

**EMOST: Report about the application of low-frequency and intensity
electromagnetic fields in disaster situation and commando training**
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Running title: **Electromagnetic treatment in disaster and commando training**

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Abstract

Recently, we published our results (Bókkon et al. 2011 Electromagn Biol Med.) regarding the effectiveness of the EMOST (Electro-Magnetic-Own-Signal-Treatment) method for the reduction of phantom limb pain under clinical circumstances. However, EMOST treatments not only significantly reduced phantom pain, but that most of the patients also reported about additional benefits such as improvement of their sleep and mood quality after treatments. Here we report some unusual applications of EMOST method under special situations. That is, we report about our effective EMOST treatments of humans under catastrophic conditions and commando training course. This article points out that it is reasonable to apply biophysical electromagnetic management under unique circumstances. We also report some preliminary experiments on twelve members of our BioLabor regarding the effectiveness of single EMOST treatment on some serum parameters and electrocardiogram.

Keywords: EMOST treatments, Catastrophic conditions, Commando training

Introduction

To the best of our knowledge, the treatment of humans by low-frequency and intensity electromagnetic fields under special situations has never been reported before. In this article, we report on the application of our EMOST method (Electro-Magnetic-Own-Signal-Treatment) in disaster situation and commando training. The goal of this paper is to demonstrate the non ionizing biophysical electromagnetic management under real-life and unique conditions and not the presentation of clinical or controlled trials.

Health-promoting effects of low-frequency and intensity electromagnetic fields

While the health-promoting outcomes of low-frequency and intensity electromagnetic fields (LFI-EMFs) can be divisive, numerous experiments suggested that LFI-EMFs are able to initiate different healing processes, such as induction of analgesia, acceleration of bone fracture processes and wound healing (re-epithelialization), antiinflammatory effects, decrease of fatigue and depression symptoms, improvement of multiple sclerosis, fibromyalgia, and chronic pulmonary disease, improvement of cardiovascular parameters, improvement of sleep and psychiatric disorders, etc. (Baldi et al., 2007; Barzelai et al., 2009; Mach and Persinger, 2009; Mancuso et al., 2007; Nishimura et al., 2011; Sandyk, 1997; Ghione et al., 2005; Kumar et al., 2005; Lappin et al., 2003; Satter Syed et al., 1999; Selvam et al., 2007; Patruno et al., 2010; Sutbeyaz et al., 2009; Zhang et al., 2007; Tsang et al., 2009; Cvetkovic and Cosic, 2009).

The contradictions of LFI-EMFs on health-promoting effects are due to several factors, among them: the lack of standardized experimental circumstances; the unsystematic application of artificial LFI-EMF signals; and furthermore the cell type-specific redox status can also be responsible for the effects of electromagnetic expositions (Simkó, 2007).

Too long expositions of LFI-EMF treatments are also extremely problematic. During LFI-EMF experiments and treatments, LFI-EMF radiations with a short-term exposition (less than 45 min) can facilitate the immune system and cellular processes* (for example, through redox activation processes), but a long-term or continuous exposition to LFI-EMFs causes a decline in cytoprotection and can shift the redox and calcium homeostasis of cells (Di Carlo et al., 2002; Regoli et al., 2005).

***LFI-EMF exposition → stimulation of cellular membrane NADPH oxidase activity → superoxide redical generation O_2^- → increased activity of calcium channels Ca^{2+} and lipoxygenases → start of arachidonsav cascade and lipid peroxidation processes → expansion of signaling pathways in cells.**

EMOST system

Our EMOST medical device can detect and scene non-linear, bioelectric and bioelectromagnetic signals of the patient (Bókkon et al., 2010, 2011a, 2011b). The collected signals from patients' skin are processed by preprogrammed EMOST device (Fig. 1). The patients are treated by preprogrammed signals of EMOST device (frequencies are in the range of 1 Hz - 1 MHz; intensity range between 0.1-10 micro Teslas, via very special input/output flat electrodes). A particular feature of our EMOST method - compared to many

electromagnetic equipments - is that the patient's own bioelectromagnetic signals, which are detected from skin are processed via analogue manner (non-digitalized) inside the EMOST device. This signals are transmitted back via a flat electrode radiator through different band/signal combinations, with some amplification (-20dB- +60dB), to the skin's surface on the opposite side and extended by the higher range sounds of the signal. The special analogous signal process of EMOST device makes it possible that the biophysical information content of detected and back-transmitted electromagnetic signal is much larger than in digitized methods.

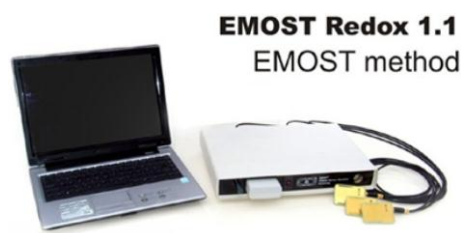


FIGURE 1 EMOST Redox 1.1 Medical Device (Certificate: HU11/6192) controlled by a personal computer.

Some possible effects of LFI-EMFs

Many possible mechanisms of various classical and quantum models have been suggested to elucidate the influence of LFI-EMFs in living systems (Binhi, 1999; Bókkon and Salari, 2010). A growing body of evidence suggested that several effects of LFI-EMFs therapies can be elucidated (or connected) by redox regulation and membrane-bound receptor mechanisms (Bauréus et al., 2003; Foster, 2003; Mathie et al., 2003). In addition, many experiments have revealed that reactive oxygen and nitrogen species as well as their derivatives act as essential signals in intracellular and intercellular communication (Dröge, 2002; Bókkon and Antal, 2011; Feissner et al., 2009; Kishida and Klann, 2007; Massaad and Klann, 2011; Powers et al., 2011; Valko et al., 2007; Zhang and Gutterman, 2007). The effect of LFI-EMFs on cell membranes and membrane-bound receptors can stimulate Ca²⁺-related pathways and free radical and redox-regulated processes. Thus, some of the fundamental effects of the EMOST treatment may be achieved via the redox balance of the body. It is likely that EMOST method can convey the detected and changed electromagnetic patterns of defective cells for surrounding and other cells, which facilitates intercellular communication via redox sensitive biochemical processes, and help restoration of homeostasis.

Biophysical therapeutic opportunities by LFI-EMF

Although modern pharmacology has made considerable progress in the medication of various diseases, we should also recognize that in many cases pharmacology treatments could be ineffective. In these cases, the biophysical LFI-EMF methods may offer some additional opportunities, because in various diseases, living cells do not only show altered biochemical processes but also generate altered non-linear bioelectric and bioelectromagnetic signals. Since each patient has a unique description of his/her own particular diseases, application of bioelectromagnetic own signals (EMOST) of patients for therapeutic applications may be effective especially compared to the diverse, artificial electromagnetic signals.

EMOST: phantom pain, sleep and mood quality

Recently, we presented our results regarding the effectiveness of the EMOST treatment (for six sessions) and the reduction of phantom limb pain under clinical circumstances (Bókkon et al., 2010, 2011a, 2011b). The EMOST method not only significantly reduced phantom pain, but also revealed additional benefits at most of the patients after expositions, such as improvement of their sleep and mood quality (Fig. 2).

We briefly mention here that we have established contact one year after our clinical EMOST experiments with those who took part in our research. However, there was no any further amputation in the EMOST treated patients during this year, and exposed patients reported a better general healthy states compared to sham exposed (control group). Pain is a key issue among veterans and members of the military due to increased survival rates from devastating injuries, including phantom limb pain after amputations (Ebrahimzadeh and Hariri, 2009; Wartan et a., 1997).

Since in many cases, various phantom pains can be disabling and can lead to a lifelong struggle with chronic pain, our EMOST method may offer a new possibility for the reduction of individual phantom pains.



Flat electrodes of EMOST device. The device cannot be seen in the photo.

FIGURE 2 Treatment of amputees by EMOST in the clinic.

Stress responses

Task stressors are a common problem in police officers, soldiers, veterans, as well as in special commandos (Carlier et al., 2000; Renck et al., 2002; Miller, 2011). The exposure to diverse violent situations, witnessing distressing events and seeing victims are some of the task related stressors. These task stress induced symptoms can range from mild to severe.

Traumatic stress experiences often produce peritraumatic stress responses during and immediately after effects of trauma and in subsequent acute and posttraumatic stress responses in stress exposed subjects. However, the perception of stress is individual dependent. What is stressful to **X** person may not cause stress in **Y** person, because it depends on the person's previous experiences, emotional and mental states.

Sleep disturbances and interpersonal problems are highly prevalent in military and police subjects with various scales of stress disorders that are associated with substantial comorbidities and increased healthcare risks (Capaldi et al., 2011). PTSD symptoms may include nightmares, disturbing thoughts, re-experiencing phenomena, being socially detached from family and friends, hyper-arousal (such as feeling angry, irritable), etc.

Several evidences indicated that traumatic stress exposures and PTSD are common anxiety disorders in military and police subjects as well as in normal populations and can be associated with cardiovascular diseases, chronic fatigue syndrome, musculoskeletal disorders, etc. (Boscarino, 2004). People with PTSD are more likely to have hypertension, obesity, hyperlipidemia, and cardiovascular disease.

The biological processes that account for the observed associations between PTSD and cardiovascular disease may relate to dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis and for continual over-stimulation of the autonomic nervous system that can promote the increases in blood pressure and lipid levels (Bedi and Arora, 2007).

Immune function changes in PTSD subjects may also influence circulating levels of interleukin-6 (IL-6), IL-1, tumor necrosis factor (TNF), and C-reactive protein (CRP) (Rohleder and Karl, 2006). However, inflammatory mediators such as TNF, CRP, and IL-6, can stimulate atherosclerosis. Interactions among the immune and neuroendocrine systems may partly account for associations between PTSD and chronic disease outcomes.

Psychological and medical treatments for PTSD include group or individual psychotherapy (for example, cognitive-behavioral therapy) and pharmacotherapy such as the use of selective serotonin reuptake inhibitors (Spoont et al., 2010).

EMOST treatment of police commandos during training exercise

In 2011, we performed some EMOST treatments of twelve Hungarian police commandos (elite forces) during their hard training exercise. During commando trainings, police officers had been exposed to very difficult physical and psychological conditions for three weeks. We provided our treatments (with official permission) on three consecutive days in the last week of exercising. The commandos came and went for shooting practice, physical training etc., and when they have a little pause, we performed EMOST treatments. As the Figure 3 shows, commandos were lying on the hard tables (sometimes with weapons) during EMOST treatments. So, the situation was very realistic.

The commandos were asked to rate their physical and psychological conditions on the 0–10 verbal numerical rating scale prior to the treatment and after the treatment during each three days. We also measured their cardiovascular risks prior to the treatments and after the treatments, and studied the speed of their reflexes via a simple task. Following the trend of the three treatments, after the third treatment, the studied parameters clearly showed a downward trend in cardiovascular risks, an improved physical and psychological conditions as well as a slightly increased reflex.

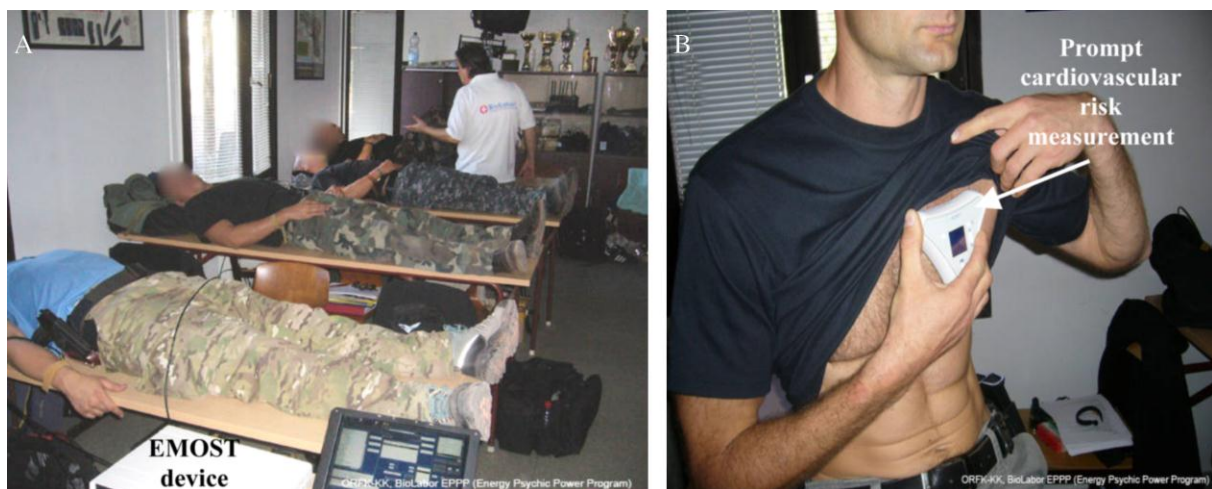


FIGURE 3 (A) Commandos were lying on the hard tables during EMOST treatments. (B) Prompt measure of cardiovascular risk.

EMOST treatments during flood disaster in Felsőzsolca, Hungary

Felsőzsolca is a small town in North-East of Hungary. In June, 2010 the biggest flood hit Felsőzsolca. Out of a total of 2200, about 1800 houses were damaged, and over 200 houses collapsed by the river Sajó. In addition to local residents, hundreds of soldiers, firefighters and

volunteers helped to save lives. The local government leaders as well as military and firefighter commanders continuously managed the rescue processes. Many managers had no sleep in 48 hours, and several residents suffered PTSD. Some voluntary psychologists also tried to reduce the extreme psychological stress caused by the flood.

Since our several years of EMOST application and our experiments indicated that EMOST can produce prompt effect to reduce stress and fatigue levels and to improve sleep and mood quality in patients, our BioLabor group also took part as volunteers in Felsőzsolca rescue-actions by EMOST treatments of several commanders and local residents that were exhausted at the border (see Figure 4 with our photos). We have treated about 80 managers and residents by some of special EMOST regeneration program. Most of the treated subjects rendered benefit improvements after 40 min treatment reported their reduced stress and fatigue levels and improved mood quality and concentration ability.

After traumatic stress (that frequently result in peri-traumatic stress), the sooner we use a variety of therapies, the smaller the chance to develop acute or posttraumatic stress state. However, biophysical LFI-EMF treatments may offer a special and prompt help in many particular situations.



FIGURE 4 Our photos have been taken in Felsőzsolca. (A) EMOST treatments of exhausted and stressed local residents, soldiers, firefighters. (B) Our car and local residents in a flooded street in Felsőzsolca, on June, 2010. (C) Residents used a boat to cross a flooded street in Felsőzsolca.

Preliminary experiments: Single EMOST treatment effect on electrocardiogram and the serum concentration of urea, albumin, cortisol, chloride, CPK, TSH, and CRP

We performed some preliminary experiments on twelve members of our BioLabor regarding the effectiveness of single EMOST treatment on some serum parameters and electrocardiogram (ECG). ECG results did not show statistically significant improvement after single EMOST treatment. In contrast, some serum factors such as uric acid, albumin, cortisol, chloride, Creatine phosphokinase (CPK), Thyroid stimulating hormone (TSH), C-reactive protein (CRP) indicated some remarkable changes following one treatment.

Cortisol, TSH, CRP, and CPK serum concentrations were reduced in the most of us. The albumin concentration usually showed a slight decrease and the uric acid concentration increased in almost all cases. Chloride level of serum showed a slight increase in almost every case. Of course, these few preface experiments have no great importance, but indicate EMOST treatment may reduce stress factors and affect on the redox/free radical processes as numerous studies reported regarding to the effect of low-frequency and intensity electromagnetic fields.

For example, cortisol levels were decreased in most of the members of our BioLabor after one EMOST treatment. Cortisol is a (glucocorticoid) steroid hormone that produced by the adrenal cortex in response to stress (Inslicht et al., 2011). Its major functions are, among them, to increase blood sugar through gluconeogenesis and suppress the immune system, but recent studies revealed that glucocorticoids (cortisol) have both stimulatory and suppressive effects on immune responses that are dependent on the GC concentration (Yeager et al., 2008).

Uric acid concentration increased in almost all cases after single EMOST treatment. However, uric acid is strong reducing agents (electron donors) and potent antioxidants (Warning, 2002). In humans, about the half the antioxidant ability of blood plasma comes from uric acid (Maxwell et al., 1997).

Chloride level also showed a slight increase in almost every case. Chloride is a prominent negatively charged ion in the blood, where it represents about 70% of the body's total negative ion content. However, chloride level has essential role of blood pH value that can influence pH-dependent redox/free radical processes. It seems that EMOST treatments may transiently potentiate functional redox processes.

However, we have started a large-scale, controlled testing of EMOST treatments (with forty subjects and with sham exposed controls) regarding its effectiveness on serum parameters and electrocardiogram. We hope that we can report the results in the near future.

Discussion and Conclusions

We have to stress again that our goal was not the presentation of clinical or controlled trials, but show the non ionizing electromagnetic management under real-life and also in unique conditions.

One may argue that the presented beneficial effects of our EMOST treatments were due to the placebo effect. However, it is unlikely that EMOST treatments could produce placebo effect on eighty subjects under flood disaster. In addition, during many years of EMOST application, we also effectively treated hundreds of children and babies with diverse health problems. It is also hardly possible that EMOST treatments could make placebo effects on babies. Furthermore, our recently published results on the effectiveness of the EMOST in reduction of phantom limb pain as well as improvement of the quality of sleep and mood in subjects under clinical circumstances also support the real effectiveness of EMOST.

Because the EMOST method based on non-linear, bioelectric and bioelectromagnetic signals of patients, it offers tailor-made opportunities. In addition, it is not realistic to apply a large number of psychologists under unexpected events and disaster conditions.

The presented EMOST application (Electro-Magnetic-Own-Signal-Treatment) under disaster conditions and commando training, may point out a further possible way of healing therapies in addition to the modern pharmacologic and psychological methods. We should also consider that the sooner we use a variety of therapies, the smaller the chance to develop acute or posttraumatic stress status after unexpected and disaster situations.

The aforementioned few preliminary experiments on members of our BioLabor regarding the efficiency of single EMOST treatment on serum parameters and electrocardiogram indicated that it is worthy to perform a large-scale, controlled testing that we have started.

Besides, not only for stress management should be considered, but also improve mental and physical states, concentration, cognitive and situation analysis abilities of exhausted troops and policemen after unexpected and catastrophic events.

In summary, we should consider biophysical electromagnetic managements as a further possible way of healing therapies in addition to the pharmacologic and psychological methods, especially under unique, unexpected and disaster situations.

CONFLICT OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content.

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References

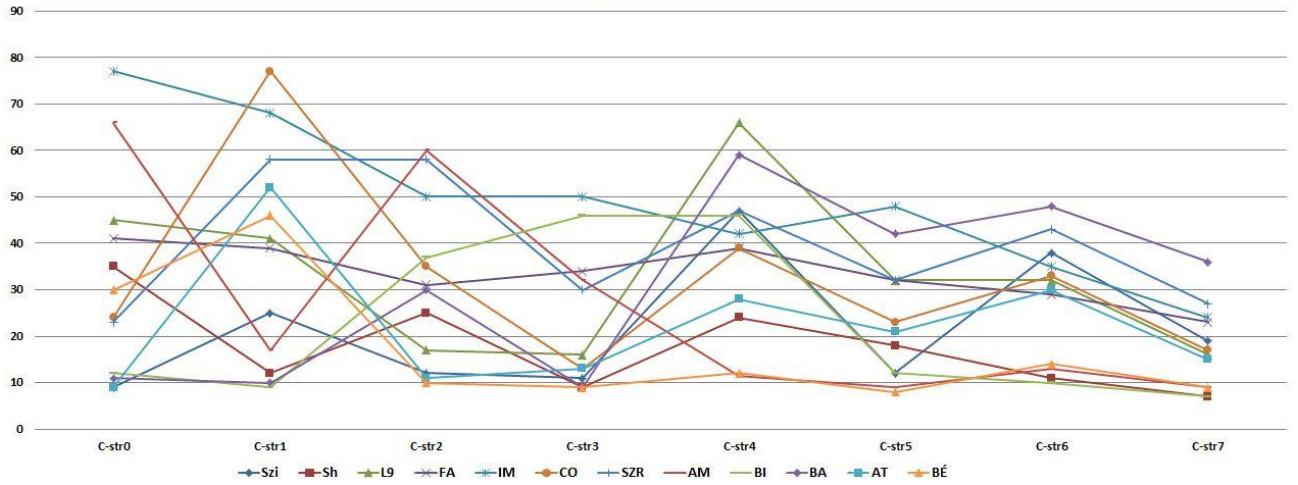
- Baldi, E., Baldi, C., Lithgow, B. J. (2007). A pilot investigation of the effect of Extremely low frequency pulsed electromagnetic fields on humans' heart rate variability. *Bioelectromagnetics* 28:64–68.
- Barzelai, S., Dayan, A., Feinberg, M. S., et al. (2009). Electromagnetic field at 15.95-16 Hz is cardio protective following acute myocardial infarction. *Ann. Biomed. Eng.* 37:2093–2104.
- Bauréus, K. C. L., Sommarin, M., Persson, B. R., et al. (2003). Interaction between weak low frequency magnetic fields and cell membranes. *Bioelectromagnetics* 24:395–402.
- Bedi, U. S., Arora, R. (2007). Cardiovascular manifestations of posttraumatic stress disorder. *J. National Med. Assoc.* 99:642–649.
- Binhi, V. N. (1999). An analytical survey of theoretical studies in the area of magnetoreception. In: Repacholi, M. H., Rubtsova, N. B., Muc, A. M. eds. *Electromagnetic Fields: Biological Effects and Hygienic Standardization*. (pp. 155–170). World Health Organization. Switzerland, Geneva.
- Bókkon, I., Antal, I. (2011). Schizophrenia: redox regulation and volume transmission. *Curr. Neuropharm.* 9:289–300.
- Bókkon, I., Salari, V. (2010). Information storing by biomagnetites. *J. Biol. Phys.* 36:109–120.
- Bókkon, I., Till, A., Erdöfi-Szabó, A. (2010). Phantom Pain Reduction by Non-ionizing Electromagnetic Treatment. *Hungarian Epidemiology* 7/4/Suppl.:15.
- Bókkon, I., Till, A., Erdöfi-Szabó, A. (2011a). Non-ionizing Electro-Magnetic-Own-Signal-Treatment. *Eur. Biophys. J.* 40 (Suppl. 1): S191.
- Bókkon, I., Till, A., Grass, F., Erdöfi-Szabó, A. (2011b). Phantom pain reduction by electromagnetic treatment. *Electromagn. Biol. Med.* 30:115–127.
- Boscarino, J. A. (2004). Posttraumatic stress disorder and physical illness: results from clinical and epidemiologic studies. *Ann. N. Y. Acad. Sci.* 1032:141–153.

- Capaldi, V. F., 2nd, Guerrero, M. L., Killgore, W. D. (2011). Sleep disruptions among returning combat veterans from Iraq and Afghanistan. *Mil. Med.* 176:879–888.
- Carlier, I. V., Voerman, A. E., Gersons, B. P. (2000). The influence of occupational debriefing on post-traumatic stress symptomatology in traumatized police officers. *Br. J. Med. Psychol.* 73:87–98.
- Cvetkovic, D., Cosic, I. (2009). Alterations of human electroencephalographic activity caused by multiple extremely low frequency magnetic field exposures. *Med. Biol. Eng. Comput.* 47:1063–1073.
- Di Carlo, A., White, N., Guo, F., et al. (2002). Chronic electromagnetic field exposure decreases HSP70 levels and lowers cytoprotection. *J. Cell. Biochem.* 84: 447–454.
- Dröge, W. (2002). Free Radicals in the Physiological Control of Cell Function. *Physiol. Rev.* 82: 47–95.
- Ebrahimzadeh, M. H., Hariri, S. (2009). Long-term outcomes of unilateral transtibial amputations. *Mil. Med.* 174:593–597.
- Feissner, R. F., Skalska, J., Gaum, W. E., Sheu, S. S. (2009). Crosstalk signaling between mitochondrial Ca²⁺ and ROS. *Front. Biosci.* 14:1197–1218.
- Foster, K. R. (2003). Mechanisms of interaction of extremely low frequency electric fields and biological systems. *Rad. Prot. Dosim.* 106:301–310.
- Ghione, S., Seppia, C. D., Mezzasalma, L., Bonfiglio, L. (2005). Effects of 50 Hz electromagnetic fields on electroencephalographic alpha activity, dental pain threshold and cardiovascular parameters in humans. *Neurosci. Lett.* 382:112–117.
- Inslicht, S. S., Otte, C., McCaslin, S. E., et al. (2011). Cortisol Awakening Response Prospectively Predicts Peritraumatic and Acute Stress Reactions in Police Officers. *Biol. Psychiatry* Epub ahead of print.
- Kishida, K. T., Klann, E. (2007). Sources and targets of reactive oxygen species in synaptic plasticity and memory. *Antioxid. Redox Signal.* 9:233–244.
- Kumar, V. S., Kumar, D. A., Kalavani, K., et al. (2005). Optimization of pulsed electromagnetic field therapy for management of arthritis in rats. *Bioelectromagnetics* 26:431–439.
- Lappin, M. S., Lawrie, F. W., Richards, T. L., Kramer, E. D. (2003). Effects of a pulsed electromagnetic therapy on multiple sclerosis fatigue and quality of life: a double-blind, placebo controlled trial. *Altern. Ther. Health Med.* 9:38–48.
- Mach, Q. H., Persinger, M. A. (2009). Behavioral changes with brief exposures to weak magnetic fields patterned to stimulate long-term potentiation. *Brain Res.* 1261:45–53.

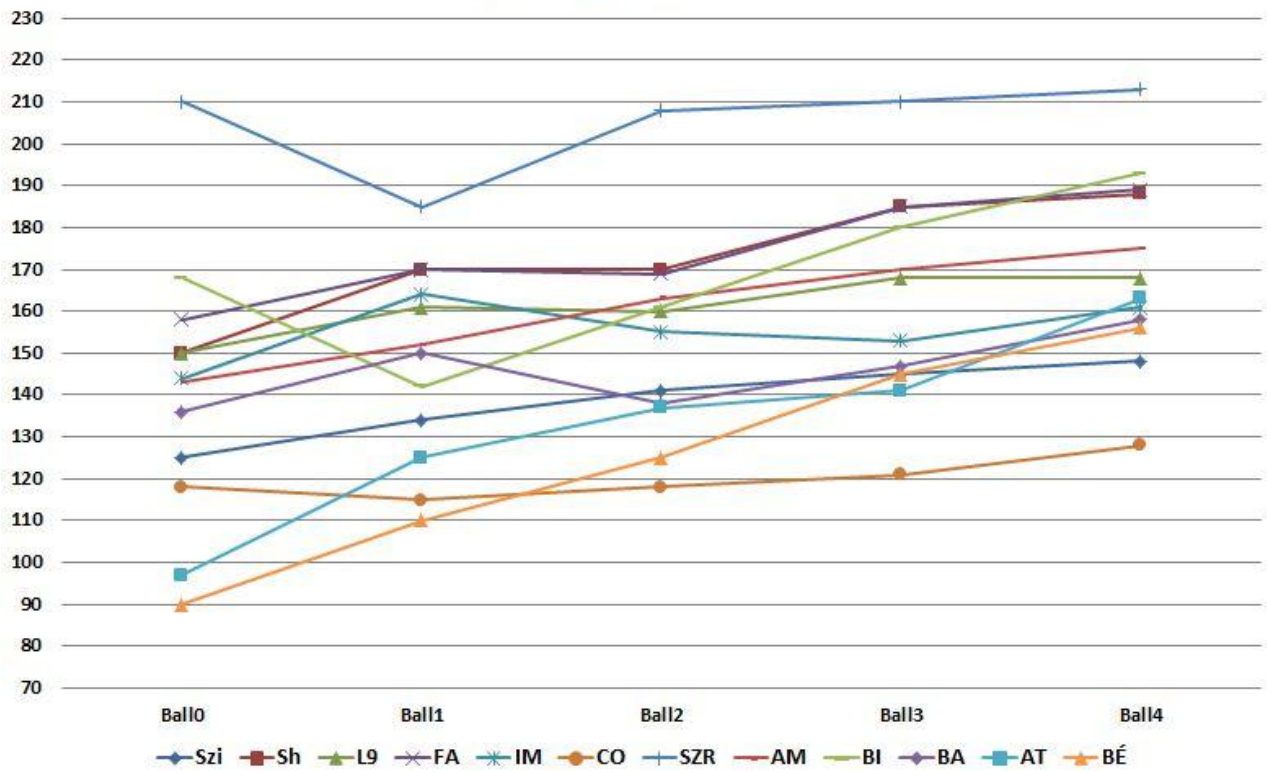
- Mancuso, M., Ghezzi, V., Di Fede, G. (2007). Utilization of extremely low frequency (ELF) magnetic fields in chronic disease; five years experience: three case reports. *Electromagn. Biol. Med.* 26:311–313.
- Massaad, C. A., Klann, E. (2011). Reactive oxygen species in the regulation of synaptic plasticity and memory. *Antioxid. Redox Signal.* 14:2013–2054.
- Mathie, A., Kennard, L. E., Veale, E. L. (2003). Neuronal ion channels and their sensitivity to extremely low frequency weak electric field effects. *Rad. Prot. Dosim.* 106:311–316.
- Maxwell, S. R., Thomason, J. H., Sandler, D., et al. (1997). Antioxidant status in patients with uncomplicated insulin-dependent and non-insulin-dependent diabetes mellitus. *Eur. J. Clin. Invest.* 27:484–490.
- Miller, G. (2011). The invisible wounds of war. Healing the brain, healing the mind. *Science* 333:514–517.
- Nishimura, T., Tada, H., Guo, X., et al. (2011). A 1- μ T extremely low-frequency electromagnetic field vs. sham control for mild-to-moderate hypertension: a double-blind, randomized study. *Hypertens. Res.* 34:372–377.
- Patrino, A., Amerio, P., Pesce, M., et al. (2010). Extremely low frequency electromagnetic fields modulate expression of inducible nitric oxide synthase, endothelial nitric oxide synthase and cyclooxygenase-2 in the human keratinocyte cell line HaCat: potential therapeutic effects in wound healing. *Br. J. Dermatol.* 162:258–266.
- Powers, S. K., Talbert, E. E., Adhietty, P. J. (2011). Reactive oxygen and nitrogen species as intracellular signals in skeletal muscle. *J. Physiol.* 589:2129–2138.
- Regoli, F., Gorbi, S., Machella, N., et al. (2005). Pro-oxidant effects of extremely low frequency electromagnetic fields in the land snail *Helix aspersa*. *Free Radic. Biol. Med.* 39:1620–1628.
- Renck, B., Weisaeth, L., Skarbö, S. (2002). Stress reactions in police officers after a disaster rescue operation. *Nord. J. Psychiatry* 56: 7–14.
- Rohleder, N., Karl, A. (2006). Role of endocrine and inflammatory alterations in comorbid somatic diseases of post-traumatic stress disorder. *Minerva Endocrinol.* 31:273–288.
- Sandyk, R. (1997). Treatment with electromagnetic fields reverses the long-term clinical course of a patient with chronic progressive multiple sclerosis. *Int. J. Neurosci.* 90:177–185.
- Satter Syed, A., Islam, M. S., Rabbani, K. S., Talukder, M. S. (1999). Pulsed electromagnetic fields for the treatment of bone fractures. *Bangladesh. Med. Res. Counc. Bull.* 25:6–10.

- Selvam, R., Ganesan, K., Narayana Raju, K. V., et al. (2007). Low frequency and low intensity pulsed electromagnetic field exerts its antiinflammatory effect through restoration of plasma membrane calcium ATPase activity. *Life Sciences* 80:2403–2410.
- Simkó, M. (2007). Cell type specific redox status is responsible for diverse electromagnetic field effects. *Curr. Med. Chem.* 14:1141–1152.
- Spoont, M. R., Murdoch, M., Hodges, J., Nugent, S. (2010). Treatment receipt by Veterans after a PTSD diagnosis in PTSD, mental health, or general medical clinics. *Psychiatric Services* 61:58–63.
- Sutbeyaz, S. T., Sezer, N., Koseoglu, F., Kibar, S. (2009). Low-frequency pulsed electromagnetic field therapy in fibromyalgia: a randomized, double-blind, sham-controlled clinical study. *Clin. J. Pain.* 25:722–728.
- Tsang, E. W., Koren, S. A., Persinger, M. A. (2009). Specific patterns of weak (1 microTesla) transcranial complex magnetic fields differentially affect depression, fatigue, and confusion in normal volunteers. *Electromagn. Biol. Med.* 28:365–373.
- Valko, M., Leibfritz, D., Moncol, J., et al. (2007). Free radicals and antioxidants in normal physiological functions and human disease. *Int. J. Biochem. Cell. Biol.* 39:44–84.
- Waring, W. S. (2002). Uric acid: an important antioxidant in acute ischaemic stroke. *QJM.* 95: 691–693.
- Wartan, S. W., Hamann, W., Wedley, J. R., McColl, I. (1997). Phantom pain and sensation among British veteran amputees. *Br. J. Anaesth.* 78:652–659.
- Yeager, M. P., Pioli, P. A., Wardwell, K., et al. (2008). In vivo exposure to high or low cortisol has biphasic effects on inflammatory response pathways of human monocytes. *Anesth. Analg.* 107:1726–1734.
- Zhang, D. X., Gutterman, D. D. (2007). Mitochondrial reactive oxygen species-mediated signaling in endothelial cells. *Am. J. Physiol. Heart Circ. Physiol.* 292:H2023–H2031.
- Zhang, X., Zhang, J., Qu, X., Wen, J. (2007). Effects of different extremely low-frequency electromagnetic fields on osteoblasts. *Electromagn. Biol. Med.* 26:167–177.

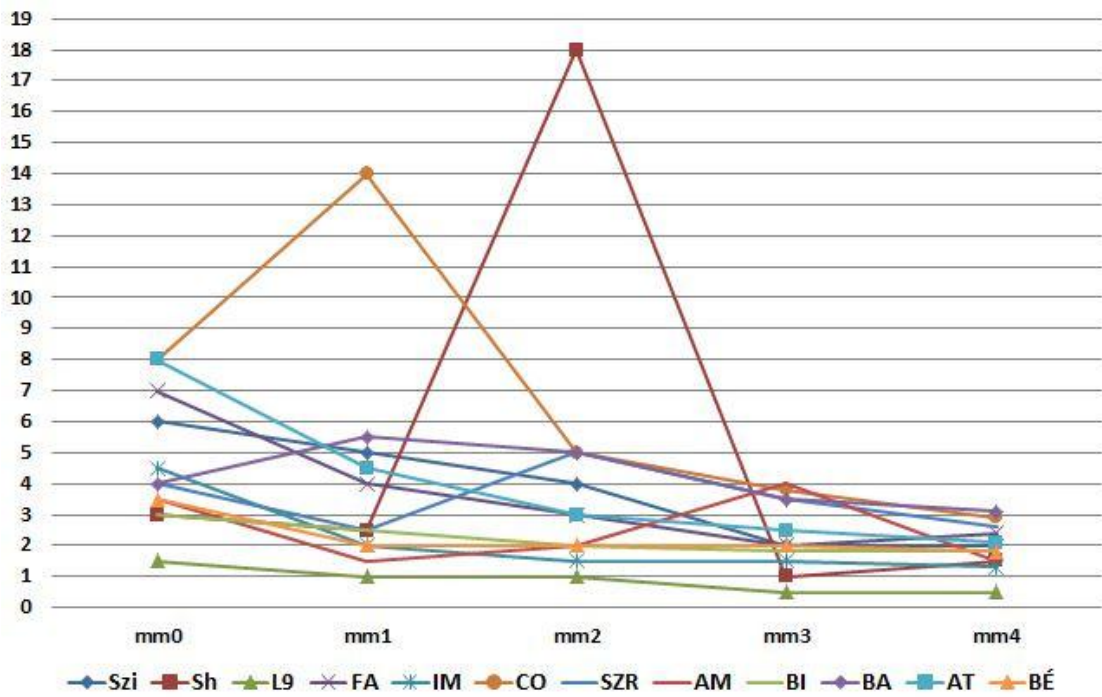
Changing in Cardio-stress



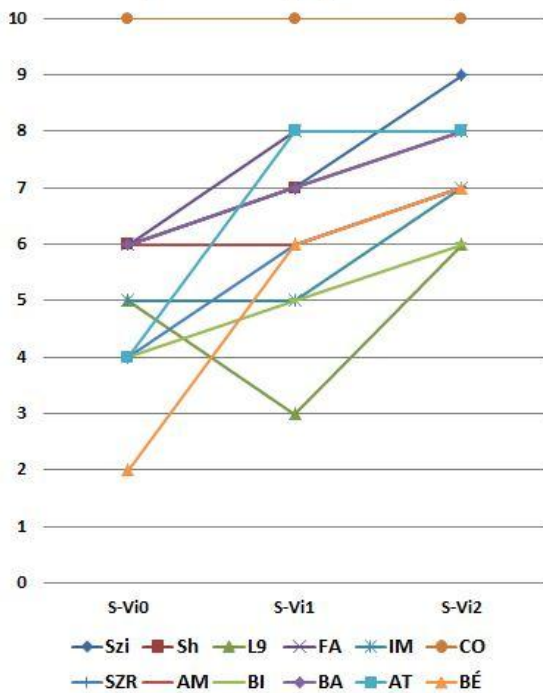
Changing in capacity, squeezes/min



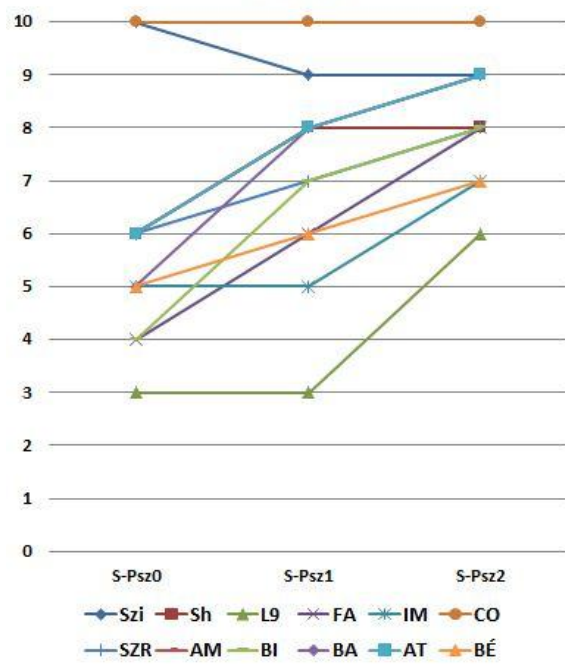
Changing in Reflex speed/mm



Subjective: changing in Vitality



Subjective: changing in Psychical balance



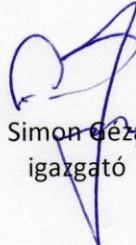


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Rendészeti Szervek Kiképző Központ
Lőkiképzés- és Intézkedéstaktikai Alosztály

Levél cím: 1097 Budapest, Vágóhíd u. 11-13.; 1903 Budapest, Pf. 314
BM ☎:28-012 Városi ☎:476-3445 BM fax:28-062 Városi fax:476-3446

Egyetértek:



Simon Géza
igazgató

Dr. Erdőfi-Szabó Attila Ph.D.,
BioLabor Biofizikai- és Laboratóriumi Szolgáltató Kft.

Tisztelt Dr. Erdőfi-Szabó Attila Úr!

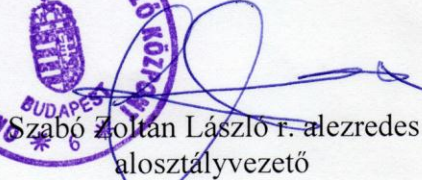
Hivatkozva 2011.11.15-i Beszámolójára, melynek tárgya a 2011.10.04-07. időszakban kiképzési programon résztvevő speciális rendőri feladatokat ellátó állományon végrehajtott EMOST típusú kezelések eredményessége, gratulálok, hogy a megküldött eredményeket elérte.

Az állomány körében folytatott konzultáció során a kezeléssel kapcsolatban csak pozitív visszajelzést kaptam. Sikerült teljesítmény növekedést és mérhető stressz terhelés csökkenést elérniük kiképzési helyzetben.

Külön gratulálok ahhoz, hogy a tapasztalt eredmények felülmúlták az Önök által előre megbecsült mértéket, és örömmel tölt el, hogy az ORFK RSZKK intézményben lett a világon először tesztelve életszerű bevetési környezetben a technológia.

Munkájukhoz, és a módszer további eredményes alkalmazásához sok sikert kívánok,

Budapest. 2011.11.28.



Szabó Zoltán László r. alezredes
alosztályvezető



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TO: Dr. Erdőfi-Szabó Attila Ph.D.,
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H-1122 Budapest Városmajor u. 20. I/20

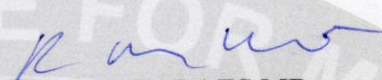
SUBJECT: **LETTER OF APPRECIATION**

DATE: 18 JUNE 2012

Dear Professor, dear Attila,

Congratulation to your scientific results, which were recently published in Electromagnetic Biology and Medicine (2012.VI, DOI: 10.3109/ 15368378.2012.681823). I see it as a great prospective in future not-yet-conventional training and rehabilitation processes.

With the hope of further successful cooperation I wish you all the best!


Lieutenant Colonel Robert BALAZS MD
Lessons Learned Branch
Acting Chief

