

PRESENTED AT THE 2ND ANNUAL SYMPOSIUM ON COMPLEMENTARY HEALTH CARE, UNIVERSITY OF EXETER, ENGLAND, 14 DECEMBER, 1995

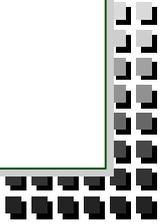
ABSTRACT PUBLISHED IN "FORSCHENDE KOMPLEMENTARMEDIZIN", 1995, VOL. 2, NO. 6, P. 335.



BIOLOGICAL RESONANCE AND THE STATE OF THE ORGANISM

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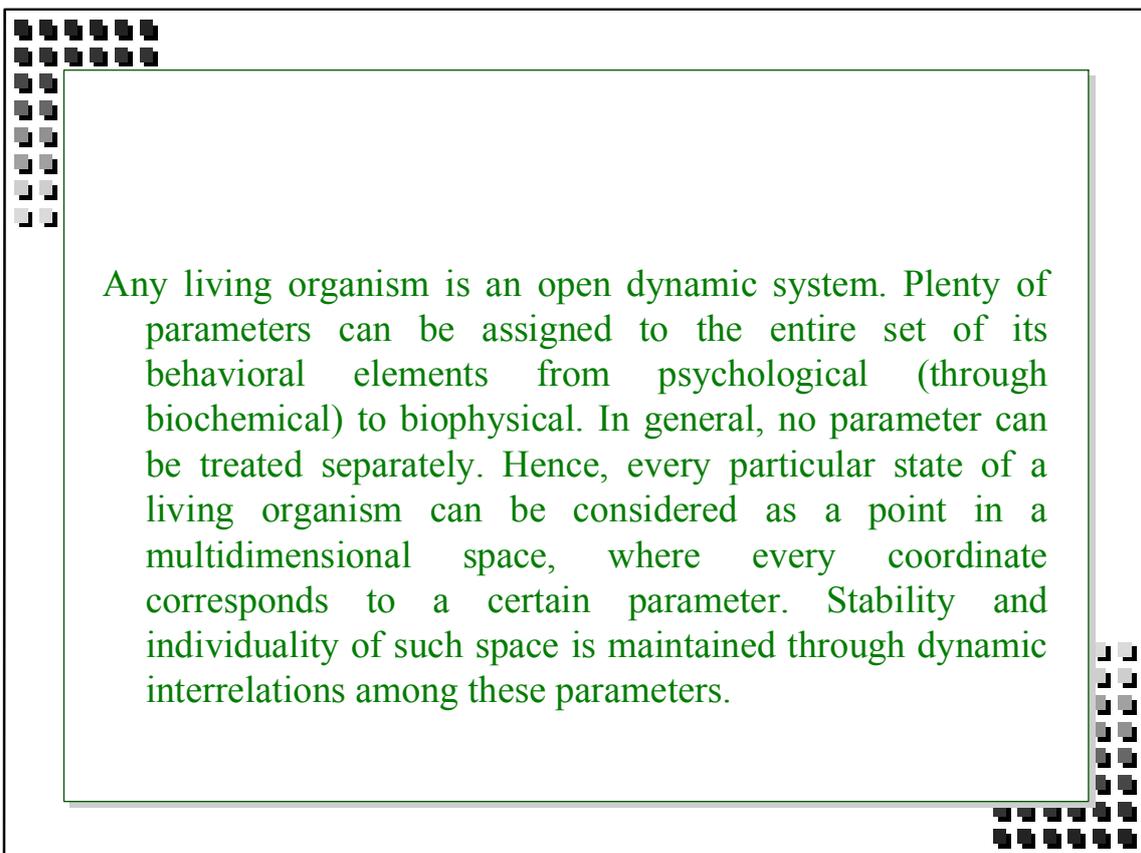
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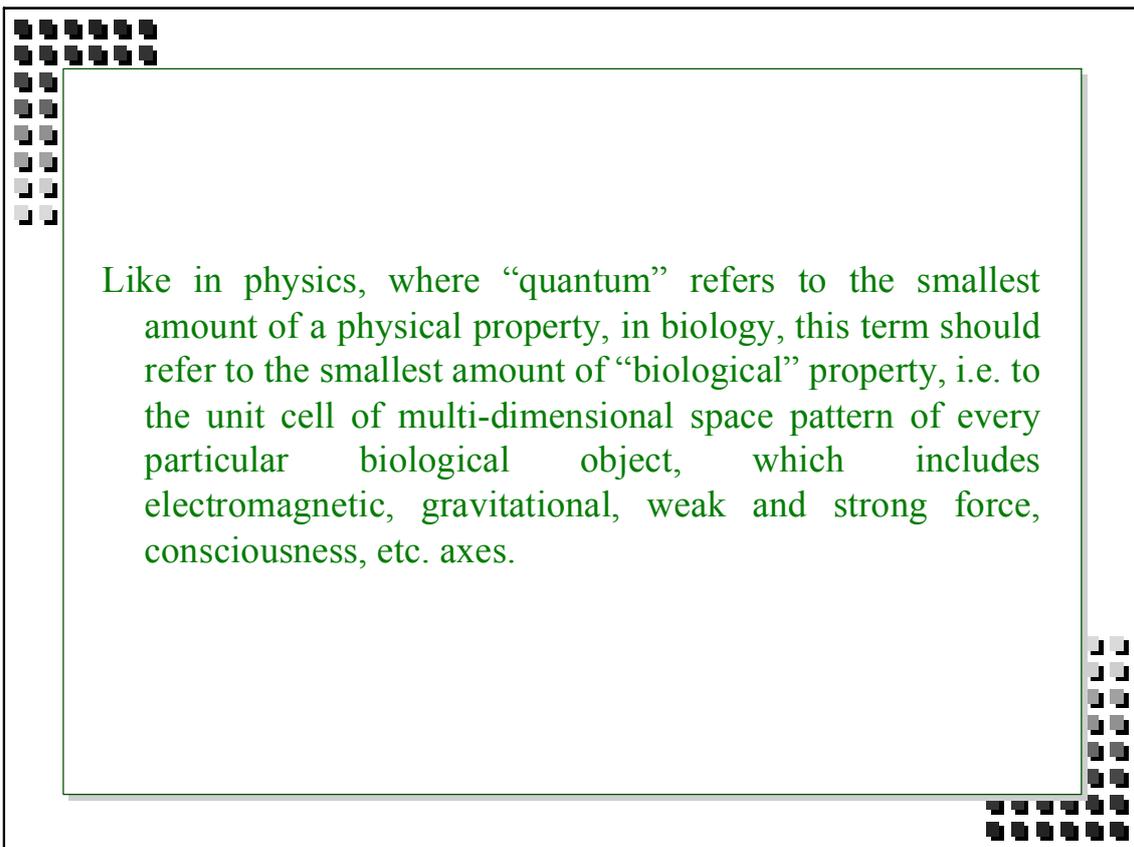
Electromagnetic biocommunication includes the investigation of both intra- and intercellular communication as well as the uninterrupted information exchange between a living system and its environment. This study represents basic research serving different modern biophysical clinical methods such as bioresonance therapy and biophysical medication testing. Environmental fluctuations perturb the multi-dimensional spatial pattern of an organism which dissipates such perturbances within its hierarchical framework only in the “physiological” state.



Any living organism is an open dynamic system. Plenty of parameters can be assigned to the entire set of its behavioral elements from psychological (through biochemical) to biophysical. In general, no parameter can be treated separately. Hence, every particular state of a living organism can be considered as a point in a multidimensional space, where every coordinate corresponds to a certain parameter. Stability and individuality of such space is maintained through dynamic interrelations among these parameters.

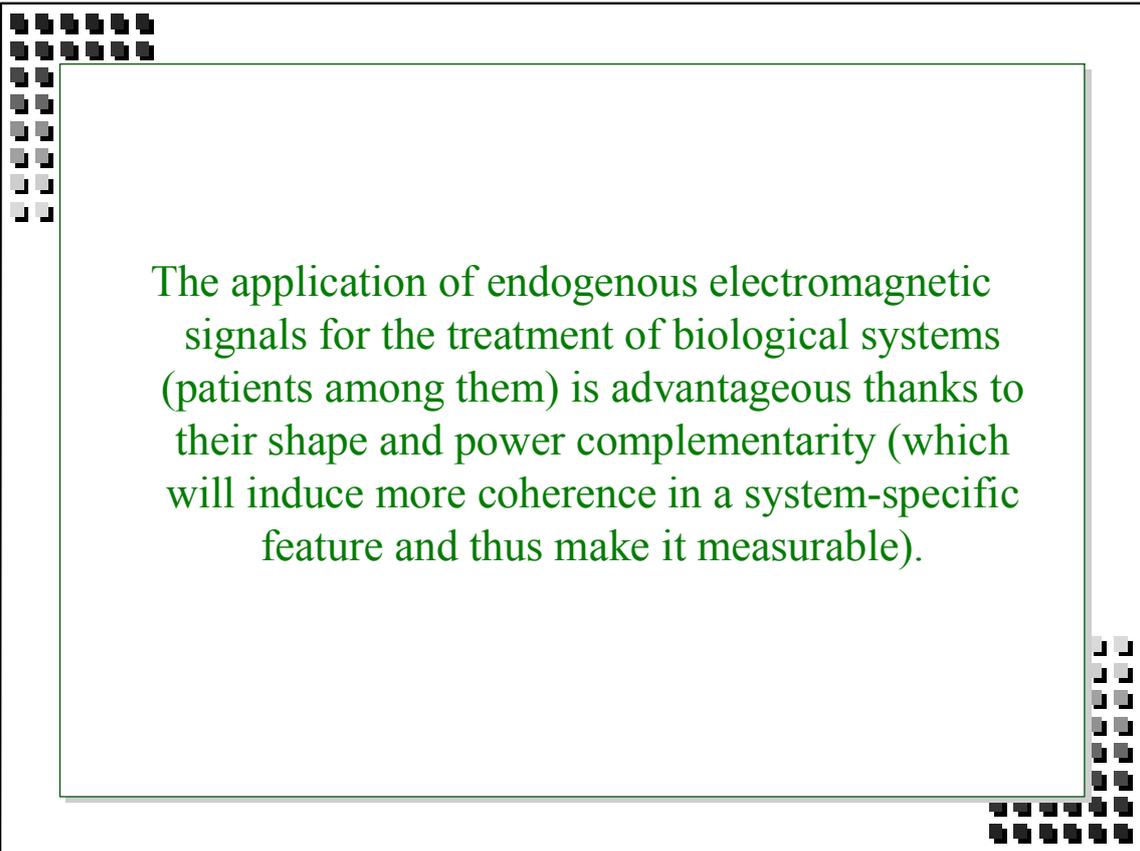
While studying a living system with conventional, though very sophisticated methods, an attempt is made to adopt it to the usual three- or not too much more-dimensional space (depending on how many parameters can be followed-up simultaneously). Usually, the intersection of spaces of different dimensions yields inadequate laws of cause and effect from the point of view of an observer in a lower-dimensional space. This is a reason that the goal of traditional science to build a model of reality independent of the observer can be hardly achieved.

Life cannot be treated as a sequence of events. From this point of view, the speculations about “biological” or “morphogenetic” fields and “auras” etc. look more correct though less “scientific” since they do not operate with any equation (and it has been accepted above that calculations reduce the versatility of the world owing to the simplifying assumptions needed to cut off interrelations and treat a process of interest separately). Therefore, the reliance on natural (i.e. non-separated from each other) forces of an organism constitutes a great advantage of holistic medicine (and bioresonance therapy as a method of it). Contrary to “traditional” western medicine, it deals not with a set of elements and events but with a complex hierarchy of them (from quantum chemical to social). Environmental fluctuations (also from cosmic irradiation to social events) perturb the multi-dimensional spatial pattern of an organism which, in what we call the “physiological” state, usually dissipates such perturbances within its hierarchical framework.



Like in physics, where “quantum” refers to the smallest amount of a physical property, in biology, this term should refer to the smallest amount of “biological” property, i.e. to the unit cell of multi-dimensional space pattern of every particular biological object, which includes electromagnetic, gravitational, weak and strong force, consciousness, etc. axes.

»The quantum character of biological systems, in turn, gives rise to the speculations about resonances and endogenous oscillations that usually are treated as the oscillations of the endogenous electromagnetic fields of living organisms. Of course, endogenous oscillations of organisms are essentially - though not exclusively - electromagnetic since all organisms carry diluted aqueous solutions with many electrolytes, semipermeable membranes, conductive protein chains and a set of biochemical reactions of electron transfer and free radical formation, etc. However, from our everyday life humans experience circadian rhythms in living matter; at least, humans can feel their own mental, physical, sexual or social rhythms which are substantially interdependent. This means that all these much more sophisticated (than electromagnetic) features alter (oscillate) with time. Returning to the previous analogy about the interception of lower- and higher-dimensional space patterns, while the accounting for all parameters (axes of space pattern) simultaneously is extremely complicated and yields incorrect results, the study of temporal behavior of one parameter can be quite informative since it includes only estimated errors of measurements.



The application of endogenous electromagnetic signals for the treatment of biological systems (patients among them) is advantageous thanks to their shape and power complementarity (which will induce more coherence in a system-specific feature and thus make it measurable).

Therefore, in order to care for another endogenous field shielding, the BICOM device (Brugemann GmbH, Germany) is used to acquire the endogenous electromagnetic oscillations emitted by a cell culture, animal or human patient at the input of the device, filter out certain a frequency band, modify its amplitude and phase and transduce these oscillations into the studied cell culture or any other system (humans among them) at the output of the device. The total spectrum of acquired EM oscillations in the frequency range of 10 Hz - 150 kHz (further denoted as "A") may be phase shifted through 180° (into "Ai"). A special separator makes it possible to filter out harmonious {"life-specific"} oscillations ("H") from disharmonious ones ("D") from within the whole part of spectrum ("A"). Metal cup electrodes and their tightly closed tops or special electrodes for animals and humans provide an electromagnetic shielding of studied biosubjects from the influence of background noise

The effect of the modulated endogenous electromagnetic oscillations on the protein molecule α -helical population

Complex formation of human blood serum albumin with alien molecules is considered a component of the non-specific resistance system of the human organism and thus is an aspect of endogenous regulatory processes. In patients with cancer, at the very early stages of the disease, a number of low molecular weight proteins (LMWP) - so-called oncoproteins - are expressed in the blood. SA conformers "recognize" such molecules and form complexes with them. In order to play a defensive role, SA must show a certain structural flexibility, i.e. it should adjust its conformation in order to achieve complementarity with an alien molecule. Therefore, protein secondary structure - and its flexibility above all - plays an extremely important role in the regulation of biological processes on a molecular level.

■ Endogenous electromagnetic fields of the blood serum of women with primary breast cancer and healthy women of approximately the same age (50 - 60 years old) were acquired, modified and transduced by using the BICOM device. The native serum is diluted 10-fold (for the further spectral studies) with a 0.9 % NaCl solution and divided into a corresponding number of samples; these are placed one-by-one into the cup electrode connected with the "output" of the BICOM device. The averaged healthy human serum preparation is placed in the "input" cup electrode. The whole system is treated over a corresponding period of time with a certain treatment program (modulation of the endogenous EMF of the input system). The same procedure is carried out on the "physiological" serum preparations in both the "input" and "output" cup electrodes.

■ The spatial structure of serum albumin in the obtained samples is estimated by using the IR spectra in the region from 1625 cm⁻¹ to 1695 cm⁻¹. The relative content of α -helices is obtained by calculating the fractional area of the amide I component band (at ~ 1651 cm⁻¹) assigned to this structure. Amide I component bands are assigned according to theoretical calculations and experimental data of other authors.

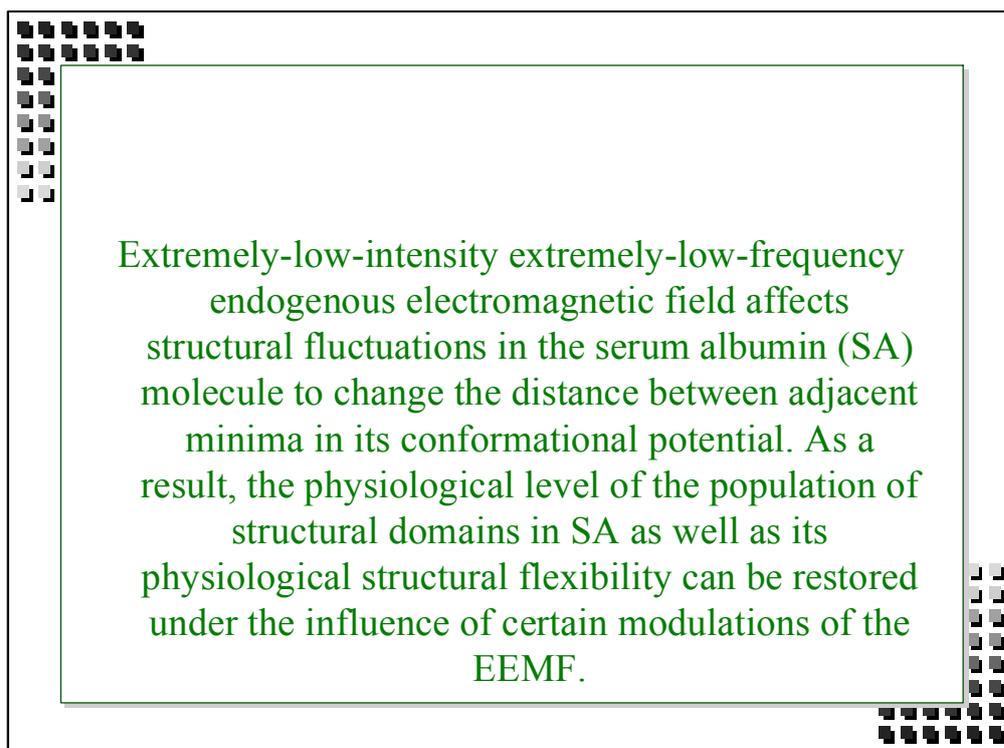


Table 1. The population of main conformational domains in blood serum albumin of healthy donors and breast cancer patients.

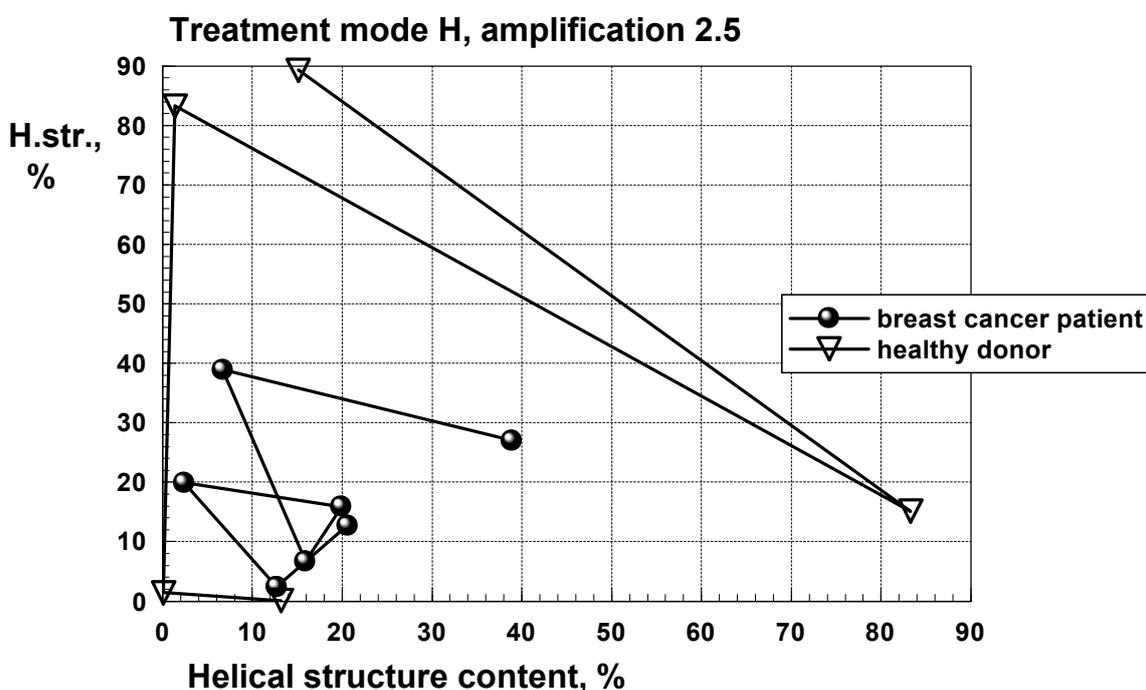
Patient	α-helical structure, %	β-structure, %	random structure	coil
Healthy donors				
1	18.4	62.0	19.6	
2	19.0	59.9	21.1	
3	17.7	61.0	21.3	
4	19.5	65.0	15.5	
5	17.9	54.1	28.0	
6	18.0	55.5	26.5	
7	20.1	64.3	15.6	
8	19.5	58.5	22.0	
9	20.0	53.0	27.0	
10	18.1	52.7	29.2	
Breast cancer patients				
1	19.0	69.0	12.0	
2	14.5	72.5	13.0	
3	18.8	70.1	11.1	
4	16.0	73.0	11.0	
5	17.7	69.4	12.9	
6	19.2	70.0	10.8	
7	19.0	73.2	7.8	
8	15.0	73.0	12.0	

Table 2. The comparison of structural flexibility of serum albumin from a healthy donor and breast cancer patient under the influence of BRT.*

The degree of structural changes in BICOM modulations (amplification) HSA	
“physiological” > “pathological”	α -helical structure: A(50); Ai(50; 0.05); random coil structure: H(0.1; 0.4; 0.8; 1.5; 3.0; 3.5)
“physiological” < “pathological”	α -helical structure: H(1.0) random coil structure: A(0.05; 12; 50); H(4.5; 1.0)
“physiological” \approx “pathological”	α -helical structure: H(0.1; 0.4; 0.6; 0.8; 2.0; 3.5); random coil structure: H(0.5; 0.6); Ai (0.05; 12; 50)

* - In the Table 2, only those data (modulations) are shown, which are reproduced in at least six patients from the eight studied (75 %).

An example of the Poincaré map for the temporal changes in the population of the α -helical structure in blood serum albumin.



The free energy of hydrogen bond formation in water under the influence of the endogenous electromagnetic field of a biological solution.

- Despite the micro- to nanosecond dynamics of most metabolic reactions, endogenous electromagnetic fields employed to initiate healing processes during BRT with the BICOM device usually are of extremely low intensity and extremely low frequency. Nevertheless, such fields not only successfully compete with thermal and geomagnetic noise but also exhibit strict dependence of their healing effect on the exposure conditions (duration of treatment, phase and amplitude modulation, etc.). This makes it possible to suggest a hierarchy of subsystems with faster metabolic reactions embedded within those with slower processes. We believe that the lower frequency of a healing influence is, the more general levels of the organism's hierarchy are involved in the healing process.

Preparations of the blood serum of four patients with breast cancer or four healthy donors' serum albumin preparations are used as a source of the endogenous ELM at the "input" of the BICOM device. Distilled water treated with Millipore M740 system (Waters, USA) is used at the "output" The free energy of the transition from free OH groups in water to H-bonded (ΔG) is estimated by using the temperature dependence of the equilibrium constant:

$$K_{eqv.} = \frac{[(OH)_{bond}]}{[(OH)_{free}]}$$

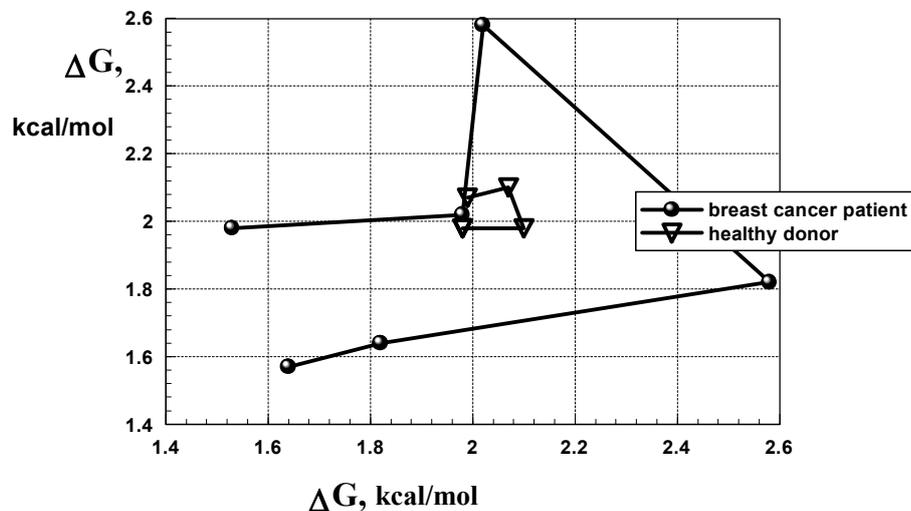
$$\Delta G = -RT \ln K_{eqv.}$$

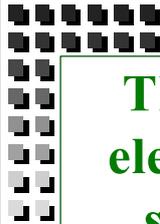
Equilibrium concentrations of free and H-bonded OH groups are estimated from the difference spectra in the near IR region (1450 nm band which corresponds to $\nu_1 + \nu_3$ vibration of the water molecule) Free energy of H-bond formation is calculated from the plots of $\ln(A_{1.49}/A_{1.41})$ against $1/T$.

The observed difference in the degree of the dynamic response of the hydrogen bond network in water samples treated with the endogenous electromagnetic field of healthy donors' blood serum preparations ("physiological" blood serum EEMF) and breast cancer patients' blood serum preparations ("pathological" blood serum EEMF) may be due to the occurrence of extremely large supramolecular structures in water and biological solutions (among others, blood serum), which are probably inherited from the evolution of biomacromolecules in aqueous medium. The "physiological" case corresponds to more complementarity in the configuration of water clusters and protein molecules than "pathological". Therefore, the EEMF of the "physiological" blood serum better fits the dynamics of hydrogen bonding network within supramolecular structures in water.

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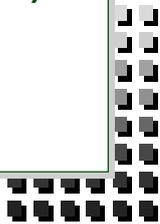
Treatment mode A, amplification 50





The influence of the human endogenous electromagnetic fields on the processes of self-regulation in the chaotic chemical oscillations

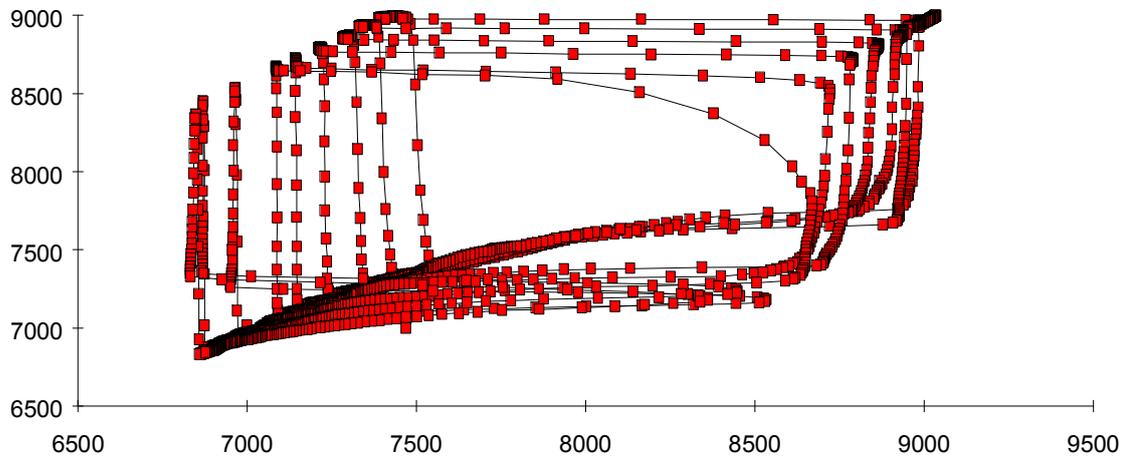
The observed influence of the human endogenous EMF on a deterministic chaos system (non-regular chemical oscillation) supports the comprehensive role of the endogenous EMFs in the processes of the ordering information transfer (communication).



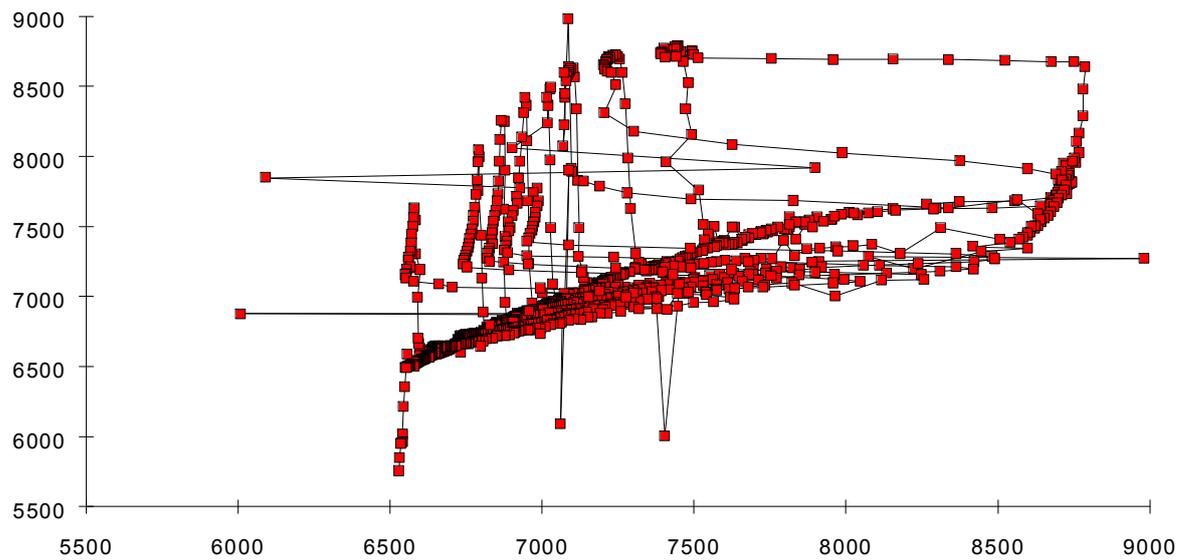
■ P-nitrophenole oxidation with potassium bromate is used as a chemical oscillative system. The alterations in the difference of the potentials of platinum spherical electrodes (that are determined predominantly with the concentrations of the products of bromate reduction) in the experimental and reference solutions are followed up during experiments. Time is measured starting from the moment of bromate introduction.

■ A vessel with reagents for chemical oscillations is placed into the "output" cup-electrode of BICOM while "input" of the device is connected with an elastic electrode on the head of a test person. BICOM is switched for 15 min in the end of the first oscillation..

**Examples of the attractors $10^4 E_{t+300} \rightarrow f(10^4 E_t)$ in the pseudophase space of the potentials for the studied reference systems;
t - time, sec.**



No treatment



Under the influence of the human endogenous EMF



Cerebellum Multichannel Biofeedback Instrument (Hippocampus Institute, Hungary).

CMBI reflects the response of patient's electrophysical characteristics to the test substances inserted into the measurement circuit while patient is not mentally aware of the actual sequence of the examination. Such testing equipment makes it possible to estimate the patient's response to a cure (or any other substance and - more generally - electromagnetic field-carrier) essentially in advance (before its direct application) and thus forecast future state of a patient.



–CMBI provides the dynamical testing of the patient's electrophysical parameters through very fast sampling rate (~ 0.1 ms) and sophisticated software for the analysis of 16 x 80 sets of acquired data. Manual adjustment of any step in the process of measurement is available.

–The measuring of various electrophysical characteristics (not only conductivity) enables more exact monitoring and makes it possible to carry out the real adaptation test.