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Myelination in the pituitary adenylate cyclase activating polypeptide (PACAP) deficient mice

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The neuroprotective effect of pituitary adenylate cyclase activating polypeptide (PACAP) has been established in several studies. Receptors for PACAP are present in many cell types including oligodendrocyte progenitor cells (OLPs), and PACAP has been shown to stimulate proliferation, delay maturation of OLPs and consequently the initiation of myelination in vitro cerebellar slice cultures. In order to elucidate the role of PACAP in myelination in vivo, we examined myelination in PACAP-deficient and wild type (WT) mice using immunohistochemistry against a major myelin protein called myelin basic protein (MBP). We found no difference in the number of MBP-immunoreactive oligodendroglial cells (OLG) at postnatal day 3 (P3) between the two groups, but at P5 more OLGs were found in the WT than in PACAP-deficient mice. The first MBP-immunoreactive fibers were seen at P8 in the corpus callosum, cingulum, and fornix in the PACAP-deficient and WT mice, but the density of myelinated fibers was lower in WT. In older animals until P60, stronger myelination was observed in all cortical and subcortical regions of the brain in PACAP-deficient than in WT mice, indicating that PACAP has an inhibitory role on myelin formation. We conclude that PACAP delays myelination in mice in vivo. Further investigations are needed to shed light on the modulatory mechanism of PACAP on myelination.

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