

Scaffolds for bone tissue regeneration

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Introduction. There are many types of scaffolds prepared in order to regenerate bone tissue defects [2]. In performed research were tested matrices of natural origin.

Materials and methods. Collagen sponges were obtained from collagen extracted from the bovine Achilles tendon [3], which were cross-linked with 25% Glutaraldehyde (GA) vapors, and with 25 mM Riboflavin solution under the action of UV-A rays during one hour. Rabbit femoral and iliac wing bones were demineralized in 0.6 M HCl solution. Bone cells (BC) and mesenchymal stem cells (MSC) were isolated from rabbit [4, 5], to perform the MTT assay and to evaluate cellular adhesion on scaffolds with DAPI. The ultrastructure of the scaffolds was analyzed by scanning electron microscopy (SEM).

Results. The MTT assay on BC and MSC showed a high cellular activity. Also, seeded cells had a good adhesion and proliferation on the prepared scaffolds at 7 and 14 days of culture. At SEM examination was determined a high porosity of both cross-linked sponges, and thin walls (2-4 μm) with many small cavities in them, through which the pores communicate. However, it is determined that the pores of sponges cross-linked with riboflavin generally have larger sizes (70-220 μm) compared to those cross-linked with GA (50-150 μm) ($p < 0.01$). Also semnificative difference ($p < 0.01$) between pore size was determined in demineralised femoral (25-80 μm) and iliac wing bones (140-520 μm), and with different wall thickness ($p < 0.01$).

Conclusions. The obtained scaffolds had a good biocompatibility and a very nonhomogeneous structure.

Keywords: collagen, demineralised bone, scaffolds.

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