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The cellular prion protein promotes olfactory sensory neuron survival and axon targeting during adult neurogenesis

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Abstract

The cellular prion protein (PrP^C) has been associated with diverse biological processes including cell signaling, neurogenesis, and neuroprotection, but its physiological function(s) remain ambiguous. Here we determine the role of PrP^C in adult neurogenesis using the olfactory system model in transgenic mice. Olfactory sensory neurons (OSNs) within the olfactory sensory epithelium (OSE) undergo neurogenesis, integration, and turnover even into adulthood.

The neurogenic processes of proliferation, differentiation/maturation, and axon targeting were evaluated in wild type, PrP-overexpressing, and PrP-null transgenic mice. Our results indicate that PrP^C plays a role in maintaining mature OSNs within the epithelium: overexpression of PrP^C resulted in greater survival of mitotically active cells within the OSE, whereas absence of prion protein resulted in fewer cells being maintained over time. These results are supported by both quantitative PCR analysis of gene expression and protein analysis characteristic of OSN differentiation. Finally, evaluation of axon migration determined that OSN axon targeting in the olfactory bulb is PrP^C dose-dependent. Together, these findings

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