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Therapeutic effect of mesenchymal stem cells-seeded and Cyclosporine A-loaded electrospun nanofibers on inflammatory reaction after skin transplantation

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Mesenchymal stem cells (MSCs) represent a population of multipotent stem cells with immunomodulatory, antiapoptotic and cytoprotective capabilities and thus hold a great promise for treatment of many inflammatory diseases and for use in a regenerative medicine. Numerous studies have shown that the administration of MSCs in combination with an immunosuppressive drug prolongs allograft survival in comparison with use of MSCs or the drug alone. However, the exact mechanism of such synergism has not yet been described.

The aim of this study was to analyze the therapeutic effect of MSCs applied locally on polylactic acid (PLA) nanofiber scaffold with or without incorporated Cyclosporine A (CsA) in a mouse model of allogeneic skin transplantation. It was founded that treatment with MSCs and CsA significantly decreased the amount of graft-infiltrating macrophages and the production of nitric oxide. These changes were accompanied with considerable lower production of interferon-gamma as cytokine priming classically activated macrophages. Simultaneously, increased production of interleukin-10 by graft infiltrating macrophages and significant upregulation of CD206 expression as a marker of alternatively activated macrophages was observed.

Our results indicate that application of MSC-seeded and CsA-loaded nanofiber scaffolds direct macrophage polarization towards development of alternatively activated macrophages. This phenotype switching may result in suppression of the local inflammatory reaction and takes part in healing process.

Biography

Michaela Hajkova is a PhD candidate at Charles University in Prague, Faculty of Science. She finished her Master's degree in Biology with the thesis: "The role of selected cell populations and molecules in inflammatory reaction and rejection of skin allograft". She is working in the laboratory of immunoregulation where she is participating in research of therapeutic potential of MSCs and their ability to contribute to tissue repair after transplantation of mouse skin allograft.

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