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Effect of gold nanoparticles on biofilm formation and destruction in *Salmonella* spp., Escherichia coli, Staphylococcus aureus and Listeria monocytogenes

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Bacteria are able to create biofilms which causes their greater endurance against the adverse environmental effects. Biofilm is not removed easily and thus causes many difficulties, e.g. in food industry and medicine. Metal nanoparticles are studied for their antimicrobial effects, as they are able to cause oxidative stress and to inhibit protein biosynthesis. The aim of this work was to examine the effect of gold nanoparticles on planktonic and biofilm cells in 13 strains of food-safety and clinically important bacteria: *Salmonella* spp., *Escherichia coli, Listeria monocytogenes* and *Staphylococcus aureus*. Gold nanoparticles of spherical shape, sized 8–10 nm were stabilized in polyethylene glycol and applied in a two-fold concentration dilution series up to the highest concentration 128 mg·l-1. Planktonic and biofilm cells were cultivated in a microtitre plate (brain-heart infusion, 25 or 37°C, 18–22 h). Biofilm was semiquantified by crystal violet staining. Tested gold nanoparticles were found to prove antimicrobial effect up to some extent. The lowest MIC50 for the planktonic cell growth was detected for *Salmonella* spp. (8-16 $mg{\cdot}l^{-1}$). However, the MIC80 was higher than 128 mg·l-1 for all tested species. $MBIC_{80}$ for the biofilm formation inhibition was higher than 128 mg·l-1, except in three strains of *Salmonella* spp. or *S. aureus* (16 mg·l-1, respectively 32 mg·l-1). The highest used concentration 128 mg·l-1 was not sufficient to reduce viability of biofilm by 80% (MBVIC80) except one strain *E. coli* (128 mg·l-1) or to eradicate biofilm by 80% (MBEC80).

Biography

Sabina Purkrtová has completed her PhD in Microbiology (thesis: Application of modern methods for study of food microorganisms) in 2014 from the University of Chemistry and Technology Prague (UCT Prague). She is an Assistant Professor at UCT Prague. She performs research and pedagogic work in food and forensics microbiology (national and international research team-member, supervising of bachelor and diploma theses, lecturing of classes and laboratory practice in Czech and English). She is a Team-Member of the Accredited Laboratory of Microbiology and GMO no. 316.3 (ISO 17025) in UCT. She has published nine papers in reputed journals.

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