Neurotransmitter GABA predicts learning

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In an international collaboration with the Johns Hopkins University (Baltimore, MD, USA), neuroscientists at the Ruhr-University Bochum have determined a link between brain levels of the neurotransmitter GABA, the main source of inhibition in the brain, and tactile learning. Using magnetic resonance spectroscopy, they were able to show that success in learning can be predicted by baseline GABA levels. The results of this research were recently published in the scientific journal *Cerebral Cortex*.

Neurotransmitter GABA plays vital role in neural processing

Processing information from the environment requires a high level of information integration by the nervous system that relies on both electrical and chemical signaling. One of the most important chemicals in the brain is GABA, which is the main source of cortical inhibition. The levels of GABA have been shown to be critically involved in the brain's ability to adapt and learn, allowing us to effectively improve our senses through repetitive exposure.

Passive stimulation leads to learning

Previous research from the same lab has shown that by passively stimulating the fingertips with low level electrical currents, tactile acuity can be improved. By applying a similar protocol in conjunction with non-invasive measurements of GABA, the Ruhr-University researchers with their JHU collaborators have provided a potential learning-associated mechanism. Put simply, the higher the GABA levels of the primary

somatomotor cortex, the greater the sensory learning potential.

Predictions on learning success becomes possible

Importantly, the interdisciplinary Neuroimaging Research Group at the Bergmannsheil University Clinic found that the levels of GABA were not affected by the sensory learning, but rather the magnitude of learning was related to baseline levels of the neurotransmitter. As the researchers explain, "Among other genetic and anatomical factors interfering with learning, the neurotransmitter GABA plays a vital role in tactile learning. Its baseline concentration lets us predict how efficient passive stimulation will result in learning, as shown by improved tactile discrimination." Future research aims to provide further insight into the mechanisms of sensory learning.

More information: Stefanie Heba et al. Local GABA Concentration Predicts Perceptual Improvements After Repetitive Sensory Stimulation in Humans, *Cerebral Cortex* (2015). DOI: 10.1093/cercor/bhv296

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