Kelly Peczka, MSPT
Vestibular Therapy

Rehabilitation Clinical Supervisor at Children's Healthcare of Atlanta

- Kelly graduated from Springfield College with a Master's in Physical Therapy with a concentration in Pediatrics in 2007. She became certified in Pediatric Balance Disorders in 2013 and in Advanced Vestibular Disorders by the American Institute of Balance in 2015.

- Works extensively with children that have had traumatic brain injuries, including concussions, and children with neural hearing loss and vestibular nerve dysfunction.

Kaitlin Sipos, Au.D.
Vestibular Therapy

Pediatric audiologist at
Children's Healthcare of Atlanta

- Dr. Sipos obtained her Au.D. from the University of Cincinnati in 2017. She specializes in the evaluation of children with hearing impairment and vestibular dysfunction.

- Coauthored a publication on normative data in pediatric vestibular assessment and holds Board Certification in Audiology from the American Speech-Language-Hearing Association.

Vestibular and Balance in the Pediatric Population

Kelly Peczka, MSPT

Kaitlin Sipos, Au.D.

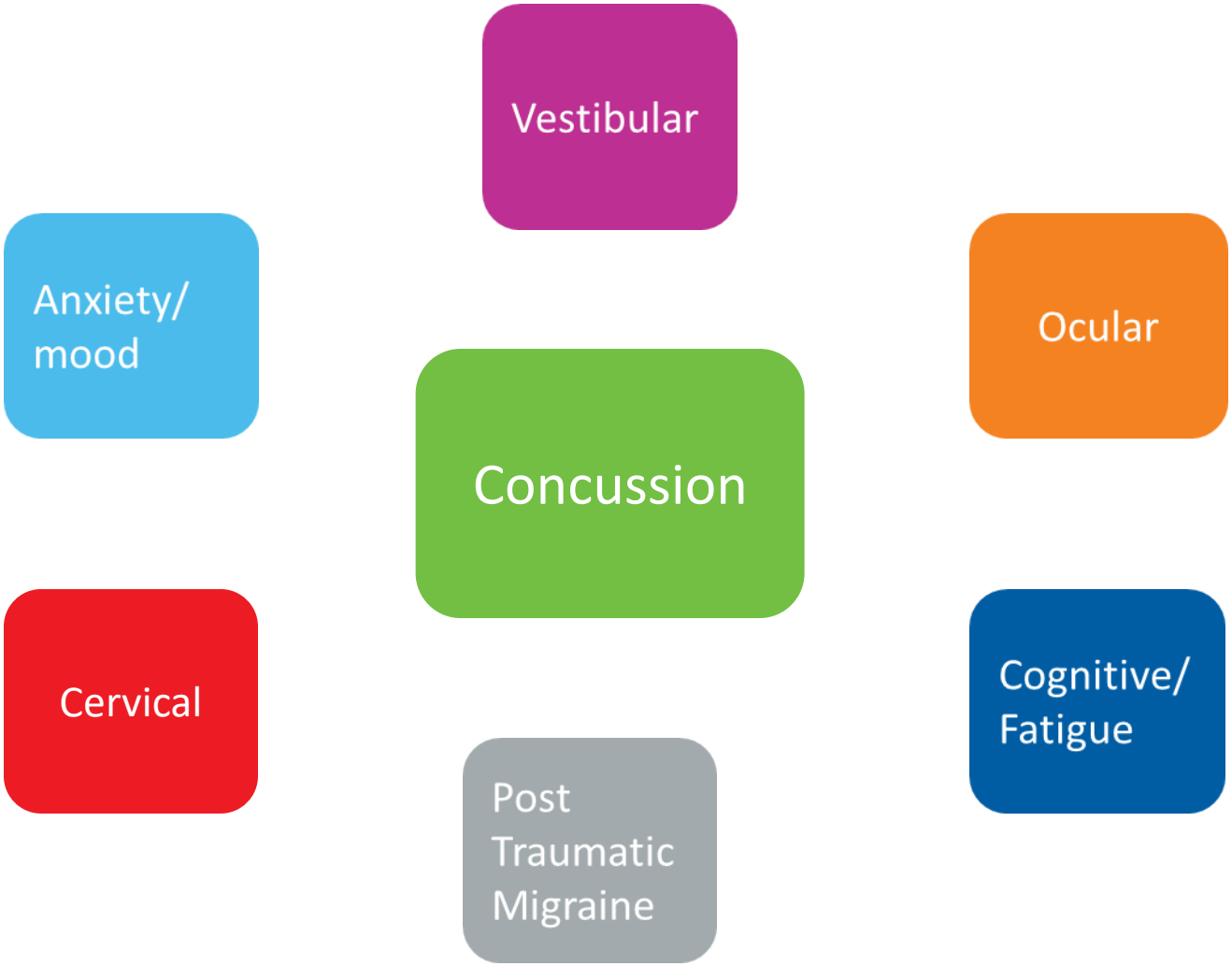
The Impact of Concussion on the Vestibular System

What happens if this system is disrupted?

- A system that is damaged by disease or injury can lead to inappropriate cues to the brain that will result in abnormal information about motion.

- This will then cause abnormal sensations and symptoms regarding motion.

Clinical Subtypes Post Concussion



Collins et al; KSSTA 2014

Prevalence of Vestibular Symptoms/ Disorders

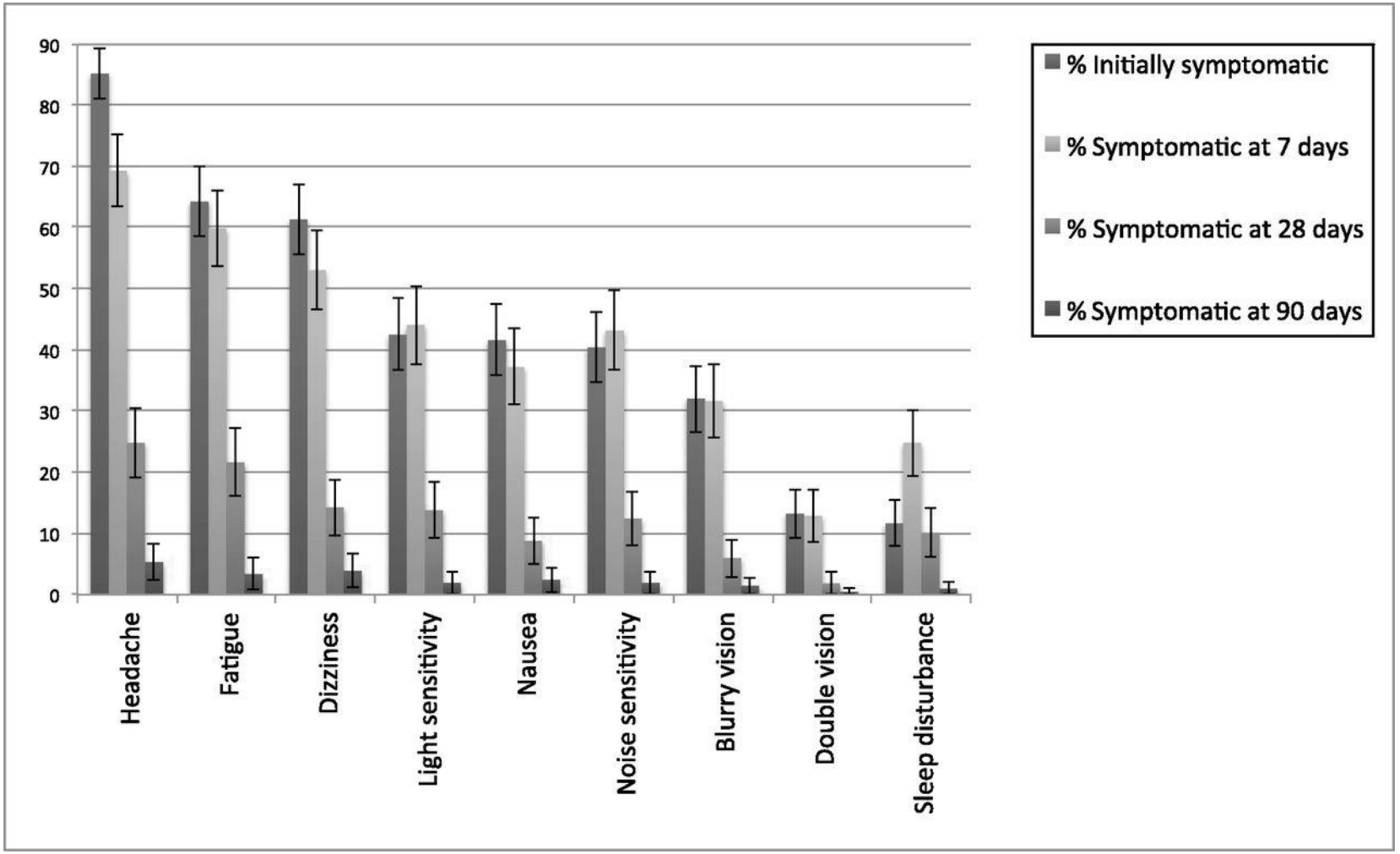
- Concussion population:
  - Headache is the most common symptom reported following a sport-related concussion.
  - ~30% report symptoms of varying balance impairments as long term sequelae.
  - Greater than 50% of athletes report dizziness
  - 38% of TBI-related patients complained of having auditory symptoms.

Concussion Complications

THINKING/ REMEMBERING	PHYSICAL	EMOTIONAL/ MOOD	SLEEP DISTURBANCE
• Difficulty thinking clearly • Feeling slowed down • Difficulty concentrating • Difficulty remembering new information	• Headache • Nausea or vomiting (early on) • Balance problems • Dizziness • Fuzzy or blurry vision • Feeling tired, having no energy • Sensitivity to noise or light	• Irritability • Sadness • More emotional • Nervousness or anxiety	• Sleeping more than usual • Sleeping less than usual • Trouble falling asleep

http://www.ohsu.edu/xd/health/services/ortho/getting-treatment/services/sports-medicine-clinic/treatment/images/Signs-and-Symptoms-of-Concussion_1.jpg

Duration and Course of Post-Concussive Symptoms



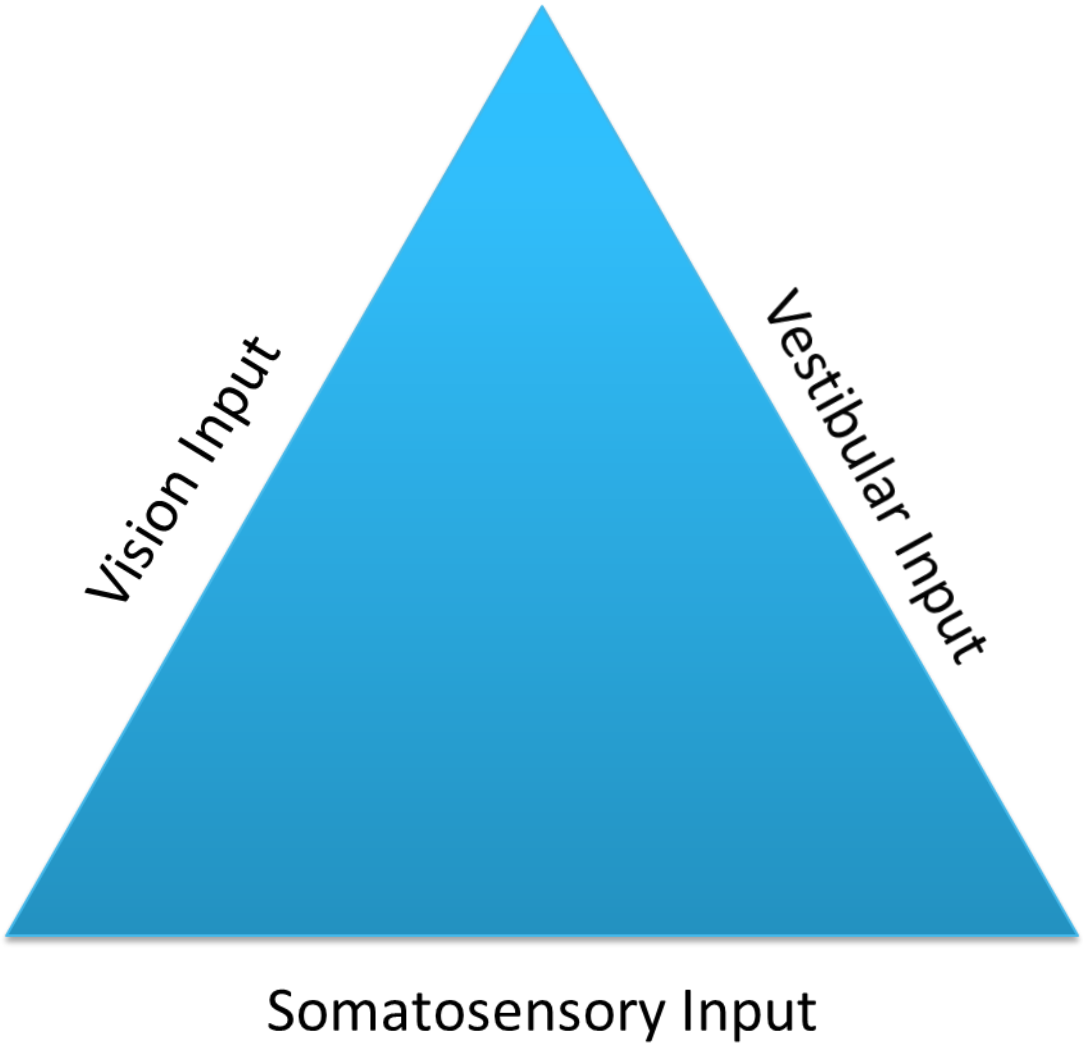
Pediatrics June 2014, VOLUME 133 / ISSUE 6 Article

Duration and Course of Post-Concussive Symptoms

Matthew A. Eisenberg, William P. Meehan III, Rebekah Mannix

Balance Overview

Balance System



How is balance achieved?

Vision

- Tells how person is oriented relative to other objects

Touch/Somatosensory

- Cues used from skin, muscles, and joints

Vestibular system

- Organs inside the inner ear detect linear and angular movement

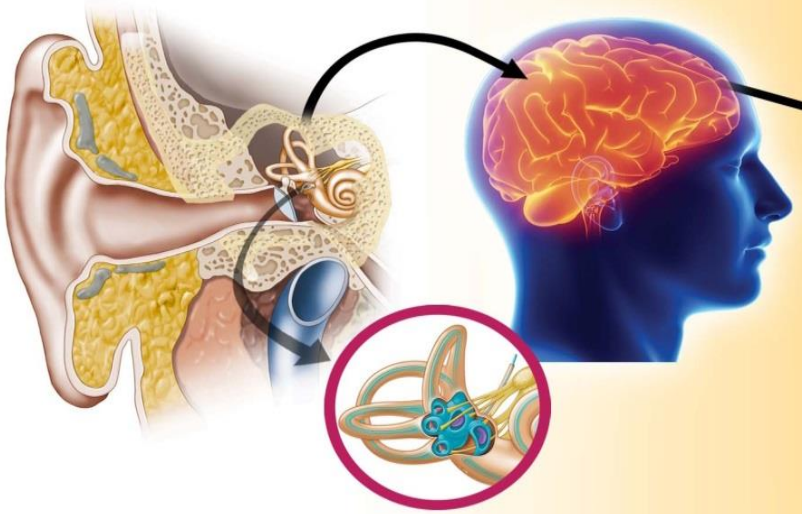
What is balance and how is it achieved?

- Balance: The ability to maintain our bodies center of mass over our base of support so that we can:
  - See clearly while moving
  - Orient with gravity
  - Determine direction and speed of movement
  - Make postural adjustments to stay stable

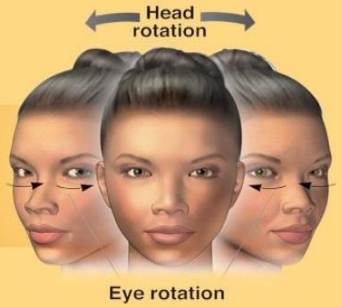
- How is balance achieved?
  - Through sensory input from vision, touch, and the vestibular system.

Your Balance System in Action

This is your vestibular (balance) system, which is part of your inner ear. It sends information about head motion and orientation to the brain for processing in order to send the right commands to the rest of your body.



Gaze Stability
Coordinates eye and head movements



Gait Stability
Keeps you upright and stable

Spatial Orientation
Maintains your sense of equilibrium

Massachusetts Eye and Ear

https://focus.masseyeandear.org/body-maintain-sense-balance/

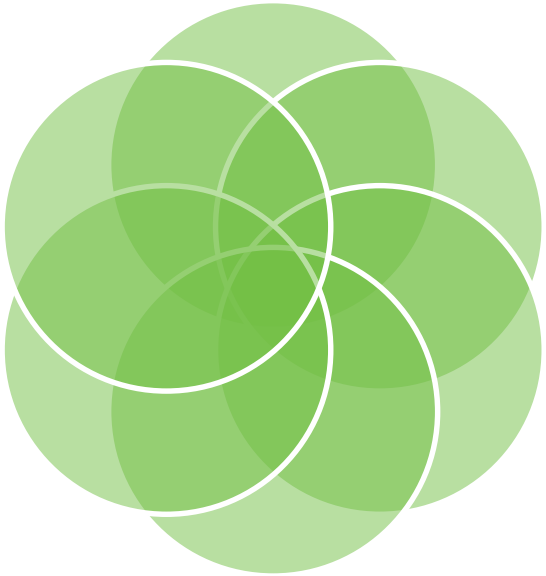
Vestibular Assessment and Treatment Options

Importance of Vestibular Assessment

Early identification of concussion and need for rehabilitation:

Submaximal exercise (prescribed exercise) is shown to decrease recovery times

Research indicates that multifaceted physical therapy improves return to sport (with in 8 weeks)



Rehabilitation improves mood, psychological disorders and sleep disturbances when prescription exercises is completed

Prolonged recovery times are related to vision and cervical dizziness, not stationary balance alone.

Balance is the first symptom to recovery, but cervical dizziness and vision disturbance tend to linger longer

Who We Are: CHOA's Vestibular Team

- A group of physical therapists and an audiologist who have received specialized training in the assessment and rehabilitation of a variety of vestibular disorders including the post concussive and sensorineural hearing loss/post cochlear implant populations.

How to determine vestibular therapy approach?

Once referral has been made, we will often speak with pt's physician to determine what testing may be appropriate

- Determining Factors (audiology vs. physical therapy):
    - Symptoms
    - Patient age
    - Developmental level

- Pending results of initial evaluation, audiology and physical therapy work as a team with the referring provider to determine if further work up is warranted from other disciplines

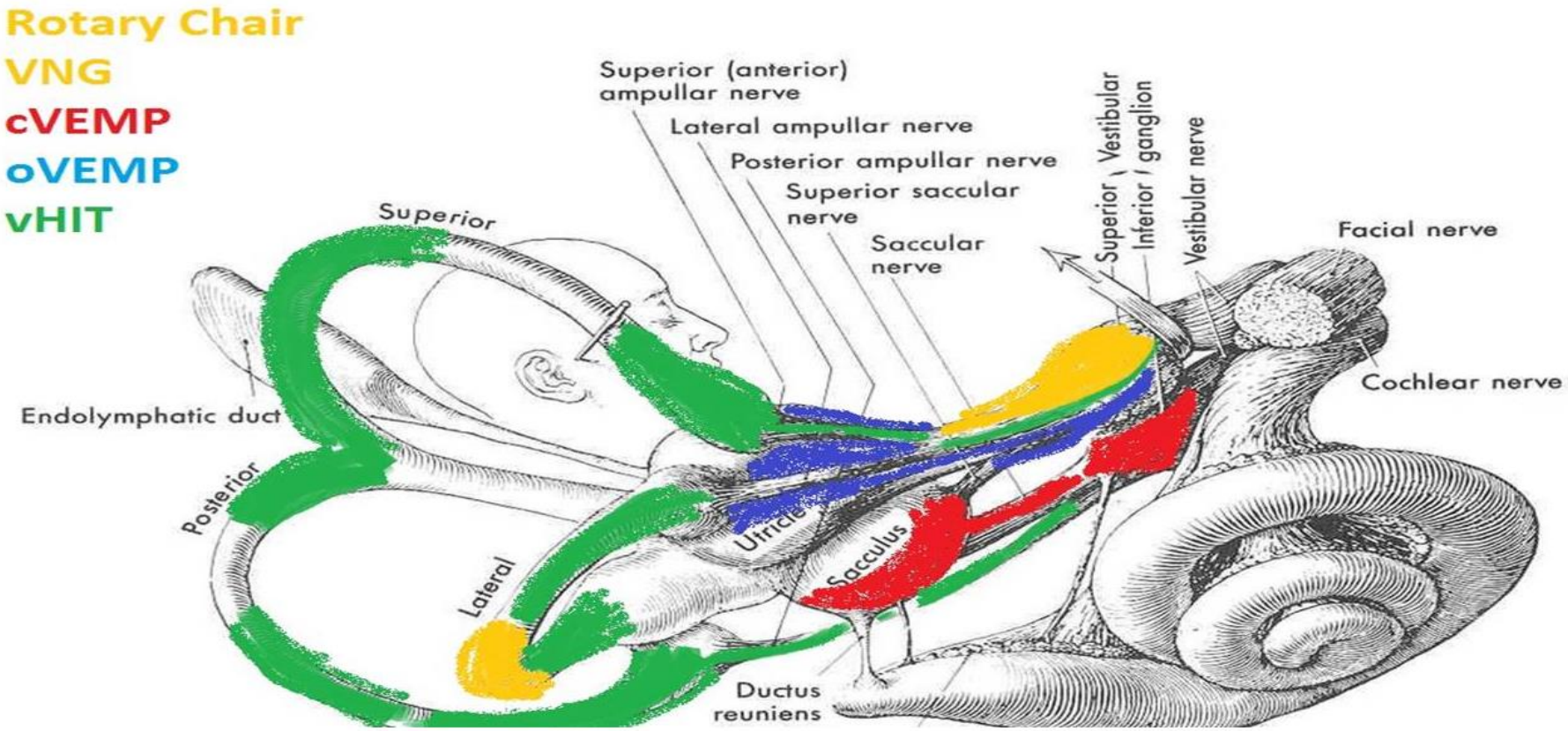
Role of Audiology

- Many changes can occur to the ear, causing reversible or sometimes even irreversible damage

- Because it is difficult to address subjective complaints in the absence of hard signs on CT and MRIs, it is important for audiologists working with patients with these symptoms to try and objectively quantify the balance disorder, so we can monitor the dysfunction and the recovery process

Diagnostic Vestibular Testing - Audiology

- Provides **quantitative** information
- To monitor progress with treatments or therapies



Violette Lavender, Cincinnati Children's

Audiological Findings Post Concussion

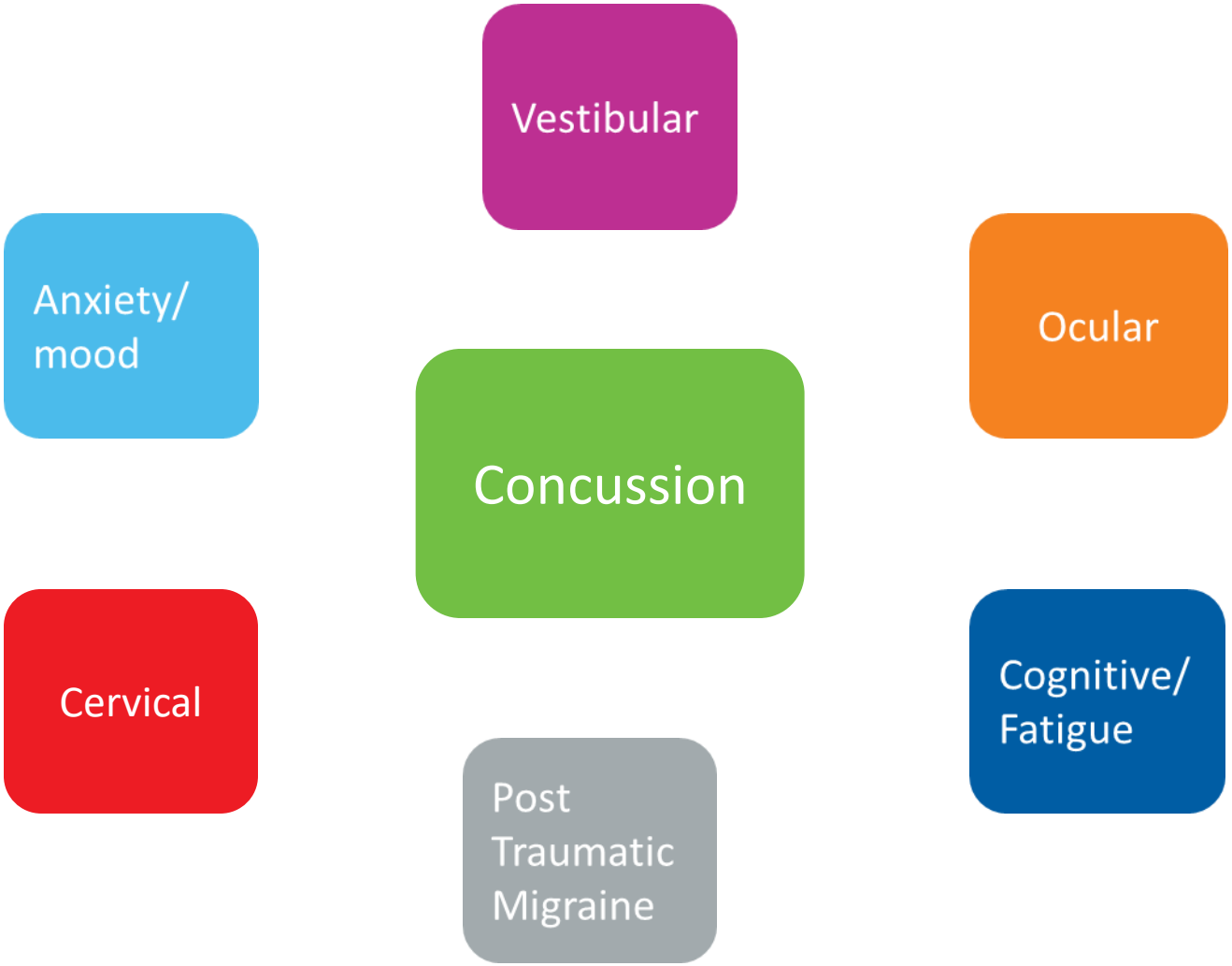
Peripheral	Central
Benign Paroxysmal Positional Vertigo	Post-traumatic Migraine Disorder
Perilymph Fistula	Psychogenic dizziness
Temporal Bone Fracture	
Labyrinthine Concussion	
Post-traumatic Meneire's Disease	

Physical Therapy Evaluation

- **Physical Therapy Evaluation**
  - In conjunction with headaches and difficulty attending to tasks, the most common deficits are directly related to gaze stability and cervogenic dizziness.

- **Vestibular Physical Therapy looks at:**
  - Ocular Motor
  - Canal Function
  - Gaze Stability
  - Otolith/utricle
  - Physical balance

Clinical Subtypes Post Concussion



Collins et al; KSSTA 2014

Cervical (aka Neck) Subtype

- Muscle trauma and inflammation from injury
- Impaired ability to sense and perceive movement of the neck

Symptoms:

- Neck pain, stiffness and decreased range of motion
- Headaches that are worsened by excessive head motion
- Poor posture

Treatment:

- Manual therapy
- Vestibular Training
- Neck strengthening and coordination of movement

Treatment- Cervical (aka Neck) Subtype

What is Manual Therapy?

- Guide to Physical Therapy Practice-

  … “Skilled hand movements and skilled passive movements of joints and soft tissue”

Why is it performed?

- Decrease tissue tightness
- Increase range of motion
- Relaxation of joints and muscle
- Mobilize or manipulate soft tissue joints
- Decrease tissue swelling and inflammation

Treatment- Cervical (aka Neck) Subtype

Vestibular Training

- Geared toward training a patient's eyes to be stable when the head is moving
- Helps with dynamic posture and balance

Neck strengthening and coordination

- Training of deep cervical neck musculature
- Improving posture and improved movement coordination

Treatment- Vestibular-Ocular Sub-type

What is Vestibular therapy?

- Guide to Physical Therapy Practice -

  …"is an exercise-based program, designed by a specialized physical therapist, to improve balance and reduce dizziness-related problems"

- **Why is it performed?**
  - Decrease Headaches
  - Improve Balance
  - Decrease Anxiety and Depression
  - Eliminate Dizziness
  - Decrease effects of decreased mobility (deconditioning)
  - Return to baseline function as soon as possible

Vestibular-Ocular Sub-type

- Poor ability to maintain clear vision when moving/dizziness and headache
- Impaired ability to sense and perceive where you are in space (eyes closed balance)

Symptoms:

- Dizziness
- Headaches that are worsened by excessive head motion
- Imbalance in busy environment
- Extreme fatigue and exacerbation of symptoms with return to school

Treatment:

- Gaze Stabilization
- Oculomotor control
- Vestibular Re- training (habituation)
- Sub maximal controlled exercise

Treatment- Vestibular-Ocular Sub-type

Vestibular training

- Geared toward training a patient's eyes to be stable when the head is moving
- Helps with dynamic posture and balance
- Habituation
- Optokinetic

Ocular training

- Geared toward training a patient's eyes to be stable when the head is moving
- Helps with dynamic posture and balance
- Convergence/divergence
- Smooth Pursuits
- Saccades

When to Refer:
Sport Rehab vs. Traditional Vestibular Rehab

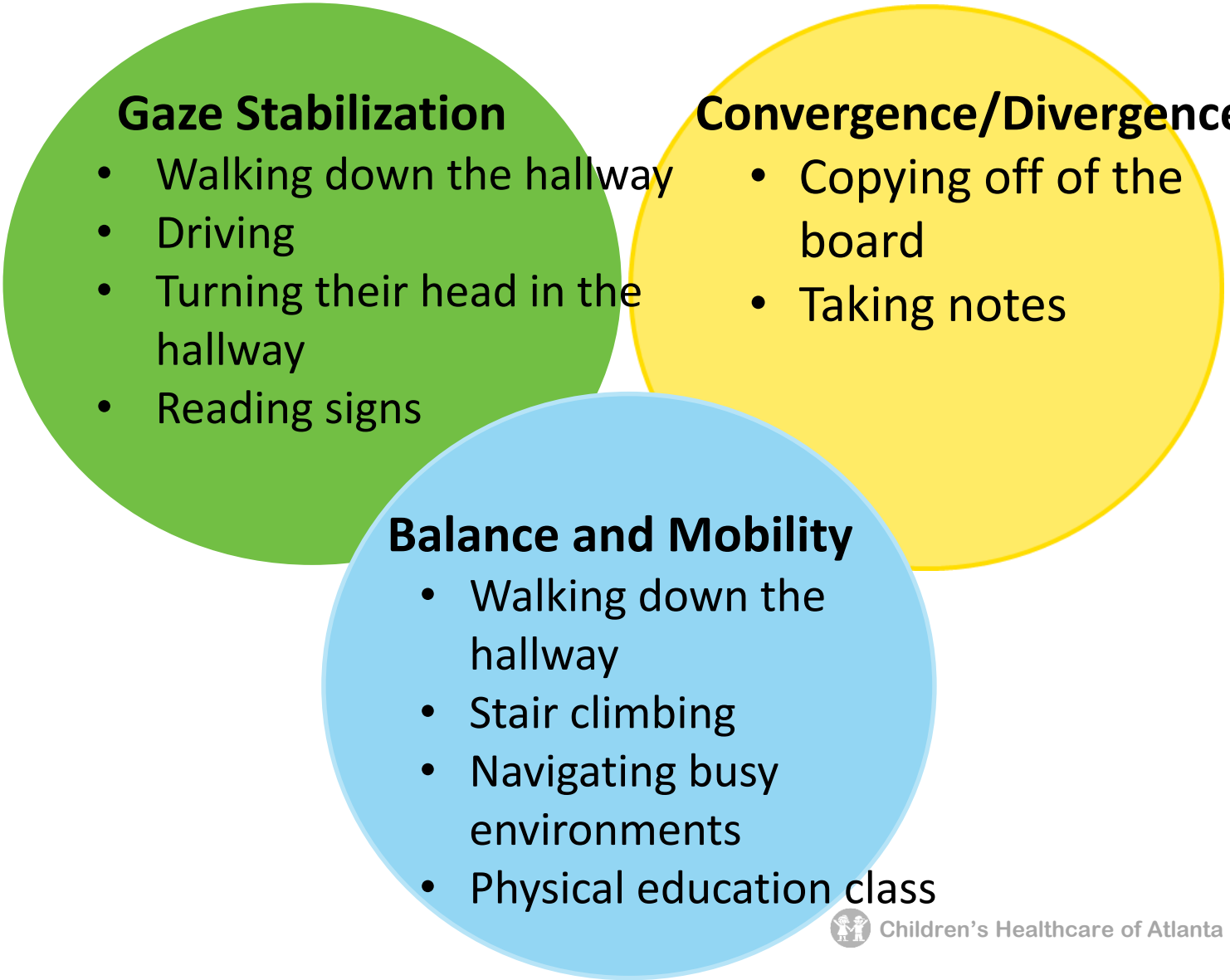
Sports Medicine

- Neck strain
- Headaches secondary to cervical spine dysfunction
- Mixed Presentation (symptoms from multiple subtypes)

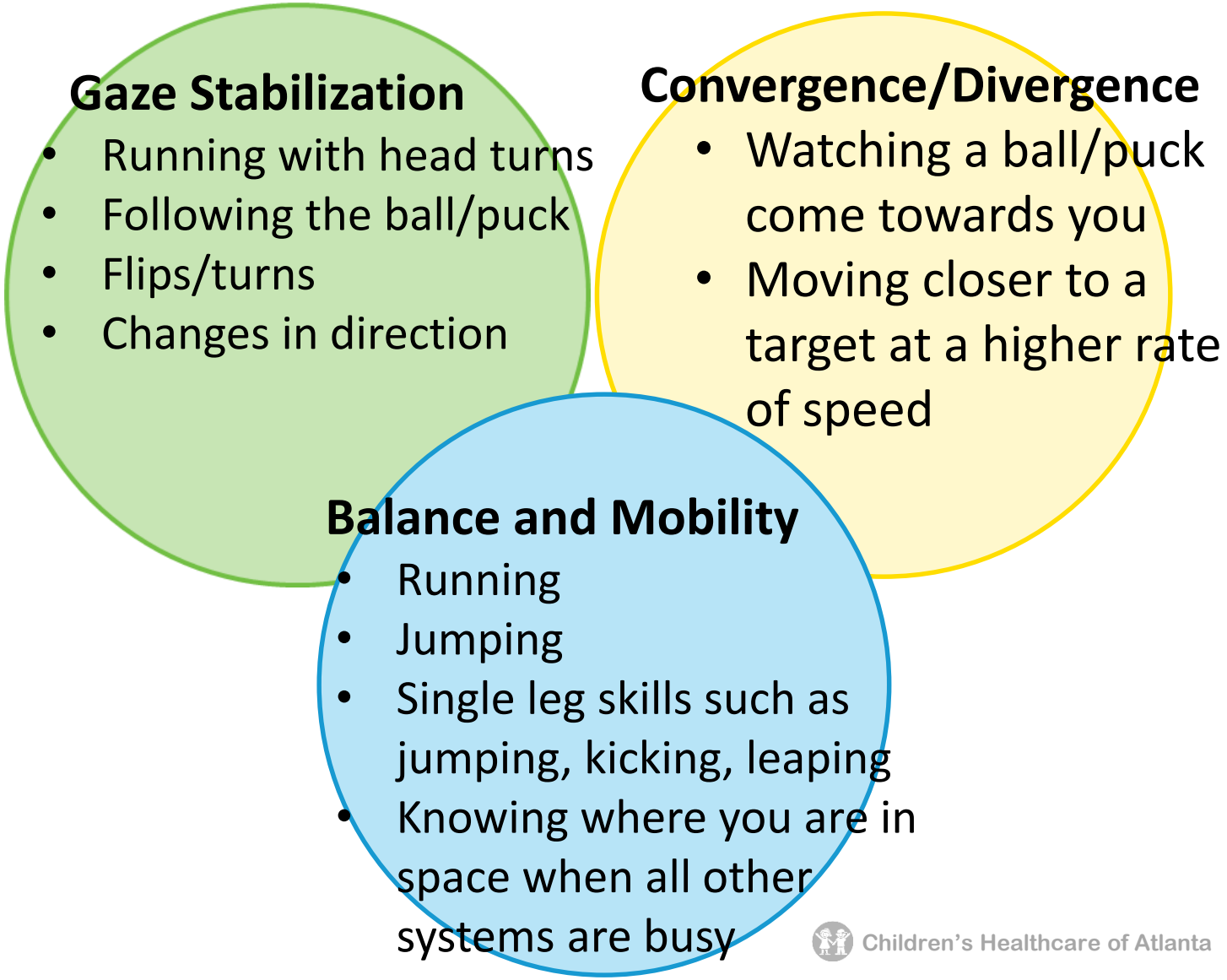
Vestibular Rehab

- Balance deficits
- Headaches when moving
- Vertigo/dizziness
- Poor Postural Control (poor BESS score)

Impacts of Vestibular Therapy on Return to Learn



Impacts of Vestibular Therapy for Return to Sport



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