

## From research to clinical management and the classroom: the role of SLPs in sports concussions

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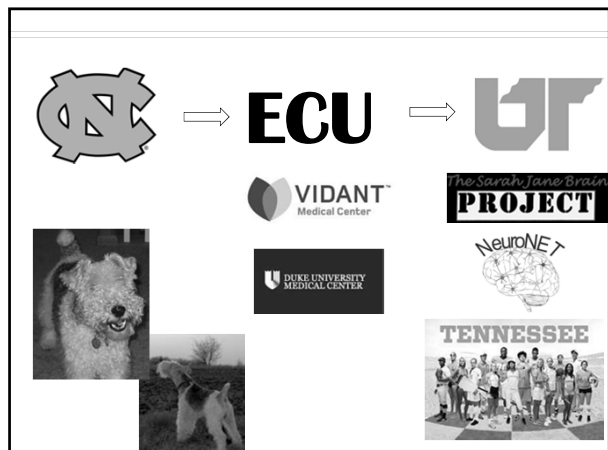
Dr. King has no relevant financial or nonfinancial relationships to disclose.

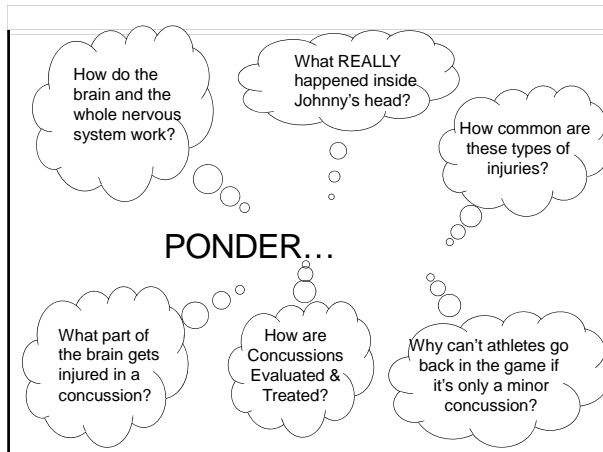
## Objectives

- Participants will be able to:
  - Discuss risk factors, recovery rates, and legislation related to sports-related concussions in young athletes at a level to provide education to others
  - Identify and list various evaluation methods for individuals with sports-related concussions
  - Identify and list appropriate intervention and treatment methods for different areas of deficits following concussions


## Goals for today.....

- Further the recognition of the potential seriousness of concussions
- Equip professionals with knowledge and functional/ practical strategies that can be applied in the school, home, community, and vocational settings






## Understanding the Dilemma




- TBI is Under-identified  
Not Reported
- Concussion / Mild TBI  
Not a Big Deal?
- Education & Awareness  
Prevention & Follow up

## Reality

- Society has an unclear understanding of TBI
- Concussion is not understood as a TBI
- Lack of or inappropriate communication between hospital, family, and school



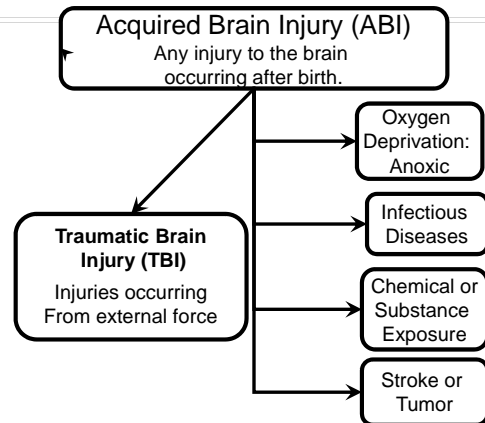
## Reality



- Family may hear the term "TBI" for the first time during follow up
- Educators are often the last to learn that an injury occurred
- Academic & behavior changes are not immediately linked to the injury

“Traumatic brain injury is the most misunderstood, misdiagnosed, underfunded public health problem our nation faces.”

Susan Connors, President  
Brain Injury Association of America



## Traumatic Brain Injury

- Define:
  - Refers to neurological damage to the brain resulting from an impact from external forces.
- Epidemiology studies show that TBI is a leading cause of death and disability in the United States
  - Currently 1.7 million people living with brain injury
- Given the frequent long-term medical, vocational, and social needs of affected individuals, TBI represents a substantial health care issue in the United States.

### American Congress of Rehabilitation Medicine: Mild Traumatic Brain Injury (MTBI) Definition

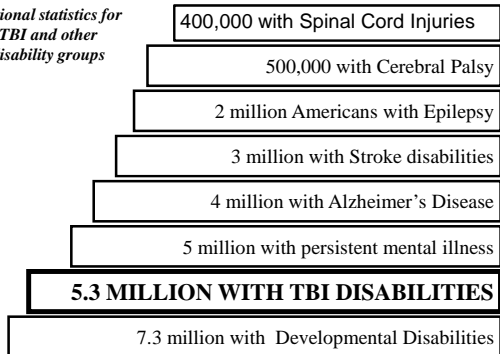
A traumatically induced physiological disruption of brain function manifested by at least one of these symptoms:

- Loss of consciousness  $\leq$  30 minutes
- Loss of memory for events immediately before (retrograde amnesia) or after the accident (Post Traumatic Amnesia  $\leq$  24 hours)
- **Any alteration in mental state at the time of the injury (dazed, disoriented, confused)**
- Presence of focal neurological deficits
- If given, GCS score  $\geq$  13

Kay, et al., 1993

### Comparison of Disability Prevalence Rates (8)

*National statistics for  
TBI and other  
disability groups*



## My Injury

## OVERVIEW OF SPORTS-RELATED CONCUSSIONS

Neuroanatomy, Symptoms, Risks, and Recovery

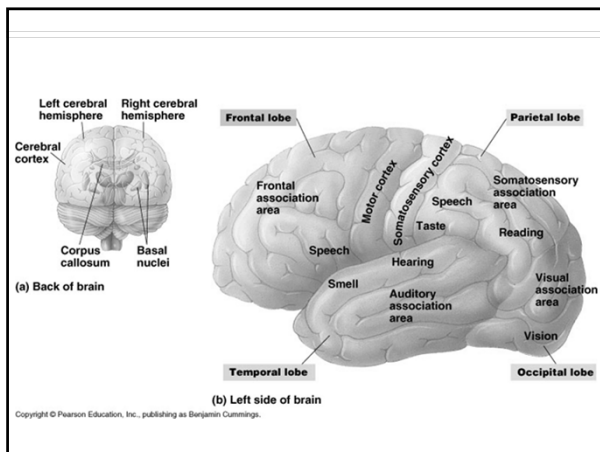
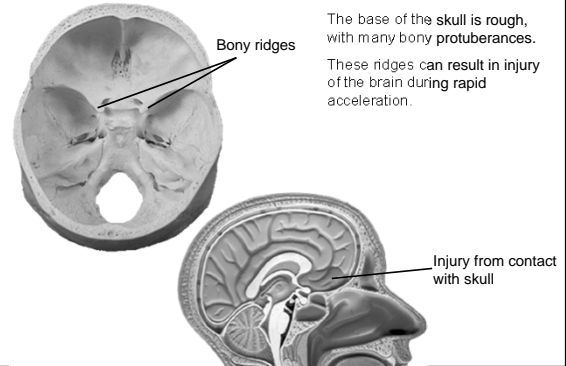
### The Developing Brain

- Children's brains do not reach their adult weight of 3 pounds until they are around 12 years old
- The brain, and most importantly, the brain's frontal lobe region does not reach its cognitive maturity till individuals reach their mid 20s

## The Developing Brain

- **Frontal Lobe:**
  - Houses executive skills
    - judgment, problem solving, mental flexibility, etc.
  - very vulnerable to injury
- Damage to the Frontal Lobe anywhere along the developmental continuum can impact executive skill functioning

## Interior Skull Surface



## Cognition

The prefrontal cortex is involved with intellect, complex learning, and personality.

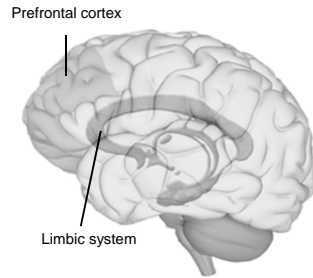
Injuries to the front lobe can cause mental and personality changes.



## Emotion...

complex brain function. The emotional core of the brain is the limbic system. This is where senses and awareness are first processed in the brain.

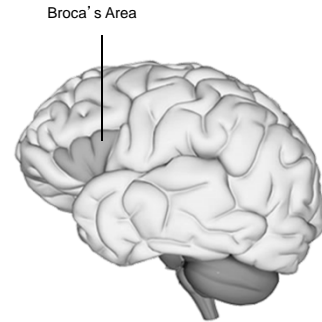
Mood and personality are mediated through the prefrontal cortex. This part of the brain is the center of higher cognitive and emotional functions.



## Speech

Broca's area is where we formulate speech and the area of the brain that sends motor instructions for speech to the motor cortex.

Injury to Broca's area can cause difficulty in speaking. The individual may know what words he or she wishes to speak but will be unable to do so.

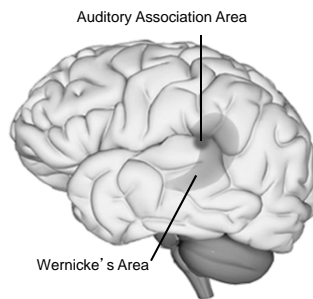


## Language

Wernicke's area is a specialized portion of the parietal lobe that recognizes and understands written and spoken language.

Wernicke's area surrounds the auditory association area.

Damage to this part of the brain can result in someone hearing speech, but not understanding it.

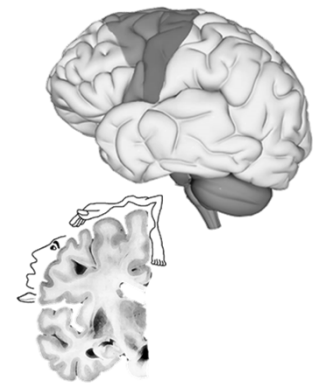


## Motor Cortex

The motor portion of the cerebrum is illustrated here. The light red area is the premotor cortex, which is responsible for repetitive motions of learned motor skills. The dark red area is the primary motor area and is responsible for control of skeletal muscles.

Different areas of the brain are associated with different parts of the body.

Injury to the motor cortex can result in motor disturbance in the associated body part.

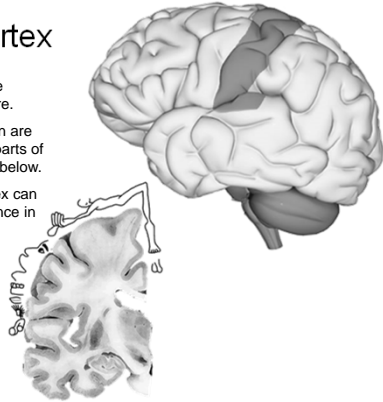


## Sensory Cortex

The sensory portion of the cerebrum is illustrated here.

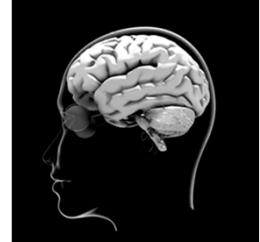
Different areas of the brain are associated with different parts of the body, as can be seen below.

Injury to the sensory cortex can result in sensory disturbance in the associated body part.



## Cerebellum

The cerebellum is connected to the brainstem, and is the center for body movement and balance.



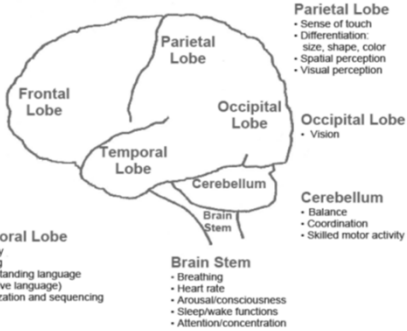
## Simplified Brain Behavior Relationships

### Frontal Lobe

- Initiation
- Problem solving
- Judgment
- Inhibition of behavior
- Planning/anticipation
- Self-monitoring
- Motor planning
- Personality/emotions
- Awareness of abilities/limitations
- Organization
- Attention/concentration
- Mental flexibility
- Speaking (expressive language)

### Temporal Lobe

- Memory
- Hearing
- Understanding language (receptive language)
- Organization and sequencing



### Parietal Lobe

- Sense of touch
- Differentiation: size, shape, color
- Spatial perception
- Visual perception

### Occipital Lobe

- Vision

### Cerebellum

- Balance
- Coordination
- Skilled motor activity

### Brain Stem

- Breathing
- Heart rate
- Arousal/consciousness
- Sleep/wake functions
- Attention/concentration

## What is a concussion?

A little miscommunication mistake...



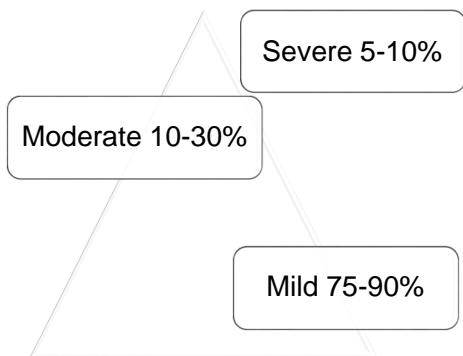
Image from San Francisco Chronicle Oct. 7, 2003

could lead to a serious injury.  
Fortunately, these guys were relatively lucky.

## Myths of Brain Injury

- “They don’t look brain injured”
- “The brain should be healed by now!”
- “It was just a bump on the head.”
- The head has to have contact with something for there to be a TBI (shaken baby, seat belts, air bags)
- There has to be a loss of consciousness for there to be a TBI (Phineas Gage, gunshot wound)
- There has to be a change on the CT or MRI for there to be a TBI

## Severity Continuum



## School of hard knocks

A concussion occurs when a violent blow to the head causes the brain to slam against the skull beyond the ability of the cerebrospinal fluid to cushion the impact. Between 1996 and 2001, NFL teams reported nearly 900 concussions.

- 1 When a football player takes a hit to the head, speeds range from 17 to 25 miles per hour with a force averaging 98 times the force of gravity.
- 2 The shock wave passes through the brain and bounces back off the skull. The concussion usually occurs at the opposite side from the point of impact.
- 3 The impact can cause bruising of the brain, tearing of blood vessels and nerve damage.

A study commissioned by the NFL revealed most hits occurred from a blow to the side of the head, often on the lower half of the face.

### Symptoms

**Immediate**  
Confusion  
Amnesia  
Loss of consciousness  
Ringing in the ears  
Nausea and vomiting  
Convulsions

**Delayed**  
Irritability  
Headaches  
Depression  
Sleep disorders  
Poor concentration  
Trouble with memory

**Cumulative effects**  
Studies show that prior concussions may lower the threshold for subsequent concussion injury and increase severity of symptoms.

Sources: MayoClinic.com, Biokinetics, Washington Post, Science Daily, Kishorathurug, Kaiser Permanente

Andrew Lucas, Jeff Gortzen | The Denver Post



## Definition of concussion

Consensus Statement on Concussion in Sport—the 4th International Conference on Concussion in Sport Held in Zurich, November 2012

**Concussion is a brain injury and is defined as a complex pathophysiological process affecting the brain, induced by biomechanical forces.**

Several common features incorporate clinical, pathologic and biomechanical injury constructs that may be utilized in defining the nature of a concussive head injury include:

1. either by a direct blow to the head, face, neck or elsewhere on the body with an “impulsive” force transmitted to the head.
2. results in the rapid onset of short-lived impairment of neurologic function that resolves spontaneously. However in some cases, symptoms and signs may evolve over a number of minutes to hours.

## Definition of concussion

Consensus Statement on Concussion in Sport—the 4th International Conference on Concussion in Sport Held in Zurich, November 2012

3. may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury and, as such, no abnormality is seen on standard structural neuroimaging studies.

4. results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course. However, it is important to note that in some cases symptoms may be prolonged.

- McCrory et al (2013) Clin J Sport Med Volume 23, Number 2

## Prevalence and Incidence

- More than 300,000 sports-related concussions per year in US
- Likelihood of suffering a 2<sup>nd</sup> concussion while playing contact sports:
  - As high as 19% per year of play
- > 62,000 concussions per year in high school contact sports and college football
  - 34% have had one concussion
  - 20% multiple concussions
  - 4-20% will sustain a brain injury in one season
  - Risk increases 3-4x in players with a previous concussion
- A study conducted by McGill University in Montreal:
  - 60 % of college soccer players reported symptoms of a concussion at least once during the season
  - concussion rates in soccer players comparable to football.

## Risk Factors

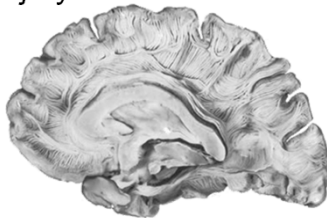
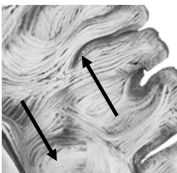
- Age/Level of Competition
- Equipment
- Sex (Female Gender)
- Sport Type
- Concussion History
- Body Mass/Neck Strength
- Genetics
- Rule Modification/Enforcement
- Style of Play
- Migraine History

### Types of Impacts...



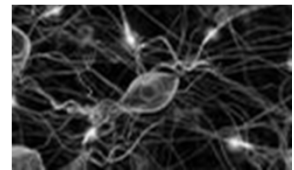
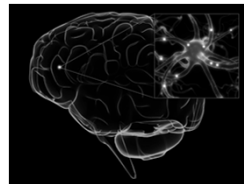
### Diffuse Axonal Injury

The brain is a complex network of interconnections. Critical nerve tracts can be sheared and stressed during an acceleration-type of injury.



Diffuse axonal injury is a very serious injury, as it directly impacts the major pathways of the brain.

### Neurons



## What happens to your brain?

### STAGE 1:

#### **An impact slams the brain against the skull**

- The axons that carry impulses from neuron to neuron stretch unnaturally, garbling their signals
- The neurons fire.  $K^+$  rushes out of them and  $Ca^{+}$  rushes in, trying to repair/balance the neuronal activity.  $K^+$  goes out of the cell in large amounts and neurotransmitters do not transfer information between cells well

Discover Magazine, Dec. 2004 "Lights Out" by neuropsychologist David Hovda, UCLA's Brain Injury Research Center

### STAGE 2:

**To fuel the absorption of new potassium, the neuron consumes glucose (glutamate) . (sugar)**

- Metabolizing glucose creates lactate, an acid that damages cell walls.

### STAGE 3:

**Needed  $O_2$  is not acquired. This causes a neuronal energy crisis. Blood flow drops and cells begin to die.**

Discover Magazine, Dec. 2004 "Lights Out" by neuropsychologist David Hovda, UCLA's Brain Injury Research Center

## Metabolic Crisis

- During this metabolic crisis
  - the  $Na/K^+$  pump works in overdrive – causing a metabolic or energy crisis.
- Why rest?
  - Thought is if a person participates in exercise or cognitive tasks during this time, the cell can die if it is not able to regulate and return the metabolic system to its original state
  - Activity can exacerbate the problem
  - This is why rest has been considered a crucial element to managing concussions

## Concussion symptoms:

The three principal features of confusion are:

- Inability to maintain a coherent stream of thought
- A disturbance of awareness with heightened distractibility
- Inability to carry out a sequence of goal-directed movements

The following are concussion symptoms:

Prolonged headache  
Vision disturbances  
Dizziness  
Nausea or vomiting  
Impaired balance  
Confusion  
Memory loss  
Ringing ears  
Difficulty concentrating  
Sensitivity to light  
Loss of smell or taste

### What do other researchers say about concussions?

*"...during the minutes to few days after concussion injury, brain cells that are not irreversibly destroyed remain alive but exist in a vulnerable state. This concept of injury-induced vulnerability has been put forth to describe the fact that patients suffering from head injury are extremely vulnerable to the consequences of even minor changes in cerebral blood flow and/or increases in intracranial pressure and apnea...."*

*Experimental studies have identified metabolic dysfunction as the key post-concussion physiologic event that produces and maintains this state of vulnerability...The result is an inability of the neurovascular system to respond to increasing demands for energy to reestablish its normal chemical and ionic environments. This is dangerous because these altered environments can kill brain cells."*

The American Orthopedic Society for Sports Medicine  
url: <http://www.intelli.com/vhosts/aossm-site/html/main.cgi?sub=151>

### When concussions happen...



### Who is more at risk?

- Males
- Females

- 

- Previous head injury
- Individuals who have already sustained one or more concussions

### POP QUIZ

- What sport is most susceptible to brain injury?  
•
- What sport is the second leading cause of brain injury?  
•

## Most catastrophic/death

Overall



Females



## FEDERAL AND STATE LEGISLATION

When and what's included? What's missing?

## National level recognition?

### Timeline

- 1933 – medical guidelines – concussions treated too lightly
- 1937 – American Football Coaches Assoc – injured players should be taken out of the game immediately
- 1952 – study *New England Journal of Medicine* – leave football forever with 3 concussions
  - Thorndike, A. **Serious recurrent injuries of athletes; contraindications to further competitive participation.** N Engl J Med. 1952 Oct 9;247(15):554-6.
- 1973 – condition later called 2<sup>nd</sup> Impact Syndrome identified
- 1991 – Colorado grading system – strict guidelines for return to play
- 1994 – NFL acknowledges danger of concussions for 1<sup>st</sup> time and forms MTBI Committee
  - Committee conducts large study but mysteriously discards results
  - Occupational risk

## National level recognition?

- 1995 – 1<sup>st</sup> use of computer to speed up recovery
- 1997 – AAN publishes guidelines for return to play
- 1999 – NFL retirement board quietly starts paying millions of dollars in disability to former players with cognitive decline
- 2000 – study by AAN finds 61% of NFL players sustained concussion/79% returned to play
  - Troy Aikmen pushed to “play through” – no evidence of effects
- 2002 – tau protein 1<sup>st</sup> seen in NFL brain – evidence of CTE
- 2003 – multiple concussions = risk of depression
- 2004 – 1<sup>st</sup> NFL player with violent death (car-accident) – CTE evidence
- 2005 – MTBI Committee says – *return to play* does not involve significant risk of second injury
  - UNC study finds connection between concussions and Alzheimer's, dementia, and depression
  - Survey finds hx of concussions = 5x more likely to have cognitive impairment

## National level recognition?

- 2005 – 2006 – NFL players commit suicide – CTE
- 2006 – ESPN discontinues its “Jacked Up” series
  - Highlighting hardest hits
- 2007 – MTBI committee – no link between head injuries and depression, dementia, Alzheimer’s, or any other “long term problems”
- 2008 – survey finds Alzheimer’s and dementia rate 19x higher among NFL athletes
- 2009 – NFL acknowledges the effects of head trauma – “quite obvious from research done that concussions can lead to long-term problems”
  - First lawsuits filed (balloons to 250 cases involving over 5,000 players – dating back to 1940s)
  - Another suicide
- 2010 – NFL – CTE “has never been linked to athletes or head trauma”
  - MTBI committee disbanded and a new committee formed
  - Posters put up in locker rooms warning of concussion risk

## National level recognition?

- 2011 – NFL players still sent back into game regularly
- 2012 – another suicide
  - 35 brains donated to Boston University – 34 have CTE
- NOW
- 2013 – lawsuits consolidated – paid out \$765 million but did not admit liability
  - \$100 million Harvard Medical School research initiative
  - New concussion safety measures – independent neurologist on the sidelines of every game
  - Concussion assessment protocols

## What do Federal and State governments have to do with Sports-related Concussions?

- Zachery Lystedt
  - May 2009 – State of Washington
  - First state to enact a youth sports concussion safety law



## What do they have to do with Sports-related Concussions?

### Key provisions:

- **Guidelines/education:** Calls for school districts board of directors and state interscholastic activities association to develop concussion guidelines and educational programs.
- **Mandatory consent:** Requires youth athletes and a parent and/or guardian sign and return a concussion and head injury information sheet on a yearly basis before the athlete's first practice or being allowed to compete;
- **Immediate removal if concussion suspected:** Youth athlete suspected of having a concussion in practice or a game must be immediately removed from play or competition

## What do they have to do with Sports-related Concussions?

- **Written clearance before return to play:** Youth athletes who have been taken out of a game because of a suspected concussion are not allowed to return to play until after:
  - **being evaluated** by a health care provider with specific training in the evaluation and management of concussions *and*
  - receiving **written clearance to return to play** from that health care provider (this does not strictly bar same day return to play)
- **Legal immunity:** A school district complying with the law is immune from liability for injury or death of an athlete participating in a private, non-profit youth sports program due to action or inaction of persons employed by or under contract with the sports program if:
  - the action or inaction occurs on school property
  - the nonprofit provides proof of insurance, and
  - the nonprofit provides a statement of compliance with the policies for management of concussion and head injury in youth sports.

## Federal level

- **Concussion Treatment and Care Tools Act (CONTACT Act)** (2010) – call to convene experts who would recommend guidelines for managing concussions in athletes in all sports, ages 5 – 18.
- **Protecting Student Athletes from Concussions Act (HR 3532)** (Nov, 2013) – would require states to implement concussion safety and management plans that include return-to-play requirements and academic supports; requires any player be immediately removed from participation until cleared by a health care professional
- **Youth Sports Concussion Act of 2013 (HR 2118)** – reduction of sports-related concussions in youth and completion of the National Academies' report on such injuries, authorizes Consumer Product Safety Commission to review the report and make recommendations; illegal to sell athletic sports equipment with false or misleading claims in respect to safety benefit

## Federal

- **Supporting Athletes, Families, and Educators to Protect the Lives of Athletic Youth Act (SAFE PLAY Act)** (S. 2718/HR 5324) (July, 2014)– provides for education, awareness, action plans, training, and further research related to health issues associated with sports (including cardiac conditions); requires school districts to have concussion management action plans that teach students, parents, and school personnel how to prevent, recognize, and respond to concussions – including academic and athletic performance
- **Bills did not receive serious consideration**

## CDC <http://www.cdc.gov/Features/Concussion/>

- **CDC working on guidelines to be implemented possibly in 2015 (modeled after AAN)**

**CDC Features**

**Learn to Prevent & Recognize Concussions**

CDC's youth sports tool kit teaches coaches, athletes, and parents to play it safe when it comes to concussions.

A concussion is a brain injury caused by a bump or blow to the head that can change the way your brain normally works. Even what seems to be a mild bump or blow to the head can be serious.

To help ensure the health and safety of young athletes, CDC developed the Heads Up: Concussion in Youth Sports initiative to offer information about concussions – steps of parents, brain injury – to coaches, parents, and athletes involved in youth sports. The "Heads Up" initiative provides important information on preventing, recognizing, and responding to a concussion.

CDC wants to equip coaches, parents, and young athletes across the country with the "Heads Up: Concussion in Youth Sports" tool kit, which contains:

- Fact sheet for coaches on concussion
- Fact sheet for athletes on concussion
- Fact sheet for parents on concussion
- Clipboard with concussion facts for coaches
- Magnet with concussion facts for coaches and parents
- Poster with concussion facts for coaches and sports administrators
- Quiz for coaches, athletes, and parents to test their concussion knowledge

### ***“Mild Traumatic Brain Injury in U.S. Soldiers Returning from Iraq”***

(Hoge, McGurk, Thomas, et.al, 2008)

- 1 in 6 returning troops have had at least one concussion
- 4.9% reported injuries with LOC of those, 43.9% met criteria for PTSD (3xs the rate found in those with other injuries)
- 10.3% reported altered mental status, of those, 27.3% met criteria for PTSD
- TBI with LOC also associated with major depression

## **NEUROCOGNITIVE AND PSYCHOSOCIAL EFFECTS**

Signs and Symptoms



**Any injury to the head has the potential to affect a student's educational performance.**

**Physical recovery can happen faster, giving a false sense that the brain is healed.**

**CT Scans are normal.**

**Second Impact Syndrome in children and young adults can be devastating.**

### **Concussion Signs and Symptoms**

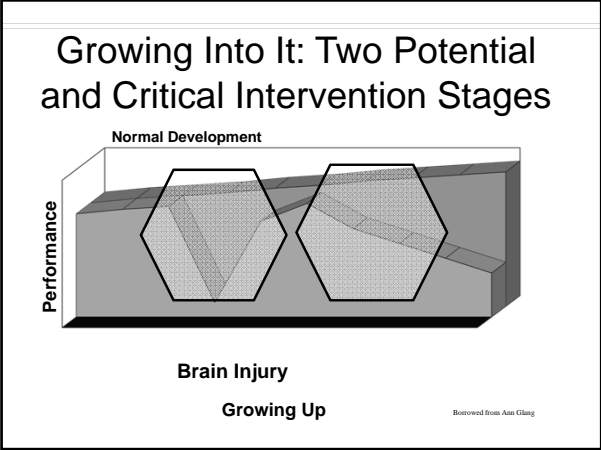
*Signs and Symptoms vary, and may include one or many of the following:*

- Unequal pupil size
- Vacant Stare
- Tinnitus (ringing in the ears)
- Nausea & Vomiting
- Delayed verbal responses
- Delayed motor responses
- Confusion & inability to focus
- Memory deficits
- Emotions out of proportion
- Slurred or incoherent speech
- Gross observable incoordination
- Disorientation (time, date, location)
- Any period of LOC
- Headaches and Irritability
- Sleep Disturbances
- Depression may develop

Information from [www.headinjury.com/sports.htm](http://www.headinjury.com/sports.htm) and [www.mayoclinic.com](http://www.mayoclinic.com)



Mental status changes	
Amnesia	Disorientation
Confusion	Excessive drowsiness
Easily distracted	Impaired level of consciousness
Feeling dinged, stunned, or foggy	Poor concentration and attention
Inappropriate play behaviors	Slow to answer questions or follow directions
Seeing stars or flashing lights	
Physical or somatic	
Ataxia or loss of balance	Blurry vision
Decreased performance or playing ability	Dizziness
Double vision	Fatigue
Headache	Lightheadedness
Nausea, vomiting	Poor coordination
Ringing in the ears	Seizures
Slurred, incoherent speech	Vacant stare/glassy eyed
Vertigo	
Behavioral or psychosomatic	
Irritability	Low frustration tolerance
Personality changes	Nervousness, anxiety
Sadness, depressed mood	Emotional lability



How does the brain works? Let's test your memory ... and more

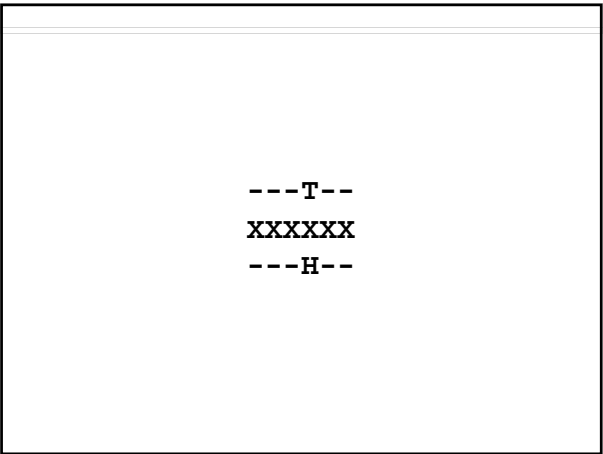
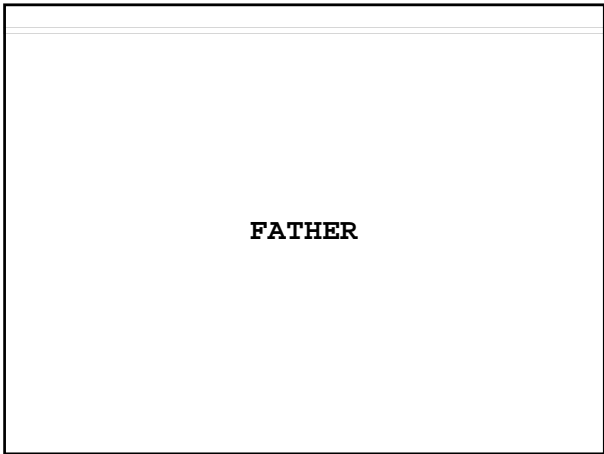
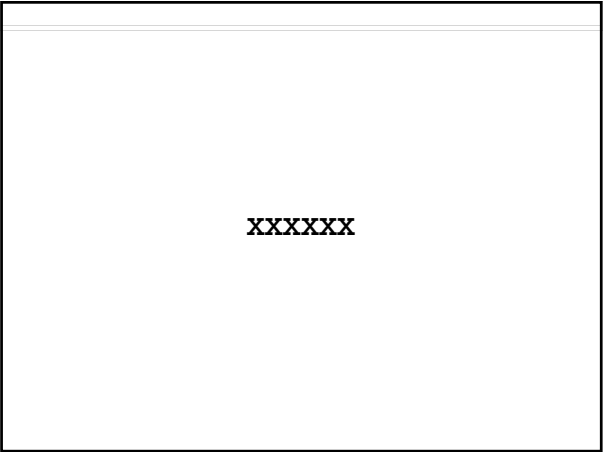
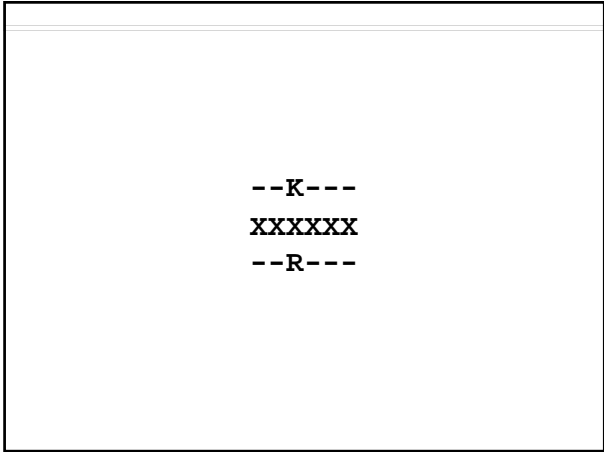
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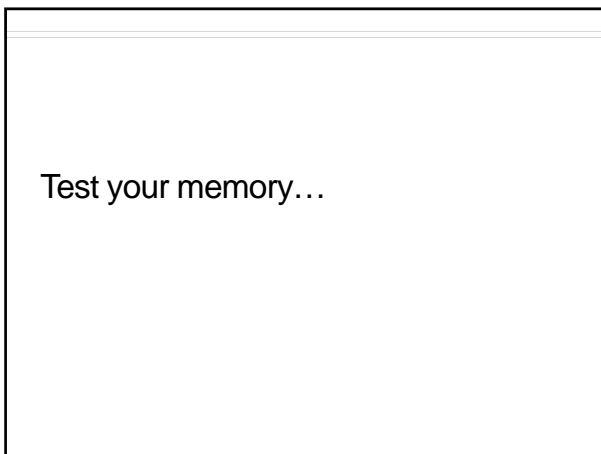
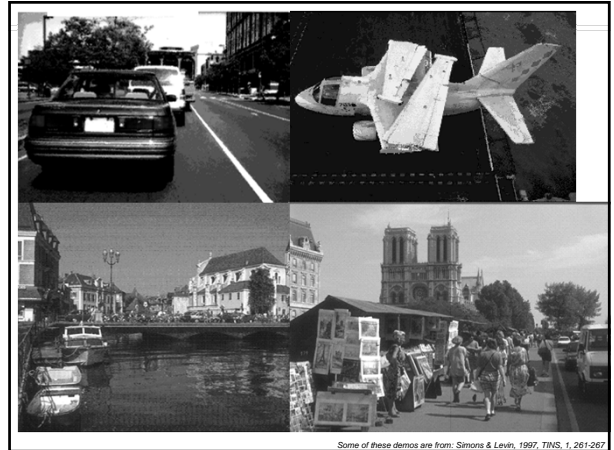
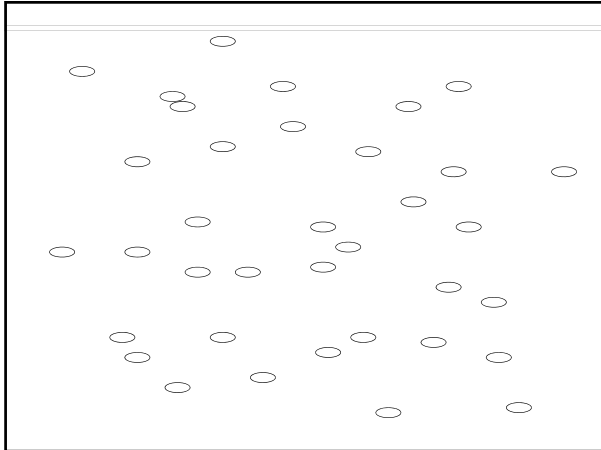
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• **Miller**, (1956) talks of 'the magical number seven, plus or minus two', meaning that:

- on average, the capacity of STM is between 5 and 9 items of information. (See: **Gross et al**, 2000, p.12.).

How did you do?

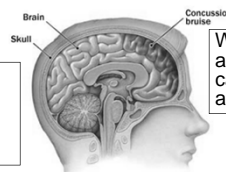
Do you remember?

What are the other 2 lobes called?

What are 2 symptoms of a concussion?

Which lobe is injured here?

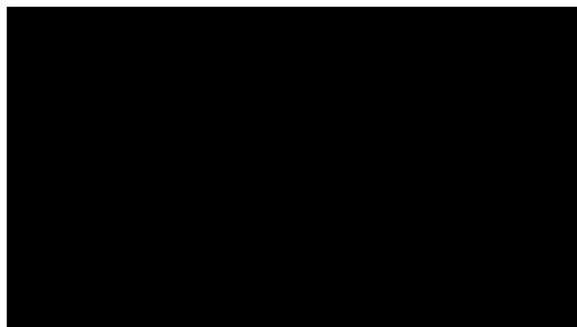
What symptoms might you expect if the occipital lobe was injured?



What types of activities might cause injury in this area?

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## Concussion Awareness



WHO WORKS WITH  
CONCUSSIONS?

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## Speech-Language Pathologists

- evaluation and treatment of deficits in attention, organization, sequencing, thinking, problem solving, judgment, memory, writing and talking.
- evaluate and treat executive function issues
- teaching and helping individuals implement compensatory strategies.
- working with individuals with brain injuries to address cognitive and functional skills.
- Making visits to the home, school, community and workplace to help design and implement strategies.

## Occupational Therapist

- skills of daily living to enhance independence to include those skills necessary to bath, cook, and run a household.
- address functional memory, visual perceptual and problem solving skills.
- work to maintain flexibility of the arms and hands through exercise and custom made splints.
- make visits to the home, school, community and workplace to help individuals with the design and use of strategies to improve independence.

## Physical Therapist

- Address physical injuries and recovery
- Vestibular disorders (balance and coordination)

## Audiologist

- Tinnitus
- Vestibular disorders (peripheral/central)
  - Dizziness
- Auditory processing issues
- Hearing issues

## Athletic Trainer

- Overall conditioning and rehabilitation
- Strength and conditioning
- Injury monitoring and care
- Management of recovery and outcomes

## Individuals With Brain Injuries May Also be Seen by the Following Rehabilitation Specialists.....

- Physiatrist
- Neurologist
- Neuropsychologist
- Neuropsychiatrist
- Special Educator
- Vocational Rehabilitation Counselor
- Cognitive Therapist

### BRAIN Injury Transition Liaison (BITL) Process (Within Children's Hospital Emergency Department)

#### Diagnoses Child With TBI

Identify child educated prior to implementation  
Obtain consent from parent/guardian authorizing BITL to:  
Follow up with family and school / Follow up with family only / Decline consent  
Provide a packet of information including the Signs & Symptoms Tool, "When Your (Child's) Head  
Hurts" booklet, and referral to BITL.

#### BITL - BITL

Collect data and documents all follow-up call details into secure online database  
Follow-up phone calls with family at 2 weeks, 3 months, and 6 months  
Provide families with helpful resources  
Obtain parent consent, communicates via e-mail with Department of Education (DOE)  
Identify schools, daycare facilities, and out-of-state schools are contacted by Project BRAIN

#### Contact

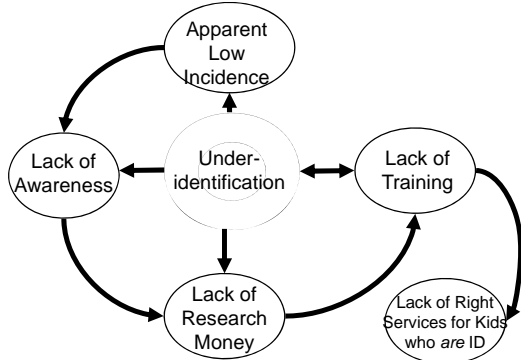
Identify school principal regarding specific student, requests sharing of information with select staff  
Provide same materials family received at hospital  
Provide contact information for Project BRAIN to provide staff in-services

Project BRAIN Staff

## ROLE OF SLPs

Testing, Treatment, Interventions, and What we can do..

## Under-identification Cycle



## School services in TN

- Estimated # of persons (ages 3 – 19) with TBI in TN 2008: **1,189**

### Services

- 336 of 166,677 (2007 – 2008)
- 57% of discharged children in 2008 were moderate to severe TBI (687)
- 43% were MTBI (502)

## Under-identification: Nationally

- Annually: 30,000 with persisting disabilities from brain injury
- Annually: 10,000 (1/3) needing special education supports
- Cumulative total (K-12): 130,000
- Total on federal census (2002): 14,844

## IDEA Definition of TBI

### Federal Public Law 101-476,1990

- .....an acquired injury to the brain caused by an external physical force resulting in total or partial functional disability or psychosocial impairment or both that adversely affects a child's educational performance.....



## IDEA Definition of TBI

**Federal Public Law 101-476, 1990** (continued)

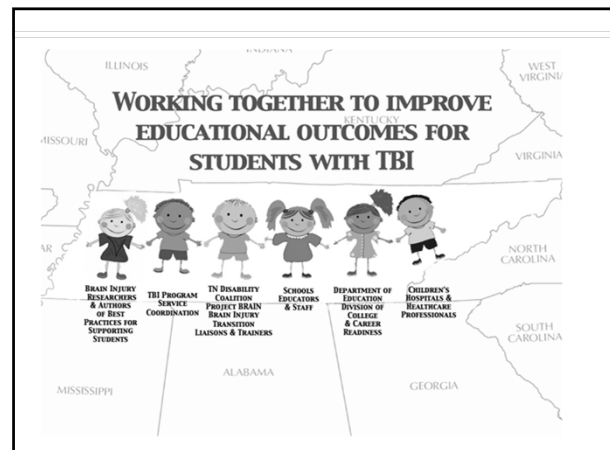
- The term applies to open and closed head injuries resulting in impairments in one or more areas, such as cognition; language; memory; attention; reasoning; abstract thinking; judgment; problem-solving; sensory, perceptual, and motor abilities; psychosocial behavior; physical functions; information processing; and speech.

## ASHA Scope of Practice

- language (comprehension and expression)
  - phonology
  - morphology
  - syntax
  - semantics
  - pragmatics (language use, social aspects of communication)
  - literacy (reading, writing, spelling)
  - prelinguistic communication (e.g., joint attention, intentionality, communicative signaling)
  - paralinguistic communication
- cognition
  - attention
  - memory
  - sequencing
  - problem solving
  - executive functioning

## The role of Speech-Language Pathologists

- work with executive system impairments, including disorganized expressive discourse (both spoken and written)
- work with comprehension difficulties associated with organizational impairment
- work with specific social skills deficits



## PROTOCOLS, SCREENINGS, TESTS, AND EVALUATIONS

### Strengths and Weaknesses

## Computer-based Apps

NAME & DEVELOPER	FEATURES	PLATFORM & PRICE
Concussion Recognition & Response – PAR, Inc. <a href="https://play.google.com/store/apps/details?id=com.parinc.crr">https://play.google.com/store/apps/details?id=com.parinc.crr</a> <a href="https://itunes.apple.com/us/app/concussion-recognition-response/id436009132?mt=8">https://itunes.apple.com/us/app/concussion-recognition-response/id436009132?mt=8</a>	<ul style="list-style-type: none"> <li>designed for parents &amp; coaches by Gerard Gioia, Ph.D. (Podiatric Neuropsychologist, director of SCORE Concussion program) &amp; Jason Mihalik, Ph.D.</li> <li>symptom questionnaire with yes/no response format</li> <li>identifies whether concussion is likely or not</li> <li>gives response &amp; management suggestions</li> </ul>	iOS (\$9.99) Android (free)
Play it Safe – Concussion Health, LLC <a href="https://itunes.apple.com/us/app/play-it-safe-concussion-assessment/id441786934?mt=8">https://itunes.apple.com/us/app/play-it-safe-concussion-assessment/id441786934?mt=8</a>	<ul style="list-style-type: none"> <li>designed for athletic trainers &amp; coaches</li> <li>symptom questionnaire</li> <li>timers for measuring cognitive function &amp; balance</li> <li>email reports to healthcare team members</li> </ul>	iOS (free)
SCAT2 - Sport Concussion & Assessment Tool 2 – Incovapp Inc. <a href="https://itunes.apple.com/us/app/scat2-sport-concussion-assessment/id452857229?mt=8">https://itunes.apple.com/us/app/scat2-sport-concussion-assessment/id452857229?mt=8</a>	<ul style="list-style-type: none"> <li>designed for healthcare providers</li> <li>app version of the SCAT2</li> <li>email tests to other team members</li> <li>stores tests for baseline and post-injury comparisons over time</li> </ul>	iOS (\$3.99)
Concussion – SportSafety Labs, LLC <a href="https://itunes.apple.com/us/app/concussion/id418559920?mt=8">https://itunes.apple.com/us/app/concussion/id418559920?mt=8</a>	<ul style="list-style-type: none"> <li>lists signs &amp; symptoms of concussion</li> <li>provides 911 access &amp; map to locate nearest hospital</li> <li>with \$4.99 in-app purchase: store baseline and post-injury measures for comparison; email evaluations and receive communication from physician regarding recommendations for return to play</li> </ul>	iOS (free)
Heads Up App – National Foundation Center For Disease Control And Prevention Inc. <a href="https://play.google.com/store/apps/details?id=org.cdc.nf">https://play.google.com/store/apps/details?id=org.cdc.nf</a>	<ul style="list-style-type: none"> <li>developed by the CDC</li> <li>separate parent, coach, and clinician versions available</li> <li>advice for suspected concussion</li> </ul>	Android (free) iOS

## Computer-based Testing

- ImPACT
- Headminder (CRI)
- CogSport (AXON)
- ANAM
- CNS Vital Signs
- Used by 50-60% of programs
- Test Verbal memory, visual memory, reaction time, and processing speed

## Return to play protocols

- Baseline testing with computerized tests
- With concussion
  - Retest within 24 hours
- Follow-up testing
- Exertion
- Return to practice with and without contact
- Return to play

## Strengths and weaknesses

- Strengths
  - Quick assessments (20-30 min)
  - Provide a baseline for comparison
  - Overall sensitive
  - Consistency of administration
- Weaknesses
  - Poor test-retest reliability
  - Trick the test

## Assessment Areas

- Orientation
- Attention
- Short-term memory
- Long-term memory
- Prospective memory
- New learning
- Word retrieval
- Reading comprehension
- Reading speed
- The Listening Inventory
- Written content and organization
- Mathematical accuracy and speed
- Convergent reasoning
- Divergent reasoning
- Inductive reasoning
- Deductive reasoning
- Problem solving
- Sequencing
- Mental flexibility

Keeley, SP, 2003

## Comprehensive battery

	Test	Purpose
• Omnibus tests		
• Brief verbal cognitive assessment	Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) Randolph (2001) The Psychological Corporation	To determine the neuropsychological status of adults ages 20-89 with neurologic injury or disease, such as dementia, head injury, or stroke
• Domain-specific tests:		
• Attention	Test of Everyday Attention (TEA) Robertson, Ward, Baddeley & Nimmo-Smith (1994) Thames Valley Test Company	Measures selective attention, sustained attention, and attentional switching using everyday materials. Developed for use with clinical and typical populations.
• Information Processing Speed	WJ-III Cognitive Battery Woodcock, McGrew & Mather (2001) Riverside Publishing	To measure cognitive efficiency, i.e., individual's ability to perform automatic cognitive tasks under pressure and with focused attention.  Standard Battery Test 6: Visual Matching Extended Battery Test 16: Division Speed

Executive functions	Functional Assessment of Verbal Reasoning and Executive Strategies (FAVRES)  MacDonald (1995) CCC Publishing	To assess verbal reasoning, complex comprehension, discourse, and executive function in order to determine the presence and severity of higher level cognitive communication deficits. Requires processing of real world information, integration of stimuli, and formulation of written and oral responses.
Declarative Memory	Rivermead Behavioral Memory Test (RBMT) – Version 3  Wilson, Greenfield, Clare, Baddeley, Cockburn, Watson, Tate, Sopena, and Nannery (2008) Pearson Assessments	To identify everyday memory problems and monitor change over time. Third edition includes novel task learning.

## Role of SLPs



## What can we do in therapy?

- Work on word retrieval
- Improve internal language organization
- Improve production of complex sentences in oral and written discourse
- Help students work out math word problems
- Improve pragmatics



## Language Therapy

- Goals:
  - Improve metalinguistic skills.
    - Use language to talk about language.
- Improve use of:
  - Nonliteral meaning
  - Multiple Meanings
  - Figurative speech
  - Metaphors
  - Similes
  - Ambiguous Language

## Definition of Cognitive Rehabilitation

- “The application of techniques and procedures, and the implementation of supports to allow individuals with cognitive impairment to function as safely, productively, and independently as possible”

• Mateer, CA (2005) in *Fundamentals of Cognitive Rehabilitation*. IN P. W. Halligan and D. T. Wade (Eds.), *Effectiveness of Rehabilitation for Cognitive Deficits*. Oxford Press

## Does it Work?

(Cicerone et. al, 2005)

- “There is substantial evidence to support cognitive rehabilitation for people with TBI, including strategy training for mild memory impairment, strategy training for post acute attention deficits, and interventions for functional communication deficits”

## ESTABLISHING RELATIONSHIPS WITH ATHLETIC PROGRAMS

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## CHRONIC EFFECTS OF CONCUSSIONS

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Long-term Sequelae



## KEY POINTS - Concussion

In predicting outcomes:

Amnesia is a more important symptom than loss of consciousness



Duration of concussion symptoms is more important to a person's outcome than the initial severity of symptoms

*An early return to play puts students at greater risk for developing Post Concussion or Second Impact syndromes. In more severe cases, students may need to be put on bed rest.*

adapted from <http://cbirt.org/tbi-education/concussion/concussion-and-sports-know-your-game/>

## Considerations during Recovery

### SIS: Second Impact Syndrome

- 2nd concussion occurs before brain has recovered from 1st concussion
- Even if 1st is mild, SIS can be catastrophic or fatal
- SIS likely to cause vascular congestion, swelling, ICP, & widespread damage
- 2 Case studies of football players who died from SIS. [Click Here](#)

<http://www.headinjury.com/sports.htm>

[http://www.medicine.virginia.edu/clinical/departments/radiology/medical\\_imaging/research/news-and-highlights/better-understanding-concussions-in-high-school-college-athletes](http://www.medicine.virginia.edu/clinical/departments/radiology/medical_imaging/research/news-and-highlights/better-understanding-concussions-in-high-school-college-athletes)

### Post Concussion Syndrome

- Long-term symptoms after severe or repetitive TBI's
- Memory, mood and attention deficits are common complaints
- Intellectual dullness
- Personality Changes
- Fatigue and headaches

<http://www.health.com/services/neurosciences/conditions-and-treatments/concussion>

## Chronic effects of long-term sequelae

- Research ongoing
- Mild cognitive impairments (MCI)
- Chronic traumatic encephalopathy (CTE)
- Post-concussion syndrome (PCS)
- Effects of multiple concussions

## Possible Changes after Concussion

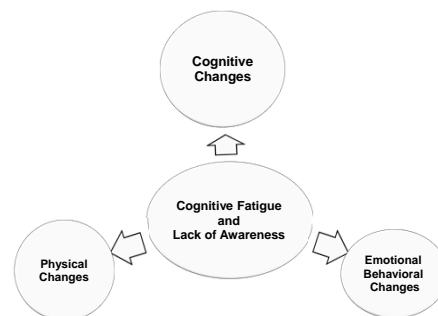


TABLE 1 Signs and Symptoms of a Concussion and the Potential Problems They May Pose to the Student

Sign/Symptom	Potential Implications in School
Headache	Most common symptom reported in concussions Can distract the student from concentration Can vary throughout the day and may be triggered by various exposures, such as fluorescent lighting, loud noises, and focusing on tasks
Dizziness/lightheadedness	May be an indication of injury to vestibular system May make standing quickly or walking in crowded environment challenging Often provoked by visual stimulus (rapid movements, videos, etc)
Visual symptoms: light sensitivity, double vision, blurry vision	Troubles with various aspects of the school building Slide presentations Movies Smart boards Computers Handheld computers (tablets) Artificial lighting Difficulty reading and copying Difficulty paying attention to visual tasks

Noise sensitivity	Troubles with various aspects of the school building Lunchroom Shop classes Music classes (band/choir) Physical education classes Hallways Organized sports practices
Difficulty concentrating or remembering	Challenges learning new tasks and comprehending new materials  Difficulty with recalling and applying previously learned material Lack of focus in the classroom Troubles with test taking Troubles with standardized testing Reduced ability to take drivers education classes safely
Sleep disturbances	Excessive fatigue can hamper memory for new or past learning or ability to attend and focus Insufficient sleep can lead to tardiness or excessive absences Difficulty getting to sleep or frequent waking at night may lead to sleeping in class Excessive napping due to fatigue may lead to further disruptions of the sleep cycle

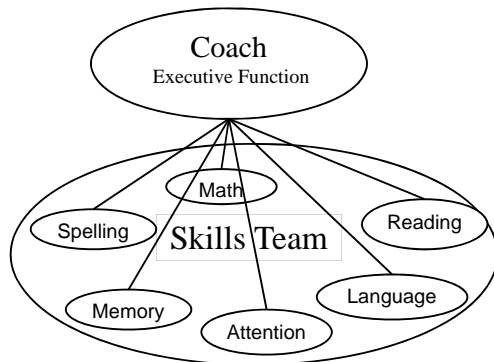
### Implications for Children: what we know from research

- Concussion and repeated concussions can occur from abuse
- Concussion and repeated concussions can occur from falls and sports injuries
- Research suggests that children who suffer a brain injury are more likely to incur a second one within 6 months (*Pediatrics*, April 2007)

### Impact on school performance: what we know from research

- Recent learning usually more affected than long-term memories
- Prospective memory (i.e., ability to carry out intended actions) frequently impaired
- Motor/procedural learning often less impaired

## Executive Functioning



## Executive Dysfunction in Children

- May present with academic, social, or behavioral difficulties that do not qualify them for Special Education services
- May be described as lazy, unmotivated, unable to get work done, confused
- May be extremely disorganized
- Academic difficulties do not present themselves until upper elementary school grades or middle school even though the child was successful in the early grades

## Areas of Cognitive Functioning that can be supported by Strategies

- |                               |                   |
|-------------------------------|-------------------|
| • Attention                   | • Persistence     |
| • Memory-(types of memory)    | • Organization    |
| • Decision making             | • Self-Perception |
| • Sequencing                  | • Inflexibility   |
| • Judgement                   | • Self Monitoring |
| • Processing speed            | • Initiation      |
| • Problem solving differences |                   |

**Cognitive Strategies are a key component of what is often referred to as “Cognitive Rehabilitation”**



## Strategies

- Use of a journal/calendar
- Create a daily schedule
- "To do" lists and shopping lists
- Labeling items
- Learning to break tasks into small manageable steps
- Use of a tape recorder
- Use of ear plugs to increase attention, screen out distractions (Parente & Herman 1996)
- Partitions/cubicles, at work, quiet space at home

## Strategies cont.....

- Work on accepting feedback or coaching from others, consult and collaborate with trusted individuals
- Work on generalizing strategies to new situations
- Use of a highlighter
- Alarm watch

## More Thoughts on Listening Skills

- An area where reduced cognitive skills can be misinterpreted as poor interpersonal skills
- Poor listening skills can be impacted by anxiety (about memory, social skills etc.)
- Relaxation techniques can be helpful (breath in slowly over 7 breaths, hold for 4-7 counts, exhale over 7, repeat as necessary)

## In the Classroom

- Structure is one of the most critical elements.
- For communication, rules, and the room
- Structure tasks by breaking long-term assignments into manageable increments.
- Teachers need to structure carefully the schedule -- alternating active and quiet periods/activities.
- Students may require assistance structuring their materials and workspace.

By **Structuring the Environment**, memory, organization and attention are supported, enhancing independence, reducing frustration, and freeing up cognitive and psychological energy to tackle new challenges at home, work and community

## LACK OF AWARENESS

A common and difficult to remediate hallmark of a brain injury



Awareness is the key to sustained functional gains-For those whose degree of damage does not allow them to take a self critical stance, they may always rely on the coaching or cueing of others to employ strategies

- Choose a goal
- Plan
- Execute
- Evaluate

What are Executive Functions?

### Adaptive Aspects of Executive Functions

- Competencies
  - Driving
  - Money management
  - Personal decisions—life choices, medical consent
  - Work
- Dealing with emergencies
- Family and other social relations
- Impulse control—addictions, spending, gambling, eating, sexual behavior, aggression
- Criminal behavior

- Impulsivity
- Depression and mood swings
- Lack of self-awareness and judgment
- Agitation and aggression
- Difficulty exercising good social judgment

### Emotional and Behavioral Consequences...

### A memory deficit might look like trouble remembering or it might look like.....

- Frequently misses appointments-avoidance, irresponsibility
- Says he'll do something but doesn't get around to it
- Talks about the same thing or asks the same question over and over
- Invents plausible sounding answers so you won't know he doesn't remember

### An attention deficit might look like trouble paying attention or it might look like ...

- Keeps changing the subject
- Doesn't complete tasks
- Has a million things going on and none of them ever gets completed
- Tries to do two things at once
  - gets confused and upset

A deficit in executive skills might look like the inability to plan and organize or it might look like...

- Uncooperativeness, stubbornness
- Lack of follow through
- Laziness
- Irresponsibility

### Unawareness might look like...

- Insensitivity, rudeness
- Overconfidence
- Lack of concern about the extent of her problems
- Doesn't think support is needed
- Covering up problems ("everything's fine...")
- Big difference in what he thinks and what everyone else thinks about his behavior
- Blaming others for problems
  - making excuses

### Changes after Brain Injury

#### Things to remember:

- A person with a brain injury is a person first
- The age at time of injury will impact development
- No two brain injuries are exactly the same
- Often symptoms of brain injury and psychiatric symptoms are similar
- The effects of a brain injury are complex and vary greatly from person to person
- The effects of a brain injury depend on such factors as cause, location and severity
- Preexisting skills will impact and be impacted by the brain injury.....(e.g. *cognitive reserve*)

### Cognitive Accommodations: All Levels

#### Processing Delays

- Increased time to complete assignments/tests
- Extra time to answer questions verbally
- Breakdown complex directions into steps
- Repeat pertinent information
- Decrease length of assignments
- Use precise concrete language

#### Attention

- Frequent breaks
- Assignments divided into small increments
- Preferential seating
- Verbal prompts to check work

## Cognitive Accommodations

### Memory Deficits

- Written & verbal directions for tasks
- Check student's understanding of directions by having student provide oral summary
- Frequent review of information
- Strategy for notetaking during long reading assignments
- Set timelines of completing work
- Have student repeat instructions to check for comprehension
- Using a watch alarm to remind student to look at memory aides
- Use planner and have teacher check to ensure all assignments written

## Cognitive Accommodations

### Organizational Skills

- Study guide and/or timeline
- Daily calendar for assignments and tasks
- Instruction in using a planner
- Highlight materials to emphasize important or urgent information
- Planning activities in routine sequences
- Use a schedule

### Academic Process

- Peer tutor
- Small group discussion
- One on one instruction
- Assign person to monitor student's progress
- Contact person (home/school)
- Weekly progress report between home and school

## Social/Behavioral Accommodations

### Emotional Well-Being

- School Counseling
- Identify an adult with whom the student can "check in" daily
- Quiet area for re-grouping
- Public praise and private reprimands when possible
- Script about accident and hospitalization
- Brain injury in-service for staff and classmates

### Behavior

- Functional behavioral assessment
- Positive behavioral management plan
- Modification of nonacademic tasks (e.g., lunch, recess)
- Time and place to re-group when upset
- Additional structure in daily routine
- Avoid criticism – Provide frequent positive feedback
- When aggression occurs, act in neutral manner

## Other Accommodations

### Technology

- Computer for homework
- Tape recorder for class work and class lecture
- Use of communication devices
- Books on tape for text and leisure materials
- Talking calculators for math assignments
- One-handed keyboard or control switches
- PDA (e.g., Palm Pilot)
- Talking watch to assist with time management
- Watch alarm for reminders

### Fatigue

- Reduced Schedule
- Avoid "overloading"
- Limit distractions
- Planned rest breaks
- Schedule arranged for high cognitive demand tasks to be followed by less stressful coursework

### Strategies: Cognitive Adults and Children

- Calendar/keep schedule predictable
- Planner vs. loose paper
- Laptop/computer
- Tape recorder
- Timer/timer watches
- Untimed testing
- Alternative testing
- Use of a reader or note taker (buddy)
- Highlighter
- Books on tape/film adaptation
- Strategic scheduling
- Break tasks/ assignments into steps

### Without Appropriate Services, Individuals with TBI are at Risk for...

- Long-Term Unemployment
- Alcohol and or Drug Use and Abuse
- Social Isolation
- Higher risk of subsequent brain injuries than individuals who have never incurred a brain injury

### Treatments

#### • **Prevention** is the only cure

- Medications
  - Presently no medications approved for TBI
- Cognitive Rehabilitation
  - Takes time
  - Qualified providers?
  - Lack of insurance approval

### Treatment Techniques

#### Memory

- Memory strategies (WRAPP - write, repeat, associate, picture, pair)
- Visual retention (e.g. objects, pictures of objects, details of picture, items in room)
- Recall list of items/words, or details from auditory stimuli
- Prospective memory tasks (e.g., routines, responsibilities each day, to-do next week, month, etc)
- Mental manipulation such as ranking, recalling specific words or concepts from sentence or paragraph, unscrambling sentences, repeating directions or sentences
- Answer general information questions

## Treatment Techniques

### Verbal Expression

- Naming:
  - Confrontational/Responsive naming of items in classroom or school environment, synonym/antonym, similarities/differences, analogies, word association, multiple meanings, definitions, figurative language, vocabulary words
- Sentence to paragraph formulation to describe wants, needs, pictures, actions, events, likes/dislikes
- Conversational discourse (e.g., homework assignments, weekend, school activities)
- Summarize reading texts, magazines, newspaper, opinions, news/educational videos
- Giving directions (barrier tasks for challenge)

## Treatment Techniques

### Written Expression

- Copy designs, shapes, letter, words, phrases, sentences
- Generate word to dictation, sentence to describe, write letter or email, take notes in lecture
- Copy assignments into planner
- Write own flashcards to review school work
- Create outlines and reports
- Take messages from voicemail or phone call

- Written communication skills
  - speed and ease of retrieving words and thoughts, sentence and paragraph organization, maintaining a topic, thought clarity, ability to integrate thoughts
  - (example: GED practice book, functional writing tasks, simulated situations)

## Treatment Techniques

### Reasoning

- Category naming, convergent/divergent, category exclusion, conclusions, problem solving, verbal absurdities, analogies, figurative language, alternate solutions to situations, pros/cons, consequences, inferences about other's feelings, inductive/deductive puzzles, inferencing, improving product/situation, other uses for items

### Sequential Thought

- Sequencing pictures, demonstrating &/or verbalizing each step in a simple-complex situation, unscrambling words/sentences, sentence/story completions

- Reasoning (concrete, abstract, decision making, problem solving)
  - abstract thinking, complex problem solving, verbal reasoning
- Mathematical skills
  - functional tasks, math practice books, simulated situations

## Treatment Techniques

### Attention/Concentration

- Visual scanning, mathematics, alternating between tasks, crossword puzzles, word searches

### Insight/Awareness

- Probing questions (i.e., What will be hard for you? What will be easy? How long will this take you? Do you think you'll need any help?)
- Follow-up questions (i.e., Where you able to complete the task? Was it completed on time? What problems did you have? What help did you need from others? What strategies did you use?)

## Treatment Techniques

### Pragmatics

- Role-playing
- Check-lists
- Assignments to socialize and reflect
- Watch TV shows and comment on the interactions and social situations

## Organization

### • Categorization:

- identification of optimal categories, recognizing subtle differences, switching sets
- discrimination of quantity concepts
- sorting objects into general and specific categories
- sorting according to various traits
- similarities and differences between objects
- identify variety of items needed for a particular situation.



## Organization

- Closure:
  - nonlinguistic tasks in which person identifies missing sections in pictures (begin with shapes)
  - identification of words with letters (parts of letters missing)
  - sound blending tasks.
- Sequencing:
  - sequencing colors from light to dark, shapes from small to large

## Expressive language and Comprehension

- personal questions
- yes/no questions
- following commands
- simple reading
- auditory word discrimination
- word finding, pragmatics, gestures, writing, word fluency

- Executive functioning skills (planning, initiation, self-monitoring)
  - goal selection, planning sequencing, initiation, task completion, time awareness, self-monitoring
  - simulated tasks
- Attention (sustained, selective, alternating, divided)
  - evaluate ability to sustain attention, inhibit distracters, shift attention, focus attention on more than one task
  - clinical observations, simulated situations

## Treatment Options

- Direct therapy
- Consultative services
- Technology
  - Cognitive software programs
    - Parrot software
    - APT
- Language/pragmatic groups
- Compensatory strategies

## Treatment Observations

- During and after treatment
  - fatigue
  - Speed
  - Frustration
  - Overload
  - need for breaks
  - repetition requests
  - ability to self-monitor/correct
  - performance with distracters

## Group Therapy ?

- group treatment, with individual treatment, should be provided
- use of an interdisciplinary approach
- things to be considered in the type of group a person should be in are:
  - cognitive level of group
  - purpose or goals of group
  - specific tasks to be introduced
  - group leaders

## Group Therapy ?

- low level groups
  - Focus: increasing the ability to sustain attention to a variety of stimuli for specified periods of time
- moderate level groups
  - Focus: problem-solving and organizational difficulties
  - skills in house, emergency procedures, giving/following directions, shopping skills, etc.
- high level group
  - Focus: variety of areas such as functional living skills, pragmatic skills, social skills, and/or cognitive language skills.

## RESOURCES

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## Resources

- Brain Injury Association of America 703-236-6000, [www.biausa.org](http://www.biausa.org)
- BIA in each state
- Special organizations

## Resources

- Health Organizer: <https://tbi.mssm.edu/>
  - research project of the Mt. Sinai R & T Center. Website provides a way for individuals with TBI or MS to organize and track their medical information, users can participate interviews regarding their use of the health organizer if they chose (paid).
- The Brain Injury Resource Center: [www.headinjury.com](http://www.headinjury.com)
  - an excellent, consumer driven website that offers free strategies and supports, lots of inventories and checklists and organizational tools

### Signs and Symptoms Tool

**When Your Child's Head Has Been Hurt:**

Many children who have had head get hurt and have no long-term problems. Some children have problems that may not be noticed right away. You may not change in your child over the next several months that concern you. You and this same concern signs that you child may have a mild brain injury. If your child has any of the problems on this list — AND THEY DON'T GO AWAY — see the "What to Do" box on the back of this sheet.

**HEALTH PROBLEMS**

**Headaches**

- Headaches that keep coming back
- Pain in head (back)
- Pain behind the eye
- Pain in the jaw
- Pain in or around the eyes

**Balance Problems**

- Dizziness
- Trouble with balance

**Visual Changes**

- Blurred or double vision
- Changes in size or color
- Spotting or floaters

**Smell Problems**

- Changes in the way things smell
- Trouble smelling
- Can't handle normal background noise

**Other Problems**

- Trouble with balance
- Can't sleep through the night
- Sleeps too much
- Day and night get mixed up

**Other Problems**

- Trouble with balance
- Can't sleep through the night
- Sleeps too much
- Day and night get mixed up

**When Your Head Has Been Hurt**

Many people who hurt their heads get hurt and have no long-term changes. Some people have changes that might not be noticed right away. You may not notice any over the next several months that concern you. You and this same concern signs that you child may have a mild brain injury. If your child has any of the problems on this list — AND THEY DON'T GO AWAY — see the "What to Do" box on the back of this sheet.

**HEALTH CONCERNS**

**Headaches**

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## Resources

- [www.attainmentcompany.com](http://www.attainmentcompany.com) - "StepPad" \$29.00, Records up to 72 seconds for step by step directions
- [www.olympus-global.com](http://www.olympus-global.com) - Digital and Microcassette hand help recorders
- [www.forgettingthepill.com](http://www.forgettingthepill.com) - has alarm watches, pillbox organizers with timers, alarms
- [www.timex.com](http://www.timex.com) - Watch that can keep appointment schedules, phone numbers, contacts \$90.00
- [www.watchminder.com](http://www.watchminder.com) - Watch with reminder functions, 30 alarm settings with viewable messages, \$79.50

- [www.dynamic-living.com](http://www.dynamic-living.com) -carries the Cadex Alarm watch (12 alarm settings) for \$50.00, as well as low vision devices, key finders, and more
- [www.neuropage.nhs.uk](http://www.neuropage.nhs.uk) -Radiopaging system to send reminders of things to do. Monthly fee, arranged in conjunction with treating physician if medication involved

- [Http://www.abledata.com/](http://www.abledata.com/)
  - An online resource catalogue that lists different types of assistive technology available to help individuals with all types of disabilities
- <http://www.biausa.org/Pages/AT/>
  - Catalog of assistive technology for people with cognitive impairments. The devices listed have been reviewed by experts in the field of brain injury. Product information, and information about manufacturers, and more offered in this catalogue

## Resources for staff training

- As of April 2004, the Defense and Veterans Brain Injury Center at Walter Reed Army Medical Center is offering an online learning course on traumatic brain injury through the Veterans Health Initiative. For more information contact: [http://www1.va.gov/vhi/docs/TBIfinal\\_www.pdf](http://www1.va.gov/vhi/docs/TBIfinal_www.pdf)
- <http://webaim.org/simulations/distractability-sim.html> - this is a site that can be used in staff training. **It is a simulation of the effects of cognitive disabilities.** You will be asked to complete simple tasks, but other tasks will get in the way.
- <http://www.biausa.org/living-with-brain-injury.htm>- links to many online articles, written not for professionals in the field, but for people learning about brain injury. They cover all types of topics, from substance abuse and brain injury to cognition and brain injury. Written by various experts in the brain injury field.
- Certified Brain Injury Specialist (CBIS) Training offered through the American Academy for the Certification of Brain Injury Specialists, <http://www.biausa.org/brain-injury-jobs.htm>

## The Michigan Department of Community Health Web-Based Brain Injury Training for Professionals

- [www.mitbitraining.org](http://www.mitbitraining.org)
- *This free training consists of 4 module that take an estimated 30 minutes each to complete. The purpose of the training is twofold, to "ensure service providers understand the range of outcomes" following brain injury and to "improve the ability of service providers to identify and deliver appropriate services for persons with TBI"*

- *Retraining Cognition, Techniques and Application*
  - Rick Parente and Douglas Herrmann, An Aspen Publication

- School-Wide Concussion Management**  
Oregon Center for Applied Science



**ACTIVE<sup>TM</sup>** Athletic Concussion Training for Coaches

**ACTIVE: Athletic Concussion Training™** using Interactive Video Education, is now available free of charge.  
Register today and earn your certificate!  
<http://activecoach.orcasinc.com>

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## Resources

Center on Brain Injury Research & Training  
<http://www.cbirt.org/>



Centers for Disease Control and Prevention  
<http://www.cdc.gov/TraumaticBrainInjury/index.html>

Brain Injury Association of Pennsylvania  
 1-800-444-6443  
 Free Brain Injury Resource Line  
 1 of 14 TBI Model Systems of Care at MossRehab in Philadelphia (Center of Excellence) - with 3  
 Centers for BI Research - U of PA, Drexel U, and U of Pitt Medical Center  
<http://biapa.org>

Brainline  
<http://www.brainline.org/index.html>

## Center on Brain Injury Research & Training

TBI Education offers evidence-based information & resources for people working with students who have a traumatic brain injury.

[Early Childhood TBI](#)

[School Reentry](#)

[504/IEP \(Formalized Support\)](#)

[Instruction Strategies](#)

[Assistive Technology](#)

[Behavior](#)

[Transition to Adult Life](#)



<http://www.cbirt.org/tbi-education>

## Resources

- <http://www.cdc.gov/concussion/policies.html>
- <http://www.ncsl.org/research/health/traumatic-brain-injury-legislation.aspx>
- <http://cbirt.org/news/sports-concussion-management-guide/>
- <http://cbirt.org/presentations/>
- <http://cbirt.org/products/>

- Free training
- <http://www.cdc.gov/concussion/headsup/clinicians.html>
- <http://brain101.orcasinc.com/1000/>

- What is your state's law/guideline?
- [http://www.edweek.org/ew/section/infographics/37concussion\\_map.html](http://www.edweek.org/ew/section/infographics/37concussion_map.html)

### COGNITIVE COMMUNICATIVE ASSESSMENT

SKILL AREA	SUGGESTED FORMAL MEASURES (Use selected subtests from the following lists based on individual needs)	INFORMAL MEASURES (Choices of family members may present stimuli)	FUNCTIONAL IMPLICATIONS
<b>Auditory comprehension</b>		Yes/No questions re: familiar information (family, toys, interests, photos)	Difficulty attending in distracting environments
Basic understanding of language; yes/no questions; picture vocabulary	Clinical Evaluation of Language Fundamentals-5 (CELF-5); Processing Subtest	Indicate named aspects of familiar/unfamiliar pictures and/or items/toys	Unable to screen ambient noise; difficulty with concentration
Processing/analysis/ integration	Illinois Test of Psycholinguistic Abilities-3 (ITPA-3); Auditory Reception	Informal commands with familiar items/toys	Act as if ignoring input at times
Phrases and sentences	Peabody Picture Vocabulary Test-4 (PPVT-4); Test of Adolescent and Adult Language (TOAL #1); Test of Language Development (TOLD #2)	Ability to follow simple general conversation	Slow/delayed processing of verbal information, especially in classroom, or shopping malls
Complex instructions	TOLD: Grammatical Unit; Test for Auditory Comprehension of Language-3 (TACL-3)	Recognition of favorite music/melodies	Difficulty following even simple directions and/or game rules
Relationships and ambiguities	Assessment of Children's Language Comprehension (ITPA-3: Auditory Assoc.)	Abilities under varied noise conditions	Greater difficulty understanding length and complexity increase
Sequential commands		Following multi-step directions	Problems with future language learning (e.g. vocabulary, concrete abstraction)
Managing increasing length, complexity and abstraction (decreased space-comparisons)	Revised TOLN Test	Following multi-step directions	
	TOAL-4: Listening Grammar; Fullerton Language Test for Adolescents (FLTA)		
	- Auditory synthesis		
	- Oral commands		
	- Grammatical Competency		
	Boston Diagnostic Aphasia Examination (BDAA)-Section II; Detroit: STU-Alt - Oral Directions		

## A little review...

- Fact or Myth?: Neuropsychologists are the only ones who can do formal testing with athletes following concussion
- Fact or Myth?: SLPs don't work with concussions
- Fact or Myth?: To be diagnosed with a concussion, a person needs to have lost consciousness
- Fact or Myth?: It's just a concussion. All they need is a couple of days of rest.
- Fact or Myth?: A person with a concussion recovers quickly, so long-term interventions are not needed.
- Fact or Myth?: As long as an athlete does not complain of symptoms that are related to a concussion, he/she is okay to return to play.
- Fact or Myth?: A student with a concussion does not need accommodations in school because the recovery time is so short.

- What are the symptoms of a concussion?
- How are sports-related concussions different than a brain injury?
- What role does the SLP play with sports-related concussions?
- What are some considerations for returning to school following a concussion?
- What testing should I use for someone with a concussion?

## Any questions?



"Whoa! That was a good one! Try it, Hobbs—just poke his brain right where my finger is."