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Dermal fibroblasts in morphologic monitoring of biodegradable materials: methodological basis of potential application evaluation in dog dentistry

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Objective: To evaluate functional state of dermal fibroblasts cultivated on titanium pieces for implants with different concentrations of a polymer film and propolis put on their surface; to determine polymer and propolis concentrations which may provide biodegradable coating nontoxicity and the required adhesive and proliferative cell culture potential (patent RU 2117997, 2240602, 240603, 22464304, 22464305, 2271139, 2271140, 2303436, 2323694, 2323695).

Materials and method As a material for our research, human dermal fibroblasts extracted from healthy donor skin were used. Culture viability and proliferative activity were evaluated in 1 mm of medium by means of an autocellcounter. Before the experiment was started the study titanium samples had been treated in the dry air sterilizer ("Across", Russia), then placed in 24-well plate ("Costar", USA) with the follow-up cell culture seeding (concentration – 1*105 cells per a sample in 2 ml of the medium). The research was conducted with adhering to all existing ethical practices.

Findings In the course of the experiment the optimal doses of the composite components which did not exert an inhibitory effect on fibroblasts were determined. The research demonstrated good cell adhesion (the first 5 types). Close to the presented samples high proliferative activity was also being observed. Then inhibition of cell growth followed by cell death was being observed, as evidenced by shape change (rounding) and growth cessation (types 6 and 7). The concentration of the polymer was consistently decreasing, the cell culture adhesive and proliferative potential were being improved (types 8, 10), as evidenced by the cells of the distinctive shape close to the sample. The best results were received for type 10. In 24 hours after the control microscopy it was indicated that the fibroblast culture was in good condition, the cells were mainly fusiform, the processes are prominent, the nucleuses are clearly contoured.

Conclusion For creating a biodegradable coating on the implant material surface the following concentrations are to be used: propolis (as a an active agent) – 1.25 mg per 1 ml, polymer - maximum of 0,0001%. Absence of culture cell damage (type 10) with a possibility of the required adhesion and proliferation on the study substances is an evidence of the biodegradable coating nontoxicity.

Key words

Dermal fibroblasts, biodegradable materials.

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