Editorial

The technological development history and current significance of the “physical BEMER® vascular therapy” in medicine

The history of BEMER technology, whose preliminary highlight is the development of the signal configuration that is currently used in therapeutic systems to apply the “physical BEMER® vascular therapy”, began in 1998. The basis for this was the development of a specific base signal, which differed from all signal forms used in non-specific electromagnetic field therapy until that time due to a particular mathematical formula and the physical signal form resulting from it.

However, the initial considerations on the development of this special signal were still dominated by the idea that the transfer of electromagnetic energy – in a way like a catalyst – could be used to intervene in, and activate, certain biomolecular processes in an organism. Today we can say that, in light of the small amount of energy transferred, this fact is not the decisive determinant of effectiveness. Instead, it is particularly the rhythm of the signal configuration, that is, the selection of repetitions (frequencies) and vascular-specific allocation, that is of greater importance.

Initial scientific studies on the fundamentals of the working mechanism in and after 2004 done at the Institute of Microcirculation in Berlin by means of intravital microscopy (a technically complex process to represent and measure microcirculatory processes) revealed that the use of this special physical signal produced in healthy, younger test subjects who were disposed to stress and infections positive changes in microcirculatory characteristics, such as vasomotion, capillary blood distribution, venular outflow and oxygen utilization, of such magnitude as had never been achieved before in the numerous studies of the Institute by means of any of the drugs administered. This fact piqued the interest of researchers, and was the start of new, targeted research and development efforts with respect to this technology. It also marked the definitive departure from the conventional, non-specific “magnetic field therapy” or “electromagnetic field therapy”.

In the process of this scientific work, some essential processes were discovered regarding the particularly important regulatory mechanism of blood distribution with respect to precapillary and postcapillary microcirculation. This also included observation of different repetition rates of vascular vasomotion depending on the caliber of vessels. Minuscule precapillary arterioles, as well as postcapillary venules, were characterized by around 3–5 vasomotions per minute under regular circumstances. The vascular sections upstream and downstream, which are only slightly bigger, had only one vasomotion per minute.

These vasomotions essentially determine the distribution of the blood and its components in the capillary network according to the respective requirements of the tissue and cells that depend on this network. The researchers also discovered that the more rapid vasomotion of the smallest vessels was autorhythmic, while the slower vasomotion of the slightly bigger vessels was subject to central, humoral or neural control. The clear objective of further development was, therefore, to optimize the effect through more precise addressing and frequency-based differentiation in the signal configuration, thus creating effect-relevant synergy in the different vasomotions of the various vascular sections.

The autorhythmically controlled vasomotions of the smallest precapillary and postcapillary vessels, discovered first, with a repetition rate of around three times per minute were the reason why, in the first development step of the signal configuration, 5 pulses with a flux density about a third higher than in the rest of the pulse sequence were inserted into the signal sequence at the time at 20 s apart. This 2007 signal configuration came to be known as the “plus” signal. It already produced a first, significant increase in the characteristic changes of microcirculation.

The researchers also found that the frequency of vasomotion decreased relative to age and/or severity of an illness. Thus, in seriously ill, older patients, only one vasomotion per 10 min was detected in the precapillary and postcapillary vascular sections. Such vasomotion frequency is absolutely inadequate for adjusted blood distribution in the capillaries, that is, the sufficient circulation of the dependent cellular tissue. Even if this is not
the cause of the illness, it is still a serious negative factor in the progression of the illness or even in the patient’s recovery.

When the new BEMER technology was applied to such patients, it was found that the frequency of the vasomotion, and also the other microcirculatory characteristics, such as capillary perfusion, venular outflow or oxygen utilization, improved significantly. The patients treated described these positive changes in most cases as feeling better.

The further development of the technology depended on finding the right time-based distributions and the specific addressing to the appropriate vascular sections, also recognizable by the organism, in the signal configuration. The frequencies and frequency components as well as their time-based distribution in the signal were examined. Using intravital microscopy, it was possible always to measure and evaluate the effects of the changes on the microcirculatory characteristics immediately. This approach, commonly called “trial and error” in the scientific community, produced better and better results and, finally, resulted in the signal configuration that proved to be the most effective in these experiments and that today is used in the current systems applying the technology.

This signal configuration, set to 120 s run time, also includes two stimulation areas that are separated from each other by intervals of 3 s. These intervals allow the organism to recognize that each stimulation is allocated to a different address (vascular section). The signal section for stimulating the smallest precapillary vascular sections via autorhythm runs over 83 s at a frequency of 30 Hertz (Hz). The stimulation section of the somewhat bigger vascular sections, which are subject to central, humoral or neural control, runs over 31 s at a frequency of 10 Hertz (Hz).

Further research dealt with the redistribution of the organic tissue-perfusion centers in the relaxation and resting phases, as opposed to the activity phases in the circadian rhythm of an organism. In this case, the results led to the development of an additional, special signal configuration that is to support regeneration and immunological processes in the rest/sleep phases of the organism. This additional treatment option is to benefit primarily patients suffering from sleep disorders, frequently those who are multimorbid and/or older patients who, due to their sleep disorders, often experience or develop deficits in regeneration and with respect to their immune system.

Today, the BEMER technology and its use via special application systems represents an effective, targeted, physical treatment method for dysfunctional microcirculation. Since therapeutic-pharmacological interventions, especially in the small-caliber arteriolar area and its autorhythmic vasomotion, are very limited, it thus currently represents virtually an unprecedented treatment option and should be used in medical practice widely as a complementary basic therapy to improve impaired microcirculation. Considering that impaired microcirculation has been recognized as the cause of a number of diseases, and substantially more conditions are affected adversely by impaired microcirculation, the fundamental importance of this new complementary physical therapy becomes clear and makes sense in many areas of medicine.

Patients suffering life-threatening shock are an especially impressive example, because impaired microcirculation plays a decisive role in the prognosis in these cases. If the regulation of endogenously released messenger substances of cells involved in the immune system and their subsequent processes, such as inflammation or changes in blood coagulation, no longer function due to flawed distribution in microcirculation, this will ultimately lead to organ dysfunction and, eventually, organ failure because of the pathophysiological mechanisms triggered by this. This is complicated further by the fact that pharmacological active ingredients applied can no longer reach the intended site of action in sufficient levels of concentration for that same reason and that the prognosis for the patient becomes severe due to this vicious circle. The use of effective stimulation of microcirculation, which is fully unaffected by the actual impairment, and its improvement through direct, physical means, that is, the “physical BEMER® vascular therapy”, is thus urgently needed for the patients affected, and can be crucial to their survival.

In summary, it bears emphasizing again that, thanks to intensive and complex research and development, the “physical BEMER® vascular therapy” in its current form has absolutely nothing in common with the conventional “magnetic field therapy” anymore, except for the fact that an electromagnetic field is used for the transmission of the effective stimulus for economic and practical reasons.

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