Concussion: A Guide for Parents

Brain Injury Alliance CONNECTICUT

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There is more at stake than just the game.

When in doubt, sit it out.

ADVOCACY SUPPORT EDUCATION OUTREACH PREVENTION

Concussion: A Guide for Parents

This publication was developed by the Concussion in Youth Sports Steering Committee of the Brain Injury Alliance of New Jersey (BIANJ).

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We also want to thank the many young athletes who have shared their stories and experiences, told of their struggles and successes, persevered through recovery, and taken steps to educate and support their peers.

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Table of Contents

Chapter 1 ***The Scope of the Problem*** 2

Chapter 2 ***Recognizing Concussions*** 3

Chapter 3 ***Causes of Concussion*** 5

Chapter 4 ***Long-Term Effects of Concussion*** 7

Chapter 5 ***Diagnosing Concussion*** 8

Chapter 6 ***Treating Concussions*** 11

Chapter 7 ***Return to Learn, and then Return to Play*** 12

Chapter 8 ***Looking Ahead: The Frontiers of Science*** 14

Chapter 9 ***Students and Athletes as Advocates*** 14

Terms and Definitions 16

Introduction

Members of the Concussion in Youth Sports Steering Committee of the Brain Injury Alliance of New Jersey (BIANJ) created this guide to help families when a child is diagnosed with a concussion or when an event occurs and a concussion may be suspected. It was developed to help guide parents of children who are recovering from a concussion, to educate them about concussion, and to describe some of the complexities of concussion management. The goal for this publication is to provide current, unbiased information about concussion in the absence of any media or marketing influence. The authors hope you find this book useful and informative.

The terms, as used in this booklet, "parents" and "families" include biological, adoptive, single parent, extended and any other familial arrangement. This resource may be valuable for anyone who cares for a child with a concussion and may need some help managing the recovery process.

Concussion affects each child differently. It is impossible to give all the answers for each situation. By familiarizing yourself with the current understanding of concussion issues, you will be better able to meet your child's needs throughout recovery.

This guide focuses on concussion and youth sports; however, concussions happen from many different types of activities such as car crashes, falls, playground and bicycle related crashes. Concussions resulting from a sports-related event are especially challenging because children who play sports typically want to get back in the game. Children diagnosed with concussion from a non-sports related event may have less risk for a second concussion because returning to their sport is not a factor in recovery. The information in this guide provides a comprehensive overview of concussion regardless of the cause of the concussion.

This guide is not intended to be a substitute for medical advice or treatment. If you suspect a concussion, seek immediate medical care and intervention.

A Parent's Guide to Concussion

Chapter 1: *The Scope of the Problem*

Definition

A concussion is a brain injury induced by a biomechanical force, such as a blow to the head or body that changes how your brain works.

Concussions are not life-threatening, but they need to be managed properly. They can seriously affect everything from your memory and mood to your vision and balance. If your brain doesn't get the time or appropriate therapy it needs to heal after a concussion, the neurological consequences can grow far worse. Public awareness about concussion is growing, but so is confusion. It is important to understand how and why these injuries happen, and what you can do to protect your child from them.

Incidence

Americans aged 18 or younger sustain between 1.1 million and 1.9 million sports or recreation related concussions every year, according to a study published in the journal Pediatrics in 2016. About half a million seek medical treatment as a result.

Diagnosed concussions in the U.S. rose 143 percent among 10 to 14 year olds and 87 percent among 15 to 19 year olds from 2007 to 2014, according to researchers at the University of California, San Francisco. That could be due both to increasing injury rates and greater awareness.

Earlier research found that sports rank second (behind only motor vehicle crashes) as the leading cause of traumatic brain injury among people aged 15 to 24.

MYTHS:

"A concussion is just a ding..."

"I've just had my bell rung."

"I can walk off a concussion just like any other injury."

TRUTH:

Athletes are particularly aware of how long it typically takes to recover from injuries such as pulls, sprains, strains or even broken bones. A concussion is a brain injury, and can affect your memory, feelings and sense of self. The usual rules and timetables may not apply. If you become active again too soon, you will put yourself at a much higher risk of severe injury.

Chapter 2: *Recognizing Concussions*

Concussions can lead to a variety and combination of cognitive problems – meaning trouble with how you think, reason or remember – as well as physical and emotional issues.

Symptoms reported by your child can include:

Headache

Nausea or vomiting

Balance problems or dizziness

Blurred or double vision

Unusual sensitivity to light or noise

Feeling foggy or sluggish

Problems concentrating or with short-term memory

Difficulty with sleep

Irritability

When a child has taken a hit or fall and a concussion is suspected they may...

- seem dazed, disoriented or stunned.
- appear to be off-balance or having difficulty with coordination.
- have trouble remembering what just happened, such as forgetting plays.
- answer questions inaccurately or slowly.
- lose consciousness.

MYTH:

"I didn't get knocked out, so I can't have a concussion."

TRUTH:

You don't have to get knocked out or lose consciousness to sustain a concussion. It's important to report any symptoms fully to your coach, athletic trainer or parent, even if it's just that you "don't feel right."

MYTH:

"I only have a headache, no real signs of a concussion."

TRUTH:

A 2010 poll by ESPN the Magazine found that 55.4 percent of high school football players, 33.7 percent of coaches and 29.7 percent of athletic trainers said a player who complains about a headache during a game should be allowed to return to it. That's wrong – and potentially dangerous.

Chapter 3: *Causes of Concussion*

Concussions can be caused by a direct blow to the head, face or neck, or from a hit to the body or fall that causes your head to move back and forth quickly. A concussion is different from a skull fracture, and its effects may not be obvious immediately. You can think of your skull as being like the shell of an egg, with your brain being the yolk – in danger of getting scrambled even if the shell doesn't crack.

You can:

• Participate only in leagues and clubs that follow the latest guidelines for limiting head impacts by age. For instance, as of 2016, the U.S. Soccer Federation does not allow heading in programs for athletes aged 11 or younger.

• Advocate for closely-supervised and safer practices, including no-contact drills. Across sports and around the country, many organizations are moving to reduce the kinds of impacts that can cause brain injuries outside of competition. For example, in 2016, the Ivy League eliminated tackling in football practices altogether. Such measures are particularly important in high school sports, where a majority of concussions actually occur during practice, not games.

• Make sure your child always wears proper equipment, such as helmets, masks or mouth guards. There is surprisingly little evidence that protective gear has a direct effect on concussion rates, and it shouldn't make athletes feel invincible. The most important thing to remember is to wear the proper equipment for the sport; be sure it fits properly and is worn properly. This can help keep children from losing their balance, tripping, or falling, which can lead to injuries.

Your child can:

Master techniques to protect his or her head, such as learning the best ways to take hits in lacrosse or fall in soccer. (If your child plays in a soccer league that allows heading, he or she should focus on striking the ball with good form and under control. High-velocity and surprise hits, such as heading a ball struck hard at close range or off a corner or cross kick, carry greater risk of trauma.)

Practice good sporstmanship.

Preventing sports related concussions:

Play by the rules.

Practice good sportsmanship.

Use proper technique for the sport.

Make sure endposts are sufficiently padded.

Check the field for uneven areas or holes.

Wear the proper equipment -- Wear it properly.

When in doubt, sit 'em out!

Concussion Rates Vary by Sport

Of course, the chances that any athlete will get a concussion depend on styles of play, circumstances of competition and random chance. Still, high school concussion rates vary widely by sport. Examples from the latest data collected by the National High School Sports-Related Injury Surveillance Study: 11.2 per 10,000 athletic exposures in football, 6.9 in men's lacrosse, 6.7 in women's soccer, 6.2 in wrestling, 5.6 in women's basketball. The lowest rate reported is for baseball, 1.2.

In sports that both genders play, concussion rates are almost always higher for women than men. Female athletes also tend to need more time to recover from concussions than males. It's not yet entirely clear why, but it is important to encourage young women to take seriously and report fully any symptoms of concussion. And if you have a daughter, you must make sure your coaches, athletic trainers and health care providers understand that women often return from brain injuries on a more extended timeline than men.

MYTH:

"Concussions are just a football problem."

TRUTH: Many news reports about concussions over the past few years have focused on NFL players with brain injuries, but the majority of high school sports concussions take place outside football. Beyond football, the riskiest high school sports for concussions include men's lacrosse, women's soccer, wrestling and women's basketball.

Chapter 4: ***Long-Term Effects of Concussion***

A concussion results in immediate changes in brain function that, most of the time, resolve on their own; many people who have a concussion recover within two or three weeks. Some require longer, sometimes much longer, recovery periods.

Beyond the acute phase of a concussion, meaning the symptoms that occur immediately following an injury, research has shown brain trauma can lead to longer-term dangers:

• Children who get concussions are more likely to have second or third concussions, and high school athletes who have three or more concussions are more likely to experience severe symptoms such as loss of consciousness and amnesia if they have further concussions.

• Young athletes who sustain multiple concussions are at risk of developing memory, emotional and physical problems. The severity of prior concussions, length of recovery, and the amount of time between concussions may be factors that determine the degree of risk for future problems. We may not understand why this happens; however, it is a fact that there are higher risks for long-term problems and longer recovery times with multiple concussions.

• Many people believe that athletes who sustain multiple, repetitive blows to the head over time may eventually develop Chronic Traumatic Encephalopathy (CTE), a degenerative brain disease that can lead to loss of impulse control and emotional breakdowns. The Sports Neuropsychology Society states: "At this time, there is no research that links youth contact sport participation with a risk for CTE." But the specter of CTE rightfully disturbs many athletes and their families. Unfortunately, at this time, we don't know why some people get it and others don't, or how many people will get it, and it can only be diagnosed after death.

• Certain factors have been shown to affect recovery such as a family history of migraines, co-occurring physical disability or injury, learning disability, medications prescribed for psychological diagnoses, attention deficit disorder, or previous concussion or other brain injury.

Chapter 5: ***Diagnosing Concussion***

If there is a possibility that your child has a concussion, it is imperative that he/she stop physical activity and remain with someone who will be able to tell if his/her symptoms are worsening. Indeed, in the case of young athletes, Connecticut state law requires that anyone "who sustains or is suspected of having sustained a concussion or other head injury … shall be immediately removed from the sports competition or practice," and that they should not return until they "no longer exhibits signs, symptoms or behaviors consistent with a concussion at rest or with exertion, and receives written clearance to participate in such full, unrestricted supervised team activities froma licensed health care professional trained in the evaluation and management of concussions."

Emergency Care

The decision about whether or not to go to an emergency room is often stressful for parents when a child is pulled from practice or competition because a concussion is suspected. You might base that decision on determining if your child's symptoms are getting better or worse. You might decide to wait until the next day to see your pediatrician; you might decide to go to the emergency department because it is a weekend or holiday. When symptoms worsen in a short time it is best to see a physician immediately either at the physician's office or in the emergency room to eliminate concern that there is a more severe brain injury.

Concussion Professionals

If you decide that your child does not need emergency care but is showing signs of a concussion, you need to make an appointment with a health care provider trained to evaluate brain injuries.

Call 911 if you observe...

- one pupil is larger than the other
- an inability to wake up
- a headache that continues to worsen
- weakness or numbness
- decreased coordination
- increased confusion or agitation
- repeated vomiting
- seizures/convulsions
- an inability to recognize people or places
- unusual behavior
- a loss of consciousness

First, though, your child must rest his or her brain to give it a chance to begin healing. Even before you make an appointment with a health care provider, make sure your child decreases his or her physical movements, mental exertion and use of electronics.

This appointment is typically the parents' choice of the family physician or pediatrician, a concussion center, a sports medicine specialist, or a specialist in a related field like neurology or neuropsychology. Any of these professionals are appropriate. Your decision may be influenced by your child's individual medical history, or your relationship with your family physician or pediatrician, or recommendations made by friends, family members, or school personnel. Following the initial appointment you may be referred to additional specialists that could include a physical therapist, vision specialist, and others.

Look for a concussion professional who can see your child soon. But do not assume you will be able to get everything you need from one doctor; you may need to see multiple specialists, and make sure they communicate and coordinate with one another and with your child's school. From diagnosis to possible treatments, it takes a team to manage a concussion: you, your child and the professionals who provide you with health care.

Concussion management varies widely among providers. In seeking a concussion specialist, look for a licensed health care professional who:

- Provides direct patient care
- Has formal training in brain injury, and is knowledgeable about the latest national and international guidelines for managing concussions
- Has at least a year of continuous, regular experience with identifying and treating concussions
- Regularly communicates with other concussion specialists to coordinate care for patients with concussions

You may encounter or can find concussion professionals at school:

- Certified Athletic Trainer (ATC)
- Concussion Management Team
- School Nurse
- School Physician

For more information about concussion professionals and the care they provide, contact the Brain Injury Alliance of Connecticut at general@biact.org; 1-800-278-8242 or 860-219-0291.

Assessments, Evaluations and Tests

Brain injury from concussion takes place at a microscopic level that cannot be analyzed by the kind of equipment used by family physician offices and even most hospitals. For example, ***CT scans and traditional MRIs do not detect concussions.*** Instead, concussion professionals use a variety of assessments to gauge patients' brain functioning.

Some tests are given "at baseline," meaning when a student or athlete is healthy. For example, computerized neurocognitive tests score you on your memory and reaction time, and you can then take the test again after an injury to see if your scores have changed. Similarly, schools, athletic programs, or concussion professionals may also test your child's vision or balance at baseline.

Tests include:

- Computerized neurocognitive/ neuropsychological testing
- Optometric testing, such as the King-Devick Test or VOMS (Vestibular/Ocular Motor Screening)
- Balance testing (Balance Error Scoring System / BESS)
- Exertional testing (typically after a child is symptom-free at rest and back to baseline on neurocognitive testing)
- Neuropsychological evaluation

MYTH:

" Our school does baseline testing, so we can handle concussions."

TRUTH:

To address concussion problems, school districts and sports leagues across the country have increasingly turned to computerized neuropsychological tests. But these tests can provide a false sense of security when not properly used. School officials don't always administer them correctly, or pay proper attention to the results. A 2009 study by researchers at Michigan State University, for example, found that just over half of athletic trainers checked baseline tests to make sure they were valid, and 13.6% said they would or might return athletes to play even if they scored below their baseline. You, your parents and your school administrators should understand them as providing one part of the information needed to diagnose and manage concussions.

Chapter 6: *Treating Concussions*

If your child is diagnosed with a concussion, you will need to make sure family, friends and the school understand that physical, mental and social rest is the foundation for getting better. After injury, the brain needs time to repair itself.

Interventions and Treatment Methods

If symptoms persist, your health care provider may recommend one or more of a wide variety of treatments for your child. Depending on the individual and his or her injury, these could include cognitive rehabilitation or visual therapy, exertion training, vestibular and/or physical therapy, medication or biofeedback for headaches, mindfulness or relaxation exercises or other alternatives.
It is important to communicate with your provider to make appropriate adjustments based on your child's responses. Remember, it takes a team to manage a concussion.

Helping Your Child Recover from a Concussion

Carefully follow your doctor's advice; ask questions about anything you do not understand.

- Monitor your child.

  Keep notes about your child's symptoms, and report them to your doctor. Too much focus on symptoms can cause anxiety which can slow recovery; it is important for your child to know that he/she will get better. If any activity causes symptoms to worsen, stop the activity and make a note.
- Communicate with your child's school to ensure a smooth transition back to school.

  Some schools have a Concussion Management Team to support students recovering from concussion.
- Check with your insurance company if you have any questions about coverage for any recommended treatments.
- Educate yourself about concussion.

MYTH:

"If I go to sleep after I get a concussion, I'll never wake up."

TRUTH: This is something a surprising number of people worry about, but it is an urban legend. Rest – mental as well as physical – is what allows your brain to heal from a concussion. (Note: a sleeping person will respond to touch or sound, but an unconscious person will not.)

Chapter 7: ***Return to Learn, then Return to Play***

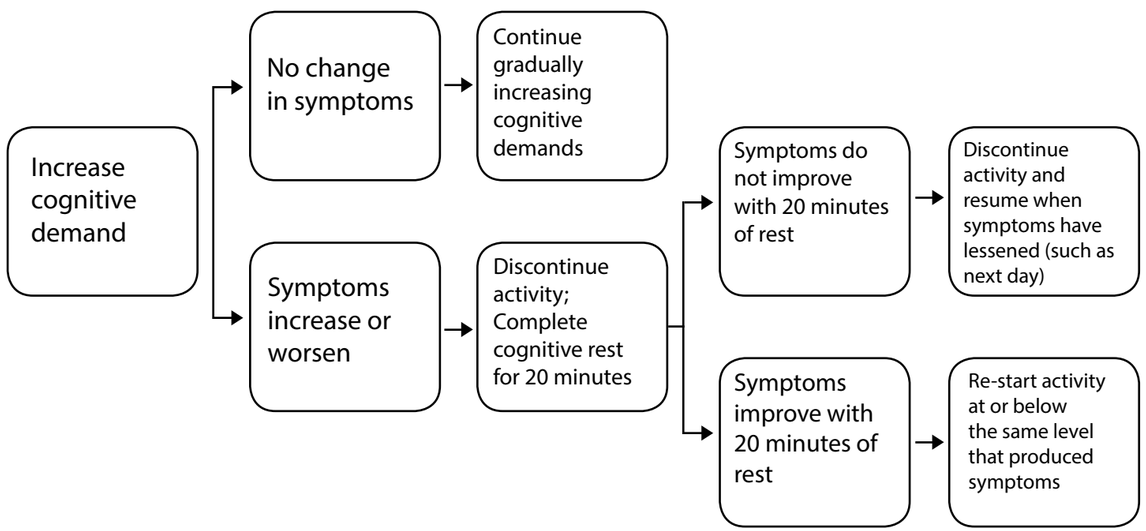
As your child recovers from a concussion, you must work with your health care provider and school to develop a plan for returning to school and play. This usually involves him/her gradually increasing his/her activities until he/she is ready to get back into the classroom and, in the case of athletes, onto the field.

Graduated Return to School

Concussions can significantly affect a student's concentration, attention span, functioning and processing speed. And while your child is healing from a concussion, mental exertion can exacerbate his/her symptoms and prolong his/her recovery.

As a result, a student may require academic accommodations (adjustments) or modifications, which should be tailored to his/her needs and limitations. These can include:

- Spending fewer hours at school
- Fewer hours reading, writing, texting or using computers
- Taking rest breaks during the school day
- Help with schoolwork
- More time to complete assignments
- Early dismissal to avoid crowded hallways



Nationwide Children's Hospital
A School Administrator's Guide to Academic Concussion Management p19

Graduated Return to Practice and Competition

For athletes, a graduated return-to-play plan usually involves a series of steps. Typically, your child will remain at each stage until he/she is symptom-free, and for a minimum of 24 hours, before moving to the next. If symptoms come back, he/she returns to the previous stage until at least 24 hours after they resolve. But every concussion is unique, which means you must work with your health care providers to make sure they tailor any return-to-play plan to your child's needs. The steps include:

- No activity
- Light aerobic exercise
- Sport-specific exercise
- Non-contact training drills
- Full-contact practice
- Normal game play

Guidelines for younger children, from Kindergarten through Grade 8, suggest additional days of rest and recovery. Be sure to consult your concussion professional before starting a return-to-play protocol.

Dangers

Students who don't fully report their symptoms as they recover, or who return to school or play before their concussions have resolved, put themselves at greater risk of needing even longer to recover, and of getting injured again. ***It is dangerous to play through a brain injury, or to carry on any strenuous physical or mental activity when a concussion could still be affecting a child's cognitive function, vision or balance.*** Places and activities with higher risk for concussion should be avoided.

In rare cases, taking another hit before full recovery can lead to catastrophic head injury, including "Second Impact Syndrome," which leads to rapid swelling of the brain, resulting in severe brain injury or death.

MYTH: *"I got a concussion, but now I'm cleared to play again, so everything's cool."*

TRUTH: *Getting a green light to return to play is great, but it's only valid if you can answer "yes" to three questions. First, did you report all of your symptoms fully and honestly? Athletic trainers and doctors can evaluate you properly only if they have all the information they need. Second, were you checked out by a doctor who specializes in the treatment of concussions? If your team or family physician doesn't, make sure you ask to be referred to one who does, because non-specialists can overlook critical symptoms. Third, is this just your first or second concussion? If you've already had multiple blows to the brain, it's time to talk with your parents and coach about your athletic future, because research says you may be putting yourself at a significantly higher risk for long-term brain damage.*

Chapter 8: ***Looking Ahead: The Frontiers of Science***

Our understanding of the brain is constantly evolving and advancing, providing new insights into the damage concussions cause and new hopes for preventing, diagnosing and repairing brain injury.

Some Possibilities:

- New imaging techniques showing concussions can lead to structural changes in the brain, not just changes in behavior.
- Genetic tests, blood tests or biomarkers might show when people are at particular risk for brain injury.
- Scientists may develop a test that would identify CTE in the living.
- Researchers are seeking better ways to treat brain injuries.

The potential of science is so vast - which only shows how much we still don't know.

Chapter 9: Students and Athletes as Advocates

Children and teenagers who have had concussions have unique credibility when it comes to helping their peers deal with brain injury. If your child has a concussion, you can learn from the experiences of students who have successfully recovered. And afterward, consider telling your story.

MYTH: *"Nobody understands what I'm going through."*

#TBIAffectedMe Concussion Story: Fatima

"Even after 2 years with a brain injury, I still ask 'Why me? Will I ever be normal again?' Then I realize, yes - I do have PCS, but I have made great improvements. Two years ago I was bed ridden, depressed, and had no motivation for life. Now I have faith, hope, and peace. I do more than lay in bed and watch TV all day. I do moderate exercises and yoga. I model. I can sit in a restaurant again. I have much less anxiety. I know how hard & confusing it is to have PCS, but my message to others is to never doubt yourself or your capabilities. We've damaged our brains - the only organ that cannot reproduce new cells, only fix the cells that were damaged. Healing can take a long time, but it will happen. Brain injury is a life changing journey, but don't let it define you."

#TBIAffectedMe Concussion Story: Daniel

"A year and a half ago my younger brother endured his seventh sports concussion. His head trauma left him with disabling migraines, difficulty reading, and memory problems that, despite an extensive hospital visit, still greatly interfere with his social life & his studies as a medical student. The real issue is not my brother's specific injury, but the culture within the sports world that minimizes the importance of concussions. If his previous concussions were taken more seriously and coaches did not push him to continue playing his symptoms would never have become so severe. In this photo the doctor is demonstrating how a nerve block is administered. My brother had the actual procedure done later that day; unfortunately it like all the other treatments he received have not relieved his symptoms. I hope this contest allows me the opportunity to educate the public about the disabling nature of concussions and migraines."

#TBIAffectedMe Concussion Story: Ryah

"Ryah was at cheerleading practicing stunts. One stunt didn't work out and she fell from about 10 feet off the ground and landed on her head. She blacked out for a minute, then jumped up as if nothing happened. 10 minutes later she collapsed. She couldn't walk or talk, and had no idea where she was. We rushed her to the ER where she got an MRI & X-rays. At that point they were calling it a stage 3 concussion. After a week of not being able to walk or talk, they upgraded her to a moderate traumatic brain injury. She's now able to walk & speak most of the time. When she's overwhelmed or tired she reverts to what we call "teenage toddler". She missed 10 weeks of school and just started back on independent study. We have good days and bad days, but overall we're doing OK!"

#TBIAffectedMe Concussion Story: Lindsey

"Transformation is an ugly process. Don't let the photos fool you. I'm conscious of this every time I put myself out there as an advocate for concussion awareness & recovery. The before & after photos don't show the times I scream "I can't do this anymore" or "why did this have to happen to me." They don't show how 15 minutes of eye exercises put me in the twilight zone or how I fear waking up to obliterating headaches in the morning. Before & after photos don't respect the process nearly as much as I have to everyday. There will be pain. There will be vulnerability. There will be frustration. But I promise you this: you will look at yourself differently. Not because & after photos are lit right or photoshopped perfectly. Not because you succeeded in fitting into some norm of health or attractiveness. Because you decided you were worth it, that the people that rely on you or love you are worth it, because you aren't done yet. You decided you matter. No photos will ever do that justice."

Terms and Definitions

Balance Testing
The Balance Error Scoring System (BESS) is commonly used to assess any balance problems ("postular instability") an athlete might experience after a concussion. The test consists of three stances: double leg, with the legs spread pelvic-width apart; single leg, with the athlete standing on their non-dominant leg and the other bent at the knee; and tandem, with one foot placed in front of the other. The test is done on both a firm and foam/soft surface. Your child's doctor might also do other balance testing as needed.

Biofeedback
Biofeedback is an alternative treatment often used for persistent headaches. With biofeedback, the patient is connected to electrical sensors that help the patient receive and measure information about their body. A trained professional teaches the patient how to make subtle changes to their body to reduce the pain.

Certified Athletic Trainer (ATC)
A Certified Athletic Trainer is a health care professional who works under the direction/ supervision of a licensed physician to provide health care to athletes. New Jersey has ATCs on staff at most high schools; they provide on-site evaluation and treatment for the injured student-athlete, immediate first aid care, follow-up rehabilitation care, and specific conditioning programs for injury prevention. The ATC is often the first professional to see the concussed student-athlete from the sidelines and remove him or her from play. They will often make the call if paramedics are needed in more serious injuries. Importantly, ATCs are often the individuals who will perform physical exertional testing and the graduated return to play protocol prior to the athlete receiving clearance to return to sports.

Cognitive Fatigue
Cognitive fatigue is different from fatigue caused by strenuous activity. A person tired from physical activity may take a nap or get a good night's sleep and be refreshed. In the context of brain injury or concussion cognitive fatigue can be caused by too much challenging cognitive or physical activity; it is often not relieved by a nap or a good night's sleep. It may take a couple of days of rest before the fatigue lifts. When recovering from concussion it is recommended to gradually increase cognitive and physical activity to prevent cognitive fatigue. A child may require more rest than usual while recovering. Cognitive fatigue can lead to behavioral problems, mood swings, and more difficulty with schoolwork.

Cognitive Rehabilitation
Cognitive rehabilitation is a type of therapy to target cognitive impairments such as attention and concentration challenges. This therapy works to improve one's ability to perform the impaired function through therapy and practice as well as help to develop strategies to compensate for any continuing impairments. Cognitive rehabilitation may be provided by a neuropsychologist, speech-language pathologist, or other specialists trained in cognitive rehabilitation.

Computerized Neurocognitive testing – Baseline and Post-concussion
Computerized neurocognitive testing evaluates skills that are most often affected by concussion, such as verbal and visual memory, visual motor speed (speed of visual processing) and reaction time. Baseline testing is administered prior to an athletic season since its purpose is not to diagnose a concussion but to report how an athlete scores with an uninjured brain. Following a concussion, these tests should be re-administered and the scores compared to the baseline scores to help track the extent of functional impairment and monitor the progress of recovery. These tests are just one tool that can be used to help make return to play decisions. There are a variety of tests on the market such as ImPACT, Headminder, Axon, CNS Vital Signs, Cogsport, and ANAM. Administration may take 20 to 30 minutes. The computerized versions are currently used for ages 10 and up. However, young athletes in the 10 - 12 or so age range will need extra guidance and attention to be sure they understand instructions. (Be aware that different testing programs have different guidelines for appropriate use. For example, a program may only be approved for use with athletes within a certain age range. Check to be sure that baseline test scores have been reviewed for validity.)

Concussion Management Team (CMT)
Schools can best support a student recovering from concussion by establishing a Concussion Management Team. The Team should minimally include an academic monitor and a symptom monitor. The Team functions as a liaison between the student, parent, teachers, and clinician managing recovery. Contact the Brain Injury Alliance of NJ to learn more about CMTs.

Difficulty with Sleep
As a symptom of concussion difficulty with sleep may mean difficulty falling asleep or staying asleep, insomnia, feeling drowsy, or sleeping more or less than usual.

Emergency Room Physician
Treatment in an emergency room typically serves to eliminate the possiblity of more severe brain injury. The physician may not order a CT or MRI unless there are signs of severe injury so as not to expose children to unnecessary radiation. Emergency room treatment should always be followed up with a family physician, pediatrician, or sports medicine physician.

Exertional Testing
Once a child is symptom free while at physical, cognitive (mental), and social rest and neurocognitive testing indicates that performance is back to baseline or better, the child should start undergoing exertional testing to determine if they are symptom free when physically stressed. Exertional testing should be done under the supervision of the certified athletic trainer or another sports medicine health care provider. Physical activity levels should be increased gradually in a step-wise process following a graduated return to play protocol. If at any point, the athlete experiences symptoms again, they should return to physical, cognitive (mental), and social rest for another day or two and return to the previous level of activity that caused no symptoms.

Medication
Pharmacological intervention is not commonly prescribed in most cases of concussion as symptoms typically resolve themselves with physical, cognitive (mental), and social rest. There is no known medication that "cures" the concussion itself, but medications may be prescribed to treat lingering symptoms such as headaches, depression, anxiety, sleep difficulties and mental fogginess.

Neuroimaging
Sometimes neuroimaging may be ordered in an emergency room depending on the signs and symptoms of the injury. Emergency room physicians are not likely to order neuroimaging studies in cases where the signs and symptoms support a diagnosis of concussion rather than more severe brain injury. They are cautious about exposing children to radiation and will typically request a CT scan only in cases of possible deteriorating neurological functioning, which is not typically the case in concussion. Following acute care, in cases where a child is not recovering as expected, neuroimaging tests including a CT scan or MRI may be ordered by the treating physician or neurologist. The purpose of these tests is to rule out a brain bleed, skull fracture, or other brain disease. Neuroimaging testing may also be ordered for the child when symptoms such as a headache persist.

Neurologist (MD or DO)
A neurologist is a physician who specializes in diseases and disorders of the nervous system. A neurological evaluation may be requested when a child has persistent symptoms of concussion that do not go away. Neurologists can assist with headache, cognitive slowness, and sleep disturbance and may use different medications to treat concussion effects. Neurologists may conduct further tests, such as an EEG to examine brain wave functions.

Neuropsychologist (PhD or PsyD)
A neuropsychologist is a licensed psychologist who specializes in how brain structures and systems affect cognition (thought), emotions, and behavior. Brain function is evaluated by testing cognitive and thinking skills such as verbal and visual memory, processing speed, attention span and reaction time. They are skilled in interpretation and in understanding of baseline and post-concussion neurocognitive testing and in understanding how other conditions (like attention and learning disorders) may affect recovery. A neuropsychologist may provide treatments like cognitive rehabilitation or psychotherapy. A neuropsychologist may be involved with your child to assist in developing a plan of academic accommodations while healing takes place, as well as to provide counseling and psychotherapy to address emotional and behavioral symptoms and social adjustment issues.

Neuropsychological Testing
Formal neuropsychological consultation may be recommended when a child or student- athlete's symptoms persist. A neuropsychological evaluation can help determine which functions of the brain have been disrupted and what these changes mean in the person's day-to-day life functioning. A neuropsychologist can provide a treatment plan with recommendations to assist the child in recovery. If the child's symptoms do not resolve, and post-concussion syndrome is diagnosed, more comprehensive testing may be recommended to determine any residual, enduring effects from the concussion.

Neuro-optometric Testing
The VOMS (Vestibular/Ocular Motor Screening) test can support a diagnosis of concussion. Using simple equipment like a metronome and tape measure, a neuro-optometrist can assess five different vestibular and ocular systems to gain insight into each individual's injury. Other neuro-optometric testing is recommended when the child's acute medical management is completed but symptoms such as imbalance, visual confusion, or reading difficulty following the concussion persist. Neuro-optometric evaluation will generally include tests for eye coordination, focusing, and eye movements, as well as spatial perception and visual memory.

Neuro-optometrist (OD)
A neuro-optometrist is a licensed optometrist with special training in testing and therapy for neurological dysfunction that affects the visual system. A neuro-optometrist can address problems such as blurred or double vision, orientation problems, reading difficulties, visual attention deficits, or visual memory deficits. They often conduct further tests of visual function well beyond the "vision chart" to test for the ability to maintain fixation, physical focus, fusion (the ability to use both eyes together as a team), and tracking skills. A Visual Evoked Potential (VEP), a special type of eye exam, is often used to examine brain function.

Nurse Practitioner (NP)
Nurse practitioners are registered nurses with advanced educational and clinical training who provide acute and preventative health care services. NPs may also examine and treat conditions such as concussion. NPs practice independently or in collaboration with a physician and may prescribe most medications.

School Nurse
The school nurse is the point person during school hours when injuries occur in sports as well as in physical education classes and recess. The school nurse can help monitor the child's symptoms and recovery as well as provide a place for them to go for a rest break. If the child has been prescribed medications by a doctor, the school nurse will help manage the medications while the child is in school.

Physician (MD or DO)
Any child who has experienced an event and a concussion is suspected, needs to be properly examined initially by a medical physician to diagnose or rule out a concussion or more severe traumatic brain injury. A physician includes a primary care physician such as a pediatrician or family medicine physician, a sports medicine physician, or an emergency medicine physician. If a child is diagnosed with a concussion the physician will then set up a plan for proper management for a safe recovery to school and sport. The physician will act as the gate keeper to help coordinate the multidiscipline approach.

Physician's Assistant (PA)
A physician's assistant is a healthcare professional who practices medicine under the supervision of a medical doctor. Similar to a medical doctor, your child may be examined and managed by a PA.

Physical Therapist (PT)
A physical therapist treats muscular and skeletal issues and may be involved if a child is experiencing dizziness or balance problems as well as pain from a neck injury (if one occurred at the time of the concussive event). PTs may provide treatment such as vestibular physical therapy to address issues with dizziness and balance as well as exercises for reconditioning.

Psychotherapy/Counseling
When symptoms of a concussion do not resolve completely, children may be affected emotionally as they try to handle the new challenges they face in daily life. Psychotherapy can be beneficial in helping the athlete learn coping strategies to deal with the demands and pressures he or she faces.

Speech-Language Pathologist (SLP)
A speech-language pathologist evaluates problems with cognitive-communication and checks the strength and coordination of the muscles used in speech and swallowing. The SLP will also evaluate a patient's understanding of reading, writing, and grammar; interpretation of jokes and sarcasm; and their ability to solve problems, plan out the steps of a task, and recall recent information. Often they can provide cognitive rehabilitation therapy.

Vestibular and Balance Treatment
Vestibular therapy may be prescribed when the athlete experiences balance problems that persist after the concussion. Symptoms can include dizziness and feelings of vertigo.

Vision Rehabilitation Therapy
Vision rehabilitation therapy, along with the use of special lenses or prisms in glasses, relieves symptoms originating in the visual system. Symptoms may include sensitivity to light (photophobia), double vision, blur, leaning or veering during mobility, headache, or reading difficulties that began at the time of the concussion.

Brain Injury Alliance
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Programs and Services

Direct Services:	Information & Resources Helpline Support Groups
Education:	In-Person presentations Annual Professional Development Seminar
Prevention:	Protect Your Brain Online Toolkits for School Professionals Concussion campaigns - in-person presentations
Advocacy:	Legislative Advocacy

Visit www.biact.org for details about our programs and services.
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Concussion in Youth Sports Steering Committee

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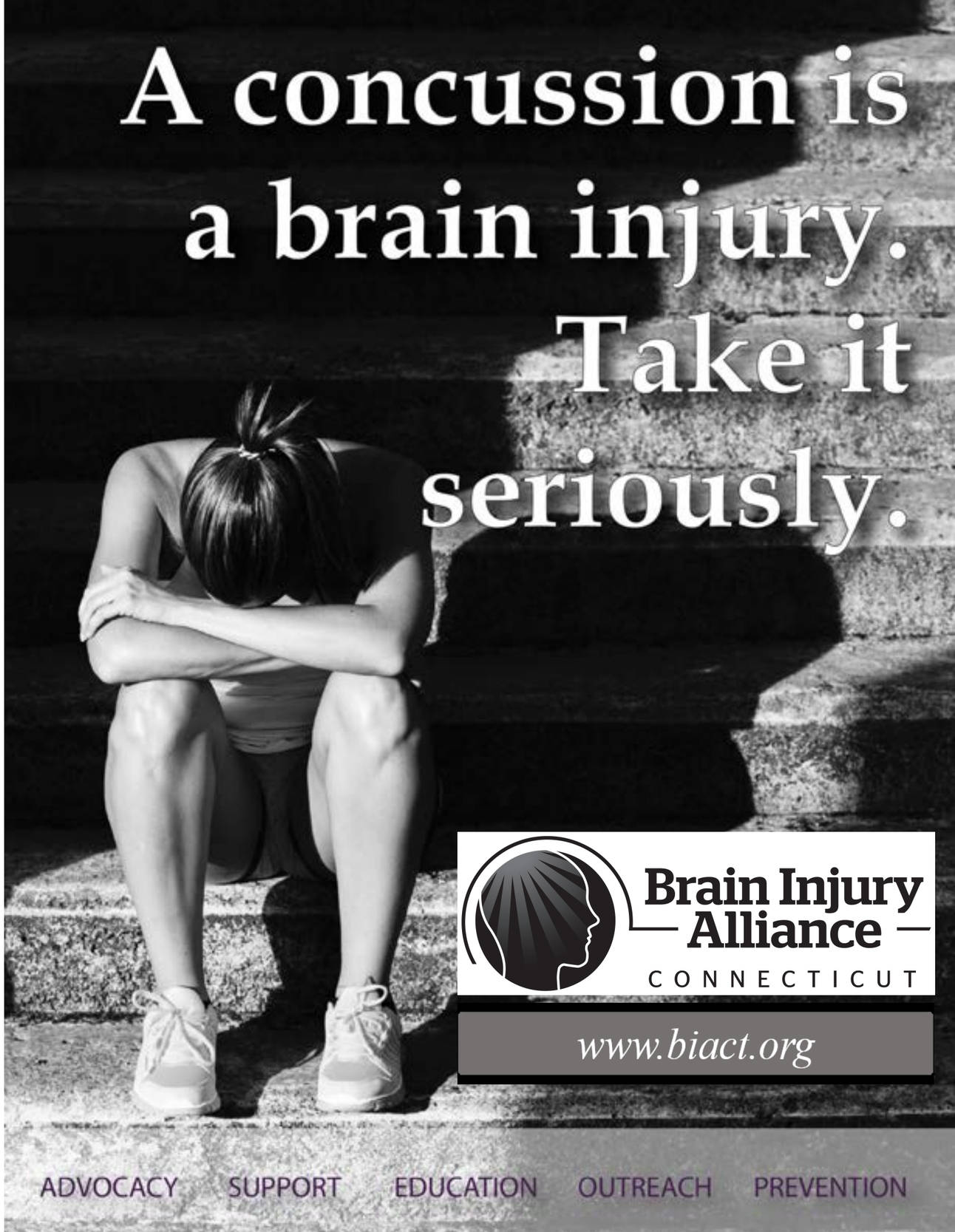

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