Biofeedback widens its role in medicine

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(WebMD) -- It looks like a scene from a 1950s science fiction flick: Patients with electrodes attached to their skulls sit deep in concentration, focusing their minds to control the beeps and squiggly lines produced by an electronic monitor.

Now these fantastic visions are unfolding with increasing frequency in real medical clinics around the country; people with epilepsy, attention deficit disorder and other forms of serious mental illness are treating these ailments by learning to control electrical patterns in their own brains. This therapy, known as neurofeedback, is emerging as the hottest new twist on biofeedback.

Though biofeedback was first developed by psychologists, its primary uses have been for illnesses below the neck. Standard biofeedback teaches you first to become conscious of normally unconscious functions such as pulse, digestion and body temperature, then teaches you to control them in response to sounds or other cues from monitoring devices. These techniques have allowed patients to lower their blood pressure, banish their headaches and control their incontinence without using drugs.

Now new insights into the biology of mental illness have made it possible to treat them in a similar fashion.

Aerobics for the brain

In neurofeedback (also known as neurotherapy), therapists attach electrodes to patients' unshaved scalps. Through these electrodes, a device measures electrical impulses in the brain, amplifies them and then records them. These impulses are divided into different types of brain waves.

For example, in order to concentrate on a task, parts of the brain must produce more high-frequency beta waves. To relax, the brain must produce more low-frequency theta waves.

Using a program similar to a computer game (only without a joystick), people learn to control the video display by achieving the mental state that produces increases in the desired brain wave. Some

practitioners call it "aerobics for the brain."

In epilepsy, where once only medications and surgery could reduce seizures, neurofeedback is showing results. A German study published in the April 1999 journal Clinical Neurophysiology found that two-thirds of epilepsy patients could reduce their seizure rate by learning to control very low frequency brain waves in the cortex.

"In people with epilepsy, part of the brain has become unstable, and occasionally it triggers the rest of the brain into seizure," explains Siegfried Othmer, Ph.D., an Encino, California, physicist who trains biofeedback therapists. "Neurofeedback may help stabilize those circuits and reduce the probability of seizures."

New understanding

The use of neurofeedback for psychiatric problems depends on recent understanding about these diseases. In the 1960s, when biofeedback was developed as a therapy, schizophrenia and attention deficit were considered mainly the result of emotional trauma or poor upbringing.

Consequently, biofeedback practitioners first focused on obviously physical problems. Now scientists understand better the electrical and chemical components of mental illness, creating opportunities for neurofeedback.

Children with attention deficit hyperactivity disorder (ADHD) use neurofeedback games to reduce theta waves and increase beta waves, increasing their attentiveness. Joel Lubar, Ph.D., a psychologist at the University of Tennessee, Knoxville, who originated neurofeedback treatment for ADHD in the 1970s, says neurofeedback can produce some of the same brain wave changes as drugs used to treat the disorder.

In a 1998 study published in the December issue of Applied Psychophysiology and Biofeedback, researchers in Ontario, Canada, taught ADHD patients biofeedback and learning strategies. They found a significant improvement in symptoms (such as impulsiveness and inattention) after 40 EEG biofeedback sessions, as well as a change in the ratio of beta to theta waves.

"Biofeedback can not only help a child use brain waves they don't usually employ, but it may also help increase blood flow to specific parts of the brain involved with ADHD," says Lubar. "Used with

behavior therapies that incorporate classroom and homework skills, neurofeedback can help these children become less dependent on stimulants like Ritalin."

More than 700 groups nationwide are using EEG biofeedback for ADD/ADHD, according to the Association for Applied Psychotherapy and Biofeedback, an organization of biofeedback practitioners. The ADHD therapists have reported that patients experienced a 60 to 80 percent significant improvement in symptoms and much less need for medicine.

Dr. J. Alan Cook, a psychiatrist in Mt. Vernon, Washington, uses it for 25 to 35 percent of his patients, treating such problems as depression, addiction, bipolar disorder and ADHD. "Once the training has been completed, patients seem to retain the benefits long term," he says.

Crossing a new frontier in neurotherapy, researchers from London, England, reported in the December 1999 International Journal of Psychophysiology that a group of schizophrenic people had used neurofeedback to create some of the same electrical patterns that schizophrenia drugs produce in the brain. Though the investigators couldn't tell from this short experiment how the neurofeedback might affect the patients' symptoms, they considered it a successful first step toward developing a new treatment.

As scientists understand better how the brain works -- or fails to work -- they are finding more and more ways it can heal itself.