Depression and Neurofeedback

Depression has a major impact on the overall population. Up to 20% of people will suffer from a depressive episode at some point or another, and a small amount of sufferers will progress into major depressive disorder (MDD).

Unfortunately, many patients do not respond well to current pharmacological or psychological therapies designed for depression. Those who do not do well with traditional treatments further deteriorate and enter a vicious cycle of psychosocial decline, which includes suicidal thoughts. This constant relapse has urged scientists to devise more individualized treatments for those going through depressive symptoms.

About 8-14% of depressed patients develop thoughts of suicide while taking one of the most common forms of depression drugs, selective serotonin reuptake inhibitors (SSRI). Although there has not been a link between the intake of SSRIs and suicidal thoughts, a recent study suggests the link between worsening suicidality and clear changes in brain function while on these medications. UCLA researchers treated 72 patients suffering from MDD, and of the 37 participants on medication, five had worsening thoughts of suicide (13.5%). Through examination using quantitative electroencephalographic (qEEG), which evaluates brain function based on the brain's electrical activity, scientists found that the 13.5% that got worse had a slowing of brain activity within 48 hours of initiating medication. Specifically, the slowing occurred in the midline and right-frontal sections of the brain, areas responsible for controlling emotions. 22% of placebo-taking participants also had increased thoughts of suicide, but the dramatic slowing in brain activity was not present. Thus, there is proof that there is a change in brain function after the start of medication which appears to be related to the increase in suicidal thoughts. For many patients, this is the reality of living with depression but hopeful researchers have turned to what they call self-regulation as a potential therapy technique.

Self-regulation is the act of something, such as the brain, regulating itself without the intervention of an external body. Continuous research shows that a new brain self-regulation technique is not only effective but it's a potential answer with long-term outcomes to those suffering from various mental health disabilities, including depression. This type of brain self-regulation can be achieved through a process called neurofeedback.

Neurofeedback is the direct training of brain function, which enables the brain to function more efficiently. It provides real-time displays of brain activity, most commonly electroencephalography (EEG). Brain activity is observed and this information is then reported back to the patient. Lastly, rewarding the brain for changing to more appropriate patterns reinforces long-term effects on both brain function and mood. This type of self-regulation training improves the efficiency of the central nervous system, which is responsible for most functions of the body and mind including our thoughts, interpretation of our external environment, and communication between different areas of the brain. Researchers have jumped at the opportunity to use neurofeedback as a positive alternative, and sometimes conjunctively with medication, type of therapy.

The idea that there can in fact be a different solution to such a devastating mental disease has driven scientists to engage in ongoing studies over the years. In a proof-of-concept study done by researchers at the Cardiff University School of Medicine, patients with depression were exposed to four sessions of fMRI-based neurofeedback as a holistic approach during a period of 4-6 weeks. Depressed patients were then compared to a control group that was not exposed to sessions of neurofeedback. All eight NF patients exhibited signs of upregulation in areas of the brain related to the generation of positive emotions towards session 2 and 3. Their symptoms, assessed with the 17-Hamilton Rating Scale for Depression, improved dramatically. On the other hand, the control group was put through a training procedure with similar cognitive strategies, but without the sessions of neurofeedback their symptoms did not improve.

It's important to note that brain wave activity can also have a large impact on mood and brain function. Specifically, theta and alpha waves have been associated to symptoms of depression. Theta waves, by definition, are present most often during deep sleep or deep meditation. In addition, alpha waves are present during wakeful relaxation. Research suggests that dense activity of these types of brain waves in an area usually indicate a decrease in brain activity. This makes sense, for both types of waves present themselves when the brain engages in relaxation, meaning less function of the brain. Through continuous studies, scientists have also been able to link frontocentral theta activity with depression. Oftentimes too much theta wave activity is connected with proclivity to episodes of depression and may make people highly susceptible based on the fact that they are already in a deeply relaxed, semi-hypnotic state. Moreover, recent studies have shown that dysfunction in the prefrontal cortex (PFC) has been identified as one of the most consistent neuroimaging findings in MDD. Alpha and theta wave dysfunction only adds to the issue. Not only does the PFC aid with executive function, but it's also been linked to emotion-processing biases in MDD. In a study in which the subjects were in their teens, scientists found through emotional facial recognition tasks that patients with depressive symptoms seem to recognize sad faces much easier and quicker than faces that show happiness. This information is critical, for it demonstrates how depressed brains relate and identify with signs of depression themselves. Alpha and theta waves were also observed and current density was high in areas specific to depression. More importantly, however, studies like this suggest that if current density of both alpha and theta can be regulated, symptoms related to depression can be diminished.

Traditional medicine has come a long way, but it comes a time when new alternatives must be introduced for the sake of patients. Studies like this prove that neurofeedback, paired with the reinforced training of positive thought patterns, is a viable source of therapy for patients that aids in the regulation of emotion circuits by individuals themselves and not through an external physical influence. This can help those suffering from depression to self-regulate and make changes from within. Although neurofeedback is a new and developing field of science, so far it's proven to be a great replacement to traditional therapy.

References

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