

Concussion in Sport

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Conflict of Interest

- * No financial conflict of interest
- * Work for World Rugby and Rugby Australia

Content

- * Concussion, Head Injury and Sport in Australia
- * Concussion and its Sequelae/CTE
- * Current approach to diagnosis and management of concussion
- * Future directions

Concussion

- * A transient disruption in neurologic function caused by an external force to the body without structural damage to the brain
- * Concussion is a mild traumatic brain injury

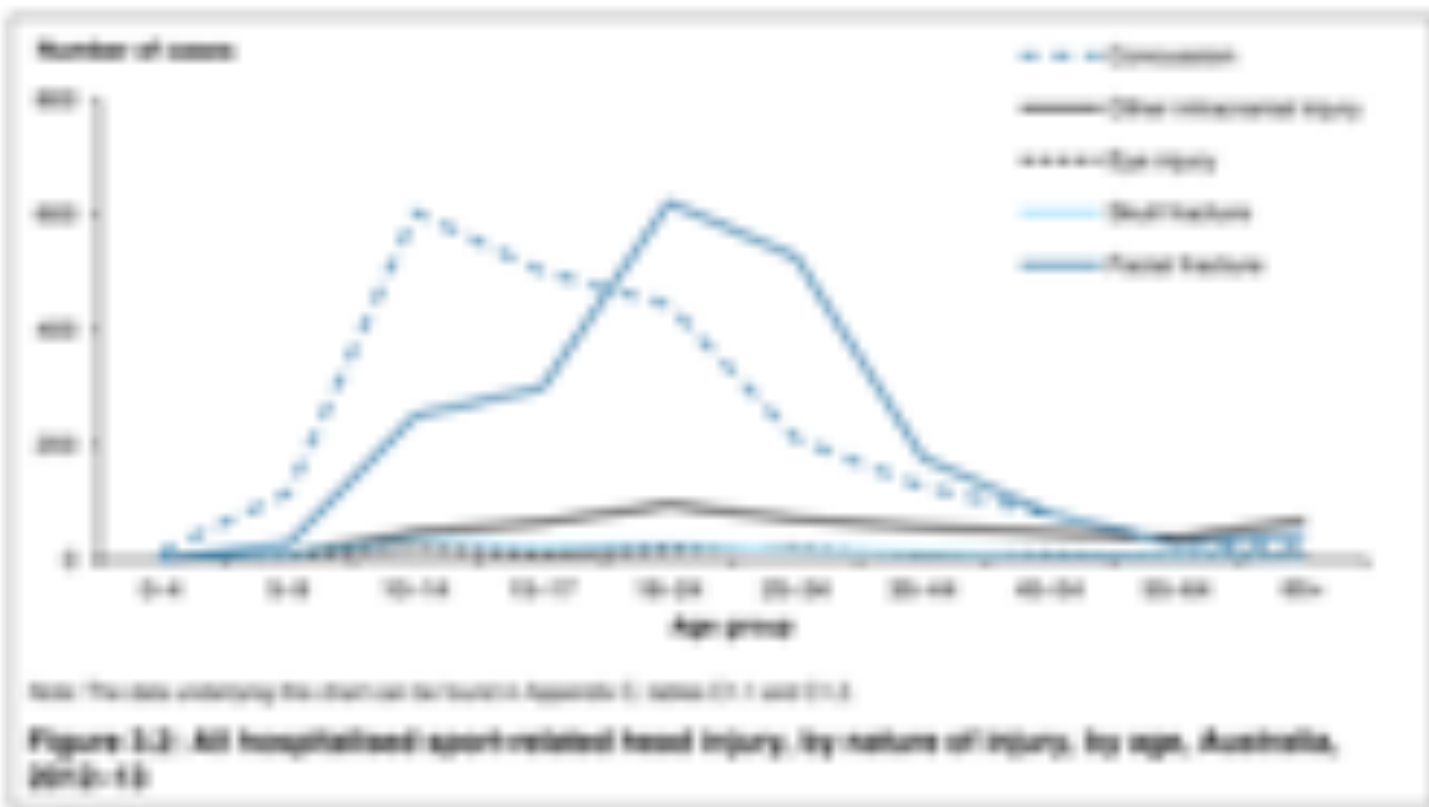
Concussion

- * Annual Incidence estimated 60-250 per 100,000 of population
- * Of these 17% sport related

Concussion

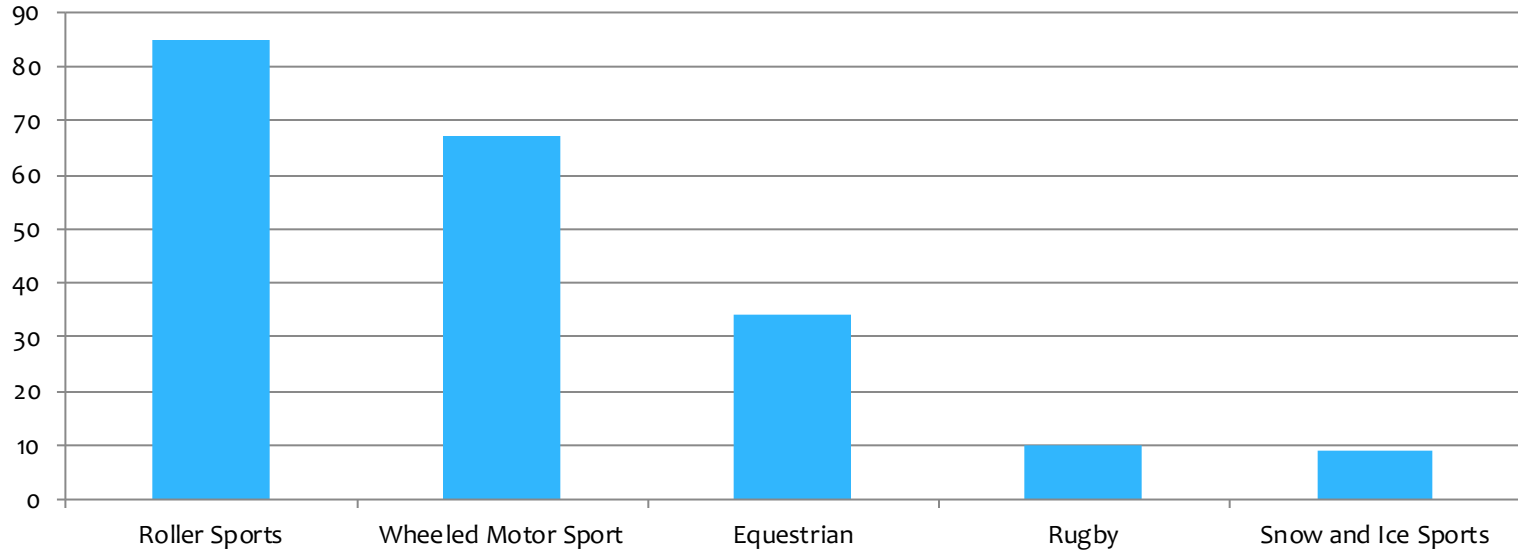
- * Concussion is not a major head injury by neurosurgical/pathologic definition
- It may be a causative factor in some chronic neurologic illnesses
- * It is not the cause of death for sportspeople who die with acute head injuries

Types of Head Injury

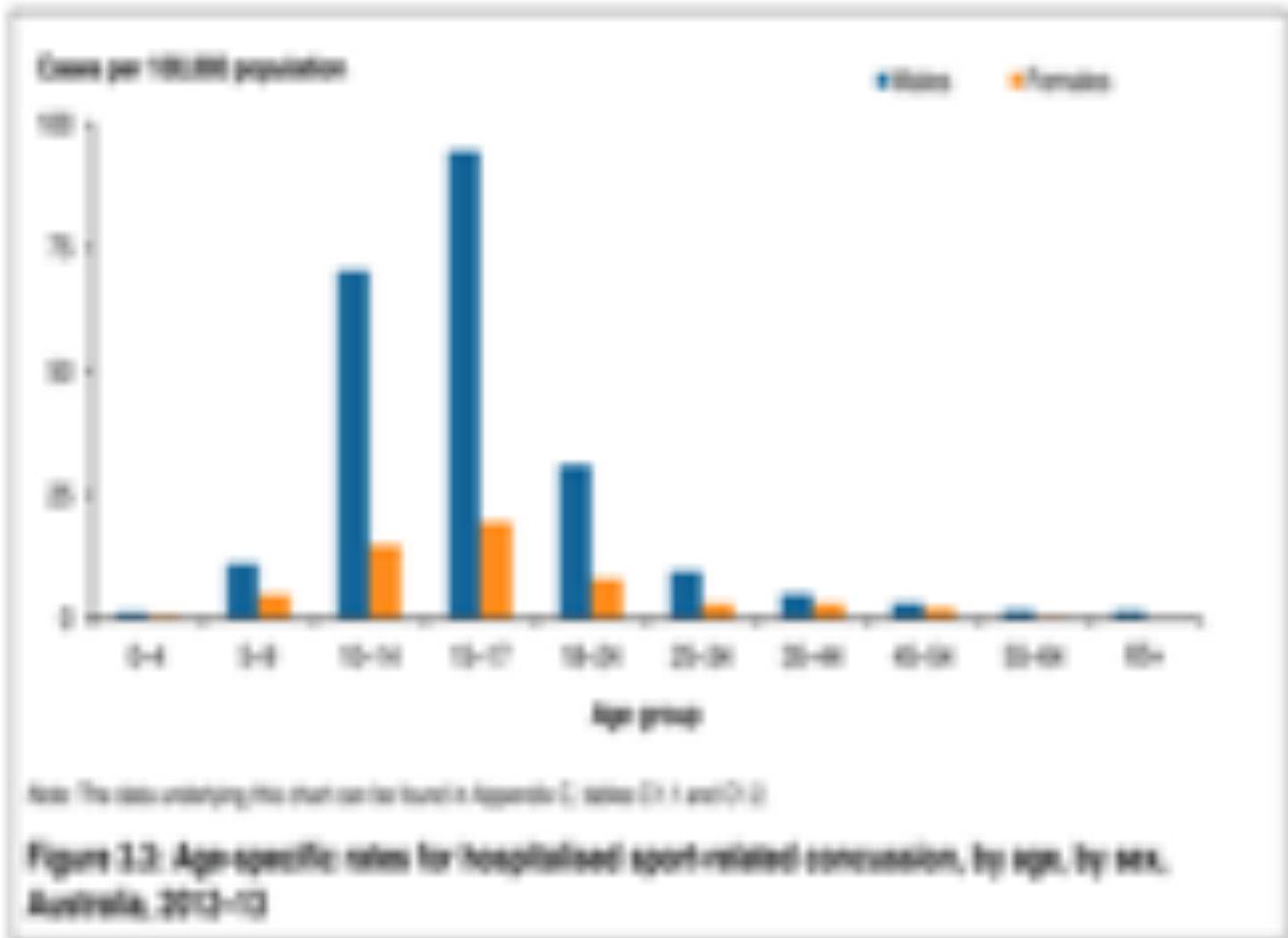


Major/Moderate Head Injury In Sport

**Annual Incidence of Major/Moderate Head Injury per
100,000 Participants**

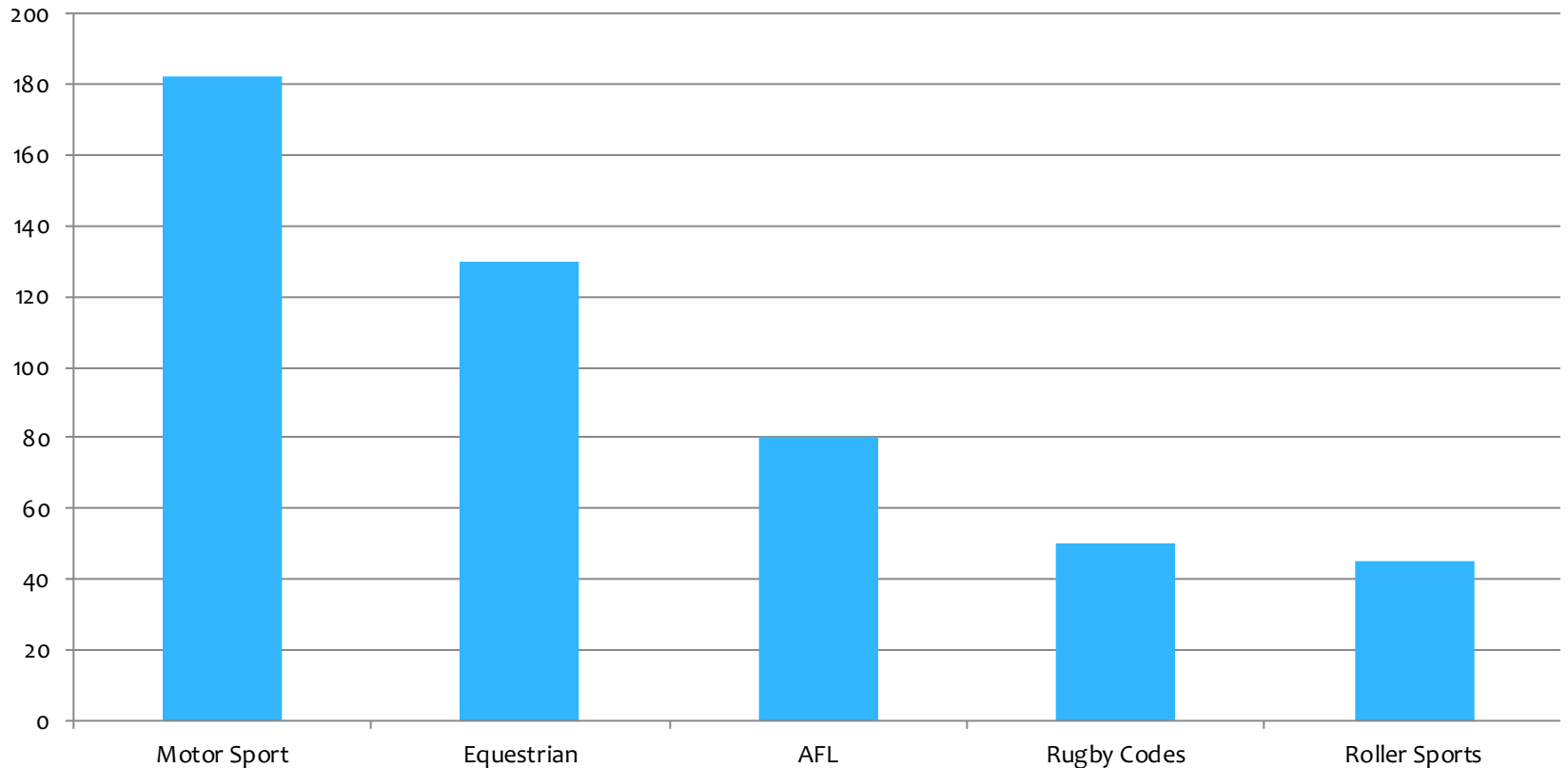


Age Specific Concussion Rate



Concussion

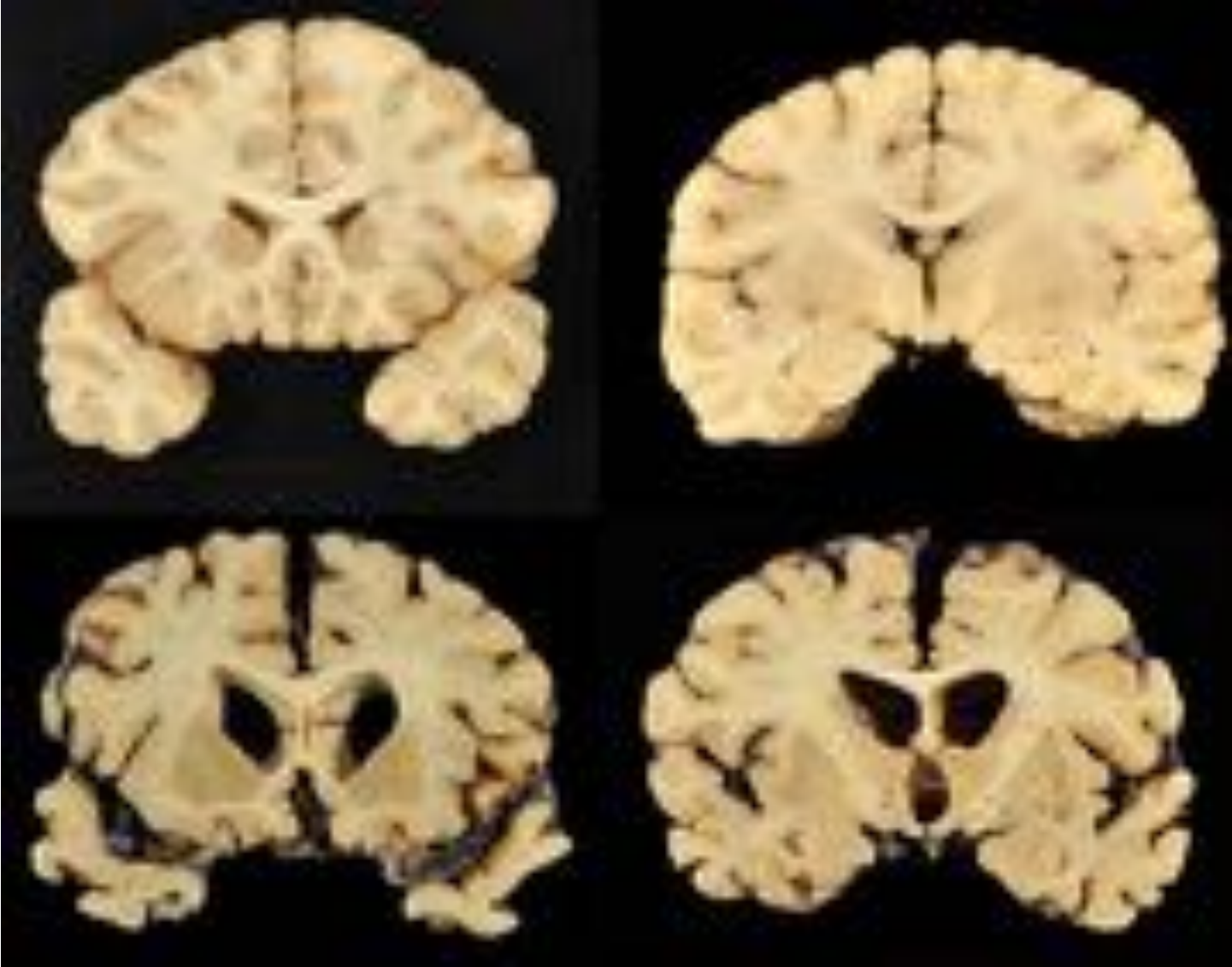
Annual Concussion Hospitalisation per 100,000 Participants



Concussion- Why do we care?







Concussion Pathophysiology



Key proteins and peptides in dementia diseases

Creutzfeldt-Jakob disease	Prion protein	Alzheimer's disease	Lewy body dementia	Parkinson's disease	Huntington's disease
PrP ^{Sc}	PrP ^{Sc}	Aβ	α-syn	α-syn	
tau	tau	tau	tau	tau	Huntingtin

CTE

- * Chronic Traumatic Encephalopathy (CTE) include behavioural and mood changes, memory loss, cognitive impairment and dementia.
- * CTE is diagnosed with certainty only by neuropathological examination of brain tissue.

Evidence for linking concussion and CTE

* AIS/AMA Concussion in Sport Position Paper Dec 2016

“There is currently no reliable evidence clearly linking sport-related concussion with chronic traumatic encephalopathy (CTE). “

Evidence for linking concussion and CTE

- * Ann McKee Neuropathologist Boston University published in JAMA 2017
- * Examined the brains of 202 deceased former football players at all levels.
 - 88 % of the brains had CTE
 - 110 out of 111 brains of those who played in the NFL had CTE.

2021. 06. 04. 09:00

Rugby league rocked by first proof of former players with CTE

By [Adam Hepburn](#)

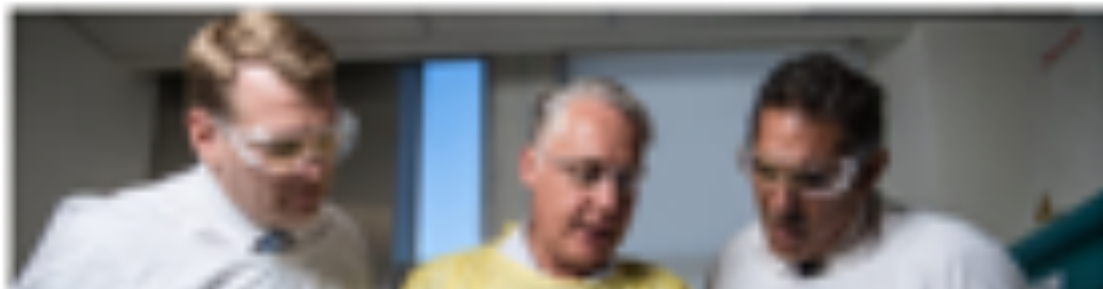
June 27, 2021 • 10:05am



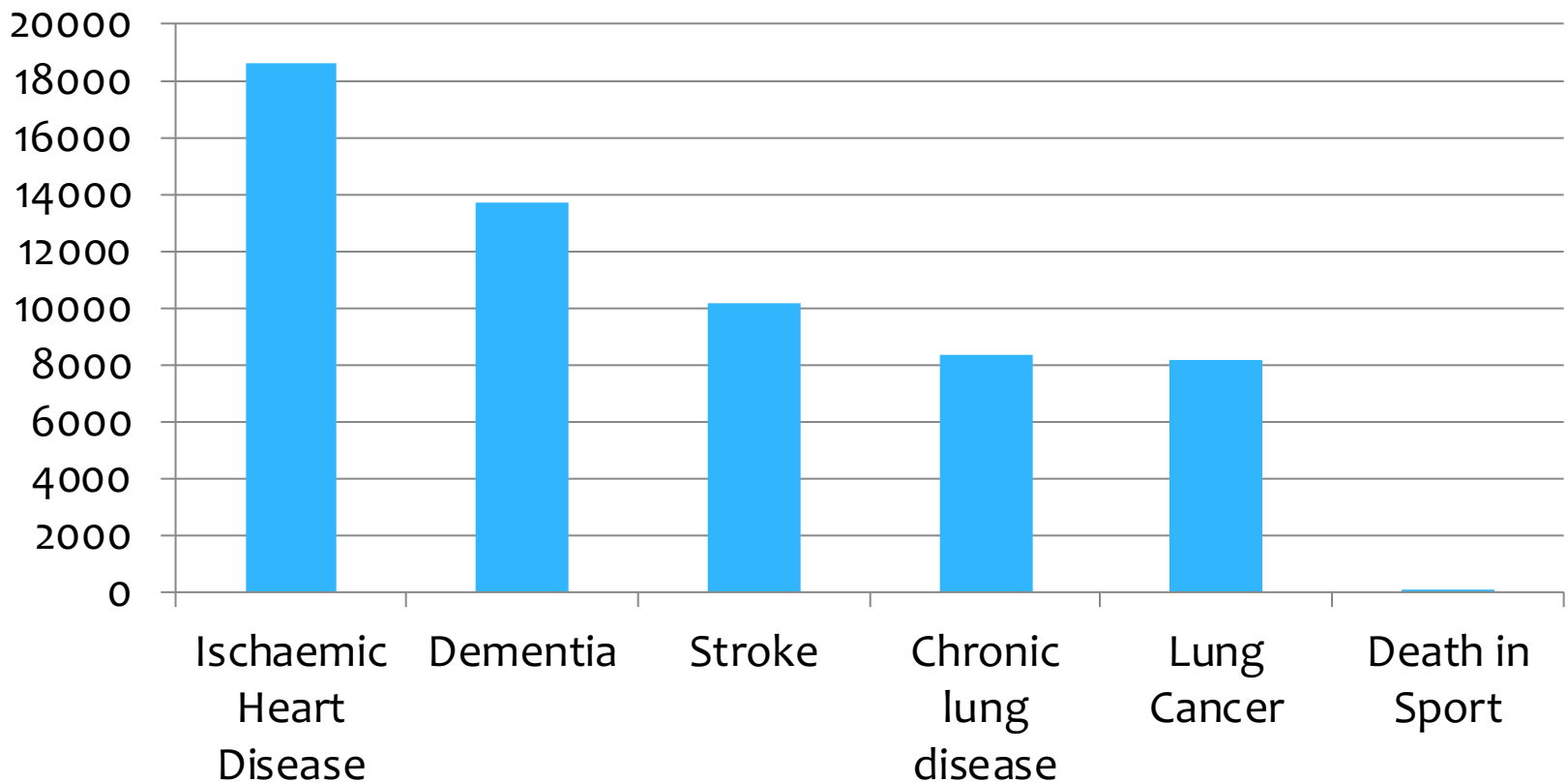
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Researchers have uncovered the first evidence of Australian rugby league players with a degenerative brain condition commonly found in retired American NFL athletes, findings that will have massive implications for the NRL.

Clinicians from Royal Prince Alfred Hospital, NSW Health Pathology and the University of Sydney's Brain and Mind Centre have discovered a local existence of Chronic Traumatic Encephalopathy (CTE), a state associated with repeated blows to the head.



Causes of Death in Australia 2017



Second Impact Syndrome

- * Second Impact Syndrome is controversial
- * Death from cerebral oedema (malignant brain oedema syndrome) in patients with a recent preceding concussion esp last 10 days, particularly in adolescents.
- * V few cases reported



REMEMBER THE
GOOD OLD DAYS WHEN
WE PLAYED SPORTS
AND NEVER WORRIED
IF WE GOT CONCUSSION?



NO.



Twinkl

Concussion Diagnosis

- * History

- Mechanism/nature of injury
- Symptoms

Concussion Diagnosis

Loss of Consciousness	No protective action taken by the athlete in a fall to ground, directly observed or on video	Impact seizure or tonic posturing
Confusion, disorientation	Memory impairment	Balance disturbance (e.g. ataxia)
Athlete reports significant, new or progressive concussion symptoms	Dazed, blank/vacant stare or not their normal selves	Behaviour change atypical of the athlete

Concussion Diagnosis

- * headache
- * 'don't feel right'
- * 'pressure in the head'
- * difficulty concentrating
- * neck pain
- * difficulty remembering
- * nausea or vomiting
- * fatigue or low energy
- * dizziness
- * confusion
- * blurred vision
- * drowsiness
- * balance problems
- * trouble falling asleep
- * sensitivity to light
- * more emotional
- * sensitivity to noise
- * irritability
- * feeling slowed down
- * sadness
- * feeling like 'in a fog'
- * nervous or anxious

CONCUSSION RECOGNITION TOOL 5+

To help identify concussion in children, adolescents and adults



CONCUSSION IS REALITY

Concussion is a common injury that occurs in many sports and activities. The Centers for Disease Control and Prevention estimates that 1.6 million children and adolescents sustain a concussion each year.

STEP 1 - RED FLAGS - (Look for signs and symptoms)

2 days or longer after an injury, identify **any** of the following signs or symptoms. A concussion may occur even if the injury is not severe. If you observe any of the following signs or symptoms, you should suspect a concussion and seek medical attention.

• Loss of consciousness	• Loss of memory	• Vomiting
• Headache	• Slurred speech	• Seizure
• Irritability or crying	• Loss of consciousness	• Loss of consciousness
• Persistent headache	• Persistent headache	• Persistent headache

Warning:

• Loss of consciousness	• Persistent headache
• Persistent headache	• Persistent headache
• Persistent headache	• Persistent headache

When you see these signs, symptoms or possible concussion, seek medical attention for the following steps:

STEP 2 - OBSERVABLE SIGNS

People close to you suggest possible concussion include:

• Loss of consciousness	• Persistent headache	• Persistent headache
• Persistent headache	• Persistent headache	• Persistent headache
• Persistent headache	• Persistent headache	• Persistent headache

STEP 3 - OBSERVABLE

- | | | | |
|-----------------------|-----------------------|-----------------------|-----------------------|
| • Persistent headache | • Persistent headache | • Persistent headache | • Persistent headache |
| • Persistent headache | • Persistent headache | • Persistent headache | • Persistent headache |
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STEP 4 - MEDICAL ASSESSMENT

Get a medical assessment from a doctor.

• Persistent headache	• Persistent headache	• Persistent headache
• Persistent headache	• Persistent headache	• Persistent headache
• Persistent headache	• Persistent headache	• Persistent headache

Children with suspected concussion should:

- Be monitored closely for 24 hours after the injury.
- Be supervised.
- Not return to school or activities.
- Be supervised by a doctor. They need to be with a responsible adult.
- Be supervised when with other children or in a healthcare professional.

Do not let the child return to school or activities until cleared by a doctor. When cleared, the child should be supervised by a responsible adult for 24 hours after the injury. If a child has any signs or symptoms, seek medical attention for the following steps.

Red flags: If you observe any of the following signs or symptoms, you should suspect a concussion and seek medical attention. If you observe any of the following signs or symptoms, you should suspect a concussion and seek medical attention.

Concussion Diagnosis in ED

- * Examination
 - * Looking for red flags that would mandate neuroimaging
 - Decision tool to help (eg PECARN for paediatrics/Canadian CT)
- * Considering concussion mimics
- * Using a tool to assess cognition and memory eg AWPTAS (Abbreviated Westmead Post-traumatic Amnesia Scale)

Concussion Mimics

- * Major HI- skull #/EDH/SDH/SAH/ICH
- * C spine injury

- * Facial # especially orbital blow out with inferior rectus entrapment
- * Tympanic Membrane perforation/middle ear dysfunction

- * Migraine
- * Depression/anxiety





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Section 1: Introduction

Section 2: Yellow Box

Section 3: Red Box

		
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Concussion Management in ED

- * Period of observation – 4hr
- * Hourly use of the AWPTAS (Abbreviated Westmead Post Traumatic Amnesia Scale) until passed
- * Suitable for DC when AWPTAS passed
- * Consider admission if don't pass AWPTAS

Concussion Diagnosis

- * The SCAT 5 is the internationally recommended concussion assessment tool from age 13yr and older
- * Child SCAT 5 for ages 5-12.
- * This should not be used in isolation but as part of the overall clinical assessment.
- * Is lengthy and much less user friendly than the AWPTAS

Concussion Management

- * There is no definitive treatment for concussion
- * Physical and cognitive rest has been the mainstay
- * Most people symptom free with 7-10 days
- * 90% will return to normal on cognitive testing by 4 weeks
- * Early light aerobic activity shows some promise to reduce symptom duration

Concussion Management

- * Reassurance and explanation of natural history
- * Simple analgesia
- * Short period of cognitive and physical rest then graduated return to school/sport/activity

Concussion Management

- * Typically 1-2 days of rest
 - Adequate rest/avoid devices/simple analgesia
 - Symptom log

- * 3-5 days relative rest
 - Light exercise- walking, simple balance, simple cognitive eg reading
 - Half day at school if 24hr symptom free
 - Taper medications

** See LMO for review when this completed**

Concussion Management

- * Graduated return to activity - physical and mental
 - Full school
 - Sport without contact
 - Return to contact after minimum 14 days symptom free children, adults vary by sport most would say minimum of 7 days
- ** + review by clinician**

Concussion Management

- * Specific Questions for ED
 - * 1) Who should be referred to a GP?
 - * 2) Who should be referred to a concussion clinic specialist?
 - * 3) When can a child return to school?
 - * 4) When can a child return to sport?

Concussion Management

1) Who needs to see their GP?

- All post concussion

2) Who needs referral to a specialist?

- Ongoing Symptoms after 3-4 weeks
- Specialist clinics
- Role of Sports Physicians

Concussion Management

3) When can a child return to school?

- Half day X 3 after 24 hr symptom free
- Full days if tolerate these

4) When can a child return to sport ?

- Graduated return to non contact sports starting after 1-2 days
- Contact 14 days after resolution of symptoms and medically cleared by clinician

Assessing the health status of your age group



Measuring Sport Expenditure by individual (by year of age)



Concussion Future

- * Prevention
 - * Law changes within sport
 - Eg No contact above the chest for tackles in rugby
 - Blue card system in rugby
 - * Protective equipment
 - Little effect in most studies
 - * Avoid contact sport



Spreads from **0.0** pips

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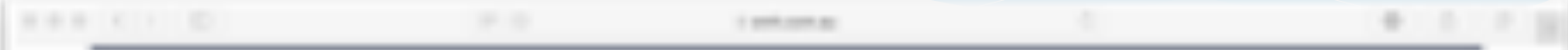
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Why NO mother should let her son play rugby: By Professor ALLYSON POLLOCK, who's spent a decade studying the sport's devastating injuries

- 1 Professor Pollock's son Hamish, 14, suffered a shattered chestbone
- 1 And at just eight years old, he'd broken his nose
- 1 Benjamin Robinson, 14, died in 2019 after he collapsed on the pitch
- 1 Professor Pollock has spent a decade researching the risks of playing rugby

New York Times

TODAY'S TOP VIDEO



ESPN.com

Contact sports will 'cease to exist' within a generation

By [Dr. Robert O'Connell](#)

August 12, 2013 — 12:05pm



Dr. Robert O'Connell, the medical pioneer who discovered the first cases of chronic traumatic encephalopathy (CTE) in American footballers, predicts contact sports such as rugby league, rugby union and NFL will cease to exist within the space of a generation due to the health hazards associated with concussions.



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O'Connell also believes children should be banned from playing contact sports until the age of 18 due to the risks associated with concussions.



Concussion Research

- * Diagnosis

- Biomarkers

- Accelerometers

- Neuroimaging



Concussion Future

* Management-

- early exercise, neck strengthening
- vestibulocochlear retraining
- NAC, astrocyte potentiators, micronutrients, hyperbaric oxygen, cannabis, hypertonic saline, ultrasound....

Concussion Challenges

- * Finding clear evidence of harm
- * Compliance from athletes/parents
- * Ethics of implied risk for competent adults



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