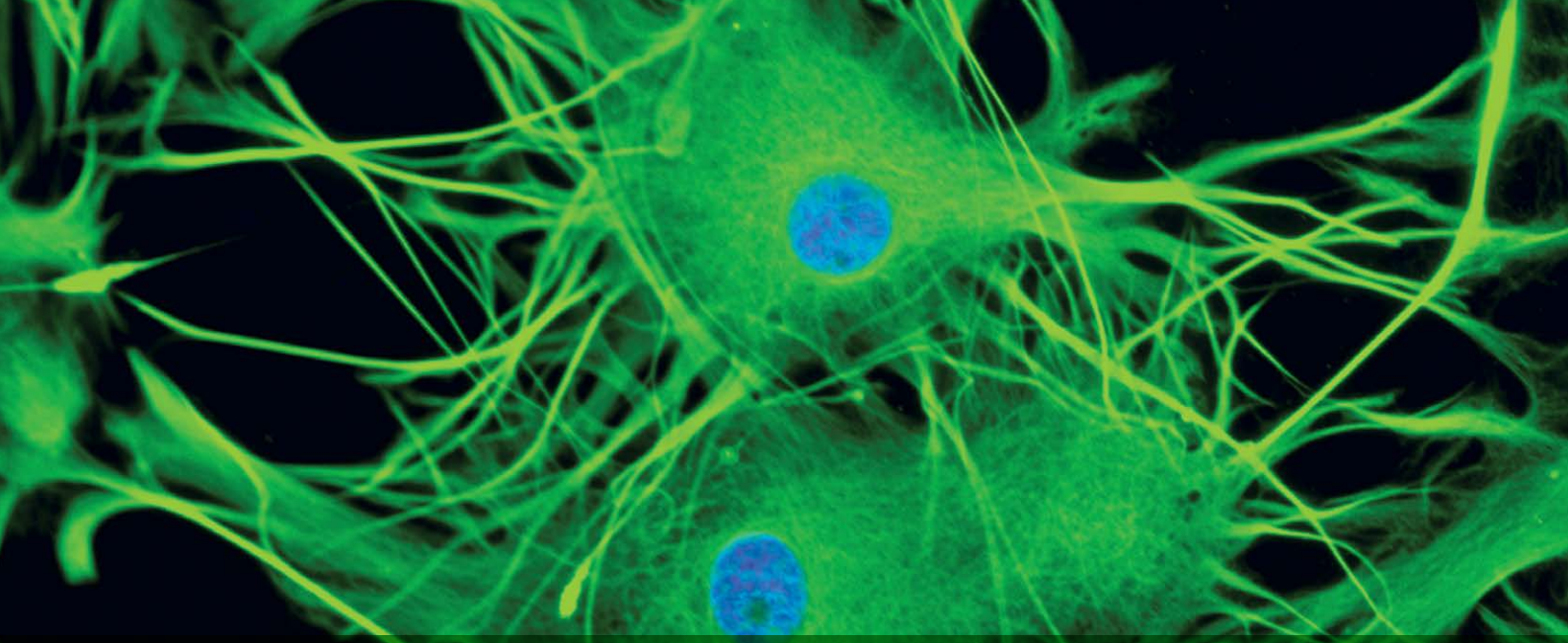

Building tools for brain repair

Professor James Bourne and his team are laying the groundwork for using stem cell transplants to treat brain trauma with the discovery of an anti-scarring agent and new biomaterials to support transplanted cells.

"What we're doing is a prelude to direct stem cell research. We hope to give potential stem cell therapies for brain trauma the best chance of success," James says.

He and his team at the Australian Regenerative Medicine Institute at Monash University are studying nonhuman primates to understand how to create the best environments for repair after brain injury.

"Simply adding stem cells into this environment might not do any good, because they are likely not to survive."

Brain injury—particularly stroke—is a serious health issue. Some estimates suggest that an Australian has a stroke every ten minutes, and many thousands of people are left with some form of disability afterwards.

Stem cells are currently under investigation as a tool to repair brain damage from strokes, trauma and other diseases. James is interested in what enables repair in the first place, to help ensure that cells transferred into a damaged brain can thrive.

"After an injury, and stroke in particular, the environment in the brain is really harsh. A stroke is caused when brain tissue doesn't get enough blood and damage begins immediately. Injured brain cells release toxins and then inflammation, swelling and longer-term scarring cause further damage. Simply adding stem cells into this environment might not do any good, because they are likely not to survive," says James.

"You wouldn't plant flowers in a bed of sand and just hope for the best. They need water, fertiliser and support to grow, and we think the same will apply to cell implants. As well as trying to understand what happens in the brain once it is damaged, we are investigating materials to provide a scaffold for the cells being implanted."

Scarring can stop repair processes before they even begin. James and his group have discovered a molecule that is present in infant's brains that minimises scarring.

"We're trying to improve recovery from brain injuries by using this molecule to make adult brains behave more like infant brains," says Dr Leon Teo, a postdoctoral researcher in James' group.

The team are currently working to demonstrate the effectiveness of their approach in patients undergoing neurosurgery. If this is successful, the next step is to connect with Associate Professor Clare Parish at the Florey Institute of Neuroscience and Mental Health, who is developing stem cell transplants to treat brain injuries.

"We believe our tools can help those cells survive and do their work," says James.