

Nanochemistry and biotechnology

Silver and gold nanoparticles: effectiveness *in vivo* in treatment of purulent-inflammatory diseases of the maxillofacial area, development of dosage forms

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Purulent-inflammatory diseases of the maxillofacial area in the form of abscesses, phlegmons, periostitis, osteomyelitis, suppuration of the bone wounds etc. are complex in treatment and make up more than 30-40% of the total number of dental surgical patients. So, search of effective ways for prevention and treatment of such diseases in the oral and maxillofacial surgery practice are important today. Development and implementation of new alternative antiseptic drugs can be effective solution of this problem. Metal nanoparticles, especially silver and gold nanoparticles have high potential in this area.

The effectiveness *in vivo* of silver nanoparticles (AgNP) and their combination with gold nanoparticles (Ag/AuNP) as new effective antimicrobial substances for maxillofacial surgery, in comparison with traditional antiseptics Chlorhexidine and Decasan has been studied. With this goal sterile monodisperse spherical AgNP and AuNP with average size 30 nm have been synthesized by the method of chemical condensation in water medium. Synthesized nanoparticles have been characterized as biosafe using parameters of cytotoxicity, genotoxicity, mutagenicity, biochemical markers (ATPase and LDHase activities) as well as LD₅₀ parameter.

AgNP, AuNP and their combination (Ag/AuNP) high antimicrobial activity, anti-inflammatory activeness and stimulation of regeneration processes have been defined *in vivo* in compare with treatment by traditional antiseptics on the models of Wistar rats' abscesses of submandibular area and suppuration of the bone wounds using microbiological, biochemical, histological and X-ray methods.

The composition and technology of different antiseptic dosage forms (gel, ointment and surgical wound irrigation solution) have been developed using water dispersions of the synthesized nanoparticles in different concentrations.