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Genetically modified human umbilical cord blood mononuclear cells as potential stimulators of neuroregeneration in degenerative disorders of central nervous system

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Abstract

Gene-cell therapy is a new step for the treatment of different human disorders including central nervous system degenerative diseases. In this review we focused on the last challenges in the field of human umbilical cord blood mononuclear cells transplantation - An attempt to support neuronal cells survival and to stimulate the neuroregeneration. As a potential therapy for the treatment of neurodegenerative diseases we reviewed the latest advances in gene modification of human umbilical cord blood mononuclear cells as a novel tool for the effective delivery of neuroprotective factors and growth factors in the injured or degenerative areas of the central nervous system under pathological conditions. The main topic of this review is the potential therapy of the amyotrophic lateral sclerosis - The progressive neurodegenerative disorder affecting primarily upper and lower motoneurons - by using genetically modified human umbilical cord blood mononuclear cells. The results from the up-to-date experiments indicated the opportunity to obtain differentiated macrophages, endothelial cells, or astrocytes from the genetically modified human umbilical cord blood mononuclear cells after their transplantation in the mouse model of the amyotrophic lateral sclerosis. Taken together, these data build the high-capacity platform for the supporting of degenerating neurons, structural and functional recovery of the brain and spinal cord after trauma, ischemia and other neurodegenerative disorders. © Human stem cells institute, 2013.

Keywords

Amyotrophic lateral sclerosis, Gene-cell therapy, Mononuclear cells, Umbilical cord blood