

## 2018 CONCUSSION UPDATE

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I do not intend to discuss an unapproved/investigative use of a commercial product/device in my presentation



- Concussion-related articles:
  - Past 12 months
    - >1100
  - Past 1 month
    - 148

## WHAT'S NEW?

- Look for treatable symptoms
- Earlier re-engagement
  - Physical activity
  - Academics
  - Social interaction
- Evolving concern for long-term consequences for concussion sustained in youth sport





## OFFICE ASSESSMENT

- Potentially treatable findings
  - Oculomotor
  - Vestibular
  - Cervical strain
  - Sleep disorder
  - Attention
  - Depression/somatic



## OCULOMOTOR

- Symptoms
  - Difficulty reading
  - “Eyes jumping”
- Findings
  - Tracking difficulties
    - Smooth pursuit
    - Saccades
  - Convergence insufficiency

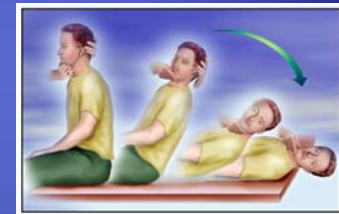
## OCULOMOTOR

- Treatment
  - Physical therapy/vision therapy
  - May benefit from:
    - Magnifier/“reader” glasses
    - Change font size/color on screens
  - Neuro-optometry evaluation



## VESTIBULAR

- Symptoms
  - Dizziness/nausea/balance issues
- Findings
  - Reproduction of symptoms with head movement
  - Dix-Hallpike



## VESTIBULAR

- Treatment
  - Physical therapy
    - Often feel worse before better
  - Avoid medication rx



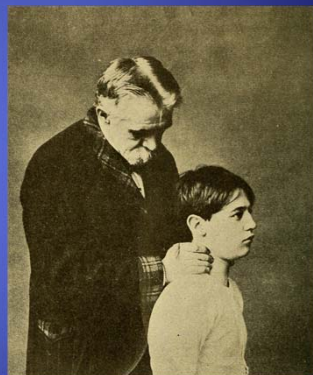
## CERVICALGIA

- Symptoms
  - Neck pain
  - Cervical headaches
- Findings
  - Pain
    - Palpation
    - Neck movement



## CERVICALGIA

- Treatment
  - Manual treatment
    - Physical therapy
    - OMT/chiropractic



## SLEEP DISORDER

- Symptoms
  - Difficulty falling/staying asleep
  - Altered circadian rhythm
  - Daytime somnolence



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## SLEEP DISORDER

- Treatment
  - Melatonin
  - Sleep hygiene
  - Physical activity
    - Details coming up



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## ATTENTION ISSUES

- Symptoms/findings
  - Decreased concentration
    - By history and on SCATS
  - Distractibility
  - Academic difficulty



Photo courtesy of: [www.amenclinics.com](http://www.amenclinics.com)

## ATTENTION ISSUES

- Treatment
  - Academic accommodations
    - As for ADHD
  - Physical activity
  - Amantadine
    - <40 kg: 5 mg/kg/day orally in 2 divided doses
    - >40 kg: 100 mg bid

## DEPRESSION/SOMATIC

- Variety mood/somatic complaints
  - Headaches
  - Depression/anxiety
- “It would be unusual for you not to have some degree of depression at this point”



## DEPRESSION/SOMATIC

- Treatment
  - Physical activity
  - Social engagement
  - Counseling
  - SSRI/TcAs
    - Avoid consistent use of OTC analgesics



## RECOMMENDATIONS: RETURN TO "LIFE" AND ACTIVITY

- Academics
- Social
- Physical activity/sport

## ACADEMICS

- "Relative" cognitive rest for several days
  - Strict rest increased recovery times
  - No rest increased recovery times
- Difficulties can be
  - Cognitive
  - Environmental
- Accommodations

### SCHOOL RECOMMENDATIONS FOLLOWING CONCUSSION

Patient Name: \_\_\_\_\_ Date of Birth: \_\_\_\_\_  
 Date of Evaluation: \_\_\_\_\_ Referral by: \_\_\_\_\_ Until further notice  
 Duration of Recommendations: 1 week 2 weeks 4 weeks

The patient will be reassessed for revision of these recommendations in \_\_\_\_\_ weeks.

This patient has been diagnosed with a concussion (a brain injury) and is currently under our care. Please excuse the patient from school today due to the medical appointment. Flexibility and additional supports are needed during recovery. The following are suggestions for academic adjustments to be individualized for the student as deemed appropriate in the school setting. Feel free to apply/reverse adjustments as needed as the student's symptoms improve/worsen.

<b>Attendance</b> _____ No school for _____ school day(s) _____ Attendance at school _____ days per week _____ Full school days as tolerated by the student _____ Partial days as tolerated by the student	<b>Recalls</b> _____ Allow the student to go to the nurse's office if symptoms increase _____ Allow student to go home if symptoms do not subside _____ Allow other breaks during school day as deemed necessary and appropriate by school personnel
<b>Visual Stimulus</b> _____ Allow student to wear sunglasses/hat in school _____ Pre-printed notes for class material or note taker _____ Limited computer, TV screens, bright screen use _____ Reduce brightness on monitors/screens _____ Change classroom seating as necessary	<b>Audible Stimulus</b> _____ Lunch in a quiet place with a friend _____ Avoid music or shop classes _____ Allow to wear earplugs as needed _____ Allow class transitions before bell
<b>Workload/Mini-Testing</b> _____ Reduce overall amount of make-up work, class work and homework _____ Private workload when possible _____ Reduce amount of homework given each night	<b>Testing</b> _____ Additional time to complete tests _____ No more than one test a day _____ No standardized testing until _____ _____ Allow for scribe, oral response, and oral delivery of questions, if available
<b>Physical Exertion</b> _____ No physical exertion/activities/jgym/recess _____ Working in gym class only _____ Begin return to play protocol as outlined by return to activity form	<b>Additional Recommendations</b> _____ _____ _____
<b>Current Symptoms List</b> (the student is noting these today) _____ Headache _____ Visual problems _____ Sensitivity to noise _____ Memory issues _____ Dizziness _____ Balance problems _____ Fatigue/fragile _____ _____ Blurred vision _____ Sensitivity to light _____ Difficulty concentrating _____ Irritability _____ Student is reporting most difficulty with/in _____ All subjects _____ Reading/Language arts _____ Math _____ _____ Science _____ Music _____ History _____ Using Computers _____ _____ PE/working _____ Listening _____ Other: _____	

I, \_\_\_\_\_ give permission for Dr. XXXXXXX to share the following information with my child's school and for communication to occur between the school and Dr. XXXXXXX for changes to this plan

XXXXXXXXXX MD  
 XXXXXXXXXXXXXXXXXXXX  
 Office: XXXXXXX-XXXX Fax: XXXXXXX-XXXX  
 Parent Signature \_\_\_\_\_ Date \_\_\_\_\_

This form may be duplicated or changed to suit your needs and your patients' needs.

## ACADEMICS

- Symptom “aggravation” is expected and does not appear to prolong recovery
- Minimize multi-tasking
  - School and home



## SOCIAL INTERACTION

- Screen-time is essential component
  - “As tolerated”
- Socialization
  - “As tolerated”
    - Or as allowed by school
  - Potential “exit strategy” if symptoms should substantially increase



## PHYSICAL ACTIVITY

- Earlier engagement physical activity
  - Progressive
  - Appropriate
- Okay for light physical activity as tolerated at any point



## PHYSICAL ACTIVITY

- Physical therapy optimal but not always possible
  - “Buffalo” protocol
    - Gradual progression of activity at subsymptomatic level
    - Heart rate monitoring ideal and accessible for many
      - Exercise to point of symptom onset
      - “Ceiling” heart rate at ~90% of that
        - » Re-engagement in team activity
      - Re-assess every 5-7 days



## RETURN TO CONTACT SPORT

- Asymptomatic
  - At rest
  - With high intensity exertion
- Restoration baseline academic achievement
- For some, computerized testing (eg ImPACT)
  - Most helpful if pre-injury comparison



## DOWNSTREAM CONSEQUENCES

## POST CONCUSSION SYNDROME

- Multiple symptoms after concussion
  - No consensus on definition
  - No consensus on timeframe
  - Eliminated from DSM-5
- “Code”able diagnosis
  - However, use of the term has fallen out of favor

## PERSISTENT SYMPTOMS

- Secondary
  - Headaches
    - Esp. migraines
  - ADHD
  - Depression/anxiety
- Prevalence after concussion not known

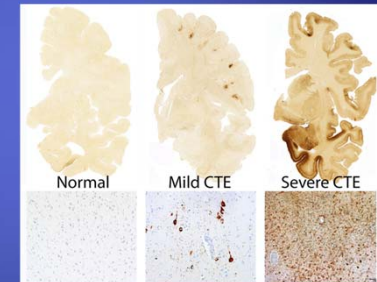
## CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

- Worry of many parents
- What we think we know now:
  - No apparent increased risk in former high school football players for
    - Dementia
    - ALS
    - Parkinson's
    - Depression



## CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

- Post-mortem studies (low numbers) demonstration CTE:
  - Most professional football players
    - Severe CTE
  - 20% HS football players
    - Mild pathology
  - No pre-HS football players



## CHRONIC TRAUMATIC ENCEPHALOPATHY (CTE)

- Cumulative head trauma emerging as dominant risk
  - Risk of subconcussive impacts back in limelight
- Stay tuned...



S.J. Kuzminski, M.D. Clark, M.A. Fraser, C.C., et al. **White Matter Changes Related to Subconcussive Impact Frequency during a Single Season of High School Football** Am J of Neurorad December 2017, DOI: <https://doi.org/10.3174/ajnr.A5489>

“... repetitive trauma to the head is of no clear benefit ...”

G. Landry and W. Meehan  
AAP Clinical Report  
“Tackling in Youth Football”

Landry G, Meehan WP, AAP COSMF. Tackling in Youth Football. Pediatrics 136:5; e1419-30, 2015

## PREVENTION

**VIRGINIA TECH**  
★★★★★  
HELMET RATINGS

FOOTBALL HOCKEY SENSORS SOCCER BICYCLE LACROSSE

**Translating Research to Reduce Concussion Risk**

Since 2011, Virginia Tech researchers have been providing unbiased helmet ratings that allow consumers to make informed decisions when purchasing helmets. The helmet ratings are the culmination of over 10 years of research on head impacts in sports and identify which helmets best reduce concussion risk. This work is done as part of Virginia Tech's service mission and is 100% independent of any funding or influence from helmet manufacturers.

**Ten-Year Plan**  
Outlining the future of STAR ratings in multiple categories.  
[View the plan \(PDF\)](#)

[Hockey STAR: A Methodology for Assessing the Biomechanical Performance of Hockey Helmets](#)

[2016 Helmet Ratings Symposium: Agenda](#)

## PREVENTION

- Helmets and headgear
  - Not yet
    - In spite of marketing claims
  - But still important
    - Well-fit
    - Good condition
    - Sports-appropriate

Schneider DK, Grandhi RK, Bansal P, et.al. Current state of concussion prevention strategies: a systematic review and meta-analysis of prospective, controlled studies. Br J Sports Med. 2016; 0: 1-11

## PREVENTION

- Mouthguards
  - Probably not
    - But still important
- Supplements
  - Not of benefit

Schneider DK, Grandhi RK, Bansal P, et.al. Current state of concussion prevention strategies: a systematic review and meta-analysis of prospective, controlled studies. Br J Sports Med. 2016; 0: 1-11.

## PREVENTION

- Helmet attachments
  - Not effective
    - Bumpers
    - Pads
    - Sensors
  - May void warranty

Schneider DK, Grandhi RK, Bansal P, et.al. Current state of concussion prevention strategies: a systematic review and meta-analysis of prospective, controlled studies. Br J Sports Med. 2016; 0: 1-11

## PREVENTION

- Apparently effective
  - Education
  - Rule changes
    - Best established in youth hockey



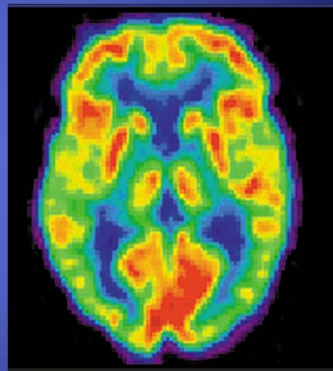
## PREVENTION

- Apparently effective
  - Neck strengthening
    - 1 lb ↑ strength = 5% risk reduction

Collins CL, Fletcher EN, Fields SK, et al. Neck strength: a protective factor reducing risk for concussion in high school sports. *J Prim Prev.* 2014;35(5):309-319

## ON HORIZON

- Functional diagnostic imaging
  - PET scans
  - fMRI
- Biomarkers for diagnosis
- Individual susceptibility to injury/sequela



## TAKE HOME

- Appropriate re-engagement in “life” is key to concussion recovery
- Identification of treatable symptoms can speed recovery
- Symptom magnification with activity progression is to be expected
- Structured return to non-contact physical activity can help multiple symptom domains

THANK YOU

