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Attenuation of adverse health effects of metallic nanoparticles with innocuous bioprotectors: Mechanistic hypotheses and experimental results

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Especially high health risks associated with impacts of metallic and metal oxides nanoparticles (Me-NPs) contaminating working environments of not only the emerging nano-industry but also of some long-existing traditional technologies makes it necessary, along with keeping respective dangerous exposures as low as possible, to look for ways of increasing the organism's resistance to them (the "biological prophylaxis"). Theoretical premises of beneficial interventions in toxicokinetics and toxicodynamics of Me-NPs are inferred from understanding general and specific key mechanisms of their adverse action and on our previous experience in the field of such bio-protection against other toxics. Based on these premises, we proposed several "bio-prophylactic complexes" (BPCs) comprising mainly pectin, some vitamins, glutamate, glycine, N-acetylcysteine, omega-3 PUFA and different essential trace elements. Results of several *in vivo* experiments with NPs of metallic silver and of copper oxide as well as with binary and trinary combinations of Me-NPs characteristic of workroom air pollution in different industries have proved that, against the background of such BPCs' oral administration, the pulmonary and systemic toxicity of Me-NPs and even their genotoxicity can be markedly attenuated. Therefore, we recommend to further develop this vector of nano-toxicological research. Our previous positive experience in organizing first a selective and then a large-scale biological prophylaxis of adverse health effects of many other toxicants makes us expect that it would be no less practicable and effective in the field of nano-toxicology as well.

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