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Polysystemic analysis for risk group revealing in nuclear plant stuff

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The health risk due to radiation exposure and the causality can be revealed only through long-term and detailed radiobiological and epidemiological studies. Many individuals (medical staff, aircrew, miners, Chernobyl clean-up workers, nuclear weapons tests participants, nuclear industry workers) are, or have been, exposed to ionizing radiation in the course of their work and the epidemiological study of occupationally irradiated groups offers an important opportunity to complement the estimates of risks to health resulting from exposure to radiation that are obtained from other populations. By a wide range of effects, the existing real radiation, physical, chemical, and biological hazards can be divided into two categories:

- 1) Risks in the deterministic range of doses and concentrations (doses and concentrations far surpassing the established thresholds)
- 2) Risks in the stochastic range of doses and concentrations (doses and concentration near the established thresholds)

In the deterministic range of doses and concentrations, the biological effects strictly depend on doses and concentrations of anthropogenic factors and can be detected by existing methods of epidemiological analysis.

LCS analysis of blood serum and urine and standard clinical blood testing for eosinophil count detected a risk group for allergic diseases (5 women and 8 men). This group included individuals with moderate or pronounced allergic shifts and mixed shifts with the allergic component. Since the target was detection of the risk group by the bronchopulmonary pathologies, further functional testing revealed reduced vital lung capacity in 5 examinees. Tiffeneau index was reduced in 4 individuals; this parameter is more important for evaluation of allergic bronchopulmonary pathologies. In 2 examinees, reduced Tiffeneau index was associated with increased relative content of eosinophils.

Conclusion

Based on the above, the algorithm of evaluation of chronic radiation, chemical, and combined risks should include the following steps:

1. On the basis of the detected shifts in the system regulating metabolism and immunity (LCS of biological fluids), reference groups for differentiation significant shifts are formed.
2. In the corresponding reference groups, variants related to functional tension in the major physiological systems are detected.
3. On the basis of systemic analysis of the tensest states in the major physiological systems, risk groups for the corresponding pathologies are formed within the selected reference groups.

Biography

Mikhail Karganov was born in Odessa, USSR. In 1980 he graduated from Moscow Mendeleev Institute of Chemical Technology, organic-fuel faculty, technology of microbiological production. He has completed his PhD at the age of 28 years from Institute of General Pathology and Pathophysiology, Russian Academy of medical sciences, postdoctoral studies DSc degree (2001) from the same Institute. From 2001 till now he is the Head of Laboratory of Polysystemic Investigations of Institute of General Pathology and Pathophysiology. The sphere of his scientific researches of the last 15 years includes the development of new biophysical methodologies which enable to detect in a rapid noninvasive mode the functional status of regulatory systems of organism responsible for preservation of its adaptive potencies. They offered to define this new trend in the medical diagnostics of so-termed deregulation state of organism, which precedes formation of different pathological processes, as objectives analogical monitoring.

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