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Stem cells and hyperbaric oxygen therapy for TBI management

Over the past 30 years there has been a significant reduction in mortality following severe TBI together with improved outcome. This has been largely due to the use of evidence-based protocols emphasizing the correction of parameters implicated in secondary brain injury. The main parameters are cerebral blood flow, cerebral oxygenation and management of co-morbidities. Neuro-inflammation is a well-established secondary injury mechanism following TBI. Inspired by success in Parkinson's and other neurodegenerative diseases, stem cell based therapy is believed to provide bio-bridges, can stabilize blood-brain barrier, reduce the oxidative stress and provide immunomodulation and neuroprotection. Hyperbaric oxygen may alleviate secondary insult in TBI through the modulation of the inflammatory response. Animal studies showed that hyperbaric oxygen improves neuroplasticity reduce the inflammatory markers and neuronal apoptosis following TBI. Modulating endogenous stem cells or cell transplantation (using exogenous stem cells) from fetal/embryonic, bone marrow stromal cells, umbilical cord cells or induced Pluripotent Stem Cells (iPSCs). There is plenty of literature showing good response of stem cell therapy, mesenchymal stem cells in particular, on the outcome in rat TBI models. The animal models indicate some vulnerability of the stem cells to the hostile environment of neuroinflammation, which may limit their potential. The results although very encouraging, are still in the laboratory/preclinical phase and lots of technical, ethical and logistic issues have to be solved before shifting to clinical trials. Hyperbaric oxygenation can provide less hostile microenvironment helping with repair and provide better use of stem cell induced growth factors.

Biography

Hazem Ahmed Mostafa, MD., PhD, is an internationally recognized neurosurgeon with over two decades of clinical and research experience. He has devoted his career to developing and providing rigorous, comprehensive and compassionate care to those with cancer, neurological degenerative diseases and pediatric disorders. He is affectionately known as Dr Brain and Spine. Dr. Hazem Ahmed Mostafa MD., Ph. D, is a professor in the Department of Neurosurgery at Ain Shams University Cairo, Egypt since 2014, where he joined the faculty as an Assistant Lecturer of Neurosurgery in 1997. He is a Consultant of Neurosurgery at his own private clinics Neuro Clinic Cairo and Hurghada- Red Sea, Egypt since 2001.

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