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Information technologies for aviation: personal databases for studying of hypoxia and possibilities of its pharmacological correction

Practical applications of information technologies developed for the scientists who study different aspects of hypoxic states development in aviation, extreme conditions and their corrections by new pharmacological preparations are presented.

Aviation and studying of hypoxia problems

The studies of hypoxic states development in organism ever were linked tightly with the progress in aviation technique. Hypoxia means the deficiency of oxygen in organism – the states which are developed sometimes during the flies at high altitudes in rarefied atmosphere, some aircraft malfunctions and accidents. Hypoxic states can be developed also as the results of different other factors, as well as ones in extreme conditions. The authors together with their colleagues have the experience of hypoxic states studies in extreme high mountains conditions [1-4] that sometimes can serve as models for aviation and findings from one sphere can be used in other. Hypoxic states can be developed also as the result of different other reasons; such items were studied deeply by Ukrainian and foreign investigators during decades because of their importance for the practice [5-10].

Among the ideas of hypoxia states regulation there were ones of pharmacological correction of hypoxic disorders and linked effects by different pharmacological preparations, including testing and use of novel preparations [5, 9, 10]. Sure, such findings were based on the deep studying of the nature, different revealing of hypoxia phenomena, mathematical modelling [1-4, 6-8, 11]. Consequently, in our époque of information technologies (IT) development the idea appeared of their application for the organization of the work of researchers and medical personnel [12-14]. Some versions of information systems with databases were constructed; and they can be used by professionals, who work in sphere of hypoxic states examinations and their manifestations correction [12-14].

Pharmacological correction of hypoxic disorders by yackton, sufan, splenozide, C60 fullerene, and others. The use of pharmacological agents for hypoxic states correction as well as novel substances ever was an attractive idea for researchers and doctors [5, 15]. In our previous publications we had already written about our experience to use for these purposes such substances as yackton, sufan, splenozide and C60 fullerene [5, 15]. In these and other our articles and abstracts we had published the information about such substances, their chemical composition, properties, details of these properties experimental examination and obtained results of experiments. Sure, with time a lot of such information was recorded in our laboratory computers. There was a time of ordering of such information using contemporary information technologies – databases, convenient information system which made these data more accessible and so on.

Information system with personal databases for the investigators of

hypoxic states. In such a way the idea of information system with personal databases for the investigators of hypoxic states appeared. Sure, in Internet it is possible to find the examples of the systems with databases like this. Necessity of personal databases appears when the researcher works intensively and enough great volume of his experimental results he obtained from day to day. Besides of this, the researchers need the quick access to all data necessary for their work.

Starting the construction of such databases it is necessary to study the necessity of researcher. For example, in our case of investigations of different pharmacological preparations influence the researcher need for his everyday work following electronic possibilities.

1- Databases of pharmacological agents with the data of their physical and chemical properties.

2- Database of the substances, necessary for the laboratory work with relative information (company of this chemical production, state of production, length of period of storage, storage conditions and so on).

3- Database of the results of experiments. The data not only in numerical and symbolic form have to be written there – acting substances, their concentrations, values of effects and etc. The graphs, videos, photos have to be written here. All obtained data have to be recorded in forms, in which they would be able for retrieval with further processing and analysis.

4- Database of everyday protocols of experiments. It is known that each experiment has to be supplemented by protocol with the details of this experiment that cannot be lost.

5- Database with the results of experimental data analysis.

"Personal mini library" of researcher. Separately it is necessary to form a set of databases that could be called "Personal mini library". Such databases can be of two types.

1- "Mini library" of the sources of scientific literature, which researcher need for everyday work in electronic form: books, articles, patents, catalogues and etc. The example of the data of such database ones can see in "References" for this conference article.

2- Database of own publication of the researcher in electronic form – also books, articles, patents, abstracts of conferences, and so on. In this case too, it is possible to use own publications from electronics profiles of researcher in "ResearchGate" or "Google Scholar (Academia)". But many of scientists know how unstable sometimes is the information in such profiles. So, to insure ourselves, it is better to double this information in personal databases of own local computer.

Conclusions. Practical applications of information technologies developed for the scientists who study different aspects of hypoxic states development and their corrections by different pharmacological preparations were presented in this conference article. The construction of information system for such researcher with personal databases and "Personal mini library" was observed. As examples of the substances for such databases can be suggested yackton, sufan, splenozide, C60 fullerene and others studied by the authors.

References

1. Beloshitsky P.V., Onopchyk Yu.M., Marchenko D.I., Aralova N.I.

Mathematic methods for investigation of reliability problem of organism functioning in extreme high mountain conditions. Physiological Journal. – 2003. – P. 139–143.

2. Beloshitsky P.V., Aralova N.I. The change of the parameters of athlete respiratory system during adaptation to the mountain meteorological factors. Research based on the mathematical models. Sports Medicine. – 2016. – 1. – P. 111–116.

3. Beloshitsky P.V., Onopchyk Yu.M., Aralova N.I. Stability, adaptation and reliability of organisms under hypoxia. 3-rd World Congress of Mountain Medicine and High Altitude Physiology. – 1998. – P. 241.

4. Onopchuk Yu.M. Homeostasis of functional respiratory system as a result of intersystem and system-medium informational interaction. Homeostasis of the functional circulatory system as a result of intersystem and system-medium informational interaction. Bioecomedicine. Uniform information space. – 2001. – P. 59–81.

5. Gonchar O.O., Maznychenko A.V., Klyuchko O.M., Mankovska I.M., Butowska K., Borowik A., Piosik Ja., Sokolowska I. C60 Fullerene Reduces 3-Nirtopropionic Acid-Induced Oxidative Stress Disorders and Mitochondrial Dysfunction in Rats by Modulation of P53, Bcl-2 and Nrf2 Targeted Proteins. International Journal of Molecular Sciences. – 2021. – 22(11). – P. 5444-5468.

6. Jezek P., Hlavata L. Mitochondria in homeostasis of reactive oxygen species in cell, tissues, and organism. Int. J. Biochem. Cell. Biol. – 2005. – 37. – P. 2478–2503.

7. Hayes J.D., McLellan L.I. Glutathione and glutathione dependent enzymes represent a coordinately regulated defence against oxidative stress. Free. Radic. Res. – 2009. – 31. – P. 273–300.

8. Ma Q. Transcriptional responses to oxidative stress: pathological and toxicological implications. – Pharmacol. Ther. – 2010. – 125. – P. 376–393.

9. Soni S., Ruhela R.K., Medhi B. Nanomedicine in Central Nervous System (CNS) Disorders: A Present and Future Prospective. Adv. Pharm. Bull. – 2016. – 6(3) . – P. 319–335.

10. Binawade Y., Jagtap A. Neuroprotective effect of lutein against 3-Nitropropionic acid–induced Huntington's Disease-Like symptoms: possible behavioral, biochemical, and cellular alterations. J. Med. Food. – 2013. – 16(10). – P. 934–943.

11. Klyuchko O.M., Onopchuk Yu.M. Some trends in mathematical modeling for biotechnology. Biotechnologia Acta. – 2018. – 11(1). – P. 39-57.

12. Aralova A.A., Aralova N.I., Kovalchuk-Khimyuk L.A., Onopchuk Yu.M. Automated information system for athletes' functional diagnostics. Control systems and machines. – 2008. – 3. – P. 73–78.

13. Aralova A.A., Aralova N.I., Beloshitsky P.V., Onopchuk Yu.M. Automatic information system for functional diagnostics of alpinists. Sport. Medytsyna. – 2008. – 1. – P. 83–94.

14. Klyuchko O.M. Information computer technologies for using in biotechnology: electronic medical information systems. Biotechnologia Acta. – 2018. – 11(3). – P. 5–26.

15. Gonchar O., Kyuchko E., Seredenko M., Oliynyk S. Corrections of prooxidant – antioxidant homeostasis of organism under hypoxia of different genesis by yackton, new pharmacological preparation. Acta Physiol. Pharmacol. Bulg. – 2003. – 27. – P. 53-58.