

## EEG and Neurofeedback Findings in ADHD

EEG (Electroencephalography) has been used in research to identify the areas of the brain affected by ADHD, and also clinically in the assessment, diagnosis and treatment of ADHD. The **ADHD Report** recently published a review by Dr Sandra Loo, of EEG use in the research, diagnosis & treatment of ADHD.

### EEG as a Diagnostic Tool

EEG studies in ADHD show increased slow-wave activity and decreased fast wave activity. However, the use of EEG to diagnose ADHD is not yet conclusive. Children with dyslexia have also displayed increased slow-wave activity. Furthermore, most children with ADHD have one or more co-existing condition such as depression, anxiety, learning disorders, and disruptive behavioural disorders). It is hard to identify whether the abnormal EEG pattern is being caused by the ADHD or the co-existing condition. Dr Loo's review recommends therefore, that "EEG findings remain an interesting but non-essential piece of information in the diagnostic procedure". She states that the "gold standard for diagnosis of ADHD is the use of a structured or semi-structured clinical interview, often combined with well standardised rating scales being collected from multiple sources (parent, teacher, child)".

### EEG Biofeedback (Neurofeedback) as a Treatment Device

The basic goal of biofeedback is to train patients to decrease their slow-wave EEG activity, and to increase their fast-wave EEG activity, using positive reinforcement in the process.

A biofeedback therapist places one to three electrodes on the patient's head, with these electrodes being connected to a computer. The computer detects the electrical activity of the brain and displays it on a computer monitor. When the patient produces the desired EEG pattern, the therapist or computer will give some sort of positive reward, usually in the form of points scored. After several of these training sessions (between 20 and 60), it is claimed that the patient will be able to produce the desired EEG brainwaves on their own, even after the treatment is withdrawn. Some therapists claim that biofeedback normalises ADHD symptoms across all situations (home, school and work), and that the benefits will continue into adulthood.

This treatment has stirred up quite a controversy among clinicians and scientists. Some studies have found very positive results from the use of biofeedback. However, critics of biofeedback believe that these studies suffered from significant methodological weaknesses.

Dr Loo's review has found that the biofeedback studies have not produced scientific evidence to prove their effectiveness. There are well established scientific standards for

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evaluating a treatment's effectiveness, such as control groups and 'blindness' of evaluators, and the EEG biofeedback studies published to date have not met these criteria.

Furthermore, the majority of these studies have been published by biofeedback therapists in neurotherapy journals which do not have rigorous peer review.

*Dr Loo's review can be found in the **ADHD Report**, Volume 11, Number 3, June 2003, pages 1-9. (Guildford Press—[www.guilford.com](http://www.guilford.com))*