

Sport Concussion & Cervical Headache

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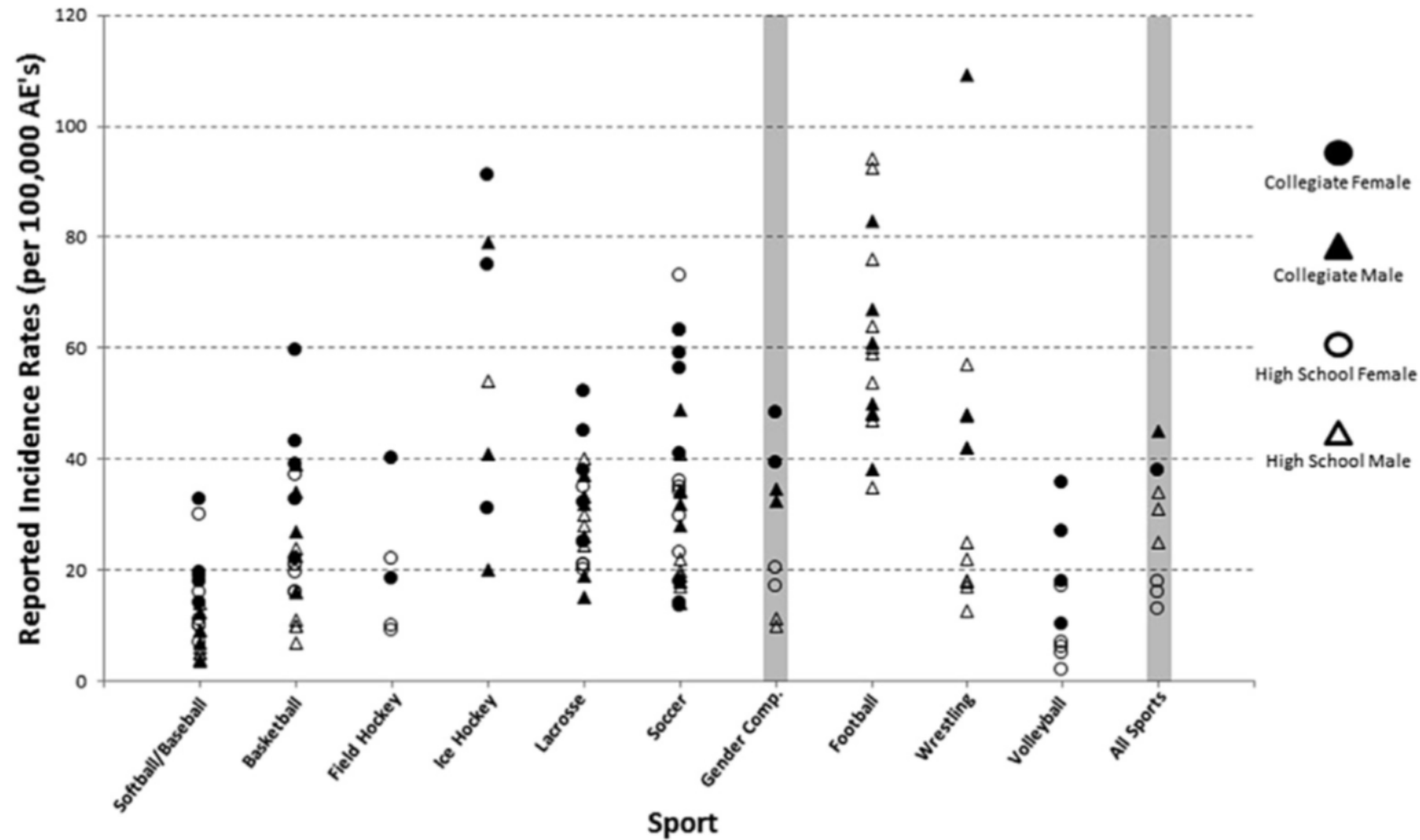
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Objective

- To highlight some of the similarities and differences of sport concussion and cervical spine associated headache

*Would you let your child play
football?*

Epidemiologic Studies



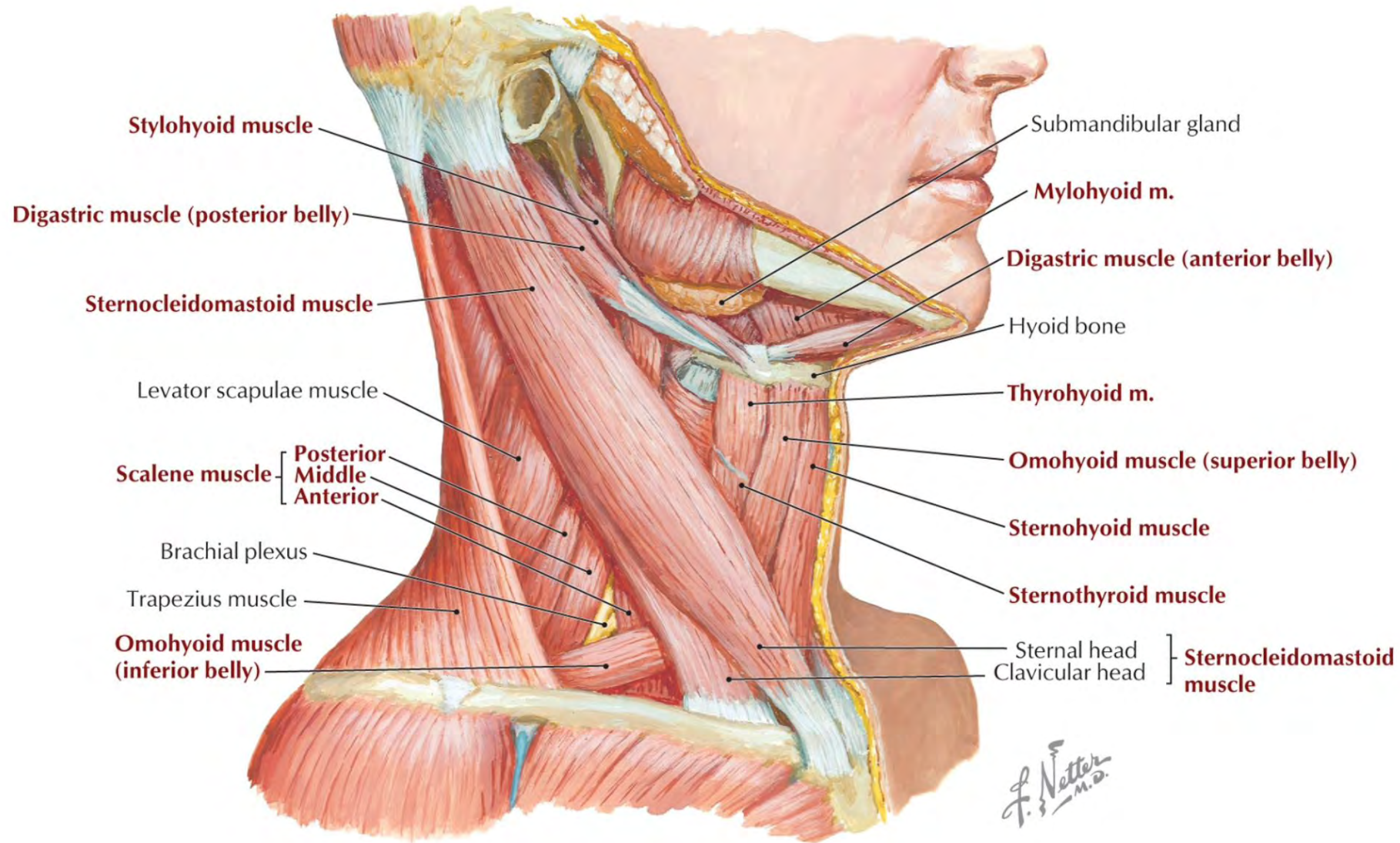
Takeaway

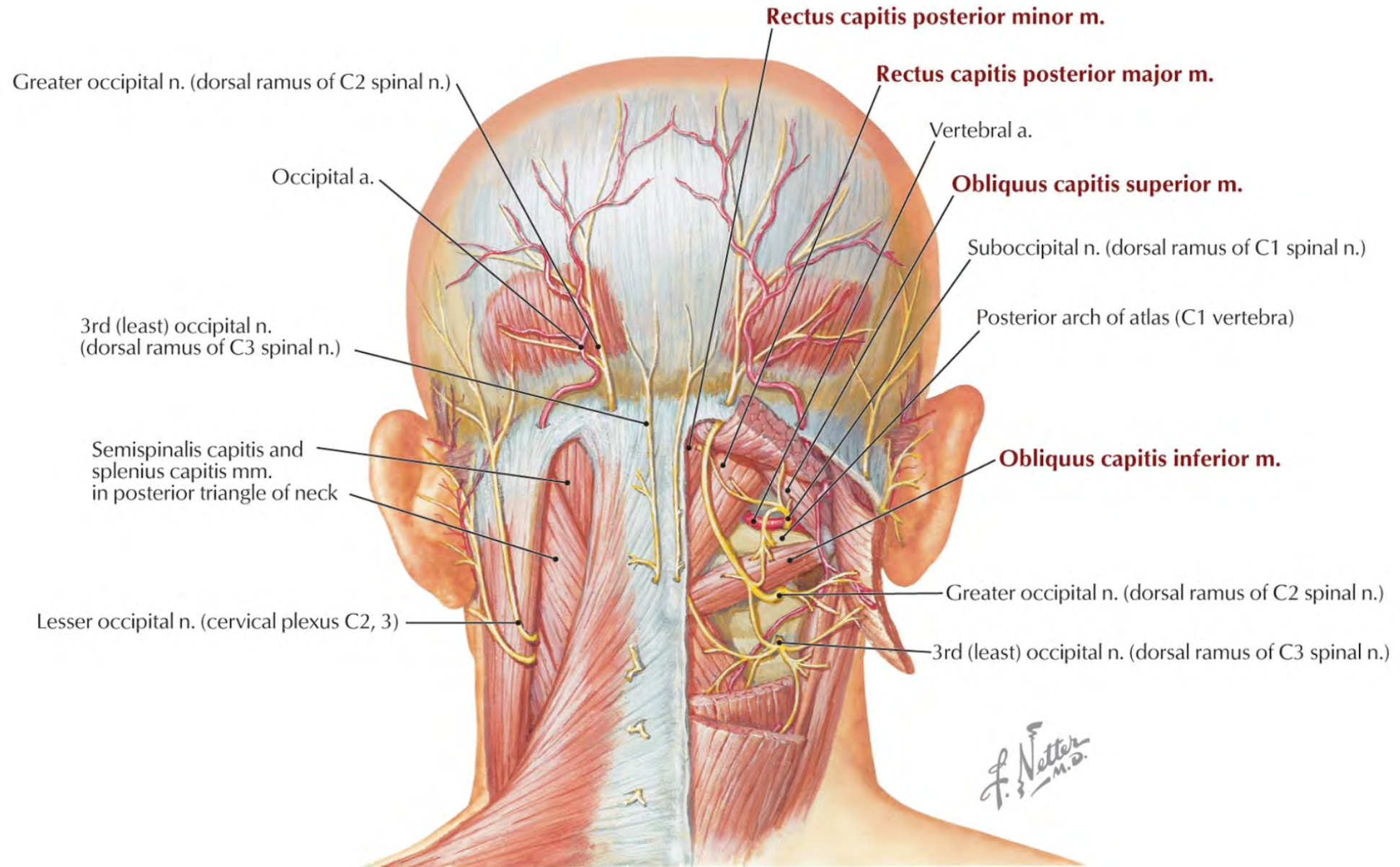
- HS and collegiate females have an equal or higher rate of sport concussion (SC) compared to males in equivalent sports

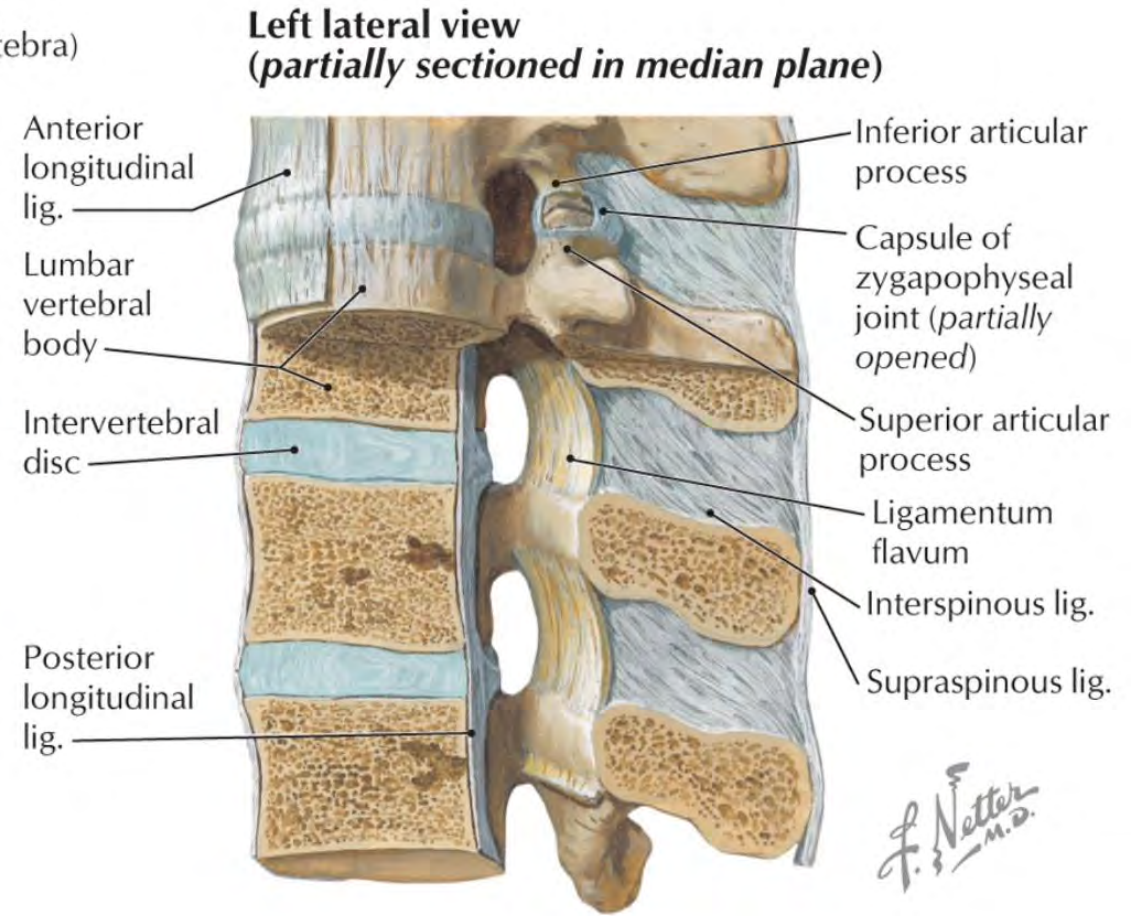
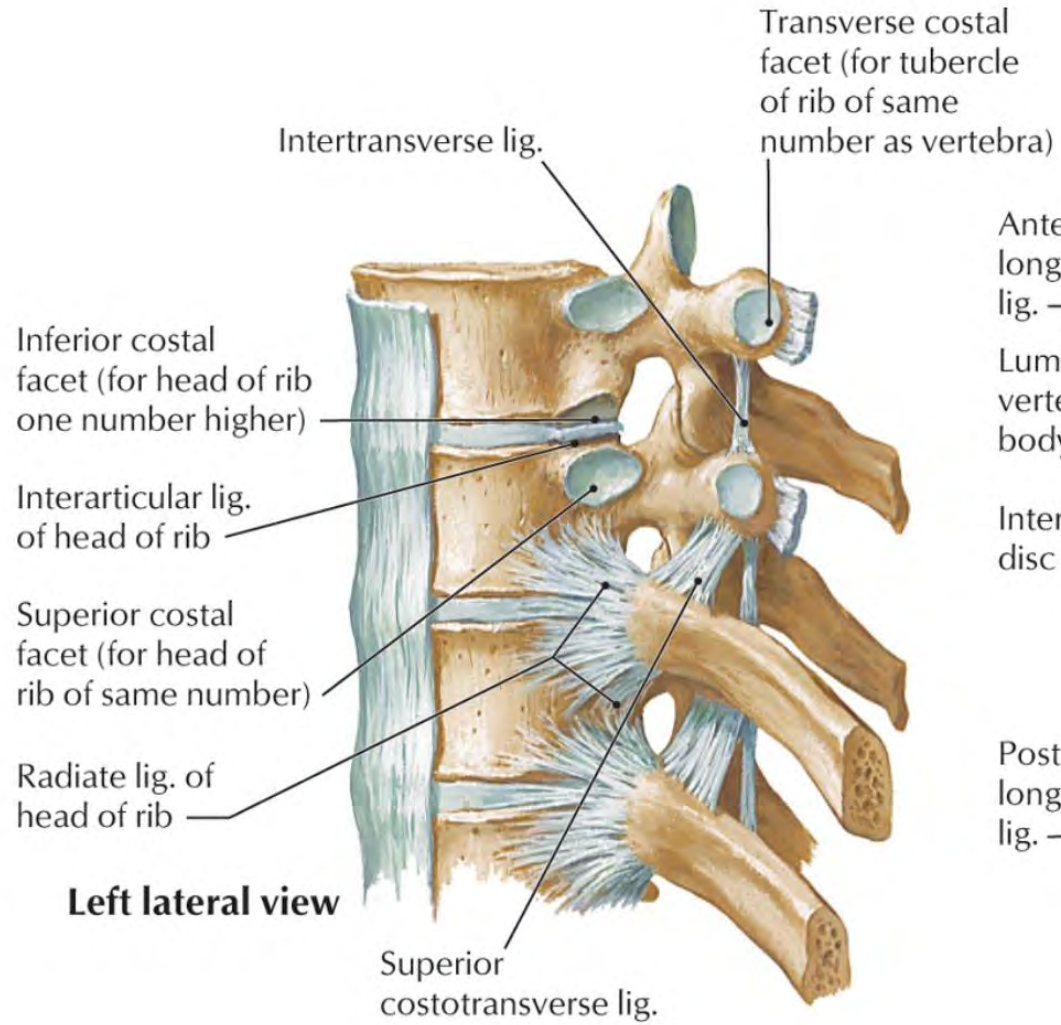
“Brain or Strain?”

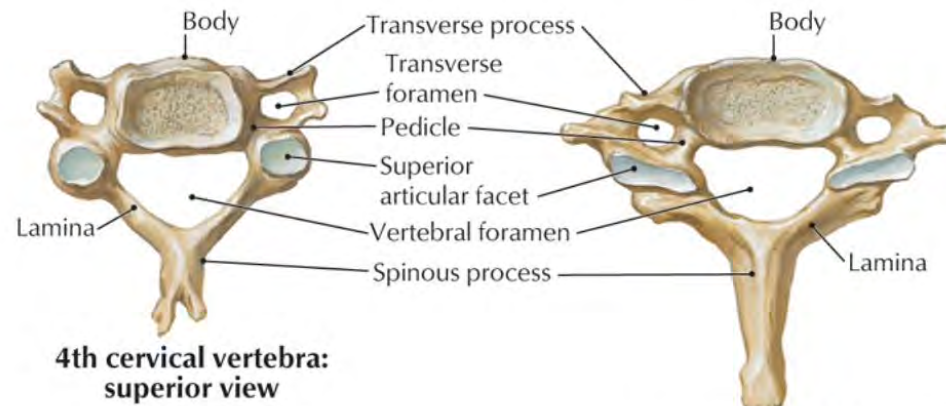
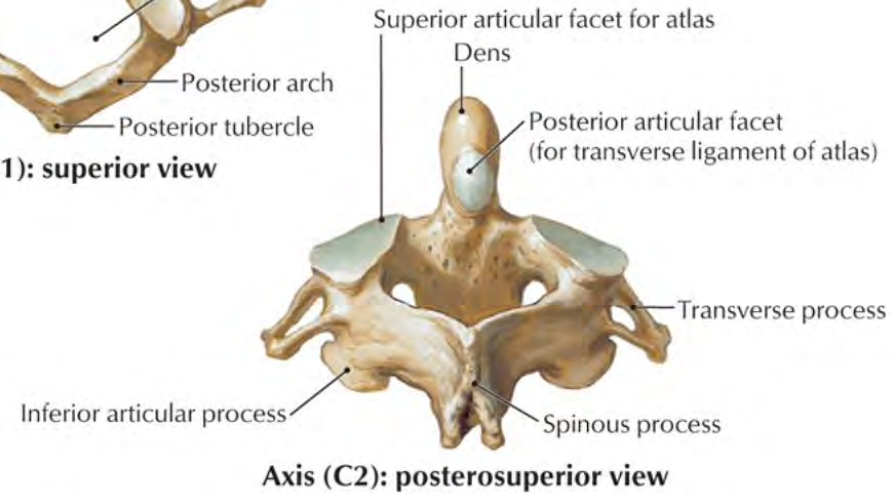
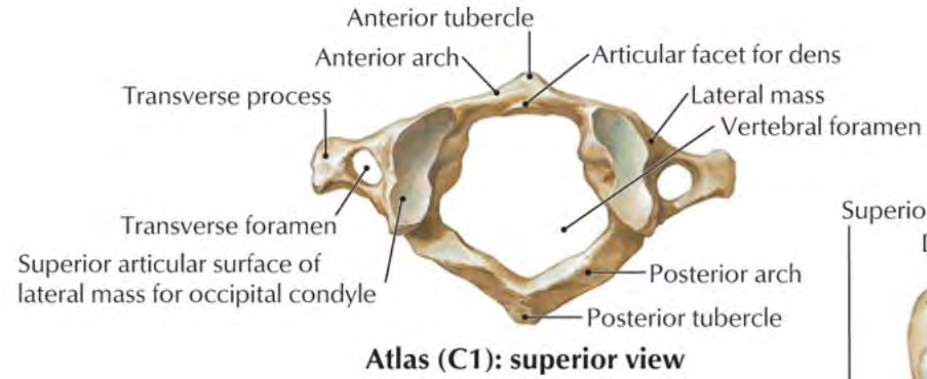
Dr. Leddy, University of Buffalo

C-Spine Considerations









F. Netter M.D.

Neck Strength / Stability

- Decreased head-neck segment mass and isometric strength can result in head-neck instability and increased head-neck acceleration
 - ? *predisposition for female SC*
- Prospective research of neck-strengthening programs and SC

Symptom Overlap

<i>Symptoms</i>	<i>Concussion</i>	<i>Cervical injury</i>
<i>Headache</i>	<i>X</i>	<i>X</i>
<i>Dizziness</i>	<i>X</i>	<i>X</i>
<i>Irritability</i>	<i>X</i>	<i>X</i>
<i>Sleep disturbances</i>	<i>X</i>	<i>X</i>
<i>Blurred vision</i>	<i>X</i>	<i>X</i>
<i>Neck stiffness</i>	<i>X</i>	<i>X</i>
<i>Balance disturbances</i>	<i>X</i>	<i>X</i>
<i>Depression</i>	<i>X</i>	
<i>Cognitive deficits</i>	<i>X</i>	<i>X</i>
<i>Memory deficits</i>	<i>X</i>	
<i>Attention deficits</i>	<i>X</i>	<i>X</i>
<i>Decreased cervical range of motion</i>		<i>X</i>
<i>Decreased isometric neck strength</i>	<i>X</i>	<i>X</i>

“Brain or Strain?”

- “Symptoms after head injury, including cognitive symptoms, do not discriminate between concussion and cervical/vestibular injury.”
 - Leddy, *et al*; CJSM, 2015

Clinical Scenario

21 y/o Division 1 Collegiate Wrestler

Chief Complaint

- Head/neck injury, r/o concussion

HPI

- 21y/o D1 collegiate wrestler presented for concussion evaluation after a head/neck injury
- Neck went into forced flexion / side bending when falling back onto the mat
- No LOC
- C/o left-sided neck pain w/out radicular symptoms (no midline pain)
- Also c/o neck stiffness, posterior headache, dizziness, and not feeling right

PMHx, SHx, FHx, Social Hx

- All non-contributory
- No h/o SC or neck injuries
- No modifiers

ATC Evaluation

- No midline neck pain or tenderness to palpation; (+) left paracervical tenderness to palpation
- No gross focal deficits
- SCAT-5 unremarkable except symptom score
- Athlete sent to MD office for evaluation

Symptom Score = 15 (5 symptoms)

- Headache: 3
- Neck Pain: 5
- Dizziness: 2
- Feeling slowed down: 2
- Don't feel right: 3

Physician Evaluation

- History confirmed
- Neuro exam
 - CN 2-12: normal
 - Strength: normal
 - DTRs: normal
 - Cerebellar: normal
- BESS
 - DL 0, SL 0, TS, 0
- Vestibular
 - Nystagmus: no
 - Abnormal Pursuits: no
 - Abnormal Saccade: no
 - Abnormal Convergence: no
 - Abnormal VOR: no
- Neck: see demo

Initial Assessment & Plan

Unspecified Head Injury & Cervical Strain

- Physical rest
- Academics as tolerated, no formal restrictions
- Treatments with ATC
- F/u in 1 day

24hr Follow-up

- Headache: 1
- Neck Pain: 3
- Dizziness: 0
- Feeling slowed down: 0
- Don't feel right: 0
- BESS: 0/0/0
- VOMs: all negative
- Academics / ADLs w/out increased symptoms
- BCCT: no increased symptoms

Diagnosis

Cervical Strain & Contact Headache

- No further testing
- Returned to full unrestricted athletics

Muscular or Ligamentous Injury

- Most common form of neck injury
- ***Can cause headache***
- Normally presents with paravertebral tenderness/spasm, decreased ROM, and without radicular symptoms
- Radiographs not needed for muscular etiology
- Treatment is conservative
- RTP when tolerated; ROM should be at baseline

Location, location, location... & Timing

- Neck pain and cervical muscle tension are prominent symptoms of primary headache disorders
 - *Tension-type*
 - *Migraine*
- Cervicogenic headache
 - Anatomic locus is the trigeminocervical nucleus in the cervical spinal cord
 - Example: pain from C2-3 facet joint is referred to the occipital, frontotemporal, and periorbital regions of the head ("third occipital headache")

Headaches

- Tension-type
 - Diffuse, band-like radiation to occiput, dull/pressure, and not associated with nausea, vomiting, photophobia, or phonophobia
- Migraine
 - Unilateral, pulsatile/throbbing, disabling intensity, associated with nausea, vomiting, photophobia, and phonophobia
- Cervicogenic
 - Unilateral head pain of fluctuating intensity that is increased by movement of the neck and radiates from occipital to frontal regions

Occipital Neuralgia

- Pain disorder characterized by paroxysmal jabbing pain (electric shocks) in the distribution of the greater or lesser occipital nerves or the third occipital nerve

Keep Looking

- Spinal nerve compression
- Disc herniation
- Posterior fossa tumor
- Arnold-Chiari malformation
- Arteriovenous malformation
- Spinal tumor
- Internal carotid or vertebral artery dissection
- Temporal arteritis

Baseline vs Acute Assessment

Think about C-Spine...

Baseline Assessment

- Account for premorbid variability, which can influence neurocognitive, balance, and symptom outcome scores
 - ADHD
 - Learning disabilities
 - Psychiatric diagnoses
 - HA disorders
 - History of SC

Baseline Assessment

- SCAT-5
- BESS
- VOMs
- IMPACT
- KD
- Paper-and-pencil batteries

Sideline Assessment

- Concern for SC, what do you check first?

C-Spine!



Be Vigilant for C-Spine Injuries

- Conservative approach is to assume the presence of C-Spine injury
- Spinal immobilization (rigid cervical collar, backboard, and lateral head support
 - *? use of rigid cervical collar only and a padded stretcher*
- Some form of C-Spine immobilization/protection should be maintained until an unstable spinal injury is excluded

NEXUS Low-Risk Criteria

- Imaging is ***not*** necessary if patients younger than 60y/o satisfy all five of the following:
 - Absence of posterior midline cervical tenderness
 - Normal level of alertness
 - No evidence of intoxication
 - No abnormal neurologic findings
 - No painful distracting injuries

Acute C-Spine Imaging

- CT w/out contrast is the preferred study
- MRI is done if CT suggests an underlying ligamentous or spinal cord injury
- Suspect a cervical ligamentous or spinal cord injury without radiographic abnormality (SCIWORA) in a patient with the following:
 - Severe neck pain
 - Persistent midline tenderness
 - Upper extremity neurological changes

Sideline Assessment

- Head/neck
- SCAT-5
- BESS
- VOMs
- CNs, cerebellar, strength/sensation, DTRs
- KD

Acute Management

- Removal from play
- Complete cognitive and physical rest
- Plan for further clinical evaluation

Brain Imaging

- SC are not associated with structural brain changes so conventional neuroimaging is not recommended for diagnostic purposes
 - Baseline and post-SC diffusion-weighted MRI?

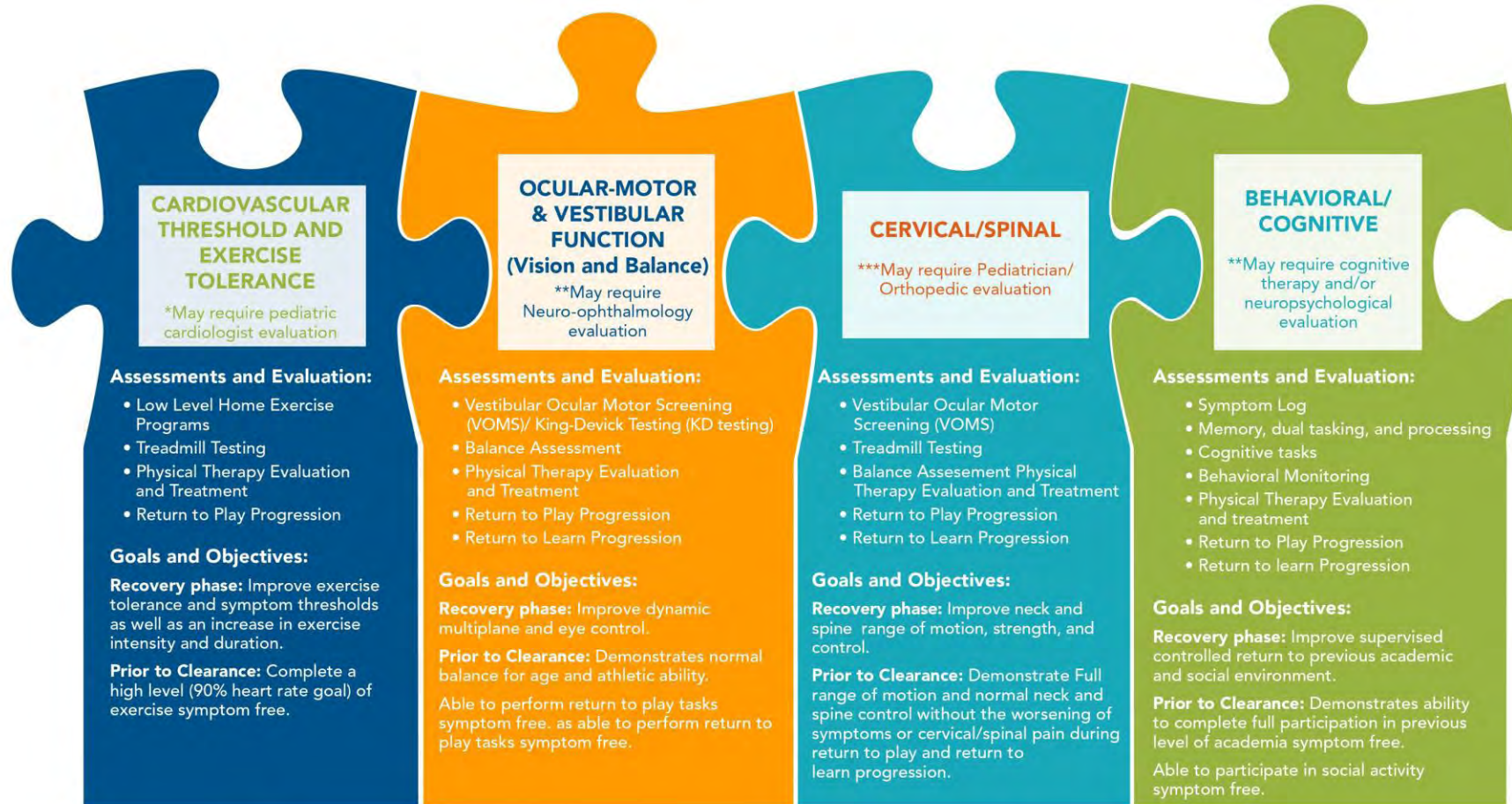
Berlin Consensus

5th International Concussion Conference in Sport

- Complete cognitive rest not validated after 48 hours
- Symptom threshold through activity/cognition in acute phase
- ***Focus on pillars for recovery***
- Defining PCS in children (>4 weeks with symptoms)

Concussion Pillars for Recovery

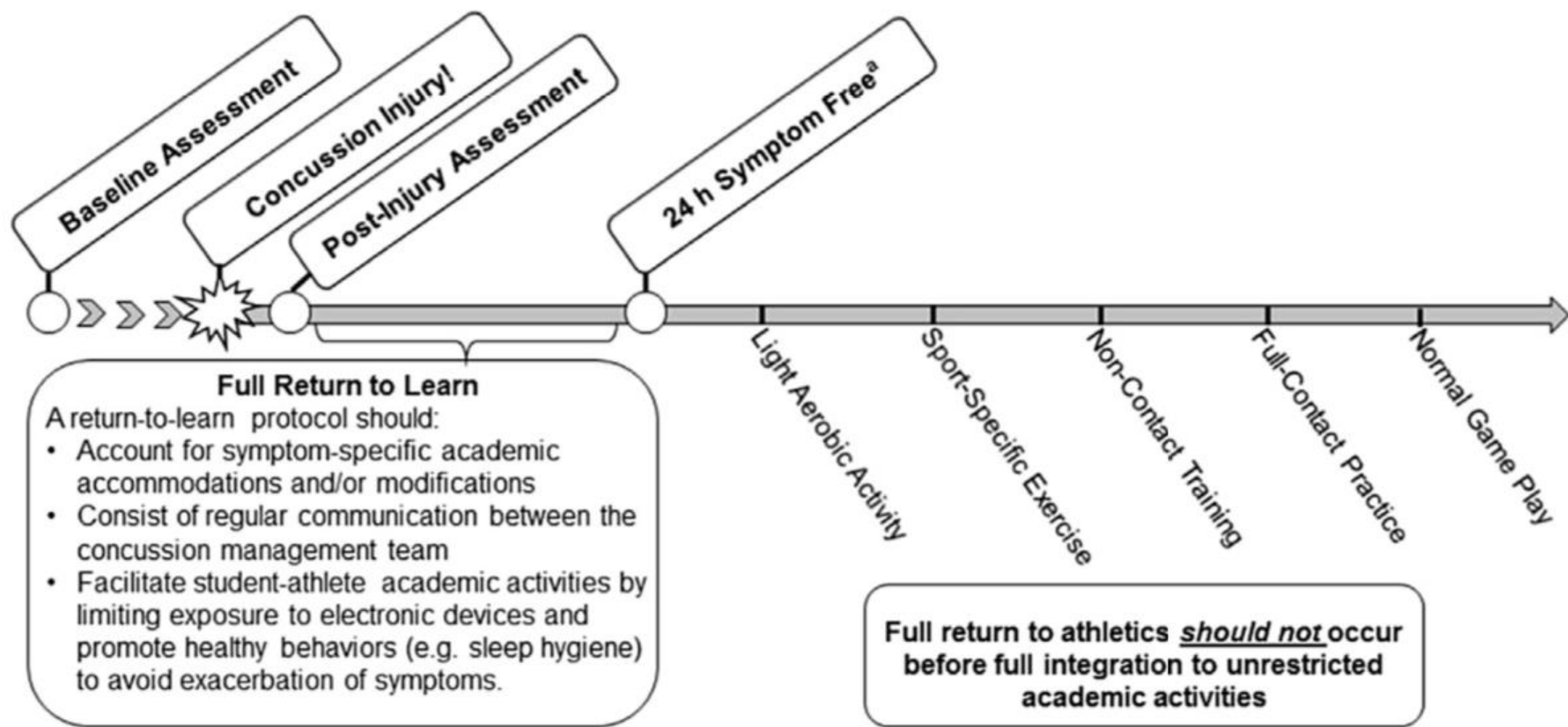
ALL PILLAR GOALS MUST BE ACCOMPLISHED PRIOR TO CLEARANCE TO RETURN TO FULL ACADEMICS AND SPORT.



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Barnabas Health
Ambulatory Care Center

RWJBarnabas
HEALTH
Let's be healthy together.



Prolonged Recovery

- Mood disorders
- ADHD
- Learning disabilities
- Visual dysfunction
- Migraines
- History of SC
- **??? C-Spine**

Summary

- Symptom overlap between concussion and cervical injury
- “Brain or Strain?”
- Be vigilant for cervical injuries
- Persistent PCS or is C-Spine confounding?
- Think C-Spine!

References

- Hall E, et al. Concussion baseline testing: preexisting factors, symptoms, and neurocognitive performance. J Athl Train 2017;52(2):77-81.
- Resch JE, et al. The acute management of sport concussion in pediatric athletes. J Child Neurol 2015;30(12):1686-94.
- Fedor A, et al. Would you let your child play football? Attitudes toward football safety. Appl Neuropsychol Child 2016;5(2):107-9.
- McCrory P, et al. Consensus statement on concussion in sport-the 5th international conference on concussion in sport held in Berlin, October 2016. Br J Sports Med 2017;0:1-10.

Questions?