Featured Publication Note
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Oligodendrocyte precursors generate myelinating oligodendrocytes and piriform projection neurons in adult mice

Oligodendrocytes are a variety of neuroglia whose principle function is to produce the myelin sheath which insulates axons. They differentiate from oligodendrocyte precursors (OLPs) and in rodents they are mostly generated during the first few postnatal weeks. OLPs express a characteristic set of markers which allow their development to be followed *in situ*, including platelet-derived growth factor α receptor (PDGFRA) and the NG2 proteoglycan.

A population of glial cells which has characteristics of OLPs persists into adulthood; however it is not known whether these adult OLPs (also called NG2 glia) generate myelinating oligodendrocytes or other differentiated cells.

In this study, the *in vivo* behavior and fates of adult OLPs was investigated using confocal imaging of a *Pdgfra-creER^{T2}/Rosa26-YFP* double transgenic mouse. This transgenic mouse line allowed researchers to induce expression of YFP *de novo* in adult OLPs, and thus identify their differentiated progeny.

Confocal images were acquired with an Ultra*VIEW*® microscope. Confocal *z* stacks were captured for each section, at 0.5 - 1 µm increments, and Volocity® software was used to reconstruct *xz* and *yz* views.

The results showed that adult OLPs generated mature, myelinating oligodendrocytes during adulthood; more than 20% of all oligodendrocytes in the adult mouse corpus callosum (the longitudinal fissure connecting the left and right cerebral hemispheres) were generated after 7 weeks of age. They also found that adult OLPs produced some myelinating cells in the cerebral cortex, although the majority of adult-born cortical cells did not appear to myelinate. Unexpectedly, the study also found evidence that OLPs can generate some projection neurons in the adult piriform cortex (Figure).

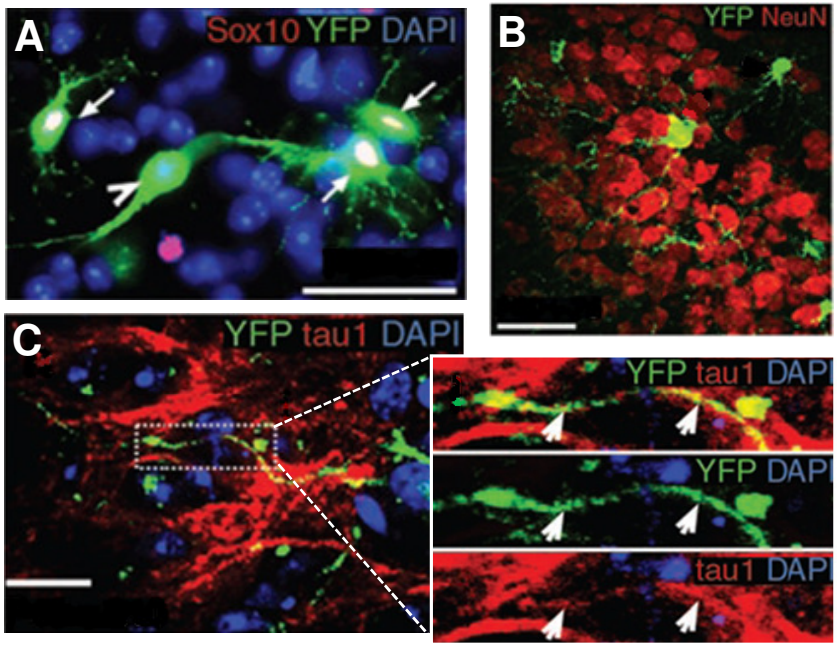

Figure: Adult OLPs generate piriform cortex neurons *in vivo*

Sections were immunolabeled for YFP and either oligodendrocyte (SOX10) or neuronal (NeuN) lineage markers. **A**: Starting around a month after induction of YFP, small numbers of YFP-labeled cells that did not co-label for SOX10 were observed in the piriform cortex and other parts of the ventral forebrain. The hypothalamus is depicted in panel A, all other panels show layers of the anterior piriform cortex. In panel A, YFP$^+$SOX10$^-$ cells are indicated by the arrowhead and YFP$^+$SOX10$^+$ cells are indicated by arrows. **B**: The YFP$^+$SOX10$^-$ cells co-expressed the neuronal marker, NeuN (red) Many of the YFP$^+$NeuN$^+$ cells had the appearance of projection neurons, with large cell bodies and long axon-like processes. **C**: The long processes could be immunolabeled with antibody to TAU1, which labels axons. Scale bars represent 30 µm in panels A and B, and 40 µm in panel C. Cell nuclei were stained with DAPI (blue). *Images courtesy of Kaylene Young*.