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Antimicrobial Properties of a New Polymeric Material for Medical Purposes under Conditions of Low-intensity Current Without External Power Supplies

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Local use of wound dressings still remains an important element of comprehensive wound treatment. Materials capable of dosing the release of drugs, including antimicrobial action, are of the highest priority. The use of composite polymers with antimicrobial properties in low-intensity current without external power supplies can enhance their effectiveness in combating wound infectious agents and improve the results of wound healing in general. Therefore, the aim of our study was to investigate experimentally the antimicrobial action of a polymeric material based on poly(2-hydroxyethyl methacrylate), modified by creating a porous structure and saturated with antiseptic against strains of gram-negative microorganisms *P. aeruginosa* and *A. baumannii* in low-intensity current without external supplies. A composite polymer material was synthesized by the method of free radical thermal polymerization of a mixture of liquid monomer 2-hydroxyethyl methacrylate, crosslinking agent triethylene glycol dimethacrylate and polymerization initiator azobisisobutyronitrile. Additionally, distilled water as a pore-forming agent and the antimicrobial agent decamethoxine were added. Suggested composite without an antimicrobial agent, as well as existing materials of synthetic and biological origin that are widely applied for the treatment of wounds were used for comparison. Some of the materials were pre-immersed in 0.02% solution of the decamethoxine. To ensure the action of biogalvanic current, a special device was placed alternately on each of the tested samples. Determination of antimicrobial properties was performed by diffusion method on a dense nutrient medium. The results of microbiological research allowed to establish the advantages of the suggested material in combating the growth of gram-negative microorganisms *A. baumannii, P. aeruginosa in vitro*, as well as the feasibility of its use under conditions of low-intensity current without external power supplies.