

FULL SPEAKER BIOGRAPHY and ABSTRACT

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Dr. Alvarez-Buylla has an international reputation for his work in developmental neuroscience and stem-cell neurobiology research. His principal research interests are in neurogenesis of the adult mammalian brain, the assembly of the brain, brain tumors and repair, and the ontogeny and phylogeny of behavior.

His expertise encompasses the fields of developmental biology, developmental neuroscience, neurobiology, molecular and cellular neurobiology, and learning and plasticity. An innovator and inventor as well as a scientist, Dr. Alvarez-Buylla has designed a device for mounting tissue sections on histological slides, a digital stereotaxic apparatus for mice and song birds, a computer-based mapping system for tissue sections, and a fluorescent staining technique.

Adult Neural Stem Cells Specification

Neural stem cells persist throughout life in the subventricular zone (SVZ), an extensive germinal region in the walls of the lateral ventricles of the mammalian brain. We have previously traced the origin of adult neural stem cells to epithelial (radial glia) cells that function as primary progenitors in the developing brain. Recent work in the laboratory has shown that adult neural stem cells retain an epithelial apical-basal organization and shared the ventricular wall with postmitotic ependymal cells in striking pinwheel architecture. Cells isolated from different locations of the SVZ appear to be multipotent in vitro, as they can generate both neurons and glial cells. However, new neurons in vivo originate from multiple locations within the SVZ and migrate to the olfactory bulb where they form different types of neurons. Recent work indicates that specific types of olfactory bulb interneurons are only normally generated within sub-domains of the SVZ. This has raised the question of the mechanism of regional specification in the adult SVZ. I will discuss recent findings indicating that hedgehog signaling regulates proliferation and specification of neural stem cells in different sub-domains of the SVZ. The new observations suggest that adult brain sonic hedgehog secreting neurons in part controls specification and proliferation of adult neural stem cells.

What is the central hypothesis of your presentation?

Shh signaling regulates the specification of ventral SVZ neural stem cell regional identity.

What is the most important observation you will discuss?

Respecification of dorsal SVZ neural stem cells and identification of group of neurons that contact the SVZ and produce Shh.

What is the translational significance?

Adult neural stem cells are not irreversibly specified; the types of neurons they produced may be altered by activation of specific signaling pathways.