

Concussion and Cardiac Arrest

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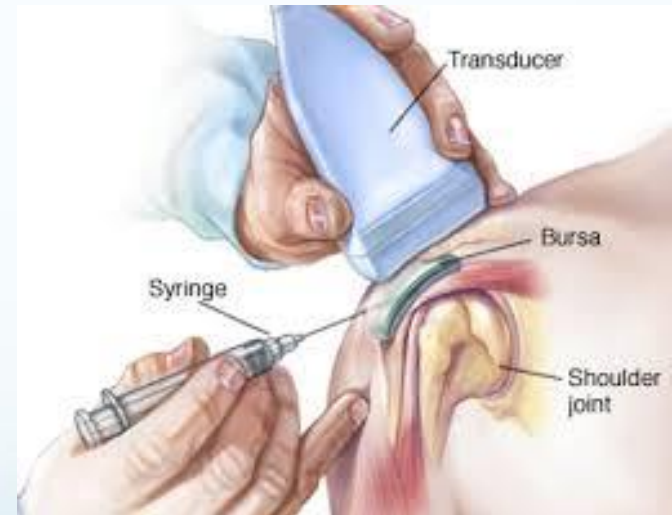


MINDGAME

Know the Impact

About My Practice

- Specialize in Sports Medicine
- Treat Sports Injuries, Fractures, Joint Pain, Tendon and Muscle Pain
- See All Age Groups
- Ultrasound-Guided Injections
- Team Physician
 - Sacramento Republic FC
 - UC Davis Intercollegiate Athletics
 - Davis High School
 - Woodland High School



Why Am I Here Today?



Objectives:

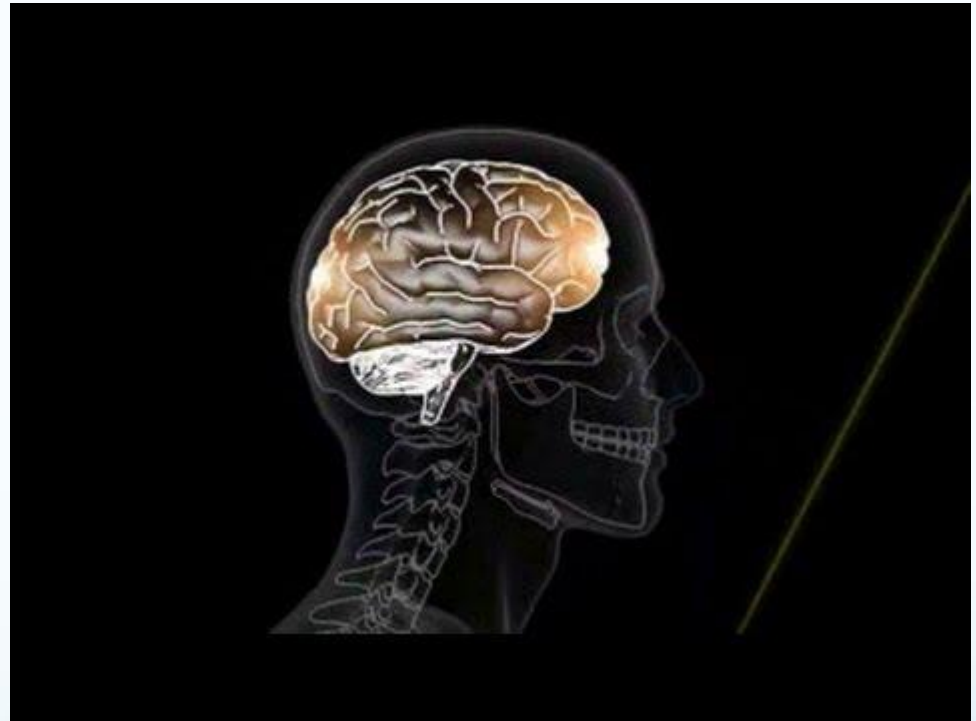
Concussion and Cardiac Arrest

- Definitions
- Initial Management
- Medical Treatment
- Safe return to sports



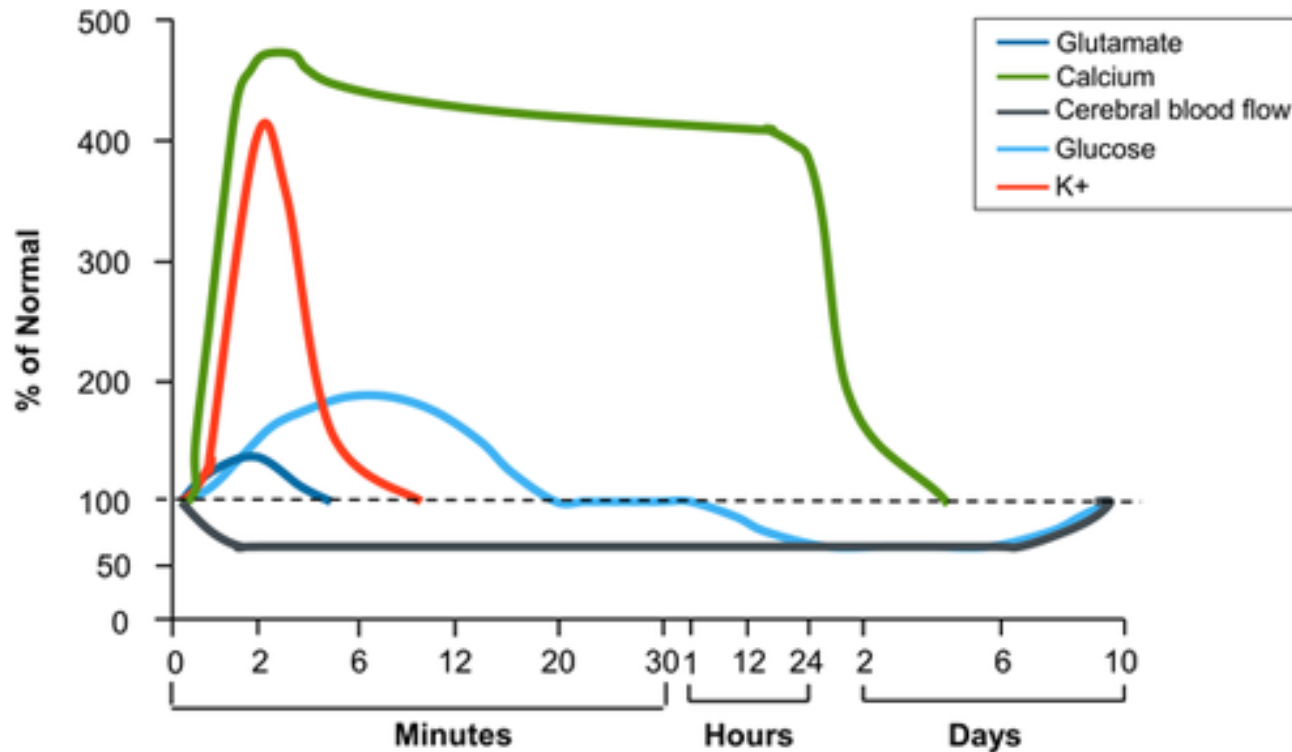
What is a Concussion?

- Mild traumatic brain injury (TBI)
- Metabolic, functional (not structural) damage from direct or indirect trauma
- Short Term Deficits



Neurometabolic cascade

Neurometabolic Cascade Following Cerebral Concussion/mTBI



From Giza CC, et al.^[10]

Sports Concussion Facts

- Approximately 1.6 – 3.8 million sports concussions occur each year in the U.S.
- 80-90% have no loss of consciousness (LOC)
- 80-90% return to full activity in 7-10 days (NCAA data)



Most Common Sports



Epidemiology of Sports Concussion

- #1 mechanism: hitting heads with another player
 - #2 in females: head-to-ball or head-to-ground
 - #2 in males: body contact with another player
- Younger and female athletes take longer to recover, high school athletes may need two weeks minimum
- We seek to avoid second impact syndrome which is associated with long term issues

Concussion Early Tip Offs

- Headache
- Visual difficulties
- Nausea/vomiting
- Memory loss/confusion
- Balance issues
- LOC: less than 10-20%

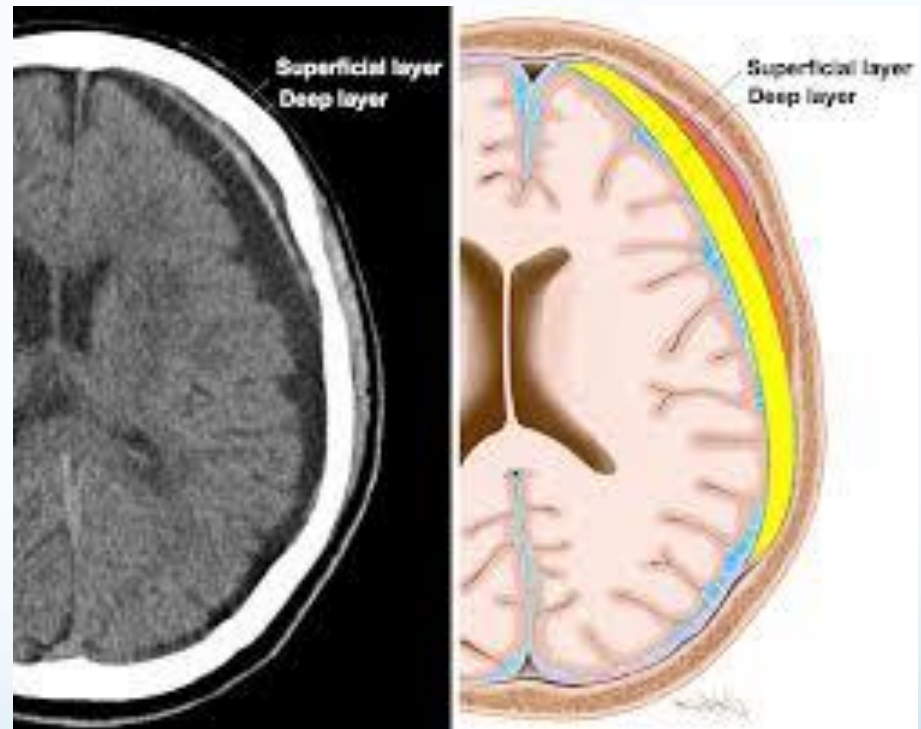


Concussion Symptoms

- Headache
- Dizziness
- Nausea/vomiting
- Balance issues
- Visual disturbances
- Feeling of fogginess
- Not feeling right
- Confusion
- Light/sound sensitivity
- Difficulty concentrating
- Emotional lability

Does Advanced Imaging Have a Role?

- Excludes severe bleed, critical structural damage
- Does NOT clear an athlete to return to play
- Don't be fooled:
 - **Normal imaging does not mean cleared to play**



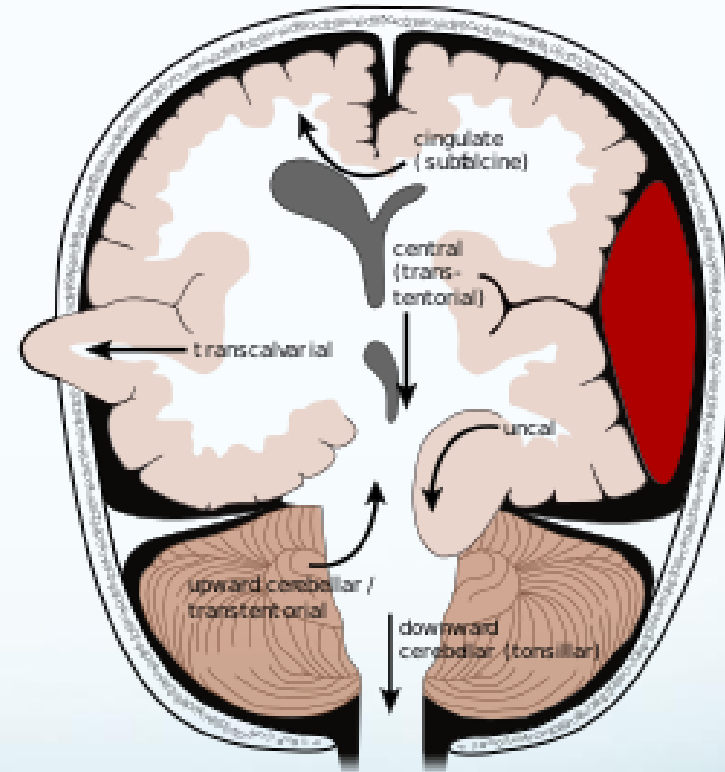
No Same Day “Return To Play”

- California AB 25 (2012) for a suspected concussion =
No return to play that day
- Medical clearance by a licensed professional must be given
before return to activity
- California AB 2127 (Cooley Law) Jan 1, 2015 =
7 day mandatory no return to play **after diagnosis** and to
follow protocols

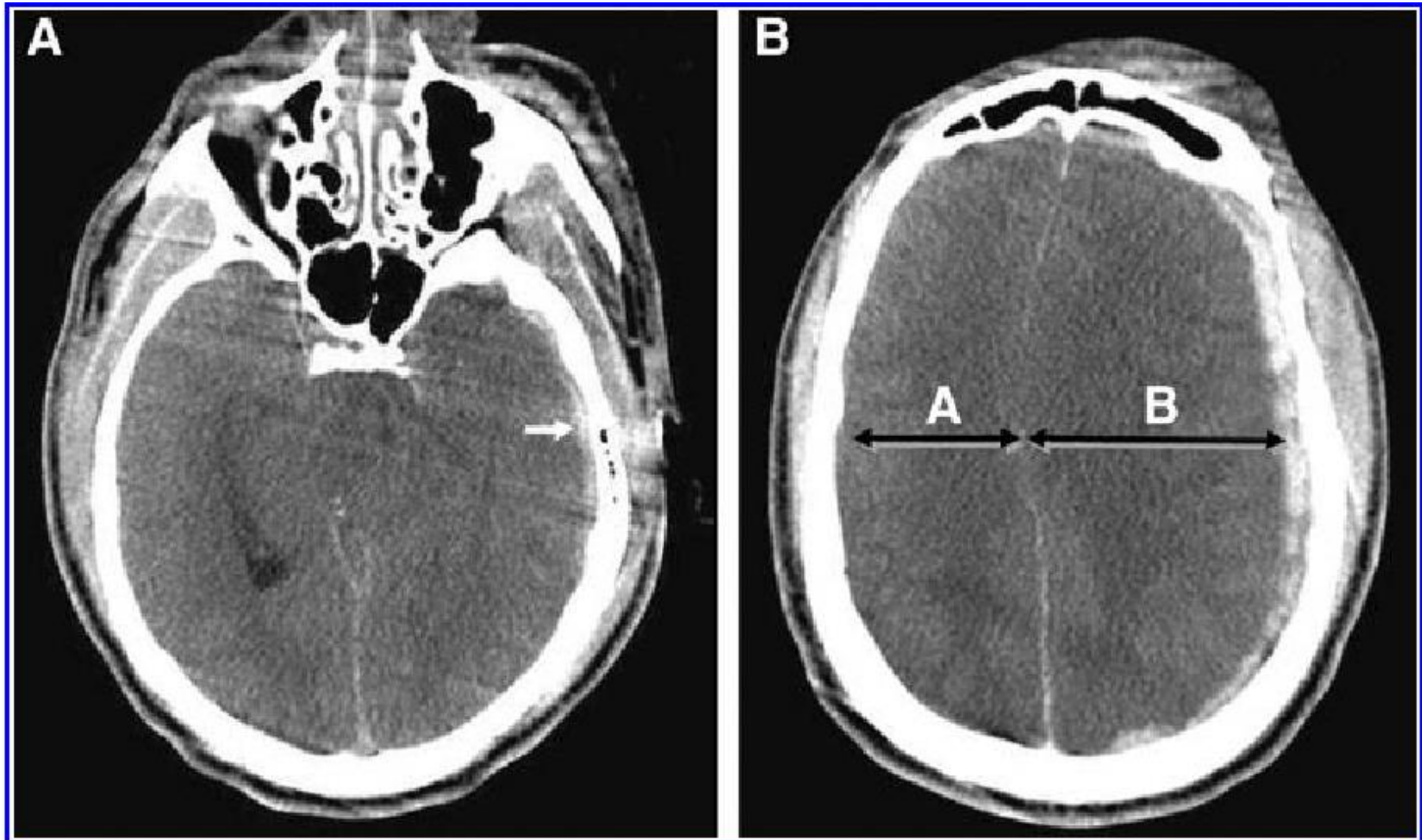


Second Impact Syndrome

- Getting a second concussion while still symptomatic
- Generally within the same season
- Mild trauma can have dramatic effect and long recovery
- **Major brain injury in sport concussion is almost always associated with second impact**



Second Impact Syndrome



Typical imaging findings of diencephalic/second impact syndrome (DIS) (A)

First Few Days

- No need to keep waking a person up hourly
- Tylenol is ok, no Aspirin or NSAIDs
- If worsening status: go to emergency room
- Consult in 1-2 days with sports medicine
- Rest and cognitive rest



Concussion: Established Treatment

- Cognitive rest
- Limited cell phones, games, texting
- Limited television, no reading
- No physical activity
- Academic accommodations (Return to Learn)*
- www.cdc.gov/concussion



Return to Learn

- Important to engage school administration
- Accommodations include:
 - Pre-printed notes
 - Recording of lectures
 - Quiet room for test taking
 - Access to notes during tests
 - Additional time for test taking
 - Reduced homework
 - Individualized instruction

Physician (MD/DO) Recommended School Accommodations Following Concussion

Patient Name: _____ Date: _____
 I, _____, give permission for my physician to share the following information with my child's school and for communication to occur between the school and my physician for changes to this plan. Parent Signature: _____

Physician Name and Contact Information: _____ Physician Signature: _____
 The patient will be reevaluated for revision of these recommendations in _____ weeks. Date: _____

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. Adjustments can be modified as the student's symptoms improve/worsen. Please see the CIF Return to Learn Protocol for more information (cifstate.org).

Area	Requested Modifications	Comments/Clarifications
Attendance	<input type="checkbox"/> No School <input type="checkbox"/> Partial School day as tolerated by student – emphasis on core subject work Encouraged Classes: _____ Discouraged Classes: _____ <input type="checkbox"/> Full School day as tolerated by student <input type="checkbox"/> Water bottle in class/snack every 3-4 hours	
Breaks	<input type="checkbox"/> If symptoms appear/ worsen during class, allow student to go to quiet area or nurse's office; if no improvement after 30 minutes allow dismissal to home Mandatory Breaks: _____ <input type="checkbox"/> Allow breaks during day as deemed necessary by student or teachers/school personnel	
Visual Stimulus	<input type="checkbox"/> Enlarged print (18 font) copies of textbook material / assignments <input type="checkbox"/> Pre-printed notes (18 font) or note taker for class material <input type="checkbox"/> Limited computer, TV screen, bright screen use <input type="checkbox"/> Allow handwritten assignments (as opposed to typed on a computer) <input type="checkbox"/> Allow student to wear sunglasses/hat in school; seat student away from windows and bright lights <input type="checkbox"/> Reduce brightness on monitors/screens <input type="checkbox"/> Change classroom seating to front of room as necessary	
Auditory Stimulus	<input type="checkbox"/> Avoid loud classroom activities <input type="checkbox"/> Lunch in a quiet place with a friend <input type="checkbox"/> Avoid loud classes/places (i.e. music, band, choir, shop class, gym and cafeteria) <input type="checkbox"/> Allow student to wear earplugs as needed <input type="checkbox"/> Allow class transitions before the bell	
School Work	<input type="checkbox"/> Simplify tasks (i.e. 3 step instructions) <input type="checkbox"/> Short breaks (5 minutes) between tasks <input type="checkbox"/> Reduce overall amount of in-class work <input type="checkbox"/> Prorate workload (only core or important tasks) eliminate non-essential work <input type="checkbox"/> No homework <input type="checkbox"/> Reduce amount of nightly homework _____ minutes per class; _____ minutes maximum per night <input type="checkbox"/> Will attempt homework, but will stop if symptoms occur <input type="checkbox"/> Extra tutoring/assistance requested <input type="checkbox"/> May begin make-up of essential work	
Testing	<input type="checkbox"/> No Testing <input type="checkbox"/> Additional time for testing/ unlimited testing <input type="checkbox"/> Alternative Testing methods: oral delivery of questions, oral response or scribe <input type="checkbox"/> No more than one test a day <input type="checkbox"/> No Standardized Testing	

Follow Up Symptoms

- Headache
- Visual issues
- Balance
- Sleep
- Irritability
- Lack of Concentration



Steps To Clearance

- 1. No symptoms
- 2. Normal focused neurological examination
- 3. Return to baseline or appropriate scores on neurocognitive testing
- 4. Then work with coach, athletic trainer or physical therapist for the progressions to full competition



Computer based NCT

Neurocognitive testing
(NCT)

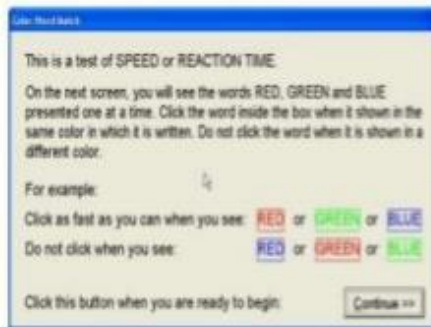
Ideally a baseline test has
been done

If no baseline, compare
with age related norms:
>20th percentile



Impact Test

Computer-Based Neurocognitive Testing



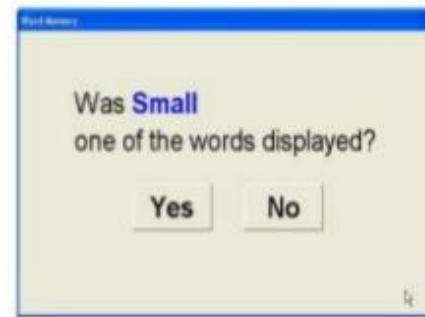
Reaction Time



Processing Speed



Visual Memory



Verbal Memory

“Return to Play” Protocol

Table 1 Graduated return to play protocol

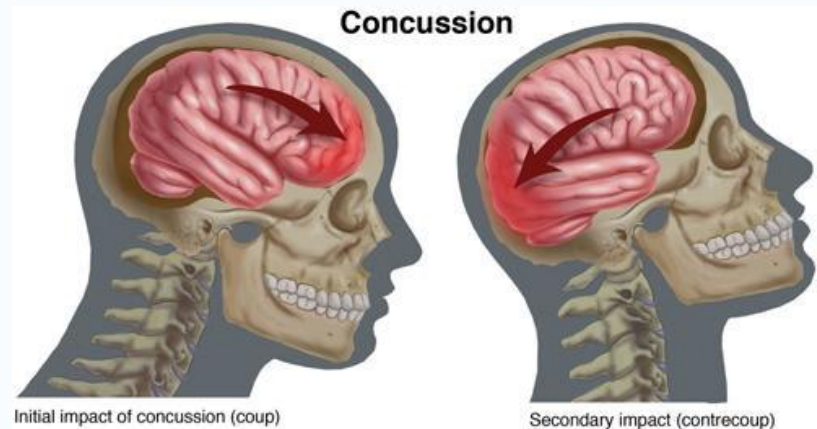
Rehabilitation stage	Functional exercise at each stage of rehabilitation	Objective of each stage
1. No activity	Complete physical and cognitive rest	Recovery
2. Light aerobic exercise	Walking, swimming or stationary cycling keeping intensity <70% maximum predicted heart rate No resistance training	Increase heart rate
3. Sport-specific exercise	Skating drills in ice hockey, running drills in soccer. No head impact activities	Add movement
4. Non-contact training drills	Progression to more complex training drills, eg passing drills in football and ice hockey May start progressive resistance training)	Exercise, coordination, and cognitive load
5. Full contact practice	Following medical clearance participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6. Return to play	Normal game play	

Rehab progression

- **Run, jog 20 minutes without symptoms**
- Wait one day
- **Sprint, interval speed work without symptoms**
- Wait one day
- **Return to the field with no contact**
- Wait one day
- **Return to the field with full contact**

Concussion Prevention

- Safe play
- Accurate diagnosis
- Education is paramount!
- Do not allow an athlete to play with a concussion



**All concussions are serious.
Don't hide it, report it. Take time to recover.
It's better to miss one game than the whole season.**

Concussion Take Home Points

- No return to play the same day
- Neurocognitive testing (NCT) is becoming the standard of care
- No symptoms, normal exam, normal NCT clears to begin the progression
- Progression: aerobic, sprint, on-field no contact and finally on-field with contact

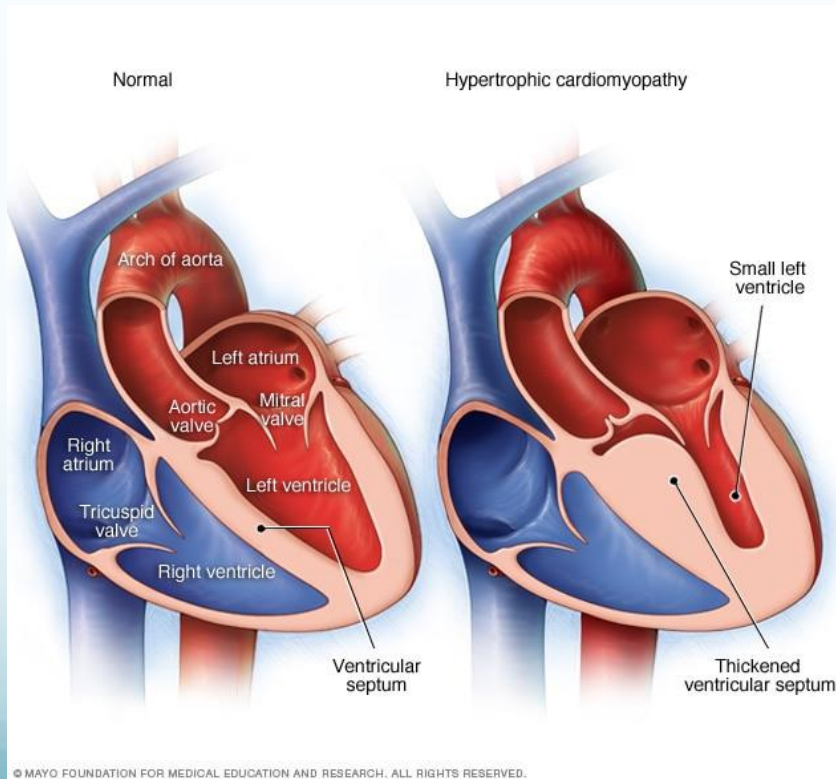
Fainting and Cardiac Arrest

- Every 3 days a youth athlete dies of cardiac sudden death
- Leading cause of death on school campuses
- Sudden cardiac death is 60% more likely to occur during exercise
- 92% of cases are fatal
- With proper emergency treatment life can be saved



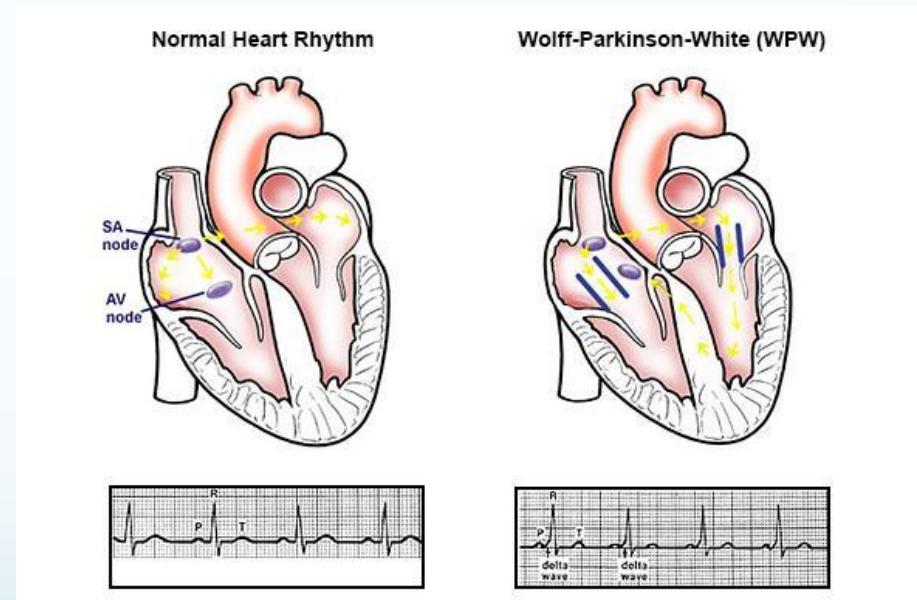
Why Do Young Athletes Have Sudden Cardiac Death?

Structural Heart Disease



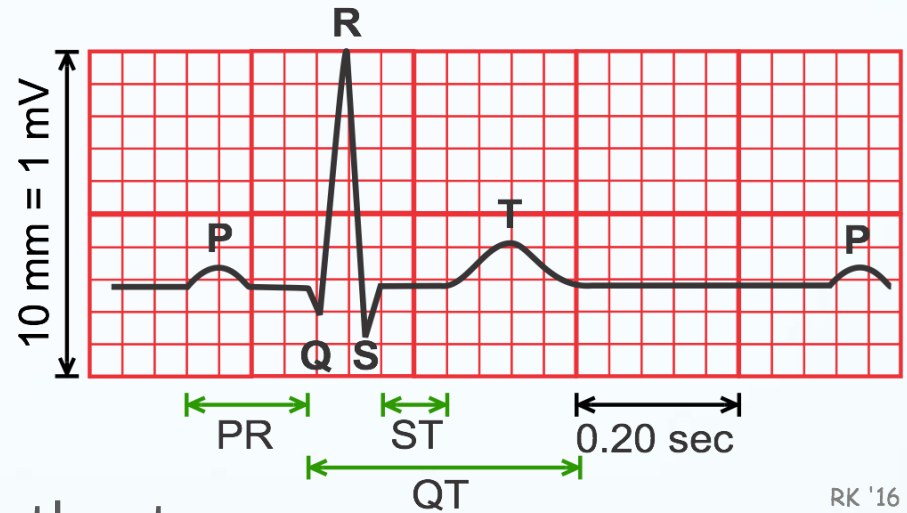
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Electrical Abnormalities



Common Warning Signs

- Fainting
- Chest Pain
- Shortness of Breath
- Dizziness
- Fluttering or Racing Heartbeat



CPR Basics

- Check for Pulse
- Start Immediately
- Compress Chest 2 inches
- Count 30 Compressions at a Rate of 100/minute
- Deliver 2 Breaths
- Repeat and Do Not Stop



AEDs Save Lives!

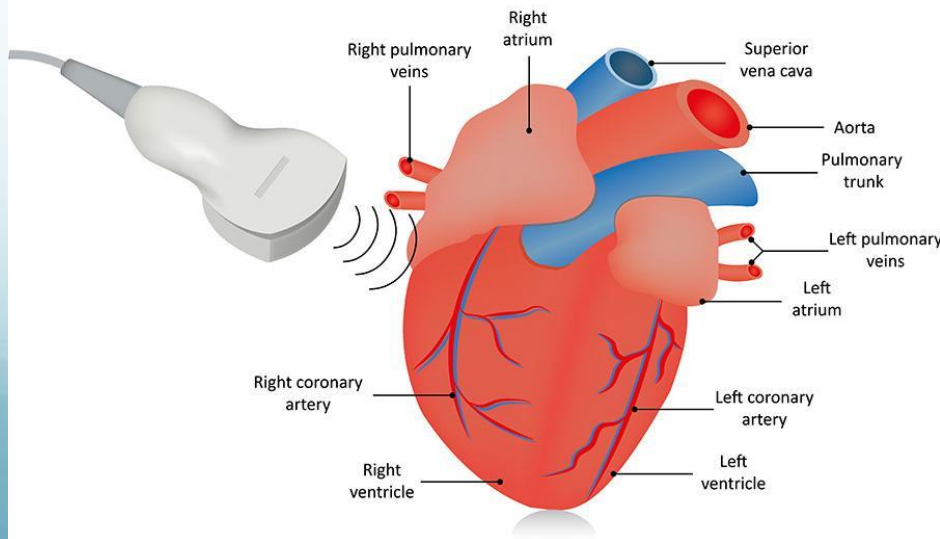
- Time is of the Essence
- Call 911
- Start CPR
- Know Where AED Lives
- Turn On, Apply Pads, Shock



Medical Evaluation

- 2016 California Law Mandates Removal from Play for Fainting or Other Cardiac Symptoms
- Must Be Cleared by Physician, NP, PA Before Return to

Echocardiogram



How To Reach Me

- Davis High School Students- Contact Andrew Superak ATC
- Regular Clinic Appointment- Office in Davis and Woodland

Call 530-668-2600

2330 W Covell Blvd, Davis

632 W Gibson Rd, Woodland

Resources

- McCrory P, Meeuwisse W, Aubry M, et al. **Consensus statement on concussion in sport**, Br J of Sports Med 2013; 47:250-258.
- www.cdc.gov/concussion
- www.sacramentovalleyconcussion.com
- [Emily's Story of Cardiac Sudden Arrest](#)
- www.aroundthecapitol.com/bills/AB2127

References

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- www.cdc.gov/concussion
- NCAA Sports Medicine Handbook: Sports Related Concussion. www.ncaa.org
- www.aroundthecapitol.com/bills
- [Landre N, Poppe CJ, Davis N, Schmaus B, Hobbs SE](#). Cognitive functioning and postconcussive symptoms in trauma patients with and without mild TBI. *Arch Clin Neuropsychol*. 2006 May;21(4):255-73. Epub 2006 May 22.
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- Bernstein, DM. Recovery from mild head injury. *Brain Injury*, 1999, 13 (3): 151-172.
- [Kashluba S, Casey JE, Paniak C](#). Evaluating the utility of ICD-10 diagnostic criteria for post concussion syndrome following mild traumatic brain injury. *J Int Neuropsychol Soc*. 2006 Jan;12(1):111-8.
- [Mucha A, Collins MW, Elbin RJ, Furman JM, Troutman-Enseki C, DeWolf RM, Marchetti G, AP Kontos](#). A Brief Vestibular/Ocular Motor Screening (VOMS) Assessment to Evaluate Concussions. *Am J Sports Med*. 2014 Oct; 42(10): 2479–2486.