100b Improved Marrow Stromal Cells Response on Nanostructured Surfaces for Bone

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A major goal of orthopedic tissue engineering is to design better scaffold configuration and materials to precisely control osteoblast behavior. Nanostructured architecture has been shown to significantly affect cellular response. In this work, nanoporous alumina membranes were fabricated by a two step anodization method to investigate bone cell i.e. osteoblast response. Marrow stromal cells (MSC) were isolated from mice and were seeded on nanoporous alumina membranes to investigate both short term adhesion and proliferation and long term functionality and matrix production. Cell adhesion and proliferation up to 7 days were characterized using a cell counting, standard MTT assay and live-dead assay. The cells were then allowed to differentiate for up to 3 weeks. The alkaline phosphatase activity was measured using standard colorimetric assay. Further, von kossa staining was used to stain the minerals of the deposited matrix on the surface of nanoporous membranes. The matrix production was characterized in terms of surface concentrations of calcium and phosphorous, major components of bone matrix, using X-ray photoelectron spectroscopy (XPS). The results from nanoporous alumina membranes were compared with those of aluminum. Results indicate improved MSC adhesion and proliferation and increased matrix production after 3 weeks of study.