Transplanted Human Stem Cell-Derived Interneuron Precursors Mitigate Mouse Bladder Dysfunction and Central Neuropathic Pain after Spinal Cord Injury.

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Public Summary:
Fandel et al. show that transplanted human ESC-derived interneuron precursors integrate into injured mouse spinal cord, differentiate into human GABAergic neurons, and relieve injury related symptoms, such as neurogenic bladder dysfunction and central neuropathic pain.

Scientific Abstract:
Neuropathic pain and bladder dysfunction represent significant quality-of-life issues for many spinal cord injury patients. Loss of GABAergic tone in the injured spinal cord may contribute to the emergence of these symptoms. Previous studies have shown that transplantation of rodent inhibitory interneuron precursors from the medial ganglionic eminence (MGE) enhances GABAergic signaling in the brain and spinal cord. Here we look at whether transplanted MGE-like cells derived from human embryonic stem cells (hESC-MGEs) can mitigate the pathological effects of spinal cord injury. We find that 6 months after transplantation into injured mouse spinal cords, hESC-MGEs differentiate into GABAergic neuron subtypes and receive synaptic inputs, suggesting functional integration into host spinal cord. Moreover, the transplanted animals show improved bladder function and mitigation of pain-related symptoms. Our results therefore suggest that this approach may be a valuable strategy for ameliorating the adverse effects of spinal cord injury.