NOOSPHERIC WORLDVIEW, NOOSPHERIC BALANCE AND CREATIVITY AS THE BASIS OF HUMAN LONGEVITY

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Abstract

The article contains the results of the author's research on the analysis of longevity problems in the context of the noospheric worldview. The author demonstrates that to develop specific measures for the prolongation of human life it is advisable to apply the noospheric balance concept proposed by the author. The noospheric balances of soul, mind and body have been considered in the context of the longevity problem. The author substantiates the point of view that the main organ providing all noospheric balances is the brain, and proposes a method of wise longevity, based on this principle. In the article, the principles of wise longevity, the synthesis of long-livers' advice and experience and researchers' scientific conclusions, have been formulated. The author demonstrates that the principles of wise longevity are in conformity with religious commandments.

Keywords: creativity, wise, longevity, religious, commandments

1. Introduction

Every person sooner or later begins to think about how long he/she will live. Some people live longer than others; they are called long-livers. These are people who live more than 90 years, and of the greatest interest are active people aged 95-100 years and beyond. The famous actor Vladimir Zeldin (Russia) in his 100 years continued to perform on stage. John Glenn (USA) flew into space at the age of 77 years. The record of verified longevity belongs to Jeanne Calment (France), who lived 122 years. The French entrepreneur Philippe Vocanson, the American financial analyst Irving Kahn, and the Chinese linguist Zhou Youguang continued to work successfully at the age of more than 100 years.

The concept of noospheric balance, introduced by the author of this article, as a universal method for solving global environmental problems can also help in solving the most pressing global problem of our earthly life – the **problem of longevity**.

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The concept of noospheric balance consists in the rational development of the human being – in the balance of rational consumption, behaviour, work and rest. And it is based not only on one's own individual mind, but on the entire experience of mankind, on the reasonable combination, rather than the opposition of Science and religion.

2. State-of-the-art - biosphere, noosphere and longevity

The modern understanding of the biosphere is based on the fundamental work by V.I. Vernadsky [1]. V.I. Vernadsky was the first who ascribed the role of the main transforming force on the planet Earth to living organisms. The human being cannot exist outside the biosphere. On the basis of his deep empirical study of the biosphere, V.I. Vernadsky observed that it began to be strongly affected by mankind, irreversible changes began to occur in it, and that humanity, which he considered a part of the biosphere, becomes an undivided population and a powerful geological force which changes the biosphere and the planet as a whole. To denote the stage of such a transition of the biosphere to a new state, he applied the term 'noosphere'.

E. Le Roy, when publishing his books, relied on V.I. Vernadsky's works. G.P. Aksyonov writes: "Having published his book, Vernadsky joined the development of French social and philosophical thought, giving an additional impetus to the birth of the idea of noosphere for two other thinkers who were simultaneously the students of H. Bergson. We are talking about Pierre Teilhard de Chardin and his friend, the philosopher, logician, and mathematician Édouard Le Roy. The book 'La Géochimie' became for them a missing link in the development of Bergson's ideas, opened their eyes to the geological component of human civilization, to the action of reason, which is usually opposed to nature, but which should be considered as a natural phenomenon." [2]

The life expectancy of people on the average is steadily increasing [3]. The successes of Medicine and the propaganda of healthy lifestyle contributed to this. The thought of immortality always stirred people's minds [4].

The famous Russian philosopher N.F. Fyodorov laid the foundations of a worldview capable of opening new ways for understanding the place and role of the human being in the Universe. Unlike many attempts to build a universal planetary and cosmic world outlook relying on oriental religions and occult ideas about the world, Fyodorov believed that **the medieval worldview is untenable after the Copernican discovery, which opened a cosmic perspective for the human being**. But the main thing, according to Fyodorov, in the teaching of Christ – the news of the coming bodily resurrection, the victory over the 'last enemy', death – was firmly preserved by him. Moreover, he put forward a paradoxical idea that this victory would be accomplished with the participation of creative efforts and work of the Mankind united in a brotherly family. He sincerely believed in real, scientifically grounded longevity [5].

Biologically, there are possible other limits for the human life duration. We need a general scientific analysis and a philosophical understanding of this problem. In my opinion, a noospheric worldview can be useful here.

The wildlife world knows many examples of longevity. For example, in the east of California, in the Ancient Bristlecone Pine Forest there grows the oldest separately standing tree on Earth, Methuselah. According to rough estimates, its age is more than 4,800 years, that is, it is much older than the Egyptian pyramids. In Iran, in the Yazd province, there grows a cypress, the approximate age of which is 4-4.5 thousand years.

There are striking examples in the animal kingdom as well. Hydra, the oldest freshwater coelenterate animal, is considered potentially immortal, which is directly connected with its high regenerative capacity. The Arctic marine sponge can exist for 23,000 years, the Icelandic cyprine mollusk lives for about 500 years. The cases are known when turtles survived to 177 years, sturgeons – up to 150 years, parrots – up to 100 years.

The biological causes of ageing are being actively studied [H. Vielle and J. Cavallasca, *Aging 101: Biological causes of aging*, LongLongLife, 2017, http://www.longlonglife.org/en/transhumanism-longevity/aging/biological-cause s-aging/]. There is a fundamental treatise 'Scientific Trends of Life Extension' [6]. This review presents the study results of 370 authors on all issues of ageing and life prolongation. Information about already obtained scientific results and tasks for the future shows an objective, mosaic picture of experiments that are carried out at different levels: molecule, cell, tissue, organ, and organism. Despite the fact that there is still no international comprehensive program for the study of ageing, the main lines of research are being formed into scientific trends of life extension. Their realization can lead to a scientific breakthrough in solving the problem of ageing. The study of the mechanisms of ageing and the search for methods of prolonging healthy life are not only the most promising scientific directions, but also the most necessary for society, the state, and every person.

Research on the noosphere continues to this day. Moreover, the researchers are already connecting the biosphere, noosphere and *infosphere* [7]. The infosphere, which has entered our life so rapidly, is also nothing but an *element of the noosphere*. The noospheric paradigm is associated with artificial intelligence [8], Science is associated with something 'consecrating' [9]. It was noted already by Teilhard de Chardin [10]. He did not see the opposition of Science and religion and called for their union. This union is possible through the 'Universal Mind', which is God. Noospheric development is closely connected with the information development [11]. A collective mind of the 'hive' type [G. Dvorsky, *How much longer until humanity becomes a hive mind?*, iod9 GIZMODO, 2013, https://io9.gizmodo.com/how-much-longer-until-humanity-becomes-a-hive-mind-453848055] can be quite real. There is scientific evidence for the existence of a 'true noosphere' [12]. And, of course, everything is connected with religion [13].

Ideas of harmonizing the interaction between society, human being and nature have been developed worldwide. These ideas came from such spheres of humanities knowledge as humanistic ecology, deep ecology, ecotheology, and other branches of ecosophy. Their exponents encourage creation of the Earth Ethics that focuses not only on the human being but on the every living thing, cosmic arrangement, and revolutionary change in the consciousness in order to develop an ecological mind-set [14-17].

New ecosophical concepts are represented in works on futurology, prognostics, geopolitics, social and economic studies of modern French, American, Norwegian philosophers – J.-P. Deléage [15], D. Bourg [18], P. Duvigneaud [19], F. Ramade [20], A. Roger [21], M. Fort [22], C. Sagan [23], C. Larrére [24], L. Ferry [25] and many others.

3. The goal and tasks of the research

The *goal* is to connect the concept of noospheric equilibrium to the human longevity problem, and check the links between the concept of noospheric equilibrium and the human longevity problem.

The *tasks* of the research are:

- analysis of the problem of human longevity in the context of the noospheric worldview;
- application of the concept of noospheric equilibrium to the human longevity problem;
- noospheric balance of the Mind, Soul and Body development;
- analysis of the role of creativity in preserving noospheric balances.

4. Methods

To study and solve the assigned tasks, a systematic analysis of the longevity problem in the context of the noospheric worldview is used. By means of the concept of noospheric equilibrium proposed by the author of this article, it is necessary to analyse the balance of the soul, mind and body of a person and, on this basis, to develop recommendations that combine the experience of the long-livers themselves and the scientific conclusions of researchers. In connection with the fact that the work of the brain is the basis of longevity, it is necessary to identify the role of the creative factor in longevity. The role of creativity in the continuation of person's life is studied in the context of solving specific problems of the noospheric balances' realization.

5. Results and discussion

5.1. Biosphere and human longevity

Living organisms in the biosphere have different lifetimes, from quite minimal to infinite. The longevity of the human being is promoted by various factors. The maximum life duration is determined by the norms of ageing, a congenital predisposition depending on genes and external environmental factors. The main essential factors that affect the life expectancy of a person include sex, heredity, the level of available health care and hygiene, the quality of food, the level of physical activity, lifestyle, social environment, and the level of consumption. The average life expectancy (and hence the number of long-livers people) differs from country to country. In the opinion of health professionals, it is impossible to single out any isolated factor that provides the extension of the life span. Longevity is determined by the complex interaction of hereditary and external environmental factors.

It is commonly agreed that *longevity is promoted by*: brain work, healthy lifestyle, proper nutrition, physical activity, good quality sleep and rest, positive psychological attitude and sense of humour (laughter prolongs life). The work of the brain should be particularly mentioned. In recent years, Academician V.N. Shabalin [3] has paid special attention to this factor.

The *enemies of longevity* are: unhealthy habits (smoking, alcohol, overeating); extremism, including extreme sports; struggle for wealth, power, interests; psychological stress.

The brain is the main organ that ensures not only the life of a person, but also its duration. It is in the human brain that **the biosphere and the noosphere meet**. It is also a unique instrument of communication of the human being with the Universal Mind, with *God*. Faith and the ether of the Universal Mind are the sources of inspiration and generation of new ideas, the sources of *creativity*. Scientists and creative people, most intensively using the brain, live longer. Anyone can train the brain, even without being a scientist. Almost all these problems lie in the sphere of social ecology, philosophy of life, and human psychology. The main and leading role of brain in the issue of longevity has been proved by biological studies [26-29]. The social and psychological aspects have been considered [30, 31]. The brain is connected to the human nervous system, thus, its work influences the whole human being function.

It is also known that excessive physical, intellectual and mental loads cause the body and brain to wear out and create stresses that shorten life. Combining the known factors of physical and mental activity, moderation, positive psychological attitude, satisfaction from life in the absence of stresses, life is built on the basis of the *noospheric balance of the soul, mind and body*. It is to the soul that the leading role belongs; it is in it that *faith, hope, love and happiness* are combined, and this is the meaning of life. One cannot help thinking about what we are constantly reminded of by various religions: immortality.

There are persistent myths that long-livers live in the mountains, eat only wholesome food, drink clean water and are mainly engaged in physical labour in fresh air. As for healthy food and clean water, this is true. It is also true that physical activity contributes to longevity. But it is not all that simple. There are long-livers who worked in rough conditions and not at all in the out-of-doors.

Emma Morano, who was 117 years old, spent most of her life working at a textile factory.

Among the long-livers there are entrepreneurs, military men, chess players, pianists, musicians, composers, teachers, athletes, diplomats, actors, doctors, even a British baron, yogi and music conductor.

5.2. Noosphere and longevity

Each person has his/her own destiny. It remains to understand what it is. The meaning of human life is to discover one's destiny and realize oneself, to go through one's life Path on the Road of Life with dignity.

The *purpose of life* is happiness. The *means of achieving* must be a goal and constant movement towards its achievement. Happiness is the achievement of constantly achieved, but never attainable goals. And at the core there lie *dream and faith.* **Their noospheric balance is in the Soul**.

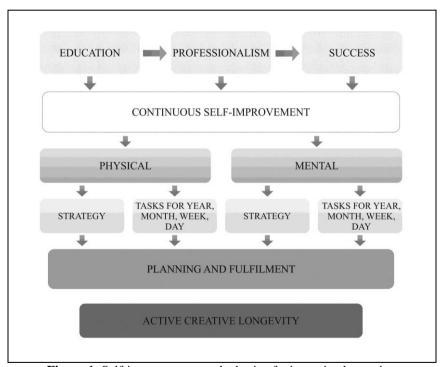


Figure 1. Self-improvement as the basis of wise active longevity.

The noospheric balance of the soul is a sensible combination of rational thinking and faith, based not only on personal experience, but also on the experience of all generations of people and on the 'experience of the Universal Mind' coming to us in the form of intuition, the Divine illumination, which is impossible to deny, because illumination lies in the foundation of any discovery or invention. The author of this article has 370 patents for 252 inventions and

knows well what illumination is. In addition, the author's scientific ideas are also based on many intuitive insights. Based on the personal experience and the experience of other people, it can be argued that rational thought and intuition are based on Divine illumination, which is grounded in faith [32]. **Faith is the basis of the noospheric balance of the soul**.

The noospheric balance of the mind is a combination of intelligent existence and constant improvement of mental faculties. The intelligent existence is, for example, wise ageing, or as the author suggests, 'WISE LONGEVITY', i.e. the conscious activity for the extension of life, observance of wise advice. This means constant intellectual work.

The main principle of intelligent existence is 'think'. Napoleon Hill released a whole series of books, 'Think and Grow Rich' [33]. The goal to grow rich is not necessarily only material. If we understand this broader, this becomes a very good principle, the second component of the balance, i.e. expanded reproduction of mental abilities, spiritual enrichment, self-improvement, which is the basis of wise active longevity (Figure 1).

The noospheric balance of the mind is based on the permanent work of the brain (Figure 2).

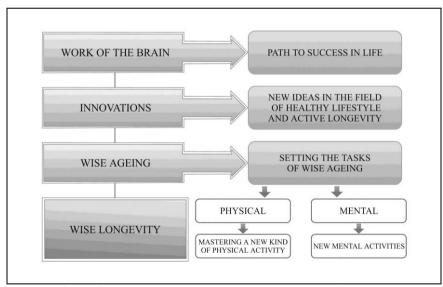


Figure 2. The main secret of longevity is the work of the brain.

The second part of the balance – the reproduction and improvement of mental activity – is directly related to education. Education is necessary; moreover, it is knowledge that is required, and not the possession of a diploma.

It is important to choose the right direction of one's activity and to study it well. Young people should understand that it is profitable to get only excellent marks while studying; it leads to success in life.

With the rise in the level of education, **professionalism** comes, which is, first of all, profound knowledge in one's profession, sharpened, verified techniques and filigree skills in one's occupation. **Professionalism brings success**. If the person has become a professional, this is already success, which brings him/her money, respect, and recognition in society. Using his/her professionalism, the person achieves further successes. This is the happiness of life: the achievement of further successes.

A professional politician who is able to capture the attention of the audience, entice it with his speech, show his mind and erudition, his desire to help people, to devote himself to serving the interests of society is a rarity in the world.

Knowledge, techniques, skills and complete mastery over them are characteristic of professionalism, but there must be additional special intuition, the sixth sense, which distinguishes just good mastering of the profession from professionalism. This distinction is barely noticeable. A competent artist-copyist can paint no worse than Rembrandt, but that doesn't make him/her Rembrandt. Professionalism consists in the intricacies of mastering the profession, in the intuition and inspiration of the master. The subtleties of mastering the profession are achieved in the development of abilities, intellect, creative thinking and in constant work.

Each person is individual and endowed with individual qualities "by God". They can manifest themselves at once, in childhood, or at a more mature age. **One must search – search for talent, ability, inclinations, and develop them.** It happens sometimes that a person is engaged in something all his/her life, and this is absolutely not interesting to him/her. And, of course, to become a professional, a person has to go an extra mile and constantly improve him/herself.

All abilities are closely interrelated. Creative abilities are necessary in the realization of both mental and physical faculties. The athlete wins wisely, using not only the force. And a certain spiritual mood is needed in the realization of both physical and mental abilities. One need to tackle the problem with enthusiasm, and it will work out. And this is possible only on the basis of the development of **creative abilities**.

Creativity is the activity on generating qualitatively new content that has never before been known; hence, the creative approach turns out to be effective. Since it was not previously known, it affects people as an attracting quality of something being created, whether it is a scientific idea or a stratagem in a lawyer's speech.

Creative abilities manifest themselves in the very process of creativity – in the easiness and speed of thinking, in the combination of concepts, in **fantasy**, in spatial imagination, in the individual abilities of activity. There are different points of view regarding the mechanism of the formation of abilities, but most scientists believe that **abilities are formed in the course of activity**, in the process of interaction of the person with the surrounding world. It is in the process of activity that the further development of abilities takes place.

The noospheric balance of the body is the combination of the intelligent way of life on the basis of the collective experience (Universal Mind) and the reproduction of one's own life possibilities.

Table 1. Active longevity and religious precepts.

The Ten Commandments (of the Christian religion)	Principles of active longevity
1. I am the LORD your God, you shall have no other gods.	Faith. Keeping of the religious commandments.
2. You shall not make for yourself an idol. I am the LORD your God.	2. Love (for God, neighbours, family, surrounding environment: humans, all living things, nature).
3. You shall not misuse the name of the LORD your God.	3. Moral rectitude.
4. Remember the Sabbath day by keeping it holy. Six days you shall labour, but the seventh day is a Sabbath to the LORD your God.	4. Rational, law-abiding behaviour.
5. Honour your father and mother.	5. Healthy lifestyle. Rational nutrition, physical activity. Good quality sleep and rest.
6. You shall not murder.	6. Positive psychological attitude. Kindheartedness. High spirits. Communication with people. Labour of love. Desire for life.
7. You shall not commit adultery.	7. Regular medical examinations. Diet, cleansing of the organism. Preventive therapy, timely surgery.
8. You shall not steal.	8. Ecologically clean natural, anthropogenic and social environment. Life in harmony with nature and people.
9. You shall not give false testimony against your neighbour.	9. Permanent self-improvement, education, training of the brain. Move with the times.
10. You shall not covet your neighbour's house. You shall not covet your neighbour's wife, or his male or female servant, his ox or donkey, or anything that belongs to your neighbour.	10. Wise ageing. Planning of intellectual and physical tasks and exercises, and their implementation in the labour of love.
ECOLOGY OF THE SOUL	

The author has analysed the advice of 100 centenarians who have passed the threshold of 100 years and identified the most interesting advice. Most believe that *the basic rules* are: moderation in food; more vegetables and fruits;

fish instead of meat; fasting diet; physical activity (body ecology); pure water; fresh air; harmony with nature (the state of the environment); and most importantly, communication (it is the lack of communication in old age that kills people), being needed for society, one's occupation as a labour of love and permanent job.

If we compare the principles of active longevity with religious commandments, then it is not difficult to notice significant agreement between them (Table 1). The religious precepts resonate with longevity principles in the context of the spiritual principles of life.

5.3. Principles of wise longevity

Summing up, it is possible to formulate 15 rules of life, based on three basic noospheric balances: of the soul, mind and body.

- 1. **Mental and physical work**, but without excessive stress. One has only one life, and it must be cherished. It is preferable to be engaged in a labour of love, and not just earn a living. 'Live to work, not work to live'.
- 2. **Balanced nutrition**. More vegetables, fruits, seafood. Do not eat before bed. Do not overeat.
- 3. **Limitation of alcohol**. It is difficult to abstain totally from it. Also, there is some good from it. But the restriction is necessary.
- 4. **Motion**, walking, activity, daily walks.
- 5. Physical training, swimming, cold training, baths.
- 6. Fresh air. Sound, healthy sleep. A good rest.
- 7. **Live in harmony with nature and with people**. Regularly go to the forest, swim in the sea. Communicate, be needed to people.
- 8. **Bring joy to yourself** (love, close people, children, good home, travels, successes in business, in science, in organizing your favourite occupation).
- 9. **Kindness.** Even if evil is done to you, do not respond with evil. Do not quarrel with anyone. Do not chatter too much. Do not be rude and do not threaten anyone. Be friendly and well-wishing.
- 10. **Shrouds have no pockets**. Greed destroys people.
- 11. **Constant creative search**: for new ideas, new occupations and new friends. Activity and sense of purpose.
- 12. **Daily planning** of all deeds and control of their fulfilment.
- 13. **Safety**. If possible, eliminate risks: criminal, natural, technogenic; lead a **healthy lifestyle** (do not smoke and do not consume anything unhealthy).
- 14. **Regular medical examinations**. Prevention of disease or its treatment but preferably at the beginning.
- 15. **Love yourself**. Life is beautiful. Positive psychological attitude.

6. Conclusions

Based on the analysis of longevity problems and in the context of the noospheric outlook, the author draws the following conclusions:

- For the development of specific measures for the prolongation of human life, it is advisable to use the concept of noospheric balance of the soul, mind and body proposed by the author, as applied to the problem of longevity.
- 2. The point of view is substantiated that the main organ providing ALL noospheric balances is the brain. It is in the brain that the noosphere and the biosphere *meet*. Based on this principle, a method of wise longevity is proposed.
- 3. 15 principles of WISE LONGEVITY, which synthesize the advice of longlivers and the scientific conclusions of researchers, are formulated; they are in agreement with the Ten Commandments, and do not contradict the commandments of other religions.

References

- [1] V.I. Vernadsky, Scientific thought as a planetary phenomenon, Nauka, Moscow, 1991, 343.
- [2] G.P. Aksyonov, *The deepest history of man: from Christianity to the Noosphere*, Librokom, Moscow, 2013, 376.
- [3] V.N. Shabalin, Zdravookhranenie Rossiiskoi Federatsii, 1 (2014) 3-6.
- [4] A.G. Ishkov, N.G. Rybalsky and V.A. Grachev, *Ecological culture*, REA, Moscow, 2015, 416.
- [5] N.F. Fyodorov, *Philosophy of the common task*, Traditsiya, Moscow, 1997, 752.
- [6] M. Batin, Scientific trends of life extension. A review of research in the field of ageing biology, Rostok Group, Moscow, 2010, 211.
- [7] V.A. Grachev and A.G. Ishkov, *Popular Ecology*, Aksi-M, Moscow, 2015, 196.
- [8] A.V. Palagin, A.F. Kurgaev and A.I. Shevchenko, J. Cybern. Syst. Anal., 53(4) (2017) 503-511.
- [9] L.H. Sideris, *Consecrating science: Wonder, knowledge, and the natural world,* University of California Press, Oakland, 2017, 288.
- [10] P.T. de Chardin, *The phenomenon of man*, Harper Perennial Modern Classics, New York, 2008, 320.
- [11] V. Voronkova, Philos. Cosmol., 16 (2016) 179-189.
- [12] D. Nelson, Scientific evidence for the existence of a true noosphere: Foundation for a noo-constitution, Proc. of the World Forum of Spiritual Culture, WFSC, Astana, 2010, 18-20.
- [13] W. Sweet and R. Feist, *Religion and the challenges of science*, Ashgate Publishing, Burlington, 2007, 235.
- [14] M. Bess, *The light-green society. Ecology and technological modernity in France, 1960-2000*, University of Chicago Press, Chicago, 2003, 369.
- [15] J.-P. Deléage, *Histoire de l'écologie: Une science de l'homme et de la nature*, La Decouverte, Paris, 1991, 330.
- [16] J.-F. Dobremez, Les forêts: des arbres toujours, mais tant d'autres choses, Editeur Rageot, Paris, 1992, 176.
- [17] H. Dupuis, Les océans: des marées noires au retour de la Grande Bleue, Editeur Rageot, Paris, 1992, 144.
- [18] D. Bourg, La nature en politique Ou l'enjeu philosophique de l'écologie, Edition L'Harmattan, Paris, 1993, 176.

- [19] P. Duvigneaud, La synthèse écologique: Population, communautés, écosystèmes, biosphère, noosphère, Doin, Paris, 1980, 380.
- [20] F. Ramade, Éléments d'écologie: Écologie appliquée d'action de l'hommej sur la biosphere, McGraw-Hill, Paris, 1991, 578.
- [21] A. Roger, F. Guery, J.-C. Beaune, A. Berque and D. Caroille (eds.), *Maitres et protecteurs de la nature*, Champ Vallon, Paris, 1991, 332.
- [22] M. Fort, La terre: des ressources en creux et en bosses, Editeur Rageot, Paris, 1992, 159.
- [23] C. Sagan and R. Turco, L'Hiver nucléaire, Le Seuil, Paris, 1991, 432.
- [24] C. Larrére, *Les philosophies de l'environnement*, Presses Universitaires de France, Paris, 1997, 128.
- [25] L. Ferry, Le nouvel ordre écologique: L'arbre, l'animal et Thomme, Bernard Grasset, Paris, 1992, 279.
- [26] I.J. Deary, W. Johnson and L.M. Houlihan, Hum. Genet., 126(1) (2009) 215-232.
- [27] L. Penke and I.J. Deary, Neurobiol. Aging, 31(9) (2010) 1656-1660.
- [28] B.K. Kennedy and V.L. Mackay, Cell Metab., **10(4)** (2009) 247-248.
- [29] M. Bauer, A.C. Hamm, M. Bonaus, A. Jacob, J. Jaekel, H. Schorle, M.J. Pankratz and J.D. Katzenberger, Physiol. Genomics., **17(2)** (2004) 230-244.
- [30] T.L. Gruenewald, T.E. Seeman, C.D. Ryff, A.S. Karlamangla and B.H. Singer, PNAS, 103(38) (2006) 14158-14163.
- [31] E.S. Epel, Hormones, **8(1)** (2009) 7-22.
- [32] V.A. Grachev, *Theory and practice of personal success*, Modern Humanities University, Moscow, 2002, 279.
- [33] N. Hill, *Think and grow rich*, Read How You Want, Sydney, 2017, 442.