

# Myelination



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What is the function of myelination?- To support fast and efficient signal transduction

- Provide metabolic support to neurons  
Discuss myelination throughout life  
Myelination is a dynamic process that continues throughout life, peaking in our mid 30s.

Loss of myelin correlates with ageing and cognitive decline

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What is the effect of social isolation on myelination? In specific areas of the CNS (inc. mPFC), social isolation causes a reduction in number of myelin sheaths per neuron, with a reduction in myelin sheath thickness. Though there is no reduction in OL number, they are have smaller and simpler processes. This correlates with impairment of learning and memory tasks in mice  
What evidence suggests that OLs are capable of dynamic myelination? In zebra fish, the first myelinated axon is the Mauthner axon. Even with the introduction of supernumerary M axons, all will be appropriately myelinated. this shows that oligodendrocytes are able to produce more myelin when required as there is no change in the number of oligodendrocytes

OLs which usually myelinated small caliber neurons are capable of myelinating large supernumerary M axons

Is there a restricted period when axons can regulate OL myelin production?

Yes. There is a critical period (4-6 hours in a zebrafish) when a OL can produce myelin. During the point, its production can be very dynamic, however after this critical period, the mature myelinating OL cannot produce more myelin. This suggests that OLs are regularly being replenished as myelination carries on throughout life. Myelination during the critical period

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is affected by ErbB1 KO, however KO after the critical period has no effect.

How neuronal activity alter myelin production during OL critical periods?

Synapse like junctions between the axon and the OL seem to signal neural activity, thus stimulating myelin production

Describe myelin sheath production round a single axon. The myelin is not 'wrapped' round the axon, rather is is formed from the inner layer, forcing the outer layers outwards.

During the critical period, excess layers can be produced but these can be degraded. Trafficking of materials to the inner tongue of the myelin sheath is facilitated by thin cytoplasmic channels which are only apparent during development.