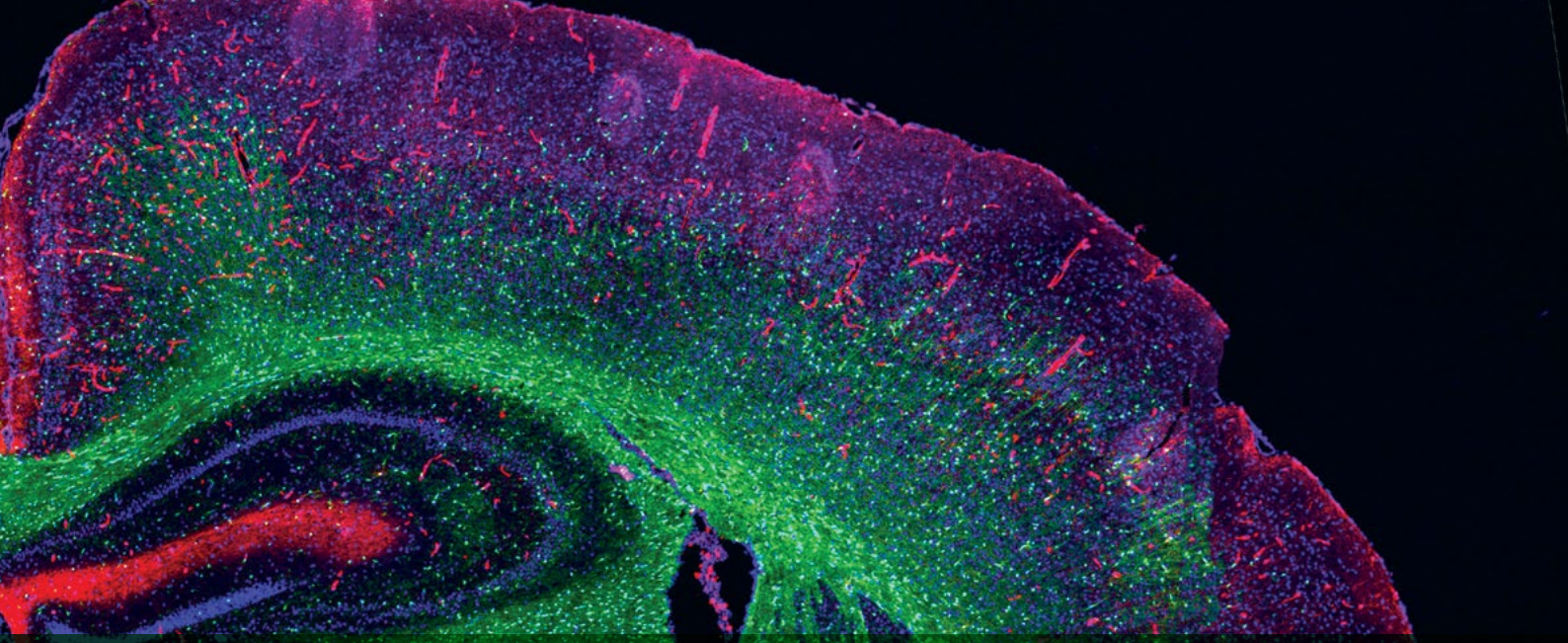

Using stem cells in the brain to combat MS

Multiple sclerosis (MS) is the most common neurological disease in young adults, and globally the number of cases is increasing, according to a recent report in *The Lancet*.

The finding throws the work of Dr Toby Merson and his colleagues at the Australian Regenerative Medicine Institute (ARMI) at Monash University into sharp focus. As a group leader in MS research, Toby is dedicated to finding a way to defeat this degenerative condition.

In MS, the body's immune system destroys myelin, the fatty sheath that protects nerve fibres in the spinal cord and brain, disrupting signalling.

The myelin itself is made by another type of cell, called an oligodendrocyte—and it is these that form the focus of Toby's work.

"We explore the regenerative capacity of stem cells that reside in the brain," he explains.

"One of the key discoveries that we've found is that the type of myelin that's regenerated by stem cells in the brain depends on the particular type of stem cell involved. We now know that certain types of them have a greater capacity to regenerate the myelin that is damaged by MS."

The way in which nervous system cells are produced by neural stem cells—a process called neurogenesis—has been a driving research interest for Toby ever since his undergraduate days studying biochemistry and molecular genetics at the University of Queensland. For his PhD he worked at Melbourne's Walter and Eliza Hall Institute before taking up a position as NHMRC/MS Research Australia Betty Cuthbert Fellow at the Florey Institute of Neuroscience and Mental Health.

In 2016 an Australian Research Council Future Fellowship allowed him to set up his own lab at ARMI.

A key strategy within the lab is the use of various types of microscopic imaging—a critical approach to understanding the mechanics of myelin production.

"Sometimes we stain tissues with fluorescent markers to follow stem cells in the brain, and sometimes we use very high-magnification electron microscopes to see fine details in cell structures," he explains.

"We also study cells at a molecular level, using techniques to identify the library of genes that are switched on as stem cells mature into myelin-forming oligodendrocytes".

Toby is plainly excited about his work, and that of his colleagues. He speaks of the importance of instilling the "spirit of discovery" into people who join his lab. "They must have the freedom to explore," he says.

But there is also a seriousness about the research—what he calls a "moral imperative"—which serves as a constant reminder that studying stems cells is much more than an academic abstraction.

"We're making a lot of discoveries in terms of stem cell biology," he says, "and we want to be able to apply that to help people living with MS."