

Dear colleagues, ladies and gentlemen!

This short message is intended to draw your attention to a circle of questions in the search for answers to which for many years well-known scientists in different countries of the world actively participated. Despite decades of rigorous biomedical research, in science until recently there has been no clear and demonstrable understanding of the nature and biological mechanisms of the action of the active components of air on mammals and humans. Time has shown that interpreting the effects of air ions based on the views of the last century has been unproductive. In particular, the electrical nature of air ions has turned the idea of the role of the charge of aeroions into one of the dogmas of modern biology, and the cumulative result of a century-long period of biological research turned out to be much weaker than the effort.

A new concept of the biological activity of air ions is based on a modern understanding of the physicochemical nature of the oxygen ion O_2^- as a gas-phase superoxide $O_2^{\cdot-}$. Recently, the identity of physiological responses in animals and humans to inhalation of $O_2^{\cdot-}$ and nasal applications of *micromolar* amounts of H_2O_2 has been proven. The new concept made it possible to consistently and provably explain the activity of negative oxygen ions by the action of micromolar amounts of hydrogen peroxide as a dismutation product of the gas phase anion-radical $O_2^{\cdot-}$. In the modern sense, both products are exogenous reactive oxygen species (ROS).

The modern approach allows one to theoretically explain and effectively use exogenous ROS as an important environmental factor. In our brief report, we are talking about the high therapeutic potential of exogenous artificial ROS. Below are some of the biological and therapeutic effects of artificial ROS that we studied – the nasal $O_2^{\cdot-}$ inhalations or H_2O_2 spray applications. A complete list of the biological effects of artificial ROS will be provided upon request.

A. Central, mainly central and / or tissue (in vitro) effects in the various animal studies:

- o increasing of the blood-brain barrier permeability to drugs and metabolites;
- o activation of the hypothalamus – pituitary complex structures;
- o 100% mortality of mice and rats as a result of complete ROS deprivation in (from) the inhaled air;
- o potentiation of the analgesic effect in experimental models of pain;
- o reduction of the neurotoxin MPTP effects as a model of Parkinson's disease and toxic parkinsonism;
- o regulation of the number and activity of APUD cells in the lungs and bronchi, and others.

B. Therapeutic application (monotherapy, as well as in combination with drug therapy):

- o pain: potentiation of the analgesic effects the various analgesics;
- o treatment of Parkinson's disease and various forms of parkinsonism (drug-, toxic- and vascular);
- o treatment of multiple sclerosis;
- o treatment of bronchial asthma in adults and children;
- o treatment of drug addiction and withdrawal syndrome;
- o cerebral palsy treatment.

C. Others (including at the cellular level):

- o decrease in the level of endogenous oxidative stress;
- o reduction of oxidative stress of *S. cerevisiae* during rehydration;
- o regulation of chemotaxis of macrophages.

The main results of our study listed here are documented by relevant publications and reflect the significant scientific and therapeutic potential of artificial exogenous ROS as a new therapeutic platform. Together, this can contribute to the formation of a new direction in biology and medicine. At the same time, we note that the awareness of the constant and inevitable presence in the biota environment of extremely small amounts of ROS harmful from the point of view of modern knowledge can serve as an incentive for a better understanding of the role of these products at all levels of development of living matter.

The main methods for the artificial production and use of the both artificial ROS - the $O_2^{\cdot-}$ anion and Parkon® as the pharmaceutical product are protected in Germany and Russia, as well by international patents (PCT). For the development and promotion of Parkon®, we received an award - the Gold Medal of the Siberian exhibition MEDSIB-2004.

Most of the research was done in the author's laboratories in Riga, Berlin and Moscow, as well as in collaboration with the departments of biophysics and human and animal physiology of the Faculty of Biology of Moscow State University; Research Institute of Neurology of the Russian Academy of Medical Sciences; Centre for Extrapryramidal Diseases, Department of Neurology, Ministry of Health of the Russian Federation; Department of Neurology and Neurosurgery, St. Petersburg State honey. University named after Acad. I.P. Pavlova; Department of Psychiatry, Rostov honey. University; biochemical laboratories of Singapore, Minsk and others.

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Berlin, 2019