Quantitative Electroencephalography and Neurofeedback for Attention Deficit Disorder

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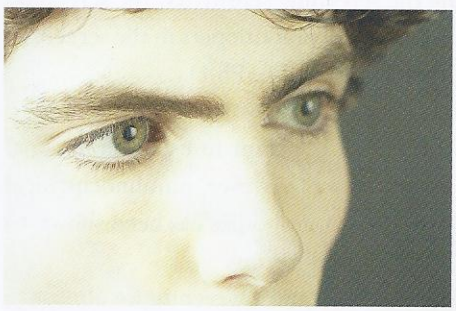

Attention-deficit/hyperactivity disorder (ADD/ADHD) is a central nervous system disorder considered to be hereditary. It is marked by persistent patterns of inconsistent attention capacities, distractibility, impulsivity and often underachievement in school or the workplace. Associated and comorbid symptoms and/or problems may typically include anxiety (often manifested in obsessive-compulsive traits), mild depression and learning challenges. Traditionally, stimulant and antidepressant medications have been the choice of treatments, sometimes accompanied by counseling, education about the disorder and behavioral interventions by a mental health practitioner. Today, additional methods of treatments are available and are effective.

A growing discipline has emerged since the 1970s that assesses electrical brain functioning to identify and treat ADD and related problems. Quantitative EEG or quantitative electroencephalography (QEEG) measures electrical patterns at the scalp's surface that reflect brainwaves or cortical electrical activity. After aberrant patterns are targeted and compared to the norm through the use of a database, EEG biofeedback, or neurofeedback training, can help the individual to normalize brainwave patterns. Typically, one or two sensors are placed at key sites on the head that measure brain activity.

During neurofeedback training, patients receive visual and auditory feedback while their EEG is monitored. Through operant conditioning appropriate brainwave patterns are reinforced and inappropriate patterns are

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inhibited. Using neurofeedback, brainwaves are monitored and displayed to individuals through video displays. This form of exercise or mental fitness training teaches people to control their brainwaves, resulting in long-term changes in attention, mood regulation, concentration, impulse control, processing and learning abilities. Some choose to use the Lexicor NeuroSearch-24 QEEG data acquisition system that is FDA-approved. The NxLink is an FDA-approved database developed by Brain Research Labs at New York University Medical Center. This database produces age-matched normative statistical data comparing brain electrical activity to referenced norms. In addition, discriminant functional analyses allow for comparisons to subgroups, such as those exhibiting ADD, bipolar, depression, dementia, post-concussive syndrome, schizophrenia and dementia. Neurofeedback programs are now available, among them S.M.A.R.T. Brain Games (Self Mastery and Regulation Training). This training program was developed by NASA and uses PlayStation games that are controlled by the individual's regulation of brain activity. It evolved from a physiologically adaptive simulator system that was developed in NASA flight deck research. With the S.M.A.R.T. system, video games replace the flight simulator. Neurocybernetics is another EEG biofeedback program that can provide the patient excellent feedback.

Neurofeedback often works well in conjunction with medication or may be used as an alternative with some patients. Today neurofeedback is being used more often by psychologists, medical doctors, neurologists and other practitioners.

For a review of quantitative EEG and neurofeedback research, the reader's attention is directed to *Clinical EEG Electroencephalography* (official journal of the EEG and Clinical Neuroscience Society, ECNS) Vol. 31 No. 1 Jan. 2000.

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