



RUDN University Biologist Discovers the Dangers of Nanotechnologies for Fish Health

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RUDN University biologist with colleagues from Iran and Thailand discovered the negative consequences of nanotechnology. Manufactured nanoparticles that help us produce new products are toxic to fish.

Metal oxide nanoparticles have become actively used in various areas of the economy, from the chemical industry to cosmetology and medicine. With the development of nanotechnology, we began to produce and consume more nanoparticles. They end up in the ecosystem and can cause harm. For example, to influence the life of animals, the state of the environment, human health. [RUDN University](#) Biologist with colleagues from [Iran](#) and [Thailand](#) found that zinc nanoparticles accumulate in the body of fish and poison them.

“The widespread use of metal oxide nanoparticles raises serious concerns about their impact on human health as well as aquatic animals. We studied how various concentrations of zinc oxide nanoparticles affect fish and found that the accumulation of a large amount of zinc ions in the liver and gills can lead to cell damage due to oxidation,” said Morteza Yousefi, Associate Professor of the Department of Veterinary Medicine, RUDN University.

For biology research chose the "goldfish", or Chinese carp (*Carassius auratus*). It is a popular aquarium fish and a model laboratory animal. The fish were placed in aquariums with different contents of zinc oxide nanoparticles. Two weeks later, biologists RUDN studied the blood parameters of fish.

Zinc nanoparticles led to a significant decrease in the number of red (erythrocytes) and white (leukocytes) blood cells. Moreover, significant changes were found in the biochemical parameters of fish blood - the activity of liver and gill enzymes decreased. RUDN University researchers have found accumulations of zinc in the liver, kidneys, and gill tissues. This led to serious histological pathologies in these organs. Also decreased the activity of enzymes that

are responsible for the antioxidant effect. They protect cells, without their work, cells are destroyed - oxidative stress occurs.

“Exposure to nanoparticles resulted in a significant decrease in the number of red blood cells and white blood cells in fish. In addition, the results revealed significant changes in serum biochemistry, liver enzyme levels, and immune and antioxidant responses. These results suggest that water-borne zinc oxide nanoparticles can easily accumulate in important metabolic organs and lead to oxidative stress, having a devastating effect on the physiological processes in the body of the Chinese carp,” said Morteza Yousefi, Associate Professor of the Department of Veterinary Medicine, RUDN University.

The results are published in [Drug and Chemical Toxicology](#).

Read the [original article](#) on Newswise.