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Editorial

Hippocampal Neurogenesis: Current Understanding and Controversies

Yasith Mathangasinghe*

Lecturer, Department of Anatomy, Faculty of Medicine, University of Colombo, Colombo, Sri Lanka

***Corresponding Author**: Yasith Mathangasinghe, Lecturer, Department of Anatomy, Faculty of Medicine, University of Colombo, Colombo, Sri Lanka.

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Since the time of discovery of the neuron by Cajal in the late 19th century, it was believed that the neurons were unable to regenerate in the adult brains. This concept was challenged in 1962 when Altman and colleagues [1] detected neuroblasts in radiographs of several areas of brain of thymidine-H^3 infused rats. This was the first evidence of neuronal proliferation of adult brains.

Subsequent animal studies confirmed that the subgranular zone of the dentate gyrus in hippocampus can generate new neurons even in the adults. In 1998 Eriksson [2] detected newly formed neurons in the dentate gyrus of the hippocampus in postmortem brain specimens of cancer patients who were infused with thymidine analog, bromodeoxyuridine (BrdU), which labeled DNA during the synthesis phase of the cell cycle. He further concluded that human brain retained the capacity to regenerate throughout life. With his discovery of neurogenesis in adult human hippocampus, researchers attempted to investigate the possibility of generation of new neurons from the progenitors to treat neurodegenerative conditions such as dementia, seizure disorders and strokes. Most of these preliminary trials did not progress beyond animal studies raising the possibility that human hippocampal neurogenesis may be strikingly different from that of the rodent and non-human primate models.

Two recent landmark studies conducted by Sorreals and Boldrini [3] concluded conflicting results regarding human hippocampal neurogenesis. Boldrini [4] found persistent neurogenesis in human hippocampus even in the eighth decade despite rapidly declining stem cell population. Furthermore, he stated that the volume of the dentate gyrus remained same despite aging, probably due to persistent neurogenesis. In contrast to Boldrini's findings, Sorreals found that the proliferating population of neuroblasts of the hippocampus declined rapidly within the first year of postnatal life. Immature neurons were not found in the adult hippocampus in his study. These conflicting results reflect that we have not been successful yet in answering many fundamental questions regarding neurogenesis of the human hippocampus.

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