
Effects of Human ES-Derived Neural Stem Cell Transplantation and Kindling in a Rat Model of Traumatic Brain Injury.

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Public Summary:

Traumatic Brain Injury (TBI) is one of the leading causes of death and disability in the population worldwide, with a broad spectrum of symptoms and disabilities. Post-traumatic hyperexcitability is one of the most common neurological disorders that affect people after a head injury. A reliable animal model of post-traumatic hyperexcitability induced by TBI which allows one to test effective treatment strategies has yet to be developed. To address these issues, in the present study, we tested human ES-derived neural stem cell transplantation in an animal model of post-traumatic hyperexcitability in which the brain injury was produced in one hemisphere of immunodeficient athymic nude (ATN) rats by controlled cortical impact (CCI) and spontaneous seizures were produced by repeated electrical stimulation (kindling) in the contralateral hemisphere. At 14 weeks post-transplantation, we report human neural stem cell (hNSC) survival and differentiation into all three neural lineages in both sham and injured animals. We observed twice as many surviving hNSCs in the injured vs sham brain, and worse survival on the kindled side in both groups, indicating that kindling/seizures are detrimental to survival or proliferation of hNSCs. We also replicated our previous finding that hNSCs can ameliorate deficits on the novel place recognition task (Haus 2016), but such improvements are abolished following kindling. We found no significant differences pre or post kindling on the elevated plus maze. No significant correlations between hNSCs survival and cognitive performance on either task were observed. Together these findings suggest that Shef-6 derived hNSCs may be beneficial as a therapy for TBI, but not in animals or patients with post-traumatic hyper-excitability.

Scientific Abstract:

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