



Concussion is a Traumatic Brain Injury

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Disclaimer

Information in this presentation is for the sole purpose of informing and enriching community knowledge base in the area of concussion

I encourage all participants to conduct their own further research to continue their learning on the topics addressed in this presentation



Acquired Brain Injury (ABI)

Any injury that occurs to the brain after birth

Results in deterioration in:

- Cognitive
- Physical
- Emotional
- Independent functioning



Impairments can be permanent, cause partial or total disability and / or psychosocial maladjustment

(Fortune & Wren, 1999)



ABI occurs as a result of

- Alcohol or Drugs
- Infection
- Stroke
- Disease or Tumours
- Traumatic Brain Injury (TBI)



Traumatic Brain Injury

Occurs when external force from a MVA, MBA, fall, assault injures the brain

➡ Causes loss of consciousness (LOC) or loss of memory

TBI caused by

- Not only the direct impact
- Rapid acceleration or deceleration of the head

Brain injury result of internal impact with the skull
Causes brain tissue to become torn, stretched, penetrated, bruised, swollen



Mild Traumatic Brain Injury (mTBI)

Concussion is a subset of mTBI

Has a higher name recognition, particularly in sport, than mTBI:

"there have been marked efforts over the years to educate and raise awareness about concussion. Renaming it mTBI may lose some of the momentum that is finally being gained in sports & in state legislation"

(Rushworth, 2012)



The term **concussion** is imprecise – causes confusion
Its usage refers to different phenomena

Definition vague...those supervising sports activities where head is injured are expected to apply a comprehensive term within a variety of rules and advice (Rushworth, 2012)



Community has a limited understanding of symptoms

20% have persisting symptoms 6 months post injury

Zader and Martelli 2003

Symptoms of mTBI or concussion that may persist significantly affect participation in family, education, employment.....



Aust Inst Health • Welfare, Disability in Aust: ABI, Aust Govt Editor, 2007



CONCUSSION

Complex pathophysiological process affecting the brain caused by direct or indirect biomechanical forces

Common features:

- Caused by an "impulsive" force transmitted to the head
- Rapid onset of short lived neurologic function impairment – resolves spontaneously
- Signs and symptoms may evolve over minutes / hours
- Reflect a functional disturbance than a structural injury
- May or may not involve LOC



Walk The Line

Simulate TBI symptoms due to

- Brain stem damage
- Damaged areas that control blood flow
- Heart rate cause blood pressure fluctuations
- Damaged Cerebellum cause balance and motor control difficulties
- Inner ear damage causes vertigo



Simple concussion

- symptoms progressively resolve in 7-10 days

Complex concussion

- persistent symptoms or specific symptoms (e.g. concussive convulsions)
- prolonged LOC (>1 min)
- prolonged cognitive changes - may include people who suffer multiple concussions over time

Second impact syndrome

- when a concussion or mild TBI is sustained before first TBI has resolved

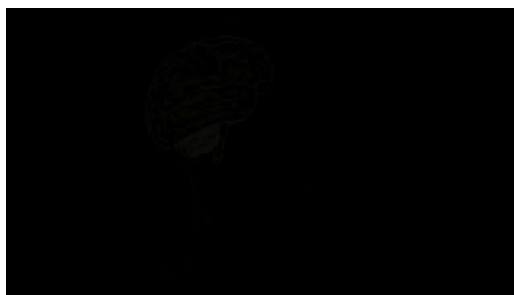
Post-Concussion Syndrome

- 3 or more symptoms persist for at least 3 months

Mater Accident Authority NSW 2008: Guidelines for Mild Traumatic Brain Injury Following Closed Head Injury



How does concussion occur?



Symptoms

- Headaches
- Feeling like in a fog
- Loss Of Consciousness
- Amnesia
- Mood/emotional changes - irritability
- Slowed reaction time
- Sleep disturbance

(McCrory, et al. 2012)

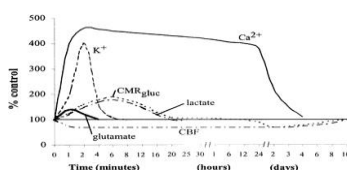
Symptoms

- Headaches, pain, dizziness, sleep disturbance
- Mood/emotional changes
- Cognitive impairment including memory changes, slowed thinking, reduced concentration
- Cognitive fatigue
- Cognitive/sensory overload
- Behavior change including irritability, impatience and socialization difficulties

(SABRS Concussion Clinic – Information Handout 13th August 2013)

Pathophysiology

- Potassium (K⁺) release in the first few minutes from intracellular to extracellular space
- Influx of Calcium (Ca⁺⁺) during first few days
- Intracellular magnesium levels are also immediately reduced and remain low for up to 4 days
- Initial increase in cerebral glucose metabolism, followed by a decrease in global cerebral glucose metabolism that may last 2–4 weeks
- Elevated levels of lactate
- Reduced cerebral blood flow (CBF) over many days, maybe reduced to 50% of normal
- CBF reduced at rest in adolescents with sport concussion up to 30 days



(Giza, Hendriks, 2001)

What does all this mean?

- In normal conditions, CBF is tightly coupled to neuronal activity and cerebral glucose metabolism
- Elevated lactate levels can result in neuronal dysfunction by inducing acidosis → Membrane damage and cerebral oedema
- Reduction in magnesium has been correlated with post injury neurologic deficits

(Giza, Hendriks, 2001)

Prevalence

According to the Australian Bureau of Statistics collisions (HITTING SOMETHING OR BEING HIT BY SOMETHING) were the second most common type of recent injury

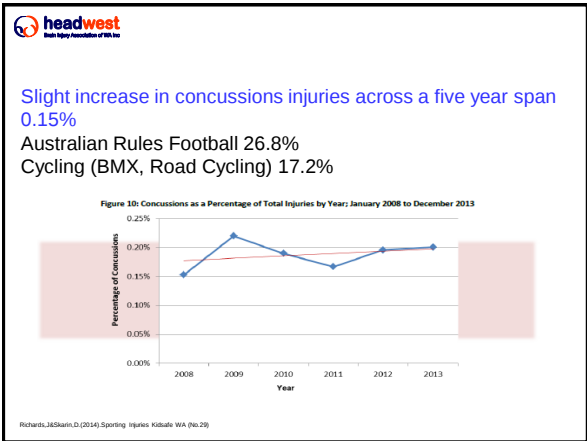
- Males were injured by collisions at higher rates than females; 31 per 1,000 males compared to 18 per 1,000 females
- 31% of males injured by collision were playing organised sport at the time compared to 20% of females

- Hospital and emergency data under-estimate the true burden of concussion on society as the majority of people who have a concussion do not seek medical attention..

(Rushworth, 2012) (Iverson, 2005) (Finch & Clapperton, 2013)

- It is more common for individuals to visit their doctor after mTBI resulting in the patient and family members being sent home with instructions to look out for signs of neurological deterioration

(Fung, et al., 2006)



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Contributing factors

Contributing predisposing factors - poorer outcome post concussion

- ❖ Pre-injury personality
- ❖ Life stressors, coping skills and motivation
- ❖ Pre-injury lifestyle, physical and mental health
- ❖ Demographics

Other considerations

- ❖ Severity of Injury and other injuries incurred e.g. musculoskeletal
- ❖ Patient education and management post injury
- ❖ Persons response to injury
- ❖ Environmental issues
- ❖ Medication side effects
- ❖ Language and cultural considerations

Aust Institute Health - Welfare Disability Australia: acquired brain injury, Aust Govt., Editor 2007, ABW

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Concussion in Sport

There is a growing awareness in the community of concussion in sport

Frequency of occurrence
Potential short and long term consequences
In particular with a focus upon sporting injuries in young people

McCrory et al state that premature return to play of a student athlete who is still injured from a concussion may result in more severe and potentially long lasting effects

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Brain Injury Australia

- In 2012 Brain Injury Australia completed a policy paper on concussion in sport for the Australian Government. The paper focuses on Australia's three major "collision" sports - Australian Rules football, rugby league and rugby union - and identified a broad lack of recognition of the injury and its potential seriousness.
- Brain Injury Australia built a campaign around its trademarked "Five Rs" of concussion for the purposes of community education: "Recognise the injury; Removal from play; Referral to a doctor; Rest and then Return to play".

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5Rs OF CONCUSSION

Concussion refers to a disturbance in brain function caused by a direct or indirect force to the head. Usually the changes are temporary and the majority of players recover completely if managed correctly.

Recognise

Look for signs and symptoms of suspected concussion such as:

- loss of consciousness
- dazed look
- headache
- confusion
- holding of head
- dizziness
- nausea
- don't feel right
- balance problems
- blurred vision
- difficulty remembering
- fatigue

Removal

Any athlete with a suspected concussion should be **IMMEDIATELY REMOVED FROM PLAY** and is not to return to play or train on the day of the injury.

Referral

Any athlete with a suspected concussion should be medically assessed (by a registered medical doctor) as soon as possible after the injury.

Rest

Physical and cognitive rest i.e. no television, video games, computer) is important to allow the brain to recover.

Return

Players should not return to playing/training until a written medical clearance has been received from a medical doctor.

Nearest Medical Centre:
Nearest Hospital Emergency Department:
Medical Emergency: Call 000

SPORTS MEDICINE AUSTRALIA
Department of Health and Communities
Injury Prevention
5Rs OF CONCUSSION
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Concussion Tools

Child-SCAT3 **Sport Concussion Assessment Tool for children ages 5 to 12 years**
For use by medical professionals only

SCAT3 **Sport Concussion Assessment Tool - 3rd Edition**
For use by medical professionals only

What is childSCAT3?

The ChildSCAT3 is a standardized tool for evaluating injured children for concussion and can be used in athletes aged from 5 to 12 years. It supersedes the original SCAT and the SCAT3 published in 2009 and 2009, respectively. For older persons, ages 13 and over, please use the SCAT3. The ChildSCAT3 is designed for use by medical professionals. If you are not qualified, please use the Sport Concussion Recognition Tool. Pre-season baseline testing with the ChildSCAT3 can be helpful for interpreting post-injury test scores.

Specific instructions for use of the ChildSCAT3 are provided on page 3. If you are not familiar with the ChildSCAT3, please read through these instructions carefully. This tool may be freely copied in its current form for distribution to individuals, teams, groups and organizations. Any revision or any reproduction in a digital form requires approval by the Concussion in Sport Group.

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NOTE: The diagnosis of a concussion is a clinical judgment, ideally made by a medical professional. The SCAT3 should not be used solely to make, or exclude, the diagnosis of concussion in the absence of clinical judgment. An athlete may have a concussion even if their SCAT3 is "normal".

(McCrory et al 2012)



Future Development..

Education about concussion in community

- Further research
- Accumulation of state based statistics
- Resource development
- Concussion program development

Its Happening now!

www.concussioninsportproject.com.au



What can you do?

- Ensure your organisation has a concussion management protocol in place
- Sporting grounds / facilities regularly checked – report all potential dangers
- Encourage players not to participate tired, ill or injured
- Ensure coach is aware of existing medical issues
- A trained & well equipped first aider present

Richards, J. & Sharrin, D. (2014). Sporting Injuries. Kidzlife WA (No. 29)

