the Neuroconnection News

Edition 5, Volume 2

February-March

The Neuroconnection

TBI Quick Facts:

- It is estimated that 1.7 million people sustain a TBI annually
- TBIs make up a third of all injury-related deaths in the US
- Age groups highest at risk for TBIs are children aged 0-4, older adolescents aged 15-19, and adults aged 65 years and older
- Falls are the leading cause of TBIs
- Motor vehicle-traffic injuries are the leading cause of TBI-related death

Source: Center for Injury Prevention and Control (2016), Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations and Deaths 2002-2006. Retrieved February 26, 2018, from https://www.cdc.gov/traumaticbraininjury/tbi_ed.html

The Benefits of Connectivity-Guided Neurofeedback: Traumatic Brain Injuries

Credit: Kids Bike Center

Traumatic brain injuries (TBIs) are head injuries that result in changes in personality or mental abilities with symptoms that can appear right away or take weeks to months to emerge. TBIs are quite common injuries, but often times go unnoticed and left untreated, thus it is important to know and recognize the causes and underlying symptoms of TBIs, as their severity could impose lifelong changes that may dramatically affect the person's ability to function in their everyday life. In this edition, we break down the common warning signs and symptoms that identify a TBI, and offer insight into an effective treatment for addressing the damage sustained.

Inside this issue:

What are TBIs?

Traumatic Brain Injuries or TBIs are head injuries that have immediate or delayed consequences affecting physical, cognitive, emotional, and behavioral areas in one's life. Even after hospitalization and receiving inpatient rehabilitation services, half of those diagnosed with a TBI will exhibit further health issues.

Credit: American Migraine Foundation

Long-term negative effects of TBI can make those with TBIs more likely to die from:

Seizures

Accidental Drug Poisoning

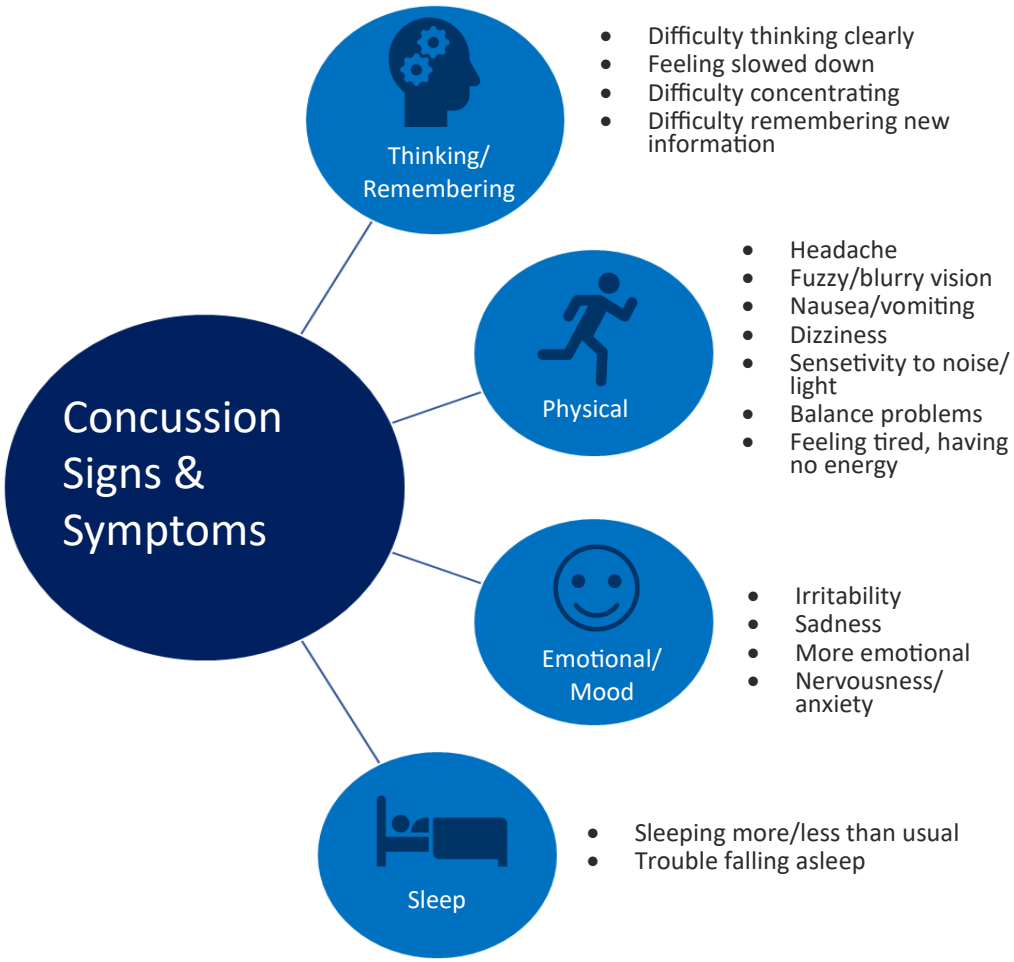
Infections

Pneumonia

Credit: Centers for Disease Control and Prevention

Common Signs & Symptoms– Concussions and Brain Injuries

A concussion is a type of TBI caused by a blow to the head or a violent shaking of the head and body. Those that have had a concussion before are at greater risk for developing another and may take longer to recover. Below are common signs and symptoms seen in those with concussions and brain injuries.



Sources:

Centers for Disease Control and Prevention (2016). Facts about Concussion and Brain Injury. Retrieved February 26, 2018 from https://www.cdc.gov/traumaticbraininjury/pubs/index.html

TRAUMA TO THE BRAIN

Traumatic brain injuries result in physiologic changes to the brain. Many factors such as age, severity, and location of the injury dictate the recovery process per individual. While no two brain injuries are alike, they do stem from four different types of injuries: closed head injuries, penetrating injuries, anoxic injuries, and toxic injuries. **Closed head injuries** are injuries where the brain tissue impacts the inside of the skull, causing bleeding, bruising, tissue damage, neurochemical changes, and increased pressure or fluid buildup. **Penetrating injuries** involve open fractures of the skull and cause damage to neurons. **Anoxic injuries** happen when there is not enough oxygen being supplied to the brain resulting in brain cell death. **Toxic injuries** are due to being exposed to toxic chemical agents that cross the blood-brain barrier and damage brain cells. No matter the type of injury, rehabilitation and therapeutic interventions are vital in for the brain to recover and repair damages.

Behavioral changes are not uncommon for those who suffer from a TBI. The reason being largely has to do with the location of the injury. Often times, those with frontal lobe damage experience anger and aggression as a result of reduced impulse control caused by the lesions. They may overreact in situations, get angry without being provoked, or behave in socially inappropriate ways. Those with brain stem injuries are likely to have issues regarding motor control, such as having trouble standing, walking, lifting, writing, or doing other normal daily activities.

Mild TBI

a brain injury causing a brief change in mental status (confusion, disorientation or loss of memory) or loss of consciousness for less than 30 minutes

symptoms: cognitive problems such as headache, difficulty thinking, memory problems, attention deficits, mood swings and frustration

Severe TBI

a brain injury resulting in a loss of consciousness of greater than 6 hours; loss of consciousness for more than 30 minutes and memory loss after the injury or penetrating skull injury longer than 24 hours

symptoms (variable): deficits range from impairment of higher level cognitive functions to comatose states; may have limited function of arms or legs, abnormal speech or language, loss of thinking ability or emotional problems

Sources:

Neurologic Rehabilitation Institute (2015). Frequently asked questions about brain injury. Retrieved February 27, 2018 from http://www.traumaticbraininjury.net/faqs/

Traumatic Brain Injury.com, LLC (2006). Understanding TBI. Retrieved February 26, 2018, from http://www.traumaticbraininjury.com/understanding-tbi/

What is Connectivity-Guided Neurofeedback?

- **Connectivity-Guided Neurofeedback (CGNFB)** is an advanced form of Neurofeedback (NFB) that allows the brain to make changes in brain wave patterns, across cortical regions, in order to develop more functional neuropathways. CGNFB is more accurate than traditional NFB because it measures the neuronal network activity in three dimensions across regions, unlike traditional NFB which only trains specific sites. This allows for improved communication within the brain and in turn, decreases neurologically rooted symptoms.
- Traumatic Brain Injuries, Anxiety, Depression, ADHD, and other problems impacting one's every day life have specific patterns that are shown in the connectivites in QEEG Brain Maps that improve with CGNFB training. Typical functional improvements include: improved focus, attention, and cognitive abilities, improved mood and behavior, increased learning capacity and academic performance, and better sleep regulation. Because CGNFB creates new neurons/networks, changes in the brain are lasting, with none of the adverse side effects that may be experienced with medications.

WHO CAN BENEFIT?

- Mood Disorders
- Attention Deficit Disorders
- Autism Spectrum Disorders
- Obsessive Compulsive Disorders
- Learning Disabilities
- Seizure Disorders
- Traumatic Brain Injuries
- Post-Traumatic Stress Disorder

CGNFB greatly improves treatment outcomes and differs from traditionally neurofeedback by achieving results in half the number of sessions. Training the brain with neurofeedback has resulted in dramatic and lasting improvements for the following conditions:

Improvements from CGNFB for these conditions are often notable in the areas listed below:

-Attention
-Shifting attention
-Executive functioning
-Following directions
-Organization
-Sensory sensitivity
-Mood
-Anxiety
-Behavior
-Obsessive thinking
-Sleep
-Social skills
-Motor skills
-Phonetics and semantic language
-Reading comprehension
-Word fluency
-Processing speed
-Speech and language ability
-Grammar and writing ability
-Handwriting
-Spelling
-Math ability
-Test performance

EVIDENCE-BASED RESEARCH

EEG Neurofeedback Therapy: Can it attenuate brain changes in TBI?

While previous research has confirmed the efficacy of neurofeedback (NF) to alleviate a variety of neuropsychological symptoms, few studies have explored the in-vivo structural and functional changes that occur following traumatic brain injuries. This overview of a recent study, performed by the National Institute of Mental Health and Neurosciences, provides concrete evidence of improved structural and functional connectivity changes among moderately injured TBI patients after

Methods

The following study's participants suffer from diffuse axonal injuries in the aftermath of their road traffic accidents. Diffuse axonal injurie (DAI) are brain injuries that incur extensive lesions in white matter tracts over a widespread area. They are one of the most common pathologic conditions of TBIs but do not show up well on CT scans, however they are often found in patients with symptoms of unconsciousness. DAIs lead to brain swelling, blood-brain barrier damage, and cell death.

Patient 1: 20 year old male; road traffic accident; lost consciousness for nearly one hour and experienced a left ear bleed following the incident. A CT scan taken 12 hours after the injury showed normal brain parenchyma and bone architecture with a possible diffuse axonal injury.

Patient 2: 12 year old female; road traffic accident; lost consciousness for approximately one week and experienced left and right ear bleeds, as well as traumatic amnesia, following the incident. Her CT scan was taken within 24 hours and showed features of a DAI.

According to their Glasgow outcome scores (GOS), both patients in this study were categorized as moderately disabled, which defines individuals who are disabled but capable of being independent and may work in a sheltered setting (Trauma.org). Each exhibited concussion symptoms such as headaches, dizziness, sensitivity to noise and light, poor concentration, angry outbursts, fatigue, and memory disturbances. Additionally, both individuals experienced a difficult time interacting with others after their accident. Upon neuropsychological evaluation, deficits were identified in motor speed, mental speed, category fluency, visuospatial working memory, set shifting ability, verbal encoding and retrieval, and visual memory for both patients.

For the purpose of the study, each patient completed 20 sessions of neurofeedback for 40 minutes a day, three days a week, over the course of two months. MRI scans were taken one week before and after treatment, as well as pre- and post- neuropsychological assessments.

Results

Following neurofeedback treatment, both patients showed significant improvement in all tested areas of cognitive functioning, as well as substantial reduction in concussion symptoms. MRI scans also indicated structural increases in grey and white brain matter, which is known to aide in synaptic plasticity.

Conclusion

Since traumatic brain injuries weaken the brain on both the structural and functional levels, victims of TBIs often continue to experience severe cognitive and somatic impairment long after their initial damage. The results of this study, however, confirm that treatment with neurofeedback can serve to combat such devasting effects of TBIs and has the potential to prevent further deterioration within the brain. Furthermore, considering many mental disorders seem to be driven by damaged or abnormal neural connectivity, it is reasonable to suggest that neurofeedback may serve as an effective modality for alleviating a wide range of symptoms associated with neurologic dysfunction.

For more information pertaining to these findings, please review the reference below:

Van der Kolk, B.A., Hodgdon, H., Gapen, M., Musicaro, R., Suvak, M.K., Hamlin, E., & Spinazzola, J. (2016). A randomized controlled study of neurofeedback for chronic PTSD. PLoS ONE 11(22): e0166752.

The Neuroconnection Case Study

Taylor*, a 50-year-old father, self-referred, sought help at The Neuroconnection in hopes of addressing his presenting symptoms of anxiety, poor focus, mood instability, and worsening short term memory after suffering a head injury a few years prior. During the initial intake, Taylor revealed multiple instances in which he sustained significant injury to his head, including frequent boxing in his early twenties, an accident 15 years prior that resulted in direct impact to his face, and a recent collision on a bike, in which he lost consciousness after being hit by a car. Recently, it had become increasingly apparent to Taylor that the trauma he endured was negatively impacting his cognitive abilities, particularly when trying to concentrate or recall recently processed information. At the time, self-reported Becks' inventories confirmed Taylor was suffering from anxiety and depression, which were also likely acquired from his previous head injuries.

In addition to the cognitive setbacks, Taylor stated that his ongoing symptoms bore an exhaustive weight on his mood. Since his recent accident, he found himself becoming increasingly irritable, quick to anger, and often depressed, which inevitably aggravated frequent insomnia and overall lack of well-being. Looking to clear this mental "fog", Taylor was eager to begin Connectivity-Guided Neurofeedback (CGNFB) training with The Neuroconnection.

To begin, Taylor was administered a QEEG to identify the neurological irregularities, in both connectivity and power, that correlated with his clinical symptoms. Analysis of his QEEG data revealed increased slow wave activity across frontal and posterior regions of the brain, as well as hypo-connectivity along the left hemisphere. As expected, these findings corresponded to the deficits Taylor was experiencing with executive functioning and mood irregularities, respectively.

A left-sided training protocol, individualized to target these abnormalities, was subsequently assigned to Taylor for a total of 10 CGNFB sessions. Upon completion, Taylor recognized substantial reduction in anxiety, agitation, and depressed mood. He had clearer thinking, less frequently clouded by racing thoughts, and noticed he was displaying more appropriate responses to the people and events around him. To verify the symptomatic gains he reported, Taylor was administered a remap QEEG to determine the neurological gains made thus far, as well as to detect if further training may be needed. Evaluation of his results indicated Taylor had significant decrease of frontal and posterior slowing, in addition to heightened connectivity across his left hemisphere. Despite marked improvements, further training was advised in order to completely normalize the residual slow-wave amplitudes and hemispheric hypo-coherence that remained. Since Taylor also acknowledged lingering concern for his lack of sleep and inconsistent focus, he agreed additional neurofeedback would be of benefit.

Continuing training, Taylor was assigned a protocol to target abnormalities that presented in both the right and left hemispheres of his brain on his remap QEEG. After finishing his second protocol, Taylor was overjoyed with the considerable gains he noticed. His insomnia had made drastic strides, as he now experienced no difficulties falling or staying asleep. Taylor also noted his fogginess was completely gone. He reported feeling "much more clear headed", applying not only to his concentration and ability recall information, but also in terms of controlling his emotional state. Updated Beck's inventories confirmed Taylor's training had enabled an 80% decrease in anxiety symptoms, while eradicating 100% of his prior depressive symptoms. The Neuroconnection received a one-year follow-up from Taylor reporting that his improvements had not just sustained, but he had continued to make further gains with his anxiety, focus, and symptoms of depression. Taylor remarked he "no longer has the anxiety [he] did before" and feels motivated for his future ahead.

*****Name has been changed to maintain confidentiality*

More on The Neuroconnection:

Upon seeing such excellent results in the past 10 years with Connectivity-Guided Neurofeedback (CGNFB), our professionals aimed to extend access to training for those outside of our geographic area or inflexible schedules. As a result, The Neuroconnection designed an @ Home Training program to offer CGNFB sessions in the convenience of your home. For five years, we have been able to provide our expertise and therapeutic treatment to families across the world. The opportunity for daily neurofeedback training at home has brought successful results for clients living as far as Russia and India.

Meet Our Director:

Ann L. Rigby, MSW, LCSW, BCN has over 30 years of experience in the mental health field. 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 Past Board Chair for the Autism Society of Illinois. She is a fellow and Board Certified member of The Biofeedback Certification International Alliance. She is also a field placement instructor for graduate students at Benedictine University and holds memberships with the International Society of Neurofeedback and Research (ISNR), 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.

the Neuroconnection
Brain Mapping and Neurofeedback

The Neuroconnection
1813 North Mill Street, Suite H
Naperville, IL 60513

Phone: (630) 858-5105
Email: arigby@theneuroconnection.com

Request more information from The Neuroconnection website!

www.theneuroconnection.com

