Center for Brain Training

Brain 101- Tuning up

Center for Brain Training

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Problem with impulsivity?
A history of poor choices/same mistake?
Little planning or organization?

Where do you target?

Pre-Frontal Lobe
Frontal Lobe
Temporal Lobe
Parietal Lobe

Easily upset or very emotional?
Poor memory retrieval?
Depression?

Where do you target?

Pre-Frontal Lobe
Frontal Lobe
Temporal Lobe
Parietal Lobe
1) Overwhelmed with noise, visual stimuli?
2) Hard time listening and taking notes?
3) Get overwhelmed by too much information?

Where do you target?

- Pre-Frontal Lobe
- Temporal Lobe
- Parietal Lobe

What does neurofeedback help with?

- It only helps with brain issues.
What brain issues?

- Anxiety
- Depression or Overly emotional
- Racing thoughts or Rumination
- Impulse Control
- Poor attention or Concentration
- Sleep
- Migraines

The Primary Recommended Solutions

- Medications
- Psychotherapy

*Sometimes these are recommended*
- Exercise
- Diet
What should be on the list?

• Food and Nutrition
• Rule out Hidden Allergies
• Reduce Sugar, Sugar, Sugar
• Thyroid/Adrenal/Hormones
• Identify and target chronic inflammation
  – High Homocysteine levels are correlated with cognitive problems. CRP is also associated with inflammation.

Brain Nutrition
(A few examples)

• B Complex
• Fish Oil with 1000/500mg EPA/DHA
• Vitamin D (2000 iu to 4000 iu)
• Folic Acid/5MHTF/Deplin
• B-12 sublingual (5000 mcg)

• Lower blood sugar. Very Important!
Brain Nutrition Examples

• Phosphatidylcholine / Phosphatidylserine
• N-Acetyl-Cysteine
• Acetyl-L-Carnitine
• Amino Acid complex
• Sufficient Minerals (Magnesium, Zinc, Selenium
• Pregnenolone
• Piracetam
• Supplements to reduce Homocysteine, an emerging marker of brain inflammation

What else should be on the list?

• Neurofeedback (Brain Training)

• Other neuroregulatory techniques
Research Highlights

• Total research publication: Since 1972, over 400 medical and psychological articles have been published. 78 appeared in PubMed/Medline journals.

• A study in the *J Child Psychol Psychiatry*, with 102 children in 2009 by Gevensleben et al showed significant improvements in the neurofeedback group versus the control group.

• Meta Analysis Arns et al in July 2009. After reviewing the main studies over 20 years, “We conclude that neurofeedback treatment for ADHD can be considered “Efficacious and Specific (Level 5) with a large effect size for inattention and impulsivity and a medium effect size for hyperactivity.”

• A study by Levesque and Beauregard in 2005 used FMRI brain imaging to record an increase in activation over the right anterior cingulate of the brain after neurofeedback training. Controls did not see this change.
What is neurofeedback

• It tunes up your brain by improving timing.

• It helps your brain be more efficient.

Medications don’t teach your brain

• When you stop, you lose all the benefits

• Neurofeedback helps you learn to change your brain – with more positive patterns

• No side effects vs medication
How?
Game provides client feedback

Mazes

Too Much – or Too Little Activity is a Timing Problem

<table>
<thead>
<tr>
<th>Brainwaves</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delta (δ)</td>
<td>Less than 4 cps</td>
</tr>
<tr>
<td>Theta (θ)</td>
<td>4-8 cps</td>
</tr>
<tr>
<td>Alpha (α)</td>
<td>8-12 cps</td>
</tr>
<tr>
<td>SMR</td>
<td>12-15 cps</td>
</tr>
<tr>
<td>Beta (β)</td>
<td>15-18 cps</td>
</tr>
<tr>
<td>High Beta (β')</td>
<td>more than 19 cps</td>
</tr>
<tr>
<td>Sleep</td>
<td>Drowsy</td>
</tr>
<tr>
<td></td>
<td>Relaxed Focus</td>
</tr>
<tr>
<td></td>
<td>Relaxed Thought</td>
</tr>
<tr>
<td></td>
<td>Active Thinking</td>
</tr>
<tr>
<td></td>
<td>Excited</td>
</tr>
</tbody>
</table>

- Depression, ADD, and seizure activity in this range.
- We train the brain to move into this range to modify symptoms of depression, ADD, and improve seizure activity.
A “Small” EEG is More Alert, Awake

This EEG is larger and slower than before. This person’s brain is going too slow. That’s not good.
This brain is alert and awake. Smaller is better.

A disregulated brain often has too much slow activity.
This individual’s eyes are open. Their brain isn’t very alert and awake.

What is neurofeedback

- Innovative biofeedback technology that monitors brain activity
- It helps YOU learn to change your own brain— and brain patterns.
Game provides client feedback

Mazes

Period = 1  Total = 62

How Does Music Make You Feel?
It’s all about Rhythm

When the EEG changes, it means:

– More neurons are doing the same thing at the same time
If the brain is more efficient, you get. . .

- Better attention / focus.
- Better sleep.
- You learn better
- Easier to handle stress, or pain.
- You can accomplish more.

- Things don’t bother you as much.

What Else Can Neurofeedback Help?
Just “Brain Things”

- Memory
- Cognitive function
- Concussions
- Immune Function
- Pain
- Seizures
Role of Center for Brain Training

- Brain Coaching
- Testing
- Neurofeedback/Biofeedback
  - neuroregulation
- Recommendations on brain support options

- How do you IMPROVE your brain

A Brain Scan called the qEEG where problems are.

Slow alpha at the anterior cingulate increases with eyes open. That’s not normal. This man was obsessive.
3 things to learn to understand neurofeedback

1) You can change your own brain
   (just like cats)

2) **Changing your brain (your EEG)**
   can have profound effects

When the EEG changes, so can . . .

- Behavior
- Attention
- Mood and Affect
- Emotional Regulation
- Ability to maintain calm (reduce anxiety)
- Sleep
- Cognition
3 things to learn

1. You can change your own brain (just like cats)
2. Changing your brain can have profound effects

3. Once learned, the effects tend to hold

Training the brain with neurofeedback is learning

- Once anything is learned well, it tends to be hard to forget.
  - Example: If you have learned to ride a bike and then don’t have to ride for 10 years, you don’t have to re-learn it

- Once you learn new EEG patterns - the learning and the effect tend to hold over time
EEG and Neurofeedback Basics

Some details about the EEG, and the implications of using it to train your brain.

ADHD, Depression, and other brain disorders are

Cortical Timing Problems

• Dr. Llinás, chairman of neuroscience and physiology at the N.Y.U. School of Medicine”
• “Abnormal brain rhythms help account for a variety of serious disorders”
“Brain training” (neurofeedback) helps individuals change cortical timing.

That means that “Abnormal brain rhythms” can be changed.

EEG Biofeedback (Neurofeedback) Research

The published research for neurofeedback covers:
- ADHD — Epilepsy
- Anxiety — Addictive Disorders
- Depression — TBI
- Learning Disabilities — Migraines
- Autistic Spectrum Disorders

- Review of research in Hirshberg, Frazier, and Chiu (2005): Child and Adolescent Psychiatric Clinics of North America Jan;14(1)
MetaStudy of EEG Biofeedback for Epilepsy*  Clinical EEG

- 82% demonstrated significant (>30%) seizure reduction, n=174 with studies spanning 24 years
- Average reduction of sz activity exceeded 50%.
- Studies reported reduction in seizure severity.
- About 5% had complete control for up to one year – even when anticonvulsants were reduced or entirely withdrawn.


ADHD Research Summary

- 9 published case series, 327 ADHD subjects, consistent effect size across varied studies

- 13 controlled trial studies – more than 400 subjects
  - Wait list controls
  - Comparison to treatments with established efficacy (stimulants)
  - Three RCT’s, double blind placebo controlled RCT

- Well established measures have been used, and positive results shown in behavioral and neurophysiological measures
Neurophysiological change in the expected direction demonstrated in several studies – fMRI, ERP’S, and EEG

Effect size equivalent to stimulant meds

Effects also demonstrated in normal subjects, using behavioral and physiological measures

EBF effect is specific, based on site and reward frequency

Those who do not learn in training do not improve

Linear relationship between degree of learning through feedback and degree of behavioral and neurophysiological change

Monastra, Monastra, & George (2002)

100 ADHD subjects (6-19)
All received stimulants, parent guidance, academic support in school
Half also received EBF, parental choice
Pre-tx: IQ, rating scales, TOVA, qEEG
1 weekly EBF session: average 43 sessions
• Post Tx repeat rating scales, CPT, qEEG
  – Both before and after 1 week med washout
  – Both EBF and stimulant groups showed signif improvements in TOVA, rating scales, qEEG post treatment
  – Only EBF group maintained gains when reassessed after med washout (p.<01)
  – 2 year follow up, gains endured


Results:
Cognitive/Behavioral Measures
• No change in controls on Conners, IVA, Digit Span, CST
• Significant improvements in EBF group
  – Digit Span p<.05
  – IVA p<.005
  – Conners:
    • Inattention p<.001
    • Hyperactivity p<.05
  – CST: Average Accuracy Score p<.05
Results: fMRI

• Both Control and EBF showed significant activation of left superior parietal lobule (Brodmann area 7) at time 1 and time 2, with no significant difference between T1 and T2

• At T2, only EBF group also showed new significant loci of activation in:
  – Right ACC (BA 32)
  – Left caudate nucleus
  – Left substantia nigra