BEST FUTURE STRATEGIES FOR NEUROREHABILITATION - STEM CELL THERAPY

Eva Feldman
Russell N. DeJong Professor of Neurology, University of Michigan, USA

Neurodegenerative diseases are increasing at an alarming rate as the worldwide population ages. There are few effective treatments for these disorders that include Alzheimer's disease (AD), Parkinson's and Huntington's disease, and amyotrophic lateral sclerosis (ALS). Cellular therapies offer a unique opportunity to delay or even improve the clinical course of these disorders. Treatment objectives typically center on cellular replacement or providing environmental enrichment. The two most common approaches involve the transplantation of fetal tissue grafts or of stem cells, the focus of today's debate. Stem cells have the capacity to proliferate and differentiate into multiple cellular lineages. There are different classifications of stem cells that reflect the range of possible cell types they can produce, and include embryonic stem (ES) cells, progenitor cells, mesenchymal stem cells (MSCs), and induced pluripotent stem (iPS) cells. Stem cells may provide cellular replacement, or more commonly provide environmental enrichment to support host neurons by producing neurotrophic factors, scavenging toxic factors or creating auxiliary neural networks around affected areas and improving neural circuitry. Many strategies for environmental enrichment utilize stem cells to provide *de novo* synthesis and delivery of neuroprotective growth factors at the site of disease. Neural progenitor stem cells are currently being transplanted into the spinal cords of patients with ALS and multiple transplants alter the normal relentless progression of the disease. While more research is required, including highly controlled clinical trials, recent success with cellular therapy in ALS provides the beginning of a new therapeutic era in neurodegenerative disorders.