Updates in Concussions- Things I Thought I Knew

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FACULTY DISCLOSURE

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has no affiliation with the manufacturer of any commercial product or provider of any commercial service discussed in this CME activity

Goals and Objectives

- Diagnosis
- Physical Exam
- Helmets
- Concussion Threshold
- Healing
- Exercise

Concussion- Definition

Vienna 2001- Concussion in Sport (CIS) Group

- **Any** alteration in cerebral function caused by a **direct or indirect (rotation)** force transmitted to the head resulting in one or more of the following acute signs or symptoms:
  - **LOC**
  - **confusion/disorientation**
  - **headache**
  - **dizziness/vertigo**
  - **memory difficulties**
  - **light sensitivity/photophobia**
  - **nausea/vomiting**
  - **abnormal vision**
  - **hearing problems**

- **Delayed signs and symptoms:**
  - **sleep irregularities**
  - **personality change**
  - **lethargy**
  - **fatigue**
  - **depression**

“We are getting a handle on diagnosing concussions”

Common Problem, but…

- **Concussions**
  - The National Institutes of Health (NIH): over 3 million in USA /year

- **90%** of sports concussions are not recognized or reported.

No Diagnosis if…

- **People don't understand what the signs and symptoms are**

or

- **They do understand but do not want to come forward to tell you**

People Don’t Understand

- **4/5 people do not understand they have suffered a concussion**
  - CFL
  - University
  - ED population

Hiding Symptoms from Medical Staff

- **Delaney et al, *Why University Athletes Do Not Volunteer Their Concussion Symptoms During a Practice or Game*, CJSM, 2015.**

- **92/469 athletes (19.6%)** believed they had suffered a concussion within the previous 12 months while playing their respective sport

- **147** self-diagnosed concussions in **92** athletes

- **72 /92 (78.3%)** did not seek medical attention during a game or practice **at least once** during the previous 12 months

Reasons for Hiding Concussions

Reason	# Athletes
Did not feel the concussion was serious/severe and felt you could still continue to play with little danger to yourself	55/72
You felt that you would be removed from the game by the medical staff and you did not wish this to happen	44/72
Fear that being diagnosed with a concussion would result in your missing future games	44/72
Fear of letting the team or teammates down by being removed from the game	44/72
You had similar symptoms of a concussion in the past and felt that there was little or no danger as you had no problems with previous concussions or similar symptoms in the past	35/72
Normally you would have sought medical attention but the concussion occurred during an important game or at an important time of the season	34/72

Hiding Symptoms from Medical Staff

- **Delaney et al, *Why University Athletes Do Not Volunteer Their Concussion Symptoms During a Practice or Game*, CJSM, 2015.**

- **Some athletes 28/92 (30.4%) both hid and volunteered concussions at different times**

- **Athletes seem educated about what will happen initially yet behave as if uneducated about risks of playing with a concussion**

“The physical exam in concussions is always normal”

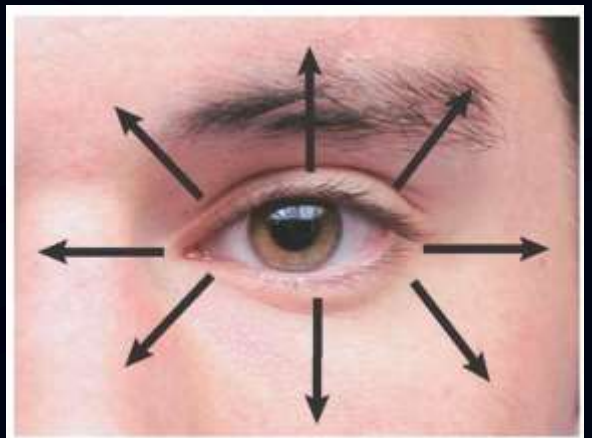
Concussion Examination- Physical Exam

- Examine the EYES
- Examine the NECK
- Examine Balance: Balance Error Scoring System (BESS)

Visual Assessments

- **Coordination of eye movements is off : <u>subtle</u>**
  - Not visual acuity

- **Students/workers who must move their eyes over a page or screen to read**
  - Increases symptoms

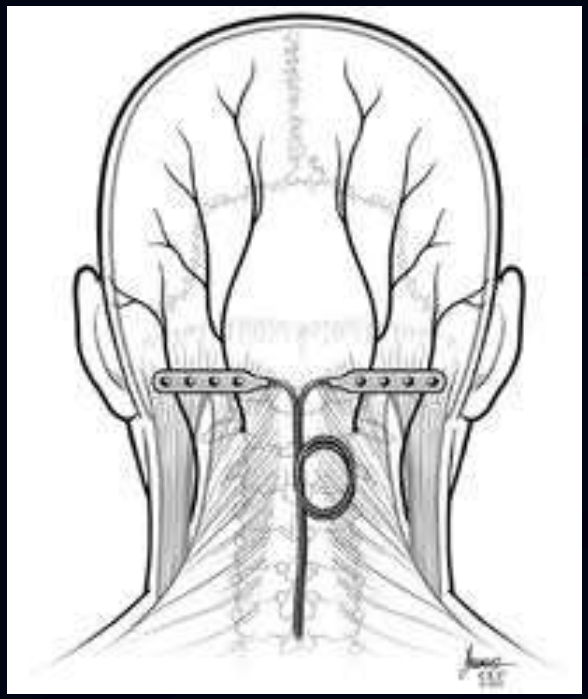


Vestibular/Ocular-Motor Screening (VOMS)

- **Systems responsible for integrating balance, vision, and movement.**

Neck Exam

- **Can be cause of headaches**
  - Tenderness over occipital nerves



“Concussion” Headaches

Neck

- Local pain
- Morning stiffness that improves
- Better with medication
- Better with exercise
- Better with therapy and possible injections

Brain

- Worse as day progresses
- Worse with stimuli
- Worse with exercise
- Meds = little help

Balance Error Scoring System (BESS)

Score= firm: a/10 + b/10 + c/10 = x/**30**

foam**:** d/10 + e/10 + f/10 = y/**30**

S-BESS

STABLE STANCE

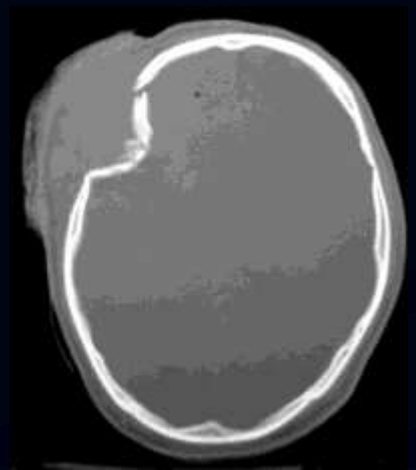
TOE POINT STANCE

T- STANCE

“Helmets prevent concussions”

Helmets in General

- **Designed to prevent catastrophic injury (skull fractures) from contact**
  - Football, hockey, bicycle, motorcycle, skiing
- **<u>Do a very good job of preventing these</u>**



Helmets in General

- **NO HELMET CAN PREVENT ALL CONCUSSIONS**
  - Standards ensure that they prevent catastrophic injury

Helmets in General

- **Single collision helmets-** bicycle, motorcycle
  - Meant to collapse and crush with impact

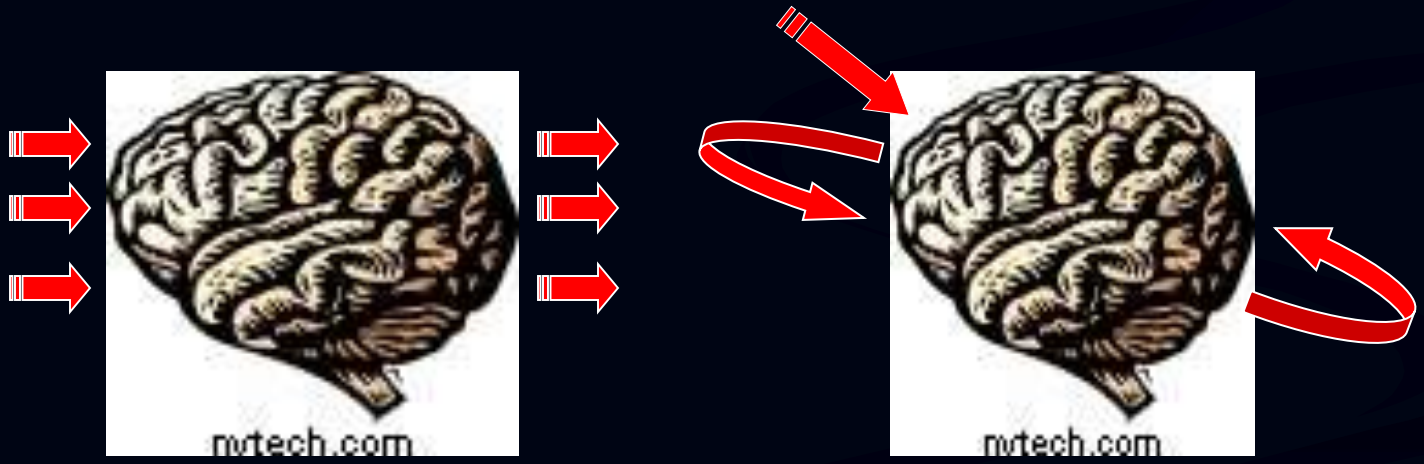
- **Multiple contact helmets-** football, hockey
  - Meant for multiple contacts

Helmets

- Can change linear into angular acceleration because of round shape

- Linear acceleration

- Rotational acceleration

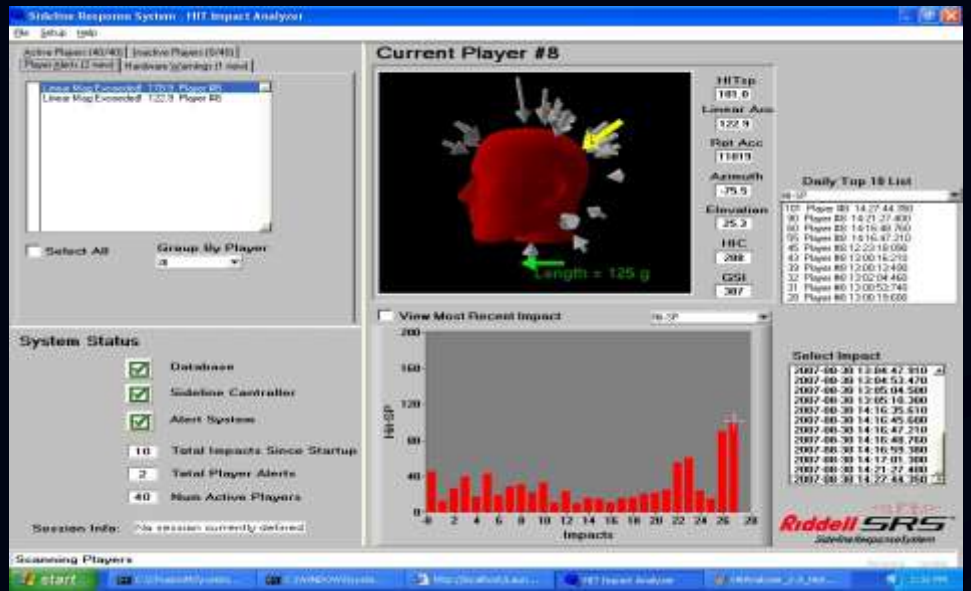


Force = Mass x Acceleration

“There is a concussion threshold, so we can tell who will have a concussion”

Riddell HITS™ Helmet

- Head Impact Telemetry System
  - Accelerometers inside helmet records the number, location, magnitude, direction of head impacts
  - Info sent to sideline recover on computer or hand held device

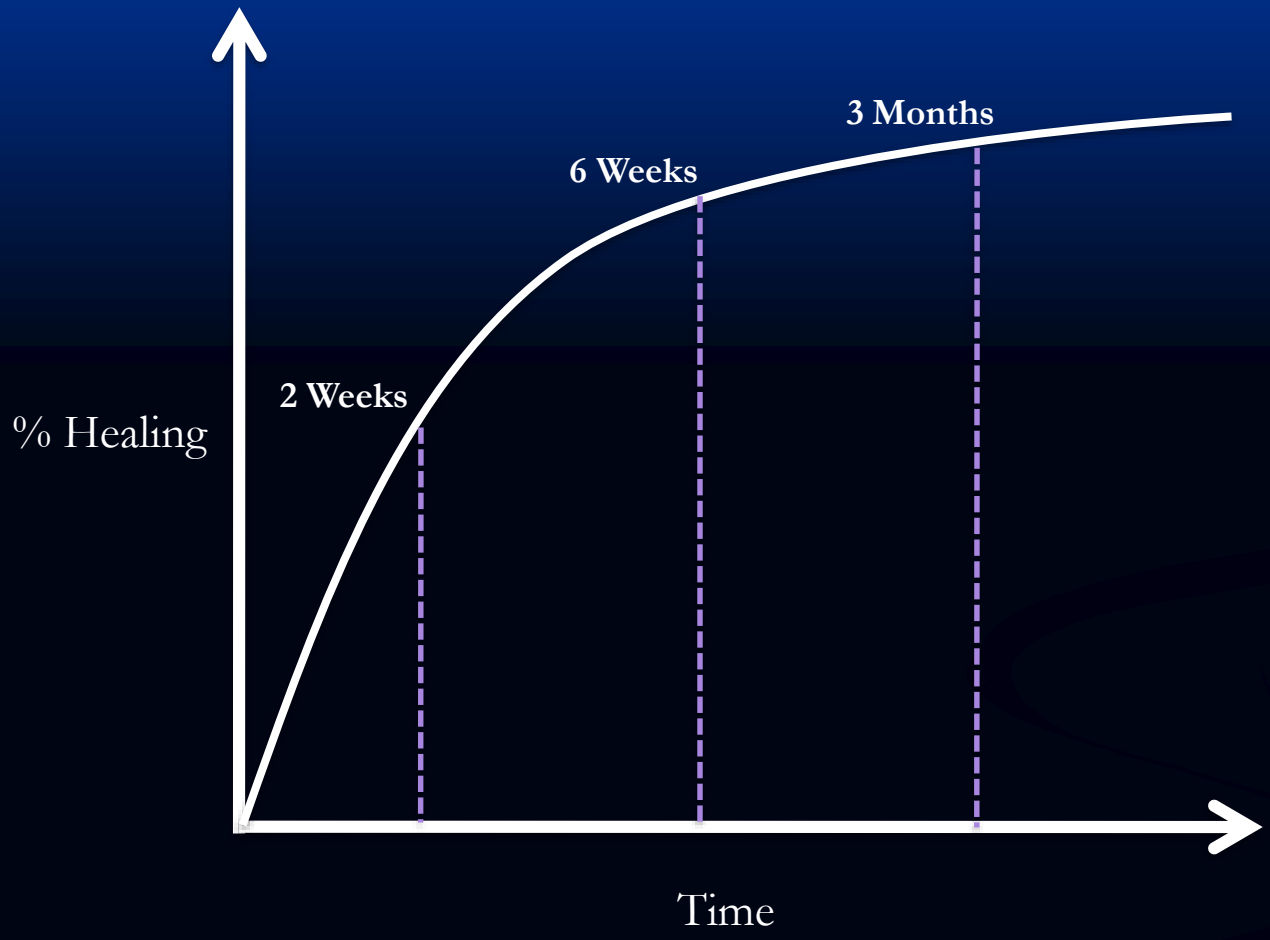


Riddell HITS™ Helmet

- **Research: Not always the big hits that result in concussions**
  - Some low energy resulted in concussions
  - Some high energy had no concussions
  - Good to keep track of total volume of contact and energy

“Concussions all get better within a few weeks”

Healing Curve



“Exercise is bad for a concussion”

Exercise

- **Acutely may exacerbate concussions**
- **Is an adjunctive treatment for**
  - Depression, anxiety, chronic fatigue. migraines

Exercise

- **When healthy adults who exercise regularly are told to stop exercising for a few days:**
  - ↑ Fatigue
  - ↓ Mood
  - Symptoms of mild depression

Exercise in Concussions – WHY?

- **Prolonged recovery from concussion have persistent symptoms**
  - Imbalance in the autonomic nervous system may contribute to ongoing concussion symptoms
  - higher heart rates during exercise as compared to non-concussed patients

- **Goal is to help improve the imbalance in the autonomic nervous system (ANS) through exercise**

Sub-symptom Exercise

- **Sub-symptom threshold exercise training (SSTET)**
  - Exercise below the level of exertion / exercise that causes the onset or aggravation of concussion symptoms in the patient.

- **Must determine the level of exertion or exercise which causes either:**
  - **ONSET** of symptoms in those patients who have no symptoms at rest
  - **WORSENING** of symptoms in those patients who already have symptoms at rest

Sub-symptom Exercise

- **Weekly test:** treadmill with increasing incline or bike

- **Daily exercise**
  - **same duration of time** they completed on the Threshold Test
  - **80% of the maximal heart rate** or **80% of the maximum perceived exertion**

Sub-symptom Exercise

- **Summary: Low level exercise may be beneficial for concussion symptoms**
  - Ideal timing of when to start is not defined

Exercise in Concussions

Aerobic → Resistance → Contact

Summary

- 90% of concussions go undiagnosed
- Helmets are designed to prevent skull fractures
- Examination of the eyes, neck and balance are highest yield
- Concussions heal more slowly as time goes on
- Exercise can be beneficial for concussions

Thank You