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Multipotent Stem/Progenitor Cells with Similar Properties Arise from Two Neurogenic Regions of Adult Human Brain*1

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Abstract

Recent*in vitro* studies have shown that the periventricular subependymal zone (SEZ) of the rodent brain is capable of*de novo* generation of neurons and glia. There is less information available on neurogenesis in the adult human brain, and no study has shown the clonal generation of neurons and glia from*in vitro*-generated "neurospheres." Here we describe the isolation of proliferative stem/progenitor cells within neurospheres from two different regions, the SEZ and the hippocampus, from surgical biopsy specimens of adult (24–57 years) human brain. Using light and electron microscopy; immunocytochemistry for a variety of neuronal, glial, and developmental (including extracellular matrix; ECM) markers; and the reverse transcriptase polymerase chain reaction to demonstrate different gene transcripts found in neurospheres, it is shown that the adult human brain harbors a complex population of stem/progenitor cells that can generate neuronal and glial progeny under particular*in vitro* growth conditions. These methods also show that these neurospheres contain both neurons and glia and demonstrate regional similarities at the mRNA level, indicating common stem/progenitor cell types within two different neurogenic regions of the adult human brain. In addition to the synthesis of developmentally regulated molecules such as the ECM protein tenascin-C, a variety of other genes (e.g.,*Pax 6*) and proteins (e.g., Bcl-2) involved in cell survival and differentiation are expressed by adult human brain neurospheres.

Author Keywords: adult human brain; multipotent stem and progenitor cells; neurospheres; neurons and glia; extracellular matrix; developmental genes.

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