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Antibacterial efficiency of hydroxyapatite biomaterials with biodegradable polycaprolactone polymer, saturated with gentamicin.

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Introduction. One of the major obstacles against a wider use of biomaterial implants is the capacity of bacteria to attach to biomaterial surfaces, which can cause infections associated with biomaterials. These infections can cause many serious problems, as well as poorly treatable biofilm infections.

Materials and Methods. Group A consisted of hydroxyapatite biomaterials with biodegradable polycaprolactone polymer, saturated with gentamicin. Group B consisted of hydroxyapatite biomaterials saturated with gentamicin. Group C consisted of hydroxyapatite biomaterials saturated with biodegradable polycaprolactone polymer. Antibacterial efficiency of all three group biomaterials were tested using *S. epidermidis* (ATCC 12228) and *Ps. aeruginosa* (ATCC 27853) bacteria reference cultures. Studied biomaterials of all groups were incubated at 37^{o}C for 24h 2 ml TSB with investigated bacterial suspension. Suspension consisted of 1 ml TSB and 1ml bacteria suspension with an optic density of 0.5 according to McFarland standard. 2ml TSA bacteria suspension with an optic density of 0.5 according to McFarland standard without biomaterial, which was used as study's control group.

Results. The average antibacterial length of group A biomaterials against *S.epidermidis* was 336h±12, whereas the average antibacterial length against *Ps. aeruginosa* was 288h±12. The average antibacterial length of group B biomaterials was 45h ±15.09 against *Ps. aeruginosa* bacteria culture, whereas the average antibacterial length of group B biomaterials against *S. epidermidis* culture was 55h ±15.09. Antibacterial characteristics were not observed on group C biomaterials against any of the bacterial cultures used in the study.

Conclusions. By using this type of biomaterials with antibiotics and polymer, the polymer is degraded slowly and it also ensures the slow secretion of antibiotic substances; however in situations when biomaterials are saturated with antibiotic substances and they are not covered by biodegradable polymer, antibiotics secrete rapidly, thus ensuring protection from infection for a shorter period of time.