What controls myelin production in the brain?

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The loss of myelin in the brain and spinal cord is a characteristic of MS. Myelin is a protein layer or sheath that coats and protects cells in the brain and spinal cord, called neurons.

Without a myelin coating, neurons cannot efficiently transmit their signals, leading to the symptoms of MS. The loss of myelin also leaves the neurons vulnerable to attack and damage, and over time these unprotected neurons die, which can result in permanent loss of function and disability.

This is thought to contribute to progressive MS, for which there are limited treatment options.

The body does have some capabilities to repair myelin, and in relapsing remitting MS, it can be repaired and this can be why in some cases the symptoms can get better following a relapse or attack. But why, in some instances, does myelin not get replaced? Can we help our bodies repair our myelin? If we are going to develop therapeutic inventions to help our bodies repair the damage we need to understand how cells normally myelinate nerves in the first place.

This study was initially funded by an MS Research Australia incubator grant with funding support from CharityWorks for MS. It looked at how cells normally myelinate nerves. Professor Trevor Kilpatrick, Michele Binder, Rainer Akkermann, and their colleagues at the Florey Institute of Neuroscience and Mental Health in Melbourne, investigated the effect of a gene called Tyro3 on myelin formation.

The team found that the absence of this gene meant that myelin formation around neurons was slower, and the overall protective myelin layer was not as thick. Showing that this is an important gene in myelin formation and thus unlocking some of the steps in the myelin process. It was also important for the team to determine whether the changes in myelin formation were due to myelin producing cells, called oligodendrocytes, struggling to make myelin or whether they were dying.

They found there didn't appear to be too many changes in the number and stage of oligodendrocytes, suggesting that these cells aren't dying but are not producing myelin as they should. This is promising as it suggests treatments that could mimic Tyro3 could be used to encourage the existing cells in the brain to make more myelin, potentially reversing, slowing or preventing the debilitating effects of MS.

These promising results suggest that the gene Tyro3 could be a new target for future MS therapies. More research will be needed to identify whether there are changes in this gene in people with MS, which may explain why myelin formation is altered in MS, and whether it's function can be restored to improve myelin repair.