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Combined therapies for spinal cord injury repair

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Tremendous efforts have been made to improve locomotor function after spinal cord injury (SCI) by searching for the proper therapy. We compared the effects of implanted olfactory ensheathing cells (OEG) and/or mesenchymal stem cells (MSCs) into SCI with the implantation of neural precursors (NPs) derived from either fetal spinal tissue or induced pluripotent cells. All cells regardless of their origin spared the white matter and improved functional outcome. NPs robustly survived in the lesion cavity and expressed neurotrophins; 4 months post-implantation some of the cells matured into Islet2+ and Chat+ cells. All transplanted cells reduced inflammatory cytokines, such as MIP1 α and TNF α . Another therapeutic goal is treating SCI by a combination of stem cells with bridging biomaterials. Hydrogels seeded with MSCs or NPs were implanted into SCI, and cell survival and tissue reconstruction were evaluated. The hydrogels adhered well to the surrounding tissue and completely filled the post-traumatic cavity. Cells survived in the hydrogel, and neurofilaments, blood vessels and Schwann cells infiltrated the implant. Combined therapy also prevented tissue atrophy and reduced scar formation. Our results demonstrate that the transplantation of neurogenic as well as non-neurogenic stem cells into SCI improves functional outcome by providing trophic support to the spared axons in the injured tissue. Neurogenic stem cells have the ability to interact with the host tissue and differentiate into a more mature phenotype, such as motor neurons. Treatment of chronic spinal cord injury will require a combination of cell therapy and lesion bridging.

Biography

Pavla Jendelova is the Head of the Laboratory of Tissue Culture and Stem Cells in the Institute of Experimental Medicine ASCR in Prague, Czech Republic. Her scientific interests are cell and combined therapies for spinal cord injury treatment, the development of new bio-modified scaffolds based on polymeric hydrogels as carriers for cell therapy and the development of nanoparticles for cell imaging. She is the author or co-author of 65 original publications in impacted journals and the holder of three biotechnology patents. Her publications have been cited more than 1600 times, and her h-index is 23.

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