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Research Reveals How the Brain Adapts to Lifelong Learning

New research from the University of Tasmania's Menzies Institute for Medical Research has revealed a previously unknown mechanism that allows our brains to adapt to lifelong learning.

In the brain, nerve cells form circuits that transmit and process information in the form of electrical signals. These circuits are insulated by a fatty substance called myelin that acts as insulation and ensures electrical signals travel reliably along the nerve.

Associate Professor Kaylene Young and Dr Carlie Cullen from the MS Research Flagship based at the Menzies Institute found that very small changes to the structure of this insulation can speed up or slow down the electrical signal and influence learning.

"Brain insulation changes as we learn so that the brain circuit works faster, and our trials indicate that faster electrical signals equal better learning outcomes," Dr Cullen explains.

It has been known for some time that learning involves the strengthening of connections between nerve cells. Research carried out by the Menzies Institute and others over the last decade has shown that new insulating cells are added to the brain throughout life to help us remember. What has now been identified is a completely new aspect of learning that relies on changes to the existing insulating cells.

"Our research aims to understand how we learn and remember things. We know that nerve cells are important for learning, but this discovery tells us that having adaptable insulating cells can be just as important for good learning outcomes," says Associate Professor Young.

Director of the Menzies Institute, Distinguished Professor Alison Venn, said that this discovery also has the potential to further research into neurological diseases.

"This research not only reveals how the brain adapts to learning throughout a person's life, but it also has important implications for understanding and treating neurological diseases, such as multiple sclerosis and Alzheimer's disease."

This research was conducted in collaboration with researchers from the University of Western Australia, Perron Institute for Neurological and Translational Research, Monash University, Oregon Health and Science University, and the University of Geneva.

These findings were published in the prestigious journal Cell Reports.

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