

BIOELECTRONIC CONCEPTION OF THE WINTER DEPRESSION

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Introduction

In electronic model of human biological system is an integrated circuit consisting of protein elements, nucleic acid: DNA and RNA, melanin which shows such proprieties as: piezoelectric, piroelectric and semiconductor. In this integrated circuit called soma there is central nervous system placed in brain which might control and coordinate the former one. The control is sustained by means of a net of information channels: electron, photon, phonon, soliton and free radicals ones; each of these can be a medium of information itself or they can function collectively in the bioplasm system.

The role of photoreceptors, hearing and touching receptors would be limited to simple stimulus reception, whereas melanin, neuromelanin would perform an integrating function, it would form one entity from stimulative elements, motion with time and s[ace, sound with light, space and time. Light electric field is the most important regulatory factor of biosynthesis of melanin, a lack of these factors has a decisive influence on biosynthesis of melanin. From the psychological side melanin and neuromelanin would be responsible for the entire process of adaptation to environment, mental development and attention and perceptive feelings development, which gain better quality and acuity. Melanin correlates strongly with melatonin, this correlation has a considerable influence on psychological states of human. It is noticeable in anorexia, winter depression, child's hyperkinesias, in different illness, e. g. phenyloketonuria or Parkinsonism etc.

From the biological side melanin has two fundamental features, to some extent it protects skin against harmful influence of UV rays. It performs a function of a natural UV filter and a antioxidant neutralizing which menas removing free radicals produced under the influence of sun rays.

Key words : psychotherapy , phototerapia winter depression, bioplasm system

1. Description of the winter depression

Depression is a disorder which causes a sense of helplessness, worthlessness, hopelessness and guilt, triggers suicidal thoughts and is connected with fatigue, the loss of interests, problems with engaging in everyday activities, neglect of hygiene. It is accompanied by fear and psychological anxiety. The sick person experiences a sense of constant tension, is unable to relax, feels panic and hyperkinesias, which manifests itself in not knowing where to put oneself and in the constant need of walking or lying. Depression makes normal life and functioning in society difficult or even impossible (Hauck P., 1992); is found 2-3 times as often in women as in men.

The winter depression is by definition a seasonal disorder. The first symptoms appear in early autumn, to be followed by improvement in the psychological health of patients in February and spontaneous recurrence of symptoms in March and April (Gamon D., Bragdon A., 2003). The winter depression results from the lengthening of the night in autumn and winter, which in turn causes lengthening of the time of melatonin synthesis by the pineal gland. The antidepressant effect is achieved by shortening the time of melatonin secretion as a result of artificial lengthening of daytime. Illumination treatment inhibits melatonin secretion and induces an increased synthesis of melanin. Decreasing the amount of melatonin in the biological system lowers the intensity of the depression syndrome (Święcicki L., 1996)

2. The action of melanin and melatonin in the winter depression

Ultraviolet radiation type B (UVB) is the strongest inducing factor in melanin synthesis. UVB radiation is received on Earth only when the sun is positioned relative to it at an angle wider than 30°. In the area of lowland Poland, the radiation is not observed between November and February, which is a period of “ultraviolet craving” with a lowered index of melanin synthesis leading to frequent cases of the winter depression. Production of melanin is conditioned by the intensity of light, the temperature and electric field resulting from the polarization of the biological pyro- and piezoelectric (Cieszyński T., 1990). Production of melatonin is induced by darkness, low temperature and a low piezo- and pyroelectric polarization index with a resultant low electric field (FIG).

In summer the day is longer than the night and the ratio of melanin to melatonin in the biological system is regulated by light. In winter, the ratio is regulated by the wind and frost. The speed of the wind in winter is 5-10 times higher than in specifically, it functions in the brain as a detector of the electromagnetic wave, analogically to rhodopsin, which detects the light wave in the eye. In both cases, the brain provides a psychological correction; in the case

of rhodopsin, the brain gives colour vision, and thanks to melanin, recognition of the environment and oneself (Sedlak W., 1988). This means that melanin is also responsible for the process of visual perception and environmental adaptation. The different psychological states are conditioned by the level of neuromelanin in the brain.

Melanin also possesses the ability to change light into sound. It is feasible to hypothesize that melanin, as a piezoelectric semiconductor, simultaneously assumes the roles of an instrument and a virtuoso playing musical composition written in the colours of light. Melanin-induced sounds in various keys transform into movement and engage the body in a “dance of life”. In autumn and winter, when the night is longer than the day, the sound, due to the lack of light, dies out in its key and the body plunges into depression.

Melanin also exhibits a selective susceptibility to phonons, which means that cells containing melanin are selectively susceptible to acoustic waves (Corry P., Mc Ginnes J. E., Armour E., 1976), (Mc Ginnes J. E., Corry P., Proctor P., 1974). Numerous natural phenomena are evidence of some sounds of certain volume stimulate the psychophysical process (Murkova M., 1972). These sounds are used in musical therapy of neuroses, emotional disorders, etc. Owing to the selective susceptibility to phonons, melanin selects such sounds, which are the most favourable to the organism. However, there is also a reverse side to the effects of the acoustic wave. Acoustic waves of a certain frequency may contribute to disrupted functioning of enzymes (Czyżewski A., 1988). Melanin regulates this process in a way which helps avoid the effects harmful to the biological system. Research has shown that there is a high enzyme deficiency in the biological membranes of nerve cells of people suffering from depression (Mc Even B., Norton-Lasley N., Pres J., 2002).

An imbalance between melanin and melatonin leads to psychological anomalies. Excess of melanin leads to concentration deficiency, hyperactivity and psychomotor coordination disorders, while melanin deficiency leads to depression. The death of the organism means, in reference to melanin, that the energy interruption in the semiconductor has dropped to zero and lost its electronic value. Melatonin is claimed to have antioxidative properties, preventing damage to cell components caused by free radicals. This compound also participates in the protection of DNA from the chemical activity of carcinogens and exhibits anti-ageing properties (Reiter R. et al, 1995).

Until now, biosystems have been considered at the level of corpuscular structures while energy and information structures have been omitted. A peculiar case of electronic and information processes are electric oscillations occurring in DNA, RNA, proteins, melanins and lipofuscins, the result of which is emission or absorption of photons of certain

frequencies. The mentioned biomolecules can co-create intracellular systems of information transfer in the form of electromagnetic signals.

3. Bioelectronic conception of the winter depression

The current biochemical model fails to provide a definite recognition of both nature of life and human psychological functions. Beside traditional, well known chemical reactions, there arises a new reality pertaining to the bioelectronic model of life. In this model, it is assumed that the biological system exhibits physical properties of biological mass and functions as a quantum construction. Basic organic compounds, such as proteins, nucleic acids or melanin are semiconductors and possess the ability to activate charges without ion participation. Semiconductors are good converters of chemical, thermal and electromagnetic energy into electric energy, and the other way round. They also possess other features such as increased conduction accompanying an increase in temperature, a significant jump in conduction in the presence of minimal donor or acceptor admixtures, the photoelectric phenomenon, it is an increased conduction under the influence of photons and quantum emission of the electromagnetic wave. A semiconductor can be a quantum generator of electrons and photons (Gribbin J., 2000). In an alternating electric field proteins, amino acids, DNA, RNA, as well as plant and animal tissues are subjects of electrostriction and become quantum generators of phonons, that is the acoustic wave. This occurs because the structures in question are at the same time piezo- and pyroelectric, which means they possess the capacity of thermal and mechanical polarization (Athenstaedt H., 1987). Piezoelectrics convert mechanical energy into electric energy, while pyroelectrics convert thermal energy into electric energy (Chełkowski A., 1979). Acoustic effects may take place not only in piezoelectrics, but also in semiconductors. A semiconductor can manage electrons in their induced state. In such cases, nonradiative recombination transmits the energy to the molecular network in the form of quantum acoustic vibration. The transition from the induced state to the basis state has got thus two possibilities: the generation of photon or generation of phonon. Biological mass is then continually shaken and “quantum-chatty” (Sedlak W., 1988).

The task of phonons is to condition the cyclicity of quantum effects. They also rise to the rank of an important factor in the creation of the action of life, as they bind optical, electrical, mechanical and magnetic phenomena with biological mass and directly combine all quantum processes with the movement of mass, the electromagnetic wave becomes again an

information centre in cell transmission, and phonons play the role of a factor recording sensations in memory through an electromagnetic field (Sedlak W., 1988).

Life is a result of all the chemical, electrical, magnetic, optical and acoustic events occurring in the living organism, in the system of organic semiconductors, piezo- and pyroelectrics (Sedlak W., 1988). This means that biological tissues have ample capacity for activating electrons, generating fields and for constant or variable polarization independent of the chemical character and ion transportation. Biological mass can thus be electrically active in non-chemical manner. Therefore life take place not in a chemical or electronic system, but to some extent among these two processes. In a living organism, chemical and electronic reactions have been “sewn up”. In this way, “a quantum seam of life” has come into existence as the smallest functional unit in the biological system. The entire “quantum link of life” takes place in the molecular network shaken by acoustic quanta (Sedlak W., 2000).

The idea of the coupling of bioelectronic and biochemical process in the human organism is alien to the classical research on the psychological life. This new approach postulates a holistic account of human being and his environment. The model in referring to psychology is very inspiring, because postulates the reception of information from the environment not only via sense receptors, but also through the entire biological organism mass understood as organic piezoelectrics, pyroelectrics and semiconductors. This means that the organism receives information from the environment not only through receptors, but also beyond the sphere of sensory experience in the typical for semiconductors manner, that is with conversion to electric energy.

The biological mass has been utilized by nature to create an electronic device working analogically to technical electronic systems, but in on the basis of organic semiconductors, piezo- and pyroelectrics. The device is powered by chemical energy of a metabolic origin, by electromagnetic energy received among things by melanin, which combines with the photoelectric effects, as well as by thermal and mechanical energy converted by piezo- and pyroelectrics into electric energy (Sedlak W., 2000). Modern electronics uses biomo-olecules, such as DNA, RNA, proteins and pigments as electronic material. Additionally, certain biological structures treats as natural electronic device, for example cellular micro-tubules, cytoskeleton and neurons as biological microprocessors (Hameroff S., Rasmussen S., 1989), whereas enzymes as natural diodes and transistors (Cardenas M., 1991). Apart from the attempts at using biomaterials, particularly enzymes in the so-called biocomputer biotechnology, they are broadly used in constructing biosensors (Bartlett P. N., Pratt F. E.,

1993), (Wnuk M., 1996). Interesting here is Liberman's conception of biomolecular quantum computers which views the nerve cell as a computer (Liberman E. A., 1996).

The basic energy source for this device is chemical energy understood as electrons bound and freed in the metabolizing process. Impoverishment of chemical metabolism in man causes a change of electromagnetic fields and waves in the particles of the human organism, as it is in the case of old age. In this period of life the organic semiconductors grow old and their exchange is no longer through – there is a disproportion between catabolism and anabolism in favour of the former and with deficiency of the latter. Along with that, the electronic action becomes less effective. Quantum efficiency decreases and the amount of the semiconductor which water is diminishes and can not be supplemented from the outside.

Dehydration of the organism increases with age and the reserves of melanin decrease as the organism grows older. Melanin has the capacity of binding protons and electrons in two independent stages (Matuszak Z., 2001). Melanin deficiency disturbs that relation whereas an increase of melanin content in the biological system is accompanied by an increased circulation of electrons and hence an increased number of electron inductions, highly enhanced generation of photons by radiative recombinations and generation of quantum-acoustic states, that is phonons, by non-radiative transitions. Delocalised electrons and protons, as well as proton semiconductions in biological membranes where active protons are fundamental centres of energy and information transduction play an important role in the structure and functioning of biosystems (Morowitz H., 1978), (Conrad M., 1990).

J. Sławiński (2001) claims that life processes and light are inseparable and internally connected due to their electromagnetic nature. Light plays a significant energetic and regulatory role in living organisms and in the entire ecosystem, for instance in photosynthesis, in the process of seeing, in biological rhythms, etc. Changes in the intensity of photon emission are functionally connected with disturbances of homeostasis and their measurements specify the state of organism vitality and the capacity for environmental adaptation (Sławiński J., 1990).

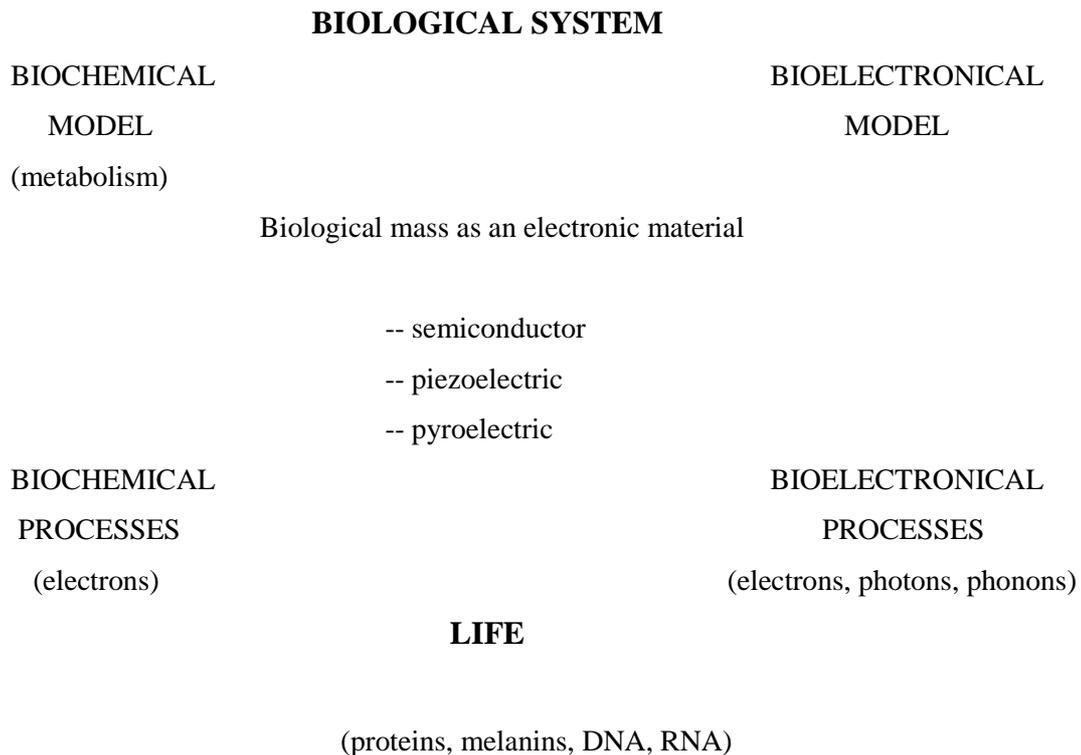


Diagram 1. – The Biological System

Conclusions

Electronic interpretation of living organism has proved to be very inspiring as it takes into account the fact that the information from the surroundings is received not only by sensory receptors and perceptual and motor systems, but also by the entire biological mass of the organism understood as the biological piezoelectrics and semiconductors. The human biological system has a bioelectronic construction and bases its activity on close functional correlation between biochemical and bioelectronic processes. In this new bioelectronic paradigm, there is place for studying man from the perspective of quantum processes. Such an approach brings new knowledge of the processes and psychological functions accompanying personality disorders.

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