

Vertebrate Neural Stem Cells: Development, Plasticity, and Regeneration

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Abstrak

Natural recovery from disease and damage in the adult mammalian central nervous system (CNS) is limited compared with that in lower vertebrate species, including fish and salamanders. Species-specific differences in the plasticity of the CNS reflect these differences in regenerative capacity. Despite numerous extensive studies in the field of CNS regeneration, our understanding of the molecular mechanisms determining the regenerative capacity of the CNS is still relatively poor. The discovery of adult neural stem cells (aNSCs) in mammals, including humans, in the early 1990s has opened up new possibilities for the treatment of CNS disorders via self-regeneration through the mobilization of these cells. However, we now know that aNSCs in mammals are not plastic enough to induce significant regeneration. In contrast, aNSCs in some regenerative species have been found to be as highly plastic as early embryonic neural stem cells (NSCs). We must expand our knowledge of NSCs and of regenerative processes in lower vertebrates in an effort to develop effective regenerative treatments for damaged CNS in humans.