

SILVER AND GOLD NANOPARTICLES: EFFICACY FOR TREATMENT OF MAXILLOFACIAL INJURIES AND THEIR COMPLICATIONS

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Oral and maxillofacial injuries, including facial bone fractures, are commonly widespread in the practice of emergency medicine and make up tangible percentage of the dental surgical patients. Such injuries are usually characterized by involving of combination of damages including soft tissues, bone, and teeth and often stay under high risk of the purulent-inflammatory complications. These factors provoke special attention to the applicable medications, which should combine antiseptic properties, anti-inflammatory activeness and stimulation of regeneration processes not only for soft tissues, but also for bone tissue. Among new created substances metal nanoparticles, especially silver and gold nanoparticles are possessed by high potential in this area.

Silver (AgNP), gold (AuNP) nanoparticles and their combination (Ag / AuNP) efficacy in treatment of maxillofacial injuries and their complications has been studied *in vivo* using model of *Wistar* rats' mandibular fracture with suppuration of the bone wounds and *ex vivo* using stromal stem cells isolated from the human bone marrow according to the method of stromal stem cells' cloning named after "Fridenshtein–Astakhova".

Water dispersions of sterile monodisperse spherical AgNP and AuNP with average size 30 nm have been used in this study. AgNP and AuNP have been synthesized according to the original protocol by the method of chemical condensation in water medium. Combination of Ag / AuNP has been received due to mixture of AgNP and AuNP in certain concentrations. Nanoparticles have been characterized as biosafe according to the parameters of cytotoxicity, genotoxicity, mutagenicity, biochemical markers (ATPase and LDHase activities) as well as LD₅₀ parameter.

AgNP, AuNP and Ag/AuNP high antimicrobial and anti-inflammatory activity as well as stimulation of regeneration processes have been revealed according to the data of microbiological, histological and X-ray tests as result of *in vivo* experiments on the model of *Wistar* rats' mandibular fracture with complication. The data of *ex vivo* experiments according to the "Fridenshtein–Astakhova" method demonstrate that influence of AuNP and Ag / AuNP is characterized by stimulation of the clonogenic activity of the stromal stem cells at two times average in compare with control.

Obtained results indicate high efficacy of AgNP, AuNP and Ag / AuNP for treatment of maxillofacial injuries and their complications due to complex manifestation of antiseptic and anti-inflammatory activeness together with stimulation of regeneration processes.



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