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Nanocomposites based on multicomponent polymer matrix and nanofillers modifiered by biologically active substances for biomedical application

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The nanocomposites based on polyurethane (PU) and poly(2-hydroxyethyl methacrylate) (PHEMA) polymer matrix and nanofillers with surface modifiered by biologicaly active substances (BAS) were created. The nanofillers with amount of 1-15 wt.% were introduced into the systems during the process of PU synthesis. As BAS the aminoacids- histidine, glycine, lysine and tryptophan;antiseptics- salts of silver, zinc and copper; metronidazol, decametoxine were used.

Examination of antibacterial properties against a number of aerobic micro-organisms and anaerobic microorganisms was carried out and membranotropnyh properties in according to cell culture Saccharomyces cerevisiae was done. The antibacterial activity of nanocomposites against anaerobic microorganisms was found , ie depressing effect on the growth of bacteria.

The release of biologically active compounds from the nanocomposites into the environment was investigated and was shown that the introduction of nanofillers modifiered by monolayers and by heterolayers of BAS and variation of polymer matrix components allowed to regulate the rate of release of biologically active substances into the environment.

A study of cytotoxicity and histocompatibility of the created nanocomposites in experiments with rats were done. The blood analysis and tissue biopsies for histological studies were performed after 1-18 days of nanocomposites implantation. The symptoms of inflammation in the tissues surrounding implant and the violation of blood parameters of the animals were not observed.

A biopharmaceutical, histoloho-morphological and microbiological studies of the nanocomposites named "Polidens" were carried out and was shown that material is non-toxic, does not cause a local inflammatory response and promising for use in the biomedical application, namely for the manufacture of surgical implants and coatings.

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