

## Background millimeter radiation influence in cardiology on patients with metabolic and pre-metabolic syndrome

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**Abstract:** The effects of background millimeter radiations (BMR) in patients with coronary artery disease (CAD), hypertension and in subjects with Inherited real risk of CAD, were investigated through invariant statistic measures, typical of nonlinear dynamics analysis of biological systems. The experimental evidences show that BMR ameliorate the nonlinear complexity in biosystems, recognized sign of physiological behavior, by increasing both the rate of unpredictability of heart rate variability (HRV) in patients with metabolic syndrome and the fractal dimension of coronary microvessel oscillations in subjects with pre-metabolic syndrome, healing their genetic alteration and CAD Inherited real risk.

**Key words:** millimeter waves; extremely high frequencies; clinical diagnosis; cardiovascular prevention; nonlinear dynamics; biophysics; deterministic chaos; water memory; heart disease; hypertension

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### Introduction

In the last decades several scientific works have focused on non-linear oscillatory behavior of well defined biological systems, whose dynamics, as measured by statistic invariants typical of deterministic chaos and fractals, can have significant interpretation and importance for clinical diagnosis and therapeutic monitoring. Deterministic chaos has been defined<sup>i</sup> as the ‘stochastic or probabilistic behavior occurring in a deterministic system’, and its main characteristics are the uncertainty and unpredictability, but it is possible to bedside detect and investigate it and to get qualitative information through invariant statistic measures, i. e., LCE<sup>ii</sup>, fractal dimension<sup>iii</sup> and entropy<sup>iv[1]</sup>.

In literature there are several researches aimed to test the non-linear behavior of heart muscle. Dynamic analysis techniques may uncover abnormalities in heart

rate behavior that are not easily detectable with conventional statistical measures. The short-term fractal scaling exponent performed better than other heart rate variability parameters in differentiating patients with CAD from healthy subjects. Patients with stable angina pectoris have highly altered fractal properties and reduced complexity in their RR interval dynamics relative to age-matched healthy subjects<sup>[2]</sup>. Major untoward events, such as life-threatening arrhythmias and acute coronary events, have been suggested to be triggered by the activation of the autonomic nervous system in patients with CAD. Heart rate variability analysis methods, such as fractal and complexity measures, as well as conventional techniques, give valuable clinical information among patients with ischemic heart disease<sup>[3]</sup>. The challenges posed by chronic illnesses have pointed out to epidemiologists the multi-factorial complex nature of disease causality. The notion of non-

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linearity is a relevant form of analytical approaches that are being tested in other disciplines<sup>[4]</sup>. Processing the database with RR-intervals of patients suffering from CAD has shown that the largest Lyapunov exponent (LCE) can be a diagnostic criteria allowing one to distinguish between different groups of patients with more confidence than the standard methods for time series processing accepted in cardiology<sup>[5]</sup>. A computerized approach of nonlinear dynamics analysis of electrocardiogram (ECG) signals has been applied for the detection of CAD. The well-known nonlinear dynamics descriptors, recurrences percentage, mutual information, fractal dimension, and a new descriptor, next embedding dimension error, are good quantitative descriptors of fluctuations<sup>[6]</sup>.

Fractal analysis of physiologic time series in health and disease reveals that the output of healthy systems, under certain critical parameter conditions, has a type of complex variability associated with long-range (fractal) correlations, along with distinct classes of nonlinear interactions. Multiscale, nonlinear complexity appears to degrade in characteristic ways with aging and disease, reducing the adaptive capacity of the individual. Further, these “syndromes” of fractal/nonlinear breakdown may be quantified, with potential applications to diagnostic and prognostic assessment. The breakdown of fractal physiological complexity may be associated on the one hand with excessive order (pathologic periodicity) and, on the other hand, with uncorrelated randomness. A unifying theme underlying both routes to pathology is the degradation of correlated, multi-scale dynamics<sup>[7]</sup>.

The above mentioned articles provide the same results, independently of the different statistical approach: fractal dimension and the rate of unpredictability of a biological system with nonlinear dynamics (measured, i. e., by LCE or Shannon entropy) helps in differentiating patients with CAD from healthy subjects.

As higher is the rate of unpredictability of a system and, in parallel, as higher is its degree of fine hierarchical non-Euclidean geometry termed fractal, whose main characteristics are scale invariance and self similarity, as much the bio-system is physiologically

healthy, presenting higher orders of high complexity typical of dissipative systems far from equilibrium studied by Prigogine<sup>[8]</sup>.

On the contrary, as much the trend of the investigated system is predictable (i. e., with marked elements of periodicity, tendency to limit cycle or fixed point), as much it tends to pathology or chronic phases. In parallel, the fractal dimension decreases, demonstrating an altered and reduced level of structural organization, impacting negatively on the physiology of the system, with loss of flexibility, adaptability and learning, while rigidities, obstructions and inharmonious behaviors emerge<sup>[9-14]</sup>.

These pioneering works, even if corroborating the correlation between deterministic chaos and the presence or absence of CAD, still leave many open questions and unresolved issues. First, these are purely statistical approaches, not easy to do at the bed-side, based on clinical test's time series (e. g., ECG) studying the changes taking place in heart rate (physiologically in healthy subjects, and pathologically in patient with a coronary heart disease: downstream diagnosis of CAD). Second, they do not address the underlying problem, namely investigating the causes of CAD, for example, by analyzing the lifelong behavior of coronary parenchymal cells, microvascular tissue or blood flow in microvessels. Furthermore, CAD is a growing epidemic, and it should be noted that often a subject unaware of being affected by CAD does not undergo clinical trials and cardiology visit, and anyway often the tests performed are not sufficient to diagnose the disease, as evidenced by the numerous deaths of young athletes for heart attack, although they undergo regular cardiac monitoring. For all these reasons new diagnostic approaches need to be explored, such as those introduced by quantum biophysical semeiotics (QBS)<sup>[15]</sup>, which through bed-side evaluation, not only can diagnose the presence or absence of CAD, even silent, but it can also assess the existence of pre-metabolic syndrome<sup>v</sup> that can last for years or decades, pre-clinical stage of the disease still potential or evolving to pathology (pre-morbid state or grey area), so allowing for an effective, pre-primary<sup>[16]</sup> and primary prevention. QBS method is useful both for clinical di-

agnosis and therapeutic monitoring as shown in Section 3 about ‘Background Millimeter Radiations’ (BMR) treatment in patients with ‘Inherited Real Risk’ (IRR) of CAD.

The effects of ‘Background Millimeter Radiations’ (BMR) in patients with CAD, hypertension and in subjects with IRR of CAD, are here investigated through invariant statistic measures, typical of nonlinear dynamics analysis of biological systems.

In Section 1 we illustrate the main researches, applications and therapeutic properties of millimeter waves in biological systems, while in Section 2 we present two experiments about BMR treatment in patients, one with CAD (arrhythmia) and one with hypertension.

In Section 3, we introduce quantum biophysical semeiotics theory and method, in particular related to the diagnosis of ‘Inherited Real Risk’ of CAD, and an experiment done to evaluate the genetic therapeutic effects of BMR used for preventive purpose (primary and pre-primary prevention), i. e., for healing the congenital alteration of mit-DNA. In Section 4 we discuss the results of the cited experiments in accordance with the nonlinear dynamics statistical analysis and the previous concerned literature above mentioned.

## 1 Background Millimeter Radiations

The first works concerning the interactions of the millimeter waves with biological objects were conducted in Russia in the middle of the XX century by the group of scientists led by N. D. Devyatkov and M. B. Golant. Their basic research demonstrated the effect of the resonant response of the reaction of the blood cells in the low-intensity electromagnetic radiation of the millimeter-wave band.

It was also shown that the effects of the millimeter influence of the waves are realized both at the cellular level and in different water base liquids in living organisms such as plants, animals and human beings<sup>[17]</sup>.

In the eighties of the XX century it was shown that the positive effects of the millimeter influence greatly

increased at the modulations carrying therapeutic frequency with small deviations in the 50 ~ 100 MHz limits<sup>[18-20]</sup>.

The first clinical results on using millimeter therapy were provided in 1978 by V. A. Nedzveckiy<sup>+</sup>. These evidences revealed therapeutic effects, connected with the stimulation of the damaged biological structures, by imposing the radiator on damaged area of the body or occipital area of the head.

In 1995 for the first time the biotechnical system of the millimeter therapy, working at avalanche transit-time diode with bio-controlled porosity signal, was patented<sup>[21]</sup>. In the biotechnical system of the same author<sup>[21]</sup> on the backward-wave tube both the broadband frequency and the amplitude modulation-carrying extremely high frequencies (EHF) signal by the biological rhythm of the patient-were used.

The clinical acknowledgement of the considered above ideas was received at treatment of complicated peptic ulcer disease by means of bio-controlled device of millimeter therapy. On the whole, from the experimental data it follows that molecules of water are possible to be considered as primary dartboard for the action by weak electromagnetic fields on biological systems. In this connection, first of all, it is necessary to consider the data of the effect, appearing when water and water solutions are irradiated by EHF range of waves.

“Radio-physical response” is the maximum difference between the own radiation of the object and the value got in the process of irradiation, for instance, of water. Radio-physical response is the value of the effect of “re-radiation”. The effect of the “re-radiation” (the forced radiations) is the ability of the earlier irradiated liquids to radiate the electromagnetic waves for some time after cessation of the irradiation at the frequency of the irradiation. “Time of relaxation” is the period of the restoration the values of the own level of electromagnetic radiation of water and water solution.

The spectrum of the own frequencies of water clusters is situated in millimeter and sub-millimeter

<sup>+</sup> He was graduate student of the Odessa State Medical Institute under the supervision of professor I. S. Cherkasov.

range of frequencies<sup>+[22]</sup>. The resonance absorption of the electromagnetic radiation by these clusters is realized exactly in the same range. The resonance interaction of the radiation with the proton and cluster structures causes the destruction followed by the reconstruction of the last ones that leads to changes in hydrogen connections between the molecules of water, and in the molecule itself.

Alongside with that, it is also noticed that the intensity of the forced oscillations is much higher than that of the own radiation of each liquid after the irradiation of water and water solutions by means of EHF. This is the effect of re-radiation.

In A. S. Kozmin (2008) opinion, the physical mechanism forming the “re-radiation” of the water is connected with the net of the hydrogen connections (biosensors)<sup>[23]</sup>. The hydrogen connection between two molecules of water is characterized by the fact that the atom of the hydrogen, being in the position between two atoms of the oxygen, can occupy the position either nearby the one, or the other atom of the oxygen  $Ox-(1/2)H \dots 1/2)H Oy$ . In other words, the proton can be considered as particle tunneling between the two potential pits, corresponding to parabolic potential<sup>++</sup>. If the atom of hydrogen (after absorption of the quantum of energy EMR) is situated on the agitated energy level for a long time, the effect of “memory”<sup>+++</sup> is realized<sup>[24]</sup>. In the process of emission of the same quantum (returning of the atom in the basic condition) the phenomenon that was called as ‘re-radiation’<sup>[25]</sup> takes place. Thereby, water fulfils the function of the background EHF-radiation generator for a period of time. These characteristics of water and water solutions were

demonstrated by the experimental investigations<sup>[24]</sup>.

In 1996 a Gunn diode<sup>++++</sup> was designed by A. V. Kozhemyakin<sup>+++++</sup>. The functioning of the diode is realized by using the semiconductor arsenide gallium with operated energy structure (the CEM-Controlled Energy Material). The crystal of the diode is capable “to remember external EHF-radiation” and forms the exact resemblance of pathogenic signals or medical factors. This property allows to realize the influence on an organism in ‘Background Resonance Radiation’ (BRR) mode under disconnected feeding of the generator<sup>[25, 26]</sup>. This direction of the investigations is related to millimeter therapy with density of the flow to the pulsed power not less than  $5 \times 10^{-10} \text{ Wt/sm}^2$  (threshold and sub-threshold MM-therapy).

In addition to that we must also take into account the background level and its own electromagnetic fluctuations, the features of which are defined by the structure of the crystal.

On the base of the Gunn diode two devices were created: the device “Cem-Tech” and the device “Cem-Activator”. The first one is designed for treatment of a wide range of diseases and for the preparation of the activated water. The second one is used for processing liquids and solutions. Both devices provide the pulsed generation and the radiation on fixed frequency within the range of 35 ~ 70 GHz with the flow of the pulsed power not less than 0.01 mWt. The frequency is modulated by a signal of 9 Hz.

It is unknown what effect the EHF in BRR mode gives on native blood in the autonomic nervous system. It is also necessary to clear up the influence that BRR can have on the genetic system of the human-being.

<sup>+</sup> In[23]and[24] data on the physical and chemical properties of water emerging in the process of its millimeter-wave radiation are provided. Furthermore, information on the intermolecular interactions of water with dissolved substances are presented. In this connection, in our work we focus only on biological (physiological) effects of activated water (activated millimeter waves).

<sup>++</sup> See Gapochka LD Gapochka M. , et al, “Effects of electromagnetic radiation UHF and SHF bands for liquid water” (1994), Bulletin of Moscow University, Series 3, Physics. Astronomy. that 35, N4.

<sup>+++</sup> In Ph. D. thesis of Kozmin A. S. (Low-intensity electromagnetic radiation of millimeter of water and aqueous solutions. Volgograd. 2011), to which we refer (supervisor Betsky O. V. ) it is stated that “the biophysical properties of THz wave band appear in the interaction with the physical and biological environments. It is known that the main target during irradiation of human tissue by means of millimeter waves is water. In[2] it is shown that the pre-irradiated in the EHF band and THz water acquires new and unique properties. This effect is known as the “memory of water”<sup>[3]</sup>.

<sup>++++</sup> The Gunn diode is based on the Gunn effect and both are named for the physicist J. B. Gunn who discovered the effect in 1962.

<sup>+++++</sup> A. V. Kozhemyakin is an engineer from the Siberian city of Tomsk.

## 2 BRR Experiments in patients with CAD and Hypertension

The aim of the conducted study is to investigate the influence of background mechanisms of EHF-radiation on native blood of patients with CAD and on the drug Lodoz (bisoprolol 2.5 mg + hypothiazide 6.25 mg), an informational copy of the aqueous solution of which was taken by patients with essential hypertension. The choice of the drug has been associated with the effect of slowing down the rhythm of the heart which can be easily documented.

### 2.1 Tasks (functions) of the research (research problems) :

The main tasks of our research are :

1. To study (experimentally and with control test) the influence of the EHF with background resonance radiation on the native blood of a patient with ischemic heart disease.

2. To study the parameters of circadian rhythms pulse of a patient with hypertensive disease (II stage) with metabolic syndrome on the background of accepting drinking-water and the pharmacological drugs not affecting the heart rhythm.

3. To evaluate the influence of the structured water, obtained by means of its activation with EHF radiation in BRR mode using the apparatus «CEM-TECH» (Cem Tech).

4. To analyze the statistical information of the dynamics of circadian rhythms of the pulse of the same patient after taking Lodoz.

5. To analyze the statistical information of the dynamics of circadian rhythms of the pulse of the patient with hypertensive disease II stage with metabolic syndrome after taking the activated water, containing of the informational copy of the drug Lodoz.

### 2.2 Materials and methods of research

For our studies the device processing liquids and

solutions «Cem Activator», certificate № ROSS RU. AE88. B00235 was used. The device is supplied with a special cap-activator<sup>+</sup> for a plastic bottle, with EHF-radiation generator-Activator 1- inside.

The device provides the impulse generation and emission of electromagnetic waves at a fixed frequency in the range of 35 ~ 70 GHz. There is the density of the current pulse power no less than 0.01 mWt, and modulation frequency of 9 Hz.

The second emitter is made in the form of a plastic «pill», inside of which one generator of EHF-radiation, having the same parameters of frequency and power, is placed. The cover has a grey colored mark and an inscription 'Activator A'.

The device «Cem-Tech» may be used for the processing of water. The diode of this unit has a yellow cover. Its frequencies are fixed in the range of 35-70 GHz.

The second emitter (Activator A, located in a special tube), affecting the blood, was used to study the effect of EHF in BRR mode on native blood of the patient's disease. Microscopic examinations of blood samples were made at 10, 30 and 60 minutes before and after irradiation.

The methodology for the preparation of informational copies of the drug is as follows:

1. The tablet of the medicine was to be transformed mechanically into a powder by crushing and rubbing; then it was strewed into a special cap-activator in the form of the stopper, having a connector (plug) with EHF-generator of Gunn diode.

2. The electric power of the device was turned on. The time of the exposition was 1 minute.

3. The power of the device was turned off and the drug was in contact with the radiator for 10 minutes<sup>++</sup>.

4. The drug was removed out from the activator.

5. Cap-activator was screwed on the bottle containing 100 ml of pure water with the subsequent exposi-

<sup>+</sup> The cap-activator, in the form of the stopper, has a connector (plug) with EHF-generator of Gunn's diode. Stopper-activator is made of plastic. The diameter of the stopper is equal to the diameter of the bottle. Gunn's diode is located behind the threaded part of the plug at the bottom of it. Water is in contact with the emitter-diode through a food film (approximately 1 mm) on the bottom of the stopper-activator.

<sup>++</sup> In methodical recommendations to the device manufacturer's specified period of exposure is equal to 10 minutes. Due to the fact experiments were carried out in Italy and in Russia (Belgorod) on the same devices, and the methodology of the study was identical to that of water (to be able to compare the results). This exposure term is sufficient for obtaining activated water, which is immediately consumed. To save water for a longer period may need longer processing period, or the increased power diode (may take two diodes). But these experiments were not part of the research problem.

tion for 10 minutes.

6. 10 minutes later the water was accepted by the patient and the registration of 500 inter-pulse intervals by means of a sensor pulse with interface via USB-port of the computer was carried out. Re-registration of inter-pulse intervals took place every 4 hours from 7.00 a. m. until 11.00 p. m. The studies were being carried out every day for 7 days<sup>+</sup>.

Therefore, 2 500 inter-pulse intervals (5 records by 500 complexes) were analyzed daily to identify the circadian rhythms of heart rate, reflecting the activity of the autonomic neural system.

Cohort studies were not conducted in connection with the fact that each person has its own individual variations of the rhythm, not comparable with deviations, identified for the group as a whole.

For the decision of the formulated tasks we used our computer methodology of processing the data of the variability of the heart rhythm of a concrete patient, which allows to carry out not only a record of 500 inter-pulse intervals, but also to calculate the significant difference of the dynamics of the studied parameters of the distribution.

In addition to the known statistical indicators in the form of mathematical expectation ( $M$ ), the errors of the mathematical expectation ( $m$ ), standard deviation ( $\sigma$ ), informational analysis allowing the computation of the entropy rates of heart rhythm was used. These were: the total entropy ( $H = -\sum P_i \text{Log}_2 P_i$ ), the maximum entropy ( $H_0 = \text{Log}_2 m$ ), the rate of unpredictability ( $h = H/H_0$ ), the factor of redundancy ( $R = 1-h$ ) and that of stochasticity ( $S = H/H_0 - H$ ).

Figure 1 shows the blood smears in the period before and after the irradiation of millimeter waves in the BRR mode. In the period before the irradiation there are deformed red blood cells, glued together (first microphotograph). Ten minutes after the BRR-action we can see that the deformation of red blood cells has decreased (second microphotograph). Later on, the number of red blood cells, which was glued together,

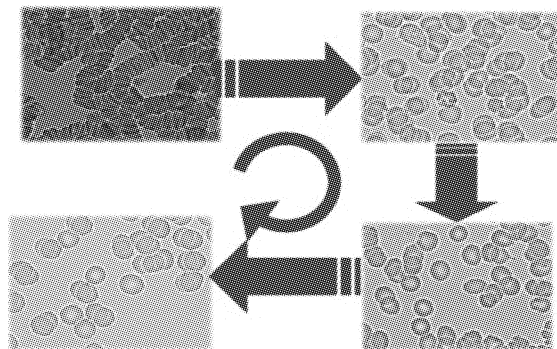


Fig. 1 BRR Action on native blood

is significantly decreased (third microphotograph). Finally, practically normal blood picture is visible (fourth microphotograph).

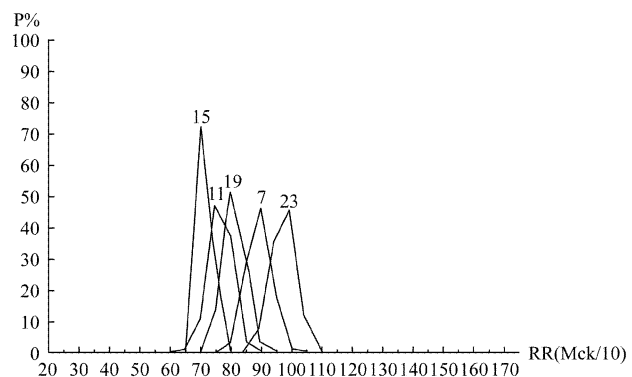


Fig. 2 Circadian rhythms of the pulse on the background of the acceptance of pharmacological drugs not affecting HRV

Figure 2 shows the curves of circadian rhythm (inter-pulse intervals) of the patient with arterial hypertension (II stage) with metabolic syndrome on the background of the acceptance of drinking-water and drugs that do not affect the heart rhythm. The graph shows that the daily cyclic (recurrence) of the heart rhythms of the patients are not changed, as their temporal sequence is preserved. As shown in Figure 2, (1) in the early hours of the distribution graphs are located in the zone of 0.67 ~ 0.99; (2) in the daytime distribution graphs inter-pulse interval occupied zone within 0.66 ~ 0.80; (3) in the evening hours marked displacement distribution graphs into an area with values of 1.00-1.20.

<sup>+</sup> Design research includes a detailed and serial description in the form of the algorithm of methodological techniques of the decision formulated tasks of the study. The paper details the technology of obtaining a copy of the informational medications (beta blockers bisoprolol) used in the treatment of hypertension. Importantly, such an approach provides the possibility to reproduce these results.

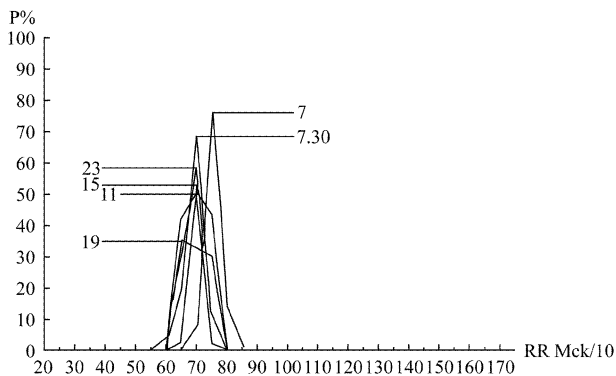


Fig. 3 Circadian rhythms of pulse on background of the acceptance of water activated by means of Gunn diode

Figure 3 shows the dynamics of circadian rhythms of the same patient in the process of the experiment with the reception of the activated water by means of the unit «Cem-Tech». From figure 3 it follows that the initial diagram at 7.00 a. m. is narrow and high, and it is located in a moderate zone of predominance of the sympathetic neural system. It is characterized by a low coefficient of variation (of 3.4%). The acceptance of the activated water after 30 minutes from the original recording is accompanied by statistically significant trend of pulse (6 of beats) in the direction of hypo-variable tachyarrhythmia unlike the graph in figure 2.

The level of activity of the autonomic neural system during all the hours of the study, according to the index of tension of regulatory mechanisms, is located in a moderate zone of predominance of the sympathetic neural system. The exception is at 7 p. m., when the distribution curve of the pulse with wide base and low amplitude was registered. The curve is located in the zone of the normal tone regulation. At the same time the harmonic interaction of cholinergic and adrenergic mechanisms of regulation is noted. During these hours the large values of the coefficient of variation (5.6%) are observed.

On the background of the effect of the drug Lodoz (2.5 mg of bisoprolol + 6.25 mg of hypotiazidum), figure 4 shows the dynamics of the circadian rhythms of the same patient.

Figure 4 also shows that after taking the Lodoz at 11.00 a. m., a displacement to the right (from the o-

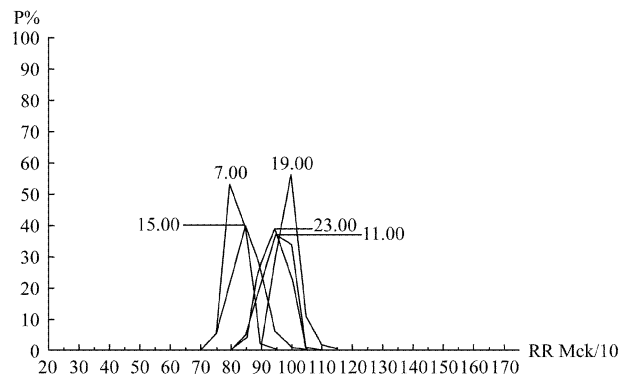


Fig. 4 Circadian rhythms of the pulse on background of the acceptance of bisoprolol

riginal diagram at 7.00 a. m.) is observed, as well as a reduction of the amplitude and an expansion of the base. Such dynamics is implemented by mobilizing cholinergic mechanisms of regulation. But, herewith, the graphs of the distributions are placed in a normotonic zone of regulation. The frequency of the heart rate was slowed statistically on 13 beats of pulse and kept within the limits of 62 beats per minute. These figures are closed to the values of 59 beats per minute for the patient.

Only at 3.00 p. m. there has been some increase in the activity of adrenergic regulation mechanisms with increasing heart rate to 70 beats per minute. In the evening, at 7.00 p. m., the pulse reaches the target value of 59 beats per minute and it is almost unchanged up to 11.00 p. m. These facts suggest that the acceptance of a single 2.5 mg dose of bisoprolol provides statistically significant slowing down heart rate with the achievement of the target function in the 59 beats per minute and the retention of the achieved status for 16 hours a day.

Figure 5 shows the graph of the distribution rate after acceptance of 100 ml of water containing information of the drug Lodoz. An initial diagram at 7.00 a. m. indicates moderate predominance of adrenergic regulation mechanisms. Four hours after the acceptance of water with Lodoz information is noted by offset graph to the right, its expansion and decrease of the amplitude, which indicates the mobilization of the mechanisms of cholinergic regulation. As such, the graph of distribution of the pulse is located in normal zone regulation.

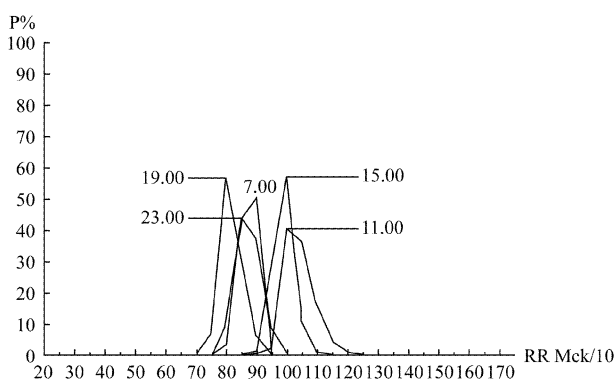


Fig. 5 Circadian rhythms of the pulse on background acceptance of activated water containing of the informational copy of the drug bisoprolol

Frequency of cardiac contractions slowed down to 7 beats of pulse (67 ~ 60), the coefficient of variation increased from 3.3% to 4.7%. Frequency of cardiac contractions reached the level of statistical significance ( $p \leq 0.05$ ).

At 3.00 p. m. the graph of distribution of inter pulse intervals is placed in normal zone of regulation, however, it increased slightly in amplitude. The coefficient of variation has statistically insignificantly decreased and formed only 4.0%. Frequency heart rate, as well as at 11.00 a. m., remains within the proper values. The difference is only 1 heartbeat (60-59).

At 7.00 p. m. an increase of significant difference in the 15 beats pulse (75 ~ 60) of the frequency of cardiac reductions is noted due to offset graph of distribution to the direction zone of the cholinergic regulation with a moderate prevalence of the degree of activity of adrenergic mechanisms. At 11.00 p. m. the graph of the distribution of the pulse is displaced to normal zone at the expense of mobilization of cholinergic regulation mechanisms. The deceleration of frequency of cardiac contractions makes 5 beats (75 ~ 70). However, it should be noted that the frequency of cardiac contractions at 7.00 p. m. and 11.00 p. m. does not attain to the target values. The difference between them was 16 pulse beats ( $75 - 59 = 16$ ) and 11 of the pulse beats (70 ~ 59).

It is shown that the action of the informational copy of pharmacological drug Lodoz is not connected with realization of the law dose-effect.

### 3 QBS and Inherited Real Risk of CAD: bedside diagnosis and BMR therapy

The above mentioned experimental results and the clinical evidences of EHF applied in patients with overt diseases<sup>[27]</sup> stimulated us to test the use of millimeter waves in BRR mode even for preventive purposes.

In fact, the experiments described in the previous section are made in patients with metabolic syndrome, and involved by CAD, analyzing HRV circadian cycles (and the heart's pulses). In turn, there can be subjects clinically health but at 'Inherited Real Risk' (IRR) of CAD, i. e., pre-metabolic syndrome, or with CAD in its different stages<sup>[28]</sup>, although silent and asymptomatic, even if ECG and other usual clinical tests are normal, as confirmed by growing sudden deaths.

In accord with the studies of one of the authors, this is due to genetic alteration of mit-DNA termed as the "Congenital Acidotic Enzyme-Metabolic Histangiopathy" (CAEMH), a unique mitochondrial cytopathy that is present at birth and open to medical diagnosis and therapy<sup>[29]</sup>.

This is possible with the aid of "Quantum Biophysics Semeiotics" (QBS)<sup>[15]</sup> a new discipline in the medical field and an extension of the classical semeiotics with a scientific trans-disciplinary approach, i. e., with the support of quantum and complexity theories.

The presence of intense CAEMH in a well-defined area (i. e., myocardium) is due to gene mutations in both n-DNA and mit-DNA<sup>[30]</sup>. This is the basis for one or more QBS constitutions which could bring about their respective IRR<sup>[31]</sup>.

In accordance with the Angiobiopathy theory<sup>[32]</sup>, coronary microvessels, related parenchyma and genome are intimately related, so that the study of microvascular oscillations can give us valuable information on parenchyma's patho-physiology.

It is well known that the oscillatory dynamics of microvessels (systole and diastole) are independent of systole and diastole of the heart muscle, so a patient's heart can be clinically healthy, according to ECG and other clinical trials, even under the nonlinear statistical



analysis of HRV time series mentioned above, but it could be accompanied by coronary microvessels with functional and structural abnormalities<sup>[33]</sup>.

The QBS method allows the clinical and pre-clinical diagnosis of the most severe diseases, e. g. , solid and liquid forms of cancer, Type II Diabetes Mellitus and coronary heart diseases, as well as the IRR of CAD; i. e. , through the auscultatory percussion of the stomach<sup>[34-36]</sup>.

Medical doctors can evaluate, with a stethoscope and the auscultation of any viscera (i. e. , stomach, ureter), mitochondria functions, as well as the behavior of any biological system. The presence of the IRR of many diseases linked with one or more “QBS Constitutions” (i. e. , diabetic, hypertensive, atherosclerotic “QBS Constitution” in case of IRR of CAD), can be clinically diagnosed from birth so that an intelligent prevention strategy can be implemented only on those at real risk (with IRR of any disease)<sup>[37]</sup>.

In health, without any “risk” for CAD, i. e. , in absence of the “variant” Reaven’s syndrome<sup>[38]</sup>, the auscultation of the stomach under an intense digital pressure applied upon the projected skin area of the heart muscle (i. e. , precordium) does not provoke a simultaneous gastric dilation and the contraction of the antral-pyloric region, i. e. , negative Caotino’s sign<sup>[39]</sup>. This sign is termed “Gastric Aspecific Reflex” (GAR).

In subjects with IRR of CAD, the above mentioned manoeuvre brings about a simultaneous GAR; i. e. , the stomach dilates and then there is a small tonic gastric contraction (just a little if there is just the IRR of disease and very significant in case of overt CAD).

When the IRR of CAD is recognized, we should refine the diagnosis in order to determine the severity of the metabolic (CAD in progress) or pre-metabolic (grade of evolution of IRR of CAD) syndrome<sup>[28]</sup>.

The gastric diagnosis is consistent and dually reflects the informative nature and quality of parameters collected by QBS microcirculatory investigations that are in accord with clinical microangiology. The pathophysiology of QBS reflexes is based upon local microvascular conditions<sup>[40]</sup>.

In case of genetic alteration of both DNAs, there is a microcirculatory remodeling due to vasomotility and vasomotion impairment (e. g. , functional imperfection) and structural obstructions, i. e. , Arteriovenous Anastomosis (AVA) and Endoarteriolar Blocking Devices (EBD)<sup>[41]</sup>.

Microcirculation shows three basic types of activation, ignoring the many transitional forms:

1) Type I, Associated (the term ‘associated’ means that vasomotility and vasomotion show the same physiological behavior);

2) Type II Intermediate, partially dissociated (pre-metabolic syndrome, dissociated because vasomotility and vasomotion have different behaviors);

3) Type III Completely Dissociated (pathological microcirculation, typical of overt disease).

In case of IRR of CAD, there is a functional alteration of microcirculatory dynamics evidenced by an impairment of vasomotility and vasomotion (microcirculatory activation, type 2, dissociated) as well as structural abnormalities such as the presence of pathological EBD<sup>[41]</sup>. These functional and structural abnormalities increase along with time, with the evolution of the IRR of CAD (pre-clinical stage) to the overt pathology (microcirculatory activation, type 3, dissociated). Microcircle’s oscillations have physiological nonlinear and complex dynamics, whose quantitative and qualitative behaviors can be determined through the invariant statistic measure of fractal dimension ( $fD$ )<sup>[41]</sup>.

There are well defined QBS techniques for calculating the  $fD$ , such as, e. g. , considering the vasomotility and vasomotion diagram, and particularly taking the ratio between the highest spikes-HS (maximum points of the oscillation) and the minimal points of coronary microvessels’ fluctuation (Figure 6).

In health, microvessels’ physiological behavior is denoted by a fractal dimension<sup>vi</sup> of 3.81. In patients where a biological system is evolving towards any chronic disease there is a lower fractal dimension, i. e. ,  $1 < fD < 3$ , and, finally, in chronic situations, i. e. , the endocrine pancreas in diabetes,  $fD$  is equal to 1, topological dimension, i. e. , from IRR to overt CAD (Table 1).

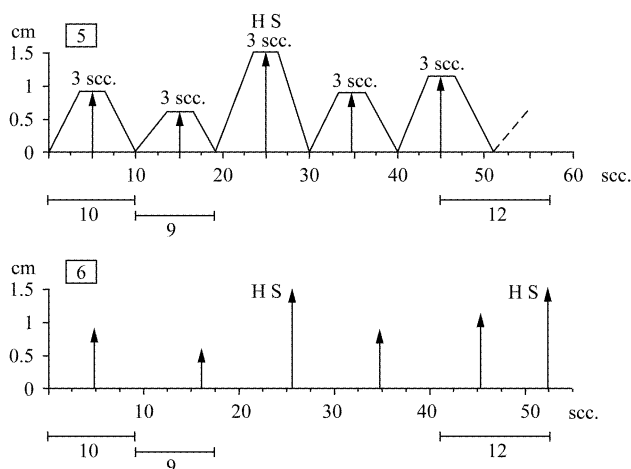


Fig. 6 Physiological microcirculatory oscillations

**Table 1 Fractal dimension in microcirculatory dynamics. Legend: CAD (Coronary Artery Disease);  $fD$  (fractal Dimension)**

Fractal Dimension	Equilibrium	State of health
$fD = 1$	fixed point	Overt CAD-chronic and acute pathology
$1 < fD < 1.9$	limit cycle tending to fixed point	pathology-tendency to CAD-State of variable severity of disease evolution
$1.9 \leq fD < 3$	limit cycle	initial implementation of the tendency to disease /potential pathology-i. e. Inherited Real Risk of CAD-initial evolution to disease
$3 \leq fD < 3.81$	limit cycle tending to strange attractor	tendency to physiologic condition (only potential phase)
$fD \geq 3.81$	strange or chaotic attractor	Physiologic condition-healthy state

Fractal dimension is simply calculated as the time of the disappearance of gastric aspecific reflex, before the appearance of the next.

The  $fD$  (Table 1) is an universal measure, independent of the investigated parenchyma, informing the physician about the health condition of the visited patient, and it is directly related to (d) or inversely (INV) related to:

A) (d) the local microcirculatory functional reserve- (vasomotility and vasomotion) and then

B) (d) the presence, or not, of the local congenital Real Risk;

C) (d) the latency time of gastric aspecific reflex (GAR) and then with tissue pH;

D) (INV) the duration of the GAR.

QBS methods are not only useful for diagnostic purposes, but also for therapeutic advices, because

they are able to measure the microcirculatory activity before and after each preventive therapy's treatment, in order to understand its effectiveness.

Some years ago, one of the authors<sup>[37, 43]</sup> asked us an open question: are QBS constitutions and Inherited real risks of degenerative pathologies reversible?

Afterwards, we used the BMR therapy, i. e., the Cem-Tech device in BRR mode as illustrated in Section 2.2 in 30 healthy subjects positive for Caotino's sign, e. g., with IRR of CAD not yet in evolution, whose microcircle's dynamics were denoted by  $fD$  in the range<sup>[2-3]</sup> (Table 2), as follows:

—the first emitter (yellow Gunn diode termed Activator A) is placed on CAEMH trigger points, i. e., skin projection area of right cerebral Planum Temporale, which is located between the transverse gyrus of Heschel and the posterior segment of Sylvius' fissure<sup>[34-35]</sup>, reading its frequencies for 60 seconds (Programme 2, BRR mode);

—the second emitter (yellow Gunn diode termed Activator B) is placed on any point of myocardium, i. e., skin projection area of heart muscle, reading its frequencies for 60 seconds (Programme 2, BRR mode);

—after 1 minute of frequencies' capturing, the two Activators are disconnected from the USB cables of the device, and left in the same place where they lies for other 10 minutes;

—during these 10 minutes the captured customized radiations of the related areas of interest are re-transmitted in the same region.

To study the effect of EHF in the BRR mode on these patients we visited them before, during and after the 10 minutes of irradiation. The QBS visit is done in order to diagnose the presence and intensity of CAEMH, the Caotino's sign, the main parameters of the cardio-GAR (latency time, duration and intensity of the reflex), the microcirculatory behavior from functional and structural points of view (microcirculatory activation's type, vasomotility, vasomotion, EBD, AVA), the fractal dimension calculated as previously shown (Scheme 2) as well as the differential latency time or pause between 2 successive cardio-GAR.

All the above mentioned parameters are consistent

and confirm each other, so that for simplicity we discuss here just the presence of CAEMH, Caotino's sign, the latency time of cardio-GAR, the microcirculatory activation and the fractal dimension of microcirculatory oscillations.

In health, there is almost always slight CAEMH, even if there is not IRR of CAD (i. e., Caotino sign is negative). The latency time of cardio-GAR is 8 seconds under mean digital pressure on any point of skin projection area of heart muscle, i. e., the precordium<sup>[28]</sup>. Vasomotility and vasomotion have the same behavior in terms of diastole and systole oscillations, so there is a type 1 associated microcirculatory activation denoted by a physiological fractal dimension (3.81)<sup>[42]</sup>.

If CAEMH and Caotino's sign are both positive, then there is an IRR of CAD, and its severity can be diagnosed through other more refined QBS signs<sup>[28]</sup>. In case of Lt equal or next to 8 seconds the IRR of CAD is not yet in evolution, vasomotility and vasomotion are already impaired (their related diastole and systole differ from each other) and the fractal dimension of vasomotility oscillations is lower than the physiological one, i. e., between 2 and 3.

During EHF radiations in BRR mode the Lt of cardio-GAR rises to 16 seconds, doubling the basal physiological one, and there is an extremely high microcirculatory activation (i. e., arteriolar diastole lasts for 11 seconds, arteriolar systole lasts for 1 second) never observed before, as the fractal dimension equal to 4, a value greater than the physiological one<sup>[44]</sup>.

QBS diagnosis ascertains the healing of CAEMH

after 5 minutes and of IRR of CAD after 10 minutes from the beginning of the application (i. e., Caotino's sign, initially positive, turns negative). From the moment of EHF application, an intense DNA's reprogramming and genome's restructuring activity starts up and lasts for about 9 months. During this period of genetic restructuring and normalization, QBS monitoring states that Lt of cardio-GAR gradually decreases to the basal physiological value of 8 seconds (Figure 7, blue therapy, bold line). The high microcirculatory activity diminishes after about one month, but it remains slightly activated till the end of the ninth month, a period of plausible normalization of the genetic restructuring just completed, before ceasing and stabilizing at rest (physiological microcirculation at rest, i. e., diastole 6 seconds, systole 6 seconds). EHF radiations in BRR mode, which belong to QBS 'type B' preventive therapy or blue therapy<sup>[45]</sup>, heal the IRR of CAD, as confirmed in all the treated patients with IRR of CAD. Similar results were observed in patients with Oncological Terrain and IRR of cancer<sup>[46, 47]</sup>.

After about 9 months from the moment of the first unique EHF application, the quantum biophysical effects of millimeter waves are over as confirmed from the latency time of cardio-GAR which is 8 seconds, physiological, the basal microcirculation at rest which shows diastole and systole both of 6 seconds, and the fractal dimension of vasomotility stabilized at the value of 3.81. This physiological value of fractal dimension is geometrically related to the nonlinear equilibrium termed strange or chaotic attractor and it confirms the current orientation in literature about this issue; a loss

**Table 2 QBS diagnosis and therapeutic monitoring before, during and after BRR radiations. Legend: QBS = Quantum Biophysical Semeiotics; BRR = Backward Resonance Response; IRR = Inherited Real Risk; CAD = Coronary Artery Disease; CAEMH = Congenital Acidotic Enzyme-Metabolic Histangiopathy; Lt = Latency time; EHF = Extremely High Frequencies; BRR = Background Resonance Radiation;  $fD$  = fractal Dimension**

	CAEMH	Caotino sign	Latency time of cardio-GAR	Microcirculatory activation	Fractal dimension
Health subject	Mainly Positive	negative	$Lt = 8$	Type 1 associated	$fD = 3.81$
IRR of CAD	positive	positive	$Lt \leq 8$	Type 2 dissociated	$1.9 \leq fD < 3$
IRR of CAD-during EHF-BRR (after 5 minutes of radiations)	negative	positive	$Lt = 16$	Type 1 associated	$fD = 4$
IRR of CAD-during EHF - BRR (after 10 minutes of radiations)	negative	negative	$Lt = 16$	Type 1 associated	$fD = 4$
After 9 months	negative	negative	$Lt = 8$	Type 1 associated	$fD = 3.81$
IRR of CAD under green therapy	positive	positive	$Lt = 12$	Type 1 associated	$fD \leq 3.81$

of complexity denotes biological systems tending to pathological conditions, while restoring of complexity identifies healing or curative processes tending efficiently to health and physiological status.

The diagnostic QBS monitoring confirms the negative CAEMH and IRR of CAD during and at the end of this period of heightened mitochondrial and microvessels' activity, at the end of which the coronary microvessels do not have any imperfection or structural and functional abnormality: they return physiologically and permanently to health (absence of pathological EBD, physiological flux motion and flow motion, absence of microvascular remodelling, associated vasomotility and vasomotion at rest and under stress tests).

The extreme importance of the above mentioned parameters is strongly evident if we compare them with those observed by QBS therapeutic monitoring of 'type A' or 'green' therapy<sup>vii</sup>.

Through a proper prevention with 'green' therapy a genetic reversibility for future generations is possible, i. e., healing the genetic mit-DNA alteration of a mother before her children's conception<sup>[43]</sup>, but this could not be enough for the current generation, especially under environmental negative conditions.

The 'green' therapy stimulates the activity of mitochondria by acting on metabolism (chemical processes), peptides' net (electric-electronic processes), but also by improving, normalizing mitochondrial and tissue oxygenation, expression of the normal operation of mitochondrial oxidative phosphorylation. Indeed, the mitochondrial functional cytopathy above mentioned (CAEMH) is the *conditio sine qua non* of the more frequent and severe human diseases.

In such a way the tissue oxygenation and mitochondrial activity are improved, mitochondria are normally performing their functions, but the genetic alteration of mit-DNA still is present: CAEMH, QBS Constitutions and IRR of disease are still positive (Table 2, last row), but the IRR of CAD, turns 'residual'. This means that a continuative 'type A' therapy averts the risk that the disease should emerge, even if the genetic problem is not yet healed.

Under a continuative 'green' therapy the latency time of cardio-GAR under mean digital stimulation of

CAD trigger-points rises maximally to 12 seconds, instead of the basal 8 seconds or less (Table 2, last row).

A latency time of 12 seconds corresponds to a microcirculatory activation, type 1, associated: diastole 7-9 seconds, systole 5-3 seconds.

EHF in BRR mode belongs to a new class of treatments for preventive purposes termed 'type B' or 'blue' therapy<sup>viii[45]</sup>, in accord with the principle of recursive genome function (PRGF) by Andras Pellionisz<sup>[48]</sup>.

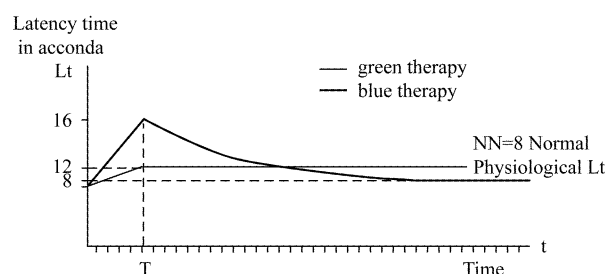


Fig. 7 Latency time under green and blue therapy

The diagram in Figure 7 shows the differences between 'green' and 'blue' therapy in terms of latency time of cardio-GAR over time. In case of IRR of CAD the latency time of cardio-GAR is 8 seconds or less ( $Lt \leq 8$ ).

Under "green" therapy (Figure 7, thin line) the Lt rises to 12 seconds, so reducing tissue acidosis, and improving mitochondrial and tissue oxygenation. This kind of therapy must be continuative to maintain a sufficient level of mitochondrial and tissue oxygenation and making "residual" the risk, persisting the microcirculatory activation, otherwise the Lt would decrease restoring the IRR of CAD in evolution. 'Type A' therapy cures but it does not heal it. It must continue forever to prevent the resurgence of the IRR of CAD and of its pre-clinical degenerative evolutionary process (pre-metabolic syndrome) which could lead, sooner or later, to the metabolic syndrome.

#### 4 Discussion of the results

Given that the technology of the treatment explored in section 2 includes the two-stage process of the use of Gunn diode, the interaction's mechanisms in

each case must be considered apart. First, we shall consider the processes in the human organism occurring in the moment when the device is connected to the electric voltage and the diode is placed on body of the patient to be assessed.

The metabolic processes, as they take place in different compartments of the cell, are cyclical but do not have harmonic properties as in technical systems.

This is connected with the fact that periods of the different cycles of a man's lifespan are constantly changed.

Moreover, it is known that in the biological rhythms of the human person alongside with cyclical components there is also a deterministic chaotic component, which, in turn, is connected with the transitional processes of the biological systems.

In the majority of healthy people the cyclical components of the biological rhythms are dominated by the deterministic chaotic component. Therefore, because of this hierarchic connection, the response of the biological system will be different depending both on physical and biological action.

In bio-systems with predominantly nonlinear dynamics the response of the system will be connected with a stochastic resonance. In biosystems with predominantly linear dynamics the response will be connected with a parametric resonance.

It is known that the human body radiates total stochastic signals, which contain both low intensive and extremely high frequency signals. In pathological conditions, these signals deviate depending on the frequency and they decrease in amplitude. In other words, the multifrequency discrete spectrum of these signals does not correspond to the hierarchies' period of biological rhythms.

We suppose that, at the moment of the contact of the Gunn diode with the point of the localization on the body of the person, the integral electromagnetic field is formed. This includes the noise spectrum of the frequencies of the diode and the noise spectrum of the patient, containing nonlinear components. The Gunn diode has negative differential conductivity that provides the passing of these processes. The electrical current running through the Gunn diode is practically in anti-

phase with the voltage.

After switching off the electric power from the diode, the stable state of the dipole active component of the diode's structure is saved. The aggregated super weak signals are transformed inwardly of the diode in the weak electromagnetic oscillations with the help of a resonant mechanism of amplification. Here begins the process of the re-radiation into internal compartments of the organism.

The concept of realization of the EMR-EHF effect at the level of the whole organism can be presented in the following fundamental principles.

Since 1995 it has been known that the frequencies of millimeter range 64.6 и 65.7 GHz of weak intensity (less of  $1 \text{ mWt}/\text{sm}^2$ ) are captured by molecules of water. Furthermore, these signals are amplified in the form of synchronous oscillations. Waves at these frequencies are distributed in aquatic environments with very low losses and, thus, they can penetrate to a greater depth of the irradiated object, involving the deep structures into the process of interaction with a weak external signal<sup>[49]</sup>.

In 2009 professor S. L. Zaguskin noticed that the level of sensitivity to external physical influence with energy less than  $kT$  (reaction on very small signals) is realized by a phenomenon based on the multi-frequency parallel resonance capture<sup>[50]</sup>.

What else promote the transmission of the signal? The low intensive EHF-radiation participates in the process of the transmission of information between cells because it proves the existence of EHF-induced intercellular interaction. This is also promoted by the motion of the liquid in the manner of convection. The convection process appears due to very low level of the intensities of the radiation (from  $10 \text{ mWt}/\text{sm}^2$ ).

It is also known that human tissues form a fractal network in which are structurally and functionally involved not only capillaries and nerves but also proteins and even chemical substances like radicals. During all the processes linked to the many different functions of the living organisms this fractal network "quakes" within the range of GHz.

The primary reception of the EHF-EMR is realized by the water. Further, the signals are transmitted

through the fractal network and are amplified by the resonance mechanism<sup>[51]</sup>.

Moreover, the rhythms of sol-gel transitions in cells take place constantly and even in the stationary conditions of the absence of functional activity.

The calcium-ions promote the maintenance of the rhythm in the phase of transition of sol in gel, under which the energy is generated in the manner of acoustic and electromagnetic field<sup>[58]</sup>.

NO (Nitrogen Oxide, synthesized by all cells of the human organism) plays a central role in the intracellular regulation of the concentrations of ion  $\text{Ca}^{2+}$  as well as the activities of the series of enzymes. In normal conditions NO serves as an important physiological regulator, acting through cGMPH-dependent mechanism (cyclical guanine mono phosphate)<sup>[52-55]</sup>.

Action of EHF electromagnetic waves at frequencies of molecular spectrum absorption and emission of nitrogen oxide (MSAE), during the regime of the amplitude and frequency modulation in vitro, caused statistically significant difference ( $p < 0.05$ ) compared with the control of the inhibition of the platelets function in the intact plasma. This is manifested by the reduction of the activity of platelets and of the decrease of their ability to aggregate.

The super low physical fields generated at transitions of sol in gel in cells as biological codes are examined on the basis of multi-frequent parallel resonance capture<sup>[58]</sup>.

In humans, the symbiosis between spirals of DNA and proteins (named histons) is responsible for the quasi-hexagonal structure of the genetic material.

The histone proteins complex is considered to have a structure such as to present information in a similar way to that of a "diskette-resonator". So, inside of the genetic construction, the fraction-organized electromagnetic field appears. Thus, DNA matrix transmits information modulated from outside the body towards the internal compartments of the human organism. It is necessary to consider that sharp response of the human organism to electromagnetic radiation of low intensity exists around the frequencies of 40 GHz that complies with resonance frequency of the tertiary structure DNA-spirals<sup>[56, 57, 59]</sup>.

This phenomenon of fraction-organized electromagnetic field is a system processor, prototyping all forms of living beings. So, primarily, after repeated sessions of irradiation, the recovery of information codes of millimeter signals and hierarchy of human biorhythms occurs.

Then, secondarily, after the treatment the recovery of all the systems of the organism, touching the majority of organs and systems, begins.

The primary physiological response consists in forming the protein molecules in function of the conditions of functional activity. Through protein receptors the process of normalization of vitally important functions of the cells and of cellular membranes fluctuations, with the rotatory spectrum by cyclic adenosine and mono phosphoric acid, is realized.

The signal of modulation plays an important role. The second and the third modes of work of device "Cem-Tech" (one and ten minutes of the radiation) have the signal of modulation with frequency 9 Hz. As it is well known, the synthesis of the protein is realized at such frequency in ribosome (the process of protein chain lengthening-elongation). This provides the optimization of the patient's protein syntheses.

That is why, for example, the trophic discrimination of the frequencies of microbes and fungi occurs in the period of the protein chain elongation which is equal to 0.033 seconds (30 Hz).

Further, it is known that the pulsed mode of the effect upon living organisms is preferred than influence with constant density of power, because biosystems react upon derivative of the signals (velocity of the change of the signal), but to constant level's signal the biological system is quickly adapted.

On the other hand, the signals coded with the help of modulation were thus amplified by means of re-radiation by water. They allow to restore the regulation's mechanisms of disorder of the cells and the concrete physiological systems of the patient.

We have obtained the results proving the influence of activated water by means of BRR on the level of activity of the autonomic neural system.

Here are presented the results of our study concerning the temporal ordering of the pulse which reflect

on the whole the dynamical skeleton in form of the informational pattern, rather than only the heart rate variability.

Acceptance of such water by the patient was accompanied by the mobilization of his adrenergic regulation mechanisms. During the 16 hours of observation we noted the sparingly expressed prevalence of neural sympathetic system. Pattern of HRV had a high factor R-of reproduction (redundancy) and a low factor S-of stochasticity.

Acceptance of water, containing information about the pharmacological drug ( bisoprolol 2.5 mg ) is accompanied by the dynamics of the pulse.

It is important to emphasize that there is a daily ‘statistically significant’ deceleration of frequency heart beating, before target value, for the background of trend activities of the autonomous neural system, due to the prevalence of adrenergic regulation mechanisms.

HRV pattern had a high factor: h- coefficient of unpredictability and S-of stochasticity.

Summing up, it is necessary to emphasize that the mechanisms of influence in common systems such as the neuro-dynamics transformation of the activity of the brain and, as consequence, the modification of the functional status of the person, are sated.

This result is strengthened from the QBS investigation of microvessels, whose dynamics reveal an extremely high microcirculatory activity and a greatly improved fractal dimension after the acceptance of activated water with customized EHF in BRR mode.

Further, the QBS diagnostic investigations, as introduced before, allow to corroborate the ‘memory-information’ property of the water<sup>[60-65]</sup>, already discussed by other authors<sup>[66, 67]</sup>, as follows. By means of the same procedure illustrated in the previous sections, the set of ‘pre-pathological’ information captured by the Gunn’s diode for 1 minute in a subject, i. e. , with IRR of CAD, are copied in an aqueous solution.

A simultaneous physiological effect was observed in the same individual after accepting of this activated water, which provokes an amplification of his microcirculation’s activity. In turn, the microcirculation remains at rest in case of acceptance of usual drinking-water<sup>[45]</sup>.

The biological effect evidenced in the ability of

Cem-Tech device to heal the genetic alteration of mitochondrial DNA in individuals at IRR of degenerative diseases such as coronary artery disease or cancer, as introduced previous, is therefore confirmed with the medium of activated water, i. e. , customized informational copy of aqueous solution. This ability to correct genetic disorders has been clinically confirmed at the bedside through QBS diagnosis<sup>[45]</sup>.

## 5 Conclusions

1. The Background resonance radiation ( BRR ) on the native blood of the patient with ischemic heart disease gives a statistically significant reduction of the number of red blood cells which had deformations and were glued together.

2. The acceptance of water, activated with the help of “Cem-Tech” device, is accompanied by the mobilization of adrenergic regulation mechanisms. Herewith, 16 hours of the study allowed to note sparingly expressed prevalence of sympathetic neural system. HRV pattern had a high factor R-of reproduction and low factor S-of stochasticity.

3. There were received graphs of circadian rhythm of the pulse of the patient after taking the multifunction preparation Lodoz, containing 2.5 mg of bisoprolol in combination with 6.5 mg of hypotiazide. Statistically significant changes of parameters of heart rhythm were revealed. These changes are reflected in the mobilization of cholinergic regulation mechanisms. During 16 hours of the studies pulse frequency reaches due values for given age and masses of the body of the patient. HRV pattern had a high factor S-of stochasticity and low factor R-of redundancy (reproduction).

4. The acceptance of water, containing information about powdery bisoprolol is accompanied by the dynamics of the pulse. This dynamics indicates the mobilization of cholinergic regulation mechanism. It is important to emphasize that statistically significant deceleration of the frequency heart beating before target value exists in a day time on the background of trend activities of the autonomous neural system with the prevalence of adrenergic regulation mechanism. HRV pattern had high factors h-coefficient of unpredictability and S-of stochasticity.

5. QBS diagnosis and therapeutic monitoring reveal that EHF in BRR mode has intensive positive influence in pre-metabolic syndrome. Just one application of “Cem-Tech” device (1 minute plus 10 minutes in BRR mode) provokes an extremely high microcirculatory activity and dynamics feedbacks sufficient to heal the Inherited Real Risk of CAD, the related QBS constitutions and CAEMH linked with a genetic alteration of mit-DNA, in the examined subjects. Among the several QBS parameters we highlight the valuable diagnostic importance of fractal dimension (fD) in coronary microvessel nonlinear dynamics: a reduced fD is symptom of pathology or tendency to disease, while a restored physiological value of fD is interpreted as successful preventive treatment, expression of a higher h-coefficient of unpredictability.

## Endnote

The CEM-TECH device used and mentioned in this paper, has now a new name: it is called “СПИОР” in Russia, and AK-TOM in other countries. For details: [www.spinor.ru](http://www.spinor.ru)

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<sup>i</sup> The Royal Society, London, 1986

<sup>ii</sup> Lyapunov Characteristic Exponents-LCE-is a statistic measure to test the presence of ‘sensitive dependence on initial conditions’-SDIC-in a system. SDIC is at the root of the ‘disorderly’ behavior of deterministic dynamical systems and is responsible for their random appearance and unpredictability.

<sup>iii</sup> Fractal dimension is a measure of the way orbits fill the phase space under the action of a flow or a map, suitable for fractal objects, characterized by a non-integer dimension.

<sup>iv</sup> Entropy is a measure of the uncertainty in deterministic dynamical systems, or equivalently is the amount of information we get on the average by making an observation. In particular, the presence of positive entropy indicates that the observation of the system continues to generate information for an arbitrary long interval of time. Consequently, unless the position of the system can be observed with absolute precision, there will forever remain uncertainty about its future course, even when the dynamical rule governing the system is known with precision. Zero entropy is interpreted as absence of chaotic or complex behavior, typical of linear or periodic systems with fixed point or limit cycle equilibrium, so that they are fully and exactly predictable; none new quality information emerges for an arbitrary long interval of time.

<sup>vi</sup> In fractal geometry, the fractal dimension,  $D$ , is a statistical quantity that gives an indication of how completely a fractal appears to fill space, as one zooms down to finer and finer scales. There are many specific definitions of fractal dimension. In this paper we are considering the Hausdorff (1919) dimension defined as follow: (0)

where  $N(\varepsilon)$  is the number of self-similar structures of linear size  $\varepsilon$  needed to cover the whole structure.

At this point the reader should know that it is possible to calculate, in several different ways of style and difficulty, the QBS fractal dimension ( $fD$ ) of a deterministic chaotic biological system, such as microvascular one, of any organ, tissue or viscera. Among the many procedures at the bedside easily achievable, the following is truly original: four High Spikes are emerging in a time interval of 120 seconds, dividing the space into four segments; each segment in turn, is further divided into 3 sections by two more “normal” fluctuations. Therefore, it is easy to calculate the  $fD$  of the oscillation in Scheme 6, , i. e. , the degree of chaos, entropy, or complexity of the figure, which roughly indicates the space occupied by the fluctuation and it is a measure of its complexity: (1) where “ $f$ ”, fractal factor, is the ratio maximal oscillation (HS) / minimal oscillation.

In health “ $f$ ” = 3, as previously reported, because the maximal oscillation corresponds to an intensity of the reflex of cm 1.5, while the minimal oscillation corresponds to an intensity of cm 0.5, so:

$$(2) = = 3$$

It follows that, physiologically, the fractal dimension is  $3 < fD < 4$ :

$$(3) fD = 3 [1.27] = 3.81$$

<sup>vii</sup> The following remedies and healthy lifestyles belong to the class of ‘type A’ or ‘green’ therapy: etymologically speaking diet, i. e. , Mediterranean diet and physical activity, histangio-protectors i. e. , conjugated-melatonin, and others, i. e. , LLLT, NIR-LED, prayer, meditation, etc.

<sup>viii</sup> The following treatments belong to the class of ‘type B’ or ‘blue’ therapy: quantum therapy able to capture and re-transmit customized frequencies from the human body in BRR, thermal sulfuric water.