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Antibacterial and antifungal effect of silver nanoparticles in compositions with polymer/inorganic hybrids

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Biocide preparations for medicine, industrial or everyday applications are based mainly on organic substances with quaternary ammonium groups and poly(hexamethylene guanidines), which are toxic for humans and environment and also cause different side effects, allergic reactions and resistance. Body surface, and especially burn wounds are suitable environments for the development of many bacteria, first of all gram-positive *Staphylococcus* spp. (42.7 %) and gram-negative *Pseudomonas aeruginosa* (10.3 %); they could also be infected with the yeast (*Candida albicans*) [1] and filamentous fungi (*Aspergillus*, *Cladosporium*, *Fusarium*, *Penicillium* et al.), and microbe associations [2]. Therefore, last years the biocide preparations of a new generation, which contain metal nanoparticles with a wide antibacterial, antiviral, and antifungal effect are of special interest. It is important that microorganisms are not able to develop resistance to such biocide preparations.

The aim of our work was studying the effect of new biocide compositions based on silver nanoparticles (AgNPs) and silica/polyacrylamide hybrids on a series of pure bacterial and fungal cultures. The bacteria of the genera *Staphylococcus* and *Pseudomonas*, yeasts of the genus *Candida* and filamentous fungi of the genera *Aspergillus*, *Cladosporium*, and *Fusarium* were used as test-cultures. The investigated biocide compositions show a bactericide effect on the *Staphylococcus* and *Pseudomonas* cultures, and fungistatic effect on *Candida* and filamentous fungi mentioned above. Zones of growth absence of the *Fusarium* and *Cladosporium* were observed during the first 3-5 days of cultivation. The fungistatic action of AgNPs compositions on *Fusarium* was prolonged to 30 days.

1. Sakharov S.P., Kozlov L.B., Ivanov V.V. Analysis of microbe content of wound infection at permanent thermal injury in children // Fundamental investigations. – 2013. – № 9–3. – C. 468-471 (In Russian).

2. Hoog G. S. de, Guarro J., Gene J., Figueras M.J. Atlas of clinical fungi. –

