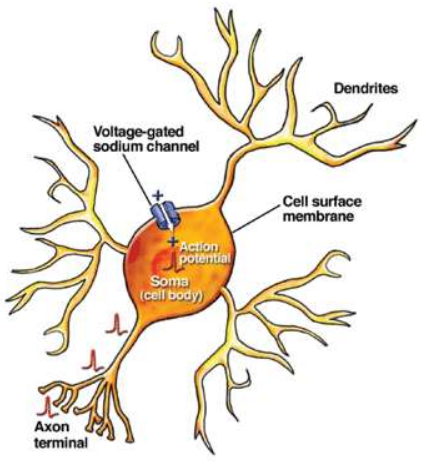
EMOST™ LIKE ULTRA-FINE NEUROMODULATOR

2013

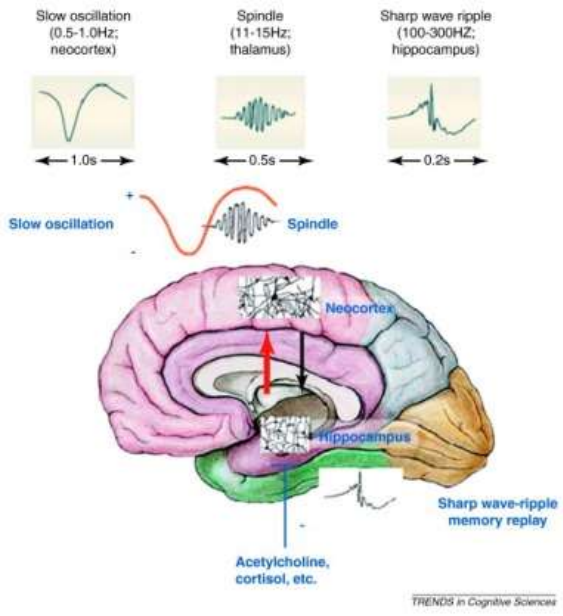
The widespread use for a variety of medical diseases of EMOST™ method is due to that the brain processes (EEG, electrochemical oscillation) can be represented on the skin through complex electro-chemical (biochemical), bioelectrical and bioelectromagnetic signals. EMOST™ method can detect, process, modify and return these represented bioelectrical and bioelectromagnetic signals that spread throughout the body and the nervous system

Various sensors, processing and storage parts or modules as well as the localized or extensive neural networks create their inherent non-linear electrical oscillations with certain frequency intervals in the brain. During information processing, storage and continuous interaction, neural networks inhibit, stimulate, modulate, and synchronize each other depending on the actual tasks in the brain. Functional parts of the brain continuously and simultaneously produce wide range of frequencies and amplitudes that are interactions. The signal density (more information can be accommodated in the smaller the higher the signal density) of the various units of the brain appears to be related to neuronal receptor density. There are many millions on each neuron surface that bear different quality signals receptors which density is increased or decreased depending on the task.



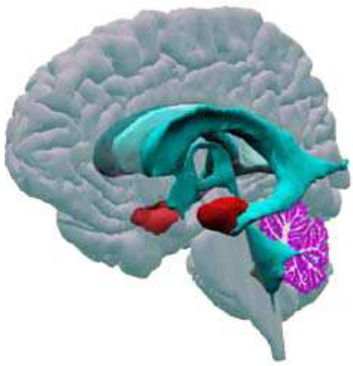
The brain is an electrochemical organ, which generates about 10 watts of electrical power. Based on fundamental laws of physics, non-linear electrical (electrochemical) signals simultaneously produce non-linear electromagnetic signals. The EMOST™ device can detect and process the brain waves that are also represented on the skin as electrochemical and electromagnetic signals.

The EEG oscillations reflect differences in normal and pathological brain function. In general, the EEG range is divided into the following frequency ranges. Gamma frequencies greater than 30 Hz, Beta frequencies between 13-30 Hz, Alpha frequencies between 8-12 Hz, Theta frequencies between 4 -8 Hz and Delta frequencies that is less than 4 Hz. The signal strength (amplitude) of the different frequencies is between 10-100 microvolt. Subsequent research revealed that the aforementioned frequency range includes high-frequency EEG oscillations (HFO), which is characterized by several simultaneously operating frequency ranges of short rhythmic brain waves. HFO often contains 30-80 Hz Gamma oscillations, fast ripple oscillations between 80-250 Hz and 250-1000 Hz ripple oscillations. It is likely that the HFO indicates the local neural network ensemble during mutual activation. Ripple oscillations for example, between 100 -200 Hz vibrations are detected in the normal hippocampus and entorhinal cortex (entorhinal cortex = EC is in the temporal lobe and is an important connection point between the neocortex and hippocampus) and is typically seen during deep sleep (non-REM). HFO may also be suitable for the detection of epileptic zones.



The alpha waves (8-12 Hz) are coherent and synchronous electrical oscillations arising from the thalamic pacemaker cells (core groups in the thalamus), which send electrical signals mainly to the frontal and the visual cortex.

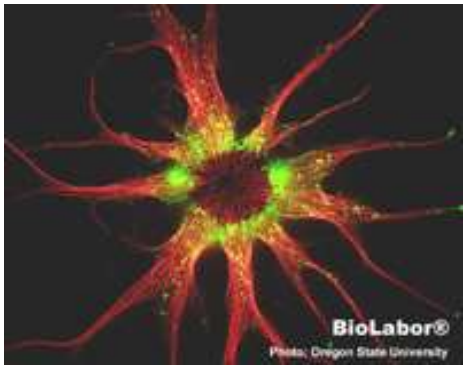
The 4-8 Hz theta EEG oscillations occur in individual neurons as well as in the wide neural network levels. The hippocampus involved in memory storage and retrieval processes in the sensory-motor system, coordination of learning, sleep and control of behavior, etc. There are two typical theta activities in hippocampus, 6-12 Hz, which is the involuntary movements, running, swimming, etc. and 4-9 Hz that connected for example, REM sleep and sensory perceptions. The amygdala performs internal rhythmic membrane potential oscillations in the theta create a 4-12 Hz frequency range.



The amygdala is critical to the emotional processes and memory processing. The theta-frequency synchronization of the interconnection of the amygdala- hippocampus system plays a key role in interaction as fear conditioning and emotional learning.

Beta activity is characterized by rapid frequencies between 13-30 Hz, which reflects the de-synchronization between neurons in active brain tissues. The beta-range frequencies have key role in cognitive processes during normal waking consciousness, concentration, worrying, and presence of Beta activity is the most prominent in the frontal cortex.

Gamma frequencies between 20-80 Hz appear virtually every part of the brain, and play a crucial role in selective attention, associative learning, emotional evaluation of visual-motor integration, sensor processes, working memory, long term memory processing, etc. Gamma deficiency causes learning disorders.



Generally, EEG frequencies are dependent on the metabolic neural processes, the hyper- or depolarized states of neurons and the resting membrane potential. The different functional and structural parts of the brain simultaneously operate in many typical frequency ranges, as briefly described above regarding the hippocampus, cortex, amygdala and thalamus. The widespread use for a variety of medical diseases of EMOST™ method is due to that the brain processes (EEG electrochemical oscillations) can be represented on the skin through complex electro-chemical (biochemical), bioelectrical and bioelectromagnetic signals. The EMOST™ method can detect, process, modify and return these represented bioelectrical and bioelectromagnetic signals that spread throughout the body and the nervous system, and act like ultra-fine neuromodulator.

The EMOST™ device operates between 1 Hz - 1 MHz frequency range. The 1-100 Hz of the EMOST™ is linked to Gamma, Beta, Alpha, Theta and Delta brain associated processes and frequencies. The kHz range of the EMOST™ is linked to high frequency (HFO, 80-2000 Hz) processes. Range from KHz-MHz of the EMOST™ device is assigned to the neuro-cellular processes.

References

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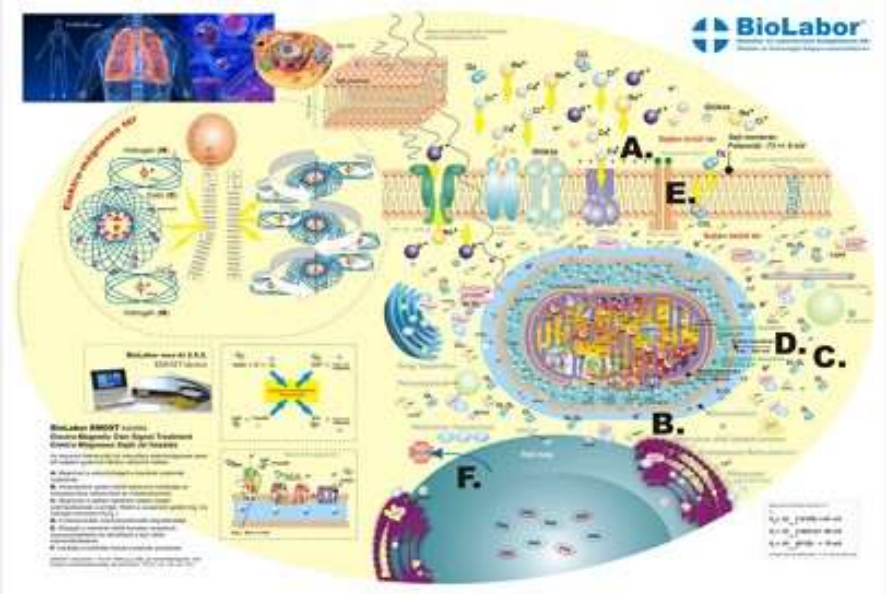
Some effects on cellular processes

- facilitation of the opening of membrane channels
- mobilisation of intracellular calcium from endoplasmic reticulum (ER) and mitochondria
- Induction of redox processes via functional free radicals (superoxide O_2 and hydrogen-peroxide H_2O_2)
- changing the mitochondrial membrane potentials
- facilitation of the assembly of receptor complexes at the membranes by the help of lipid rafts
- induction of sythesis of heat shock proteins



The effect of the EMOST™ is due to the bidirectional communication between the nervous system and the skin cells

According to research, the skin is the largest organ of the body and is the most densely innervated that is functionally linked to peripheral, autonomic and central nervous system. There is bidirectional communication between the nervous system and the skin cells: *directly* to the central nervous system (the drain nerves and central nervous system mediators) and *indirectly* connected to (adrenal, immune system) by functions of the skin (see Figure). The autonomic nervous system has a central role in emotional responses. The emotions create specific autonomic nervous system activity. The basic emotions (happiness, surprise, anger, fear, sadness and disgust) induce specific autonomic patterns in the skin revealed by the electrical skin resistance, skin conductivity, electrical skin potential, skin blood flow and skin temperature measurements. The skin is able to represent the conscious and non-conscious emotions and brain processes can appear in the skin cells as complex electro-chemical (biochemical), bioelectrical and bioelectromagnetic signals.

Recent experiments show that magnetic stimulation of acupuncture points on the skin modulates EEG and acts on specific brain regions. The experiment indicates that the magnetic signals on the skin capable of activating specific brain regions. Merkel excitable cells in the skin (near the sensory nerve endings) can also act as magnetic receptors. The weak electromagnetic fields are capable of promoting the growth of skin keratinocyte cells and skin modulates chemokine production and inflammatory processes, act through the inhibition of NF-kappaB signal path. Weak low-frequency electromagnetic fields modulate cyclooxygenase-2, inducible nitric oxide synthase, endothelial nitric oxide synthase enzyme expression / activity in human skin keratinocyte cells.

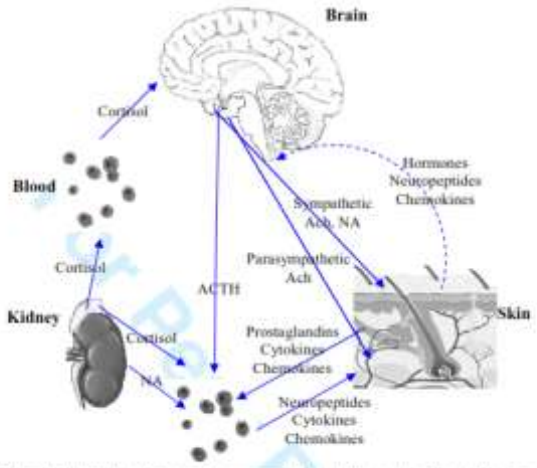


Fig. 3. Shematic illustration about complex communication between skin cells and the nervous system. Ach –acetylcholine, NA–noradrenaline, ACTH– Adrenocorticotropic hormone.

The mentioned experiments and the models indicate that the skin is a complex organ, can represent the brain/neural processes and also can perceive and spread weak electromagnetic signals throughout the body and the nervous system. This guarantees that the ultra weak electromagnetic signals from EMOST™ device are based on the subject's own signs and when these ultra weak electromagnetic signals are returned to the skin surface

do not elicit any action potential, but exert an ultra weak effects like a neuromodulator (fine-tuning effect).

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How output signals from EMOST device can reach to all parts of body

1. EMOST-sensor
2. skin
3. epidermis
4. dermis
5. fat
6. blood wessels
7. sweat gland
8. receptors
9. free nerve endings
10. nerve
11. neuropeptides
12. fybroblasts, keratnocytes
13. hormones 14. proteases, cytokines 15. Merkel-cells, local immun system

I. First signal way: Output signals from EMOST™ via a flat electrode can influence bioelectrochemical and redox processes of blood circulation of arterial and capillary systems under the skin thus output signals can reach to all parts of our body.

II. Second signal way: Output signals from EMOST™ via a flat electrode can influence terminal nerves and sensory receptor cells in the skin. Excited fibres of sensory skin receptor cells convey the EMOST™ induced signals to spinal nerves or cranial nerve, which can modify membrane and action potentials.

III. Third signal way: Output signals from EMOST™ via a flat electrode can influence immune system of skin. It is less known that there is twice as much T cells in our skin than in our circulation blood. However, according to latest scientific results, the skin works as a neuroimmuno-endocrine organ.

IV. Forth signal way: Output signals from EMOST™ via a flat electrode can influence terminal Merkel cells the skin, as a bipolar electro-accupuncture effect –with non-invasive. The Merkel cells modify the ATP activity. The ATP-activated sensory nerves also lead to modulation of the activity of brain-stem neurons controlling autonomic nervous system functions of gut, lung, urogenital, and cardiovascular systems—all of which have been treatment targets for traditional acupuncture procedures.

Testimonies

http://www.emost-med.com/testimonies/

Own scientific literature related to research with EMOST™ device

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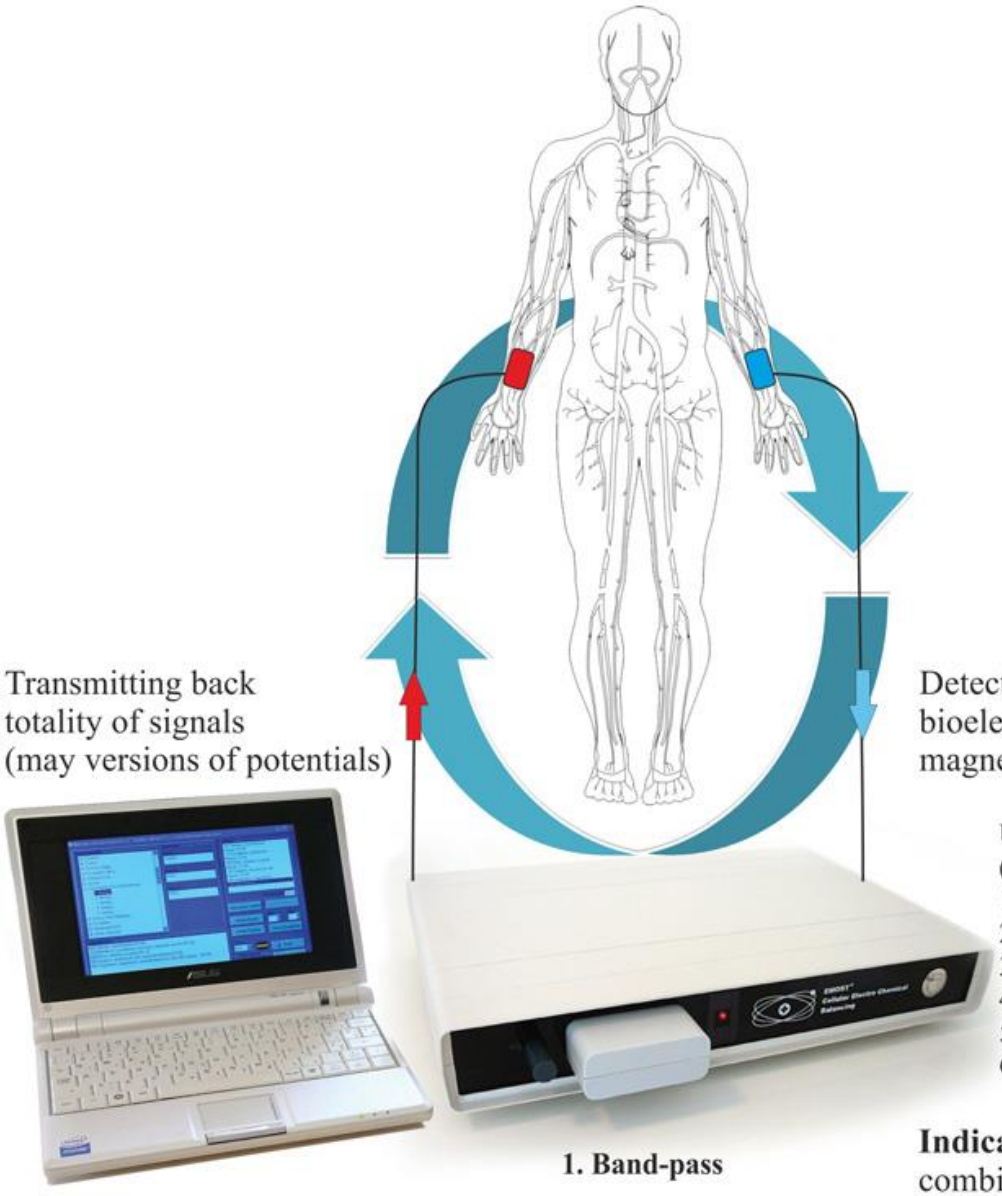
- Bókkon I, Till A, Erdöfi-Szabó A (2010) Phantom Pain Reduction by Non-ionizing Electromagnetic Treatment. *Hungarian Epidemiology* 7/4/Suppl. p:15. Abstract

The EMOST® process

transmitting the natural based extrem-low intensity analogue signals back in natural range



Transmitting back
totality of signals
(may versions of potentials)

Detection of natural
bioelectric and bioelectro-
magnetic signals

Used bands of detected signals
(may periods of potentials)
1. 1-10 signal/sec
2. 10-100 signal/sec
3. 100-1000 signal/sec
4. 1000-10000 signal/sec
5. 10000-100000 signal/sec
6. 100000-1000000 signal/sec

1. Band-pass

2. Amplification

-20 dB,
60 dB

3. Expansion, and extension of variations

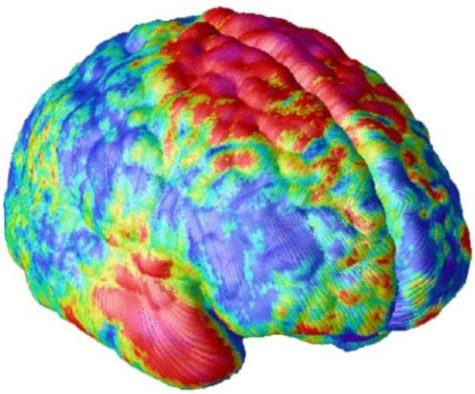
Fourier transform
-14 dB to 5 MHz
0,1 sec. – 102 sec

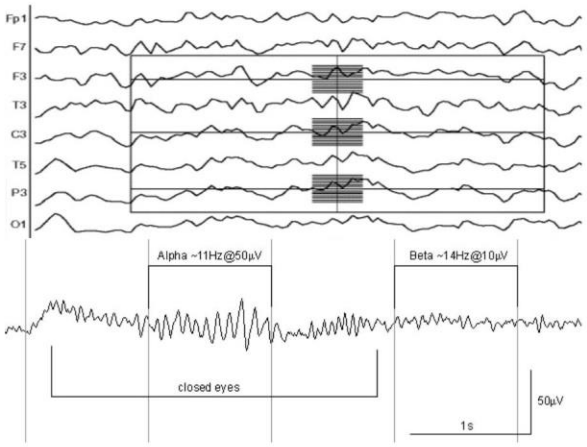
Indicatio:
combinations of signal-bands,
variations of amplification
and extension of variations

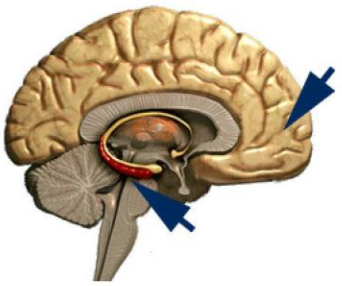
CE 1979
MEDICAL DEVICE

PRESUMABLY UNIQUE OF THE WORLD ...2011...

Developer/owner: EMOST Nano-MED Ltd., Manuf.: Caduceum Ltd., Excl.Distributor: BioLabor Biophysic Ltd.
www.biolabor-med.com







Probably:

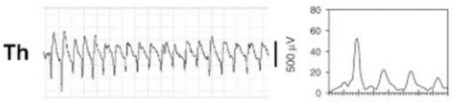
Frontal lobe: also involved in emotion, and in the ability make plans, think creative, and combinations of synapses (from/to memories, experiences etc.)

Amygdala: evaluates sensory information, determining it's importance, agression, anxiety...

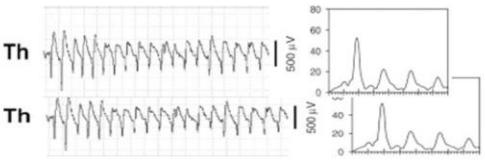
Thalamus: relay center, directs sensory messages (signaling testosterone immun function, apoptose etc.)

Hypothalamus: responsible for regulating basic biological needs: temperature, thirst, hunger etc.

EMOST ™ recognising and separating it's functional bioelectric signals in it's natural range: (from 1 Hz, potentials µV)



EMOST ™ makes slightly variations of amplification (from 1 Hz, potetntials µV, from -20 dB to 60 dB) via analogue (non-linear, non-digitalized) mode, and makes expansion, slightly extension of functional signal variations via Fourier lines (-14 dB, 5 MHz)



EMOST ™ - the EM Own Signal therapy ™ - then the variations and the original functional signal are returned through another free nerve ending zone, and helps for the neurovegetative system in signal transmission, signal recognising and electro-chemical balancing.

EMOST ™ - the EM Own Signal therapy ™ - the retransmitted own information helps re-coordinating of functional signal, and the retransmitted own functional signal energy has enough redundancy to overcome the dead point and to regain balance.