

TOPICAL ISSUES OF HYGIENIC SAFETY IN PRODUCTION AND APPLICATION OF NANOMATERIALS

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Nanotechnologies are the one of priority directions of the scientific and technical development of the Republic of Belarus. Scientists of the National Academy of Sciences of Belarus have developed “Concept for the development of nanotechnology and nanomaterials”. The Republican Association of Nanoindustry is successfully developing, which combines about thirty enterprises.

Nanoparticles and nanomaterials (NP and NM) are actively used in microelectronics, power engineering, construction, chemical and perfume and cosmetics industries, medicine and biology, agriculture, and also some other areas. Such intensive production and widespread use of new in their properties and biological effect nanoparticles and materials requires tackling a number of medical and biological problems. The most important issues are the study of patterns of biological effects manifestations of nanoparticles depending on their chemical nature, shape, size, surface area, charge and other physicochemical features of the structure, as well as dose, route of entry, concentration in target organs and duration of action.

In order to address the issues of hygienic safety, it is necessary to improve existing and develop new methods for studying the toxicity and danger of NPs and NM, taking into account their unique physical and chemical properties and modern international requirements. Research methods should be consistent with the concept of an “integrated research strategy” and be based on *in vivo* and *in vitro* studies. According to this experimental model, the main toxicological studies are carried out on warm-blooded organisms, but in order to limit animal testing, it is constantly necessary to search and implement alternative methods and test systems. The main objective of NM research is to study the systemic toxic effect on the body and specific (selective) effects on individual organs and tissues, as well as long-term effects.

To achieve success in the field of hygienic safety and risk assessment in the production and application of NP (NM) requires focus on solving the following problems:

- development of uniform criteria for the hazard of NP (NM) and methods for their determination/control;

- justification of safe levels of NP (NM) content in the habitat and production facilities;

- classification of NM by hazard classes in accordance with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) and preparation of NM safety data sheets according to generally accepted rules for chemical products;

- development and implementation of accurate and informative instruments for determining and controlling NP (NM) in practice;
- assessment of the impact of NP (NM) on the health status of workers and population, identification of risk groups.

Currently, the Republican unitary enterprise "Scientific practical center of hygiene" is carrying out research on the features of biological action and specific (mutagenicity, carcinogenicity, genotoxicity) toxic effects of nanomaterials based on metals (the research is funded by the state and carried out within the framework of the industry scientific and technical program "Hygienic safety", 2019-2023). It is planned that the results of scientific research will contribute to the solution of the urgent problems of hygienic safety listed in the publication in the production and use of NPs (NM) and will minimize the risk of adverse effects on human health due to the development of nanotechnology.