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Abstract

# Carboxymethyl cellulose film-implant with silver nanoparticles for the treatment of burns with different etiology

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**Abstract:**
Silver nanoparticles inhibit the activity of the enzyme providing oxygen exchange in protozoa, such as pathogenic bacteria, viruses, and fungi (about 700 species of pathogenic flora and fauna) [1]. The transition from the ionic Ag+ form to metallic nanoclusters makes it possible to reduce silver's toxicity to cells of higher organisms without suppression of the antimicrobial activity against pathogenic microflora. Silver nanoparticles, especially stabilized ones, have greater stability and prolonged action [2]. Sodium carboxymethylcellulose (Na-CMC) - a water - soluble film forming biodegradable polymer widely used in the production of oral pharmaceuticals and drugs for external use primarily to increase the viscosities of ointments, in the production of pastes as hydrogel bases, and in the production of drugs for parenteral use - is of high interest as a stabilizer of silver nanoparticles. In addition, Na-CMC is utilized as a binding and disintegrating agent in the production of tablets. Na-CMC is one of the key components of adhesive absorbing systems employed to treat problematic wounds, to remove extravasates, sweat, and the contents of wounds, and to regulate the kinetics of release of active substances of systems contacting mucous membranes.The aim of this study is to prepare stabilized silver nanoparticles in polymer films based on Na-CMC and to investigate their structures, physical and chemical properties, and microbicidal activities. Industrial samples of Na-CMC with degrees of substitution of 0.65-0.85 and degrees of polymerization of 200-600 obtained from cotton cellulose were used as polymer matrices after their purification from inorganic and organic admixtures. To prepare silver nanoparticles in the films based on CMC, AgNO3 aqueous solutions of various concentrations were utilized. The bacterium Staphylococcus epidermidis and the yeast fungus Candida albicans - pathogens of humans and animals-were used as test cultures. To form the films, 2-4% aqueous solutions of purified Na-CMC samples with various degrees of substitution and polymerization were employed after the removal of the gel fraction via centrifugation with a laboratory centrifuge at 2500 rpm for 20 min. Then, calculated amounts of 0.1-0.001 M aqueous solutions of AgNO3 and 0.1-0.5% glycerol, which played the role of a plasticizer, were added under stirring to the gel free Na-CMC solutions, and the stirring was continued until homogeneous Ag+CMC– hydrogels formed. The photochemical reduction of silver ions in the Ag+CMC– structure to nanoparticles was performed at 25°С through their irradiation with a DB-250 high pressure mercury lamp. The dispersions of silver nanoparticles were prepared via ultrasonic dispersion of the hydrogels with the use of UZDN-1 and U-4.2 ultrasonic dispersers.

**Biography:**
Kh.E. Yunusov is a professor in Academy of Sciences of the Republic of Uzbekistan, Uzbekistan

**Publication of speakers:**

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