Early postnatal proteolipid promoter-expressing progenitors produce multilineage cells in vivo.

Journal: J Neurosci

Publication Year: 2009

Authors: Fuzheng Guo, Joyce Ma, Erica McCauley, Peter Bannerman, David Pleasure

PubMed link: 19494148

Funding Grants: Stem Cell Research Training Grant

Public Summary:

Scientific Abstract:
Proteolipid promoter (plp promoter) activity in the newborn mouse CNS is restricted to NG2-expressing oligodendroglial progenitor cells and oligodendrocytes. There are two populations of NG2 progenitors based on their plp promoter expression. Whereas the general population of NG2 progenitors has been shown to be multipotent in vitro and after transplantation, it is not known whether the subpopulation of plp promoter-expressing NG2 progenitors [i.e., plp promoter-expressing NG2 progenitors (PPEPs)] has the potential to generate multilineage cells during normal development in vivo. We addressed this issue by fate mapping Plp-Cre-ER(T2)/Rosa26-EYFP (PCE/R) double-transgenic mice, which carried an inducible Cre gene under the control of the plp promoter. Expression of the enhanced yellow fluorescent protein (EYFP) reporter gene in PPEPs was elicited by administering tamoxifen to postnatal day 7 PCE/R mice. We have demonstrated that early postnatal PPEPs, which had been thought to be restricted to the oligodendroglial lineage, also unexpectedly gave rise to a subset of immature, postmitotic, protoplasmic astrocytes in the gray matter of the spinal cord and ventral forebrain, but not in white matter. Furthermore, these PPEPs also gave rise to small numbers of immature, DCX (doublecortin)-negative neurons in the ventral forebrain, dorsal cerebral cortex, and hippocampus. EYFP-labeled representatives of each of these lineages survived to adulthood. These findings indicate that there are regional differences in the fates of neonatal PPEPs, which are multipotent in vivo, giving rise to oligodendrocytes, astrocytes, and neurons.