Animal Model

# MAG -/- mice: a model for studying pathological mechanisms of acquired demyelinating diseases

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**Abstract**

**Challenge**

Genetically modified animals are essential research tools in modern neuroscience, since they allow researchers to study the role of specific genes in pathological processes leading to neurodegenerative diseases. The myelin-associated glycoprotein (MAG) is a transmembrane glycoprotein localized in the myelin sheath membranes of periaxonal Schwann cells and oligodendroglial cells. MAG functions both as a ligand for an axonal receptor needed for the maintenance of myelinated axons and as a receptor for an axonal signal promoting differentiation, maintenance and survival of oligodendrocytes. MAG has also been implicated to play a major role in acquired neurological disorders caused by autoimmune mechanisms (e.g. IgM paraproteinaemic neuropathies).
In situ-hybridization studies show that Mag mRNA is expressed by oligo-dendrocytes in the cerebellum.

**Technology**

MAG -/- mice were generated by inactivating the Mag gene via homologous recombination in embryonic stem cells and creating transgenic mice. MAG -/- display mild cognitive and locomotor impairment and subtle structural abnormalities in the periaxonal region of myelin sheaths. Furthermore, degeneration of periaxonal oligodendroglial processes has been observed in aging MAG -/- mice, suggesting a "dying-back" oligodendrogliopathy which is typically seen as a reaction to certain toxins (e.g. Cuprizone toxicity), but also in early-stage multiple sclerosis. MAG -/- mice are therefore a valuable tool for studying the pathological mechanisms of acquired demyelinating diseases.

**Commercial Opportunity**

Breeding pairs are available under a Tangible Property License Agreement.

**Further Reading**

- Montag et al.: Mice deficient for the myelin-associated glycoprotein show subtle abnormalities in myelin. Neuron, Vol. 13, 229-246, July, 1994.
- Quarles RH: Myelin-associated glycoprotein (MAG): past, present and beyond. J of Neurochemistry, 2007, 100, 1431 - 1448.

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