HB

15

<TARGET><BILL>HB 15</BILL><SUBJECT>HB
15</SUBJECT><COMM>SHSS27</COMM></TARGET>

Alaska State Legislature

Mike Doogan
Representative
District 25, Anchorage

SPONSOR STATEMENT

HB 15

An Act relating to prevention and evaluation of and liability for traumatic brain injuries in student athletes

More than 60,000 high school student athletes sustain concussions each year. The number is much greater when you include middle school and younger children. The National Football League has recently begun focusing on concussions and brain trauma, raising public awareness of this serious problem, and many states are now moving to add protections for students who participate in sports or other potentially dangerous activities. While concussions and brain trauma are more prevalent in football, many other sports and activities are also dangerous, with girls' soccer resulting in the second-most concussions.

A concussion results from the brain striking the inside of the skull, and can be caused by a blow to the head, or by violent motion of the head. Though the risk can be somewhat reduced with a helmet, it cannot be prevented with external equipment. While it is nearly impossible to completely prevent an initial concussion or brain trauma, this legislation seeks to minimize complications and more permanent conditions that can be caused when athletes continue to practice or play after receiving a concussion.

HB 15 is modeled after legislation that recently passed in Washington State, known as the Zackery Lystedt Law. Zackery was a middle-school football player who was returned to a game after suffering a concussion. He sat out for about 15 minutes, and then returned to the game, forcing a game-saving fumble, but suffering a further head injury on the play. The second injury caused a brain hemorrhage that ultimately lead to the removal of both sides of Zackery's cranium, leaving him drifting in and out of a coma for three months. He has battled his way back to some sense of normalcy, but will never fully recover from this avoidable injury.

HB 15 simply requires school districts, in consultation with the Alaska School Activities Association, to develop and publish guidelines and information to educate coaches, student athletes and parents about the nature and risks of concussions and traumatic brain injuries. The bill will require that a student athlete suspected of suffering a concussion or brain trauma be removed from practice or play, and not be allowed to return until cleared by a licensed health care professional.

While there is no way to completely prevent concussions or traumatic brain injuries, we can strive to prevent the serious complications and potentially life-altering or life-threatening ramifications that can occur from continuing to practice or compete once a brain injury has occurred. This is a critical public health issue, and a responsibility to our children we should take seriously.

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Juneau, AK 99801
907-465-4998 or 800-689-4998
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Rep.Mike.Doogan@legis.state.ak.us

The bill as drafted applies these principles to school-based youth sports. While this is vital, we encourage you to consider amending the legislation to include other youth sports leagues as well. All young athletes deserve the protections offered in this bill.

The youth concussion bill provides better protection for Alaska's youth athletes by mandating a more formal, aggressive and uniform approach to the treatment of concussions. We applaud you and offer our assistance in aiding the passage of this bill.

Parents, coaches, teachers and school personnel will benefit from this measure. And, most importantly, our youth athletes will as well.

Sincerely,

Jeff Miller
Senior Vice President

SECTIONAL ANALYSIS

HB 15

An Act relating to prevention and evaluation of and liability for traumatic brain injuries in student athletes.

Section 1: Adds a new section to the uncodified law of the State of Alaska that will explain statistics, risks and challenges related to youth-related concussions, including:

(1) Concussions rank high in reported brain trauma injuries to children participating in sports and recreational activities.
(2) The CDC estimates nearly 4 million sports- and rec-related concussions in the US every year.
(3) Provides the definition of a concussion and some of the consequences of concussions – the effects may or may not include loss of consciousness; disruption of normal brain function.
(4) Explains how concussions may occur during organized or unorganized sports and rec. activities – such as through a fall or from a collision with another player.
(5) Explains that the risks of catastrophic injury or death from head injuries increase without proper evaluation and management, and if the athlete is allowed to continue participating following the concussion.
(6) Explains that, in spite of nationwide guidelines recommending individual assessment and gradual return to play following concussions, athletes continue to be returned to play prematurely – increasing risk of greater injury.

Section 2: Amends AS 14.30 by adding new sections to article 3 that would establish requirements for school district governing bodies relating to prevention and reporting. It also clarifies points of liability and damages (more details below, if needed):

Sec. 14.30.142. Concussions in student athletes: prevention and reporting.

(a) Requires school district governing body to consult with Alaska School Activities Association to develop and publish guidelines, etc. to educate coaches, student athletes and parents about the nature and risks of concussions.
(b) A student suspected of having a concussion or traumatic brain injury is immediately removed from the practice or game.
(c) Before returning to play or practice, the student must be cleared by a licensed health care provider who has received training in evaluating and managing traumatic brain injuries, including concussions.
(d) This provision explains that an evaluator may not be held liable for civil damages, except where he/she acted recklessly or with intentional misconduct or gross negligence.

Sec. 14.30.143. Concussions: school district immunity.

(a) Explains that a school district may not be held liable for injury or death resulting from the action or inaction of an employee or contractor with a non-profit youth organization if –

(1) the action/inaction occurred on school property during the delivery of services by the district or organization;

(2) the organization is under contract with the district to provide the services, and

(3) before the provision of services, the organization provided to the district written verification of –

(A) a valid insurance policy covering the injury or death in an amount not less than $50,000 per person and $100,000 per incident;

(B) compliance with the protocol for prevention and reporting of traumatic brain injury required in AS 14.30.142.

(b) This section may not be construed to impair or modify a person's ability to recover damages for harm due to negligent or reckless actions of a school or district employee or contractor or by the existence of a condition, equipment, program or structure known by the school district or organization to be unsafe.

(c) "Youth organization" means a public or private entity, qualified to do business in the state, that provides a program or service to persons under 19 years old.

FISCAL NOTE

STATE OF ALASKA
2011 LEGISLATIVE SESSION

Fiscal Note Number: 1
Bill Version: CSHB 15(EDC)
(H) Publish Date: 3/31/11

Identifier (file name): HB15-EED-TLS-3-11-11
Title: "An Act relating to prevention and evaluation of and liability for traumatic brain injuries to student athletes."
Sponsor: Reps. Doogan, Kerttula, Johnson, Munoz & Gruenberg
Requester: (H)EDC

Dept. Affected: EED
Appropriation: Teaching & Learning Support
Allocation: Student & School Achievement
OMB Component Number: 2796

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	Appropriation Required	Information					
OPERATING EXPENDITURES	**FY 2012**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**
Personal Services							
Travel							
Services							
Commodities							
Capital Outlay							
Grants							
Miscellaneous							
TOTAL OPERATING	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
CAPITAL EXPENDITURES							
CHANGE IN REVENUES							

FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts							
1003 GF Match							
1004 GF							
1005 GF/Program Receipts							
1037 GF/Mental Health							
Other (please identify)							
TOTAL	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Estimate of any current year (FY2011) cost _____

POSITIONS

Full-time							
Part-time							
Temporary							

Why this fiscal note differs from previous version (if initial version, please note as such)

Prepared by: Cynthia Curran , Director — Phone: 465-2851
Division: Teaching & Learning Support — Date/Time: 3/11/11 2:55 PM
Approved by: Mike Hanley, Commissioner — Date: 3/11/2011

(Revised 1/27/2011 OMB)

FISCAL NOTE #1

STATE OF ALASKA
2011 LEGISLATIVE SESSION

BILL NO. CSHB 15(EDC)

Analysis

This legislation has no fiscal impact on the Department of Education and Early Development.

Youth Concussion Education, Awareness and Advocacy

AMERICAN COLLEGE of SPORTS MEDICINE

USA Football — Football's National Governing Body

NFL

BRAIN INJURY ASSOCIATION OF WASHINGTON

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CERTIFICATION OF ENROLLMENT

ENGROSSED HOUSE BILL 1824

Chapter 475, Laws of 2009

61st Legislature
2009 Regular Session

YOUTH SPORTS--HEAD INJURY POLICIES

EFFECTIVE DATE: 07/26/09

Passed by the House April 20, 2009
Yeas 98 Nays 0

FRANK CHOPP

Speaker of the House of Representatives

Passed by the Senate April 2, 2009
Yeas 45 Nays 0

BRAD OWEN

President of the Senate

Approved May 14, 2009, 11:24 a.m.

CHRISTINE GREGOIRE

Governor of the State of Washington

CERTIFICATE

I, Barbara Baker, Chief Clerk of the House of Representatives of the State of Washington, do hereby certify that the attached is **ENGROSSED HOUSE BILL 1824** as passed by the House of Representatives and the Senate on the dates hereon set forth.

BARBARA BAKER

Chief Clerk

FILED

May 18, 2009

Secretary of State
State of Washington

ENGROSSED HOUSE BILL 1824

AS AMENDED BY THE SENATE

Passed Legislature - 2009 Regular Session

State of Washington 61st Legislature 2009 Regular Session

By Representatives Rodne, Quall, Anderson, Liias, Walsh, Pettigrew, Priest, Simpson, Kessler, Rolfes, Johnson, Sullivan, and Morrell

Read first time 01/30/09. Referred to Committee on Education.

AN ACT Relating to requiring the adoption of policies for the management of concussion and head injury in youth sports; amending RCW 4.24.660; and adding a new section to chapter 28A.600 RCW.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF WASHINGTON:

Sec. 1. RCW 4.24.660 and 1999 c 316 s 3 are each amended to read as follows:

(1) A school district shall not be liable for an injury to or the death of a person due to action or inaction of persons employed by, or under contract with, a youth program if:

(a) The action or inaction takes place on school property and during the delivery of services of the youth program;

(b) The private nonprofit group provides proof of being insured, under an accident and liability policy issued by an insurance company authorized to do business in this state, that covers any injury or damage arising from delivery of its services. Coverage for a policy meeting the requirements of this section must be at least fifty thousand dollars due to bodily injury or death of one person, or at least one hundred thousand dollars due to bodily injury or death of two or more persons in any incident. The private nonprofit shall also

provide a statement of compliance with the policies for the management of concussion and head injury in youth sports as set forth in section 2 of this act; and

(c) The group provides proof of such insurance before the first use of the school facilities. The immunity granted shall last only as long as the insurance remains in effect.

(2) Immunity under this section does not apply to any school district before January 1, 2000.

(3) As used in this section, "youth programs" means any program or service, offered by a private nonprofit group, that is operated primarily to provide persons under the age of eighteen with opportunities to participate in services or programs.

(4) This section does not impair or change the ability of any person to recover damages for harm done by: (a) Any contractor or employee of a school district acting in his or her capacity as a contractor or employee; or (b) the existence of unsafe facilities or structures or programs of any school district.

NEW SECTION. **Sec. 2.** A new section is added to chapter 28A.600 RCW to read as follows:

(1)(a) Concussions are one of the most commonly reported injuries in children and adolescents who participate in sports and recreational activities. The centers for disease control and prevention estimates that as many as three million nine hundred thousand sports-related and recreation-related concussions occur in the United States each year. A concussion is caused by a blow or motion to the head or body that causes the brain to move rapidly inside the skull. The risk of catastrophic injuries or death are significant when a concussion or head injury is not properly evaluated and managed.

(b) Concussions are a type of brain injury that can range from mild to severe and can disrupt the way the brain normally works. Concussions can occur in any organized or unorganized sport or recreational activity and can result from a fall or from players colliding with each other, the ground, or with obstacles. Concussions occur with or without loss of consciousness, but the vast majority occurs without loss of consciousness.

(c) Continuing to play with a concussion or symptoms of head injury leaves the young athlete especially vulnerable to greater injury and

even death. The legislature recognizes that, despite having generally recognized return to play standards for concussion and head injury, some affected youth athletes are prematurely returned to play resulting in actual or potential physical injury or death to youth athletes in the state of Washington.

(2) Each school district's board of directors shall work in concert with the Washington interscholastic activities association to develop the guidelines and other pertinent information and forms to inform and educate coaches, youth athletes, and their parents and/or guardians of the nature and risk of concussion and head injury including continuing to play after concussion or head injury. On a yearly basis, a concussion and head injury information sheet shall be signed and returned by the youth athlete and the athlete's parent and/or guardian prior to the youth athlete's initiating practice or competition.

(3) A youth athlete who is suspected of sustaining a concussion or head injury in a practice or game shall be removed from competition at that time.

(4) A youth athlete who has been removed from play may not return to play until the athlete is evaluated by a licensed health care provider trained in the evaluation and management of concussion and receives written clearance to return to play from that health care provider. The health care provider may be a volunteer. A volunteer who authorizes a youth athlete to return to play is not liable for civil damages resulting from any act or omission in the rendering of such care, other than acts or omissions constituting gross negligence or willful or wanton misconduct.

(5) This section may be known and cited as the Zackery Lystedt law.

Passed by the House April 20, 2009.
Passed by the Senate April 2, 2009.
Approved by the Governor May 14, 2009.
Filed in Office of Secretary of State May 18, 2009.

(INSERT SCHOOL/ORGANIZATION NAME HERE)
Concussion Information Sheet

A concussion is a brain injury and all brain injuries are serious. They are caused by a bump, blow, or jolt to the head, or by a blow to another part of the body with the force transmitted to the head. They can range from mild to severe and can disrupt the way the brain normally works. Even though most concussions are mild, **all concussions are potentially serious and may result in complications including prolonged brain damage and death if not recognized and managed properly.** In other words, even a "ding" or a bump on the head can be serious. You can't see a concussion and most sports concussions occur without loss of consciousness. Signs and symptoms of concussion may show up right after the injury or can take hours or days to fully appear. If your child reports any symptoms of concussion, or if you notice the symptoms or signs of concussion yourself, seek medical attention right away.

Symptoms may include one or more of the following:	
• Headaches • "Pressure in head" • Nausea or vomiting • Neck pain • Balance problems or dizziness • Blurred, double, or fuzzy vision • Sensitivity to light or noise • Feeling sluggish or slowed down • Feeling foggy or groggy • Drowsiness • Change in sleep patterns	• Amnesia • "Don't feel right" • Fatigue or low energy • Sadness • Nervousness or anxiety • Irritability • More emotional • Confusion • Concentration or memory problems (forgetting game plays) • Repeating the same question/comment

Signs observed by teammates, parents and coaches include:
• Appears dazed • Vacant facial expression • Confused about assignment • Forgets plays • Is unsure of game, score, or opponent • Moves clumsily or displays incoordination • Answers questions slowly • Slurred speech • Shows behavior or personality changes • Can't recall events prior to hit • Can't recall events after hit • Seizures or convulsions • Any change in typical behavior or personality • Loses consciousness

What can happen if my child keeps on playing with a concussion or returns too soon?

Adapted from the CDC and the 3rd International Conference on Concussion in Sport
Document created 6/15/2009

(INSERT SCHOOL/ORGANIZATION NAME HERE)

Concussion Information Sheet

Athletes with the signs and symptoms of concussion should be removed from play immediately. Continuing to play with the signs and symptoms of a concussion leaves the young athlete especially vulnerable to greater injury. There is an increased risk of significant damage from a concussion for a period of time after that concussion occurs, particularly if the athlete suffers another concussion before completely recovering from the first one. This can lead to prolonged recovery, or even to severe brain swelling (second impact syndrome) with devastating and even fatal consequences. It is well known that adolescent or teenage athletes will often fail to report symptoms of injuries. Concussions are no different. As a result, education of administrators, coaches, parents and students is the key to student-athlete's safety.

If you think your child has suffered a concussion

Any athlete even suspected of suffering a concussion should be removed from the game or practice immediately. No athlete may return to activity after an apparent head injury or concussion, regardless of how mild it seems or how quickly symptoms clear, without medical clearance. Close observation of the athlete should continue for several hours. The new "Zackery Lystedt Law" in Washington now requires the consistent and uniform implementation of long and well-established return-to-play concussion guidelines that have been recommended for several years:

> "a youth athlete who is suspected of sustaining a concussion or head injury in a practice or game shall be removed from competition at that time"
>
> and
>
> "...may not return to play until the athlete is evaluated by a licensed heath care provider trained in the evaluation and management of concussion and received written clearance to return to play from that health care provider".

You should also inform your child's coach if you think that your child may have a concussion. Remember it's better to miss one game than miss the whole season. And when in doubt, the athlete sits out.

For current and up-to-date information on concussions you can go to:
http://www.cdc.gov/ConcussionInYouthSports/

_____	_____	_____
Student-athlete Name Printed	Student-athlete Signature	Date
_____	_____	_____
Parent or Legal Guardian Printed	Parent or Legal Guardian Signature	Date

Adapted from the CDC and the 3rd International Conference on Concussion in Sport
Document created 6/15/2009

CHRISTINE O. GREGOIRE
Governor

STATE OF WASHINGTON
OFFICE OF THE GOVERNOR
P.O. Box 40002 • Olympia, Washington 98504-0002 • (360) 753-6780 • www.governor.wa.gov

December 8, 2010

Roger Goodell, Commissioner
National Football League
280 Park Avenue, Floor 12W
New York, NY 10017-1206

Dear Commissioner Goodell:

From the time I was first approached to support a law to protect youth athletes from the risks of concussions, I have focused on, and learned much about, this important issue. We all share the desire to protect our children from serious, yet preventable, health risks. This is why I am pleased to share Washington State's experience with the Zackery Lystedt Law.

I feel it is my responsibility to protect the health and safety of our young athletes while carefully limiting the cost to Washington State taxpayers. Our state, like many others in our country, is facing significant budget challenges, so any new expenditures have to be carefully scrutinized.

I am thrilled to report that the Zackery Lystedt Law is working. We are seeing a decrease in concussions and other head injuries in our student athlete population. I believe the adoption of this important legislation has saved our state money in emergency medical care, rehabilitation, and other services children need when they suffer the consequences of untreated brain injuries. In addition, school districts have not been required to hire medical professionals or trainers, and no additional significant investments were needed to comply with this law.

Thank you for your leadership in working to have a version of the Zackery Lystedt Law adopted around the country. Please feel free to share this with other states as you work to keep our country's children active and safe.

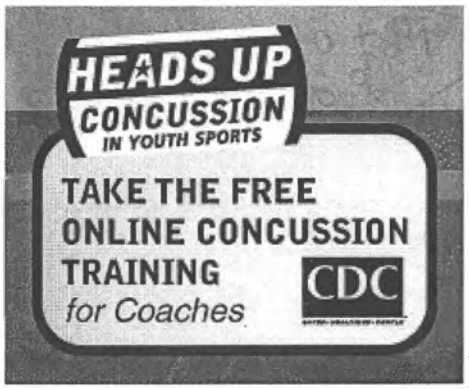
Sincerely,

Chris

Christine O. Gregoire
Governor

Happy holidays!

Centers for Disease Control and Prevention
Your Online Source for Credible Health Information



Heads Up Online Training Course

Heads Up: Concussion in Youth Sports is a free, online course available to coaches, parents, and others helping to keep athletes safe from concussion. It features interviews with leading experts, dynamic graphics and interactive exercises, and compelling storytelling to help you recognize a concussion and know how to respond if you think that your athlete might have a concussion.

What You Will Learn

This course will help you:

- Understand a concussion and the potential consequences of this injury,
- Recognize concussion signs and symptoms and how to respond,
- Learn about steps for returning to activity (play and school) after a concussion, and
- Focus on prevention and preparedness to help keep athletes safe season-to-season.

You can help make your league and school sports safer and healthier for all athletes. Learn when to make the call to pull an athlete off the field, ice, court, or track, and work with athletes, parents, and league and school officials to implement a concussion action plan and prevention strategies.

Course Highlights

Concussion Basics

- Understand concussion and what happens to the brain,
- Discover what causes a concussion, and
- Learn the potential consequences of concussion.

Recognize and Respond to a Suspected Concussion

- Focus on what to look for and when to pull athletes out of play,
- Watch for danger signs and seeking immediate medical attention, and
- Learn the four-step, "Heads Up" action plan when a concussion is suspected.

Helping Athletes Get Back to Play and to School

- Characterize the gradual steps for returning to activity (play and school), and
- Review a concussion preparedness checklist to guide you through pre-, mid-, and post-seasons.

Resource Center

- Access additional concussion information, videos, presentations by leading experts, fact sheets, communication strategies for talking with parents and athletes, and other tools.

Click here to take the training

Follow us on Facebook and learn more about concussion: www.cdc.gov/Concussion.

Page last reviewed: August 24, 2010
Page last updated: August 24, 2010
Content source: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control

Centers for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA 30333, USA
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348, 24 Hours/Every Day - cdcinfo@cdc.gov

HEADS·UP CONCUSSION IN HIGH SCHOOL SPORTS

A FACT SHEET FOR PARENTS

What is a concussion?

A concussion is a brain injury. Concussions are caused by a bump, blow, or jolt to the head or body. Even a "ding," "getting your bell rung," or what seems to be a mild bump or blow to the head can be serious.

What are the signs and symptoms?

You can't see a concussion. Signs and symptoms of concussion can show up right after the injury or may not appear or be noticed until days after the injury. If your teen reports ***one or more*** symptoms of concussion listed below, or if you notice the symptoms yourself, keep your teen out of play and seek medical attention right away.

Signs Observed by Parents or Guardians	Symptoms Reported by Athlete
• Appears dazed or stunned • Is confused about assignment or position • Forgets an instruction • Is unsure of game, score, or opponent • Moves clumsily • Answers questions slowly • Loses consciousness *(even briefly)* • Shows mood, behavior, or personality changes • Can't recall events *prior* to hit or fall • Can't recall events *after* hit or fall	• Headache or "pressure" in head • Nausea or vomiting • Balance problems or dizziness • Double or blurry vision • Sensitivity to light or noise • Feeling sluggish, hazy, foggy, or groggy • Concentration or memory problems • Confusion • Just not "feeling right" or is "feeling down"

How can you help your teen prevent a concussion?

Every sport is different, but there are steps your teens can take to protect themselves from concussion and other injuries.

- Make sure they wear the right protective equipment for their activity. It should fit properly, be well maintained, and be worn consistently and correctly.
- Ensure that they follow their coaches' rules for safety and the rules of the sport.
- Encourage them to practice good sportsmanship at all times.

What should you do if you think your teen has a concussion?

1. **Keep your teen out of play.** If your teen has a concussion, her/his brain needs time to heal. Don't let your teen return to play the day of the injury and until a health care professional, experienced in evaluating for concussion, says your teen is symptom-free and it's OK to return to play. A repeat concussion that occurs before the brain recovers from the first—usually within a short period of time (hours, days, or weeks)—can slow recovery or increase the likelihood of having long-term problems. In rare cases, repeat concussions can result in edema (brain swelling), permanent brain damage, and even death.
2. **Seek medical attention right away.** A health care professional experienced in evaluating for concussion will be able to decide how serious the concussion is and when it is safe for your teen to return to sports.
3. **Teach your teen that it's not smart to play with a concussion.** Rest is key after a concussion. Sometimes athletes wrongly believe that it shows strength and courage to play injured. Discourage others from pressuring injured athletes to play. Don't let your teen convince you that s/he's "just fine."
4. **Tell all of your teen's coaches and the student's school nurse about ANY concussion.** Coaches, school nurses, and other school staff should know if your teen has ever had a concussion. Your teen may need to limit activities while s/he is recovering from a concussion. Things such as studying, driving, working on a computer, playing video games, or exercising may cause concussion symptoms to reappear or get worse. Talk to your health care professional, as well as your teen's coaches, school nurse, and teachers. If needed, they can help adjust your teen's school activities during her/his recovery.

If you think your teen has a concussion:
Don't assess it yourself. Take him/her out of play. Seek the advice of a health care professional.

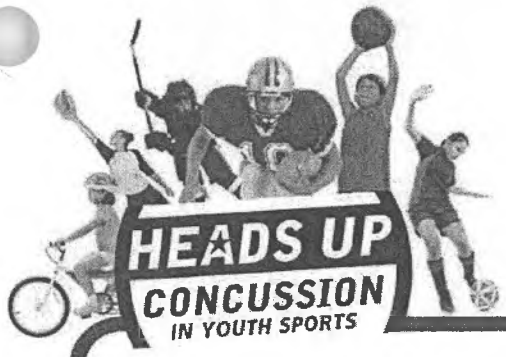
It's better to miss one game than the whole season.

For more information and to order additional materials ***free-of-charge***, visit: **www.cdc.gov/Concussion**.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

June 2010

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention



A Fact Sheet for **ATHLETES**

WHAT IS A CONCUSSION?

A concussion is a brain injury that:

- Is caused by a bump or blow to the head
- Can change the way your brain normally works
- Can occur during practices or games in any sport
- Can happen even if you haven't been knocked out
- Can be serious even if you've just been "dinged"

WHAT ARE THE SYMPTOMS OF A CONCUSSION?

- Headache or "pressure" in head
- Nausea or vomiting
- Balance problems or dizziness
- Double or blurry vision
- Bothered by light
- Bothered by noise
- Feeling sluggish, hazy, foggy, or groggy
- Difficulty paying attention
- Memory problems
- Confusion
- Does not "feel right"

WHAT SHOULD I DO IF I THINK I HAVE A CONCUSSION?

- **Tell your coaches and your parents.** Never ignore a bump or blow to the head even if you feel fine. Also, tell your coach if one of your teammates might have a concussion.
- **Get a medical check up.** A doctor or health care professional can tell you if you have a concussion and when you are OK to return to play.
- **Give yourself time to get better.** If you have had a concussion, your brain needs time to heal. While your brain is still healing, you are much more likely to have a second concussion. Second or later concussions can cause damage to your brain. It is important to rest until you get approval from a doctor or health care professional to return to play.

HOW CAN I PREVENT A CONCUSSION?

Every sport is different, but there are steps you can take to protect yourself.

- Follow your coach's rules for safety and the rules of the sport.
- Practice good sportsmanship at all times.
- Use the proper sports equipment, including personal protective equipment (such as helmets, padding, shin guards, and eye and mouth guards). In order for equipment to protect you, it must be:
  - The right equipment for the game, position, or activity
  - Worn correctly and fit well
  - Used every time you play

July 2007

It's better to miss one game than the whole season.

For more information and to order additional materials free-of-charge, visit:
www.cdc.gov/ConcussionInYouthSports

For more detailed information on concussion and traumatic brain injury, visit:
www.cdc.gov/injury

CONCUSSION

A Must Read for Young Athletes | Let's Take Brain Injuries Out of Play

CONCUSSION FACTS

- A concussion is a brain injury that affects how your brain works.
- A concussion is caused by a blow to the head or body:
  - from contact with another player, hitting a hard surface such as the ground, ice, or court, or
  - being hit by a piece of equipment such as a lacrosse stick, hockey puck, or field hockey ball.
- A concussion can happen even if you haven't been knocked unconscious.
- If you think you have a concussion, you should not return to play on the day of the injury and until a health care professional says you are OK to return to play.

CONCUSSION SYMPTOMS

- Concussion symptoms differ with each person and with each injury, and may not be noticeable for hours or days. Common symptoms include:
  - Headache
  - Confusion
  - Difficulty remembering or paying attention
  - Balance problems or dizziness
  - Feeling sluggish, hazy, foggy, or groggy
  - Feeling irritable, more emotional, or "down"
  - Nausea or vomiting
  - Bothered by light or noise
  - Double or blurry vision
  - Slowed reaction time
  - Sleep problems
  - Loss of consciousness

During recovery, exercising or activities that involve a lot of concentration (such as studying, working on the computer, or playing video games) may cause concussion symptoms to reappear or get worse.

WHY SHOULD I REPORT MY SYMPTOMS?

- Unlike with some other injuries, playing or practicing with concussion symptoms is dangerous and can lead to a longer recovery and a delay in your return to play.
- While your brain is still healing, you are much more likely to have another concussion. Repeat concussions can increase the time it takes for you to recover and the likelihood of long term problems.
- In rare cases, repeat concussions in young athletes can result in brain swelling or permanent damage to your brain. They can even be fatal.

*For more information about concussion and other types of traumatic brain injuries, go to

www.cdc.gov/Concussion

A part of CDC's Heads Up series

What Should I Do if I Think I Have a Concussion?

DON'T HIDE IT, REPORT IT. Ignoring your symptoms and trying to "tough it out" often makes symptoms worse. Tell your coach, parent, and athletic trainer if you think you or one of your teammates may have a concussion. Don't let anyone pressure you into continuing to practice or play with a concussion.

GET CHECKED OUT. Only a health care professional can tell if you have a concussion and when it's OK to return to play. Sports have injury timeouts and player substitutions so that you can get checked out and the team can perform at its best. The sooner you get checked out, the sooner you may be able to safely return to play.

TAKE CARE OF YOUR BRAIN. A concussion can affect your ability to do schoolwork and other activities. Most athletes with a concussion get better and return to sports, but it is important to rest and give your brain time to heal. A repeat concussion that occurs while your brain is still healing can cause long-term problems that may change your life forever.

All concussions are serious. *Don't hide it, report it. Take time to recover.*

It's better to miss one game than the whole season.

USA Football serves as the sport's national governing body on youth and amateur levels. An independent non-profit based in downtown Indianapolis, USA Football leads the game's development, inspires participation and ensures a positive experience for all youth and amateur players. USA Football was endowed by the NFL Youth Football Fund in 2002.

Working in partnership with the Centers for Disease Control and Prevention since 2007 as well as other credentialed medical organizations and doctors regarding player health and safety, USA Football stands among leaders in youth sports concussion education, particularly in youth football. The organization has built the first football-specific online youth football coaching course that includes chapters and comprehension quizzes encompassing concussion education and management, heat and hydration preparedness and equipment fitting guidelines. USA Football's members – youth football coaches, players, league commissioners and game officials – reside in all 50 states.

USA Football partners with collegiate athletic conferences, the NFL and its teams to promote concussion education through its 80-plus annual football training events and national campaigns. Dozens of articles, downloadable online resources and video promoting concussion education and management reside at usafootball.com and are available at no cost. Approximately 1 million visitors reach usafootball.com annually.

What Youth Football Coaches Should Know About Concussions

By Michael D. Goodlett, M.D., Lawrence J. Lemak, M.D.
March 11, 2009, revised December 28, 2009

Recognize the signs and symptoms of a concussion to ensure your players' safety. An easy rule of thumb to follow is when in doubt, sit them out.

WHAT COACHES SHOULD KNOW

Knowing the signs and symptoms of a concussion will help a youth football coach feel more comfortable and be more prepared in case of an emergency.

*A concussion is any change in an athlete's behavior, awareness, and/or physical feelings caused by a direct or indirect blow to the head.

*Any concussion has the potential to be a serious injury.

*Before letting an athlete go back to play, a concussion should be evaluated by a doctor.

*An athlete should never return to play while exhibiting any signs or symptoms of a concussion either at rest or with exertion. When in doubt, sit them out!

*There is an increased risk of suffering subsequent concussions after a first concussion.

*Any head injury associated with loss of consciousness must be treated as a suspected head, neck, or back injury.

*The only instances in which an athlete's helmet and shoulder pads should be removed is when a medical authority believes that it is necessary for the care of the athlete, or if the equipment interferes with the rescuers' ability to provide required CPR.

*If necessary to provide care for life-threatening conditions, it is recommended that the facemask be removed rather than the whole helmet. A tool to remove the facemask should be in the first aid kit.

*For any head injury, activate the Emergency Action Plan and follow the emergency action steps, Check-Call-Care.

When a player is hit, he may receive a blow to the head and become unconscious or demonstrate changes in behavior. If the player regains consciousness, seems to be alert and oriented, and is eager to play, a coach may feel the player is fully recovered and allow him back into the game or practice. However, the player has suffered a concussion. Failure to recognize a concussion can potentially lead to coma and death particularly if a second impact occurs. Coaches need to be aware of the signs of concussions and treat the situation properly.

Concussions are caused by a force being transmitted to the head. The force may be caused by any direct or indirect hit to the head or body and can cause changes in behavior, awareness, or physical feeling in the injured person. Concussions often go unrecognized by coaches because they are underreported by athletes who want to continue competing. Athletes often will minimize or deny symptoms. Maintaining a high level of suspicion and having some knowledge of the individual athlete's personality helps coaches in early detection of the signals of concussion. This awareness can prevent additional concussive injury, potential long-term brain damage, or other possible catastrophic outcomes.

On-The-Field Evaluations
If there is a forceful blow to the head, with or without loss of consciousness, the coach should suspect a head injury and also be concerned that the neck or back has been injured. When caring for the player on the field, tell him not to nod or shake his head during the assessment, but to say yes or no. The player's helmet should also be left in place. The goal is to minimize movement. If the head impact has caused the player to become unconscious or show the signs of concussion listed below, activate the Emergency Action Plan and follow the emergency action steps, **Check-Call-Care**. **Check** the scene for safety and check the ill or injured athlete, **Call** 9-1-1 or the local emergency number when needed, and

Care for the injured player until EMS personnel arrive.

To Care For Serious Injuries To The Head, Neck, And Back
Follow basic precautions to prevent disease transmission.

Minimize movement of the player's head, neck, and back by putting your hands on both sides of the player's helmet or head. Maintain an open airway using a jaw-thrust maneuver. Have the player remain in the position that you found him until EMS personnel arrive and take over.

Monitor the player's airway, breathing, and circulation.

If life-threatening symptoms are present, it is recommended that the facemask of the athlete's helmet be removed, rather than removing the entire helmet. This will allow access to an airway should the athlete stop breathing.

A tool for removing the facemask should be in the team's first aid kit.

The coach should evaluate the symptoms listed below if he suspects a player may have a concussion requiring immediate care.

The only instance in which an athlete's helmet and shoulder pads should be removed is when a medical authority believes that it is necessary for the care of the athlete, or if the equipment interferes with the rescuers' ability to provide CPR.

Symptoms that require immediate activation of the Emergency Action Plan and immediate removal to a medical facility are:

- *Period of unconsciousness;
- *Confusion, disorientation to time and place;
- *Severe headache or vomiting;
- *Appears sleepy, pale, and is sweating;
- *Blurred vision, slurred speech, and muscle weakness;
- *Neck pain.

Checking For Concussion
If the player is removed from the field after receiving a head impact, it is important to continue evaluating the player every five minutes for at least 30 minutes.

Look at the facial expression of the athlete.

- *Does the athlete have a vacant stare or a confused facial expression?

Check the athlete's behavior.

- *Is the athlete easily distracted or slow to answer questions or follow directions?
- *Does the athlete display unusual emotional reactions, such as *crying or laughing?
- *Does the athlete have a headache or complain of nausea?
- *Is the athlete irritable and easily frustrated?
- *Does the athlete appear unusually anxious or depressed?
- *Does the athlete appear sleepy?
- *Does the athlete have significantly decreased playing ability from earlier in the contest?

Check the athlete's orientation and memory.

- *Is the athlete aware of the time of day and date?
- *Is the athlete generally confused? Questions to ask
- *Which quarter or period is it?
- *Where are we? Which field or arena?
- *Which team are we playing?
- *Which side scored the last points?
- *Which team did the athlete play in the last game?
- *Did the athlete's team win or lose in the last game?

Check for posttraumatic amnesia (the athlete's ability to remember events after the injury).

- *Ask the athlete how he got injured?
- *Ask the athlete the first thing he remembers after the injury?
- *Ask the last thing the athlete remembers before the injury?

Medical attention is required if the athlete's expression, behavior, or memory is affected. Attention should be immediate if symptoms show a deteriorating situation. When an athlete has had a concussion, he should not be allowed to return to the current game or practice, and should not be left alone. Medical evaluation following the concussion is required before a return to participation is permitted.

Postconcussion syndrome
After a player is removed from the field, he may develop symptoms of postconcussion syndrome. This can occur immediately after the injury or many hours or days later. Symptoms of postconcussion syndrome include:

- *Blurred vision
- *Fatigue
- *Ringing in the ears
- *Trouble falling asleep
- *Dizziness

- *Sleeping more or less than usual
- *Headache
- *Increased sensitivity to light and noise
- *Nausea and vomiting
- *Feeling more emotional than normal
- *Poor coordination or balance
- *Difficulty concentrating
- *Increased irritability
- *Difficulty remembering
- *Slurred speech
- *Feeling dazed or stunned
- *Seeing stars or flashing lights
- *Having double vision.

A physician may conduct neuropsychological testing or neuroimaging to assess exactly when the athlete has recovered from a concussion. No athlete should go back to play before being free of all symptoms and signs, both at rest and during exertion, and a physician has indicated the player is ready to return to competition.

HEALTH & SAFETY

Concussion Awareness

CDC, NFL unite national governing bodies of sport to teach young athletes about concussions

By Joe Frollo
October 11, 2010, revised October 28, 2010

Free poster available for download and distribution to all youth leagues

The Centers for Disease Control and Prevention (CDC), the NFL and 14 national governing bodies of sport, including USA Football, are promoting a free poster designed to increase concussion awareness among young athletes, parents and coaches.

The poster, created by the NFL's Head, Neck and Spine Medical Committee, the CDC and the NFL Players Association, is similar to the one displayed in NFL locker rooms but geared toward a younger audience. It stresses the importance of recognizing a concussion, taking time to recover and not returning to play too soon. By walking through the steps to recognize if the athlete - or a teammate - has suffered a concussion, the goal is increased concussion awareness in all sports.

Players, coaches and parents can better recognize concussion symptoms thanks to a poster being distributed by the Centers for Disease Control and Prevention, NFL, USA Football and other national governing bodies of sport.

"The NFL understands its obligation to educate and inform parents, teachers, coaches and especially young athletes about the risks of concussions," NFL Commissioner Roger Goodell said. "This poster is one element of the NFL's program to assist in the development and broad dissemination of reliable medical information on concussions, which will give players, parents, coaches and others the information they need."

The poster is available online for download and order at no cost at CDC's website or by calling (800) CDC-INFO. Information on recognizing and reacting to concussions also can be found at usafootball.com and through USA Football's Put Pride Aside For Player Safety program as well as through the following national governing bodies:

USA Football's Certified Coaching Education Program, employed by youth football coaches in all 50 states, includes chapters on concussion awareness and management as well as hydration and proper equipment fitting. Health and safety videos also are available at USA Football's Health and Safety page.

"Having more than one dozen different sports be part of this initiative underscores the point that coaches, athletes and parents across all youth athletics need to be informed about this issue," USA Football Executive Director ScottHallenbeck said.

"USA Football has worked with the CDC on concussion education since 2007, and we will continue to emphasize it while teaching coaches and players proper football fundamentals for fun and safe play."

Links related to this article:

NFL and CDC create poster to educate young athelres about concussions

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HEALTH & SAFETY

Concussion Awareness

Redskins and USA Football Welcome High School Coaches for Concussion Education

By Steve Alic
April 23, 2010, revised April 29, 2010

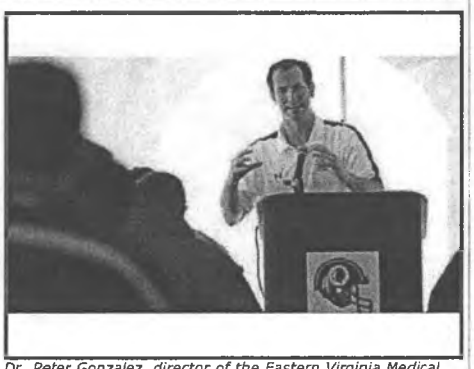
The Washington Redskins and USA Football partnered for the Redskins' inaugural Concussion Awareness and Education Forum on April 17 at Redskins Park.

Redskins Park has a history of preparing football teams for success.

Successful preparation at the football training facility earned a new and vital definition on April 17 when the Washington Redskins and USA Football partnered for the Redskins' inaugural Concussion Awareness and Education Forum for Maryland, Virginia and Washington, D.C. high school head football coaches.

Nearly 200 high school coaches traveled to Redskins Park as guests of the team to watch minicamp practice and participate in a 90-minute concussion education seminar led by USA Football's Peter Gonzalez, M.D.

Dr. Gonzalez is the director of the Eastern Virginia Medical School Sports Concussion Program in Norfolk, Va.



Dr. Peter Gonzalez, director of the Eastern Virginia Medical School Sports Concussion Program, spoke on behalf of USA Football regarding concussion awareness and management to 170 high school head football coaches at Redskins Park. The session was part of a full-day minicamp invitation that the Washington Redskins extended to high school coaches throughout Maryland, Virginia and Washington, D.C. (Photo courtesy of Ned Dishman/Washington Redskins)

Redskins General Manager Bruce Allen opened the day by welcoming the coaches and introduced Dr. Gonzalez. Each coach received a USA Football/CDC concussion awareness clipboard sticker listing concussion signs, symptoms and an action plan. This same material is given to thousands of coaches who attend USA Football's full-day coaching schools across the country. Concussion-related information is available at no cost throughout usafootball.com.

"The coaches asked good questions," Dr. Gonzalez said after the presentation. "The Redskins are to be commended - this was a great discussion and also was the largest group of high school coaches I've spoken to at any one time."

"I came to learn all I can," said Jason Meade, head football coach of Lee-Davis High School in Mechanicsville, Va., a two-hour drive from Redskins Park. Coach Meade enters his eighth season as head coach this fall. "Learning more when it comes to putting our players in a better, safer situation is important to us."

"We can't allow high school athletes who suffer concussions to return to play too soon," Dr. Gonzalez added. "If there's one thing a coach takes away from our session today, it's not allowing an athlete to return to play while still possessing the symptoms of a concussion.

"And if we even suspect someone to have suffered a concussion, there is no same-day return to play."

Concussion awareness and management is an important part of USA Football's online coaching education courses and its 80-plus training events held across the country for players, coaches and youth league commissioners.

USA Football is the official youth football development partner of the NFL, its 32 teams and the NFL Players Association. More than 60 of USA Football's events in 2010 are conducted in partnership with NFL clubs.

For Immediate Release
Tuesday, December 7, 2010

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NATIONAL FOOTBALL LEAGUE AND THE NATIONAL ATHLETIC TRAINERS' ASSOCIATION TEAM TO PASS STATE LAWS TO PROTECT YOUTH ATHLETES FROM THE RISKS OF CONCUSSIONS

Washington, D.C., December 7, 2010 – The National Football League and the National Athletic Trainers' Association today announced a joint effort to promote legislation to raise awareness and protect youth athletes from the risks of concussions. The new partnership was announced during the Youth Sports Safety Summit in the nation's capital.

"We are pleased to team with the National Athletic Trainers' Association on a state-based legislative effort to protect youth athletes," said Jeff Miller, the NFL's vice president of government relations. "We will advance a simple, but significant shared goal -- to help prevent concussions and make sports and recreational activities safer for young athletes around the country."

The NFL and NATA have agreed to work together to pass concussion awareness and prevention laws in every state throughout the country. The league and the association will promote laws modeled on the Zackery Lystedt law in Washington State, which contains three key elements: (1) concussion education for young athletes, parents and coaches on an annual basis; (2) immediate removal of a student athlete who appears to have suffered a concussion from play or practice; and (3) mandatory clearance of that student by a health care professional who is trained in the evaluation and management of concussions before returning to play or practice.

Marjorie J. Albohm, MS, ATC, president of the National Athletic Trainers' Association added, "We know from recent cases and studies that far too many youth athletes are either playing with undiagnosed symptoms of concussions or returning to play before fully recovering from them. That's why our organization of trained health care professionals supports legislation in every state that will help coaches, youth athletes, their parents and school officials to recognize and respond appropriately to concussions. Doing so will help prevent injury, chronic impairment and even death."

-more-

The NFL and NATA also have pledged to encourage and enlist the participation of other stakeholders and advocates. Organizations already supporting the adoption of such laws include USA Football, the American College of Sports Medicine and the Brain Injury Association of Washington. To date, nine states have enacted adequate concussion awareness and prevention laws including Washington, Oregon, New Mexico, Virginia, Rhode Island, Massachusetts, Oklahoma, Connecticut and New Jersey.

National Athletic Trainers' Association (NATA) – Health Care for Life & Sport

Athletic trainers are health care professionals who specialize in the prevention, diagnosis, treatment and rehabilitation of injuries and sport-related illnesses. They prevent and treat chronic musculoskeletal injuries from sports, physical and occupational activity, and provide immediate care for acute injuries. Athletic trainers offer a continuum of care that is unparalleled in health care. The National Athletic Trainers' Association represents and supports 32,000 members of the athletic training profession. Visit www.nata.org

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TIME IN PARTNERSHIP WITH CNN

Thursday, Feb. 03, 2011

Headbanger Nation

By Jeffrey Kluger

I didn't get a good look at the little boy who injured my daughter in the science museum in Mexico City. He seemed to be about 7, my daughter Elisa was not yet 3, and the two of them were part of a scrum of kids playing on an indoor patio. At precisely the wrong moment, she turned left, he turned right, and they collided. Physics being physics, the smaller mass yielded to the larger one, and my daughter fell down. She landed first on her bottom, then tipped backward and hit her head on the floor.

The sound was one that parents dread: the singular clunk of skull striking cement. I winced, Elisa wailed, and I gathered her up. Soon she stopped crying and went off to play, but even as she did, a dangerous process had begun to unfold inside her skull. (Read Dr. Mehmet Oz's column about concussions.)

When Elisa's head hit the floor, the deceleration was sudden, but — physics again — her brain stayed in motion for an instant, moving through the small intracranial space until it collided with the back of the inside of her skull. Concussive energy radiated through the tissue. As it did, channels in the neurons opened wide, allowing calcium ions to flow into the cells, depressing their ability to metabolize energy. Brain tissue began swelling, but with nowhere to go, it squeezed up against the skull wall. Shearing forces tore axons connecting the cells, damaging their myelin sheathing, which can disrupt nerve signals. All of that was the best-case scenario. The worst case was a brain bleed, which could be fatal without immediate surgery.

Within 20 minutes, Elisa grew withdrawn. An hour later, back in our hotel, she vomited and then began thrashing convulsively. We rushed her to a hospital, where doctors struggled to get a line into one of the tiny veins in her arm, shouting at her to stay awake.

"Open your eyes!" I shouted at her in English. "*Abre tus ojitos!*" my wife echoed. Elisa understood both languages; she answered in neither.

Finally, the doctors got her into a CT scanner, then administered an EEG. There was no bleeding, but there was swelling. Elisa spent three days in the hospital taking antiseizure and antiswelling medication and finally was released. On the flight home, she was a terror — but only in the way a toddler is supposed to be. (See a graphic on the physics behind concussions.)

For us, that was a first-time — and, we dearly hoped, last-time — experience, but we're hardly alone in having gone through it. In the U.S., concussions are an alarmingly commonplace injury, particularly among kids and most particularly among active, athletic ones. Up to 3.8 million Americans are getting concussed per year, according to the Centers for Disease Control and Prevention, and even that big a figure is a moving target. In 2005, the number of children who visited emergency rooms for treatment of concussions was more than twice what it had been in 1997, according to a new study in the journal *Pediatrics*. High school football players alone sustain 100,000 full-blown, diagnosed concussions per year. Flying under the radar are injuries mild enough to get passed off by coaches as a mere ding or ignored by players anxious to get back on the field.

According to a study by neuroscientist Kevin Guskiewicz of the University of North Carolina, the average college football player sustains a breathtaking 950 to 1,100 subconcussive blows per season — hits that are enough to do cumulative damage to young brain tissue but not enough to cause immediate symptoms. "There's what we call a dose response," Guskiewicz says. "After a certain number of hits, the damage starts to show."

But while football is responsible for more than half the concussions kids suffer playing team sports, there's a lot more blame to go around. The success of Title IX, which forbids gender discrimination in scholastic athletics, has led to a 900% increase in girls' sports teams since the law's passage in 1972. But guaranteeing girls equal access to sports also guarantees them equal access to injuries. Girls' soccer accounts for nearly 12% of total team-sports concussions, compared with just 6.6% for boys' soccer. Girls' basketball causes 7%. Even volleyball weighs in at 1.1%. (See a special report on women and health.)

What's more, a third of all concussions among kids are caused by nonteam activities such as ice skating, bicycling and playground recreation. Gaining fast too are newer head-cracking activities like snowboarding and extreme skateboarding. Kids may be the first group to fall in love with such sports, but they're the last group — neurologically speaking — that should engage in them.

"The immature brain is still developing," says Julian Bailes, a neurologist at West Virginia University and the medical director for the Pop Warner Youth Football program. "That makes it more susceptible to damage and more likely to suffer repetitive injury." How this shapes overall development is unknown. A child's brain is like a ship en route to somewhere: a concussion can blow it off course.

The severity of the damage — both acute and chronic — is what researchers are now trying to understand and what legislators and the sports-equipment industry are trying to control. Even as scientists look deeper into the physics, neurochemistry and genetics of brain injury, lawmakers are imposing new rules governing how kids should be assessed for concussions and when they should and should not be eligible to play. Equipment manufacturers, particularly those who make football helmets, are being pushed to redesign their product lines and reform the testing standards that essentially allow the industry to police itself. Pro teams too are feeling the heat for selling an elbow-throwing, stick-swinging, head-butting ethos that may be

fine for millionaire athletes who know what they're getting into but is hurting, and in some cases killing, the kids who emulate them.

"I keep telling kids, Your brain is not your knee. It's not your shoulder. It's your future," says neuropsychologist Gerard Gioia, chief of pediatric neuropsychology at Children's National Medical Center in Washington. "We have to protect it better than we are." (See TIME's special report "How to Live 100 Years.")

The Science of a Hit

If it's football that receives most of the attention in conversations about concussions, it's partly because the hits inflicted in the game can be so shocking. In soccer, basketball or even hockey, violence is typically a by-product of aggressive play. In football, it is the play. Guskiewicz conducts his studies by placing accelerometers in players' helmets and recording not just how often they get hit but also how hard. The unit of measure he uses is g-force. Liftoff of a Saturn V moon rocket exposed its crew to a maximum of four g's. A roller coaster may exceed six g's. College football players, by contrast, collide with each other with an impact of nearly 23 g's — and that's the average. Higher-end blows range from 85 to 100 g's. "The highest we ever recorded was 180 g's," says Guskiewicz.

Worse, it's not necessary to be hit in the head for that kind of impact to do concussive damage. A player struck in the chest can suffer whiplash just like a passenger in a car accident, and when the head snaps back and forth, the brain sloshes around with it. "One sign," says Gioia, "is when a player complains of neck pain. That's often an indicator that the head has moved around hard."

Many of those blows don't necessarily lead to a concussion, and in a way, that's unfortunate. Only about 10% of concussions lead to loss of consciousness, but the other signs are hard to miss, including headache, vomiting, dizziness, balance problems, sensitivity to light or noise, confusion, irritability and amnesia. A player with any of those symptoms is likely to be sent to the bench — at least for a while. A player whose brain has been jolted at a subconcussive level is much likelier to stay on the field and return there week after week with no recuperation time. The damage that does can be deadly. (Read Dr. Mehmet Oz's column about concussions.)

In April 2010, University of Pennsylvania football star Owen Thomas committed suicide in his off-campus apartment, having never before exhibited any sign of mental illness. When researchers at Boston University examined his brain, they found it flecked with what are called tau proteins, telltale signs of a condition known as chronic traumatic encephalopathy (CTE), which is often seen among dementia patients and NFL players with a lifetime of concussions behind them. Thomas had never sustained a concussion, but that might not have mattered.

"He'd been playing since he was 9," says neuropsychologist Robert Stern, part of the team that conducted the analysis. "That suggests he had a great deal of exposure to repeated subconcussive blows."

The link between tau and brain damage is straightforward. The protein is one of the major structural materials of nerve tissues. When the brain is shaken too hard, nerve fibers are torn and the tau is released. The brain tries to clean up the mess, and given enough time, it could. If the hits keep coming, however, the proteins just accumulate. "I describe [the tau deposits] as a form of sludge," says Bailes.

It's not unusual for players like Thomas suffering from CTE to die in violent or otherwise dramatic ways. Bailes was part of a team that found tau protein in the brain of Chris Henry, a player for the Cincinnati Bengals who was killed in 2009 when he got into an argument with his fiancée and jumped on the back of her pickup truck as she drove away — taking a fatal tumble onto the road. In 2007 wrestler Chris Benoit murdered his wife and son and then hanged himself. In 2004 former Pittsburgh Steeler Justin Strzelczyk, who suffered from hallucinations, died when he drove his car into a tractor trailer while fleeing police. Both Benoit and Strzelczyk had CTE. "This disease starts young and progresses through life," says Stern.

Until recently, doctors didn't know just how young, but they're getting an idea. Michael (not his real name) is a ninth-grade football player visiting an outpatient concussion clinic Gioia runs in Rockville, Md. Michael got clobbered in a game in mid-September, suffered many of the immediate concussion symptoms and four months later is still not well. Recovery time varies for all patients, though three months is a good benchmark; four months suggests trouble. Michael's sleep remains disturbed, his temper remains erratic, and his school performance has cratered. An honor-roll student in eighth grade, he has gotten mostly D's and F's this year. "The change," says his mother, "it's shocking."

It's not possible to diagnose anything like CTE from just those symptoms, particularly because Michael's recent academic problems began before his concussion. But he already had a history of what he calls stingers, or head blows — none of which kept him off the field. What's more, his coach allowed him to return to play only a month or so after his recent concussion, a game in which he took another blow to the head, then lost his temper and got ejected.

Michael is hardly the only student athlete playing roulette with his brain, and his coach is hardly alone in abetting such recklessness. One study has shown that up to 40% of players who experience a concussion are back on the field before their brains have fully healed. That, Gioia says, is especially worrisome since sometimes two mild injuries can do more damage than one severe one. In some cases — mercifully rare — players who return to the field before they're fully recovered may even suffer what is known as malignant brain edema, or second-impact syndrome, in which another blow to the head leads to a fatal brain bleed. About half a dozen kids per year die from second impact. (Read Dr. Mehmet Oz's column about concussions.)

It's easy enough to make the case that any person who has suffered a brain injury needs a long period of recuperation before returning to vigorous physical activity. But what about vigorous intellectual activity? The brain is a cognitive machine, and it requires an enormous amount of energy to keep its gears moving. That's a fact concussed kids often confront when they resume their classwork after an injury and find that their symptoms return the moment they crack a book. "Cognitive exertion requires a high degree of

metabolic activity," says Gioia. "If you have a brain that's already impaired, that ability is going to be reduced."

Mary, a high school junior and another patient at Gioia's clinic, has suffered three concussions over the past three years as a goalie for her soccer team. Surprisingly, it is not heading the ball that leads to most concussions in soccer — though the limited studies that have been done have looked only at young adults, and none have explored subconcussive injury. Rather, the damage is done mostly by collisions with other players or, as in Mary's case, with equipment. Her third concussion came last November, when she hit her head against the frame of the goal. She remains an honors student in the International Baccalaureate program in her high school, but the struggle to keep up that level of academic excellence has been grueling.

"I didn't have any exams until two months after the injury," she says. "But when I did, the headaches and fatigue came back immediately. I lost focus during one test and had no idea what I'd just written." She got through all the same and has gone back to school full time, but every day is a battle with pain, exhaustion and sensitivity to noise and light. She has also accepted that soccer — which was a passion — is just not an option anymore. "I can't afford another concussion," she says. (See a graphic on the physics behind concussions.)

Digging Deep

The fact that no two concussions follow the same recovery arc is one of the things that makes them so challenging to diagnose and treat. But that same particularity of injury also provides scientists insights into which people are at the greatest concussive risk.

Gender, for one thing, seems to play a role. Mary may be recovering faster from her injury than Michael is, but on the whole, females are both more susceptible to concussions than males are and suffer more-severe symptoms. So far, the reason for that gap is unclear. There is some thought that a girl's comparatively weaker neck muscles may leave her head more susceptible to violent shock. Hormones too may play a role. Among epileptic girls and women, rising and falling estrogen levels are known to make the brain more or less vulnerable to seizures. The thinking is that this may apply to concussion symptoms as well — though it's unclear whether a girl's hormonal makeup leaves her more concussion-prone throughout the month or just during menstruation. (See a special report on women and health.)

Genes may also be involved. The fact is, plenty of athletes make it through their careers battered and scarred but cerebrally intact, while others who may not get hit with any greater frequency suffer all manner of brain damage. Researchers at the Children's National Medical Center are studying the genomes of both concussed and nonconcussed kids, looking for markers that may explain the difference.

"There could be a genetic predisposition that affects metabolic activity," says geneticist Susan Knoblach. "People always assume that there's a genetic component in degenerative conditions but not acute ones, but of course there can be."

Maryland's Fairfax County has instituted a program in which student athletes spit into cups so their genetic profiles can be taken. The genomes of the ones who come down with concussions can then be compared for key similarities. Early attention is focusing on a gene that codes for a protein called ApoE, which has been implicated in Alzheimer's disease. In the long run, teasing out concussion genes could lead to better drugs or gene therapy to treat or prevent the injury. In the short run, it could help parents and coaches determine in advance which sports kids are best suited to play. Says Gioia: "We may actually find out, 'You know what? You're not set up to be a football player. You might be a better tennis player.'"

Newer brain-scanning technology is also making a difference, helping doctors diagnose concussions and track recovery. The microscopic size of tau proteins and nerve fibers makes them impossible to see without a postmortem exam, but three noninvasive techniques can help sidestep that problem. Magnetic resonance spectroscopy measures not direct damage to the brain but its metabolic activity — a good way to evaluate the very system that breaks down first when a brain is concussed. Diffusion tensor imaging can observe transmission along nerve-fiber tracks, providing a sense of the integrity of the neural wiring. And resting fMRI allows physicians to watch the brain when it's not performing a task, providing a look at basic function. (See TIME's special report "How to Live 100 Years.")

Changing the Rules

Smart medicine, of course, can do only so much to reverse the number of concussions. Smart policy must do the rest. To keep kids from hurting themselves — and to prevent coaches from enabling them — 10 states, including New Jersey, Oregon, Virginia and football-mad Oklahoma, have passed return-to-play laws requiring kids who have sustained even a suspected concussion in any sport to be pulled from play and not returned until a doctor or certified athletic trainer declares them fit. A handful of other states are considering similar legislation, and last year two separate bills along the same lines were introduced in the House of Representatives. Both will have to be resubmitted under the new GOP majority. Still, the national trend is clear: "When in doubt, sit them out" is how the advocates put it.

Most major professional sports leagues in the U.S., as well as most large universities and 4,000 high schools, now also use a computer program known as ImPACT (for Immediate Post-Concussion Assessment and Cognitive Testing) that measures such basic skills as memory, word recognition and pattern recognition. Players are required to take a baseline test at the beginning of the season and are periodically retested, especially postconcussion, to determine if there's been any erosion of skills. "I used to sit across from athletes doing paper-and-pencil memory tests," says ImPACT developer Mark Lovell, a neuropsychologist at the University of Pittsburgh Medical Center. "That would never work with large groups of kids. There aren't that many neuropsychologists alive."

Reform is also coming — slowly — to the major manufacturers of football helmets, driven mostly by the NFL, which has imposed much stricter concussion and tackling rules in the past season. The NFL is anxious both to protect its players and to shake its image as a weekly tutorial for student athletes learning all the wrong safety lessons from pros who should know better. Currently, the group that certifies helmets is the National Operating Committee on Standards for Athletic Equipment (NOCSAE), which sounds

reassuringly official except for the fact that it's essentially funded by the manufacturers themselves. NOCSAE has come under fire not only for this seeming conflict of interest but also for what critics consider unreliable testing. The larger problem, though, is that the standard football helmet was designed to prevent only lacerations and fractures — a job it does very well — and to do little or nothing to prevent concussions. "The science just isn't there today," says Dr. Robert Cantu, a neurosurgeon at Boston University and a member of NOCSAE's board. (See a graphic on the physics behind concussions.)

That's not NOCSAE's or the NFL's fault, but they're trying to do something about it. In December the league and the helmet manufacturers convened a sort of head-injury summit in New York — a gathering that also included officials from NASCAR and the military — to consider helmet modifications that could reduce the concussive carnage. For football, those modifications could include better padding, stronger chin straps and redesigned face masks that distribute shock differently. Kids' helmets must also be more than simply smaller versions of those used by adults. The padding inside all helmets is designed to compress at the forces generated by colliding adult bodies. With the smaller forces kids produce, the padding stays rigid, essentially becoming one more hard surface for the head to strike. Innovations introduced in football could ripple out to other sports' playing fields, to say nothing of battlefields.

Athletics will never be stripped of all danger, and terrible as the blown knee or wrecked elbow may be, there is always an assumption of those risks when you elect to play the game. But the brain is more than a joint or a limb. It's the seat of the self. We overlook that fact at our peril and — much worse — at our children's.

Boston University School of Medicine

sportslegacy INSTITUTE

Department of Veterans Affairs

EMBARGOED UNTIL August 18, 2010, 8 a.m. E.T.

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BOSTON UNIVERSITY AND DEPARTMENT OF VETERANS AFFAIRS RESEARCHERS DISCOVER BRAIN TRAUMA IN SPORTS MAY CAUSE A NEW DISEASE THAT MIMICS ALS

Two former NFL players died after being diagnosed with Lou Gehrig's Disease; New findings suggest they had a new disease associated with repetitive brain trauma

(BOSTON) – The Center for the Study of Traumatic Encephalopathy (CSTE) at Boston University School of Medicine (BUSM) and Department of Veterans Affairs (VA) announced today that they have provided the first pathological evidence that repetitive head trauma experienced in collision sports is associated with motor neuron disease, a neurological condition that affects voluntary muscle movements. The most common form of motor neuron disease is amyotrophic lateral sclerosis (ALS) or Lou Gehrig's disease. The findings will be published in the September issue of the *Journal of Neuropathology and Experimental Neurology* (**http://journals.lww.com/jneuropath**).

The finding was discovered by Ann McKee, MD, and colleagues at the CSTE. McKee, a CSTE Co-Director, is an associate professor of neurology and pathology at BUSM, as well as Director of Neuropathology for the Department of Veterans Affairs at the Bedford VA Medical Center, where this research was conducted.

McKee and the CSTE researchers made this groundbreaking pathological discovery while examining the brains and spinal cords of 12 athletes donated by family members to the CSTE Brain Bank at the Bedford VA Medical Center. Three of these 12 athletes, including former professional football players Wally Hilgenberg and Eric Scoggins, as well as an unidentified former military veteran and professional boxer, developed motor neuron disease late in their lives. The former football players were diagnosed clinically with ALS, which is a progressive neurodegenerative disease that attacks motor nerve cells in the brain and spinal cord, resulting in muscle weakness and atrophy. ALS affects fewer than two in 100,000 patients annually, and 30,000 Americans currently live with the disease. The majority of ALS cases (90-95 percent) are considered "sporadic," meaning of unknown cause, although it has long been suspected to involve a complex interaction between multiple genetic and environmental risk factors.

In this study, funded in part by an unrestricted gift from the National Football League (NFL) to the CSTE, McKee found that when they died, all 12 athletes showed neuropathological evidence of chronic traumatic encephalopathy (CTE), a progressive degenerative brain disease characterized by deposits of an abnormal form of *tau* protein and believed to be caused by repetitive head trauma. In the three athletes with motor neuron disease, abnormal *tau* protein deposits were not only found throughout the brain, but also in the spinal cord.

CSTE researchers also discovered that 10 of 12 CTE victims had a second abnormal protein, TDP-43, in their brains. Of those 10, only three had TDP-43 in the brain *and* the spinal cord, and those were the three athletes diagnosed with motor neuron disease. TDP-43 is also found in individuals with sporadic ALS although in the athletes with repetitive brain trauma, the TDP-43 pathology was more severe than found in sporadic ALS and was accompanied by extensive *tau* pathology. The brains and spinal cords of normal individuals show no TDP-43 or *tau* deposition.

These new findings suggest that the motor neuron disease that affected the three athletes is similar to, but distinct from sporadic ALS and represents a disease never described previously in the medical literature. This new disease, referred to as chronic traumatic encephalomyopathy (CTEM) by McKee and colleagues is likely caused by the repetitive head trauma experienced by athletes in contact sports.

The association between head trauma and ALS is supported by the medical literature, in which the risk of ALS has been reported to be higher among contact sport athletes and veterans. A study of professional soccer players in Italy found that the incidence rate of ALS was 6.5 times higher than in the general population. An increased incidence of ALS has also been reported in American football players, including three players from the 1964 San Francisco 49ers who died from ALS. Based on the number of retired NFL players with ALS, it is estimated that the risk is at least 8 times higher than in the adult male population. Among Veterans with a history of head injuries, their risk of ALS was 2.3 times higher than normal, and Gulf War Veterans have a twofold increased risk. In fact, since 2008, the US Department of Veterans Affairs has considered ALS as a presumptively compensable illness for all veterans. The discovery of this new ALS-like disease by the BU CSTE investigators suggests that one possible reason for the increased risk of clinically diagnosed ALS in veterans and in contact sport athletes may be the exposure to repetitive head trauma, including concussions, subconcussive blows and blast injuries.

These findings raise the question of whether head injuries may have contributed to Lou Gehrig's motor neuron disease, and whether he also suffered from CTEM. Gehrig, nicknamed the "Iron Horse," played football at Columbia University before becoming a legendary member of the New York Yankees and playing in 2,036 consecutive games, a record that stood for more than 60 years. Gehrig suffered at least five documented concussions and was reported to have been knocked unconscious for five minutes after taking a pitch to the head while not wearing a helmet. He played the next day.

"When we read reports about cases of the disease being linked to specific activities or experiences, such as the increased risk associated with military service, or this one regarding professional athletes, we are reminded of just how complex of a disorder ALS is. We're hopeful that this new work may shed light on potentially exciting new possibilities for biomarker and therapy development," said Steve Perrin, PhD, CEO and Chief Scientific Officer of the ALS Therapy Development Institute.

Responding to these new findings, Hunt Batjer, MD and Richard Ellenbogen, MD, the co-chairmen of the NFL's new Head, Neck and Spine Committee, stated, "We are pleased that the NFL has provided the support necessary for this research and look forward to continued discussion of the findings within our medical committee and with other researchers to better understand their clinical implications."

McKee now has analyzed the brains of more than 35 athletes and found evidence of CTE in 12 of 13 former NFL players. These brains were acquired primarily through the efforts of CSTE co-director Chris Nowinski who is also president of the non-profit Sports Legacy Institute. The CSTE maintains a registry of more than 350 living athletes who have agreed to donate their brain and spinal cord following death and to undergo telephone-based interviews and assessments during life. Robert Stern, PhD, CSTE co-director and an associate professor of neurology at BUSM, oversees the CSTE registry as well as a study about to begin of retired NFL players who undergo extensive neurological, cognitive, psychiatric, cerebrospinal fluid and neuroimaging studies. Robert Cantu, MD, a clinical professor of neurosurgery at BUSM and co-director of the CSTE, was recently appointed senior advisor to the NFL Head, Neck and Spine Committee.

COORDINATES WOULD BE PLACED HERE

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Wally Hilgenberg died in 2008 at the age of 66 after a three-year battle with ALS. After graduating from the University of Iowa, Mr. Hilgenberg played 12 seasons with the Minnesota Vikings and three with the Detroit Lions as a linebacker.

Eric Scoggins died in 2009 at the age of 49 after a two-year battle with ALS. After graduating from the University of Southern California, he played one season for the San Francisco 49ers before playing two seasons in the United States Football League, for the Los Angeles Express and the Houston Gamblers.

Early symptoms of ALS often include increasing muscle weakness, especially involving the arms and legs, and progressive problems with speech, swallowing and breathing. Because voluntary muscle action is progressively affected, patients in the later stages of the disease may become totally paralyzed. In nearly all cases, ALS is fatal.

The CSTE (**www.bu.edu/cste/**) was founded in 2008 and is the leading center in the world studying the long-term effects of repetitive brain trauma in sports and the military. The CSTE was created as a collaboration between Boston University (BU), Sports Legacy Institute (SLI) and the Department of Veterans Affairs. Co-directors of the BU CSTE include Robert Cantu, MD, a clinical professor of neurosurgery at BUSM, Ann McKee, MD, an associate professor of neurology and pathology at BUSM, Chris Nowinski, and Robert Stern, PhD, an associate professor of neurology at BUSM. The mission of the CSTE is to conduct state-of-the-art research of CTE, including its neuropathology and pathogenesis, the clinical presentation, biomarkers, and course, the genetics and other risk factors for CTE, and ways of preventing and treating this cause of dementia. Brain trauma is increasingly seen as a public health crisis due to the discovery of CTE in a number of recently deceased athletes, most of whom have been studied at the CSTE. McKee also identified CTE in the only former NHL player examined, Reggie Fleming. The CSTE's groundbreaking research created a dramatic change in the understanding of and response to brain trauma and concussions in all sports, especially football. The BU CSTE has received grants from the National Institute on Aging and the National Operating Committee on Standards in Athletic Equipment (NOCSAE), and has received an unrestricted gift from the NFL.

CTE, originally referred to as "dementia pugilistica" because it was believed to only affect boxers, is a progressive brain disease believed to be caused by repetitive trauma to the brain, including concussions and subconcussive blows. It is characterized by deposits of an abnormal protein called *tau* in the form of neurofibrillary tangles, glial tangles, and neuropil threads throughout the brain, and, in some cases, the presence of another abnormal protein – associated with motor neuron disease – known as TDP-43. These abnormal proteins are associated with the impaired functioning and eventual death of brain cells. Early on, CTE sufferers may display symptoms such as memory impairment, emotional instability, erratic behavior, depression and problems with impulse control. CTE may eventually progress to full-blown dementia. Although similar to Alzheimer's disease, CTE is pathologically distinct, and it is the only known preventable cause of dementia.

CSTE co-directors Cantu, McKee and Nowinski serve on the NFL Players Association Mackey/White Traumatic Brain Injury Committee, which includes, and is chaired by, CSTE registry member Sean Morey. In addition, Cantu serves as a senior advisor to the newly created NFL Head, Neck and Spine Committee.

Sports Legacy Institute is a 501(c)(3) nonprofit corporation founded in 2007 to solve the sports concussion crisis. SLI is dedicated to education, prevention, treatment and research on the effects of concussions and other brain injuries in athletes and the military. SLI partnered with Boston University School of Medicine to form the Center for the Study of Traumatic Encephalopathy in 2008.

BRAIN INJURY ASSOCIATION OF WASHINGTON

Journey Toward Understanding: Concussion & Mild Brain Injury

Introduction

Three little monkeys jumping on the bed.
One fell off and bumped his head.
Took him to the doctor and the doctor said,
"That's what you get for jumping on the bed!"

This nursery rhyme tells a story about concussion--the bumps, bangs and shakings to the brain that many adults and children experience. Unfortunately, just like the monkeys jumping on the bed, professionals may not understand concussion well enough to offer support and to help individuals who sustain concussions. People with concussions may just try and "shake it off" and, thus, not be evaluated and treated properly by professionals. It is not uncommon for individuals to be sent home from emergency rooms (ERs) with no follow-up care or to end up with long-term problems that no one understands. This paper will define concussion, present the common symptoms of concussions and discuss ways to help people who sustain concussions.

Each year, it is estimated that approximately 1.5 million people experience concussions. Vehicular crashes (cars, motorcycles, bicycles), sports/recreational activities (football, hockey, playgrounds), abuse/assault (shaken baby syndrome, beatings), falls (young children and the elderly) and other events all have been implicated. It is easy to see that almost any activity can put a person at risk for a concussion. It is a little surprising that people do so well avoiding concussions and equally not surprising that many of us have had concussions.

It is important to note that concussions clearly are associated with lifestyle and parallel other similar lifestyle injuries. If you are involved actively in sports that put your body at risk for muscle pulls, strains, sprains and broken bones, then your chances of a concussion also are great. The Centers for Disease Control and Prevention (CDC) estimates 300,000 sports-related concussions in the United States each year. The more risk to your body, the more risk of serious harm and permanent damage, and the greater the chances that a concussion or more permanent brain injury can occur.

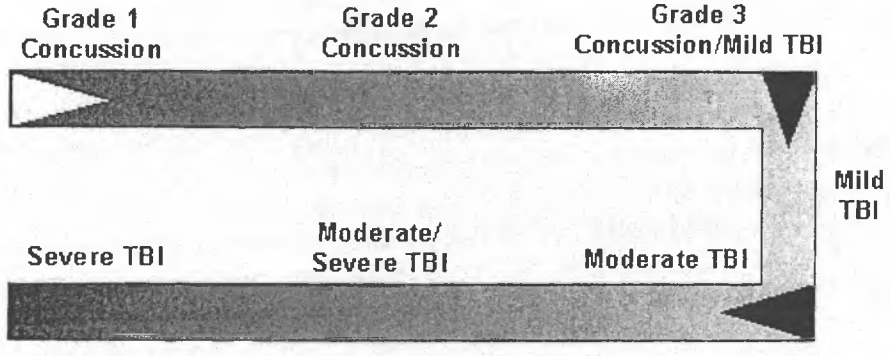
If your job involves heavy labor in farm or construction settings, your chances of physical injury increase and the chances of a concussion increases as well. The use of substances, such as alcohol, that alter your judgment and coordination about everyday activities, like driving or even walking, put you at risk for physical injury and, therefore, at similar risk for a concussion or more serious brain injury. Children--especially younger children--are susceptible to sustaining concussions from falls, play activities and abuse. Lastly, older individuals with balance problems may be prone to falls that can result in not only broken hips, but concussions as well.

What is Concussion?

It is important to understand that a concussion is a physical injury to the brain that causes a disruption of normal functioning just like any other physical injury disrupts your normal functioning. For example, some ankle injuries (i.e., sprains and fractures) are more disruptive

than others, just as some brain injuries are more disruptive than others. The better we understand any injury, the better our chances are for a speedier and healthier recovery.

There is some confusion as to the definition of a concussion and the definition of a mild traumatic brain injury (MTBI). Brain injury can be viewed along a continuum that incorporates concussion, mild brain injury, moderate brain injury and severe brain injury. Each type of brain injury varies depending upon: 1) whether the person was unconscious, 2) how long he/she was unconscious, 3) the length of their amnesia, 4) the resulting cognitive, behavioral and physical problems and 5) the recovery. Viewed as a continuum, the severity of brain injuries can be represented as follows:



As one can see, the definition for a Grade 3 concussion and a MTBI tend to overlap on this continuum.

To further clarify, a concussion is defined as a trauma (i.e., a blow to the head or a serious whiplash) that induces an alteration in mental status (physical or cognitive abilities) that may or may not involve a loss of consciousness.
Concussion as detailed by guidelines developed by the American Academy of Neurology (AAN) and the Brain Injury Association (BIA), commonly is divided into three different types.

Grade 1 Concussion

- Person is confused but remains conscious.
- SIGNS: Temporarily confused, dazed, unable to think clearly, has trouble following directions
- TIME: Symptoms clear within 15 minutes

Grade 2 Concussion

- Person remains conscious, but develops amnesia .
- SIGNS: Similar to Grade 1
- TIME: Symptoms last more than 15 minutes

Grade 3 Concussion

- Person loses consciousness
- SIGNS: Noticeable disruption of brain function exhibited in physical, cognitive and behavioral ways.
- TIME: Unconsciousness for seconds or minutes

It is important to note that a person can sustain a concussion (Grades 1 & 2) without losing consciousness. A Grade 3 concussion involves the loss of consciousness, even if only briefly. As defined by the American Congress of Rehabilitation Medicine, MTBI is a traumatically induced physiological disruption of brain function as manifested by some or all of the following:

- Any period of loss of consciousness
- Any loss of memory for events immediately before or after the incident
- Any alteration in mental state at the time of incident
- Focal neurological deficits that may or may not be transient but does not exceed:
  1. Loss of consciousness of approximately 30 minutes or less
  2. An initial Glasgow Coma Scale score of 13-15 after 30 minutes
  3. Post-traumatic amnesia (PTA) of no more than 24 hours

If concussion and MTBI are seen as part of the brain injury continuum, with Grade 3 concussion and MTBI overlapping, one can get a better understanding of how these definitions compliment each other and enhance our understanding. BIA estimates that approximately 75% of all brain injuries fall in the "concussion-MTBI continuum."

The Functional Mechanics of Concussion

Two mechanisms currently are believed to underlie the changes following concussion. In the first, a sudden movement or direct force applied to the head can set the neural matter of the brain in motion even though the brain is well protected in the skull and very resilient. This motion squeezes, stretches and sometimes tears the neural cells, changing the precise balance and distance the cell's axons and dendrites maintain to transmit or process information.

The second mechanism involves changes that occur in the neuron's ability to produce energy for the cell's vital functions in structures called mitochondria. An initial increase in energy production occurs followed by a dramatic decrease that affects the ability of the cell to produce structural proteins to preserve the diameter of the axon. This change occurs gradually after the time of impact and may be responsible for the delay in symptoms sometimes observed.

The changes that occur affect the electrical or chemical aspects of neural cell functioning and result in unusual processing of normal information. (For this reason, radiologic studies that look at the structure of the brain, such as CT scans and MRI, are most frequently read as normal after concussion/MTBI.) This actually is quite adaptive because the brain cells automatically keep working to reconnect or establish normal impulse transmission. Even the loss of consciousness is adaptive, because the brain shuts down all unnecessary functions until the most important life sustaining neural adjustments are made. Unfortunately, sometimes these neural adjustments cannot be made quickly enough and death can occur.

As a person recovers, the cells re-establish the precise balance needed to ensure effective information processing, but this may mean some compensation or adjustments to the neural cell's original alignments. The more often neural cells must compensate or adjust to injury, the more likely the task takes longer and may not be as complete. For example, when a person sprains or fractures an ankle, professionals recommend cold/heat treatments, rest and supports (i.e., cast, brace) and specific exercises to help the ankle adjust to the injury and recover maximal function. Depending on the severity of the ankle injury (i.e., sprain, fracture) and what is required after recovery (i.e., long distance running, ballet), the severity of the injury to the ankle can disrupt a person's life. Obviously, a human brain is much more complicated than an ankle. Yet similarly, rest, supports (i.e., compensations, modifications) and "exercises" (i.e., therapies, education) for the brain may be recommended to rehabilitate and restore useful

function. Depending on the severity of the concussion and what the person needs to do (i.e., care for a family, return to work or school, manage a large company), a concussion can disrupt a person's life for a short period of time or even longer.

To review, a concussion causes a disruption of normal brain function that may be a temporary inconvenience or result in permanent changes in brain function. Where there are complicating factors, the disturbance in brain function can be fatal. Because of the potential life-threatening danger associated with brain injury, the severity of any brain injury--including concussion--is determined at the time of the injury, based on measures of physical, cognitive and behavioral responsiveness. Again, the three categories commonly used to describe brain injury--mild, moderate and severe--indicate only how seriously impaired the person was at the time of the injury. Thus, on the brain injury scale of severity, a concussion usually is classified as a MTBI because the alterations in brain function are not severe enough or do not last long enough to be classified as moderate or severe brain injury. In the moderate and severe classifications, there appears to be direct damage to the brains neural network with long-term difficulties related to the sites of the damage. The long-term effects of MTBI on brain cell recovery and functioning and behavior vary across individuals. However, for most individuals, no long-term neuronal changes are noted after three to four months and the cognitive and behavioral adjustments return to normal.

Exceptions to this rule exist. Studies indicate that age (i.e., 40 years or older), the presence of a systemic disease (i.e., diabetes mellitus), and possibly female gender affect the recovery process. Other risk factors for delayed recovery include a history of previous brain injury or when situational and personality factors play a role in recovery. For example, individuals who sustain a second concussion while still symptomatic from the first one may sustain what is termed "second impact syndrome." This condition is very serious and can result in lifelong impairments, coma and even death. Individuals who sustain a series of multiple concussions over time (i.e., boxers, abused children) may be left with permanent impairments and disabilities. People who have mental health issues or other disabilities (i.e., attention deficits, learning disabilities) may find that a concussion further complicates their behavioral and learning challenges. Also, even litigation issues may complicate a person's recovery.

The symptoms of concussions cover a wide range of perceptual, sensory, cognitive, emotional and behavioral features. The TABLE below lists the common early and late symptoms of concussion:

Early Symptoms:

- Headache
- Dizziness or vertigo
- Lack of awareness of surroundings
- Nausea with or without memory dysfunction
- Vomiting

Later Symptoms:

- Persistent low grade headache
- Lightheadedness
- Poor attention and concentration
- Excessiveness or easy fatigue
- Intolerance of bright light or difficulty focusing vision
- Intolerance of loud noises
- Ringing in the ears

- Anxiety and depressed mood
- Irritability and low frustration tolerance

As you can see, many of the symptoms listed above are common to a variety of other natural human experiences. Feeling scared or anxious can make our vision change and cause dizzy feelings and numerous "fight or flight" reactions. Muscle cramps in the neck can give headaches, just as not having our usual dose of caffeine causes headaches. A virus can make us feel "spaced-out" and affect our balance. Depression can affect our cognitive abilities and memory. Being angry over changes due to an injury such as a broken arm can make us irritable and affect our motivation. And, as with concussion, if everyone else feels you "should be over it by now," being treated unfairly may cause hopelessness that makes it difficult to concentrate and sleep.

Recovery Variations after Concussion

Concussions vary, depending upon the type and the individual, hence, recovery varies as well. Some commonly asked questions by individuals who sustained concussions include:

Why is there so much variation in symptom presentations? This variation can best be explained because people differ and their perceptual experience of sensations such as pain and distress remains subjective. Without a technology (i.e., more sophisticated CT/MRI scanning technology) to measure these individual experiences, it remains difficult to determine when the brain's coping or healing has taken place and when the individual's reaction to the process has left perceptual and learned phenomena. Thus, we need to monitor the symptoms of concussion in order to monitor recovery. The following checklist can help individuals and their families monitor their recovery one to three months after a concussion so they can report this information to their physician or therapist. Symptoms that persist beyond the usual recovery time for concussion need to be evaluated and treated more carefully.

Physical Symptoms

- Headache, dizziness, lightheadedness
- Vomiting or nausea
- Numbness or tingling
- Balance problems, clumsiness, drops things, trips often
- Fatigue, tires easily, needs extra sleep, drowsiness, trouble falling asleep or staying asleep
- Sensitivity to light and noise
- Blurry vision
- Ringing in ears

Cognitive Symptoms

- Confusion, in a "fog," has befuddled expression, gets mixed up about time and place
- Attention or concentration problems, inability to do more than one thing at a time, unable to return to a task if interrupted
- Memory problems, forgets things
- Takes longer to get things done or complete assignments
- Has problems organizing thoughts or words, misunderstands things

Behavioral Symptoms

- Restless, irritable, fussy
- Acts without thinking

- Becomes upset easily, loses temper
- Sadness, depressed mood
- Anxiety, nervousness

Why some people adjust better after a concussion than others? Research in cognitive-behavioral therapy supports the notion that: 1) looking at the positive aspects of recovery, 2) taking steps to gain control of your rehabilitation and 3) knowing that fundamental healthy behavior requires a focused rehearsed plan all can contribute to dealing better with the many sensations and feelings that often follow concussion. Concussion needs to be taken seriously and modifications to a person's life (i.e., home, work, school) need to be made during the recovery period. Just because a person "looks great" does not mean that they are recovered fully. Having a good plan for recovery and knowledge about concussion helps individuals feel more in control and lessens their anxiety.

Why do concussive symptoms change over time? It now appears that during the first months after concussion the brain begins to heal and evidence suggests that there is little trace of brain damage after three to four months. During this period of time, sleep patterns return to normal, sensations mirror the brains recovery and efforts to return to normal and develop a sense of self are influenced by the rehabilitation process. For example, many strange sensations accompany recovery from a sprained or fractured ankle, including pain from the efforts a person makes to accommodate the recovery time (such as muscle atrophy), as well as sleeping and exercise changes due to limitations. Brain function is much more complex to understand and monitor. Yet, just as an ankle can "return to normal" over time, so can the brain after concussion.

Why can't professionals tell if there is permanent brain injury over time? Without doing an autopsy, brain function can only be estimated. For example, neurological testing can provide information about what a person might be able to do at this point in time, but without the same information from before the concussion, it is only possible to estimate how a concussion affected performance. Many professionals use various tools to help them understand the degree of brain damage (i.e., CAT scans, MRI, neuropsychological batteries, neurolinguistic assessment, functional behavioral analysis), but these tools are only approximations and it is difficult to predict the total impact a brain injury may have on a person's life. The best "predictor" is the person with the injury working with a dedicated team of professionals to identify and compensate for permanent damage.

Is permanent brain damage always bad? This is a trick question because the easy answer is that damage always means a loss of brain cells. Yet, many people can attest that the loss of brain cells does not mean that they themselves are "lost". Rather, many individuals have found the strategies and techniques they have used to cope with brain injury have been helpful in assisting them to become the person they felt they wanted to be all along--happy, loved, productive and important. The experience of coping with a rehabilitation or treatment program has helped them: 1) appreciate their talents, 2) give up bad habits and 3) become more mindful of what they truly wanted out of life. This is not to minimize the tremendous changes brain injury causes for people and their families, but rather to emphasize the importance of good treatment programs and community support to help people re-define their lives.

Treatment Recommendations

The only cure for brain injury is prevention. Obviously, the treatment of concussion starts with prevention. Thoughtful preparation before activities--knowing your limits; minimizing risk to one's head by wearing protective gear such as seat belts, helmets, hard hats; and being

substance free when activities require concentration such as driving, bicycling, swimming, boating and skiing--all will reduce the likelihood of injury. Unfortunately, concussions often are difficult to prevent even with careful preparation and protective gear.

Immediately after a concussion, emergency care may be required. Since life-threatening complications--usually due to brain swelling and bleeding--can occur from any brain injury regardless of the type, all brain injuries must be taken seriously. The proper assessment of concussion by emergency medical professionals and physicians is critical.

AAN and the BIA have developed a clear, scientifically based set of guidelines for the medical management of concussion in sports that is used by team physicians, coaches and athletic trainers and can easily be adapted for all concussions. Thus, after the type of concussion has been determined, management guidelines are implemented. If an adult sustains a Grade 1 or 2 concussion, it may be wise for that person to rest for two or three days before returning to regular activities and not operate a motor vehicle for at least a week. If a child crashes a bicycle and the physician has examined and given them a clean bill of health, it is wise to keep the child off the bicycle for a week. As always with children, the rule should be that if it has wheels, you need a helmet.

The potential danger with concussion is sustaining a second one before allowing the brain time to rest and recovery from the first one (as we would for a broken ankle). The chart below summarizes AAN's management recommendations for athletes returning to play after concussion, but reworded for the general audience. Please remember that all concussions are potentially serious and an individual should be examined by a physician if there is any doubt about their safety.

Grade 1 Concussion Management Guidelines

If the person has no symptoms or mental status abnormalities 15 minutes after the injury, he/she can resume normal activities. All symptoms from the concussion must have disappeared, first at rest and then with exertional testing, before the individual can return to regular activities.

Grade 2 Concussion Management Guidelines

The individual should refrain from activities for at least one week, again only after the person is asymptomatic at rest and during exertion. Additionally, a physician should perform a neurological exam before the individual is allowed to go back to regular activities. If the individual experiences a worsening in headaches and other concussion symptoms and/or these symptoms last longer than a week, a CT scan or MRI is recommended.

Grade 3 Concussion Management Guidelines

One month should be the minimum period for an individual to return to rigorous activity. For an individual with a brief loss of consciousness (i.e., seconds), he/she can return to regular activities only after being asymptomatic for at least one week. For a person who had a prolonged loss of consciousness (i.e., minutes), he/she can resume normal activities no sooner than after two weeks of rest. A thorough neurological examination and a neuro-imaging study (i.e., CT scan, MRI) should be performed on all individuals who have been rendered unconscious for brief periods of time. The individual should be admitted to the hospital if any signs of pathology are detected and/or the mental status of the person remains abnormal.

Recovery after concussion--just like a sprained or fractured ankle--takes time. An individual with a broken ankle would not go out the next day and run a marathon. That individual likely would take time out from work, rest and put the leg up, use crutches, attend therapy, if necessary, and allow the ankle time to recover. Too often after concussion, many individuals immediately return to work or school, push themselves to think as well and as quickly as they did before and expect that in a day or two they are recovered fully. One of the problems with concussion is that people try and "get back on the horse" too quickly. The danger in doing this is that the person could sustain a second concussion (i.e., the athlete returns to the game; the child gets back on his/her bicycle; the person resumes driving a car) that could cause more serious injury to the brain. Or, if individuals push themselves to perform and/or are expected to perform by their colleagues and family too soon after the concussion, the symptoms may become exacerbated.
After a concussion, it is wise for people to modify their lives by: 1) reducing workloads, 2) building in rest periods, 3) giving more time to finishing projects, 4) developing a written plan to refer to when confused or uncertain, 5) using a notebook/calendar to write things down and check-off when completed, 6) writing down schedules with time, place and person and 7) avoiding the use of alcohol or other substances that may slow recovery.

It is also important to monitor symptoms over the next one to three months and report this data to one's physician and other treating professionals. Family members can become more knowledgeable about concussion and help the person make accommodations, monitor symptoms and ensure that--just like with a broken ankle--the person is given ample healing time. The use of other professionals, such as a Neuropsychologist, can help through testing to determine a person's strengths, needs and preferences. Psychologists and counselors may be extremely beneficial in helping people with more serious injuries to understand and adjust to any changes caused by the concussion. BIA, its chartered state affiliates and support groups may provide the person with education about concussion and where to go for additional help.

Conclusion

Concussion is the most common of all brain injuries. It needs to be better understood, evaluated and treated. Individuals who sustain concussions may experience an array of symptoms, both short, and long term. The important thing is to take any concussion seriously and recognize that recovery is dependent on many things.

About the Authors...

William Frey, PhD, maintains a private clinical psychology practice in Rutland, VT, specializing in behavioral medicine with a focus on traumatic brain in jury rehabilitation. He received his BA from Villanova University (1967) and his MS (1969) and PhD (1976) from the University of Vermont. In addition to his clinical practice, he has held faculty positions at the University of Vermont, St. Michael's College and Middlebury College and, most recently, had been interim Dean of Student Development at Green Mountain College in Poultney, VT. He has been a President of the Vermont Psychological Association (1985-1987) and a founding board member or the Vermont Head Injury/Stroke Independence Project (1983-1986). He has published articles on mild traumatic brain injury and the impact of brain injury on sense of self and has developed an ecologically-based rehabilitation model for traumatic brain injury.

Ronald C. Savage, EdD, has worked with children, adolescents and young adults with neurological injuries and disabilities for over 25 years. Presently, Dr. Savage is Executive Vice President for Professional Development at Bancroft NeuroHealth in New Jersey. He is the former Senior Vice President of Behavioral Health and Rehabilitative Services at The May

Institute in Massachusetts and the former Director of Clinical Services for Rehabilitative Services of New York and the company's for rehabilitation facilities. In addition, Dr. Savage has taught at the elementary and secondary school level as a classroom teacher and as a special educator, as well as teaching at several colleges and universities. Dr. Savage presently holds academic appointments at Tufts University, Department of Rehabilitation Medicine; Northeastern University, Department of Psychology; The George Washington University School of Education; and the Laboratorio de Neuropsicologia, Universidad de Sevilla, Spain. Dr. Savage has presented at over 200 conferences, training seminars and grand rounds presentations in the past four years. He has published numerous articles, chapters, manuals and books on children, adolescents and adults with traumatic brain injuries and other neurological disabilities.

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Content Edited By

Lisa Ward, Director of Communications, Brain Injury Association
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NATIONAL FOOTBALL LEAGUE

March 15, 2011

The Honorable Mike Doogan
House of Representatives
Alaska State Capitol
Room 112
Juneau, Alaska 99801

RE: HB 15 – Student Athlete Traumatic Brain Injuries

Dear Representative Doogan:

The National Football League is pleased to support HB 15 – the Student Athlete Traumatic Brain Injuries bill. The bill will help raise awareness and protect youth athletes from the dangers of preventable brain injuries.

The NFL is playing a leading role on this important issue for the safety of our own players as well as athletes at all levels of sports. Our primary rule is this: the medical decisions of health care professionals take precedence over the playing decisions of coaches and players. Given our experience at the professional level, we believe a similar approach is appropriate and necessary when dealing with concussions in youth sports.

Concussions can occur in male and female athletes of any age and in any sport or recreational activity. In fact, the Centers for Disease Control and Prevention estimates that there may be as many as 3.8 million sports and recreational-related concussions each year in the United States.

In addition, medical researchers have determined that children and teenagers whose brains still are developing are more susceptible to concussions than adults, and they recover more slowly. Recognizing and responding to concussions when they first occur aids recovery and helps to prevent prolonged concussion symptoms, chronic impairment and even death.

That is the reason the NFL supports the passage of this bill and similar legislation in states throughout the country. HB 15 contains three core principles: (1) concussion education for youth athletes, parents and coaches on an annual basis; (2) immediate removal of a youth athlete who is suspected of sustaining a concussion from play or practice; and (3) mandatory clearance of that youth athlete by an appropriate licensed health care professional before returning to play or practice.

1201 Pennsylvania Avenue NW, Suite 645, Washington, DC 20004 Tel 202.662.6650 Fax 202.662.6860

The future of our state depends on the brains of the individuals that reside here. HB 15 is one tool to giving Alaska's youth the best opportunity to become community and business leaders as adults.

The Alaska Brain Injury Network appreciates your leadership in sponsoring this important legislation. You have our support.

Sincerely,

Jill Hodges
Executive Director

alaska brain injury network

3745 Community Park Loop, Ste. 140
Anchorage, Alaska 99508
office: (907) 274-2824 fax: (907) 274-2826
www.alaskabraininjury.net

The Honorable Mike Doogan
Alaska House of Representatives
Alaska State Capitol, Rm 400
Juneau, Alaska 99801

Dear Representative Doogan,

Thank you for introducing HB 15, an act relating to prevention and evaluation of and liability for concussions in student athletes.

The Alaska Brain Injury Network, Inc (ABIN) is a non-profit organization dedicated to Alaskans whose lives have been changed by brain injury. ABIN's eighteen member board represents all regions of Alaska and at least 50 percent are TBI survivors or family members. We fully support HB 15.

ABIN has become the leader in understanding the needs of Alaskans with brain injury. ABIN has heard from 800 Alaskans requesting brain injury services since 2007. In addition, ABIN has heard public testimony from hundreds of Alaskans from Anchorage, Juneau, Fairbanks, Kenai, Barrow, Nome, Kodiak, Dillingham, Bethel, Copper River Basin, Tok, Ketchikan, Sitka, Homer, and more.

There are an estimated 10,000 Alaskans who have experienced long-term difficulties from a moderate to severe brain injury. The number of Alaskans experiencing a concussion or Mild TBI (mTBI) who visit the emergency department is estimated at 3,000 per year. Concussion and brain injury need to be taken seriously. With proper diagnoses, management, and treatment, research shows 80-90 percent of people experiencing a concussion or mTBI will recover fully. HB 15 is vital to ensuring our youth athletes have the best chance of recovery after an injury. When a concussion is not properly managed, prolonged recovery or even death from a second impact may result.

The National Football League, National Hockey League, the United States Olympic teams, majority of collegiate teams, and most recently in many states, even high school and youth sports teams have protocols and guidelines for concussion identification and return to play. Many of the leagues also require a cognitive baseline which is the first step to providing the best data to assess for a concussion when symptoms appear. If an athlete is suspected of a concussion, the assessment guidelines and return to play protocol are in place for the safety of the athlete, as well as ensuring the team has the strongest players in the game. A player who is normally elite, but then suffers a concussion, may temporarily have difficulty making quick decisions, their speed and reaction time may be compromised, and they may clumsily handle the ball. This compromised state caused by the concussion may hinder the team, and more importantly may put the athlete at risk for serious, life-long disability. No one wants to see an athletic child or young adult become disabled due to a decision to keep a kid in the game for a win or because of lack of education of what concussion symptoms may look like.

HB 15 will ensure that coaches have a basic understanding of concussion, student athletes will begin to understand the seriousness of concussion on and off the field, and parents may begin to understand brain injury better as well. This legislation is an opportunity to improve the public's awareness of the seriousness of concussion and brain injury, and keep our student athletes safe.

ALASKA ATHLETIC TRAINERS ASSOCIATION

Alaska Athletic Trainers Association
PO Box 872710
Wasilla, AK 99687

March 15, 2011

Representative Doogan,

The Alaska Athletic Trainers Association fully supports the language of House Bill 15 and Senate Bill 22, *Student Athlete Traumatic Brain Injuries*. This legislation serves to raise awareness and protect youth athletes from the risks of concussions. The Alaska Athletic Trainers Association pledges to support the following key elements: (1) concussion education for young athletes, parents and coaches; (2) immediate removal of a student athlete who appears to have suffered a concussion from play or practice; and (3) mandatory clearance of that student by a health care professional who is trained in the evaluation and management of concussions before returning to play or practice.

Athletic trainers are health care professionals who specialize in the prevention, diagnosis, treatment and rehabilitation of injuries and sport-related illnesses. We prevent and treat chronic musculoskeletal injuries from sports, physical and occupational activity, and provide immediate care for acute injuries. Athletic trainers offer a continuum of care that is unparalleled in health care.

The Alaska Athletic Trainers Association is also working toward licensing athletic trainers in the state of Alaska. A licensed athletic trainer is one who has established qualifications and works within a scope of practice. Alaska is one of only three states that do not regulate athletic trainers and we feel it is time to change that. We hope you will support our professional endeavor for licensing athletic trainers in Alaska.

Sincerely,

B. Shelden

Brenda Shelden
Certified Athletic Trainer
President of the Alaska Athletic Trainers Association
(907)841-8942

The National Football League, USA Football, the Brain Injury Association of Washington, and the American College of Sports Medicine, among many other organizations, strongly support the adoption of laws to prevent traumatic brain injury in youth athletes in all fifty states. The Zackery Lystedt law, passed in Washington state, through the efforts and hard work of advocates in the medical, educational and athletic fields represents model legislation. The bill includes three elements essential to protecting youth athletes in all sports:

(1) Inform and educate youth athletes, their parents and guardians and require them to sign a concussion information form;
(2) Removal of a youth athlete who appears to have suffered a concussion from play or practice at the time of the suspected concussion; and
(3) Requiring a youth athlete to be cleared by a licensed health care professional trained in the evaluation and management of concussions before returning to play or practice.

This packet of materials includes information about the Zackery Lystedt law and frequently asked questions regarding it. In addition, educational materials on the topic of youth concussions are included. These documents published by the Centers for Disease Control and Prevention and USA Football and endorsed by the American College of Sports Medicine, the National Football League, USA Football, and the Brain Injury Association of Washington will provide significant information about youth concussions.

As of November 2010, nine states have adopted laws containing the three key provisions of the Zackery Lystedt law. We encourage you to adopt a similar law in your state and encourage you to reach out to our organizations if we can be of assistance.

Sincerely,

Jeffrey A. Miller
Vice President
Government Relations and Public Policy
National Football League

Stanley A. Herring, M.D.
Chairman
Advocacy and Education Subcommittee
NFL Head, Neck and Spine Committee

Richard Adler
Chairman/President
Executive Board
Brain Injury Association-Washington

James R. Whitehead
Executive Vice President and CEO
American College of Sports Medicine

Scott Hallenbeck
Executive Director
USA Football

FREQUENTLY ASKED QUESTIONS ABOUT CONCUSSION-PREVENTION LAWS

How widespread are concussions among youth athletes?

An estimated 400,000 high school athletes sustained concussions while participating in five major male sports and four major female sports during the 2005-2008 school years[i]. In addition, experts believe that the prevalence of sports-related concussions among young people in all sports is significantly higher than reported.

Moreover, the number of youth athletes taken to emergency rooms with sports-related concussions doubled during the 10-year-period from 1997 to 2007[ii]. Meanwhile, among youth aged 14 to 19, emergency room visits for concussions sustained during team sports more than tripled over the same period[iii].

What dangers do these head injuries pose to young athletes?

A concussion is a type of traumatic brain injury, or TBI, which changes the way the brain normally works. Recognizing and responding to concussions when they first occur help to aid recovery and to prevent prolonging concussion symptoms, chronic brain damage or even death. Yet, a recent study estimated that more than 40 percent of high school athletes return to participate in school athletics before they have fully recovered from these serious head injuries[iv].

Do concussions involve youth athletes in all sports and at any age or is it just an injury sustained by boys who play football?

Concussions can occur in athletes of any age and in any sport or recreational activity. In fact, each year, U.S. emergency departments treat an estimated 135,000 sports-related and recreation-related TBIs, including concussions, among children ages 5 to 18[v]. In addition, children and teens are more likely to get a concussion and take longer to recover than adults. While youth sports concussions often are associated with football, the rate of concussions in girl's high school soccer is almost as high. Research also indicates that there may be gender differences in how boys and girls recover from concussions.[vi]

How many states have enacted laws related to concussion-awareness, prevention and management?

As of October 2010, eight states have adopted similar concussion-awareness and prevention laws initially adopted in Washington, known as the Zackery Lystedt law, including Oregon, New Mexico, Connecticut, Oklahoma, Virginia, Massachusetts and Rhode Island. In many other states, active coalitions are pushing to enact similar legislation.

What are the key elements of a concussion-prevention and management bill?

An effective concussion-prevention bill follows the example of the State of Washington's Zackery Lystedt law. It includes three essential elements: (1) inform and educate student athletes, their parents and guardians and require them to sign a concussion information form; (2) removal of a student-athlete who appears to have suffered a concussion from play or practice at the time of the suspected

concussion; and (3) requiring an athlete to be cleared by a licensed medical professional trained in the evaluation and management of concussions before returning to play or practice.

There is an international consensus on return to play guidelines for youth, adopted at the 3rd International Conference on Concussion in Sport in Zurich, in November 2008, which states that "It is not appropriate for a child or adolescent athlete with concussion to RTP on the same day as the injury regardless of the level of athletic performance."[vii]

What is the cost of implementing a concussion prevention and awareness bill?

Zero. The bill is revenue neutral. There are no mandates in the bill and no requirements that resources be spent to hire or train medical professionals or to purchase equipment. Free information on concussions for high school and youth coaches, parents, athletes, as well as school professionals is publicly available on the Centers for Disease Control and Prevention's (CDC) website at www.cdc.gov/Concussion, including a youth concussions poster found at www.cdc.gov/concussion/pdf/poster_Eng.pdf designed to hang in every locker room across the country.

What are the penalties for violating the concussion prevention and awareness law? Who is liable if the law is not followed?

There is no liability attached to Washington's Zackery Lystedt law. It does not mandate any civil or criminal penalties, nor does it create greater liability for individuals and/or organizations. Indeed, the education and awareness efforts and requirement of medical clearance before return to play has decreased the variability of care and decreased liability. Wherever the law is passed, the community can determine if and how to monitor and enforce the law.

What about implementing the law in rural areas where it may be more challenging to find medical professionals?

The law does not require a specific medical specialist to participate in every evaluation. Rather, the language of the Washington statute requiring an athlete "to be cleared by a licensed medical professional trained in the evaluation and management of concussions before returning to play or practice" permits a wide range of qualified individuals to determine a youth athlete's suitability for returning to play. For example, in Washington State, the Washington Interscholastic Activities Association decided that qualifying medical professionals included: medical doctors, osteopaths, nurse practitioners, athletic trainers, and physician assistants.

What is the impact of concussion-prevention laws on private sports organizations?

These laws may be written in such a way as to apply not only to public sports organizations but also to private sports organizations, many of which maintain public-sector connections/affiliations (such as the use of public facilities). For example, in Washington private sports groups are required by law to carry insurance to play on publicly-owned playing fields. The Zackery Lystedt law amended that insurance-based law to require private nonprofits to comply with the policies on the management of concussions and head injuries in youth sports.

What impact have concussion-prevention laws had in states that have passed them?

The Zackery Lystedt law was the first concussion-prevention state law to pass in 2009. While no comprehensive and detailed assessment can yet be made, early and anecdotal data suggests that the law is having an immediate and positive impact. It is helping meet a critical goal -- preventing preventable brain injuries and making sports and recreational activities safer for youth.

What organizations have supported such measures?

A broad coalition of groups representing teachers and parents, sports medicine, medical professionals, school administrators, the disability community and athletic organizations have supported concussion-prevention legislation at the state and federal level. These organizations include the National Football League, American College of Sports Medicine, USA Football, National School Boards Association, Parent Teacher Association, National Association of School Nurses, National Council of Youth Sports, The Sarah Jane Brain Foundation, National Disability Rights Network, National Athletic Trainers' Association, National Association of Health and Fitness, the Brain Injury Association of America, the Brain Injury Association of Washington, and many others.

What law, if any, has Congress proposed or passed regarding concussion prevention and awareness?

The "Protecting Student Athletes from Concussions Act of 2010" incorporates the same core principles of the Lystedt law and was introduced in Congress in September of 2010. If passed, the bill would require school districts to develop and implement a minimum standard, community-based plan for concussion safety and management. Of course, states would be able to implement standards far exceeding these basic, minimum standards.

Where may I find/read a copy of the Zackery Lystedt law?

The Zackery Lystedt law may be found in this packet. It may also be found online by visiting: http://www.leg.wa.gov/CodeReviser/documents/sessionlaw/2009pam3.pdf

Where may I find more information about the dangers of concussions and passing a law in my state?

More information about concussions may be found on the website of the CDC. You also may watch an NFL-produced video about enacting a concussions-prevention law in your state, which is available at NFL.com/youthconcussions and on the CDC's website as well.

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[ii] Bakhos L., Linakis J., et al. "Emergency Department Visits for Concussions in Young Child Athletes," Pediatrics, 2010.
[iii] Ibid.
[iv] Center for Injury Research and Policy at Nationwide Children's Hospital, Columbus, Ohio
[v] Morbidity and Mortality Weekly Report, Centers for Disease Control and Prevention, 2007.
[vi] Journal of Athletic Training, 2007
[vii] McCrory P, Meeuwisse W, et al. "Consensus Statement on Concussion in Sport, 3rd International Conference on Concussion in Sport," Clinical Journal of Sports Medicine, 2009.