NEUROPSYCH UPDATE

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SPORTS CONCUSSION **DIAGNOSIS** AND **SIDELINE ASSESSMENT**

COMPLEXITIES **OF YOUTH CONCUSSIONS**

GOVERNOR BROWN **VETOES HELMETS**

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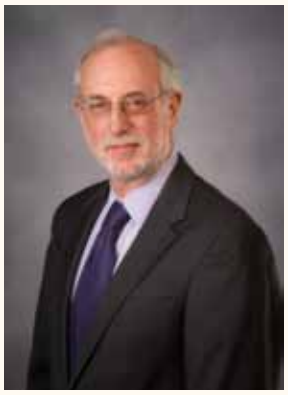
WELCOME TO OUR FALL 2011 ISSUE OF NEUROPSYCH UPDATE FOCUSING ON SPORTS INJURIES.

This is the time of year when many of our children are engaged in athletics, such as football and soccer, with skiing and snowboarding only weeks away. It is important to be aware of the neuropsychological issues that can arise, as we want our kids to enjoy athletics, to be safe, and to be ready when they return to play following an injury.



The media has recently featured many stories about athletic injuries, such as concussions, but most sports injuries are quite mild, and while difficult in the short run, our kids usually recover rapidly. These injuries are generally not as bad as we may think, and parents want reassurance when it's advisable for kids to return to play.

When my son played football in high school, I assumed that one concussion would eliminate him from playing at least all season, and potentially, forever. An explosion of research related to sports injuries in recent years shows that many injuries are not serious and do not have lasting consequences; cases in which kids don't recover are rare.

The extent of an injury can depend upon the play, the sport, and the position of the child's head. For example, football linemen move straight ahead and experience more head-on impact resulting in milder injuries. Receivers, hockey and soccer players are more likely to experience rotational impact injuries which cause more problematic injuries with longer periods of recovery.

We have extremely high expectations about return to play for celebrity athletes, but there is a very different vantage point when it's your son or daughter, and we do not assume their rapid return to play. Instead, many parents like myself worry about the safety of any return to play. Many parents want professional validation about whether return to play is advisable, and that is when the pediatrician or family doctor can assess the patient's condition or refer to a neuropsychologist to help make a well-informed decision.

Professional athletes are evaluated according to a baseline pre-test with them at the beginning of the season. Thus, when an injury occurs, we know how the player should be functioning, and we can compare it with post-injury functioning in order to evaluate them effectively.

Most kids need a medical waiver in order to participate in high school sports, and the pediatrician can recommend getting a baseline neuropsychological screening/evaluation to establish a student's functioning for comparison purposes if they get injured. Screenings are like health insurance and take approximately two hours. Of course, the reality is that for most children, this baseline testing will not take place. Parents are unlikely to assume the financial cost, especially when the risk for a specific child is low. Even though a baseline is very helpful, we can still make reasonable decisions without it.

Sincerely,

Howard J. Friedman, Ph.D., ABPP

GOVERNOR BROWN VETOES HELMETS

On September 6, 2011, California Governor Jerry Brown vetoed SB 105, state legislation mandating the use of helmets in children under 18 who ski and snowboard. Authored by child psychologist State Senator Leland Yee and sponsored by the California Psychological Association, SB 105 received widespread professional and industry support. The bill would have required children to wear helmets while skiing or snowboarding, like the existing requirement for children who bicycle or skateboard.

Neuropsychological research has shown that half of all skiing deaths are caused by a head injury. The Federal Consumer Products Safety Commission (CPSC) has shown that for children under 15, 53 percent of head injuries are addressable by the use of a helmet. Recent studies have also shown that when helmets are used, the incidence of traumatic brain or head injury has been reduced 29 to 56 percent. The Governor was apparently not moved by this information.

In light of Governor Brown's unfortunate veto, it is more vital than ever to avoid traumatic brain injuries by encouraging parents to enforce helmet use by children on the slopes.

INCIDENCE OF CONCUSSIONS

One study examined more than 200 high schools over a three-year period, and found **23,566 injuries** with **1,219 identified as mild traumatic brain injuries** (mTBI).

In a Canadian study of one million school children (ages 6-16), the incidence of mTBI was 3.98 per 100 children. Younger children were predominantly injured in falls and older children in sports activities. Most pediatric head injuries occurred in free play or recess, but there was also a high relationship between contact sports and concussion.

Other studies found that **8.9% of high school athletic injuries were concussion related.** The frequency of injury varied according to the sports activity, such as 9.36 per 100,000 for cheerleading and 33.09 per 100,000 for football. These are low estimates, since as many as 66% of high school athletes who have a probable concussion do not report it.

COMPLEXITIES OF YOUTH CONCUSSIONS

The actual speed of youth recovery from concussion is controversial. On one hand, clinical symptoms subside quite rapidly; however, physiological changes can continue for several weeks. Changes can include altered metabolism, impaired connectivity, and alterations in neurotransmitter function. Some research has suggested that overstimulation or physical exertion can disrupt the recovery of an injured brain. Post-concussion symptoms with changes in behavior, mood or attention, generally called post-concussion syndrome, can be misidentified in youths as attention deficit or conduct problems.

Rates of recovery vary based on age. High school athletes had longer periods of recovery for memory function compared to college athletes. At the high school level, the recovery period seemed to last beyond three to five days. Younger children are also different in their response, having more head injuries but fewer concussion symptoms.

An arbitrary decision about sitting out of play for one to two weeks after an injury may be erroneous. The day counting should more safely start when the child is asymptomatic, since neuropsychological testing can reveal continuing problems 7-14 days after injury. Erring on the side of caution can help to prevent Second Impact Syndrome.

GENDER DIFFERENCES

There may be gender differences related to concussion issues. Within the same sports, such as soccer and basketball, women were up to three times more likely to experience concussion and have a more severe outcome. Offsetting this result, women were more likely to stay out of play longer than men after injury. There is no information regarding the basis for this difference. There is speculation about differences in neck muscle strength causing differences in resistance to rotation force, hormonal factors, or anatomical differences in brain structure.

SPORTS CONCUSSION DIAGNOSIS AND SIDELINE ASSESSMENT

The diagnosis and assessment of sports concussions differ from other sources of concussions, such as motor vehicle accidents. With motor vehicle accidents, elements such as Glasgow Coma Scale, loss of consciousness (LOC), and post-traumatic amnesia are often used as indicators of the presence of a concussion and as markers of severity. However, with a sports concussion these major features occur in less than 70% of injured athletes, making them useless as measures of concussion with this population. This led to a revision of the definition of concussion by the American Academy of Neurology in 1997, which indicated that concussions could involve transient confusion, mental status abnormalities, and not necessarily LOC. With the lowest grade of concussion, these transient changes could resolve in less than 15 minutes.

Over the years, a series of international symposia with an array of professional groups took place, and ultimately, a consensus statement (3rd International Conference on Concussion in Sports, Zurich 2008) also emphasized that concussions should be determined based on these functional changes, that structural changes, such as with neuroimaging, would be unlikely to yield information, and that LOC was unlikely to occur.

Several brief inventories, such as the Concussion Symptom Inventory and the Standardized Assessment of Concussion, have been developed for use on the sidelines by trainers or team physicians. These inventories primarily assess immediate orientation, immediate and delayed recall (five words), and mental processing with repeating numbers forwards and backwards. Tests like these can be administered in less than five minutes, are easily scored, and provide information about the athlete's mental status. Other tests, such as the Balance Error Scoring System, examine changes in physical functioning but require considerably more training in scoring reliability.

CAUTIONARY NOTE: SECONDARY CONCUSSIONS

Vision, motor coordination and reaction time can be affected when a player has not fully recovered from a concussion. The decrease in these skills increases the chances of experiencing a secondary concussion and not fully recovering in the long run from the initial injury. Incurring a new injury in addition to an initial injury from which the child has not fully recovered has an exponential effect.

There is a longer recovery process in athletes who have had prior concussions regardless of age. It was found that 9.4% of players without a prior injury had a prolonged recovery, but almost 32% did if they had multiple concussions. After multiple concussions, more prolonged effects occur regarding gait stability which, in turn, can result in increased risk of further injury and concussion. Paradoxically, athletes with a prior concussion reported fewer immediate symptoms after a new concussion, but had more symptoms in the following week. This would suggest that the athlete is not a reliable source of immediate information about impairment, and external expert evaluation becomes necessary.

Adolescents are particularly vulnerable to incurring a second injury while still in recovery from the first (Second Impact Syndrome), due to increased vulnerability of cerebral auto regulation following head injury that entails cerebral vascular congestion, increased intracranial pressure and brain herniation through the foramen magnum.

The training and expertise of the person assessing the extent of initial injury are critical, and different programs have very different standards. At the high school level, a student trainer or certified athletic trainer (CTC) can be the one deciding whether an athlete is fit to play, the level of cognitive disruption that has occurred, and whether fitness to play should be further assessed. Most high schools have certified athletic trainers available for their teams. Many schools also have student trainers who provide limited support for athletes but are mostly hands off. Most colleges also have ATCs and sometimes PTs; many hire student volunteers who are majoring in athletic training or pre-med.

BAY AREA CHILD ASSESSMENT CLINIC
ASSESSMENT, DIAGNOSIS *and* TREATMENT PLANNING

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RETURN TO PLAY GUIDELINES

Many organizations, such as the National Athletic Trainers Association, suggest conservative return to play guidelines for younger players. The suggestion is for gradual increased activity after the player is symptom-free and all tests, if administered, have returned to baseline. Players with more than one concussion in a season should be treated more conservatively and held out for about seven days after symptom resolution. One of the International Conferences on Concussion in Sports (Prague, 2004) developed a summary of graded return to play. The recommendations also pointed out that there should be a graded return to academics since many high school and college athletes notice concussion symptoms brought out with the cognitive strain of immediate return to the classroom.

Guidelines for return to play can include:

1. Rest until asymptomatic
2. Light aerobic exercise
3. Sport-specific training
4. Non-contact drills and light resistance training
5. Full-contact training after medical clearance
6. Return to competition

ADVISE PARENTS TO:

1. Establish strong relationships with coaches, trainers, athletic departments and leagues
2. Find out the extent of training by schools regarding athletic trainers and injury prevention
3. Become informed about school policies regarding return to play issues
4. Know timeline of recovery issues
5. Enforce wearing of helmets by children and adolescents

WHEN TO CONSULT WITH A NEUROPSYCHOLOGIST:

1. If there is a desire to establish a baseline of neurological function prior to engaging in sports
2. To determine the extent of injury and advise effective treatment
3. To assist in determining when someone is asymptomatic and there can be a reasonable return-to-play decision
4. To provide a second opinion regarding cognitive function and return to usual activities, school and sports

BAY AREA CHILD ASSESSMENT CLINIC

DR. HOWARD J. FRIEDMAN, Director, is board certified in clinical neuropsychology. In addition to providing his expertise in private practice, he serves as Director of Psychological Assessment Services for the Wright Institute and has also served as the Director of Psychological Services for Walnut Creek Hospital and consulting neuropsychologist for the Adolescent Treatment Center at John Muir Medical Center.

Comprehensive assessments for:

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