TMS TRENDS

SEPTEMBER 2015

A publication of the TMS Institute of Pennsylvania – Advanced Neuropsychiatric Solutions

SCIENTISTS SHOW HOW MAGNETIC PULSES CHANGE THE BRAIN

http://www.sciencedaily.com/releases/2015/08/150830152603.htm

Transcranial magnetic stimulation therapy for depressed patients uses a magnetic pulse applied to the frontal part of the brain. So far, TMS is something of a blunt instrument, as scientists have a limited idea of how it works. A new study has shown that targeted magnetic pulses cause biochemical and connectivity changes across the brain.

In a placebo-controlled study, researchers from the University of Nottingham applied MRI-guided targeted bursts of magnetic pulses to the dorsolateral prefrontal cortex in the brains of 27 healthy volunteers. This is the first time that MRI-guided TMS pulses have been used to look at changes in individual brain networks and brain chemistry. Using the same MRI scanner, they were able to measure the subtle functional changes in the brain caused by the magnetic pulses. They were also able to measure the changes in brain chemistry, using magnetic resonance spectroscopy.

Lead researcher Dr. Sarina Iwabuchi (Nottingham) said, “We found that one session of TMS modifies the connectivity of large-scale brain networks, particularly the right anterior insula, which is a key area in depression. We also found that TMS alters concentrations of neurotransmitters, such as GABA, which are considered important for the development of depression.”

She continues, “These results mean that for the first time, we have an understanding of the direct effects TMS has on the brain. If we can see the change caused by the treatment, then treatment can be smarter. It also means treatment can be better tailored to each individual’s brain; in other words, this could be a personalized treatment for depression.”

DEPRESSIVE RUMINATIONS AND THE IDLING BRAIN

http://www.sciencedaily.com/releases/2015/07/150730081158.htm

Depressed people often find themselves preoccupied with guilty, shameful, or self-defeating thoughts for large parts of their day. This propensity for rumination in depression has been well categorized in previous research. To further understand this symptom of depression, Dr. J. Paul Hamilton at the Laureate Institute for Brain Research and his colleagues at Stanford University studied the brain mechanisms responsible for this unproductive rumination. Their research illuminates the relationship between a region in the brain implicated in depression, the subgenual prefrontal cortex (sgPFC) and a brain network involved in reflection, sometimes called the default mode network (DMN).

By reanalyzing previous studies, Hamilton and his colleagues illustrate that depressive ruminations are more likely to occur in depression when the activity in the sgPFC, indicating depressed mood, is more closely coordinated with the activity of the DMN. The researchers propose that the increased connectivity shows an integration of the sgPFC and the DMN processes. This finding, in turn, supports rumination in depression. “The study shows that depression distorts a natural process. It would seem that normally the subgenual prefrontal cortex helps to bias the reflective process supported by the default mode network so that we can consider important problems in the service of developing strategies for solving them,” commented Dr. John Krystal, Editor of *Biological Psychiatry*. “However, in depression it seems that the subgenual prefrontal cortex runs amok hijacking normal self-reflecting in a maladaptive way.”