

Experimental models of a transfer of stem cells for therapeutic purposes

Abstract

Stem cell therapy currently represents a standard procedure of treating a wide variety of hereditary diseases and serious injuries. Development of the most suitable way of transfer of stem cells into the patient body remains very important question concerning this type of therapy.

In our experiments we used nanofiber scaffolds for stem cell cultivation and their subsequent transfer. These nanofibers were prepared by the original needleless electrospun Nanospider™ technology. Allogeneic cornea or skin graft were transplanted from B6 mice to BALB/c mice. The grafts were covered by a nanofibrous scaffold with cultivated stem cells. Stem cells were stained by an immunofluorescent dye to enable us to monitor their migration from nanofibers into tissues and consequent distribution in the body and characterize changes of this distribution in the time. The methods of ELISA and PCR were used to confirm that mesenchymal stem cells support the production of antiinflammatory cytokines IL-4 and IL-10 and contribute to inhibition of production of proinflammatory cytokines IL-1, IFN γ and inducible nitric oxide synthase.

We confirmed an important beneficial role of nanofiber scaffolds in transplantation of mesenchymal stem cells. Nanofiber scaffolds facilitate an immediate contact of stem cells with the transplanted graft. In addition, nanofibers support the viability of stem cells as well as their immunomodulatory properties. Hereby, nanofiber scaffolds and stem cells contribute toward inhibition of local inflammatory reaction, which accompanies the transplantation.

Keywords: cornea transplantation, inflammatory reaction inhibition, nanofiber scaffolds, skin transplantation, stem cells.