

Despite the progress that has been made in dentistry in recent years, infection of the oral cavity is still one of leading public health issues. According to the World Dental Federation, more than 6 milliard people around the world suffer from oral diseases. Furthermore, at more than 20 years, this phenomenon is constantly intensifying. PD is definite a group of related inflammatory conditions affecting the tooth supporting tissues, caused by bacterial infection and plaque formation. Pathological changes of the oral cavity (teeth, gingiva, mucosa membrane) are mainly caused by bacterial or fungal infection. It is estimated that the oral cavity an adults is the habitat of more than 700 species of bacteria and fungi. Pathogenic bacterial and fungal strains can enter the oral cavity through daily contact with external factors such as eating, drinking, talking, wearing braces, or dental procedures. Interestingly, 95% of microorganisms is organized as a culture, embedded in a matrix called biofilm. The ability of bacteria to biofilm formation determines the virulence of microorganisms. Bacteria in biofilm exhibit reduced metabolism, increased immunity, and virulence, resulting in reduced penetration of conventional antibiotics which hampers treatment and raising treatment costs. Left untreated, the inflammatory process may lead to loss of tooth-supporting connective tissue and bone, and eventually to edentulism.

Contemporary dentistry, still has not found an effective method of fighting with microbial oral infections causing inflammation. Difficulties may arise from an unclear mechanism of PD. Important role in the progression of periodontal disease plays angiogenesis. During PD new blood vessels can maintain the chronic inflammatory state by transporting inflammatory cells to the site of inflammation and supplying nutrients and oxygen to the proliferating inflamed tissue.

An interesting alternative to conventional treatments appears to be silver nanoparticles (AgNPs). They have a high surface area relative to the size which allows a decrease in concentrations / dosages of treatment. Thus allow for reduce the side effects and costs of therapy. What is more, easy penetration through biological membranes helps to pierce into biofilm structure. However, controversial information on the AgNPs cytotoxicity to eukaryotic cells, significantly limited their usage in the treatment and prevention of oral infections. It was showed that NPs functionalization by organic compound significantly increase their cytotoxic effect, preserving antimicrobial activity.

The proposed study may lead to the use of functionalization with organic compounds as a method to reduce the adverse effects of NPs and use glutathion-modified silver nanoparticles (AgNPs@GSH) in stomatology treatment. Moreover, the synthesis unique, not described so far in the literature NPs, will provide valuable information about their therapeutic properties, contributing to better use their potential in medicine.