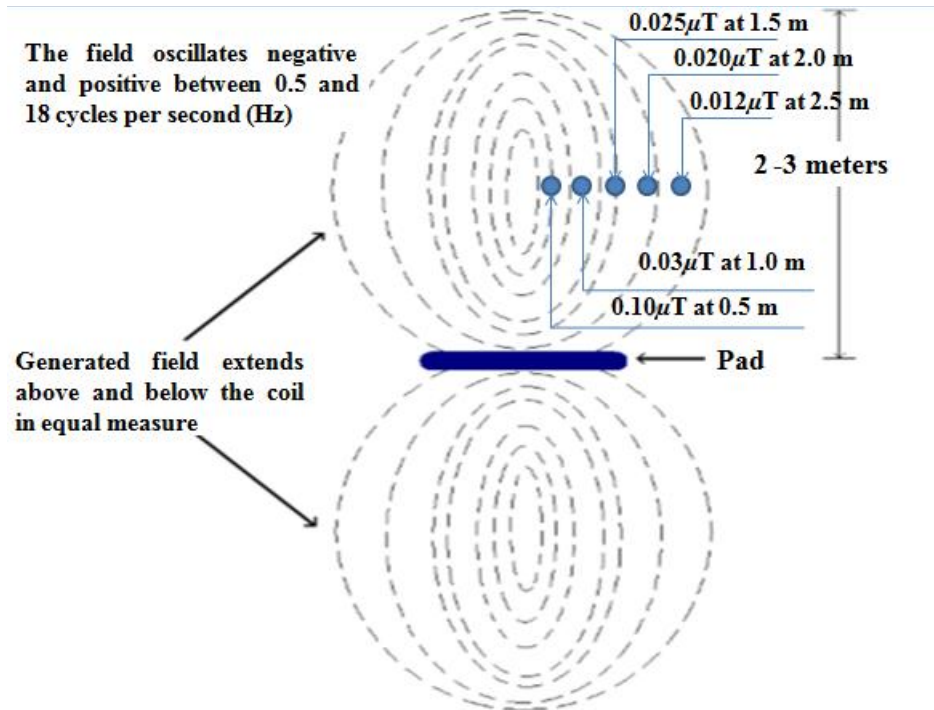


Figure 1 The approximate shape of the predominant enclosed electromagnetic fields when the frequency is at 12Hz

The strength of the bio-inspired electromagnetic fields is listed in Table 1.

Table 1 The strength of the signals.

Frequency	0.5Hz	8Hz	12Hz	Range
The strength of bio-inspired electromagnetic fields	0.05 μ T	0.07 μ T	0.10 μ T	50cm
	0.04 μ T	0.06 μ T	0.03 μ T	100cm
	0.025 μ T	0.028 μ T	0.025 μ T	150cm
	0.010 μ T	0.015 μ T	0.020 μ T	200cm
	0.006 μ T	0.008 μ T	0.012 μ T	250cm

Figure 2 shows the front and rear control panels.

3.4 Observed Magnafield® effects

Magnafield® successfully uses extremely low frequency, low power multiple form pulses. The oscillating electro-magnetic forces work in conjunction with a group of specific harmonics which are introduced through the body subjecting nerve and other cell tissue to changing electrical potentials which induce an analgesic effect and promote the healing of damaged tissue. The main effect of Magnafield® is at the cellular level.

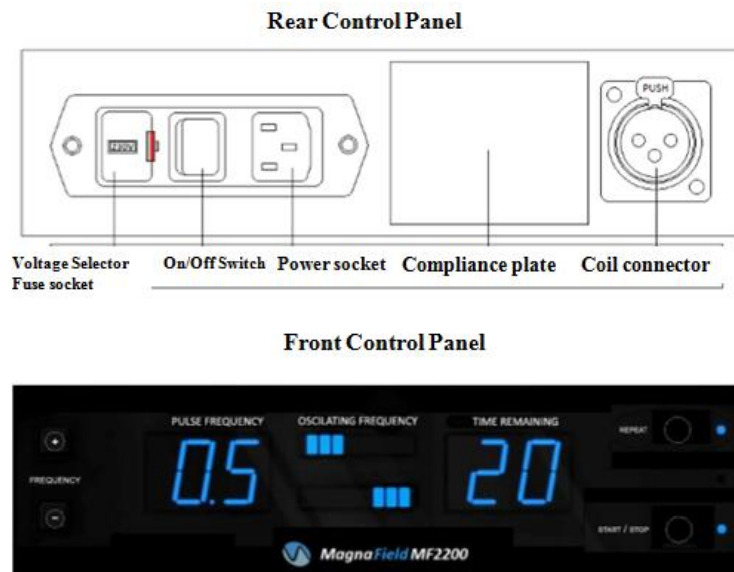


Figure 2 The front and rear control panels

The general effects of the Magnafield® are:

- 1) Ionic transfer - calcium, potassium, and sodium balanced may be restored (Essential for normal cell function & health)
- 2) Protein synthesis may be increased and absorption rate can be increased (Cellular uptake providing healthy tissue and muscle elasticity)
- 3) Acid/alkaline pH balance may be improved, particularly if too acidic (May assist with digestion; also helps with some arthritic conditions)
- 4) Inflammation, swelling and pain may be reduced at 0.05Hz to 3Hz (Temporary Relief) (Important phase prior to promotion of the healing process)
- 5) Cell regeneration and healing may be assisted: Oxygen transport and cellular uptake improved at 5Hz, 8Hz and 10Hz (Helps to promote good health)
- 6) Blood flow, peripheral circulation may be enhanced (Especially at 12-15Hz) (May improve peripheral circulation, healing rate and reduce risk of more serious injury)
- 7) Phagocyte cell production, T-cell and auto-immune system stimulation (0.5, 4 and 8Hz) (For health maintenance and improvement)
- 8) Endorphin, enkephalin, serotonin and nor-adrenaline release for pain inhibition (Stimulating the body's own natural pain inhibitors – temporary relief)
- 9) Synchronisation of dominant brain waves (0.5, 1 and 10Hz) (Assists with co-ordination and balance)

Another distinctive feature Magnafield® is its 'Repeat Function'. Magnafield® is the only electromagnetic field equipment that can be applied repeatedly and continuously without stop. Apart from single treatments in some clinical situations it is advisable to have repetitive multiple applications. The Magnafield® will do this automatically. the Magnafield® will automatically operate for 20 minutes (the timer display will count down). At the end of the 20 minute treatment period, the Magnafield® unit will stop for 20 minutes resuming treatment at the end of the rest interval. This cycle of 20 minutes on and 20 minutes off will continue until the unit is stopped.

3.5 Frequency – the key to effective treatment

It is recognised that the specific nature of the electromagnetic signals natural to the normal operation of the body. These are characterised by ultra-low frequency, low power, oscillating signals with a group of associated, specific harmonics.

In addressing any condition with the Magnafield® the frequency selection is the most important factor. In general, the following is a guide to the possible effects at various frequencies.

Generally under 10Hz: There can be a mild vaso-constrictive effect, increased lymph drainage effect, blood flow, inflammation, metabolism reduced or lowered

At 10Hz: Stabilising (re-balancing effect) liver function may be assisted

Over 10Hz: Mild vaso-dilative effect, assisted blood flow increase and cellular activity and metabolism increase

Some specific frequencies are reported to have the following effects as listed in Table 2.

Table 2 The effect of Magnafield® at some specific frequencies

Frequency	Effects
0.5Hz – 4Hz	Sedating, relaxing and calming effect; assists with deeper sleep. Reduction of bruising, bleeding. Lymph drainage (micro-muscular movement), best at 3Hz or 1Hz, pain relief(temporary).
0.5Hz – 1Hz	Pain relief (Temporary) – natural opiates released; lymphatic's assisted. Reported mitosis reduction or inhibition of rogue cell activity, oxygen absorption. • Balancing sodium-potassium cellular exchange; improved neurological signalling.
2Hz	Promotes phagocyte and T-cell production. • Reported stimulation of the immune system (Thymus).
3Hz	assist lymph drainage; also good for sleep where 0.5Hz is not benefitting.
4Hz	Pain modulation (temporary relief) if 0.5Hz or 1Hz are not helping.
5Hz	Increased DNA synthesis; cellular signalling; repair and healing.
8Hz	Muscle tissue repair; muscle tone; nerve regeneration. • Stimulation of ATP production. • Recharging and balancing of ionic and cell membrane potentials.
10Hz	General re-balancing of cellular activity; improved oxygen uptake; assists liver function.
12Hz – 15Hz	May assist in peripheral circulation; Increased blood flow through vasculature relaxation; more oxygen and nutrients available.
18Hz	Increased metabolic rate; pre-sport or pre-exercise (for generally healthy people).

In addition, it should be pointed out that the Magnafield® unit incorporates the preceding properties in its induced field. The Magnafield® unit was the first to reflect the added benefits gained at 1Hz – 5Hz. The unit had another world first with the introduction and

successful utilisation of 0.5Hz oscillating pulses. The 0.5Hz pulsed frequency is a special feature of the Magnafield®. This lower frequency offers the greater benefits of low frequency biological and bio-energetic electromagnetic induction.

All 11 frequencies promote tissue repair and there are no known or reported side effects of the Magnafield®.

In summary, the Magnafield® operates at the cellular level and beyond in an effort to assist the body to heal itself from the inside. Individual disease states and conditions are not normally subject to this approach. The intent is to make every cell of your body a healthy cell and by doing so equip your own body with the means to combat disease.

4 Experiments - case studies

This section presents a number of case studies to experimentally validate the effectiveness and efficiency of this innovative bio-inspired electromagnetic field system. The case studies include: (1) human health enhancement and illness treatment, (2) pet health enhancement, (3) equine health treatment, (4) reduction or elimination of jet lag.

4.1 Human health enhancement and illness treatment

4.1.1 Case 1

Name: Wendy Pearson; **Age:** 56 years old; **Gender:** Female; **Healthy Problem:** Psoriasis of the hands.

Effectiveness: In her own words: 'I have suffered from this condition for more than 40 years, as shown in Figure 3A. The images tell a better story than I can. I used the Magnapulse on an 8Hz setting for 4 months and the results can be seen, as shown in Figure 3B. My condition has almost cleared up completely which is nothing short of a miracle'.



Figure 3 The hands' conditions before and after using the Magnapulse on an 8Hz setting

4.1.2 Case 2

Name: Maureen Loseby; **Age:** 63 years old; **Gender:** Female; **Healthy Problem:** Chronic back pain for the last 20 years.

Effectiveness: Maureen was on strong pain killers in order for her to manage the severe back pain condition she had. As a public house landlady her duties were varied and many including standing for long periods of time behind her bar. Strong pain killers were the only method that helped her control the severe back pain she had to endure.

Maureen began using a Magnapulse at settings 8Hz and 16Hz depending on the severity of her pain. Within two days she had stopped taking pain killing drugs and her pain had diminished to the point where she was able to move freely in little or no discomfort. In her own words:

“I have no idea how the unit works, I only know that it does. You have given me my life back and made an old lady very happy”

Maureen started using the unit 6 months ago and is still pain free today.

4.1.3 Case 3

Name: Jim Turner; **Age:** 48; **Gender:** Male; **Healthy Problem:** The fast growing face cancer.

Effectiveness: Jim Turner, from San Antonio Texas, is a New York Times Best Selling Author of detective stories. He writes as James Houston Turner. He used to live in Adelaide, but went back to the US about 4 years ago.

In 1991 Jim was diagnosed with a fast growing face cancer. Doctors operated and removed part of his face, neck and shoulder. He came to Magnacare in very poor condition and started using a Magnafield. When he returned to Texas he took the smaller Magnapulse with him as well. On the morning of his departure back to the United States he made this comment:

“You don’t beat cancer fighting hard ... you beat it fighting smart.

Here I am on my 24th anniversary of the diagnosis that originally gave me 18 months to live. Some of you have stood by me all the way, especially my gorgeous wife Wendy. Thanks must also go to Magnacare and their amazing products the Magnafield and Magnapulse ... they seriously help!!”

Jim has a zero wheat and sugar diet. He eats a lot of fresh vegetables and very little meat.

4.1.4 Analysis

The case studies presented here were chosen specifically because of the differences in conditions and give good examples of the wide range of issues that bio-inspired pulsed electromagnetic therapy can deal with successfully. These case studies also highlight the important fact that BPEMF is not condition specific. BPEMF based on natural ULF’s and ULP reinvigorates the poor condition of cells encountered and by rectifying and enhancing that poor condition helps the body to better combat the root cause of the problem. Because

the action of BPEMF is based on natural frequencies and power levels no harm is done. If humans walked bare foot on the natural earth (Grass) they would receive earth based natural frequencies with no harmful effects. BPEMF is no different because it mimics natural processes.

4.2 Small animal health enhancement and illness treatment

In this case study, the Magnafield has been used to help quick recovering post operation and reducing the symptoms due to brain tumors. The test was carried out by Dr Roger Clemmons, and Dr Simon Platt's team at Department of Small Animal Clinical Science, College of Veterinary Medicine, University of Florida.

Dr Roger Clemmons, Dr Simon Platt's team have been using the Magnafield for the past three months on several types of clinical cases. To date, they have only used the pulsed electromagnetic induction therapy on dogs in the hospital. Since their practice is primarily referral neurological cases, like human medicine they deal with man back problems, brain tumors and epilepsy.

They have used the unit mostly in acute paraplegic dogs that have spinal cord injuries from herniated intervertebral discs. Because they only have one unit at this stage, and they receive between 2-6 cases of this problem per week, they have been using the Magnafield in the immediate post operative period on 0.6 Hz - Repeat mode for at least 24 hours. The length of time will vary depending on how many other cases they have that may need this type of therapy. Their test results have shown that the Magnafield's pulsed electromagnetic field therapy (1) reduces post operative pain and anxiety and eliminates the need for drug therapy which has the secondary effects that prolong recovery time, (2) has the positive benefits on spinal cord healing after treatment and help the dogs that had brain tumors become quiet, calm and would sleep.

In their own words:

'Typically dogs receive morphine for pain immediately post operatively with repeat morphine every 4-6 hours, as well as oral diazepam to reduce muscle spasms. With this type of drug therapy, dogs are sedated and disoriented for 12-18 hours post operatively. Many dogs are still anxious and appear distressed even on this drug therapy.

Although they can only at this point in time give our clinical observations, they have been impressed with the immediate post operative recovery of dogs receiving treatment with the Magnafield. In this study, they still often give one dose of morphine immediately post operative, but no other drugs. Within 3-4 hours the dogs are awake and responsive and appear relaxed. They think pulsed electromagnetic field therapy reduces post operative pain and anxiety and eliminates the need for drug therapy which has the secondary effects that prolong recovery time.

Using Dr Clemmons rat spinal cord injury model, they may further show, in a controlled objective study, positive benefits on spinal cord healing after treatment with Magnafield therapy.

They have used the Magnafield at 0.5Hz on Repeat mode, on two dogs that had brain tumors and were delirious, barking and hyperactive. They were in the intensive care unit and were disturbing the other animals and staff. Normally, they would have had to sedate them heavily. With the Magnafield, they became quiet, calm and would sleep.'

4.3 Equine health treatment

4.3.1 Introduction to the Case

In this case study, the Magnafield has been used to generate bio-inspired electromagnetic field for tumour treatment in an Arabian horse. Sarcoids, a form of skin cancer, are the most common of equine tumour. Conventional treatment, such as surgery, chemotherapy and immunotherapy, are painful for the animal and achieve limited success. Khalifa, a pure-bred Arabian horse, has been treated drug-free with BPEF for about six months with remarkable results.

As a 5-year old colt, Khalifa was suffering badly from the most the common tumour type facing horses: sarcoids. Sarcoids are the most commonly occurring equine skin tumour. They are likely to be associated with bovine papillomavirus (BPV), and their viral pathogenesis may be at least in part responsible for their spread within an animal.²⁵ They have been problematic for horses and their owners for centuries, partially because available treatments give such variable results and are often somewhat savage and painful for the animal. Conventional treatments include banding with rubber rings, surgical excision, cryosurgery, immunotherapy by injection with BCG (Bacillus Calmette-Guérin), radiotherapy and use of topical or injected chemotherapy agents.

4.3.2 Treatment and observation

The trial consists of continual treatment of the whole animal using a Magnafield MF 2200 set at 0.5Hz and extremely low power (8V 1A), and operating on a 20-minute duty cycle. The unit produces a field of some 2.5 m x 3 m, which is sufficient to envelope the horse when it is standing in close proximity to the field coil. The coil is placed in a specifically designed cradle suspended from a roof beam within the animal's stall, and with all cables and the Magnafield unit safely out of reach.

The duty cycle of the Magnafield unit comprises 20 minutes on at 0.5 Hz, followed by 20 minutes off. The unit is left switched on at all times and this 20/20 cycle is repeated continuously. The rest cycle is designed to avoid cell fatigue, which can compromise the efficiency of the treatment.

A daily observation sheet that includes a weekly comment section is filled in by those responsible for monitoring the animal's progress.

It has now been 6 months since the trial began, and the horse has been monitored throughout with photographs taken of the sarcoids at monthly intervals. The results so far have been nothing short of remarkable, as shown in Figure 4. From the figure, it can be seen that Sarcoids can be seen regressing in right image, having developed no further and are now

crusting and flaking off after 5 months. At beginning, it was believed that Khalifa needs around 6–8 months of exposure to the device for complete results – so things look fully on track for this lucky colt.



Figure 4 Sarcoids on Khalifa’s sheath at start of treatment (A) and after 5 months ago (B).

Without any drugs whatsoever, and retaining his normal diet, the horse showed almost immediate signs of improvement from the first day of treatment. The scar left by lancing one of the biggest of the sarcoids has healed so quickly that hair is now growing back, and there are no signs of returning infection – as usually occurs. The horse was badly infected in its groin area which, as you can appreciate, is not good for a breeding stallion. These have shrunk and continue to shrink so much so that the horse will be completely clear of the infection in less than one year.

Interestingly, a prediction was made on the day that the unit was first fitted. That prediction involved a question as to where the horse preferred to stand when in his stall, the answer being, “**Right next to his feed bag**”. The following prediction was made: “**In less than three months, his preferred place to stand will be directly underneath the field coil**”. Three months later, this is exactly where he preferred to stand and continues to do so.

4.3.3 An owner’s perspective

Jenny and Tony Lees, owners of Khalifa’s stud, Pearl Island, wanted to try something different. Around 5 months ago, a Magnafield was installed in Khalifa’s stable. Khalifa has experienced no negative side effects, but his owners have been stunned with the changes they have seen occurring over the last few months.

Jenny Lees said that “Khalifa has got sarcoids around the sheath and this is a very difficult area to treat conventionally even if there was a suitable treatment. In the past, we’ve had to rely on the sarcoids being burned off with toxic chemicals or them being injected with BCG after being banded. It’s often ineffective in the long term, is nasty for the horse and requires a lot of vet time during treatment, so is expensive. But since the Magnafield has been fitted in Khalifa’s stable, the results have been remarkable. We’ve seen no further development or growth in any sarcoids. Even more amazingly, over the last 4 or 5 months since the device was fitted, we’ve witnessed their steady and uniform shrinking, getting crusty and simply flaking off.”

4.3.4 Analysis

The bio-inspired pulsed electro-magnetic field treatment involves the application of specific power and frequency levels of pulsed electromagnetic fields to assist in boosting immune system response and thereby assist self-healing. This type of treatment is relatively new and

remains at the edge of conventional and complementary medicine, despite many scientifically validated articles that confirm and attest to its efficacy.

The application of this individual treatment originates from observational data derived from both human and animal patients that have benefited in the past from cellular status correction and improvement of a number of conditions. Pulsed electromagnetic field has been well established for the use of cellular stimulation in both human and animals. In this case, it involves a magnificent 5-year-old Arabian endurance and breeding stallion.

Although not proven, it is highly likely that contracting sarcoids is an indication of a severely depleted immune system, which may also be linked to the BPV virus. Given this possibility, it seemed logical to approach the problem from this perspective in the first instance. A drug-oriented approach relies on treatment without recourse to cause or nutrition, which could be a dominant factor in the dismal success rate of equine sarcoids treatment.

Animals of any kind are the best patients in the world. They carry no 'baggage'. They rarely, if at all, complain, and if something is doing them good they gravitate to it of their own accord. In my view, all zoos should have this type of system fitted to keep their animals in better condition.

In summary, Khalifa's apparent response to treatment is the first case that show the effectiveness of BPEF for the treatment of equine's sarcoids. So it cannot be used as the solid evidence of effect of treatment. This is because sarcoids can spontaneously regress for no apparent reason. And even if Khalifa was responding to treatment, until many horses have been evaluated, there is no evidence that all, or most, horses, will respond. But Khalifa is far from the only animal, or indeed even human, on which BPEF has been trialled. And Khalifa's response is one of a very large number of positive responses witnessed by many people using the Magnafield in different parts of the world. Animals like Khalifa are always interesting subjects for such treatments, because the device installed on the roof of his stable is unlikely to induce any placebo effect.

4.4 Reduction or elimination of jet lag

4.4.1 Introduction

In this case, the Magnapulse has been used for the people on long flights. It has been found that the effects of 'Jet Lag' on long haul flights can be minimised substantially. The provision of the important 7- 8Hz bio-inspired pulsed electromagnetic field frequency at the same intensity and power levels found naturally will greatly minimise the effect of 'Jet Lag' if not combat it entirely. The devices have been tested successfully on flights from London to Honolulu, London to Auckland, London to Malé (Maldives) and from London to Hong Kong, Amsterdam to Beijing and Frankfurt to Shanghai both ways. On each occasion there was no or small reported 'Jet Lag' effect either way. The London-Honolulu and London – Hong Kong flights have been tested 3 times, each time with no reported 'Jet Lag'.

4.4.2 Analysis

Ever since jet lag became a reported phenomena at the end of long haul flights and in the days that followed, the causes were believed to have their origins in the time differences between embarkation and destination. The most accepted reason is the disruption of 'Circadian Rhythms'.

Circadian rhythms are physical, mental and behavioural changes that roughly follow a 24-hour cycle, responding primarily to light and darkness in an organism's environment. They are found in most living things, including animals, plants and many tiny microbes. The study of circadian rhythms is called chronobiology.

It is believed that our biological clocks drive our circadian rhythms. The biological clocks that control circadian rhythms are groupings of interacting molecules in cells throughout the body. A "master clock" in the brain coordinates all the body clocks so that they are in synchrony. The 'Master Clock' that controls circadian rhythms consists of a group of nerve cells in the brain called the suprachiasmatic nucleus, or SCN. The SCN contains about 20,000 nerve cells and is located in the hypothalamus, an area of the brain just above where the optic nerves from the eyes cross.

Jet lag is said to occur when travellers suffer from disrupted circadian rhythms. When you pass through different time zones, your body's clock will be different from your wristwatch. For example, if you fly in an airplane from London to Beijing, you 'lose' 7 hours of time. So when you wake up at 8:00 a.m., your body still thinks it's 1:00 a.m., making you feel groggy and disoriented. Your body's clock will eventually reset itself, but this often takes a few days, for some people, it can be as long as two weeks.

The body's internal biological clock controls the body's Circadian Rhythms. In turn the biological clock has a strong relationship with the earth's natural magnetic fields (a kind of PEMF). Anything that disrupts the essential influences of the earth's naturally produced magnetic fields, particularly in the 7-8Hz range, will affect the body's internal biological clock and subsequently the body's circadian rhythms.

Any commercial high flying aircraft is in essence a pressurised Faraday cage. It is believed that on short flights of up to and including 6 hours duration and 2 hours time difference either way should not affect the passenger adversely. If the flight time and time difference between embarkation and destination exceeds 6 hours and 2 hours then an adverse effect will be noticed. The longer the flight and time difference the greater the effect of 'Jet Lag'

Because the aircraft is in essence a sealed and pressurised structure, the long haul passenger will be deprived of the essential life and health giving Schumann frequencies provided by the planet at both ground and high atmospheric levels.⁹ They will get 'Jet Lag' as a result of this deprivation. The severity of the condition will depend on the health of the individual and the length of time in the aircraft. The healthier they are the less they will feel the 'Jet Lag' effects. But they will feel it in some measure!

In addition, the reduced oxygen in the flight also has an effect. Normally, commercial airlines reduce the amount of oxygen in the cabin to reduce fire risk and the obvious cost of the oxygen. This lowered oxygen content in the breathable atmosphere of the cabin also adds to the 'Jet Lag' effect as the body needs full oxygenation of the circulatory system to function correctly. Lowered oxygen levels for the duration of even a 20+ hour flight is not life threatening but it does have an effect on the passenger which can manifest itself as a component of 'Jet Lag'.

If a passenger wears a Magnapulse at 7-8Hz, this device will create a local bio-inspired pulsed electromagnetic field around the passenger. This field functions like natural electromagnetic field with Schumann frequencies, then the passenger stays in the environment as he/she stays

on the earth. So the passenger will not be effected by the flying aircraft's pressurised Faraday cage. Besides, the bio-inspired electromagnetic fields also stimulate ATP production, recharge and balance of ionic and cell membrane potentials. The circulatory oxygen is also improved by the Magnapulse adding to the positive effect of the unit on the effects of 'Jet Lag'.

5 Conclusions

This paper presents an innovative bionic system that can be used to generate the bio-inspired pulsed electromagnetic field by mimicking natural Earth, body frequencies and strengths. This innovative bio-inspired system has been applied for health enhancement of humans, equines and pets etc. A number of case studies have been present to demonstrate the efficiency and effectiveness of the system.

Various experiments have been carried out. Experimental results show that this innovative bio-inspired system works efficiently and effectively in enhancing human and animal health. It has been proven that this bio-inspired system can be effectively applied to many areas such as (1) human health enhancement and illness treatment, (2) pet health enhancement, (3) equine health treatment and (4) reduction or elimination of 'jet lag'.

However, results obtained from the use of the Magnafield® can and will vary as no two people are the same. Every individual responds in a different way. The current limitation of this research is that (1) the data collection of the case studies does not follow a standard to ensure the consistency of the data collected, (2) the theoretical research on the working principle of the Magnafield is very limited, (3) though the frequency choices of Magnafield design are based on the bio-inspirations of natural Earth, body frequencies and strengths, the study has not covered the details for different organs and different health problems. So it is suggested that further research is carried out to solve these problems.

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