

Publication

A crucial role for neurotrophin-3 in oligodendrocyte development

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The neurotrophins nerve growth factor, brain-derived neurotrophic factor, neurotrophin-3 and neurotrophin-4/5 promote the survival of subpopulations of vertebrate neurons in vitro, but so far only nerve growth factor has been demonstrated to be essential for normal neuronal development; no neurotrophin has previously been shown to function in normal glial cell development. We found recently that neurotrophin-3 promotes the survival of pure oligodendrocyte precursor cells in vitro, and, although by itself it induces only a small percentage of these cells to synthesize DNA, in combination with platelet-derived growth factor it induces the majority of them to do so. Neither of these factors, however, has been shown to contribute to oligodendrocyte precursor cell proliferation in vivo or to stimulate pure populations of these cells to proliferate (as opposed to synthesize DNA) in vitro. Here we show that neurotrophin-3 and platelet-derived growth factor collaborate to promote clonal expansion of oligodendrocyte precursor cells in vitro and to drive the intrinsic clock that times oligodendrocyte development. We also show that neurotrophin-3 helps stimulate the proliferation of oligodendrocyte precursor cells in vivo and is thus required for normal oligodendrocyte development.

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