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Human umbilical cord blood mononuclear cells transfected with dual cassette plasmids (VEGF + neurotrophic factor) for the treatment of amyotrophic lateral sclerosis

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Abstract

To increase the viability of neural cells in neurodegenerative diseases, after neurotraumas and ischemic strokes the most important neurotrophic and neuroprotective factors, which can be used as therapeutic agents were identified in long-term studies in vitro and in vivo. These include brain-derived neurotrophic factor (BDNF), glial-derived neurotrophic factor (GDNF), insulin-like growth factor (IGF) and vascular endothelial growth factor (VEGF). One of the promising ways of the delivery of supporting neuron survival factors is considered to be transplantation of genetically modified cells overexpressing recombinant therapeutic genes. This article describes generation of cellular delivery vectors of therapeutic genes - human umbilical cord blood mononuclear cells genetically modified by dual cassette plasmids, expressing two therapeutic genes. Efficiency of transgene expression was confirmed in vitro using RT-PCR. Analysis of survival, migration, and phenotype of genetically modified cells was performed 2 weeks after transplantation into transgenic mice with amyotrophic lateral sclerosis phenotype.

Keywords

Amyotrophic lateral sclerosis, Basic fibroblast growth factor, Gene-cell therapy, Glial cell-derived neurotrophic factor, Human umbilical cord blood mononuclear cells, Neural adhesion molecule L1, Vascular endothelial growth factor