Medical Xpress

Trouble with the latest dance move? GABA chemical messenger might be to blame

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If you tend to have trouble picking up the latest dance moves or learning to play a new piano piece, there might be an explanation. A new study published online on March 3rd in *Current Biology*, a Cell Press publication, shows that people who are fast to learn a simple sequence of finger motions are also those whose brains show large changes in a particular chemical messenger following electrical stimulation.

That chemical messenger, known as GABA, is important for the plasticity of the motor cortex, a brain region involved in planning, control, and execution of voluntary movements.

"There is considerable variability in motor learning behavior across individuals," said Charlotte Stagg of the University of Oxford. "We aimed to test whether some of this variability could be explained by variation in responsiveness of the GABA system."

The researchers used magnetic resonance spectroscopy to directly measure GABA levels in the brain both before and after a low-level current was delivered through research participants' scalps. That procedure, called anodal transcranial direct current stimulation (tDCS), is known to produce a decrease in GABA within the motor cortex. The exercise therefore allowed the researchers to quantify individuals' baseline GABA levels and their "GABA responsiveness."

On a separate day, those individuals were asked to learn a sequence of finger motions while their brains were again scanned by functional magnetic resonance imaging (fMRI). It turned out that those who were more GABA responsive were also quicker to learn the simple motor task. The brains of more GABA-responsive individuals also showed greater activation in the motor cortex during learning. The researchers also found that those with higher GABA concentrations at baseline tended to have slower reaction times and less brain activation during learning.

The findings suggest that GABA responsiveness may be key in the motor cortex for making the neural connections that are the cellular basis for learning and memory, the researchers say. They also offer an important window into recovery after brain injury, such as a stroke.

GABA levels can change after that kind of brain trauma, and the findings support the idea that treatments designed to influence GABA levels might improve learning. In fact, tDCS is already in use as a tool for motor rehabilitation in stroke patients.

"This shows how that might work," Stagg said. It may also lead to strategies for making those improvements longer lasting, she added.

Provided by Cell Press