

Bemer Therapy as Help in the Training of Law Enforcement Professionals

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The quality of performance of public and professional services determines the stability and operational efficiency of a country. Workloads and the related expectations and tasks are putting increasing pressure on employees. At the same time, maintaining and preserving the health of regular members of the law enforcement bodies (war, migration, etc.) is crucial for the effective performance of their duties. Physical training is an important part of the education of law enforcement personnel, which includes, in addition to practical training, knowledge about exercise theory and healthy lifestyles. Another objective is to use effective technical equipment in the training. The aim of this research is to present the BEMER and its potential application in the physical training and rehabilitation of law enforcement professionals.

The effectiveness of the BEMER physical vascular therapy device has been proven by clinical research. BEMER is a medical device used especially in medicine (improving microcirculation, reducing pain, treating hypertension and fractures) and in sport (warming up, preventing injuries and treating injuries, and enhancing performance). In my research I will rely on the research methodology of the literature that is relevant to the topic of physical training for law enforcement professionals.

Rehabilitation devices used in medicine are gaining ground in public use. They are used for therapeutic, preventive or performance-enhancing purposes under the guidance of appropriate professionals. I believe that there is a need for rehabilitation tools, including BEMER, in the training of law enforcement professionals.

In my opinion, BEMER helps to improve the physical performance of law enforcement personnel. It is also suitable for post-injury rehabilitation.

The acquisition and use of additional smart devices (smart watches, body composition analyser, chest strap recording physiological data, etc.) could open up new horizons in the field of physical training for law enforcement professionals.

Keywords: law enforcement, physical training, physical vascular therapy

I. Introduction

Professional staff and persons undergoing law enforcement training are required by law to have their fitness assessed at specified intervals. The physical fitness check is carried out every semester for university students and every year for those in the ranks. Due to the specific nature of law enforcement work, it is important to maintain and improve physical and mental fitness and, in case of injury, to support and speed up recovery. The effectiveness of work and action is determined not only by physical fitness, but also by the technical skills, experience in action and tactics, professional knowledge and competence of the professionals. Thus, the right balance of mental, psychological and physical fitness has a major impact on the performance of professional staff.

Police work is in many ways similar to the training workload of an athlete. Such factors include the possession of specific conditioning and coordination skills, as well as a high level of emotional and cognitive skills. This means that there are also common opportunities to improve

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performance. According to the literature the use of BEMER physical vascular therapy enhances the development of endurance in athletes.

Before exploring the potential for improvement, it is necessary to clarify the legal background and to understand the theoretical and practical background of physical vascular therapy and how it works.

We need to gain an insight into the research results to date that confirm the feasibility of its use and the positive physiological and physiological effects to be expected.

A Legislative changes in physical fitness tests

After lengthy revisions the joint Decree 57/2009 (X. 30.) IRM-ÖM-PTNM ²was replaced by BM (Ministry of Internal Affairs) Decree 45/2020 ³(XII. 16.) published in the Hungarian Gazette Issue 280, 2020. Subsequently, on 01 January 2021 the new BM legislation defining the procedure for the examination of the health, psychological and physical fitness of law enforcement personnel came into force.

The BM Decree also defines the entry physical requirements, the job categories corresponding to the specialisations and the age categories. On the basis of the Decree the commanders of the national services lay down in instructions the actual physical requirements for professional staff serving under them.

The level of the requirements set in the new regulations is lower than the criteria of the Joint Regulation 57/2009 (except for certain specific posts of the Standby Police and in particular the Personal Protection Directorate: helicopter pilots, explosives experts, dog handlers and certain commanders). The aim of the Regulation and the Instructions is not to make the recruitment and annual physical assessment more difficult, but to focus on the preparation during the service, where there is an opportunity and justification to introduce new methods and tools.

In my opinion, the vascular therapy method will help prepare police personnel to meet the physical requirements. To demonstrate the effectiveness of the method, it is necessary to clarify some basic concepts.

B The evolution of magnetotherapy from antiquity to the BEMER device

Treatment in an electromagnetic field has been used for centuries. The phenomenon of magnetism was known in antiquity, using both natural and artificial magnetic fields.⁴ The first written records date back to 2000 BC. The ancient Chinese expressed their belief in magnetism in their manuals of traditional medicine, and the ancient Greeks and Egyptians in their drawings and writings. In the 16th century, a Swiss doctor called Paracelsus used magnets to cure his patients. In the 17th century, William Gilbert recorded his experiences of magnetism and electro-magnetism in his book *De Magnete* (1600). In the mid-18th century, Maximilian Hell, a Jesuit priest, and his follower Franz Anton Mesmer also used magnetic forces to treat their patients. In 1795, Elisha Perkins of Connecticut patented her method of using a magnetic device to eliminate the cause of a disease.

Magnetotherapy was overshadowed by the development of medicine and, at the same time, of pharmaceuticals. In the 21st century, it has gained significance, as it has been recognised that standard medical interventions for chronic diseases and disorders are of little or no help, but that they can be more effective when supplemented by magnetotherapy.

The first systems of the latest generation of electromagnetic field therapy devices were developed around 1990 by Prof. König and Dr. Wranke. These devices already worked at an intensity corresponding to the earth's magnetic field, making them suitable for home use. The

² <https://net.jogtar.hu/jogszabaly?docid=a0900057.irm>

³ <https://net.jogtar.hu/jogszabaly?docid=a2000045.bm>

⁴ Zyss, 2008

research of Prof. Wolf A. Kafka focused on the measurable physiological effects that result from inter- and intramolecular interactions, among other things. As a result, he developed a special pulsed signal (Bemer signal waveform), which led to the introduction of the Bemer 3000 therapeutic device in 1999.⁵

The signal shape discovered by Kafka was further developed ⁶in 2010 by Professor Klopp, the result of which is known as Bemer Classic and Pro set.

Today, a number of devices are available for home use, but there are significant differences in the type of stimulation and waveforms used.⁷

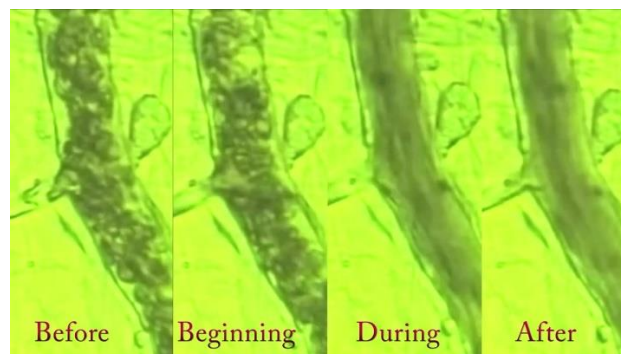
Electromagnetic physical vascular therapy is excellent for double-blind placebo-controlled trials as the patient feels neither current nor heat.

Bemer devices are classified as medical devices. They also closely cooperate with the competent authorities beyond European borders, e.g. they are listed by the FDA (one of the largest authorities in the USA responsible for the approval and market surveillance of medical products, among other things) and the devices are classified as II/a.

Picture 1: Bemer Pro set⁸



Picture 2: Microcirculation before and after treatment⁹



⁵ Bohn, Wolfgang. "The technological development history and current significance of the "physical BEMER® vascular therapy" in medicine." *Journal of complementary & integrative medicine* vol. 10,Suppl (2013): S1-3. doi:10.1515/jcim-2013-0036

⁶ Klopp, Rainer: *Im Fokus der Forschung; Einführung in biomechanische, physiologische und pathophysiologische Grundlagen sowie ausgewählte Behandlungsoptionen*. Mediquant-Verlag. (2008)

⁷ Möbes, Karin: Diplomarbeit, Grabs (2003)

⁸ https://www.bemer3000.hu/bemer_keszulekek.html

⁹ <https://life.bemergroup.com/science/>

II. Method

The effectiveness of physical vascular therapy has been proven by numerous studies. It is mainly used in medicine (improving microcirculation, reducing pain, treating high blood pressure and fractures, treating MS patients, improving quality of life...) and in sport (warming up, preventing and treating injuries, and enhancing performance). As a methodology, I will draw on the literature, grouped according to the nature of the presentation. The studies were conducted using a placebo group controlled, double-blind method.

The main distribution of studies by appearance is:

- PubMed-indexed publications
- clinical research in lecture or conference proceedings
- other scientific journal and medical journal articles, book chapters.

III. Result and Discussion

To get to know the research, in Table 1 I summarise the publications on Bemer that have been annotated by PubMed, by topic.

Table 1: Publications on Bemer annotated by PubMed

Author	Title	Research area
Gyulai, F., Rába, K., Baranyai, I., Berkes, E., & Bender, T. (2015).	BEMER Therapy Combined with Physiotherapy in Patients with Musculoskeletal Diseases: A Randomised, Controlled Double Blind Follow-Up Pilot Study	physiotherapy, pain relief
Bohn W. (2013)	The technological development history and current significance of the "physical BEMER® vascular therapy" in medicine	The history of Bemer
Bohn, W., Hess, L., & Burger, R. (2013)	The effects of the "physical BEMER® vascular therapy", a method for the physical stimulation of the vasomotion of precapillary microvessels in case of impaired microcirculation, on sleep, pain and quality of life of patients with different clinical pictures on the basis of three scientifically validated scales.	Quality of life
Haase, R., Piatkowski, J., & Ziemssen, T. (2011)	Long-term effects of Bio-Electromagnetic-Energy Regulation therapy on fatigue in patients with multiple sclerosis	multiplex sclerosis
Říhová, B., Etrych, T., Šírová, M., Tomala, J., Ulbrich, K., & Kovář, M. (2011).	Synergistic effect of EMF-BEMER-type pulsed weak electromagnetic field and HPMA-bound doxorubicin on mouse EL4 T-cell lymphoma.	effect on tumour cells
Piatkowski, J., Kern, S., & Ziemssen, T. (2009)	Effect of BEMER magnetic field therapy on the level of fatigue in patients with multiple sclerosis: a randomized, double-blind controlled trial	multiplex sclerosis, fatigue
Walther, M., Mayer, F., Kafka, W., & Schütze, N. (2007)	Effects of weak, low-frequency pulsed electromagnetic fields (BEMER type) on gene expression of human mesenchymal stem cells and chondrocytes: an in vitro study	gene expression
Klopp, R. C., Niemer, W., & Schmidt, W. (2013)	Effects of various physical treatment methods on arteriolar vasomotion and microhemodynamic functional characteristics in case of deficient regulation of organ blood flow. Results of a placebo-controlled, double-blind study	flexible arteriolar vasomotion
Klopp, R. C., Niemer, W., & Schulz, J. (2013).	Complementary-therapeutic stimulation of deficient autorhythmic arteriolar vasomotion by means of a biorhythmically physical stimulus on the microcirculation	arteriolar vasomotion, physiotherapy treatment

	and the immune system in 50-year-old rehabilitation patients.	
Klopp, R. C., Niemer, W., Schulz, J., & Ruhnau, K. J. (2013)	Influence of a specific, biorhythmically defined physical stimulus on deficient vasomotion in small-caliber arterioles in the subcutis in patients with diabetic polyneuropathy	diabetes
Klopp, R. C., Niemer, W., & Schulz, J. (2013)	Effects of physical stimulation of spontaneous arteriolar vasomotion in patients of various ages undergoing rehabilitation	arteriolar vasomotion
Bernát S. I. (2013).	Effectiveness of pentoxifylline and of bio-electromagnetic therapy in lower limb obliterative arterial disease	peripheral arterial disease
Auger, K., Shedlock, G., Coutinho, K., Myers, N. E., & Lorenzo, S. (2021)	Effects of osteopathic manipulative treatment and bio-electromagnetic energy regulation therapy on lower back pain	musculoskeletal pain
Benedetti, M. G., Cavazzuti, L., Mosca, M., Fusaro, I., & Zati, A. (2020)	Bio-Electro-Magnetic-Energy-Regulation (BEMER) for the treatment of type I complex regional pain syndrome: A pilot study.	pain syndrome
Biermann, N., Sommerauer, L., Diesch, S., Koch, C., Jung, F., Kehrer, A., Prantl, L., & Taeger, C. D. (2020)	The influence of pulsed electromagnetic field therapy (PEMFT) on cutaneous blood flow in healthy volunteers1.	blood flow
Kanaparthi, A., Kesary, S., Pujita, C., & Gopalaiah, H. (2020)	Bio Electro Magnetic Energy Regulation (BEMER) therapy in myofascial pain dysfunction syndrome: A preliminary study	pain relief
Tamulevicius, N., Wadhi, T., Oviedo, G. R., Anand, A. S., Tien, J. J., Houston, F., & Vlahov, E. (2021)	Effects of Acute Low-Frequency Pulsed Electromagnetic Field Therapy on Aerobic Performance during a Preseason Training Camp: A Pilot Study	endurance athletes, fatigue
Kreska, Z., Mátrai, P., Nemeth, B., Ajtay, B., Kiss, I., Hejjel, L., & Ajtay, Z. (2022).	Physical Vascular Therapy (BEMER) Affects Heart Rate Asymmetry in Patients With Coronary Heart Disease	heart disease

The results of the scientific work included in the summary show that the members of the pulsed electromagnetic therapy (BEMER) group experienced a change in their health, improved quality of life and reduced pain as a result of the additional treatment.

There are several case studies on the effects of BEMER on the human body, covering the following areas:

andrology, treatment of chronic gynaecological diseases, osteoporosis, neurology, osteonecrosis of the jaw, oral surgery, hearing impairment, tinnitus, lower limb circulatory disorders, ophthalmology, speech development, neurosurgery, stroke treatment, changes in thigh tension in MS patients, sleep disorders.¹⁰

Other research areas that demonstrate the effectiveness of the method include:

- improving red blood cell metabolism¹¹

¹⁰ https://www.bemer3000.hu/uploads/3/9/1/2/39121891/_bemer_orvosi_esetismertet%C3%A9sek_hu.pdf

¹¹ Spodaryk, Kristof: Red blood Metabolism and Haemoglobin Oxigen Affinity: Effect of Elektromagnetic Field on Healthy Adults. In: Wolf A Kafka (editor) *2nd Int. World Congress Bio-Electro-Magnetic-Energy-Regulation, Emphyspace* 2,15-19. (2001)

- wound healing¹²
- improving the quality of life of people with peripheral artery disease¹³
- -sensitization if cancer cells¹⁴

Figure 1: Changes in blood flow as a result of treatment¹⁵



Many physical discomforts are directly linked to poor local circulation, which can lead to malfunctioning metabolic processes in muscle tissue and can inhibit optimal performance and recovery. Improved local blood flow can lead to better oxygenation and better carbon dioxide disposal.

Most of the research into the effects of BEMER has been carried out by Dr R. Klopp (Berlin Institute of Microcirculation), with significant work by Dr K. Spodaryk (Rehabilitation Institute Cracow), Dr R. Jelinek (Charles University of Prague) and Dr B. Villiger (Swiss Medical Centre Bad Ragaz) demonstrating the effectiveness of the device.

C Research results in the field of sport

The effect of BEMER treatment in enhancing athlete performance has been tested in a previous study of Malomsoki¹⁶ using a double-blind trial. It was shown that the performance of treated athletes improved to a greater extent than those who were not treated. The treated athletes achieved the greater performance improvement with greater anaerobic lactate effort and a more favourable Conconi transition (a non-invasive way of determining the anaerobic threshold). Treated subjects were able to compensate more rapidly than non-treated subjects for the lactic acidosis produced during the effort.

Other physiological changes measured in the study suggested that tissue oxygenation of athletes treated with pulsed magnetic fields was better than that of non-treated athletes.

Research on endurance athletes was carried out by Tamulevicius et al.¹⁷ Participants completed six runs at altitude. The PEMF group used BEMER therapy before and after each exercise session, for a total of 12 sessions. Time significantly influenced absolute and relative ventilatory

¹²Kafka, Wolf & Preisinger, M. : Verbesserte Wundheilung durch gekoppelte, Bemer 3000typisch gepulste, Elektromagnetfeld- und Led-Licht-Therapie am Beispiel vergleichender Untersuchungen an standartisierten Wunden nach Overaktomie bei Katzen (felidae). Salzburg, ÖGT Congress (2002)

¹³Bernát, Sándor Iván. "The efficacy of the bio-electro-magnetic-regulation therapy and pentoxifylline treatment in peripheral arterial stenosis". *Orvosi Hetilap* 154.42 (2013): 1674-1679.

¹⁴ Storch, Katja, Dickreuter, Ellen, Artati, Anna, Adamski, Jerzy & Cordes, Nils: BEMER Electromagnetic Field Therapy Reduces Cancer Cell Radioresistance by Enhanced ROS Formation and Induced DNA Damage, *Plos one* (2016)

¹⁵ <https://life.bemergroup.com/science/>

¹⁶Malomsoki Jenő & Babindák Elvira: Mágneses kezelés hatása sportolók teljesítőképességére és egyes teljesítmény-élettani mutatókra, *Sportorvosi szemle*, 47/2-3/2006 (2006)

¹⁷Tamulevicius, N., Wadhi, T., Oviedo, G. R., Anand, A. S., Tien, J.-J., Houston, F., & Vlahov, E. Effects of Acute Low-Frequency Pulsed Electromagnetic Field Therapy on Aerobic Performance during a Preseason Training Camp: A Pilot Study. *International Journal of Environmental Research and Public Health*, 18(14), 7691. MDPI AG. (2021)

threshold (VT), as well as maximum heart rate, heart rate in VT and respiratory rate in VT. This study was the first of its kind to study pulsed electromagnetic field technology in combination with elevated baseline exercise. Results showed that PEMF therapy can be used to improve VT during short-term training sessions.

Under physiological conditions, creatine kinase (CK) is present in very low levels in the blood. However, in the presence of muscle injury, e.g. trauma, muscle fever or other types of musculoskeletal overload, more CK is released into the blood and is detected in correspondingly higher concentrations. Depending on the duration and intensity of the exercise, CK is released into the circulation with a delay. Since exercise-induced stress in sport is cumulative and takes longer to remove CK, resting CK activity is related to the after-effect of previous stresses. In a double-blind study of subjects treated with the Bemer 3000 system by Karin Möbes, CK values decreased significantly earlier. The inflection point was found at 7.2 hours in the treated group and 9.2 hours in the placebo group ($p=0.025$). On the one hand, the CK values show a significantly different time course in percentage terms, with a slight delay between the rise and the fall of the measured value when using the functional device. On the other hand, the decrease in CK value occurred much faster in the group treated with the functional device compared to the placebo group. Based on subjective perception, more severe muscle pain and leg fatigue were reported after the hard exercise test with the placebo device than after the functional device.¹⁸

IV. Conclusion

The justification of BEMER as an adjunctive treatment option for physical vascular therapy in medicine has been demonstrated by the research studies listed in the literature and by clinical case studies. In the field of sport, few studies have been carried out, but they have demonstrated the merits of the treatment in the area of performance and recovery.

The ideal personality traits of the professional staff are similarly complex to those of the athlete. They are defined by a complex of ability-skill combinations. Just as for athletes the technical, tactical, sport-specific skills specific to the sport, so for law enforcement personnel the skills of action technique, tactics and job performance play an important role.

Previous research has shown how the presence of oxygen affects performance and how the lack of it generates physiological and biochemical processes in the body. In the near future, I believe that scientific research is warranted to investigate the effects of Bemer as a physical vascular therapy method on performance, i.e. its effects on endurance and strength development.

My research plan aims to investigate the effectiveness of this method and will therefore be carried out in a double-blind trial. One group of students participating in the training of the Faculty of Law and Order will use the real device, the control group will use the placebo device. The participants will be selected randomly and the measurement will be based on the detailed description of the physical fitness test in the Regulation. The students' physical condition will be assessed before the start of the treatment and after the 15th day of treatment. Differences between the assessment results will be examined to verify the rate of improvement between the groups.

¹⁸Möbes, Karin: Diplomarbeit, Grabs (2003)

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Pictures:

1. Bemer Pro Set, https://www.bemer3000.hu/bemer_keszulekek.html
2. Microcirculation before and after treatment, <https://life.bemergroup.com/science/>
3. Changes in blood flow as a result of treatment, <https://life.bemergroup.com/science/>