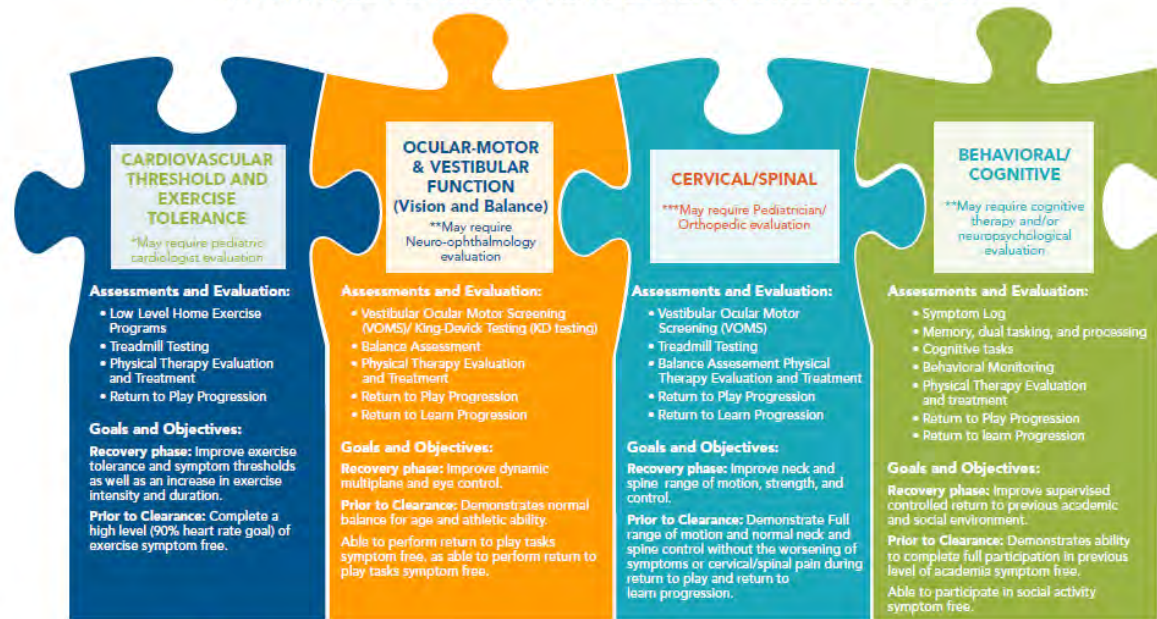


Vestibular – Ocular Pillar Are the Eyes or Ears to Blame?

Concussion Pillars for Recovery

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



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HEALTH
Let's be healthy together.

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Post Concussion Statistics

- Over 80% of people who have had a concussion report symptoms of dizziness or headache
- 50% of people after a concussion have an oculomotor issue



Normal Statistics

- Over half of the Brains pathways involve vision
- 5-20% have an abnormal oculomotor baseline
 - Smooth pursuit, vergence, accommodation, saccades



Eyes and Ears through the Years

- Visual System: Eye Got this!
 - Matures later than most other sensory input as reading ability continues to improve through elementary school
 - Younger kids will have longer KD times at baseline
 - Convergence and Accommodation present after age 6 months

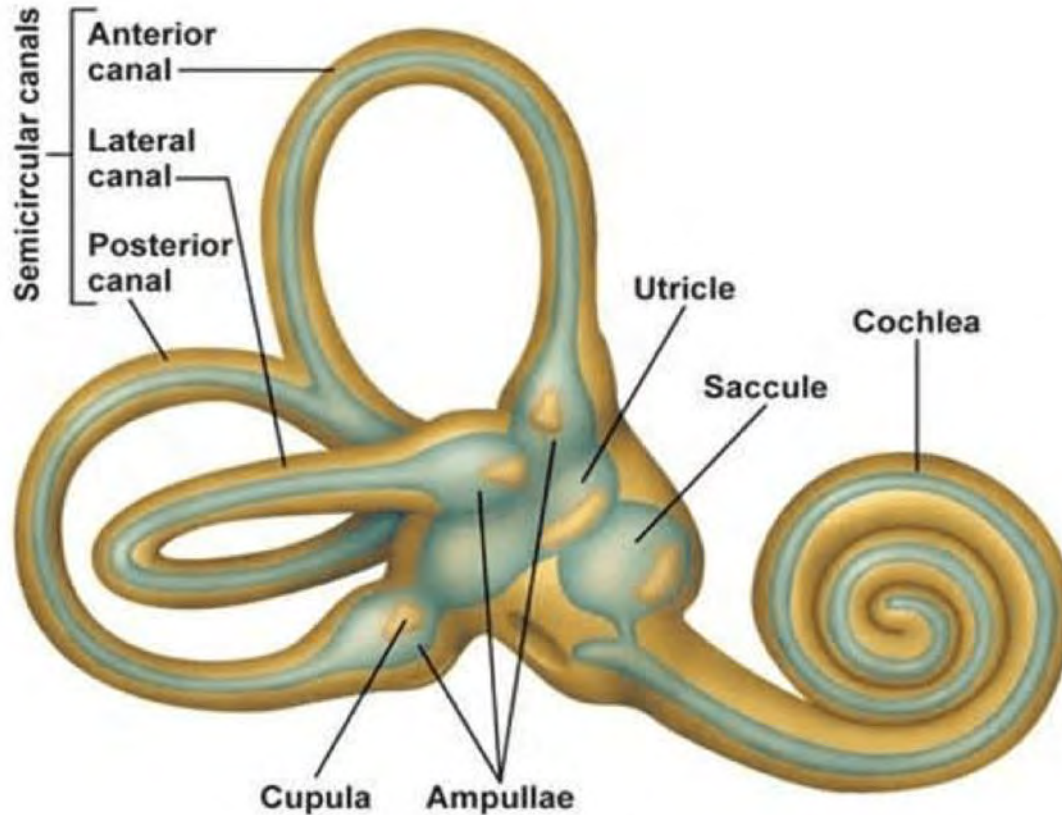


Eyes and Ears through the Years

- Vestibular System:
- Dizzyworld: the most vestibular place on earth
 - Develops at 28 weeks en utero
 - Matures by age 7
 - Fully integrated by age 15 to other sensory input
- Balance:
 - Single leg stance for a 3 year old: 3 sec
 - Single leg stance for a 7 year old: 10 sec



What is the Vestibular System?



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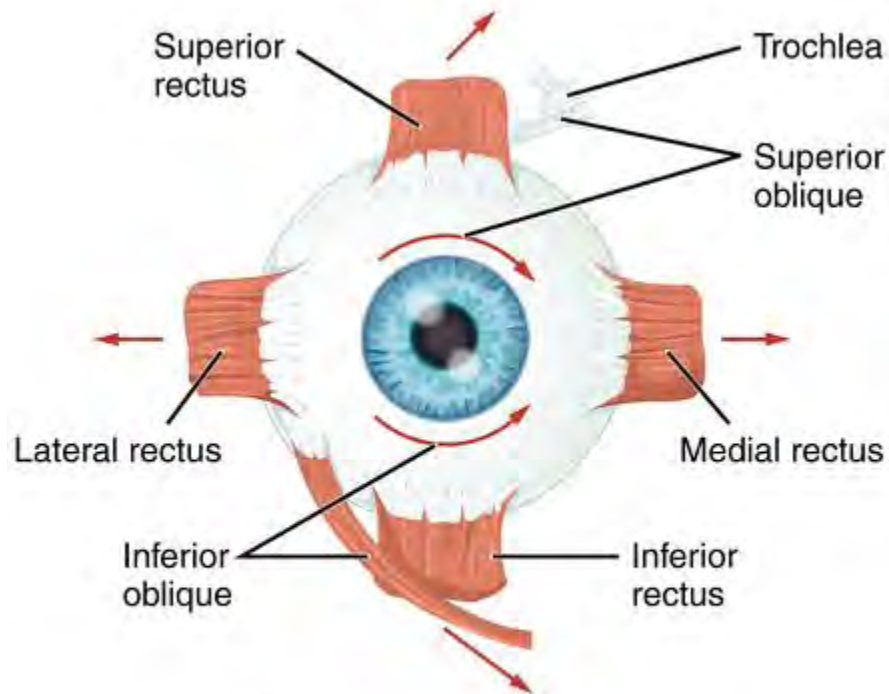
Vestibular Function

- As our head moves, the fluid inside moves and gives our brain input about how our body and head is moving, with out the use of the eyes
 - Movement – Direction – Velocity
- Your head's GPS in respect to gravity;
- Sense of movement: acceleration, deceleration (horizontal, vertical and rotary)



Oculomotor System

It's More than just 20/20 vision



Anterior view of the right eye



Ocular Function

- #1 – 20/20 vision (CAN you SEE clearly)
- Ocular motor
 - Smooth Pursuit – can follow a target
 - Saccade- acquire and move to a target
 - Vergence – depth perception and near focus
- Pupillary response
 - Accommodation
 - Light filter / Gauge
- Central fixation and Peripheral awareness



Eye Teaming

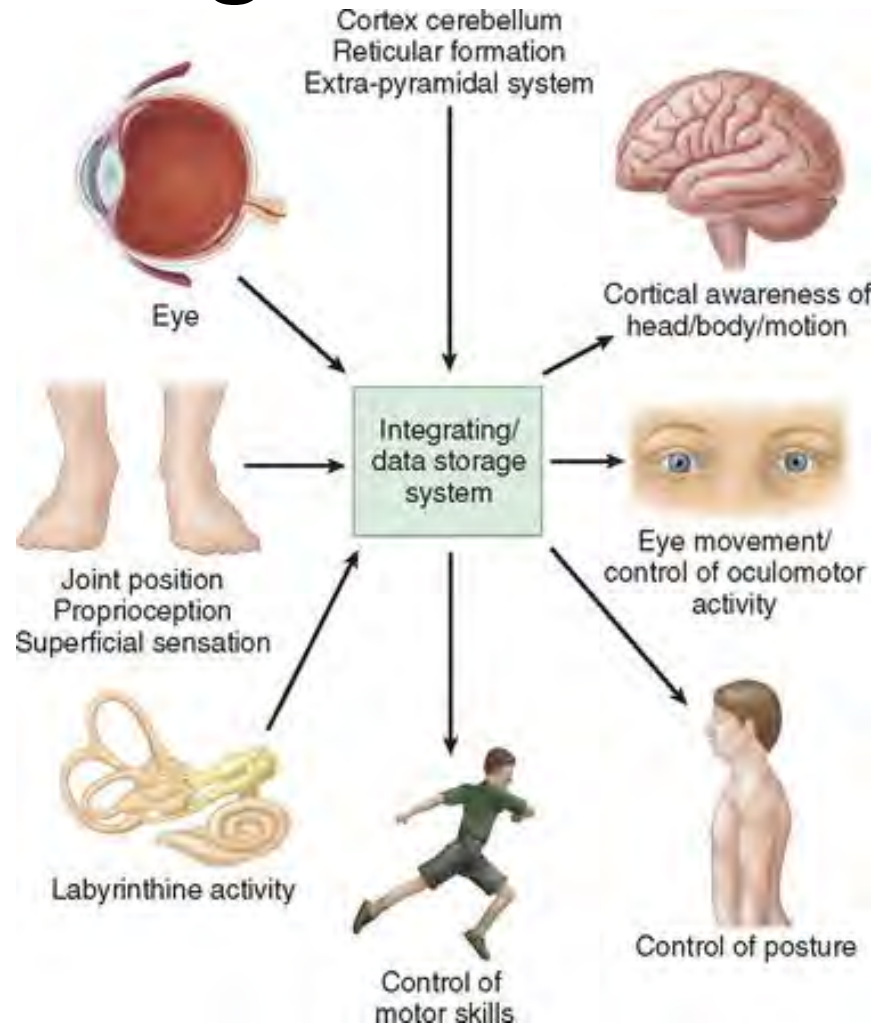
- Near Convergence : doing work within arms reach
- Accommodation: refocusing your eyes from near to far distances (blurry vs clear)
- Reading: eyes are jumping from word to word (KD testing - Saccades)
- Hand eye coordination



Sense of Touch and Proprioception (Somatosensory)



Eye-Vengers: Vestibular War



Vestibular - Ocular Function

- Balance (with somatosensory)
- Gaze Stabilization – VOR
- Gaze Holding
- Motor Coordination
 - Body
 - Extremity
- Cross body coordination
- Hand eye coordination



Reflexes that incorporate both systems

- VOR – vestibular ocular reflex- tests the ability for the eyes and the ears to work together for gaze stability
- VCR – vestibular cervical reflex –the ability for the eyes and ears to send information quickly to stabilize or move your head in response to movement
- VSR – vestibular spinal reflex –the ability for the eyes and the ears to send information to your body to react quickly to avoid a fall



What does this mean for you?

- The clumsy middle-schooler
- The “uncoordinated” athlete
- The post concussion athlete
- The Sports requiring higher level function of vestibular and oculomotor function
- The athlete with a learning disability



Why is All this Important?

- Life without Gaze Stabilization ...



Recovery – RTL – RTP

- All the pillars need to be addressed
 - Cervical
 - Vestibular /Ocular
 - Exercise Threshold
 - Behavioral / Cognitive
- Rule #1
 - Don't Hit your head !
- Rule #2
 - If you have symptoms STOP – recover !



Active Recovery

- What can YOU do with limited space and resources ?
 - Rule #1 and Rule #2
 - Could your athlete exercise?
 - Could they play catch?
 - Could they watch practice/ games?
 - Could they stand and practice Balancing?



Prevention / Reduction / Performance

- Improving sport performance with vision training
 - VOR – fast head / eye coordination
 - Hand /Eye coordination
 - Peripheral Vision
- Reducing falls velocity
 - Neck strength
 - Core strength
 - VSR – response



LAB

- VOMS + Accommodation
 - Can they See clearly ?
 - Do they wear corrective lens
 - Do they have a 'Lazy eye'



VOMS

Vestibular/Ocular Motor Test:	Not Tested	Headache 0-10	Dizziness 0-10	Nausea 0-10	Fogginess 0-10	Comments
BASELINE SYMPTOMS:	N/A					
Smooth Pursuits						
Saccades – Horizontal						
Saccades – Vertical						
Convergence (Near Point)						(Near Point in cm): Measure 1: _____ Measure 2: _____ Measure 3: _____
VOR – Horizontal						
VOR – Vertical						
Visual Motion Sensitivity Test						

Add in Accommodation and Convergence jumps for more in depth information



Active Recovery

- EXERCISE
- Tennis Ball Drills
 - Yes! Its ok to make sport specific
- Balance



Exercise

- Chair work out?
- Walk
- Bike
- Treadmill



Tennis Ball Drills

- Pass /catch while walking forward / backwards
- Self catch against wall to targets
- Self catch against wall with VOR
- Self catch with cervical /visual / vestibular arc
- Self catch with arc while walking forward / backwards

****If poor balance is a safety concern, perform these tasks in the corner of the room ****

Balance

- Feet together, Tandem stand, single leg
 - Eyes open , Head movement, Eyes closed
 - Soft surface
- Yoga?
- Stationary Core work ?
 - Dead bugs? Bird Dogs?

