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Funding Source: National Institutes of Health

Stem cells transplanted into the brain are immunogenic and are actively rejected by the host

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Stem cell-based therapies have shown great promise in the treatment of neurodegenerative diseases such as Batten's Disease and Parkinson's Disease. Intracranial stem cell transplantation has the potential to restore function and compensate for neural cells lost due to injury or disease. However, rejection of donor cells by the host immune system may limit the effectiveness of stem cell therapies. Recent research has suggested that some stem cells may be immunoprivileged, able to avoid rejection by the host's immune system in both allogeneic and xenogeneic settings. This can occur regardless of an MHC mismatch. However, several aspects of these studies complicate interpretations of their results. Transplant recipients are often irradiated before the transplant (Drukker et al. 2006) or otherwise immunocompromised and studies often culminate in a time period insufficient for immune rejection to have occurred (under a week) (Li et al. 2004). To evaluate whether stem cells are immunoprivileged when transplanted into the brain, GFP-expressing neural stem cells (NSCs) were transplanted into the brains of immunocompetent, immunologically mismatched mice. Mice were then sacrificed at time points of one, three, five, seven and nine days posttransplantation. The brains were fixed, freeze-embedded with OCT and sectioned. Graft survival was evaluated by observing the amount of GFP-expressing donor cells in the sections. Sections were also immunolabeled for cells expressing CD4, CD8 and CD11b, all of which are markers for infiltrating immune cells. Presence of such cells indicates immune detection and rejection and can be used to quantify the immune response to foreign stem cells. In future studies, the use of Regulatory T Cells may help to alleviate this rejection by suppressing the activity of CD8 (cytotoxic) and CD4 (helper) T Cells.