# Plasticity and therapeutic potential of human fetal tissue

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Rebuilding of brain structures and nervous circuitries with grafting of fetal tissue is currently being explored as a strategy to repair the damaged nervous system (Handb Clin Neurol 2009).

Experimental studies demonstrated that transplanted neuroblasts can survive and proliferate in the host. Migration of primary or expanded neural precursors following transplantation has also been well documented. Cell migration plays a pivotal role in the organogenesis and contributes to multiple processes in adulthood, such as tissue repair and immune response. Migrating neuroblasts are capable of anatomically re-establishing damaged neural circuitries in the adult animal brain. These results suggest that there might also be a real potential for neurotransplantation in humans in order to promote reconstruction after brain injury. The challenge of such an approach is that the primordium recapitulates its ontogenesis in the host, being deprived of the fetal brain environmental cues, while it is subject to extrinsic cues coming from the diseased adult brain. In animals, recapitulation of normal development was achieved "simply" by implanting fetal neurons.

Striatal fetal grafting as a strategy of cell replacement has been extensively investigated in Huntington's disease (HD) animal models. There is evidence that primary grafts of human fetal striatal tissue contain proliferative cells capable of migrating, differentiating and establishing robust graft-host interconnectivity, significantly recovering lesion-induced damage, without graft overgrowth or neoplastic proliferation (Lancet Neurol 2006).

Based on these studies and the fact that current therapies do not prevent the unrelenting clinical course of HD, a clinical trial of human fetal striatal tissue transplantation for the treatment of HD has been initiated at the University of Florence. Fifteen HD patients underwent bilateral transplantation. The current report provides the first "*in vivo*" evidence that unmanipulated grafted neural precursors from human striatal anlagen developed within the diseased striatum of HD patients and moved into the adult brain, reaching short- and long-distance appropriate anatomical targets. The anlagen development resulted in the building of metabolically active new nervous structures displaying striatal-like imaging features (Exp Neurol 2008, 2010). These events were accompanied by beneficial effects on the disease clinical course without negative outcomes, such as grafted tissue overgrowth or cyst formation.

Key words
Neurotransplantation, Fetal tissue, Restoration