Interneurons from embryonic development to cell-based therapy.

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Public Summary:
Many neurologic and psychiatric disorders are caused by imbalances between the connections in the brain. A type of neuron, the interneuron, is heavily involved in creating the neural network of the brain. When these interneurons are transplanted from one animal to another they disperse and integrate into the host brain's circuits. This movement and integration ability of interneurons makes them a amazingly subject for potential cell-based therapies to treat psychiatric and neurological disorders. Transplantation of new interneurons into a host brain could potentially repair or ameliorate damaged brains.

Scientific Abstract:
Many neurologic and psychiatric disorders are marked by imbalances between neural excitation and inhibition. In the cerebral cortex, inhibition is mediated largely by GABAergic (gamma-aminobutyric acid-secreting) interneurons, a cell type that originates in the embryonic ventral telencephalon and populates the cortex through long-distance tangential migration. Remarkably, when transplanted from embryos or in vitro culture preparations, immature interneurons disperse and integrate into host brain circuits, both in the cerebral cortex and in other regions of the central nervous system. These features make interneuron transplantation a powerful tool for the study of neurodevelopmental processes such as cell specification, cell death, and cortical plasticity. Moreover, interneuron transplantation provides a novel strategy for modifying neural circuits in rodent models of epilepsy, Parkinson's disease, mood disorders, and chronic pain.