

## Concussion ABCs

Concussions are a hot-button topic for the National Football League. Considering that 55.5% of high school students participate in athletics (NFHS 2012), concussions are of concern to many high school students as well.

Risk factors for concussions go beyond playing sports. More than half a million people a year go to emergency rooms after bicycling accidents, many with head injuries (CDC 2009). Among kids and teens, ERs treat about 170,000 sports- and recreation-related traumatic brain injuries, including concussions, annually (CDC 2011). More than 62,000 concussions are sustained each year during high school contact sports, according to the University of Pittsburgh (2001–13). Too many youth return to the field before they fully recover.

The consequences of concussions can reach the classroom, affecting teens' ability to think, remember, and concentrate (see "On the Web," "Returning to School After a Concussion" and "Sarah's Story").

"Academic activities that require concentration—studying intensely for an exam, for example—can cause a student's concussion symptoms to reappear or worsen," says Wendy G. Novick, a physical therapist at the Center for Sports Medicine at Nemours/Alfred I. duPont Hospital for Children in Wilmington, Delaware. "Because cognitive rest is part of the treatment for concussions, some teens may miss a week or more of school and require limitations on classwork and homework when they return."

A study of children ages 10–17

showed that structural changes in their brains observed two weeks after mild traumatic brain injuries remained evident more than three months later, even after symptoms faded. These long-lasting effects can make kids more vulnerable to subsequent concussions, the consequences of which are more severe and long-term (Mayer et al. 2012).

"Fifteen or so percent of people with a single concussion have persisting cognitive dysfunction; meaning they don't go back to school or to work or just carry on life the way they had it," says Dr. Douglas H. Smith, director of the Center for Brain Injury and Repair at the University of Pennsylvania, in the documentary film, *Head Games* (see "On the web").

## Classroom activity

Help teens understand the serious nature of concussions by showing them *Head Games* (see "On the web"), a documentary on concussions that includes vignettes of high school athletes. Then, have students write a two-part report. For part one, have students research and write about one of the following:

- ◆ What happens to the brain during a concussion
- ◆ Chronic traumatic encephalopathy (CTE) among retired pro athletes
- ◆ The role of tau protein buildup in neurons in CTE
- ◆ How dementia pugilistica (a former term for CTE) came to be identified among boxers in 1928
- ◆ Difficulties researchers face determining causality between concussions and CTE
- ◆ How new knowledge of concus-

sions is changing sports rules

- ◆ The role of baseline concussion testing
- ◆ Why neurosurgeon and concussion expert Dr. Robert C. Cantu says kids younger than 14 should not play contact sports
- ◆ Why some experts say three concussions may be the threshold for quitting contact sports
- ◆ How concussion rates vary by sport and gender
- ◆ Concussion-related protocols for athletics at your school

The second part of their report should explain the "concussion ABCs" recommendation from the CDC: Assess the situation. Be alert for signs and symptoms. Contact a health care professional.

Students should list all concussion signs and symptoms. They should also explain how important it is that a student not return to sports, P.E. class, or other physical activity until a health professional experienced in evaluating concussions gives the okay.

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## On the web

Concussion ABCs (CDC): [www.cdc.gov/features/ConcussionABCs](http://www.cdc.gov/features/ConcussionABCs)

Concussions (article, video, quiz for teens): [www.KidsHealth.org/teen/safety/first\\_aid/concussions.html](http://www.KidsHealth.org/teen/safety/first_aid/concussions.html)

FAQs About Baseline (Concussion) Testing Among Young Athletes (CDC): [www.cdc.gov/concussion/sports/baseline\\_test.html](http://www.cdc.gov/concussion/sports/baseline_test.html)

*Head Games*. 2012. [www.headgamesthefilm.com](http://www.headgamesthefilm.com)

Returning to School After a Concussion: [www.cdc.gov/concussion/pdf/TBI\\_Returning\\_to\\_School-a.pdf](http://www.cdc.gov/concussion/pdf/TBI_Returning_to_School-a.pdf)

*Sarah's Story*: Concussions Can Affect Kids and Teens in the Classroom: [www.cdc.gov/concussion/pdf/sarahs\\_story-a.pdf](http://www.cdc.gov/concussion/pdf/sarahs_story-a.pdf)

Society for Neuroscience teacher resources: [www.brainfacts.org/educators](http://www.brainfacts.org/educators)

Sports Concussion Institute teacher resources: [www.concussiontreatment.com/forteachers.html](http://www.concussiontreatment.com/forteachers.html)

## References

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- Centers for Disease Control and Prevention (CDC). 2011. Nonfatal traumatic brain injuries related to sports and recreation activities among persons aged  $\leq 19$  years. [www.cdc.gov/mmwr/preview/mmwrhtml/mm6039a1.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6039a1.htm)
- Mayer, A.R., J.M. Ling, Z. Yang, A. Pena, R.A. Yeo, and S. Klimaj. 2012. Diffusion abnormalities in pediatric mild traumatic brain injury. *The Journal of Neuroscience* 32 (50): 18047–18053.
- National Federation of State High School Associations (NFHS). 2012. 2011–12 high school athletics participation survey. <http://bit.ly/VKvOrA>.
- University of Pittsburgh, Brain Trauma Research Center. 2001–13. Sports-related concussions: [www.neurosurgery.pitt.edu/trauma/concussion.html](http://www.neurosurgery.pitt.edu/trauma/concussion.html)



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