IMPROVING OUTCOMES POST CONCUSSION

(AND RETURN TO WORK)

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Northeast **Rehab**

Spine • Sports • Neuro • Pain

Unique… with certain necessary elements

Concussion Recovery rates

Accelerate

- Excellent fitness
- Younger age
- Single impact
- Reassurance
- Rapid reactivation

Decelerate

- Migraine history
- Preexisting concussion
- Multiple impacts
- Underlying anxiety /depression
- Prolonged rest
- Overstimulation
- Female gender

Time to complete “recovery”

Definition dependent

Classifications of recovery

- Symptomology
- Clinical
- Physiologic

Symptomology assessments

- Rivermead
- Sport concussion Assessment tool (SCAT)
- Post concussion Scale
- IMPACT 21 concussion scale
- “How are you doing ?”
  - Best to use validated tests with reliability
  - Can increase awareness of failure to progress (focus more on bad days)
  - Confirm subsystem involvement.
- Gaudet (Occup Med 2019)
  - 91 % RTW at 90 days post injury

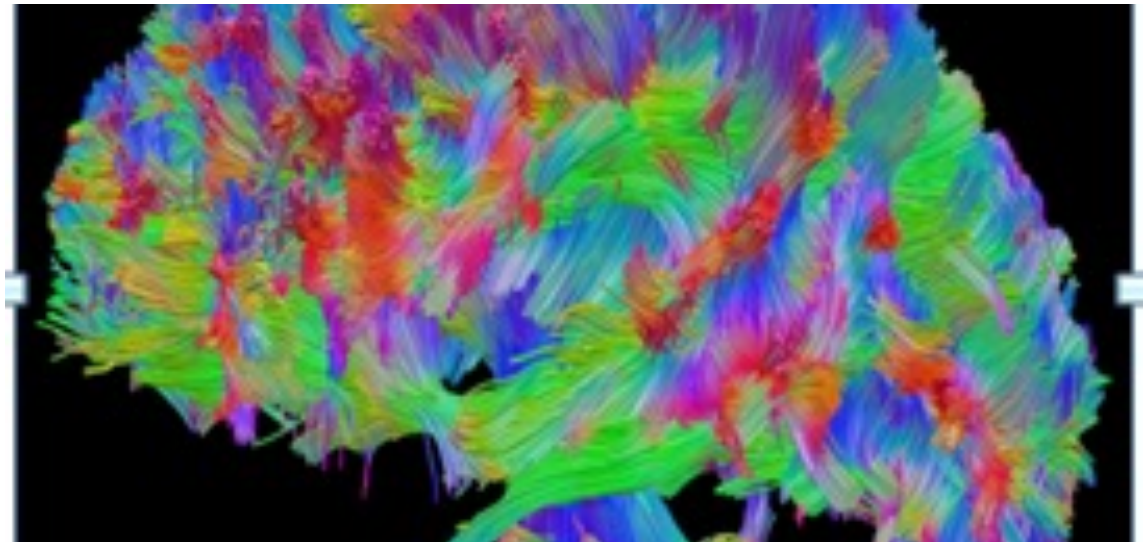
    41 % of workers continued to complain of ongoing symptoms

Clinical assessments

- Balance testing
  - BESS (balance error scoring system
  - SOT (sensory organization test)
  - Force plate testing (Kin Com)
- Exercise testing
  - Buffalo concussion Treadmill testing
  - 5 step RTP (return to play protocol)
- Computerized Neurocognitive testing
  - IMPACT testing
  - NVC (neurologic vital signs testing)
- VOMS testing
  - Ocular movements
  - Ocular synchronization
  - Induced symptomatology

Physiologic Assessments

- Reconciliation of symptomatology with “Objective Testing”
- Clinical testing is objective , but can be potentially confounded intentionally /unintentionally



Physiological assessment

Objective Physiological testing

- Kamins (BMJ 2017) reviewed 5834 articles (2005- 2017)
- 82 studies were included

Modalities assessed and recovery range

- F MRI (functional MRI) (18 studies) (3 days--- 23 months)
- Diffusion MRI (7 studies) (5 days– 180 days)
- MR Spectroscopy (10 studies) (7 days --- 30 days)
- Cerebral blood flow (2 studies) (30 days– 40 days)
- EEG (electro encephalogram) (15 studies) (7 days --- 45 days --- 4 years)
- Blood and urine biomarkers (10 studies) (12 hrs.---- 144 hrs.)
- Exercise and heart rate (5 studies) (inconclusive)
- Transcranial Magnetic stimulation (4 studies) (10 days--- 9 months)

Usefulness of physiologic testing

- **F MRI** can be useful to evaluate the brain under conditions of both rest and activation
- **Diffusion MRI** may be helpful to differentiate “white matter changes “ in the brain
- **MR Spectroscopy** can identify persistent chemical changes in the brain typically seen with multiple impacts
- **CBF** can show changes in brain with altered CO2 levels (not breathing at a high enough rate)
- **EEG** are there permanent changes in brain function ? (easily obtained studies)

Historically… “ 3 months for full recovery.”

- **Majority of pts experience significant improvement in 2-4 weeks**
- McCrea (2003 JAMA) study was essentially the basis for the 3 month recovery framework
    - Neuropsych evals on days 2, 7 , 90
    - Collegiate level athletes (excellent fitness)
    - symptoms and functional deficits as endpoints… **not …** cerebral activity as determinates for recovery
    - “mild to moderate “concussions only

- McCrea (2017 Journal of Athletic trainers) study noted 1 in 5 had prolonged recovery based on physiological data

Is it a cerebral concussion?

1st criteria **Plausible injury mechanism**

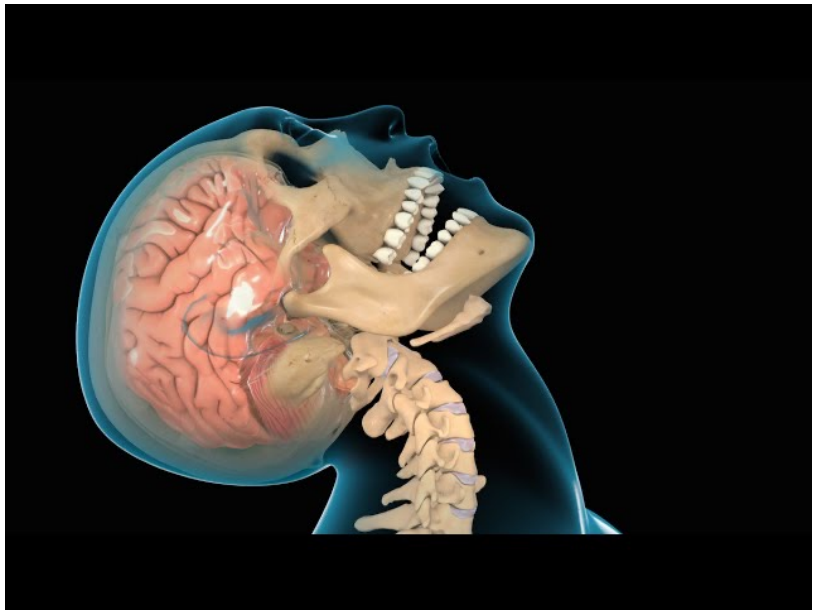
appropriate forces, adequate description, personal memories vs learned info

2nd criteria **Query signs and symptoms**

alteration in mental status, loc, confusion , amnesia etc.

3rd criteria **Rule out confounding factors**

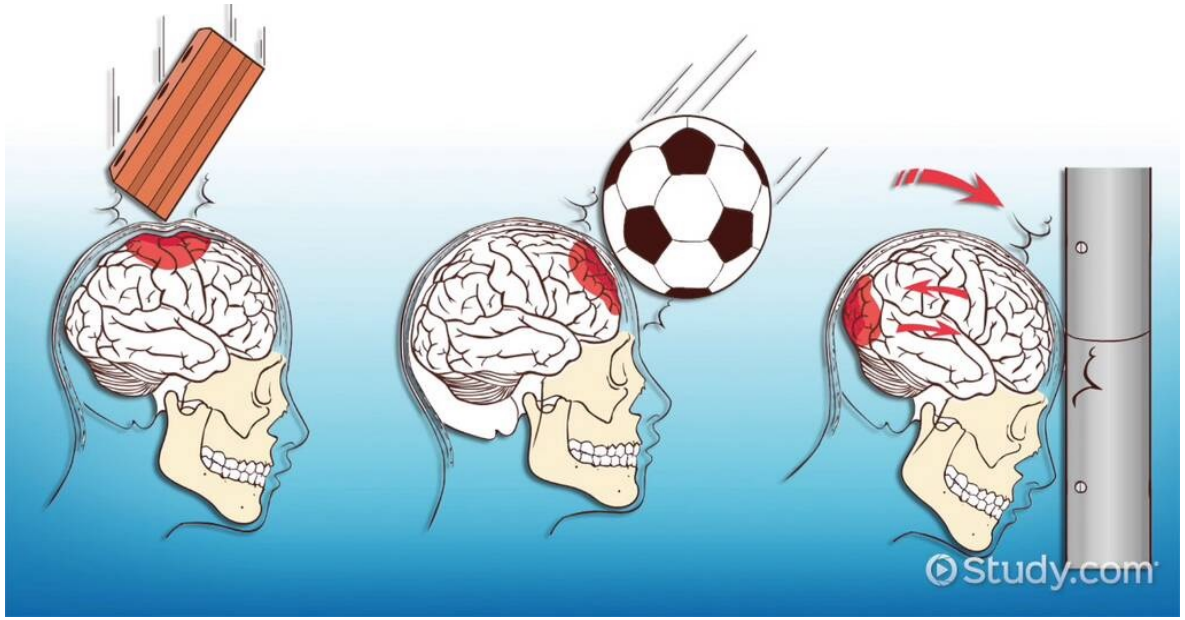
EtOH, drugs, severe pain , significant fearful event



Possible additional diagnosis to be considered

- Cervical strain
- Other neurologic disorders
- Chronic pain
- Deconditioning
- Analgesic meds
- Post traumatic stress disorder
- Depression
- Developmental issues
  (learning impairment , ADHD)

- If none apply consider persistent neurocognitive deficits due to Post Concussion Syndrome



Mechanism of injury

Sports related compared to MVA

- Seiger (2015 J Head trauma rehab)
  - 13-21 years old
  - football recovery 32 days vs. MVA 97 days

MVA Based concussions

- Cassidy (2014 APRM)
- Median time to recovery 100 days
- 23 % still unresolved at 1 year
- Negative factors for recovery
  - Age> 50 yo
  - No high school diploma
  - Having poor expectations for recovery
  - Somatic symptoms

Employment status post Cerebral concussion

- Silverberg (2017 APMR) reassessed at 8 months
    - 58% full RTW
    - 44% increased PCS complaints
    - 18% depression
    - 24% anxiety
    - 30 % bodily pain

Identify weakness and barriers

Preexisting conditions

- Motion sickness
- Migraines
- Previous cerebral concussions
- Unresolved cerebral concussions

Mitigating factors

- Insomnia
- Somatic symptoms
- Headache
- Exacerbated psychiatric complaints

We should be aggressive in treating uncomfortable symptoms initially

- Reduces recovery time
- Improves ability to make a more clear assessments from neuropsych testing
- Reduces catastrophication
- Reduces the interference associated with depression and anxiety

Thank you .