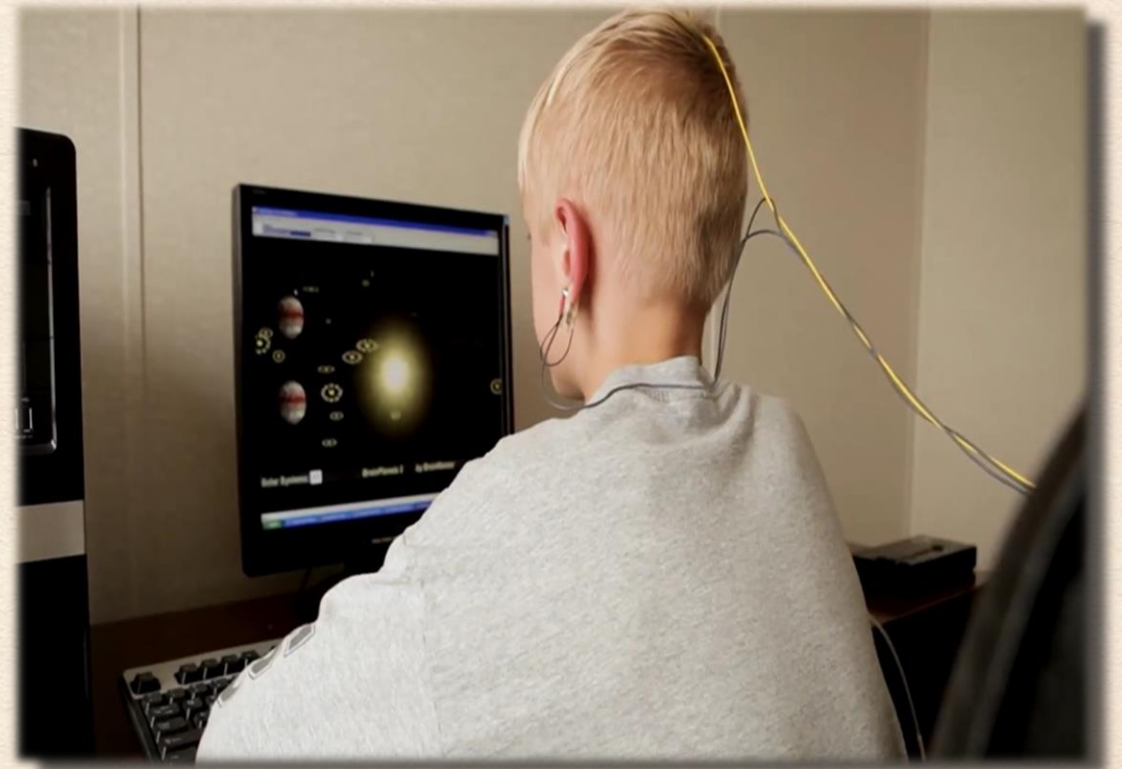


# BRAIN BASED SERVICES

QEEG - Brainmapping / Trauma / Neurodevelopmental Disorders



Presentation Download available at:  
<http://www.brainbasedservices.com>

 **Youth VILLAGES**®  
The force for families



# BIOGRAPHY

## Chris Raines, EMBA, BCN

Has worked with QEEG/Brainmapping, Neurofeedback, and Neurosciences for over 13 years.

Is a certified Neurofeedback practitioner through the BCIA - Biofeedback Certification International Alliance.

Extensive training, mentoring, and education from leading clinicians in the fields of QEEG/Brainmapping, Neurofeedback, Neurosciences, Neuroeducation, and researching involving each.

Currently manages the Neuro-Psychiatric Services Program at Youth Villages – Inner Harbour Campus. Have been employed at the Inner Harbour Campus for more than 13 years.

Owns and operates Informed Group Enterprises an outpatient practice in Douglasville, GA

Consults and provides QEEGs/Neurofeedback at other psychiatric facilities.

Graduate of Mercer University with a BA in Education and Religious Studies.

Graduate of Colorado Technical University with an Executive Masters of Business Administration. Graduate Certificates in Business Administration, Change Management, and Business Management.

Doctorate level work in Psychology, Education, Business, Anatomy, and Neuro-Genetics

Currently earning Doctorate in Education from Liberty University

Married with two sons





# BIOGRAPHY

## **Keaton Manners, BA**

Has worked with QEEG/Brainmapping and Neurofeedback for over 15 years.

Served 14 years in Army Reserve.

Trained under Dr. Emily Stevens of Neurobehavioral Consulting. Dr. Stevens is highly respected and her work has received national attention within the field of Neurofeedback and QEEG.

Specializes in Neurofeedback and provides services at Youth Villages – Inner Harbour Campus. Has worked with the Inner Harbour Campus for more than 30 collective years.

Owens and operates Informed Group Enterprises an outpatient practice in Douglasville, GA.

Graduate of Jacksonville State University with a BA in Art

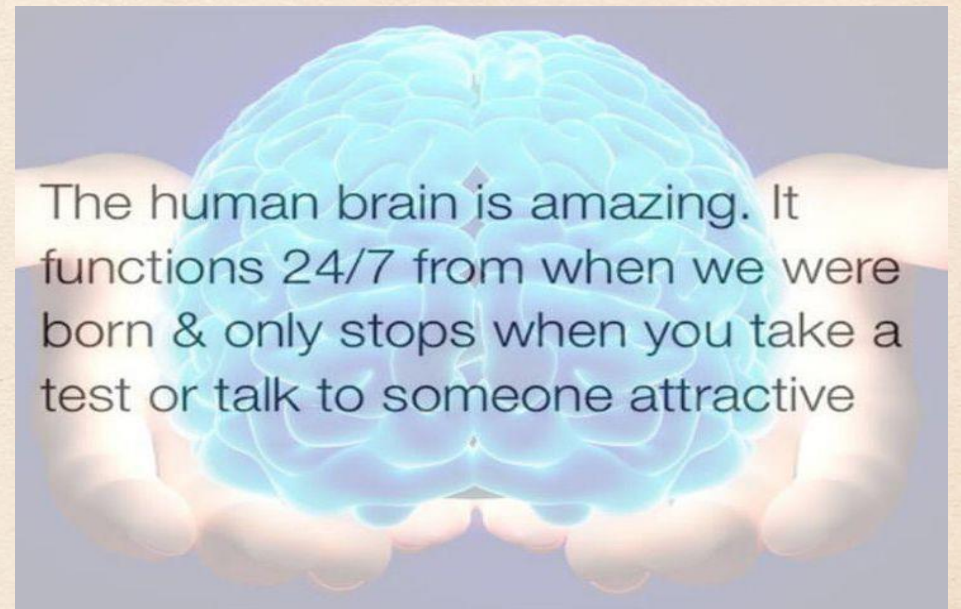
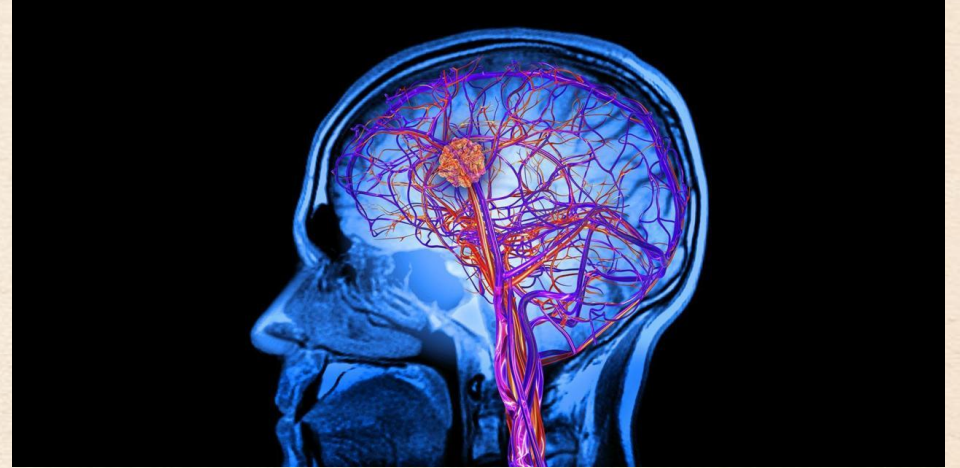
Married with two older children





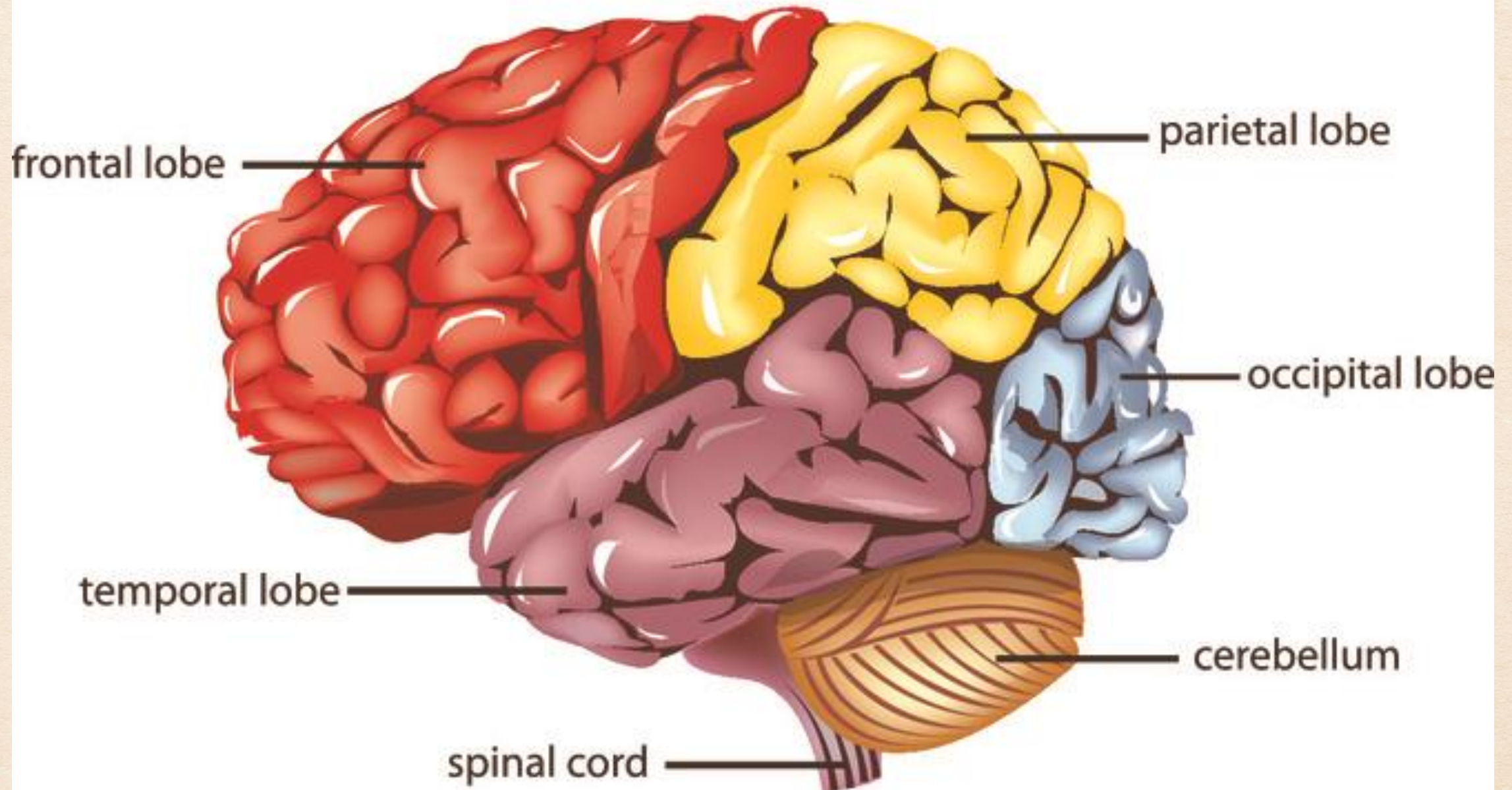
# BRAIN FACTS

- 2.5 million GB of storage (estimate) / 2500 TB – largest hard drive currently = 16 TB
- 78% Water, 10% Fat, 8% Proteins
- Left Handed People Better Memories (corpus callosum bigger)
- 65,000 – 100,000 thoughts a day
- The Brain is always working, expanding, and regenerating
- The Brain = 3 lbs, structure gets lost – but neurons vary! / 2% of your Body Weight
- There are over 100 billion brain cells – we lose daily & gain daily
- 3-5 weeks post conception synapses begin
- Trauma can begin at conception per latest research and understanding
- The Brain is Plastic and CAN CHANGE
- We get so focused on exercising physiologically and need to also exercise neurologically



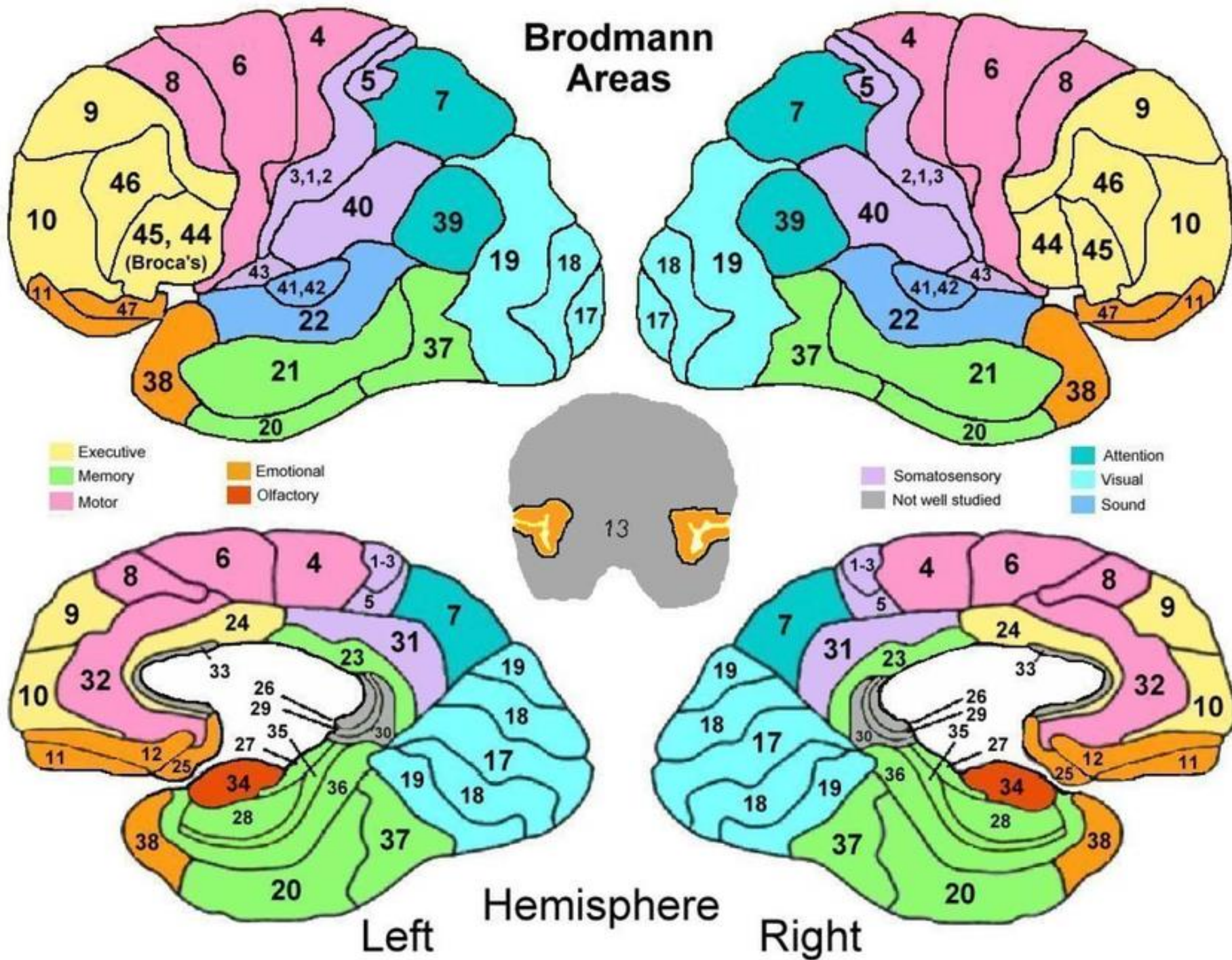


# Parts of the Human Brain





# Brodmann Areas





# TRAUMA

A Clinical View - events that involve real or perceived threats of death or serious injury, or threat to the physical integrity of the person or others, *and* from which that person experiences overwhelming fear, hopelessness, helplessness, or horror.

Another View - overwhelming stress – TOXIC STRESS related to individual perception

Even Another View - level of stress an individual perceives, *independent of an event or series of events*

What We Do Know - long-term impacts! Trauma changes the physiology and functional operation of the brain!

**The Question – What does it look like from a Neurophysiological Perspective?**



# TESTING OPTIONS

## Standard Tests Include:

X-Ray – Bone Visualization – not soft-tissue friendly

CT Scan – Anatomical 3D Model – measures density. Used for brain swelling / brain bleeds.

MRI – 3D Proton Magnetic resonance imaging - measures molecules (air, blood, water makeup of brain)

## Brain Function Tests Include:

Pet Scans - *Positron Emission Tomography* – tracer injection that looks at the metabolic value of Brain. Based on Glucose can help with identifying deficit areas of brain that regulate mood, attention, memory, etc...

fMRI – Detailed magnetic and radio wave images similar to MRI that detects blood flow

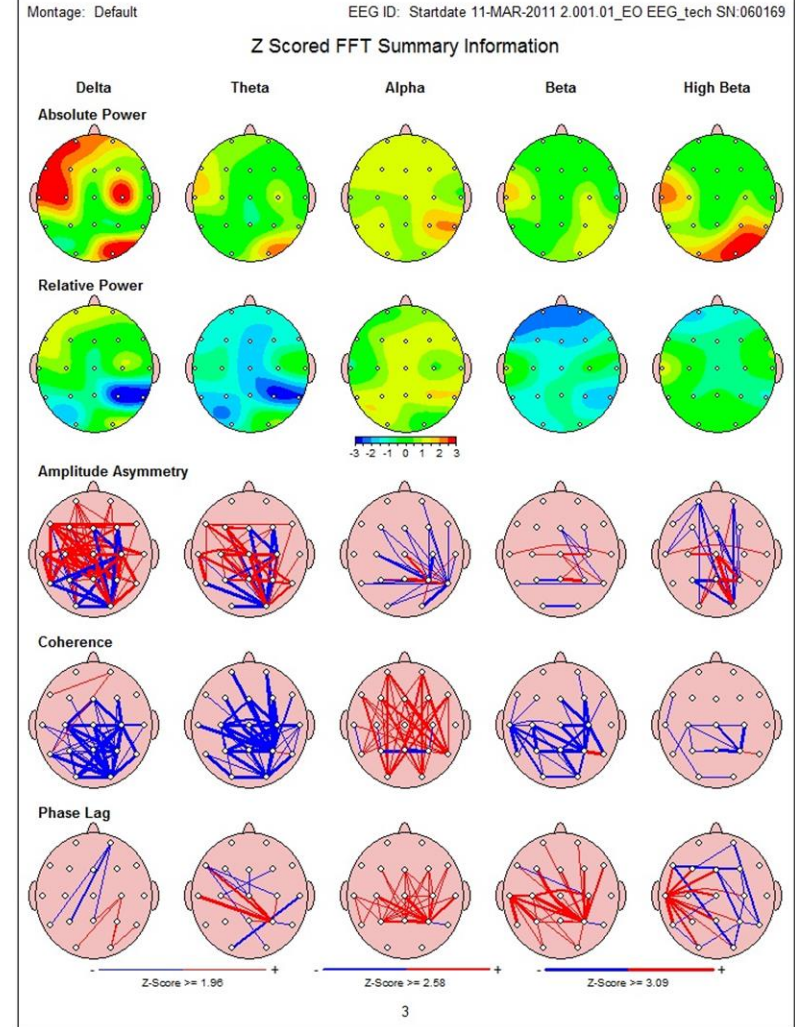
SPECT Imaging - *Single Photo Emission Computed Tomography* – lower resolution than Pet scans – measures Blood Flow using tracer injection.

DTI - Diffusion Tensor Imaging – tracks nerve fibers – useful for injuries in tracking nerve fibers connected to white matter

QEEG - measures electrical activity at the surface of the scalp that is known as brainwaves



# QEEG / BRAINMAPPING





# WHAT IS A QEEG?

- Brainmapping (also called QEEG) is used to obtain the electrical functional status of the brain.
- It is a non-invasive and painless procedure.
- QEEG measures electrical activity at the surface of the scalp that is known as brainwaves.
- Then a map is generated that shows that electrical activity.



# WHY DO WE USE QEEG?

- Outside of X-Ray technology the most researched, well established, and proven brainmapping modality
- Measures electrical function
- Higher accuracy and resolution capabilities (Loreta Images)
- Can pickup potentially on structural issues, lesions, metabolic issues, toxicity issues, brain damage, and other issues like other brainmapping modalities



# PURPOSE / WHY DO BRAINMAPS?

- To assess brain functioning
- To develop an individualized treatment plan. Useful to both psychiatrists for proper medication usage or Neurofeedback practitioners for appropriate protocols.
- To evaluate symptomology and functional status. Certain brainmap findings can correlate with symptoms and/or diagnoses.
- To evaluate the course of treatment. Pre-examination, Mid-session examination, post-examination.
- To provide therapists/counselors with physiological data that can guide effective therapeutic decisions.





# PROCESS

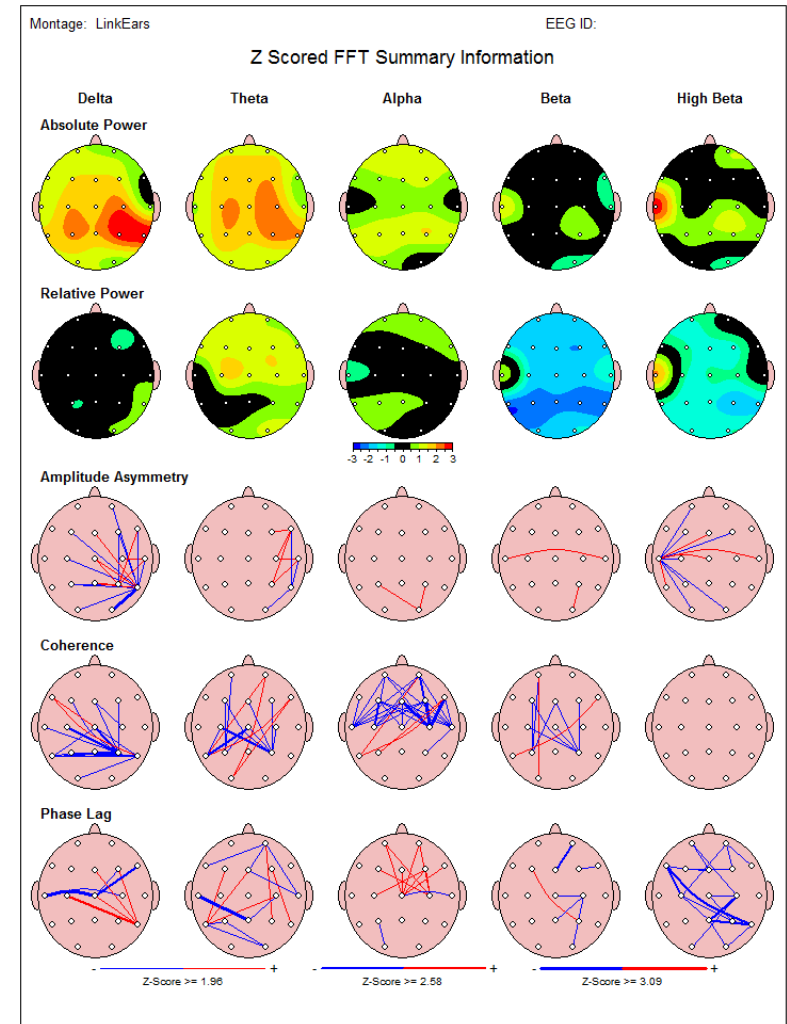
- The individual is placed in a chair and is told by the clinician what the process of the test will include.
- An individual is prepared for the test by cleaning certain areas such as the ears where leads will be placed.
- A cap is then placed on the individual. Additionally, leads that may be necessary are placed. Some clinicians like to measure EKG (heart rhythm) along with the EEG to tell when a client is not as still as they need to be.
- The cap is filled with a special gel that serves as a bridge to the electrical activity that is to be measured.
- The clinician checks all levels at every site on the brain being recorded to make sure there is a good connection.
- Recording is started and usually eyes open and eyes closed is captured to see how the brain functions under both situations.
- Recording lasts about 10 to 15 minutes (according to which protocol a clinician has selected and what they are wanting to capture.)
- After recording the individual removes the cap and cleanup proceeds.





# RESULTS

- The electrical activity that is recorded is then analyzed.
- There are many options for analysis. Common options are to have an expert produce a map from the data that is gathered. Chris Raines at Youth Villages – Inner Harbour Campus edits, interprets, and reports on all clients EEG data. He utilizes Richard Soutar's from New Mind Center's database and reporting for further analysis. There are others around the world. ***We produce maps from a symptomology point-of-view, not a diagnostic point-of-view.***
- Another option is to produce the maps yourself like we do at Youth Villages. This is left to experienced and advanced practitioners through a software and database such as one developed by Applied Neurosciences and Robert Thatcher. The software Neuroguide provides a database to develop the QEEG's/Brainmaps and is considered the standard in the field by many experts.
- The maps are generated and then a report of findings are listed. The findings relate specifically to the individual and compares it to a "normal" brain of that persons age, gender, race, and other factors.





# EVALUATION / USE

**QEEG/Brainmaps** are used by many clinicians in adjunct with other behavioral evaluations such as:  
IQ tests, Achenbach  
Becks Inventories  
Trauma Checklists  
WISC

This provides them another tool to create a big picture of physiological function for their clients and to get a better understanding of why they exhibit certain behaviors/symptoms.

Some clinicians / practitioners use them to guide Neurofeedback. They are additionally used to show the improvements being made with a patient as they progress in Neurofeedback treatment.





# WHAT ARE WE ANALYZING? BRAINWAVES

## *Associated with the results and findings*

Brainwaves are measured in hertz frequencies and are associated with different states and symptoms.

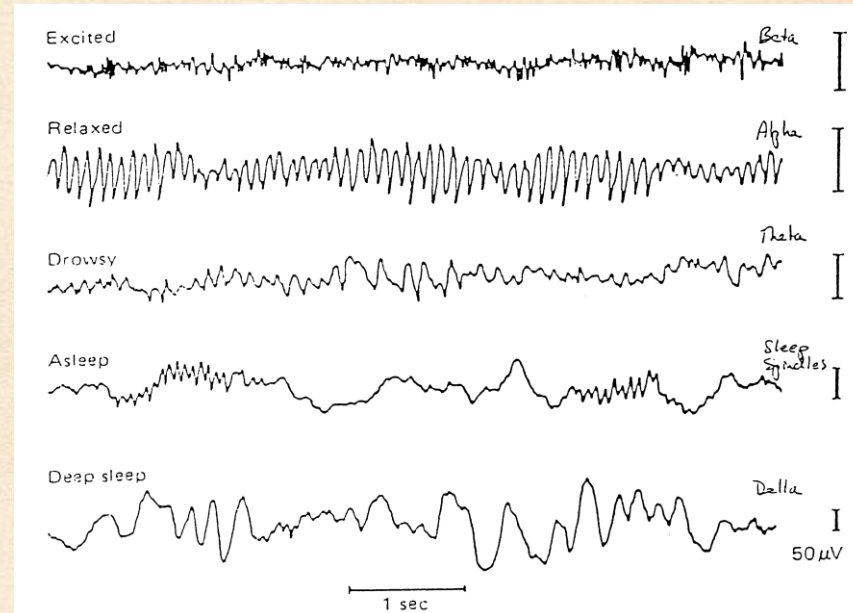
DELTA – associated mostly with sleep

THETA – associated mostly with attention, learning, sleep, and meditation

ALPHA – associated mostly with relaxation, alertness, calming, and creative visualization

BETA – associated mostly with concentration, arousal, and cognition (Mood and Trauma)

GAMMA – associated mostly with problem solving, consciousness, and perception.



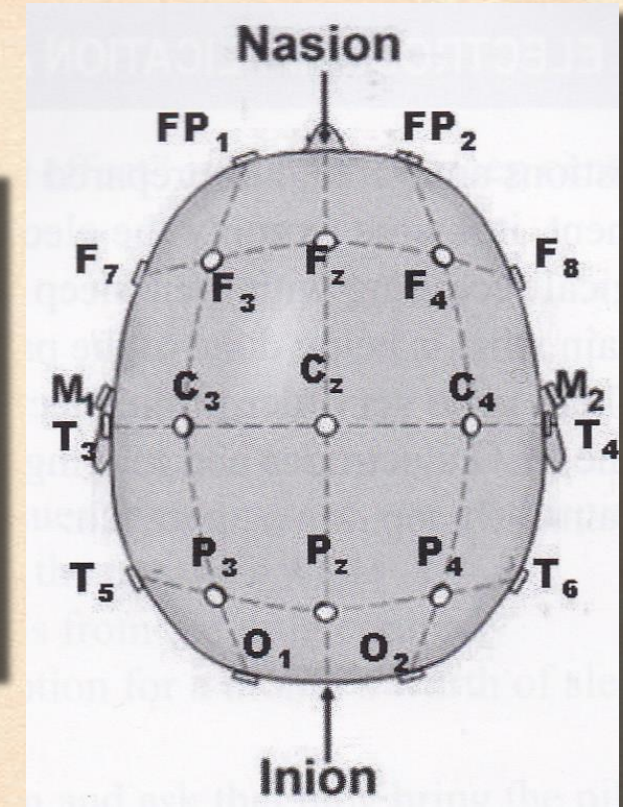
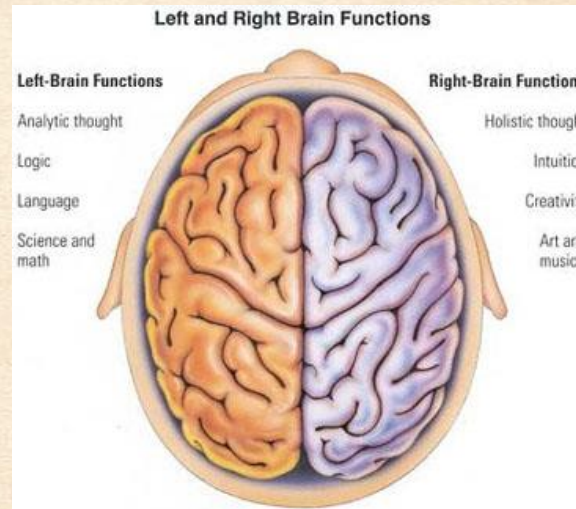


# BRAINMAPS / FINDINGS

When analyzing a brainmap it is important to know a great deal about the functioning of each part of the brain such as the frontal lobe, central lobe, parietal lobe, and temporal lobes.

It is also important to know how they correlate with the hemispheres, brainwaves, and other factors that may have produced what is being seen on the brain map.

Each site on the brain that was recorded provides a separate function and according to what is happening with the brainwaves at that site, certain symptoms may be observed in the patient (or individual).



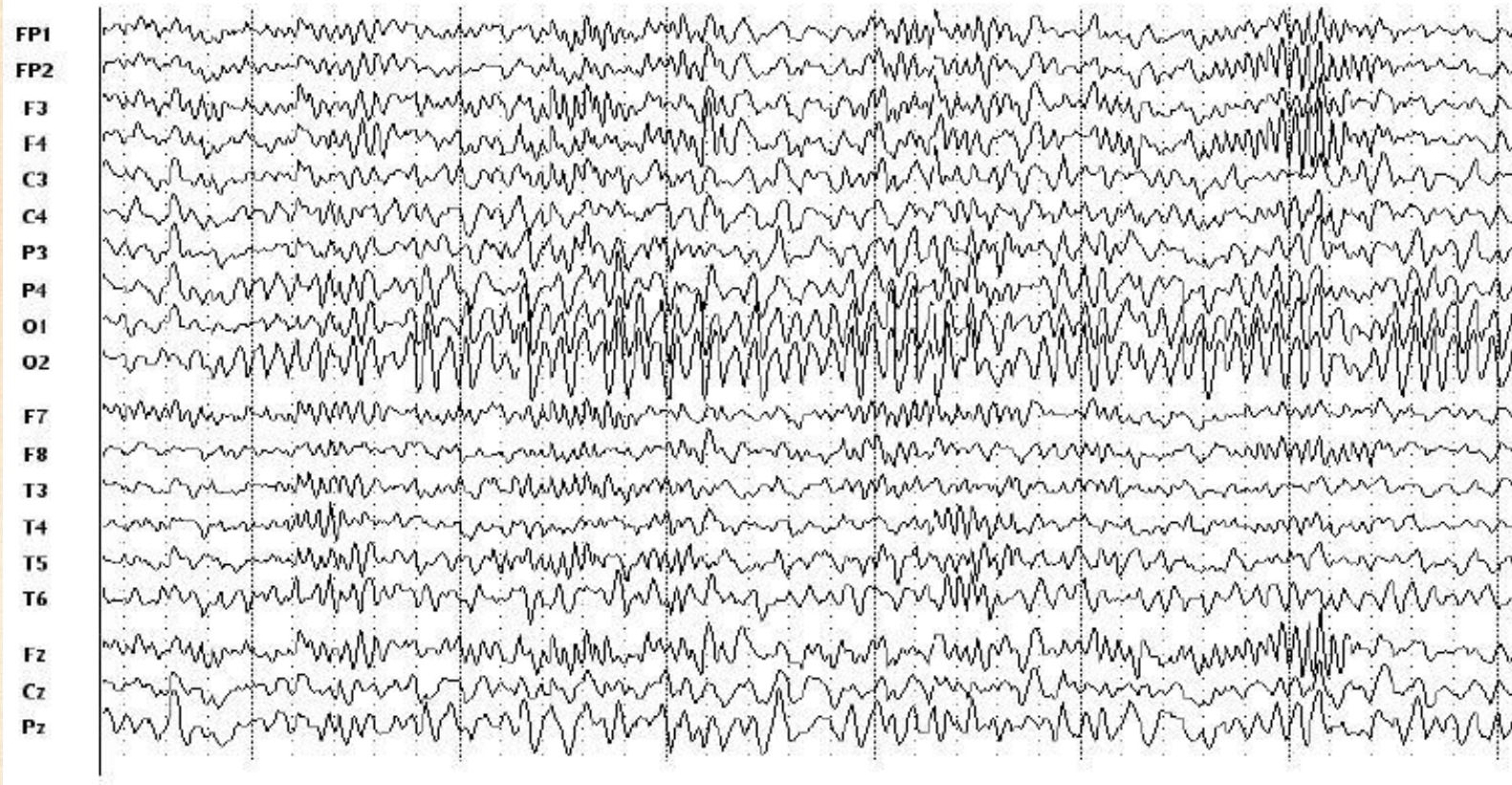


# EEG – INITIAL RESULTS

**Diagnosis:** Anxiety, Rage, OCD, Oppositional defiant

**Medications:** Adderall, Buspar, Growth hormone shots

**Figure 1: Sample of Eyes Closed Resting EEG - Linked Ear Montage**



This is converted into colored aerial brainmaps that are commonly seen on most reports



# BRAINMAPPING TRAUMA

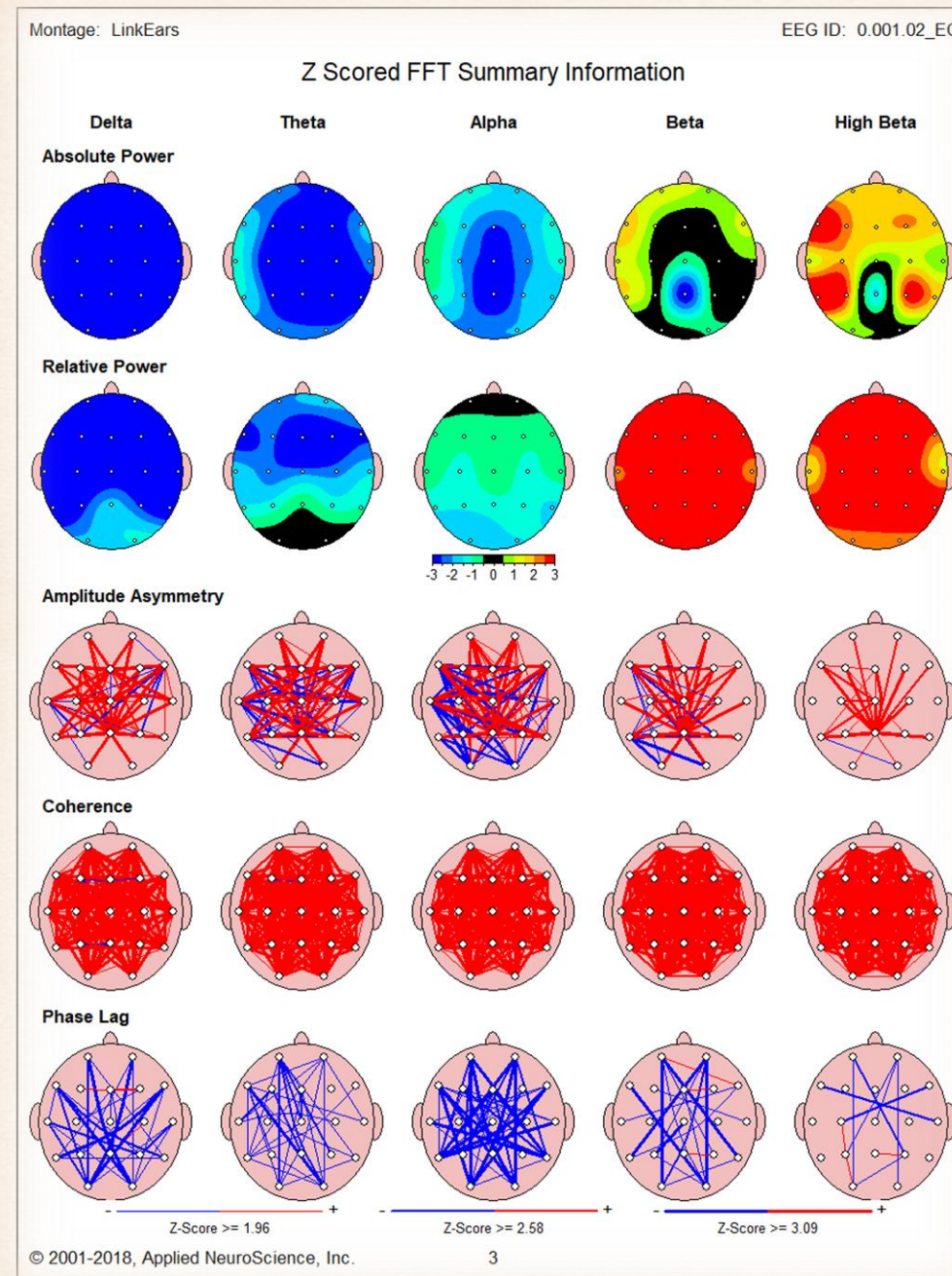


Taken from Dualdiagnosis.org / <https://www.dualdiagnosis.org/infographics/effects-of-emotional-psychological-trauma>



# BRAINMAPPING TRAUMA

## Emotional Trauma



Low Delta's – Possible physical trauma, low dopamine = fatigue, attention issues, depression, anxiety

Low Theta's – Executive function, attention, metabolic issues

Low Alpha's – stress, mental fatigue, reduced cognitive stamina, confusion

High Beta's – worry, chronic hyperarousal, mood related issues, emotional instability, negative rumination

Coherence – hypercoherences between brain sites

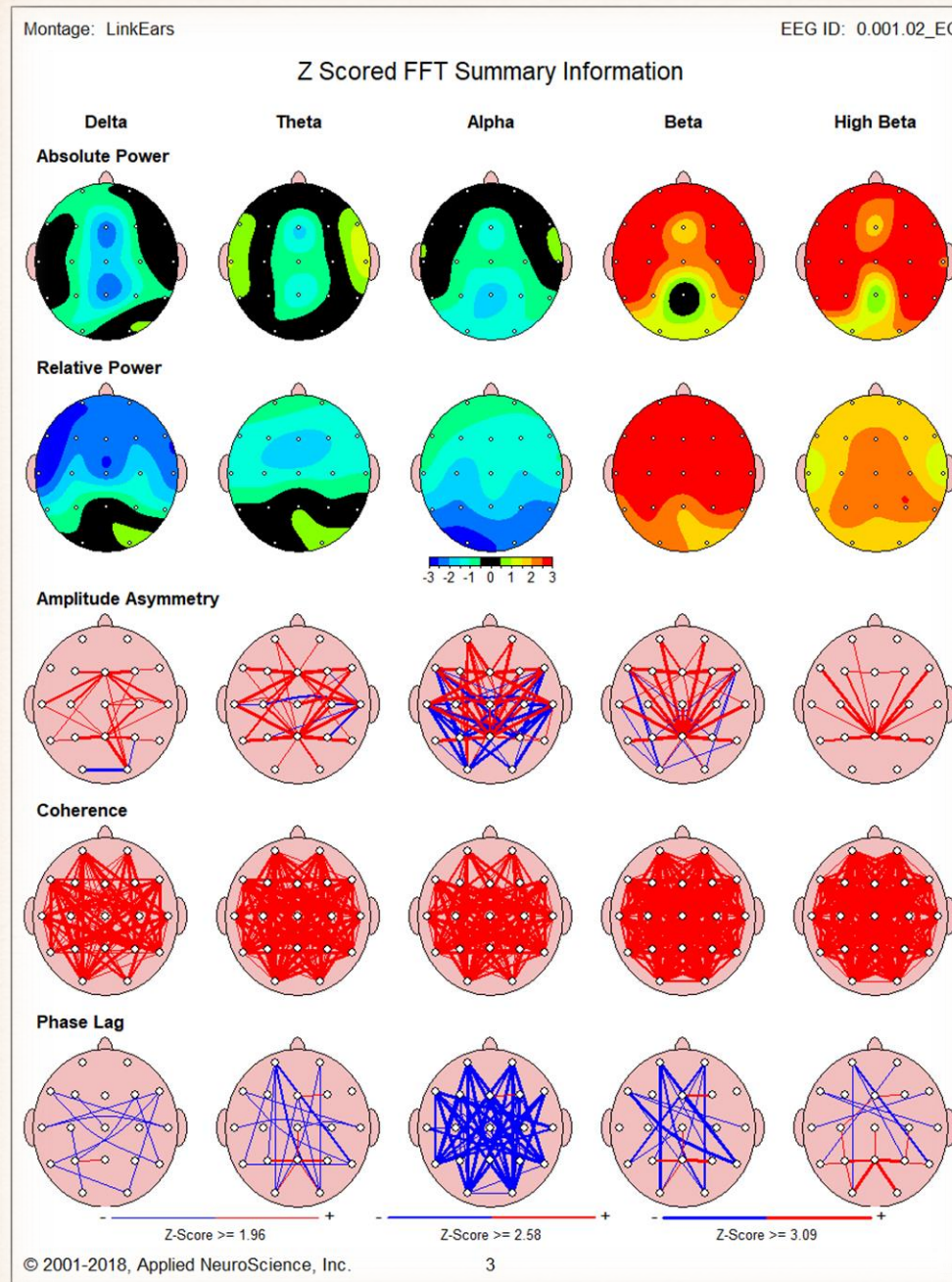
Asymmetry – brain imbalances – widespread associated with trauma's



# BRAINMAPPING TRAUMA

## Emotional Trauma & Physical Trauma

Physical Trauma shows up  
in relative decreased Delta  
and absolute increased  
Beta's



Low Delta's – Possible physical trauma, low dopamine = fatigue, attention issues, depression, anxiety **NOT AS INTENSE AS LAST SLIDE**

Low Theta's – Executive function, attention, metabolic issues **NOT AS INTENSE AS LAST SLIDE**

Low Alpha's – stress, mental fatigue, reduced cognitive stamina, confusion **NOT AS INTENSE AS LAST SLIDE**

High Beta's – worry, chronic hyperarousal, mood related issues, emotional instability, negative rumination

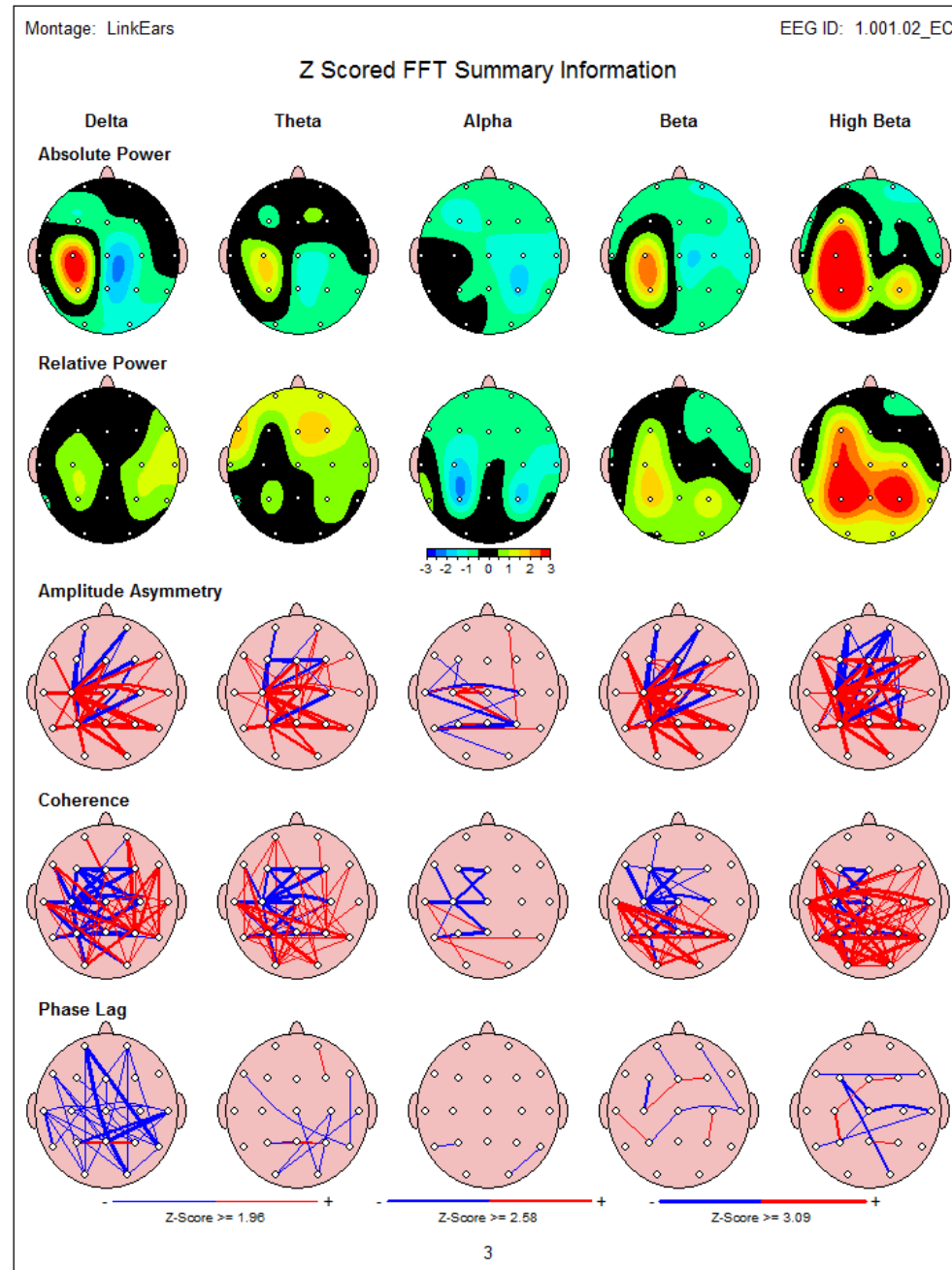
Coherence – hypercoherences between brain sites

Asymmetry – brain imbalances – widespread associated with trauma's



# BRAINMAPPING TRAUMA

## Emotional Trauma & Potential Moderate Head injury Ruled Out



High Delta – Left hemisphere  
Possible physical trauma,  
attention issues, depression,  
anxiety

Low Theta's – Executive  
function, attention

Low spread Alpha's – stress,  
mental fatigue

High Beta's – Left Hemisphere  
speech comprehension issues,  
verbal memory issues, poor  
information processing,  
attention issues, negative  
rumination

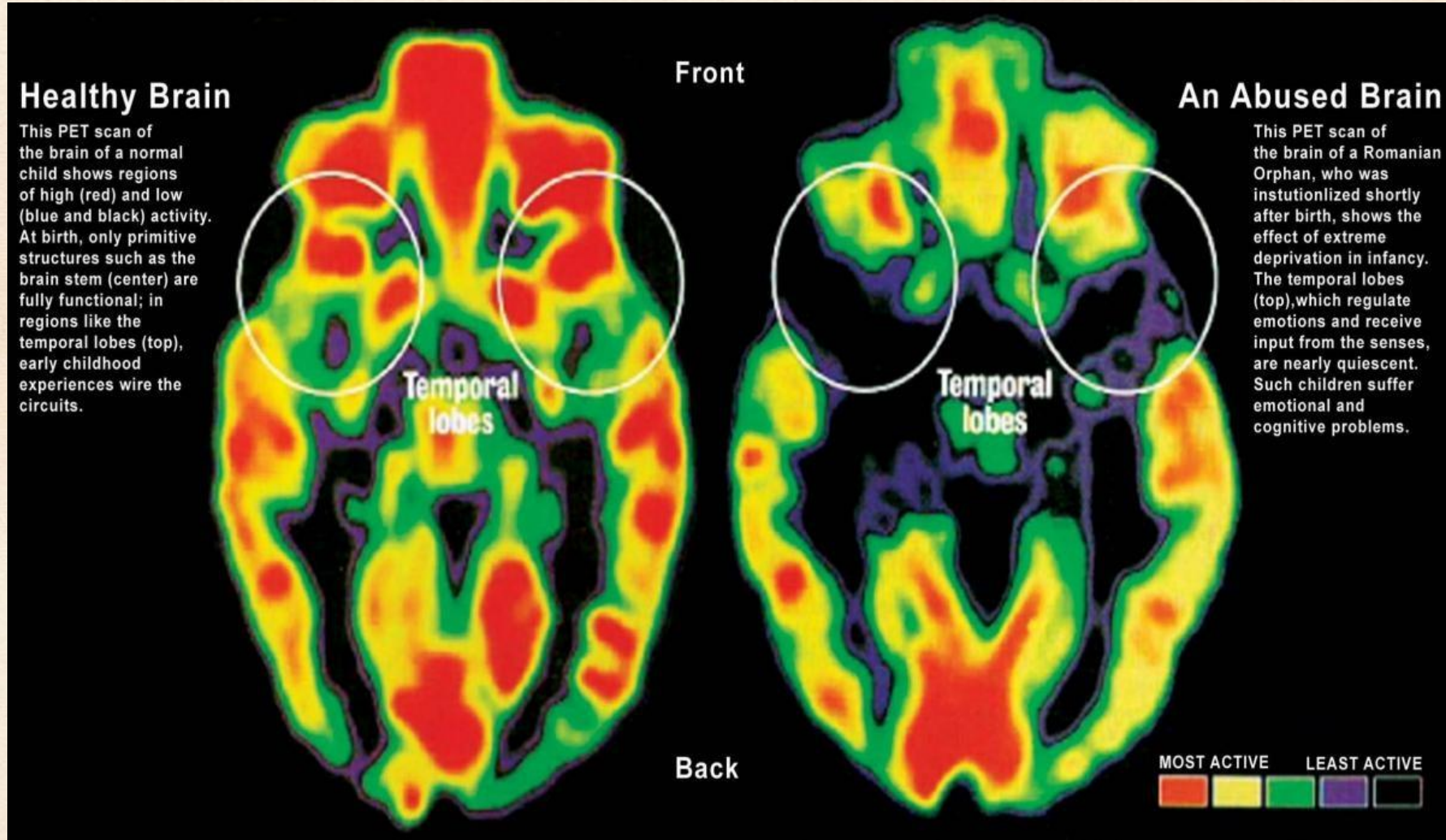
Coherence –  
hypo/hypercoherence  
widespread

Asymmetry – Left hemisphere  
brain imbalances – widespread  
associated with trauma's



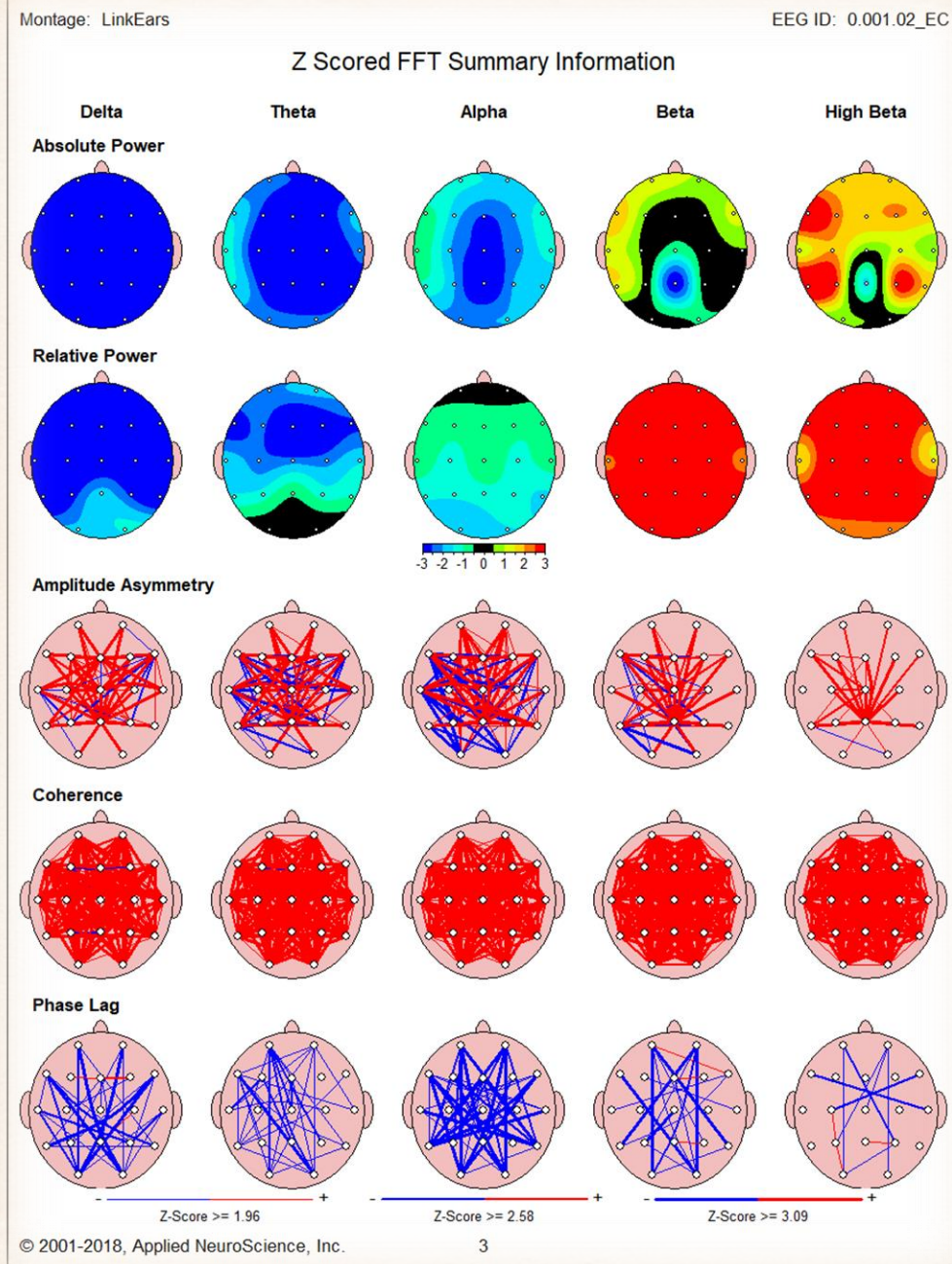
# PET SCAN

Shows constant release of stress hormones harmful enough to alter brain architecture

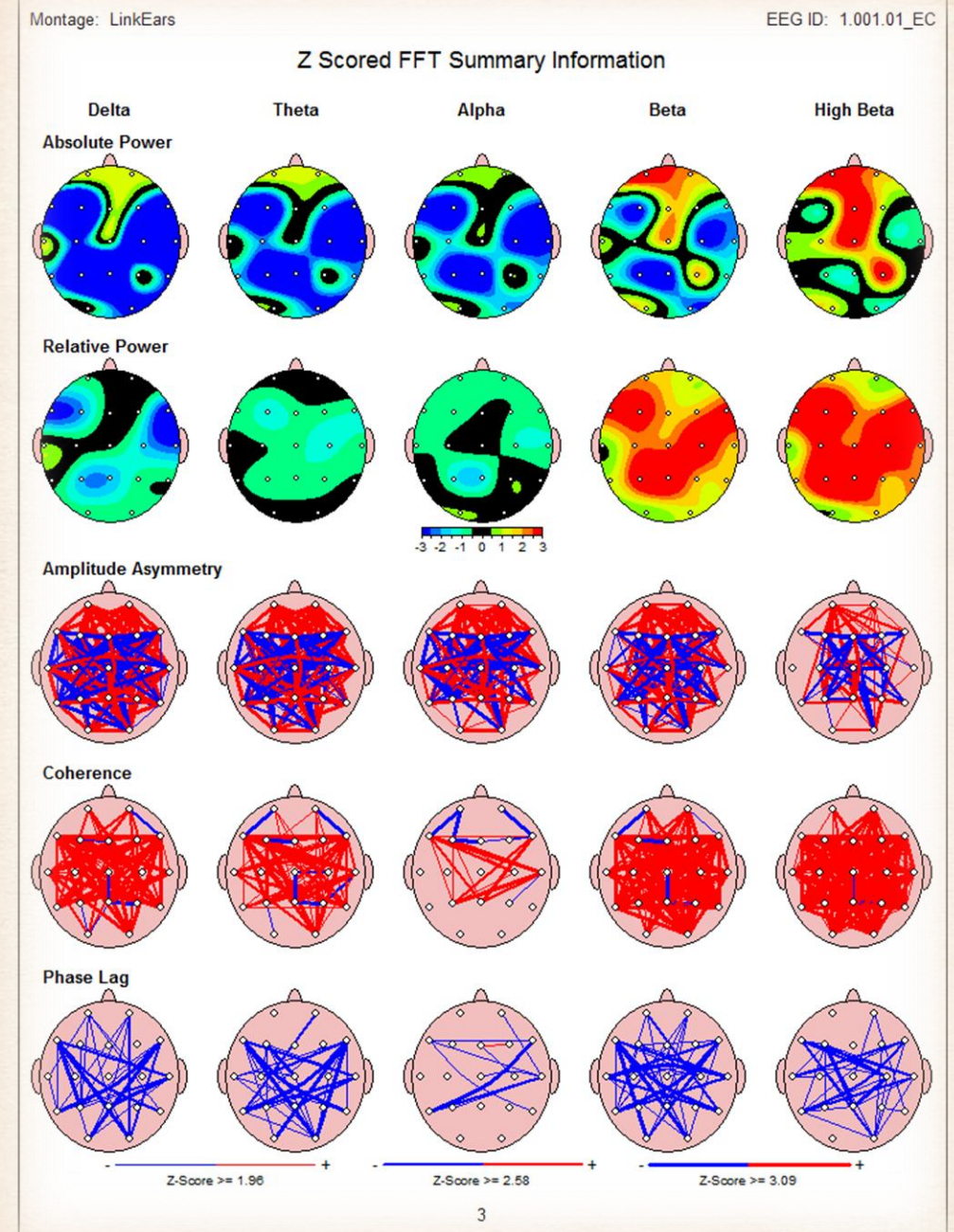




# Brain Emotional Trauma



# Autism Spectrum

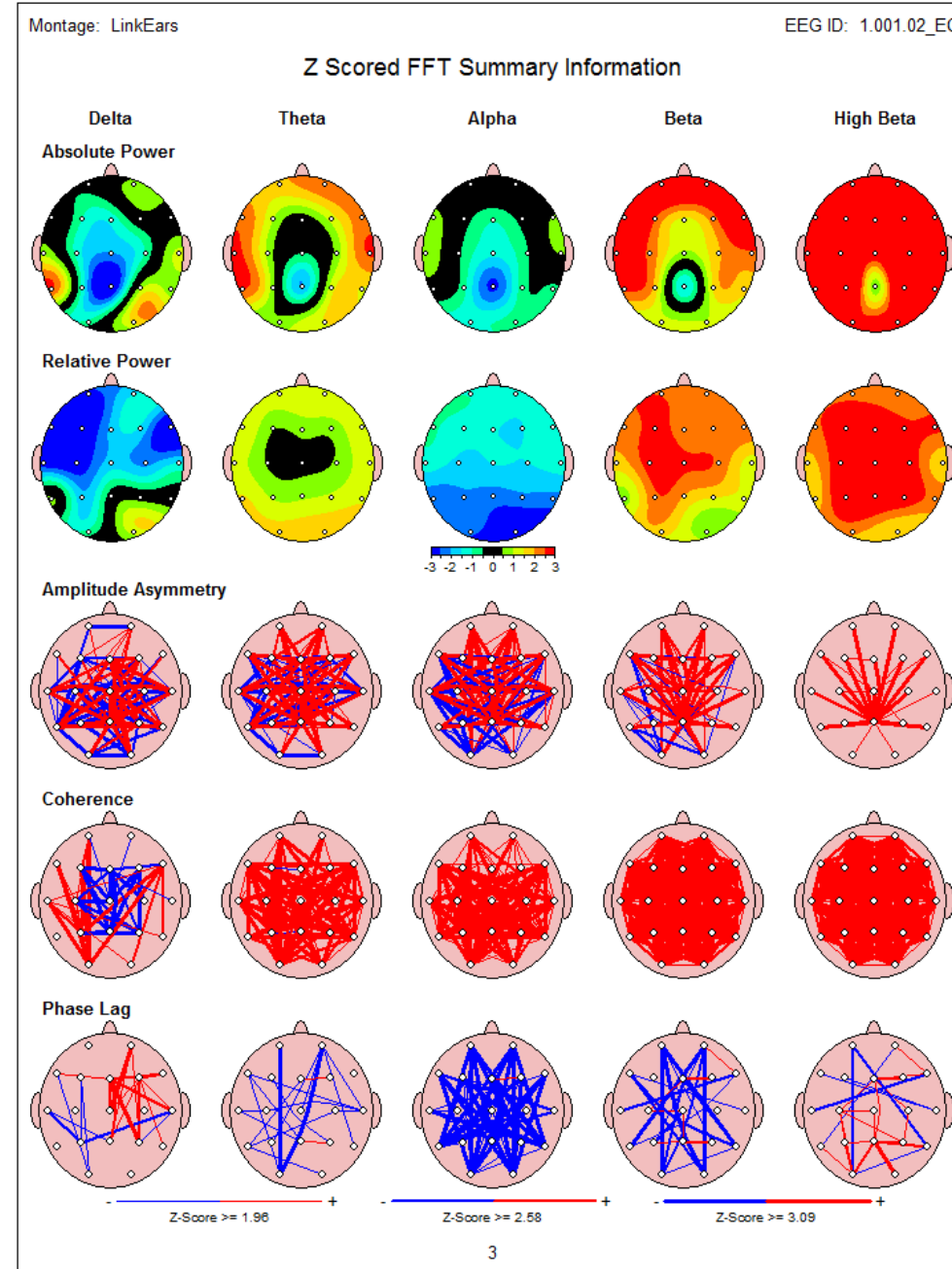




# BRAINMAPPING TRAUMA

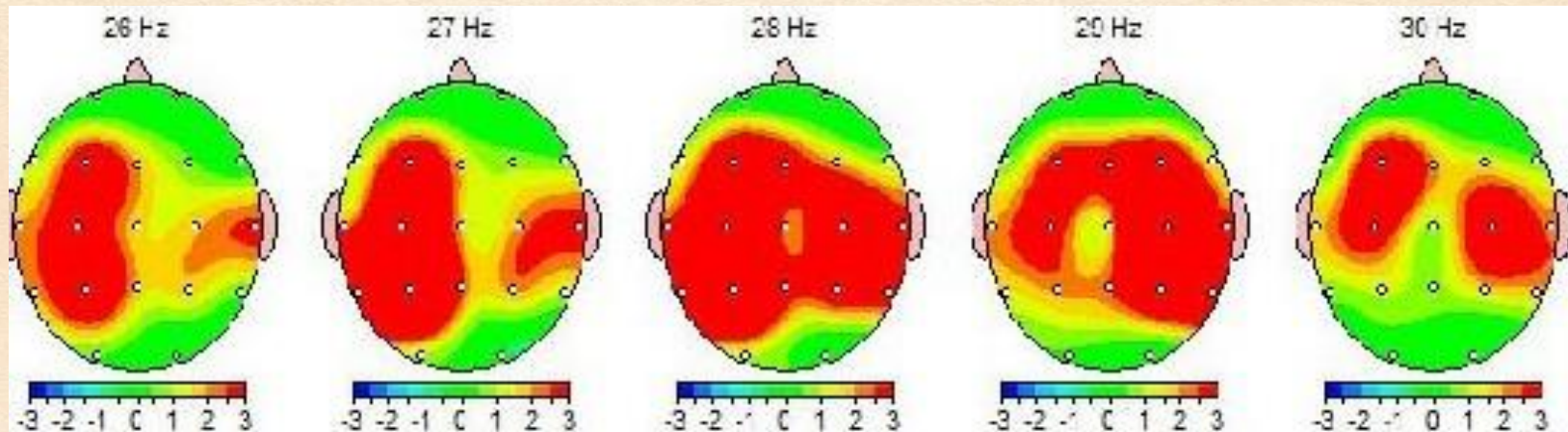
Emotional Trauma  
&  
ADHD

*Physical Trauma  
Ruled Out*





# OTHER NEURODEVELOPMENTAL DISORDERS



Anxiety



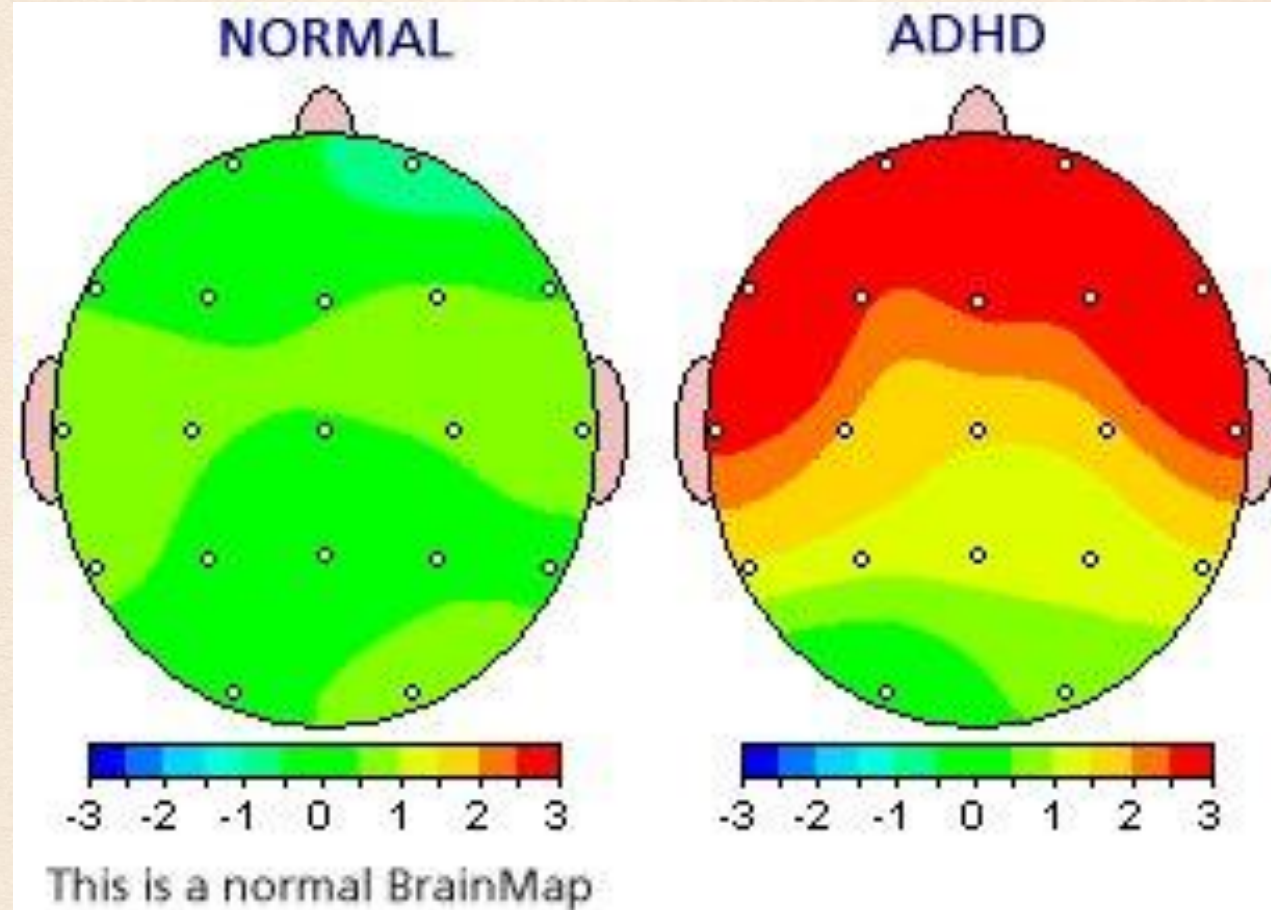
# BRAINMAP EXAMPLE

## ADHD

A common finding for a youth with ADHD is increased frontal Theta. The frontal lobes provide our executive functioning, emotional control, and some motor skills.

Common symptoms seen in this brainmap may be agitation, changes in social behavior, inattention, impaired thinking, inability to use external cues.

### INCREASED THETA WAVES

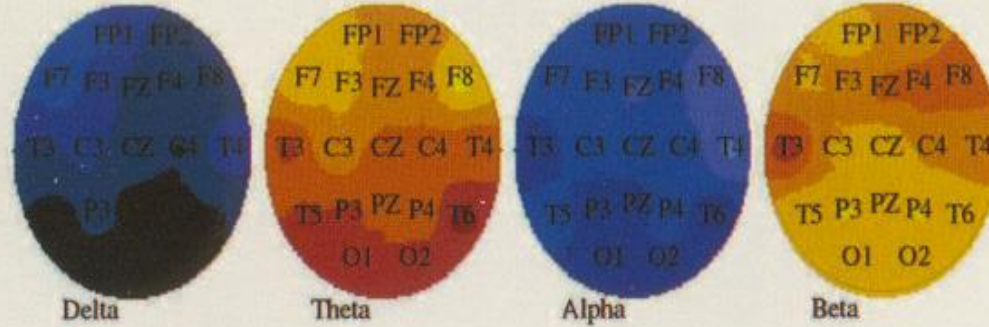


This is one of the typical BrainMap patterns seen in a child with ADHD. It shows an underactive (red colour) frontal lobe behind the forehead.

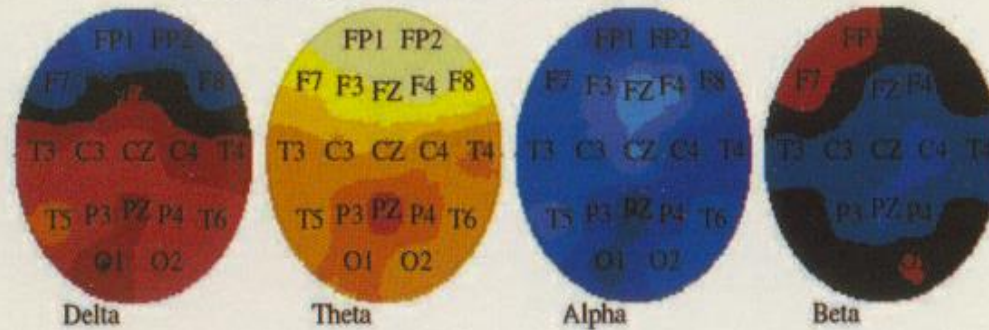


# BRAINMAP EXAMPLE

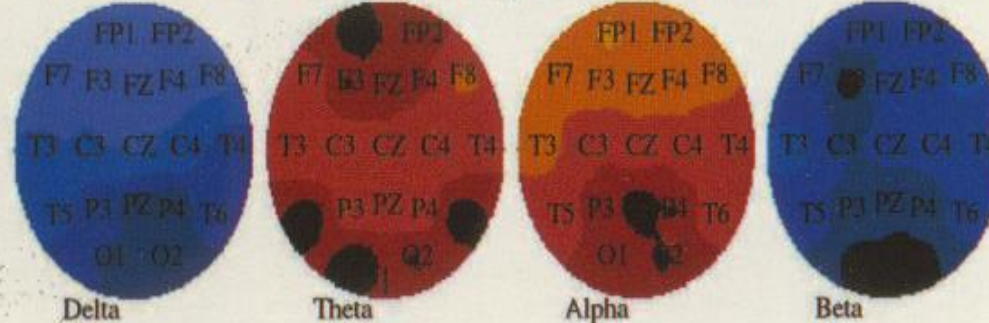
ADHD & Alcoholism / Anxiety



Theta Subtype of ADHD & Learning Disabilities



ADHD & Major Depressive Disorder

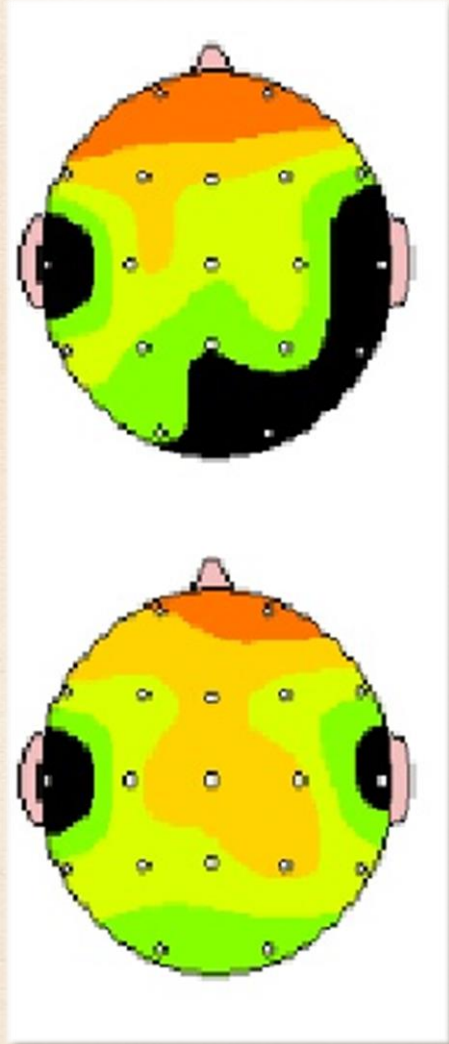


Other ADHD examples with correlating symptoms among different subtypes.

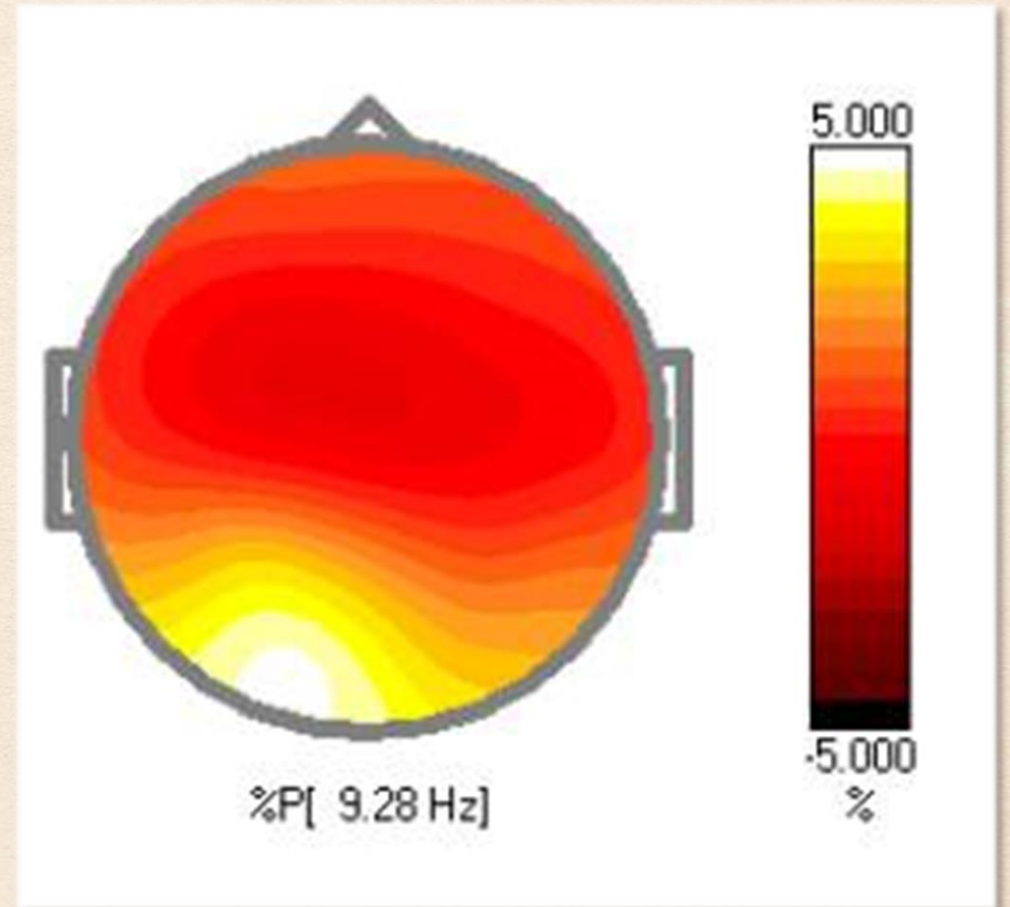


# BRAINMAP EXAMPLES

BIPOLAR – SIMILAR  
SYMPTOMS  
INCREASED BETA WAVES



MEMORY ISSUES  
INCREASED ALPHA IN  
LEFT OCCIPITAL LOBE

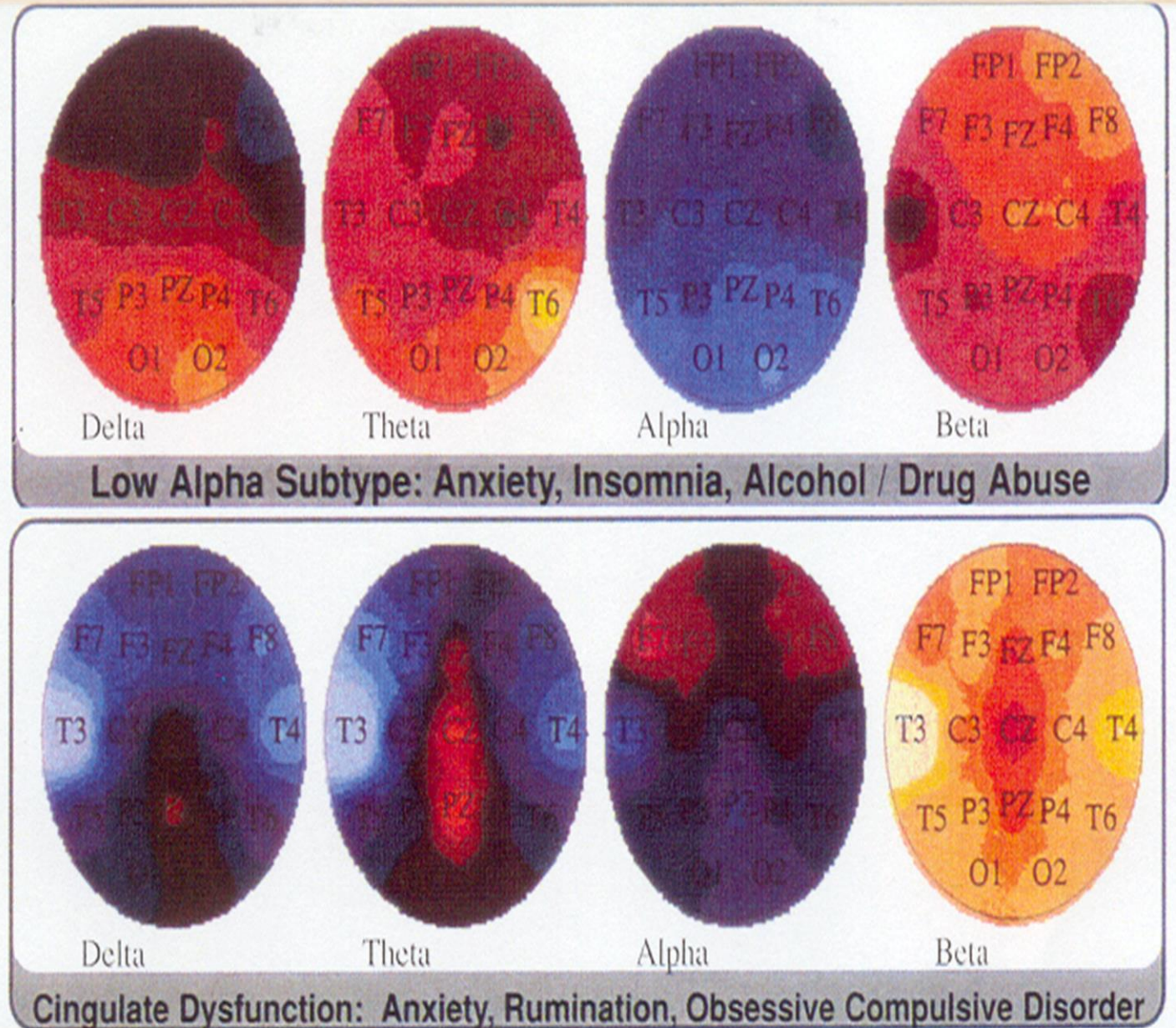




# BRAINMAP EXAMPLES

Examples of what other symptoms may appear as on a brainmap.

These can vary and appear differently according to age, gender, and other factors.





# TREATING TRAUMA NON-INVASIVELY

## BRAIN BASED INTERVENTIONS

Include (but not limited to)

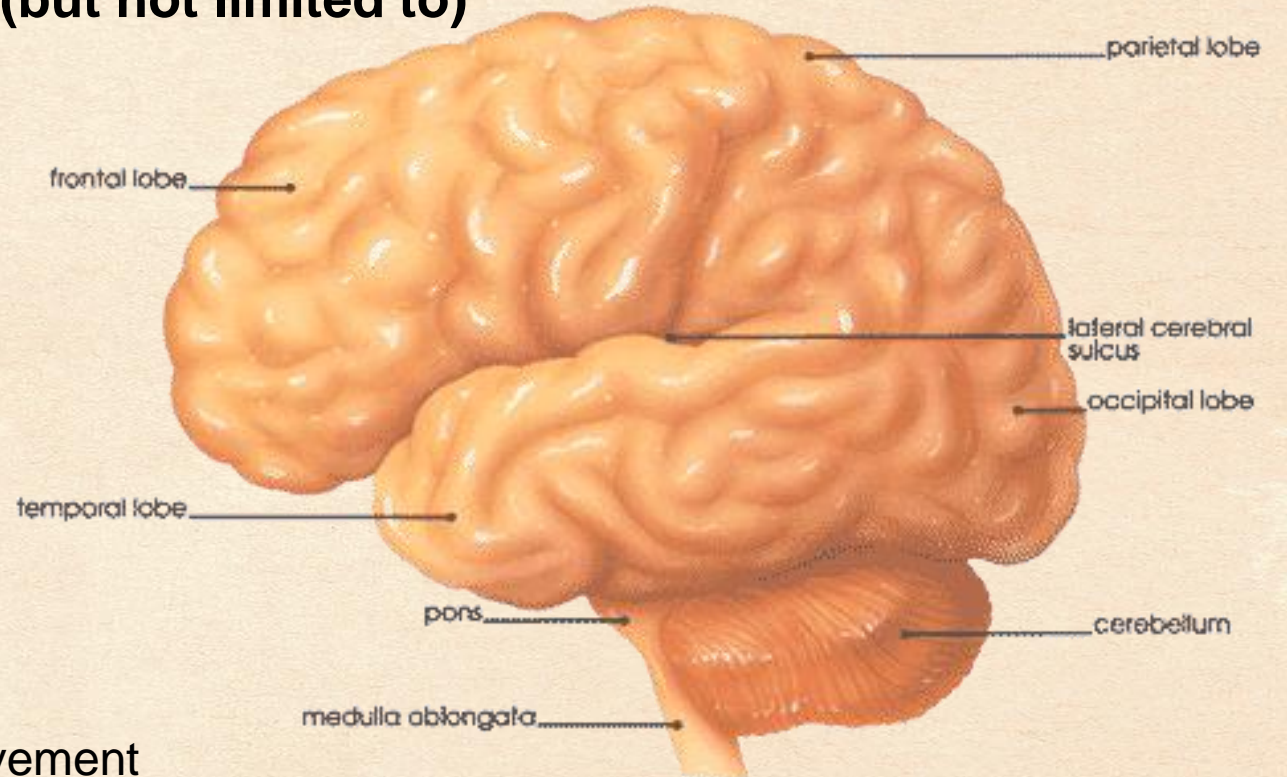
**NEUROFEEDBACK**

**NEUROCOGNITIVE REHABILITATION**

**AUDITORY VISUAL ENTRAINMENT**

**ALPHA-STIM**

Very Honorable Mention: EMDR - Eye Movement  
Desensitization and Reprocessing  
8 Phase intervention, may involve eye movement  
exercises, taps, tones. Find more at [emdr.com](http://emdr.com)







**NEUROFEEDBACK**



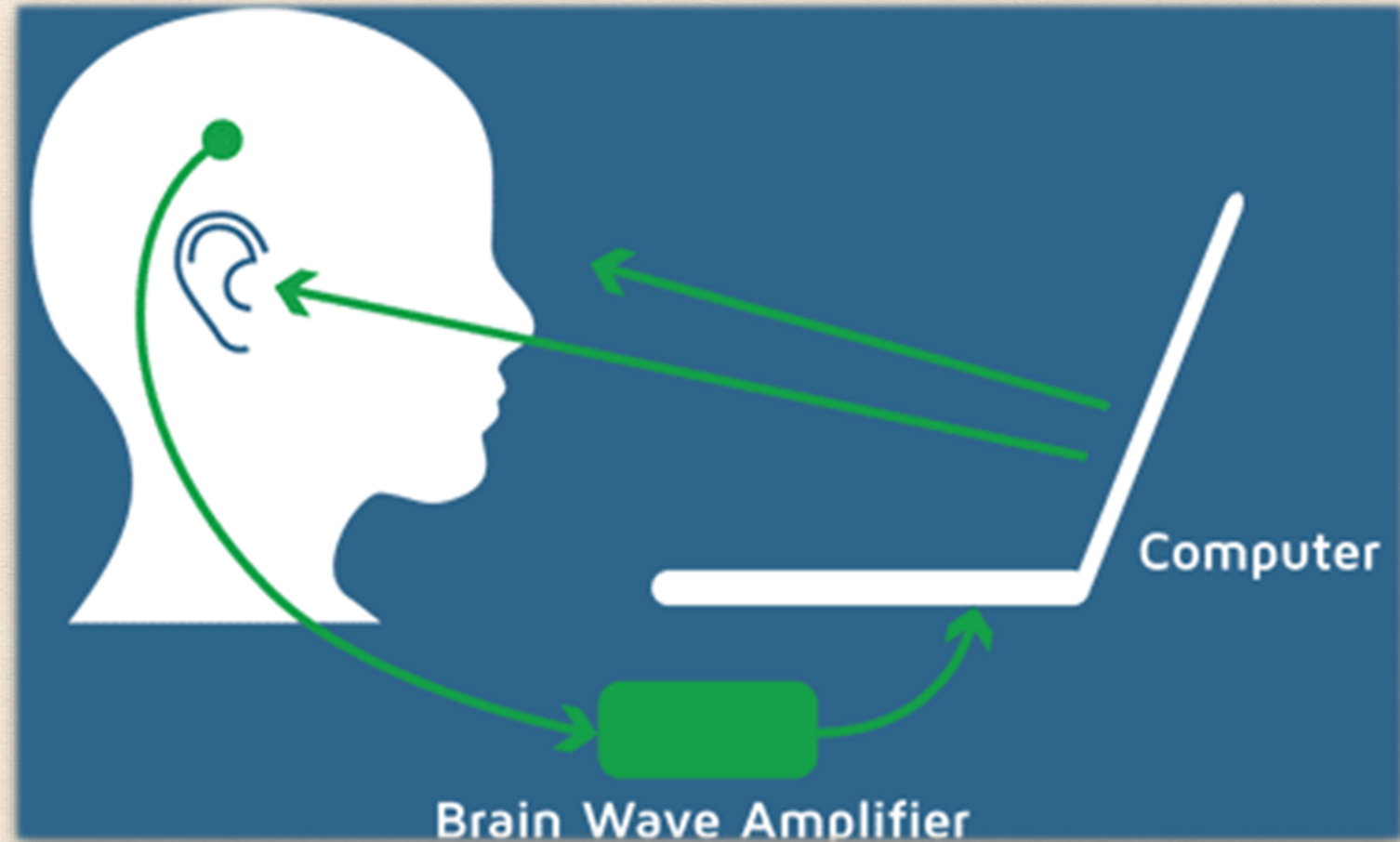




# NEUROFEEDBACK

**Evidence-Based Treatment that can treat many Neurodevelopmental Disorders effectively such as:**

- ADHD/ADD
- Depression
- Anxiety / Stress
- Emotional Trauma
- PTSD
- Traumatic Brain Injury
- Mood Disorders
- Autism Spectrum Disorders
- Migraines
- Other organic brain disorders
- Others...





# NEUROFEEDBACK

Neurofeedback is a brain training educational, treatment, and therapeutic modality with over 60 years of research used to improve brain functioning.

The Academy of American Pediatrics endorsed Neurofeedback as an effective treatment in the treatment of ADHD in 2010.



When analyzing the QEEG / BRAINMAPPING results, a Neurofeedback practitioner can work towards correcting the brainwaves what may be excessive or deficient. As the brainwaves start to become normal symptoms and behaviors are observed to improve. Sensors are placed on the scalp to transfer electrical signals from the scalp to a computer in the form of a game.

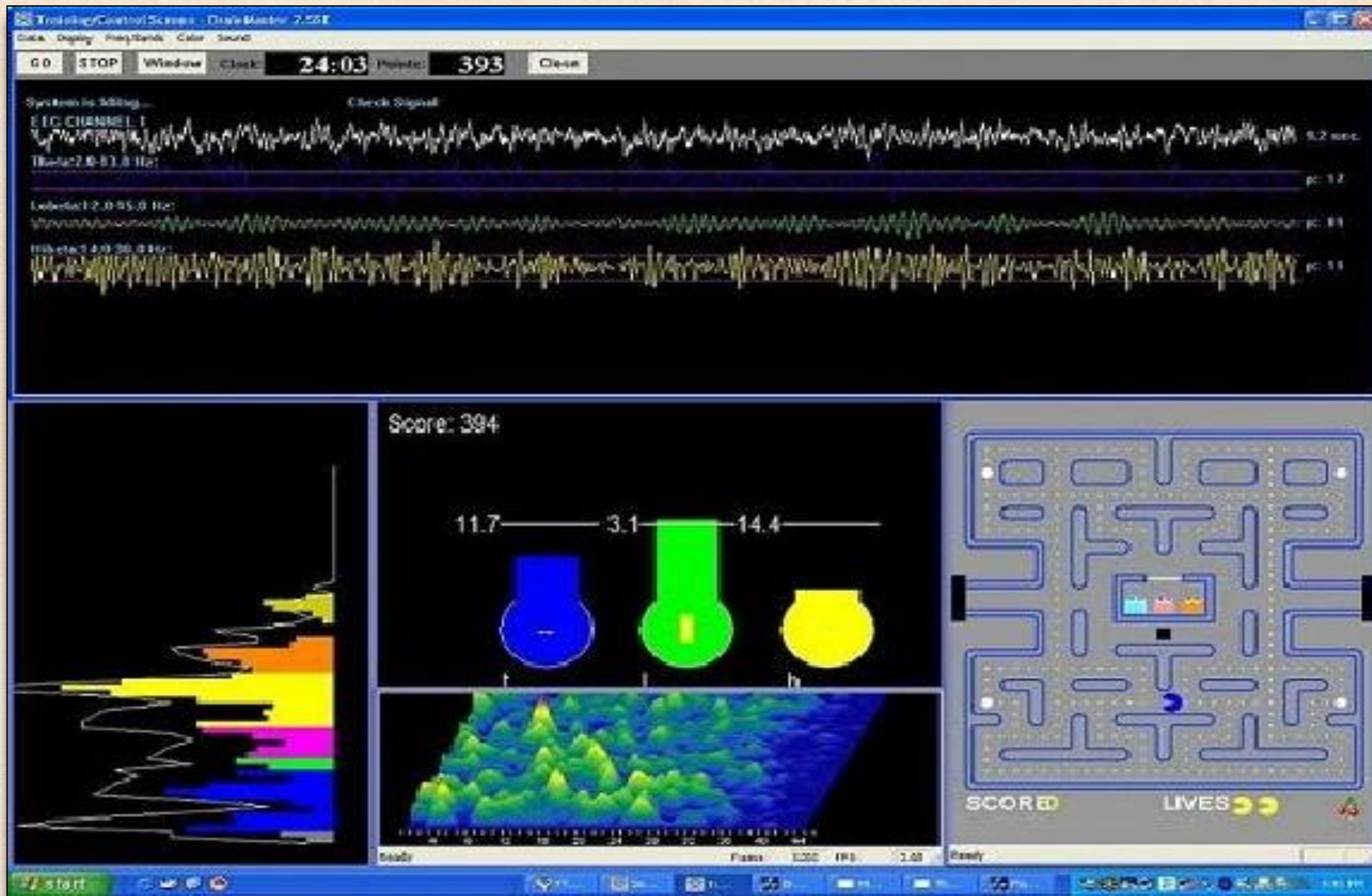


# NEUROFEEDBACK



Sensors are placed on the scalp to transfer electrical signals from the scalp to a computer in the form of a game. The individual can then focus and train their brainwaves naturally and non-invasively.





*This screenshot is from Neurofeedback software (BrainMaster) and shows how a client can train their brainwaves to function correctly.*



# NEURO-COGNITIVE REHABILITATION

Helps with speech, language, logic skills, Working Memory, Auditory Deficits, Visual Deficits, Listening Skills, Impulsivity, and many others cognitive related symptoms.

Can improve symptoms and cognitive ability in individuals who have experienced Trauma which decreases the visibility and observed symptoms associated with Trauma.





# AUDITORY VISUAL ENTRAINMENT

Allows the brain to be stimulated at specific brainwave frequencies during the session.

Specific frequencies are known to help with different symptoms and Neurodevelopmental disorders.

Utilized in the treatment of ADHD, PTSD, Depression, Anxiety, Migraines, and other Neurodevelopmental disorders. It has been described as “exercising the brain”.





# ALPHA-STIM

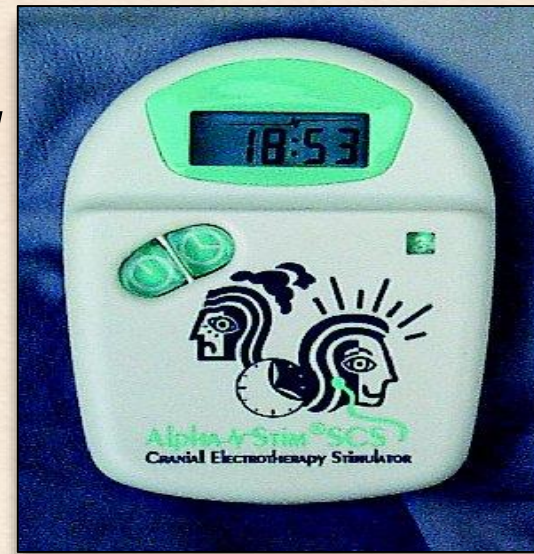
## *CRAINIAL ELECTRO-STIMULATION*

Alpha-Stim is a FDA approved device used to treat anxiety, depression, and/or insomnia. It has been found effective in managing anger and frustration levels as well.

Used just 20 to 60 minutes once a day or on an as-needed basis, it can help induce a relaxed state and enable the user to focus attention on the task at hand.

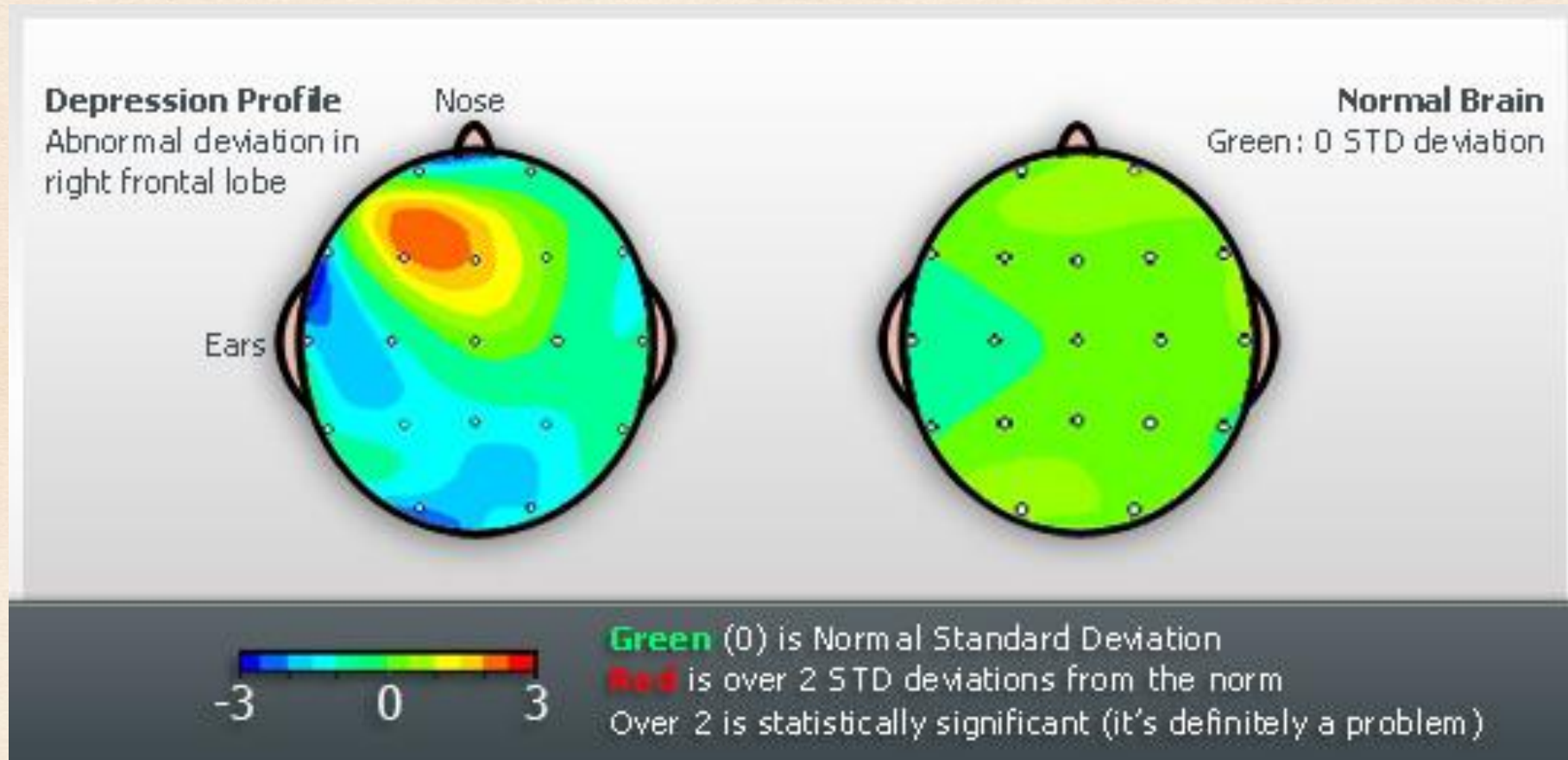
Research and observations show a huge improvement in Traumatized Individuals by using Alpha-Stim.

**Youth at the Inner Harbour Campus have reported being able to focus and control outbursts of anger by using Alpha-Stim.**





# IMPROVEMENTS OBSERVED AFTER UTILIZING NEUROFEEDBACK



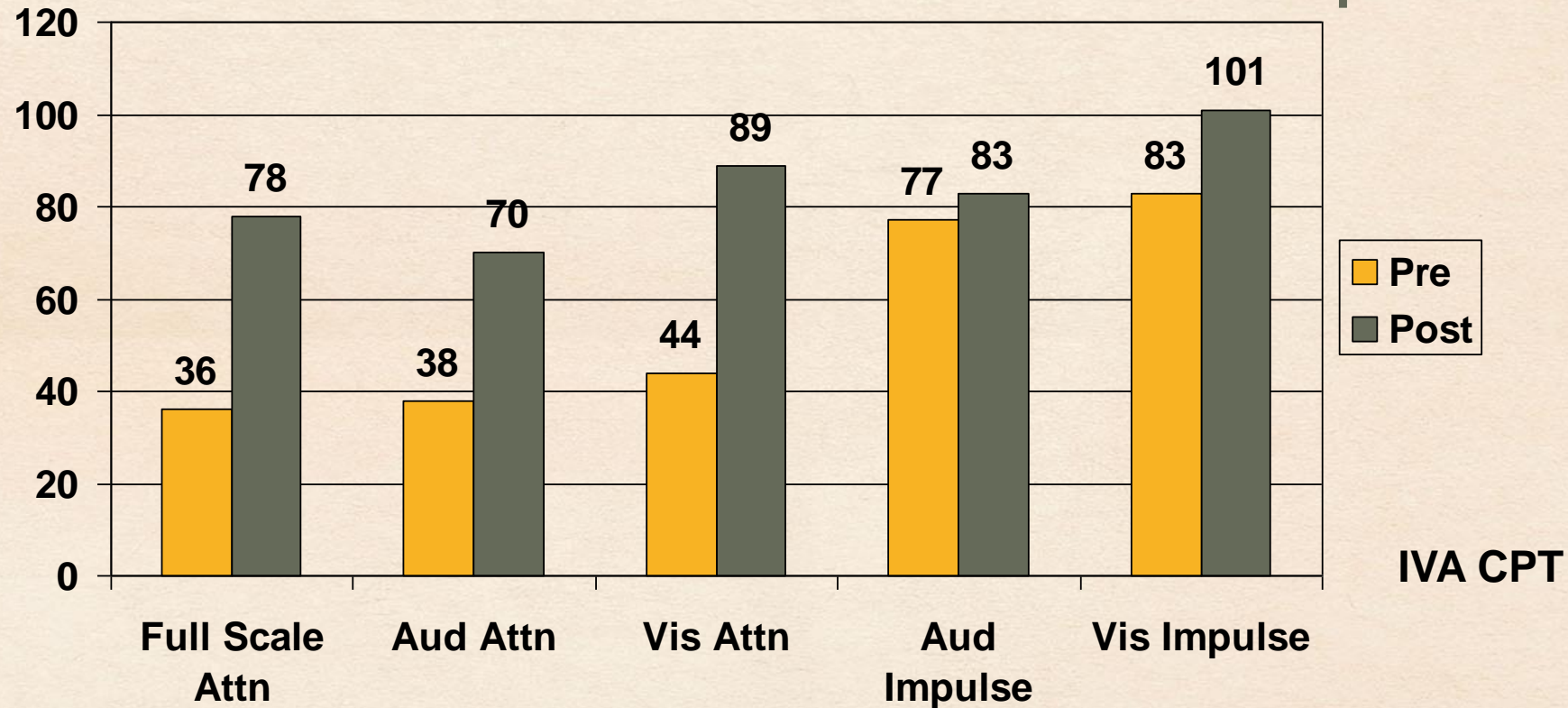


# CASE REVIEW: 13 Yr Male

24 Neurofeedback sessions, 6 Captains Log sessions, 3 Earobics sessions

Child who is inattentive, displays Behavior Problems, Poor Impulse

**More Sessions = More Improvement**



IVA Continuous Performance Test ( 85 and above are within normal limits)

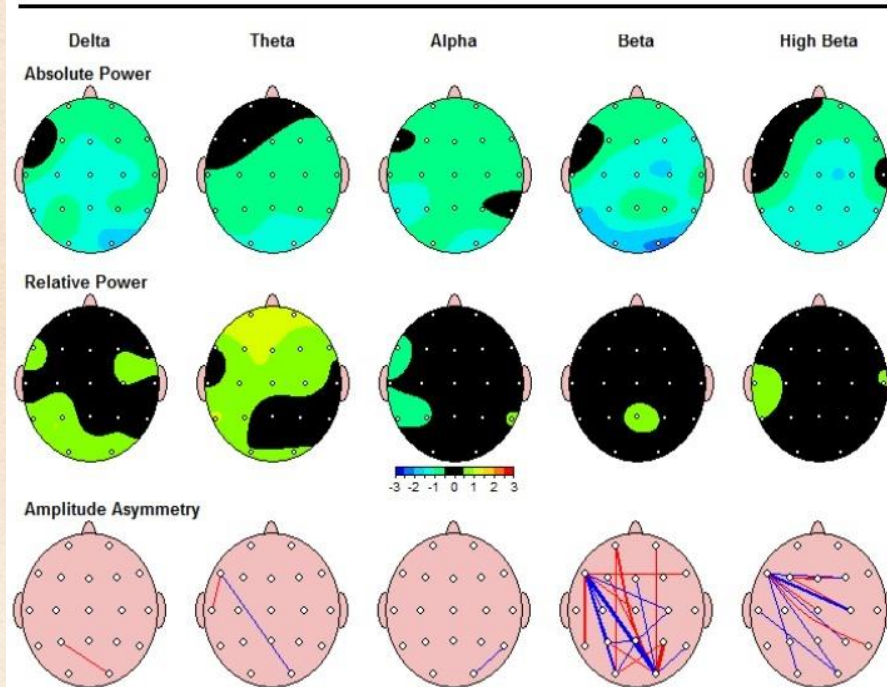


# CASE REVIEW: 16 Yr Male

## Medication Review

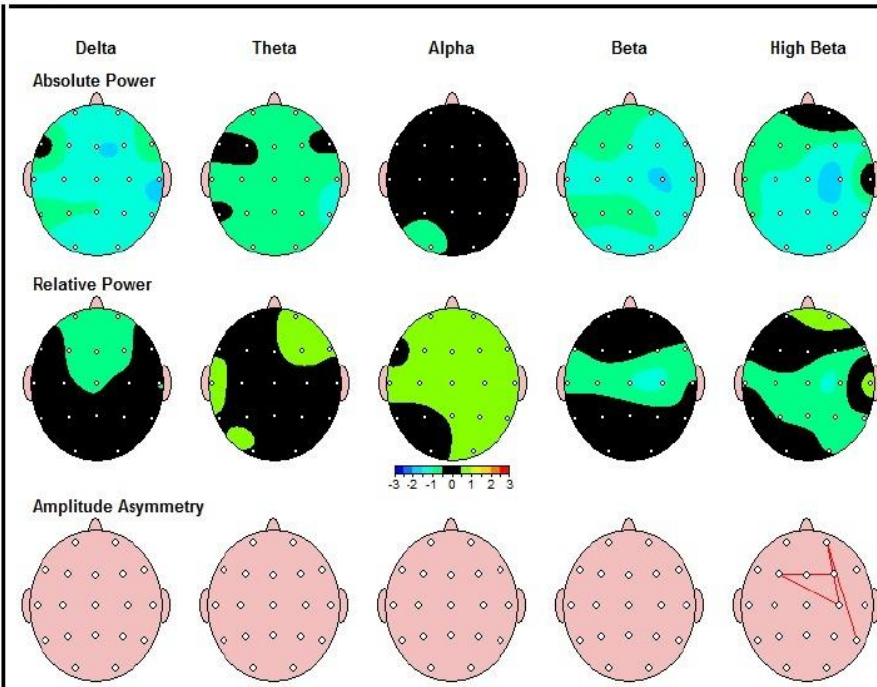
### QEEG - Pre Assessment

Increased/Decreased Beta Asymmetry  
Decreased Occipital Beta  
Slightly Increased widespread Alpha  
Potential TBI - 70% probability in Moderate Range of Severity



### QEEG - Post Assessment

Normalized Beta Asymmetry - (due to recommended medication change utilizing QEEG)  
Improved Occipital Beta  
Normalized widespread Alpha  
No indications of youth falling into a TBI population



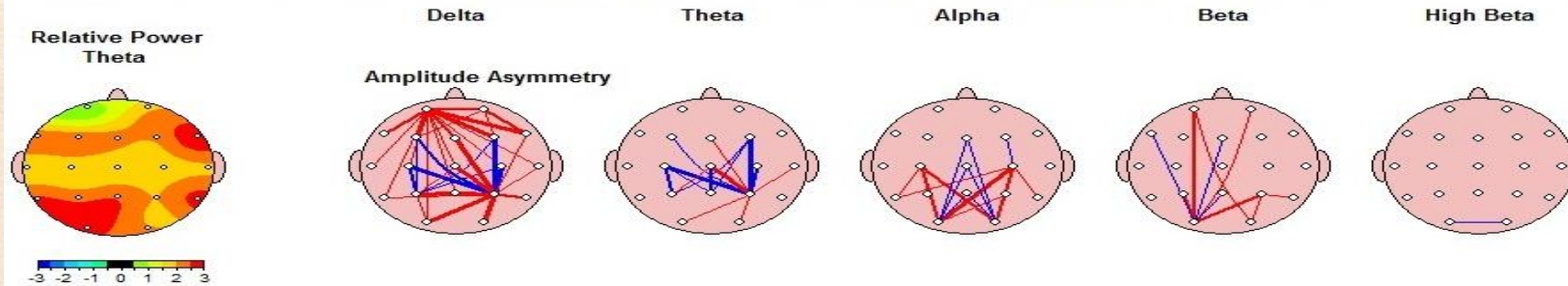


# CASE REVIEW: 15 Yr Male

24 Neurofeedback Sessions

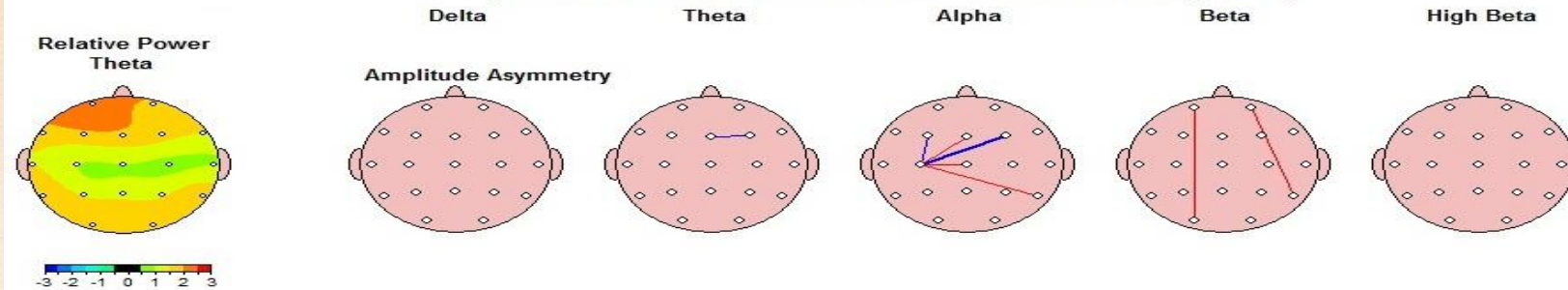
## QEEG/BRAINMAP #1 - PRE TEST

*(Before 24 Neurofeedback Sessions were completed)*



## QEEG/BRAINMAP #2 - POST TEST

*(After 24 Neurofeedback Sessions were completed)*

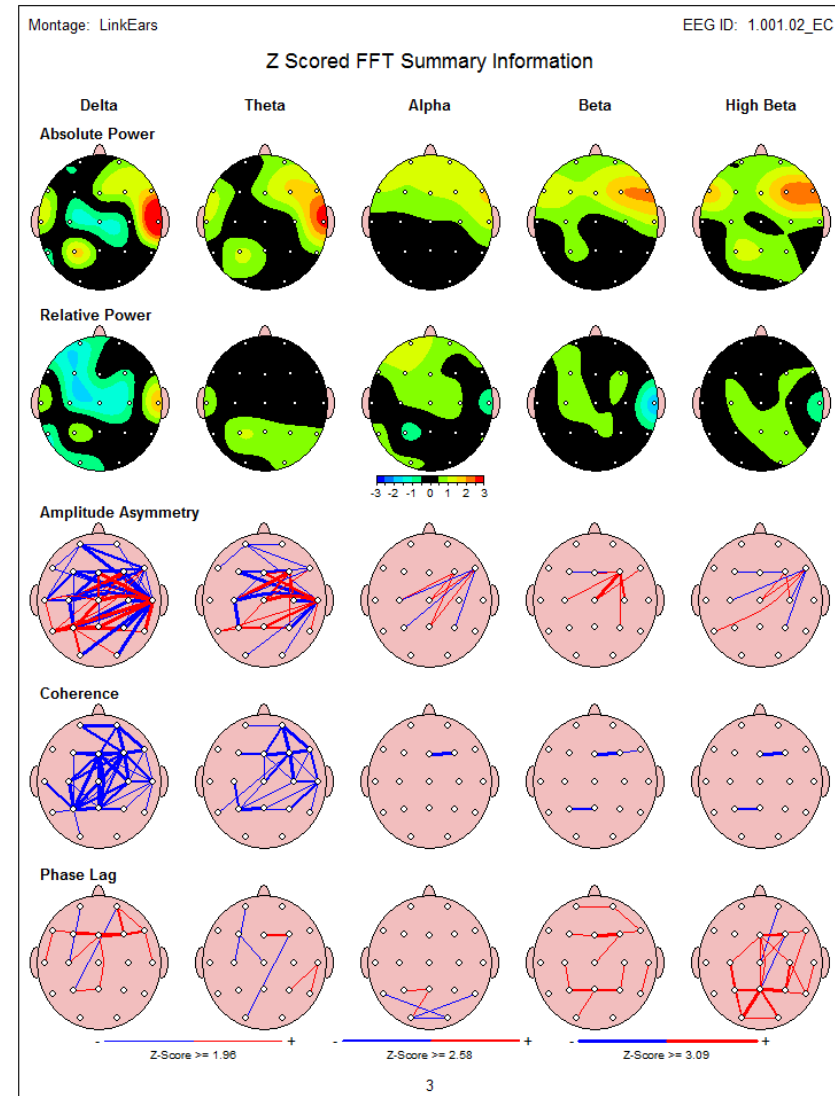
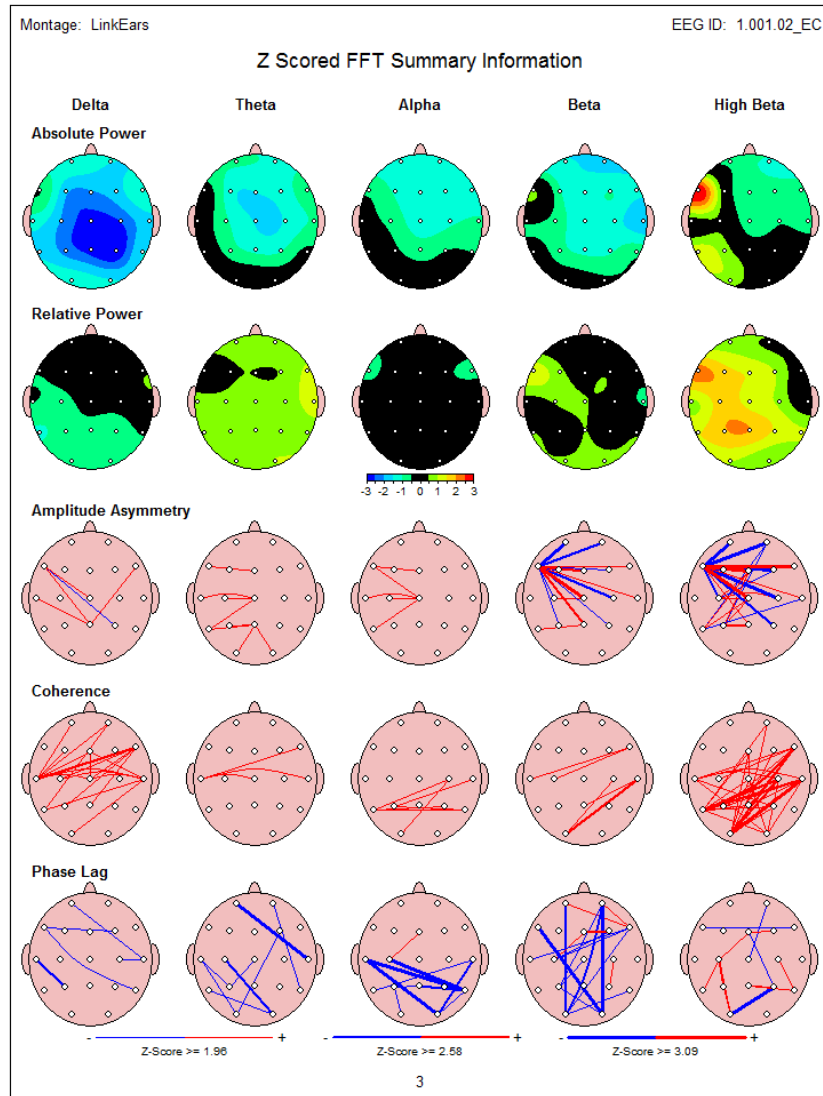


**The changes between the pre and post QEEG/Brainmap suggest an improvement in cognitive functioning, reaction, memory, and other negative symptomologies should be observed. Actual improvements in these areas were observed and documented with this client.**



# CASE REVIEW: 14 Yr Female

25 Neurofeedback Sessions





Treating  
Childhood  
Trauma

YV  
CBS46



# RESEARCH AT YOUTH VILLAGES INNER HARBOUR CAMPUS

- Therapeutic Drumming
- Think:Kids (Collaborative Problem Solving)
- YV Tough Run 5K
- Individual Case Studies
- Alpha-Stim Study (American Academy of Pediatrics)



## Introduction

QEEG / Brainmapping records the EEG (electrical activity) of the brain that gives us a better understanding of how the brain works.

For this research project 4 subjects completed two tests. First, they completed a Pre QEEG/Brainmap before running. Second, they completed a Post QEEG/Brainmap after running the YV Tough Run. The intention was to see what changes in the brain from a Neuroelectrical perspective. We know endorphins and proteins are released during running. We know there is a drop in glucose (glycogen) that depletes neurons and muscle density. We also know that amino acids are altered which require water after running to keep the brain from fatigue. The question that can be asked in this research project is, “What happens to the brain from a neuronal and electrical perspective?”

## The Results

3 out of 4 runners showed positive overall improvements in the brain after running the YV 5K

**Test Subject #1** showed a major improvement in the Delta brainwave frequency, improved asymmetry, and Theta/Alpha frequencies appeared as a calm and normal. This suggests that running helped the subject with increased focus, better brain balance, and helped improved a known neurological condition with the subject.

**Test Subject #2** showed a major improvement in Beta rhythms and normalized Delta rhythms. This test subject was able to show running helped improve mood and emotional trauma that had been observed on the pre Brainmap. A more relaxed and balanced brain is also observed after running.

**Test Subject #3** showed an improvement in frontal Delta and Theta brain rhythms. Good alpha is also observed. This suggests that running helped improve the subjects executive function in the frontal lobe, further suggesting running helped the runner with increased attention, focus, cognitive ability, problem-solving, organization, and other executive function areas.

**Test Subject #4** had the same results on the post Brainmap that were observed on the pre Brainmap. There were small positive changes to asymmetry that may suggest this subject did have some improved brain balance. While no other changes are observed an assumption can be made that running did not have any negative impact on the brain.

## What does this mean?

This small research study implies a further bigger study may be useful in determining more about what happens to the electrical part of the brain when an individual runs and/or exercises. The test subjects of this study suggest that as endorphins are released, neuronal activity improves! Running optimizes brain rhythms which help improve attention, focus, mood, sleep, cognitive ability, executive function, and other symptomologies. As the brain improves on a neuro physiological level, further assumptions and implications can be made such as:

Running helps improve negative symptomologies of ADHD, Bipolar Disorder, Anxiety, Depression, and Trauma

Running helps the brain improve its' balance which further helps the brain function to be more operant

When you run and endorphins and proteins are released, brain chemicals improve electrical firing which improves brain health





# REFERENCES

**Presentation Download available at:  
<http://www.brainbasedservices.com>**

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Evans, J. (2009). Handbook of Neurofeedback: Dynamics and Clinical Applications. Informa Healthcare. New York, NY.

Budzinski, T. et al. (2009). Introduction to Quantitative EEG and Neurofeedback: Advanced Theory and Applications. 2<sup>nd</sup> ed. Elsevier Inc. New York, NY.