ON A NATURAL-SCIENCE INVESTIGATION OF THE ULTRALOW DOSES EFFECT

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Abstract

Scientific and practical methods for studying ultralow doses effect are discussed. The importance of contemporary physics achievements in the construction of exact models is accentuated. The applicability of mathematical and computer modeling methods are also discussed.

1. INTRODUCTION

It is well known that any external factor (physical, chemical, etc.) acting on an organism in one way or another changes its functioning. As this takes place, a specific answer of the organism appears for any value (dose) of the action. Ultralow doses are used both in classical (acupuncture, electrophoresis) and homeopathic medicine, hence from this point of view the separation medicine on allopathic and homeopathic is artificial and conditioned by historical and economic reasons. As far as application of large doses of medicines may lead to side effects, many specialists suppose that low and ultralow doses provide` more delicate treatment.

Numerous researches show that in the network of the paradigm of classical medicine a study of ultralow doses effect is rather difficult. Recent advances in physics offer a clearer view of how these mechanisms work. Investigation in this area may promote considerably to the progress of so called conclusive medicine.

Many distinguished scientists made a contribution to the forming common approach to the study of complex biological systems. It was L. Boltzman who made an effort to reduce the biological evolution theory to thermodynamics and chemistry of 19 century and connected micro processes in an environment with its macro state. On this way he formulated the 2nd Law of thermodynamics (for a closed isolated system) in statistical form: the system entropy S is proportional to the logarithm of the thermodynamic probability W of the system state, i.e. S ~ log W. In fact he proposed to consider an integral characteristic of a system.

I. Prigogine, who investigated nonequilibrium processes in open systems (supposing that any system has an environment), also considered entropy as a system characteristic.

Russian biologist I. Shmalgauzen and physiologist P. Anohin asserted that the main property of an organism is the integrity that cannot be reduced to the sum of its elements. The founder of homeopathy H. Haneman also considered a man as a whole system and developed his treatment methods (based on ultralow doses application) in accordance with this approach.

Hence a system study of biological systems allows us to consider both qualitative and quantitative characteristics of common principles of their functioning. That leads to active application both mathematical and computer modeling.

From the point of view of modern science the occurrence of one or other macrophenomenon in a system (an organism) is a result of nonlinear interactions of its micro elements. Achievements in physics led to the elaboration and substantiation of these interactions, which are based on a special structure of water in alive tissues and the transfer of energy in biomolecula chains. It is important to note

that the supposed mechanism is the same for the processes generated by ultralow factors effect.

To analyze the results of ultralow effects one can use biotests (for example blood analysis, thermal imager data). It is the analysis of digital images that opens up possibilities to apply mathematical and computer methods to obtain comparative characteristics and classification signs of the images. In the paper we discuss the results of application both mathematical and computer methods to solve the problem concerning the methods of treatment using ultralow effects.

2. LOW AND ULTRALOW EFFECTS

In physics by low effects (or low signals) is meant both a measure of an action on an object and the value of the answer of the object. In classical sense the notion "experiment" means a purposeful action on an object that answers by a signal, and this signal should be measured. In this case it is implicitly assumed that when measuring only one acting factor is registered.

It should be noted that any effects, both low and ultralow, generate in a system a complex answer. But for low effects in the majority of cases the components of the answer are composed to a resulting signal, whereas for ultralow effects this does not take place.

In this situation we should estimate a change of a system state integrally and use biotests as indicators of such changes. The changes in biotest states really happen, are observed and may be experimentally registered.

3. ON A SUBSTANTIATION OF ULTRALOW DOSES METHOD

Basing on theoretical and experimental investigations of A. Sent-Dierdi, E. Burlakova [4], A. Konovalov [7], L. Gall [6] and many others one can formulate the following:

- A set of biologically active substances, many of which are used as medicines, demonstrate in hyperweak solutions special properties that they have not in more concentrated ("classical") solutions. The answer of an organism on a drug substance action when consecutive decreasing its concentration is nonlinear and non-monotonic: for ultralow concentration the answer may increase again. These properties are called "bimodal biological effect".
- These substances in hyperweak solutions show special physicochemical properties and form so called nanoassociates of rather large size (up to 200 nm).
- In addition these properties are observed only if solutions are saved no less than 18 hours in the magnetic field of the Earth, and not observed if the solutions are in a screening container.
- It is the magnetic field of the Earth that determines special properties of hyperweak solutions and acts the organizing role in all the structural processes concerning to water.

We note that used in homeopathy method of exponentiation of solutions gives the analogous properties to hyperweak solutions. Hence now the well-known ultralow doses method turns out to be explained and substantiated.

4. ON A PRACTICAL INVESTIGATION OF RESULTS

It should be noted that in the majority of cases in studies of complex biological system we cannot count on a mathematical model making. Hence we have to follow practical methods of investigation — experiments and measurements. Modern technologies put forward a wide spectrum of high-resolution hardware to measure and register processes elapsing in biological systems. The results of measurements may be obtained as digital images which are classified and analyzed by precise mathematical methods. The revealing an image structure and characteristics may considerably help a physician in diagnosing.

In analysis of such images statistical, texture, multifractal, morphological and spectral signs and their combinations are used. Many of these characteristics are invariant relative to wide class of image transformations, such as rotation, change of illumination, scaling. If there is a mathematical model of a process under investigation (described by a system of equations), one can use numerical methods to find a solution. All these methods may be applied to elaborate modern software and hardware instruments in investigations and treatment when using homeopathic medicines and other methods of conclusive medicine.

Consider examples of application of different mathematical methods.

4.1. Mathematical morphology

Investigation of blood crystal images obtained by "sensitive crystallization" by E.Pfaifer. The method is based on addition of blood to a solution of cuprum chlorides. In the book of A.Selavri [10] the method to study blood crystals to define malfunctions of organs and pathological processes has been described. For blood the crystallization by cuprum chlorides is a sensitive morphological test. The application of rigorous mathematical methods to different kinds of blood crystal allows us to extract many features such as regular areas, cavities and structures. In [11] such images were classified by the methods of mathematical morphology. Figure 1 shows typical blood crystal images [10]:

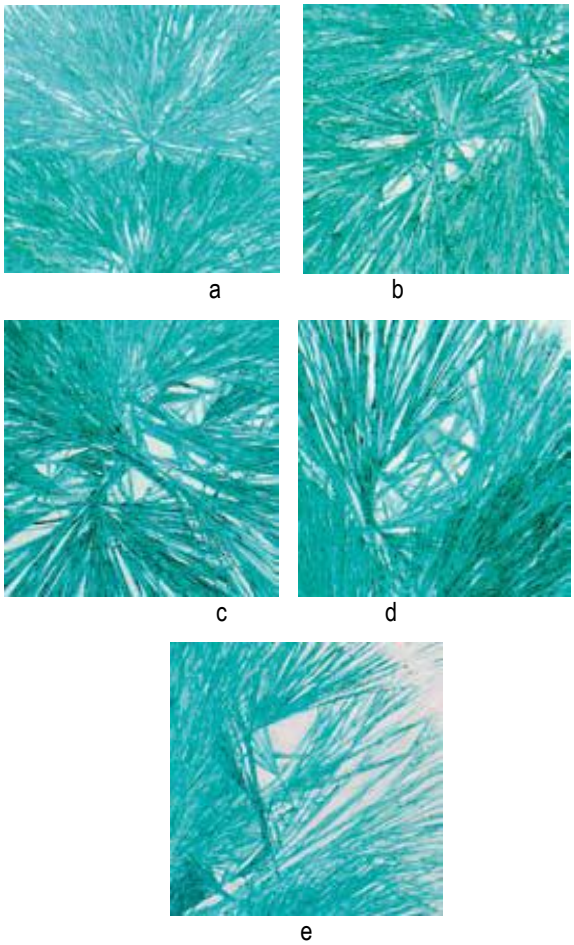

Figure 1. Blood crystals

(a) crystallization in the star form, which is typical for acute inflammatory process;

(b) crystallization in the star form with hole structure, which is typical for chronic inflammatory process;

(c) hole structure of crystals – typical for degenerative processes;

(d) hollow form of the crystal, benign tumor;

(e) hollow form of the crystal with transversal structures, malignant tumor.

4.2. Fractal analysis

To classify pharmacological solutions of Ag containing different (low) doses of the substance the authors of [3] used Regny spectrum. The images of solutions with different concentrations of Ag and corresponding Regny spectra are shown on Fig. 2.

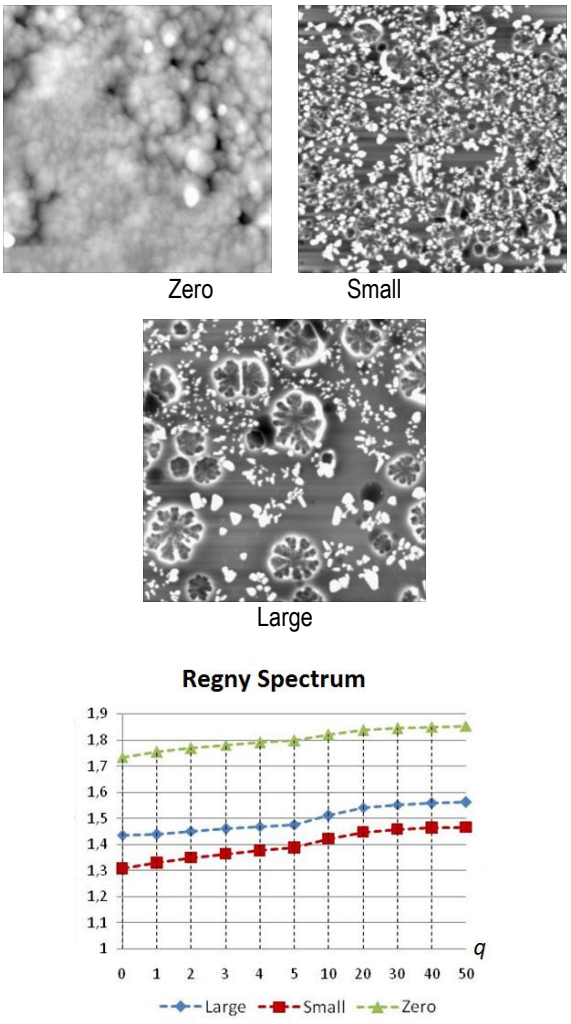

Figure 2. Fractal analysis of Ag solutions

4.3. Stationary processes on graphs

A method of a classification of images concerning to a substance propagation process was proposed in [1]. The image is considered as a lattice formed by pixels of given intensity. Then an oriented graph corresponding to the image is constructed in the following way: every vertex (pixel) is connected with N neighbours. For a given vertex all outcoming

edges have a value (pixel intensity/N), for boundary vertex – pixel intensity/(N-1).The constructed flow is normed. For obtained Markov chain by the Sheleihovsky-Bregman method a stationary distribution is constructed, which maximizes weighted entropy. It is weighted entropy that is used as a classifying sign when images with different doses of a substance are analyzed. In fact, weighted entropy may be considered as a time that is required for a distribution process to achieve a stationary state: the more concentration the more this time. For images shown on Figure 2 weighted entropy was equal to 0.0000025, 0.000013 and 0.000043.

4.4. Mathematical modeling

a) When a process may be described by a system of differential or difference equations, one can use numerical methods and the theory of dynamical systems to investigate the types of equilibrium states. In [5] the authors used differential equations with a small parameter and modeled the motion of ions in alive tissue under the influence of toroidal low frequency magnetic field. Studying the system behavior for various parameter values they obtained phase portraits. The conclusion of the physician concerning the effectiveness of treatment was based on both the results of measuring and corresponding phase portrait.

b) The study of the action of low frequency magnetic field in magnetotherapy devices is one of the most important problem in clinical practice. The papers [2,8,9] are devoted to the construction of space configuration of magnetic field for different configurations of the coils. The obtained numerical results and their visualization may be used to estimate the effectiveness of clinical procedure: changing the parameters of configuration a physician may choose a more appropriate regime.

CONCLUSION

Recent advances in physics, mathematics, computer science and their applications resulted in the substantiation of ultralow doses effect. There are various methods to measure states of a biological system when acting by such doses of medicines and other external factors. Numerical and experimental ways allows us to estimate the values of doses for which side effects would be minimal.

Acknowledgements

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