

Physiological Characteristics of Nestin-Positive Progenitor Cells in Adult Mouse Hippocampus

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1 Introduction

We have previously shown that nestin-positive precursor cells in the adult subgranular zone (SGZ) of hippocampal dentate gyrus express either passive membrane currents typical for astrocytes, or voltage gated K⁺ channels typical for glial precursor cells or a subtype of astrocytes, or currents typical for neurons (Filipov et al., 2003). We now correlated the physiological profile their morphological features, namely cells with radial morphology and cells that lack processes. The majority of radial precursor cells expressed passive currents (95%), the remainder had voltage gated K⁺ channels. Cells with neuronal properties were only in the population lacking processes (10%), while the other physiologically defined cell types were also present. To test for electrical coupling, we dialyzed the cells with Alexa Fluor 594, a gap junction-permeable fluorescent dye. While radial cells were rarely coupled: 4 out of 24 filled cells were coupled with two to 20 cells. In contrast, more than half (59%) of the cells lacking processes were coupled with one to 24 cells. Almost all the coupled cells expressed passive membrane properties (20 out of 22). We tested also for the cells to respond to kainate or aspartate, since in CA1, two types of astrocytes have been reported, responding either to kainate or aspartate. More than half of the precursor cells responded to both substances indicating that they expressed kainate/AMPA receptors and glutamate transporters. In few cases (3 out of 140) we observed synaptic input while stimulating the perforant path.

2 References

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