

The Neuroconnection Celebrates April – Autism Awareness Month

Since the 1970s, April has been recognized as National Autism Awareness month in order to promote Autism awareness and acceptance. According to the U.S. Centers for Disease Control and Prevention, the prevalence of Autism in U.S. children has increased by 119.4 percent from 2000 (1 in 150) to 2010 (1 in 68) (CDC, 2014). As a result, Autism is the fastest-growing developmental disability (CDC, 2008). The professionals at The Neuroconnection understand the significance and impact that these statistics entail. For this reason, we have a special focus on addressing the symptoms of those with Autism Spectrum Disorder (ASD) by utilizing a newer type of brain training called Connectivity-Guided Neurofeedback (CGNFB), which trains the way the brain communicates with itself. This type of training is based on the latest research of neurofeedback with Autism. To date, The Neuroconnection has mapped and trained hundreds of patients with Autism and the results achieved with this type of neurofeedback have been dramatic and lasting.

To highlight Autism Awareness month, we bring you this month's newsletter with an overview of brain functioning differences in the Autistic brain and how using CGNFB, the most advanced form of Neurofeedback, can treat the functional deficits in the brain. The unmatched results for those affected by Autism will also be covered in depth, along with evidence-based research illustrating how a stable pattern of EEG spectral coherence distinguishes children with Autism from neuro-typical controls. A case study concludes this issue, demonstrating how CGNFB has provided success for patients with Autism.



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Upcoming Events

Options Health

Presenter Topic: Introduction to Brain Mapping & Connectivity Guided Neurofeedback: A Non-pharmaceutical Approach for Improving Neuropsychological Symptoms

Date: April 9, 2015

Time: 10:45 a.m. - 12:15 p.m.

Location: Iroquois Room at Kankakee Community College

Cornerstone Services

Presenter Topic: The Benefits of Connectivity Guided Brain Mapping and Neurofeedback for Mental Health Disorders

Date: April 20, 2015

Time: 11:00 a.m.

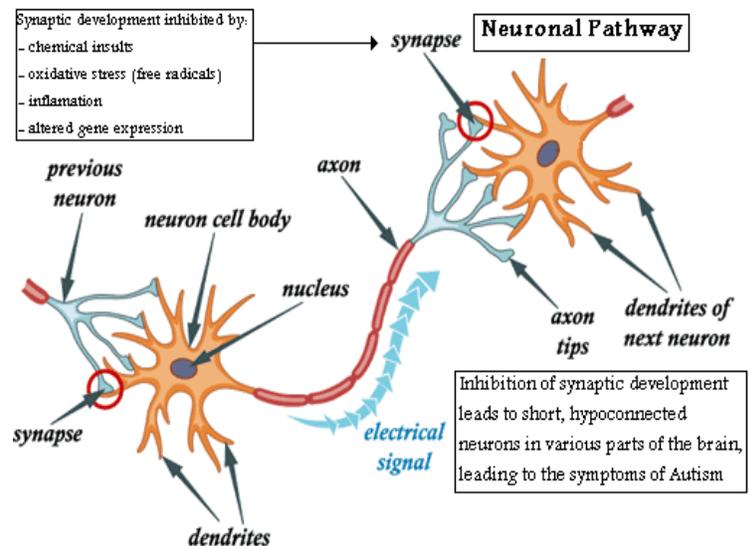
Location: 800 Black Road
Joliet, Illinois 60435

Neurophysiology of Autism

In the last several years, neuroimaging studies including functional MRI, SPECT imaging, PET scans, and QEEG's show that those on the Autism spectrum have abnormalities in function and structure that can be linked to neuropsychological dysfunction. What many of these imaging studies show is that the changes in the brain start after the child is born, during the first years of life. It is thought that Autism is an epigenetic phenomenon, one that environment and genetics has a role in creating. What we know is that at an early age there is an inflammatory process in the body that affects multiple systems and the brain. This inflammation in the brain leads to an expansion of the white matter that has the connectivity fiber in the brain, especially in the middle and frontal sections of the brain.

Neuro-inflammation interferes with the pruning process to perform specialized functions in the brain during development, resulting in areas of "hyper" and "hypo" connection. This interference of the specialization process causes children to essentially get "stuck" or halts the specialization of the brain, resulting in delays. This is shown as areas of hyper and hypo connections on EEG brain maps.

EEG and fMRI studies have all confirmed what EEG recordings in adults with Autism found: a combination of higher than normal neuronal connectivity (hyper-connection) within



Tortora, G.J., Derrickson B. (2010). *Introduction to the Human Body: The Essentials of Anatomy and Physiology* (8th Ed.). Hoboken, NJ: John Wiley & Sons, Inc.

the frontal lobes and lower than normal connectivity (hypo-connection) between the frontal lobes and other brain regions, especially from frontal to more posterior structures (Courchesne & Pierce, 2005). This indicates that with Autism, when one area of the brain is communicating too much with itself, it prevents the other areas from forming proper connections. All of the research on connectivity abnormalities was confirmed in Dr. Coben and Hudspeth's research on EEG connectivity abnormalities which showed up to seven different abnormal connectivity problems in individuals with Autism. It is from their research on EEG connectivity patterns that the development of the most advanced way to treat Autism with Neurofeedback was developed, to improve EEG connectivity and abnormalities in the brain.

*For more information pertaining to the findings noted above, please review the references below.

- Coben, R., & Hudspeth, W.J. (2007). *Mu oscillations in autistic spectrum disorder and their underlying mechanisms*. Unpublished manuscript.
- Coben, R., Hudspeth, W.J., Clarke, A., & Barry R. (2006), September). QEEG in autistic disorders: Power and connectivity analyses. Paper presented at the 14th Annual Conference of the International Society for Neuronal Regulation, Atlanta, GA.
- Courchesne, E., & Pierce, K. (2005). Why the frontal cortex in autism might be talking only to itself: Local over-connectivity but long distance disconnection. *Current Opinion in Neurobiology*, 15, 225-230.
- Duffy and Als: A stable pattern of EEG spectral coherence distinguishes children with autism from neuro-typical controls - a large case control study. *BMC Medicine* 2012 10:64.
- Murias, M., Webb, S.J., Greenson, J., & Dawson, G. (2007). Resting state cortical connectivity reflected in EEG coherence in individuals with autism. *Biological Psychiatry*, 62, 270-273.

EEG Abnormalities in the Autism Population

The prevalence of seizures and epilepsy in Autistic samples is near 36% by some estimates (Danielson, Gillberg, Billstedt, Gillberg and Olson, 2005; Hara, 2007; Hughes & Melyn, 2005; Darmeggian, et al; 2007.). EEG abnormalities are in greater proportion of Autistic children, who regress, than those who do not (Hughes & Melyn, 2005). EEG abnormalities, including paroxysmal events, are present in an even greater number of children on the spectrum than those with seizures. Paroxysms are bursts of abnormal activity characterized by the differences from the normal background EEG. They can take the form of transient – spike and wave discharges, sharp waves, poorly organized high amplitude events and are associated with behavioral/cognitive/attention symptoms, typically, non-epileptic seizures. It is estimated, in reviewing the raw data EEG screening, that 20-30% of Autistics had seizures but when you looked at paroxysmal discharges, anywhere from 10-74% of the Autistic population had this (Coben, 2009) .

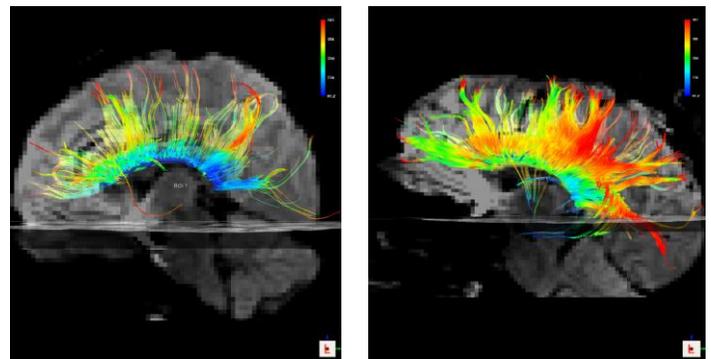
The professionals at The Neuroconnection have a unique way of looking at the abnormalities within the EEG which includes: quantifying them, understanding where they are located in the brain and what symptoms they may correlate with, and then training over epileptiform and non-epileptiform events. It is with this method that we are able to reduce the number and intensity of these events, ultimately then, leading to a decrease in symptoms.

Of critical concern within the practice of neurofeedback with Autism is the use of pairwise coherence connectivities estimates that assume a flat, 2-dimensional space when the space is actually 3-dimensional. This is insufficient because using a 2-dimensional space does not take into account the distance between sites which gives us the correct values to train. Only NeuroRep, a multivariate coherence measurement using principal component analysis developed by Dr. William Hudspeth, correctly assesses the 3-dimensional connectivity measure of waveforms in the brain. It is with this tool, in combination with our spike detection capability reviewed by a trained neurologist, that makes our work with Autism far more accurate and successful with what we train.

Paroxysmal discharges have been associated with underlying morphological brain abnormalities, metabolic disturbances.

*(Shelley, et al. 2008;
Kobayshi, et al. 2006)*

*DTI of Corpus Callosum Connectivity
Patient with Autism (left) and Normal Control (right)*



Provided by Dr. Robert Coben

Results using Connectivity-Guided Neurofeedback for Autism Spectrum Disorder

At The Neuroconnection, we have been utilizing neurofeedback since 2001 and in 2008 we began training our clients using Connectivity-Guided Neurofeedback (CGNFB). The sophisticated CGNFB has proved especially beneficial for those with Autism, as it trains regions of the brain - where neuropathways were supposed to have formed during early development and did not - for better communication and timing. Due to the brain's lifelong plasticity, the brain can change and form new connections at any age. When you have the neuroconnections that allow you to now perform tasks, improvements are seen more quickly.

For instance, speech therapy can be enhanced, children are able to pay more attention and get more out of tutoring, become socially aware and engaged, and often need to join a social skills group to catch up due to their new awareness and interest in peers. Among other results is the ability to transition without disruption, improved eye contact, increased focus, improvement in social skills and social pragmatics, increased calmness and decreased anxiety, improved verbal communication or expressive language, improved receptive language, fewer repetitive behaviors and improved processing speed. Best of all, the improvements seen with training are lasting.

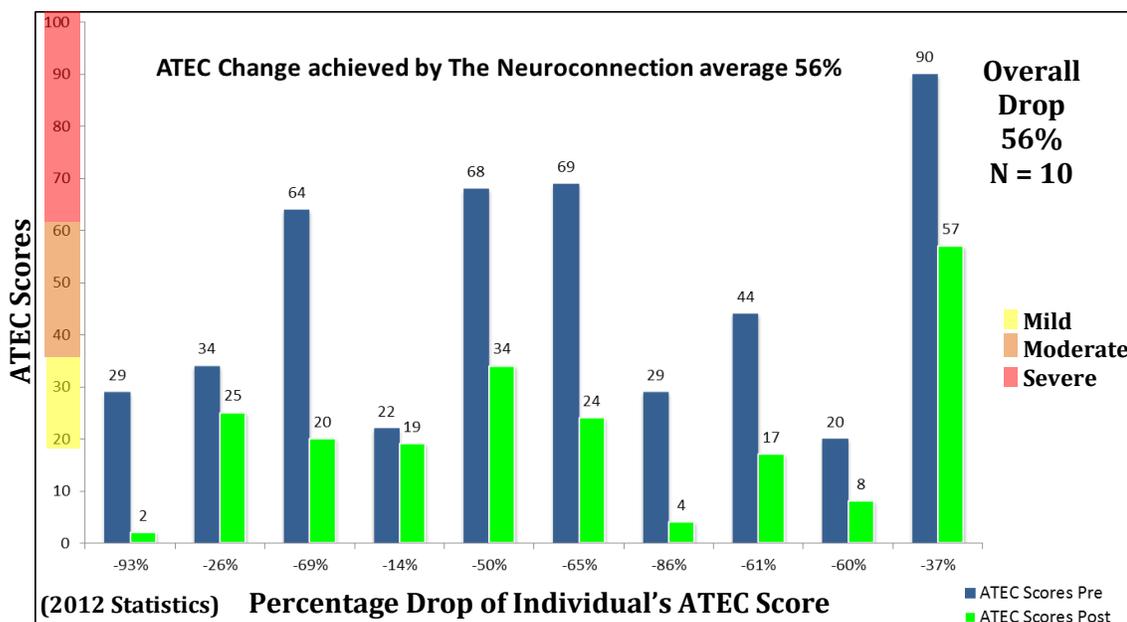
Research Basis for Connectivity Guided Neurofeedback

In 2009, Dr. Robert Coben reported results of a large-scale study of 85 children in an experimental group trained used Connectivity Guided Neurofeedback which study showed a 57% decrease in Autistic symptoms. A follow up of these subjects after one year showed that these improvements held and some subjects made additional cognitive and social gains.

Using this model, we have achieved very similar outcomes to the 2009 study, which included a control group. It's also not uncommon for our clients to be able to come off stimulant medication, antidepressants, and anti-anxiety medication following training.

*For more information on Dr. Coben's 2009 study, please see the following reference:

Coben, R., & McKeon, K. (2009). EEG Assessment & treatment for autism spectrum disorders. *The Autism File*, 32, 10-47.



The Autism Treatment Evaluation Checklist (ATEC) is used to evaluate the effectiveness of treatments for children and adults with Autism. The ATEC scores measure speech, sociability, sensory/cognitive awareness, and health/physical/behavioral measures.

Evidence-Based Research

A large case control study, conducted by Duffy and Als in 2012, utilized 1,304 subjects ages ranging from 1 to 18 years old, assessed with comparable EEG studies. Of the subjects who participated in this study, 463 children were diagnosed with Autism Spectrum Disorder (ASD) and 571 children were neuro-typical controls (C). The study attempts to answer the open question of coherence differences between children with ASD and neuro-typical healthy controls.

Upon care being taken to reduce the effects of EEG artifact upon coherence data, principal component analysis (PCA) identified EEG spectral coherence factors with loading patterns. It was found that classification success suggests a stable coherence loading pattern that distinguishes children with ASD from neuro-typical controls, possibly constituting an EEG coherence-based phenotype of childhood Autism (Duffy & ALS, 2012).

Duffy & ALS (2012) concluded the article by stating “It is speculated that spectral coherence data may prove useful in exploration of similarities and differences within a broader population of Autistic children and adults. Spectral coherence alone may also assist in the early detection of ASD in younger children including infants and/or it might be helpful in concert with additional techniques of EEG analysis such as “complexity” measures among them.” (p. 15-16).

***For more information pertaining to this study, please review the reference below.**

Duffy and Als: A stable pattern of EEG spectral coherence distinguishes children with autism from neuro-typical controls - a large case control study. BMC Medicine 2012 10:64.

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CGNFB Provides Success for Patients with Autism at The Neuroconnection

The Neuroconnection is pleased to announce its recent feature in the Daily Herald, published on February 18, 2015. Written by Janice Youngwith, this article highlights two success stories of children diagnosed with Autism, whom responded positively to our four-channel CGNFB training. Four-channels allow us to speed treatments and in many cases, shorten the path to results. It is great news for our clients and their families because the four-channels create lasting change within half of the number of sessions of the two-channel training that was previously done in our office. Ultimately, four-channel training reduces the number of sessions needed to create lasting change by 50 percent.

A Rolling Meadows family shares their personal success for 6-year old Brenner Zeek. A combination of both right and left hemisphere training brought upon amazing changes. "Diagnosed with an autism spectrum disorder at age 3, Brenner wasn't speaking or making eye contact, was socially withdrawn," reports his mother, Nicole. "We had just moved to Rolling Meadows from Naperville when my husband, Christopher, recalled seeing an article on Connectivity Guided Neurofeedback training."

Brenner's first protocol focused on the right hemisphere of his brain, in order to target an area responsible for anxiety, poor social skills, disinterest in other kids, poor eye contact, and inattention. "Following just 10 sessions, we started to notice a considerable decrease in hyperactivity and impulsivity," recalls his mother who says her son seemed to have fewer emotional outbursts, wasn't jumping off furniture, could occasionally sit for a time, and became more flexible and socially appropriate. She reports that the biggest plus was that Brenner was finally able to start sleeping through the night.

"I was skeptical at first, but by the time he returned to school in the fall, even his teachers were amazed by his newfound ability to sit still, concentrate, and focus on lessons," she reports. "They didn't think he could be the same child they had seen just a few months previously!"

According to his mother, Brenner's first-grade teachers at Marion Jordan School in Palatine reported improvements and he started having some great days. "Even though we worked on the right side, his speech also started to improve and he began using more novel sentences and more words."

Upon remapping, Brenner did show improvements on both sides of the brain. We then did additional sessions on both hemispheres, as Brenner continued to make significant and steady progress. His hyperactivity decreased, focus increased, he was able to demonstrate more knowledge of and use of words, had less scripting, and was better able to follow novel commands.

Overall, Brenner's parents reported a 52 percent drop in Autism symptoms with just 30 sessions of the four-channel CGNFB. Brenner's mom reports, "Our last brain mapping results were amazing." She also shares that money spent on the four-channel CGNFB was an investment in her child and she is already seeing a giant return on that investment.

New on the Mouse, Finner: Four Channel Connectivity

New guided therapy speeds brain training

By Janice Youngwith

There's good news for the parents of children with autism: a new type of brain training called connectivity guided neurofeedback (CGNFB) is helping speed up the process of brain training. The new therapy, which is based on the science of brain connectivity, is being used by a growing number of parents and therapists. It's a non-invasive, non-pharmaceutical approach that's been shown to be effective in helping children with autism improve their social skills, communication, and focus. The therapy is based on the science of brain connectivity, which is the way that different parts of the brain are connected to each other. In children with autism, these connections are often disrupted, leading to the symptoms of autism. CGNFB helps to restore these connections, which can lead to significant improvements in a child's behavior and social skills. The therapy is based on the science of brain connectivity, which is the way that different parts of the brain are connected to each other. In children with autism, these connections are often disrupted, leading to the symptoms of autism. CGNFB helps to restore these connections, which can lead to significant improvements in a child's behavior and social skills.

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*To read the full length article, please see the reference below:
 Youngwith, J. (2015, February 18). New guided therapy speeds brain training. *The Daily Herald*, pp. 12, 13.

Learn more about The Neuroconnection's director:

Ann L. Rigby, MSW, LCSW, BCN has over 25 years of experience in the mental health field. She has specialized training and extensive experience in the areas of Autism, Attention Deficit Hyperactivity, Anxiety, and Mood Disorders. Ms. Rigby has been providing Neurofeedback services since 2001. She founded "The Neuroconnection", a Brain Mapping and Neurofeedback clinic that provides an advanced, research-based form of Neurofeedback known as Connectivity Guided Neurofeedback.

Ms. Rigby is the Board Chair for the Autism Society of Illinois and is a field placement instructor for graduate students from Benedictine University. She holds memberships with the International Society for Neurofeedback and Research (ISNR), the Association of Applied Psychophysiology and Biofeedback (AAPB), the Biofeedback Certification Institute of America (BCIA), and the National Association of Social Workers (NASW).

Ms. Rigby is a frequent speaker and exhibitor at many national and regional conferences throughout the year on topics related to the benefits of Connectivity Guided Neurofeedback. In the past year, Ms. Rigby spoke at the following conferences: The 45th Autism Society of America National Conference, The Special Needs Expo, The Family Time Magazine Autism and Special Needs Seminar, and the Autism Society of Illinois 10th Annual Parent and Professional Networking Conference.

To learn more about up and coming speaking engagements, go to our website www.theneuroconnection.com and visit our Resources tab.



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