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Treatment of traumatic brain injury with cell therapy

Traumatic brain injury continues to be an important cause of human morbidity. As many as 50,000 Americans are killed and an equal number disabled by traumatic brain injury each year. Current treatment consists of evacuating mass lesions and providing an optimal milieu in the intensive care setting for the injured brain to recover. The therapeutic interventions currently available cannot repair the biostructural neural damage. We are actively researching ways to ameliorate brain function following traumatic brain injury using cell therapy. We are transplanting bone marrow stromal cells (MSCs) after traumatic brain injury in rats. MSCs are pluripotent cells which can induce tissue repair after injury in many organ systems. We have used intravenous route of administration as well as direct intracerebral transplantation in rats after traumatic brain injury. We have also impregnated MSCs into collagen scaffolds and then transplanted scaffolds into injury sites. This way, we have combined cell therapy with tissue engineering. Our results have shown that treatment with MSCs after traumatic brain injury induces neuro-restoration, as well as neuro-protection. MSC treatment improves survival of intrinsic neurons, especially in the hippocampus. It also induces proliferation of neurons in the subventricular zone, as well as at the injury site. MSCs produce neurotrophic factors themselves as well as induce intrinsic brain cells to produce them. The induction of these neurotrophic factors is one of the major mechanisms by which MSCs promote neural recovery. We have also shown that transplantation of MSCs promote the regeneration of corticospinal tracts in the brain, as well as in the spinal cord. By using this cell therapy, we hope to improve the outcome of traumatic brain injury. Success in this therapy can be subsequently applied to all forms of neurological disorders.

Biography

Asim Mahmood, MD is clinical professor of Neurological Surgery at Wayne State University, Detroit, Michigan. He is senior staff neurosurgeon at Henry Ford Hospital. He is the Director of Neurotrauma Research Laboratories at Henry Ford Hospital and has conducted research on cell therapy, as well as pharmaco-therapy after traumatic brain injury. He has published more than 50 papers on this subject and his research has been funded six times by the National Institute of Health

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