

## THE PECULIARITIES OF METAL NANOPARTICLES INTERACTION WITH BACTERIA CELLS: BASIS FOR NEW PHARMACEUTICAL AND VETERINARY PREPARATIONS' DEVELOPMENT

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### Abstract

On the modern stage of nanotechnologies' advances understanding of the mechanisms of contact interaction between metal nanoparticles and live cells is the main key for new high effective pharmaceutical and veterinary preparations' development. For the purpose of study of the peculiarities of metal nanoparticles interaction with bacteria cells spherical monodisperse metal (gold, silver, iron, copper, bismuth) nanoparticles with different sizes has been synthesized according to the original developed protocols of colloidal-chemical synthesis in water medium. All synthesized metal nanoparticles have been characterized as biosafe using different biosafety level estimation parameters (cytotoxicity, genotoxicity, mutagenicity, main biochemical markers, LD50, etc.). For the investigated metal nanoparticles it has been revealed their evident accumulation on the surface as well as within wide range of aerobic and anaerobic bacteria cells (test strains as well as resistant clinical isolates): *E. coli*, *Act. lignieresii*, *Cl. perfringens*, *F. necrophorum*, *Kl. pneumonia*, *S. aureus*, *S. typhimurium*, *B. anthracis*, *M. tuberculosis*, already after 10 minutes of contact interaction. For the observed processes of contact interaction between metal nanoparticles and bacteria cells their dependence from the metal nanoparticles' nature, size and concentration, as well as role and contribution of cells' surface structure and main enzymes of energy metabolism has been determined. The defined biochemical mechanisms of bacteria cells contact interaction with certain metal nanoparticles serve as the basis for some high effective pharmaceutical and veterinary preparations' development: antimicrobial preparations with wide spectrum of activity (including strains with multiple antibiotic resistance), complex vaccines as well as probiotics for animals and poultries protection, etc.

**Keywords:** Metal nanoparticles, bacteria cells, contact interaction, biochemical mechanisms, preparations' development

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