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Evidences of novel neurogenic niche in the ventricular region of the rat brain

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The subgranular zone in the hippocampus and walls of the lateral ventricles are the established adult neurogenic niches in rat. Investigations on the occurrence of other adult neurogenic niches are being carried out in several laboratories. Recent studies from our laboratory showed that ependymal surface of the cerebral ventricles could be another neurogenic niche in the adult rat brain. Ependymal lining of cerebral ventricles lies at the interface between the ventricular cavities and the brain parenchyma. At several locations, at the ventricular surface, single and cluster of supraependymal structures consisting of neurons, axons and glial cells were observed. These supraependymal structures are immersed in the cerebrospinal fluid and enjoy a unique environment which is different from other regions of the mammalian brain. Transmission and scanning electron microscopic studies showed an extensive growth of the axons on the ventricular surface following axotomy of the supraependymal fibers. Interestigly, scanning electron microscopic studies showed a profound increase in the number of supraependymal neurons on the surface of the third ventricle following unilateral cervical sympathectomy. This increase was much larger at fifteen days following unilateral cervical sympathectomy as compared to that observed after seven days after unilateral cervical sympathectomy. From these studies, it can be concluded that supraependymal elements of the ventricular floor may represent a novel niche of neural stem cells in the adult mammalian brain that proliferate and differentiate in response to changes in sympathetic activity.

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