treatment, while the control groups recovered only 50%. In histology, we found that uP-IL4 treatment reduced adipocytes and myofibers with peripheral nuclei, showing healthier and normalized skeletal muscle. Collectively, it seems that the overexpression of IL-4 in the ischemic limb recruited more anti-inflammatory monocytes and macrophages temporarily, which promoted ischemic muscle repair and regeneration with less adipocytes.

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Differentiation potential of stem cells cultured on glass surfaces coated with magnetic nanoparticles

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Cell-matrix interaction plays a major role in cell differentiation alongside growth factors and cell-cell interactions. Investigation an effective nanomaterials promoting adhesion, proliferation, and differentiation of cells is crucial in tissue engineering. Iron oxide magnetic nanoparticles (MNPs) is one of the promising nanomaterials that may be used to modify cell substrate. The manipulation of MNPs by an external magnetic field allows constructing complex surface for cell culturing. In this study, we investigate the influence of MNPs-based surface on the differentiation potential of adipose-derived mesenchymal stem cells. The study was performed according to Program of Competitive Growth of KFU and funded by the subsidy allocated to KFU (project 16.2822.2017/4.6), the Russian Presidential grant MK-4498.2018.4 and RFBR project № 18-53-80067. MNPs were synthesized by the method of chemical reduction and characterized by both atomic force (AFM) and hyperspectral dark-field microscopy (HSM). Next, the surface of MNPs at concentrations 0.3-1.2 mg/ml was constructed by the method of colloid immobilization. The roughness of samples was analyzed by AFM. Biocompatibility of samples was measured by MTT-assay. Differentiation of cells into chondrocytes, adipocytes, and osteoblasts was done using specific media with corresponding growth factors. Differentiation potential during 14 days was studied with the bright-field microscopy and HSM. Results of MTT-assay suggests good biocompatibility of samples coated by MNPs with concentration <600 µg/ml. In addition, MNPs-based coating does not prevent differentiation into chondrocytes, adipocytes, and osteoblasts. In conclusion, the results allow us to consider MNPs-based surface as a promising approach in regenerative medicine, but further studies are required.

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Impact of nucleated cell isolation method on the manufacturing of mesenchymal stromal cell-based medicinal product.

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