



Concussion Management with Vestibular Rehab

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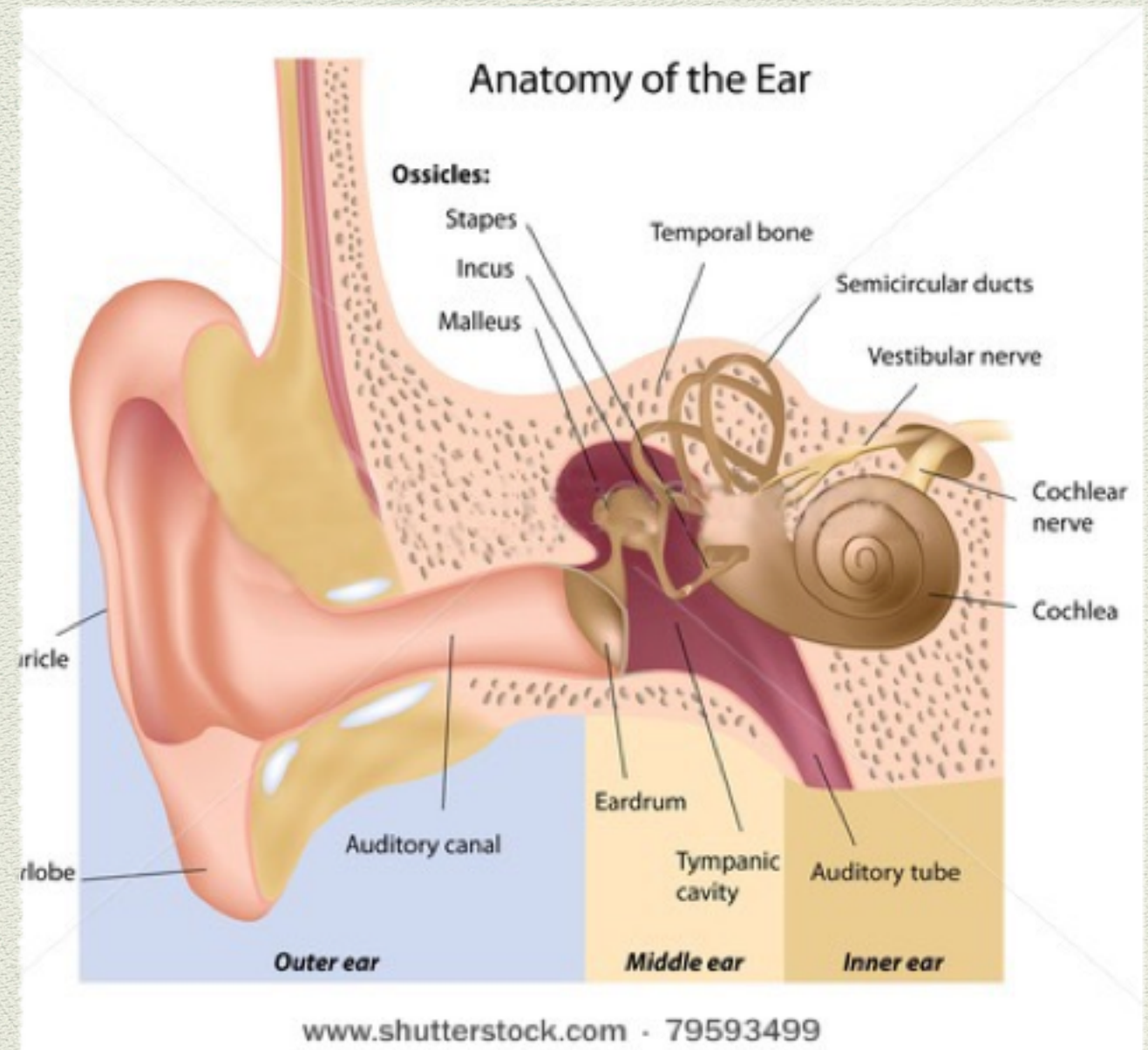
Stanford Health Care

Objectives

- ◆ Ability to define vestibular rehabilitation
- ◆ Understand the importance of a vestibular evaluation after a concussion
- ◆ Identify other therapies involved in rehabilitation

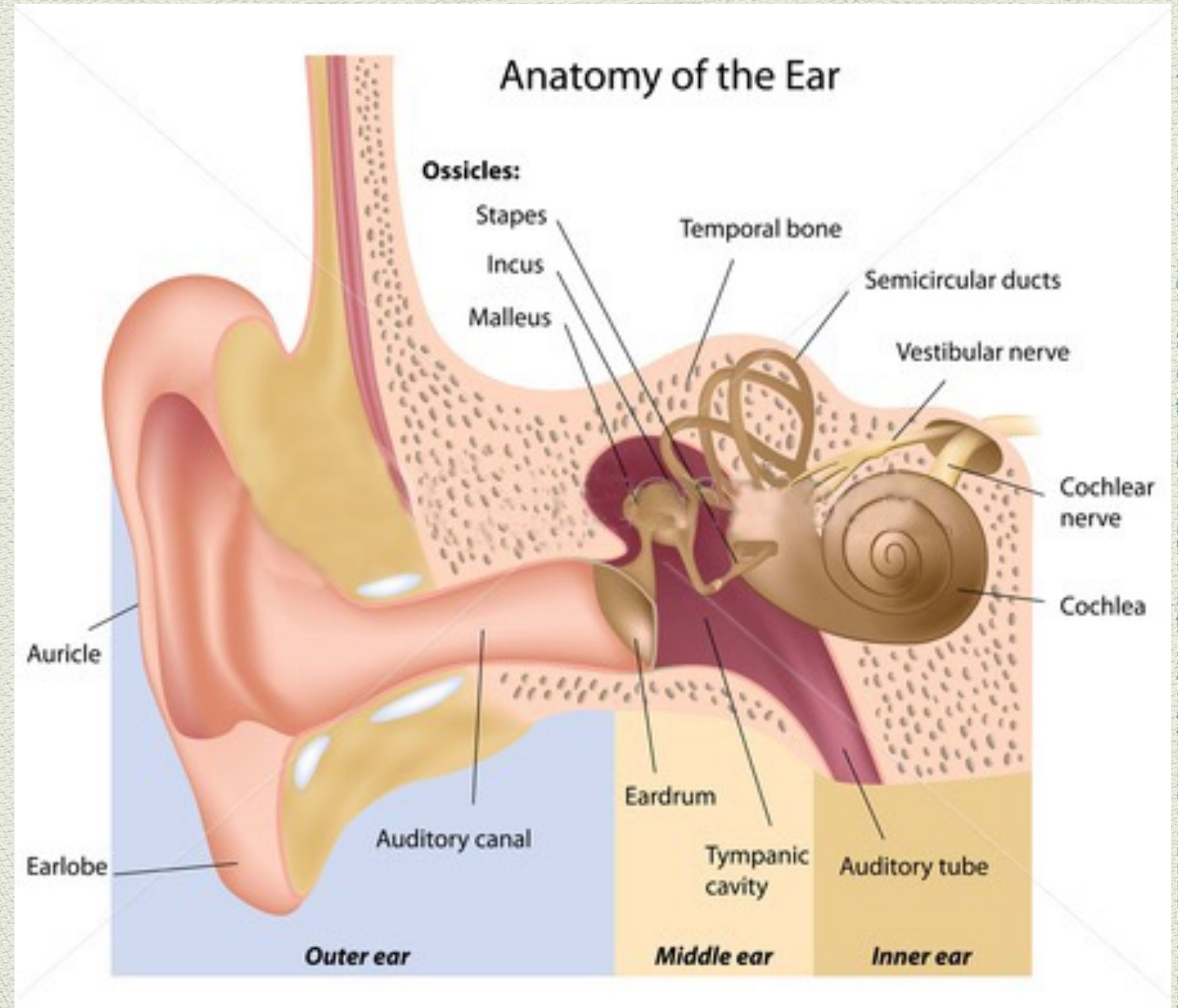
Vestibular System

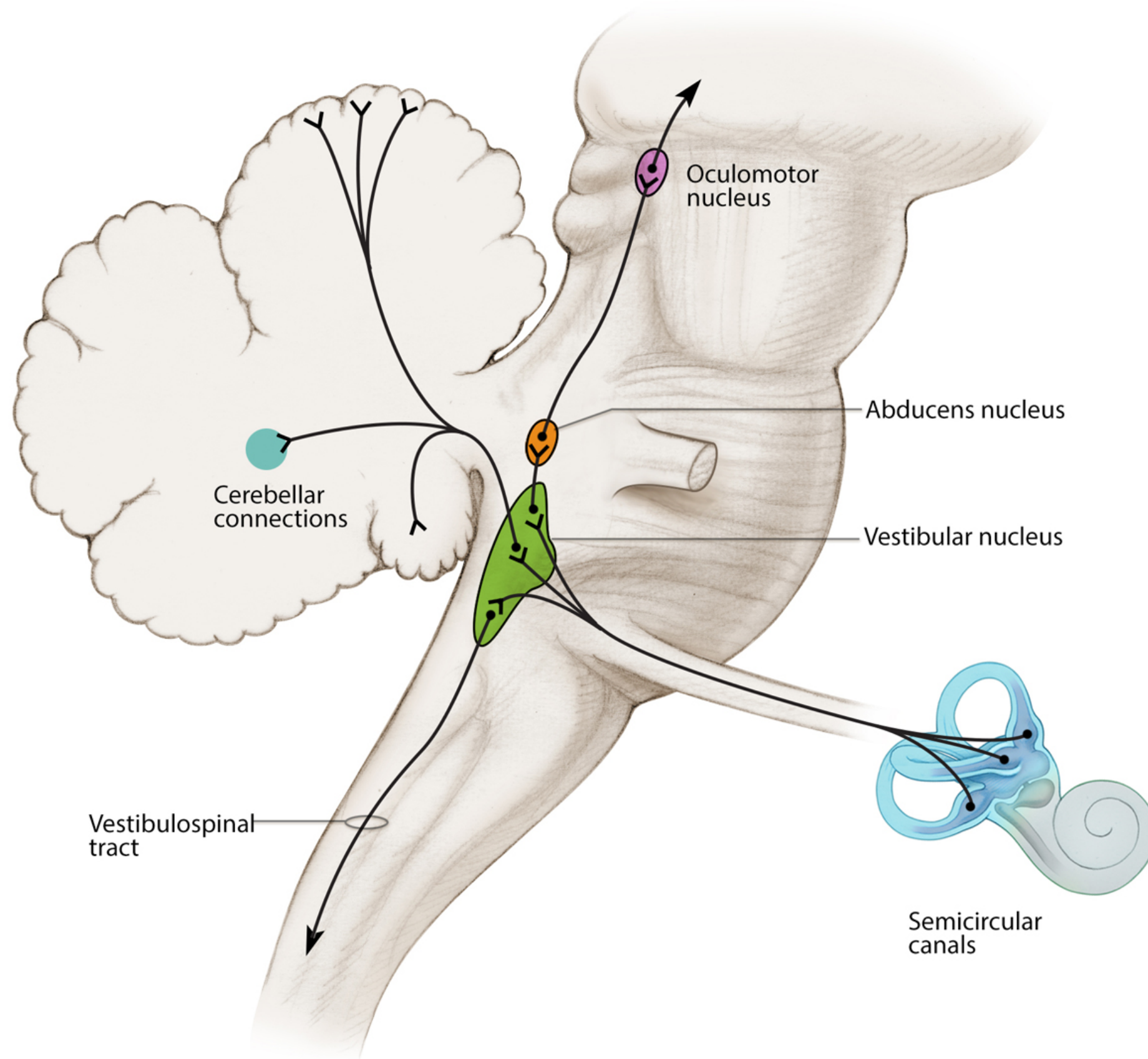
- ◆ Inner ear
- ◆ Functions
 - ◆ Motion perception
 - ◆ Spatial orientation
 - ◆ Head/eye coordination
 - ◆ Balance & posture



Vestibular System

- Communication
 - Central nervous system
 - Brain, cerebellum, & brainstem
 - Ocular motor system
 - Muscles control eye movement





Symptoms Related to Vestibular

- ◆ Dizziness
 - ◆ Reported by 50% of concussed athletes
- ◆ Vertigo
- ◆ Motion sensitivity, nausea
- ◆ Imbalance



Vestibular System and Dizziness

- ◆ Head and eye coordination (Vestibular Ocular Reflex)
 - ◆ Head movement stimulates the vestibular system
 - ◆ Angular & linear acceleration and gravitational forces
- ◆ The vestibular nerve communicates direction of motion through the central nervous system (CNS)
- ◆ The CNS projects this communication so that eye movement is equal and opposite. This keeps objects in focus.
- ◆ Treatment focuses on improving the interpretation of vestibular information



Vestibular System and Concussion

- ◆ After a concussion, the central nervous system (CNS) has decreased ability to integrate vestibular input
- ◆ It is important to evaluate whether the inner ear is affected in addition to the central interpretation of the vestibular system
- ◆ If the inner ear is also involved; it will lead to a longer recovery process
- ◆ It is a misconception that movements that may cause the manifestation of symptoms should be halted. These movements should actually be promoted to retrain the brain.

Vestibular System and Balance

- ✦ Sensory organization
 - ✦ Three sensory systems send information to the central nervous system informing it where we are in space
 - ✦ Vision
 - ✦ Vestibular
 - ✦ Somatosensory (touch, pressure, and joint position)
 - ✦ CNS interprets the information and directs the proper balance strategies
 - ✦ Ankle
 - ✦ Hip
 - ✦ Stepping



Vestibular System and Balance

- ◆ Static balance
 - ◆ Focuses on perfecting the efficiency of the ankle and hip strategies
- ◆ Treatment
 - ◆ Narrow base of support
 - ◆ Stand on uneven and compliant surfaces
 - ◆ Head movement and /or eye movement

Vestibular System and Balance

- ◆ Dynamic balance
 - ◆ Involves walking tasks and dual/multi-tasking that integrate vestibular, visual, and cognitive
- ◆ Treatment
 - ◆ Head turns
 - ◆ Eyes closed
 - ◆ Ball toss
 - ◆ Count backwards by 3's
 - ◆ Treadmill



Ocular Motor System

- ◆ Involves the coordination of the eyes
- ◆ Required to function effectively for the vestibular system to work at peak performance
- ◆ Symptoms
 - ◆ Headaches while reading
 - ◆ Difficulty with a visually complex background
 - ◆ Dizziness
 - ◆ Difficulty tracking letters on a page
 - ◆ Blurred vision

Ocular Motor System

- ♦ Eye Coordination
- ♦ Convergence / Divergence
 - ♦ Ability to bring eye in and out to keep an object in focus
- ♦ Saccades
 - ♦ Rapid eye movement to keep an object in focus
- ♦ Pursuits
 - ♦ Ability to follow an object in motion and maintain focus
- ♦ May require an evaluation by a behavioral optometrist followed by vision therapy

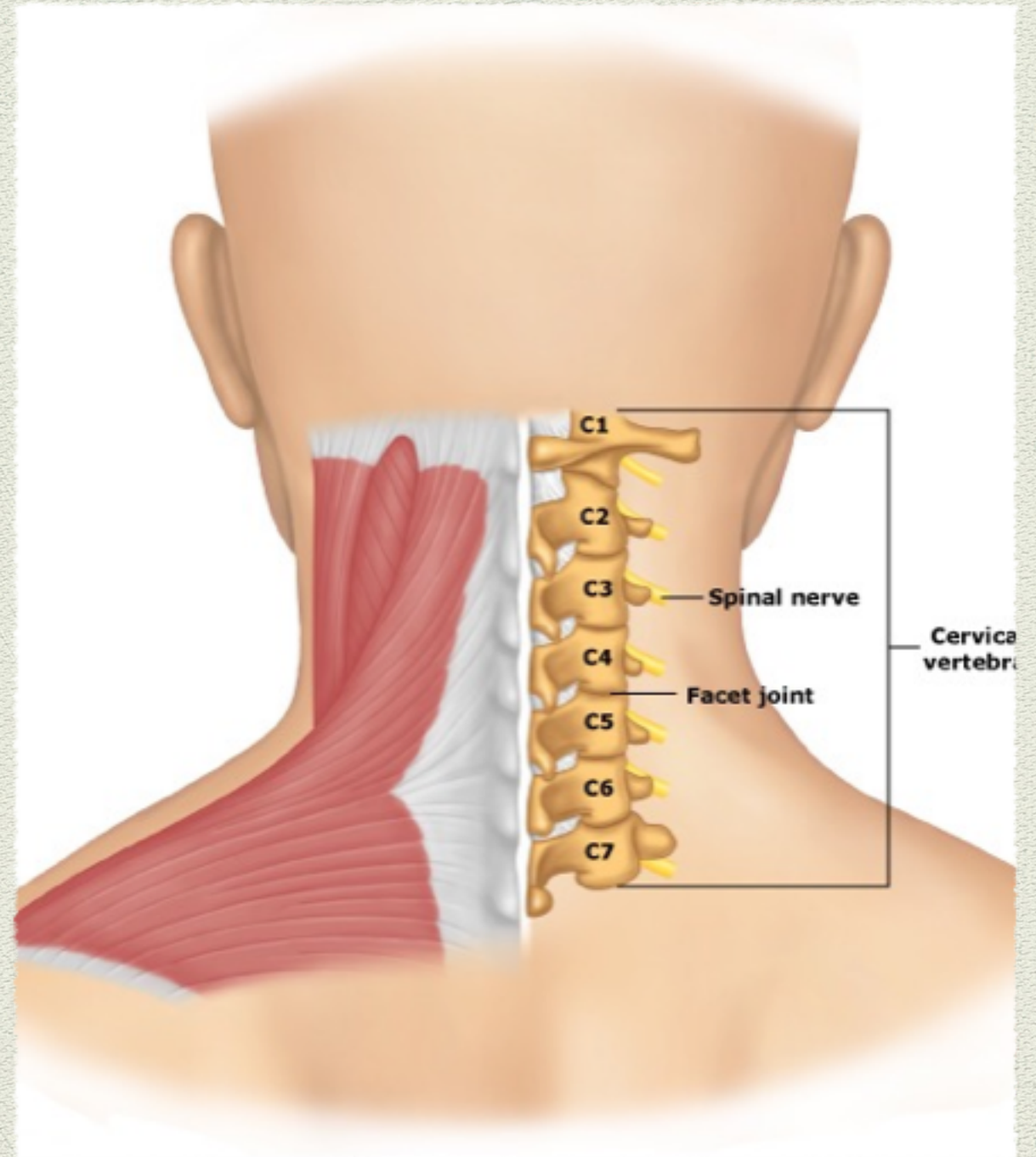


Cervical Spine

- ◆ Cervical spine trauma may cause prolonged post concussion headaches
- ◆ Treatment of the cervical spine has demonstrated improvements with suspected cervicogenic dizziness
 - ◆ Dizziness associated with the cervical spine
- ◆ Highly developed proprioception in joints
 - ◆ Utilization of vestibular and visual systems

Cervical Spine

- ◆ Symptoms
 - ◆ Dizziness or floating
 - ◆ Lightheaded or detached
 - ◆ Imbalance
 - ◆ Association with visual motion discomfort
- ◆ Pain
 - ◆ Headaches and muscle tension
- ◆ Blurred vision



Exertion Therapy

- ◆ Return to physical activity
- ◆ CA policy for schools
 - ◆ Requires completion of a return-to-play protocol
 - ◆ Protocol must be at least 7 days and performed by a licensed health care provider
 - ◆ Each year a concussion and head injury information sheet must be signed by the parents/guardians and athlete



Exertion Therapy

- ◆ 5 Stages of exertion
- ◆ Individualized program of physical activity including cardiovascular, strengthening, stretching, and balance
- ◆ Integration of vestibular components with progression
- ◆ Monitor patients
 - ◆ Target heart rate
 - ◆ Borg - Rate of perceived exertion
 - ◆ Balance
 - ◆ Symptoms

6	No exertion
7	
8	
9	
10	
11	Light
12	
13	Somewhat hard
14	
15	Hard (heavy)
16	
17	Very hard
18	
19	
20	Maximal exertion

Participation

- Vestibular rehab will be a factor in return to sports and school
- Physician is responsible for providing clearance to return to sports and guidelines for accommodations



Psychosocial

- ◆ Anxiety & depression can amplify symptoms that present after a concussion
- ◆ Vestibular rehab and exertion assist in decrease anxiety & depression
- ◆ Psychologist will assist in coping strategies

Occupational Therapy

- ◆ Concussions can impact occupational performance, return to life roles and one's quality of life
- ◆ Occupational therapists analyze activities and identify limiting patient factors or environmental barriers that may prevent full participation
- ◆ Evaluate visual skills with function and sensory processing

Speech Language Pathology

- ◆ Evaluate and improve the cognitive process
 - ◆ Attention
 - ◆ Memory
 - ◆ Organization
 - ◆ Problem solving / reasoning
 - ◆ Executive functions
 - ◆ Mental skills needed to perform tasks
 - ◆ Manage time, plan / organize, remember details, performance based on experience, and switch focus



Resources

- ◆ Support Groups

- ◆ Mid-Peninsula concussion support group

- ◆ stanfordbraininjury@gmail.com (Jaclyn Konopka)

- ◆ Websites

- ◆ www.vestibular.org

- ◆ www.neuropt.org

- ◆ www.covd.org

- ◆ www.concussionpolicyandthelaw.com/tag/california/

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