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Direct isolation of human central nervous system stem cells.

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Stem cells, which are clonogenic cells with self-renewal and multilineage differentiation properties, have the potential to replace or repair damaged tissue. We have directly isolated clonogenic human central nervous system stem cells (hCNS-SC) from fresh human fetal brain tissue, using antibodies to cell surface markers and fluorescence-activated cell sorting. These hCNS-SC are phenotypically 5F3 (CD133)(+), 5E12(+), CD34(-), CD45(-), and CD24(-/lo). Single CD133(+) CD34(-) CD45(-) sorted cells initiated neurosphere cultures, and the progeny of clonogenic cells could differentiate into both neurons and glial cells. Single cells from neurosphere cultures initiated from CD133(+) CD34(-) CD45(-) cells were again replated as single cells and were able to reestablish neurosphere cultures, demonstrating the self-renewal potential of this highly enriched population. Upon transplantation into brains of immunodeficient neonatal mice, the sorted/expanded hCNS-SC showed potent engraftment, proliferation, migration, and neural differentiation.

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