New research identifies ‘genetic switches’ may play a role in secondary progressive MS

New research has just been published looking at the role of microRNAs or ‘genetic switches’ in secondary progressive MS. microRNAs are tiny pieces of genetic material found in cells which for a long time were not thought to have any biological function.

It turns out that microRNAs are able to turn particular genes on and off in different parts of the body. This genetic control system helps to dictate the cell’s behaviour, determines what type of cell they are, how they grow, and how they respond to the environment around them.

Researchers are increasingly becoming interested in the potential role of microRNAs in diseases such as MS. However, identifying these genetic switches and linking them to the genes they affect is not a trivial task. It requires enormously complex experiments with precious tissue samples donated by people with MS, and then a vast amount of computing power to sequence, analyse and interpret the results.

PhD scholar, Katherine Sanders and her colleagues at Bond University, Queensland and the Hunter Medical Research Institute in Newcastle, NSW, have done exactly that. They have compared the microRNA profiles in a specific type of immune cell in the blood of people with secondary progressive MS and compared this profile to people who do not have MS. These immune cells, known as CD4+ cells, are the ones thought to initiate an immune response leading to the loss of myelin and consequently the corresponding symptoms of MS.

Published in the journal *Clinical Epigenetics*, the team identified ten microRNAs which were present at lower levels in secondary progressive MS, five of which were confirmed using multiple laboratory methods. The researchers think these miRNAs are likely to have a combined effect on a few specific genes.

Using complex computer algorithms, the researchers looked into which genes the microRNAs should control and found that the majority are switches for an immune gene called SOCS6. They showed that in the blood of people with secondary progressive MS, the SOCS6 gene was not being totally switched off as expected. This is in line with other research that has shown that the SOCS6 gene is more active in areas of the brain affected by MS.

This research is important since it shows that while the CD4+ immune cells are thought to be a driving force behind the earlier stages of MS, where inflammation is key, these cells do not seem to be playing a large role in secondary progressive MS. Uncovering the processes at work in progressive stages of MS is vital to identify new ways to treat progressive forms of the disease.

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