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Isolation and growth of neural stem cells derived from adult human hippocampus

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Abstract:

Background: The hippocampus is known to be required in the processing of spatial and contextual memories. A specific role in this context appears to be played by the new neurons continuously generated during adulthood from progenitor cells in the subgranular zone of the dentate gyrus. Ablation of neurogenesis by toxins, x-ray irradiation or virus-activated pro-drugs causes severe cognitive deficits in mice models.

Methods: Histologic specimens from adult human hippocampus, dissected during the amygdalohippocampectomy process for mesial temporal sclerosis, were obtained and cultured in suitable media. Neural stem cells were characterized using an appropriate in-vitro molecular biomarker profiling.

Results: A total of six adult human hippocampal tissues were evaluated of which, two specimens retrieved well-characterized neural stem cells.

Conclusions: The adult mammalian hippocampus contains neural precursor cell populations, which give rise to new neurons by passing a sequence of different amplifying lineage-determined progenitor cells. While some of the newborn neurons are integrated into the functional circuitry, most of them have only a transient existence. These cells provide the substrate for neuronal plasticity at the cellular level eventually playing a role in learning and memory.

Keywords:

Neural stem cell, Cell culture, Hippocampus, Neural stem cells

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