Research holds out hope for stroke patients

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(Medical Xpress) -- People with a curious condition that causes them to apply make-up on only one side of their face, or ignore food on half of their plate, are playing a new role in understanding stroke recovery.

Researchers from the Queensland Brain Institute (QBI) at The University of Queensland have found the condition, a subset of the stroke called ‘unilateral spatial neglect', tend to have the worst recovery outcomes in regaining lost functioning in their bodies, leading them to believe attention may have an important impact on recovering successfully.

Unilateral spatial neglect is typically caused by strokes on the right hand side of the brain and manifests in patients ignoring the left side of their body.

People with the condition may ignore food on the left hand side of their plate or, if asked to draw a clock, squash all 12 numbers into the right side of the clock face, leaving the other side blank.

They may also fail to shave, or to put make-up on the left side of their faces and. In severe cases, they behave as though the left side of their world does not exist.

“We know that brain plasticity plays a critical role in recovering from stroke,” says Professor Jason Mattingley, who holds the Foundation Chair in Cognitive Neuroscience at The University of Queensland.

“The fact that people with spatial neglect tend to have poorer recovery of motor function suggested to us that attention may be important for guiding plasticity following stroke.”

Current research being undertaken by the Mattingley laboratory is exploring this link.

“What we're trying to do is explore what effect attention has on brain plasticity, and how attention might be used in neurorehabilitation” says Professor Mattingley.

Volunteers first undergo a magnetic resonance imaging (MRI) scan, which provides researchers with a three-dimensional picture of the brain.

“In terms of their structure, brains are like fingerprints – no two are exactly the same, even though superficially they seem very similar,” Professor Mattingley explains.

The MRI scan allows researchers to guide a transcranial magnetic stimulation (TMS) coil into position upon a volunteer's scalp.

The device induces a small electrical current in the underlying brain tissue, causing it to become more active.

The researchers specifically target a part of the motor cortex that controls the thumb muscle in the left hand.

“It's well established that the more often neurons activate at the same time, the more likely they are to communicate efficiently in the future. This is how the brain learns,” says Professor Mattingley.

“We're exploiting that general principle in this research.”

Dr Marc Kamke, Research Fellow at QBI explains: “By adjusting the type of brain stimulation delivered we can artificially induce short-term changes that resemble naturally-occurring plasticity.”

But what the researchers have found is that the effects of stimulation upon a brain's plasticity are dependent on attention.

“When we ask people to undertake a visual task that is irrelevant to the brain stimulation, but that demands a great deal of their attention, we observe a reduction in plasticity,” Dr Marc Kamke explains.

“When the task does not require much attention, however, the brain's plastic response is apparent.”

“These results show that attention plays an important role in guiding brain plasticity,” says Professor Mattingley.

He adds, “while practical applications remain several steps away, this knowledge may ultimately help us develop more effective strategies for physical therapy after stroke.”

The results of the research, which was funded by the National Health and Medical Research Council of Australia, are published this week in *The Journal of Neuroscience.*

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