What is EEG Neurofeedback?

By Elaine Offstein, MA, Board Certified Educational Therapist

All systems of our body and brain are designed to constantly work to maintain life-sustaining balance that scientists call homeostasis. Unconsciously and automatically our bodies and brains maintain the functions and systems enabling us to be active and alive, such as body temperature, blood pressure, heart rate, breathing, digestion, elimination, and healing.

The brain is the master controller for all voluntary and involuntary body systems and actions. It sends messages to the body and receives messages from the body by using electricity. The brain does this using a network of specialized cells called neurons, combined with specific hormones and chemicals produced by the brain and body for this purpose.

The brain produces five distinct types of rhythmic electrical impulses known as brain waves, labeled with the Greek letters Alpha, Beta, Theta, and Delta. Brain waves are measured in electrical units known as Hertz. Hertz is a standard unit of measurement equal to a frequency of one cycle per second. Each brain wave has it's own unique frequency range. Beta measures 15 Hertz and above. Alpha is 8-14 Hertz. Theta is 4-7 Hertz. Delta is less than 4 Hertz. The fifth brainwave pattern is called Gamma and is extremely fast. Not much is known about how the body uses this wave pattern and it is not part of EEG neurofeedback protocols.

People usually produce a mixture of brain waves frequencies at any given time. An electroencephalogram, or EEG, is a recording of brain wave activity. Brain waves are measured and recorded using an instrument known as an electroencephalograph (EEG) machine. The normal, focused waking state consists primarily of Beta. When you close your eyes during relaxation/meditation and during dreaming activity, Alpha waves tend to be produced. The slower Theta and Delta are dominant during deep sleep.

If the rhythmic electrical impulses, or brain waves, produced by the brain become abnormal or out of balance, imbalances are created in the body. Examples of conditions that can result in abnormal brain wave rhythms are: open and/or closed head injury, stroke, coma, autism, epilepsy, migraine and cluster headaches, attention deficit disorder, dyslexia, learning disabilities, clinical depression, anoxia, Parkinson's disease, and post viral damage.

All-Digital, Real-Time EEG Neurofeedback is one of the most compelling examples of the body's ability to self-regulate and bring itself into balance. Current brain research has shown that All-

Digital, Real-Time EEG Neurofeedback can be an effective auxiliary treatment for the above-mentioned conditions.

When there is a brain injury or irregularity, the brain tends to produce too much Theta frequency. The ratio of Theta brainwaves to Beta brainwaves becomes out of balance.

All-Digital, Real-Time EEG Neurofeedback uses a special computer and amplifier to display the brain waves with less than one-thousandth of a second delay. It is this immediate and real time feedback that enables retraining of the brain. During All-Digital, Real-Time EEG Neurofeedback training, the brain learns to inhibit this abnormal amount of Theta and return to a state of balance among the four brain waves.

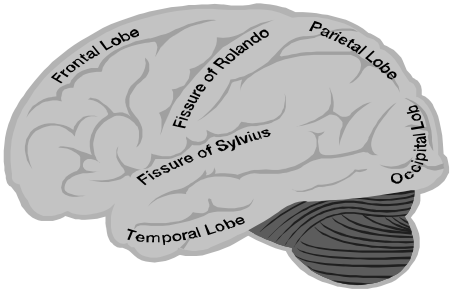
In All-Digital, Real-Time EEG Neurofeedback training, non-invasive painless sensors, called electrodes, are placed on the surface of the scalp. These sensors enable the brain wave patterns to be amplified and displayed on a computer screen. By displaying abnormal rhythmic patterns, the brain can be trained to replace them with normal patterns.

The computer assists the brain in recognizing normal rhythmic patterns by producing immediate audio and visual reinforcement when they occur. Because the brain inherently seeks normal brain wave rhythmic balance, the brain makes appropriate corrections immediately.

All-Digital, Real-Time EEG Neurofeedback is both safe and effective. It helps to improve functions such as concentration, short-term memory, speech motor skills, sleep, energy level, and emotional balance.

Once the brain's normal rhythmic patterns have been restored, All-Digital, Real-Time EEG Neurofeedback is no longer necessary. The results of the training are permanent unless another trauma or injury occurs.

The brain is divided into two halves, known as the right and left hemisphere. Each hemisphere is also divided into sections called lobes. Many parts of the brain are interconnected and control similar functions, but each part also has unique functions. The following provides a limited explanation of some brain functions.



Frontal Lobes:

Ability to feel and express emotions

Ability to understand feelings of others

Anxiety and panic attacks

Attention span

Balance

Control distractibility

Control hyperactivity

Control rage/anger

Control time management

Feelings of self-worth

Impulse control

Initiation of action/Procrastination

Judgment

Learning from experience

Maintaining focus

Organization

Problem solving

Social anxiety

Visual perception

Right Temporal Lobe

- Creativity
- Emotional control
- Fine Motor Control
- Memory
- Social skills
- Visual learning
- Visualization

Left Temporal Lobe

- Auditory learning
- Control of aggression
- Language skills
- Logical functioning
- Math skills
- Reading skills
- Short-term memory
- Speech

No claims are being made to cure or diagnose any illness, disease, or condition using All-Digital, Real-Time EEG Neurofeedback. However, many people have reported experiencing improvement after being diagnosed with one or more of the following conditions:

- Anoxia (oxygen deprivation)
- Attention Deficit Disorder
- Attention Deficit Hyperactivity
- Autism
- Birth injuries
- Cerebral palsy
- Closed head injury
- Cluster headaches
- Coma
- Concussion
- Dyslexia
- Fibromyalgia
- Learning Disabilities
- Migraine headaches

Near drowning	Post-neurosurgical trauma
Open head injury	Post-viral brain injury
Parkinson's Disease	Stroke
Epilepsy	Unipolar depression
Pervasive developmental disability	Whiplash

There are many different forms and practitioners of EEG Neurofeedback. The information discussed in this article relates exclusively to the unique, All-Digital, Real-Time EEG Neurofeedback Neuropathways System, developed and patented by Margaret Ayers. This system is the only EEG Neurofeedback system that provides immediate audio and visual feedback with less than one-thousandth of a second delay.

Elaine Offstein is a Board Certified Educational Therapist (BCET#10151). She holds a Bachelor of Arts Degree in Psychology, a Master of Arts Degree in Special Education, an Elementary Education Credential, a Resource Specialist Certificate, and a Montessori Education Certificate.

She has been trained in EEG Neurofeedback techniques by Margaret Ayers, the creator of the world's first patented, Real Time, All Digital EEG Neurofeedback Machine (USA patents: 4,919,143; 5,024,253; 5,571,057 and patents in England, Germany and Japan). All EEG Neurofeedback equipment used in brain retraining sessions is the patented Margaret Ayers system.

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