Collaboration in the Care for Vestibular Patients

Rehab Education Lecture Series

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BELIEVE IN *WE*™ OhioHealth

Objectives

- To promote and maintain collaboration between OhioHealth interdisciplinary care for Vestibular patients
- To educate regarding the roles of ENT, Audiology, and Vestibular therapy across the continuum of care for Vestibular patients (acute vs sub-acute/chronic)
- To identify and educate regarding the differences in training and what assessments are completed by ENT, Audiology, and Vestibular PT
- To identify and educate regarding when referral should be may to ENT vs Audiology vs Vestibular PT vs Neurology

Facts

- Vertigo is among main complaint in ED at 4.4% in United States[3] and is chief complaint of ~ 3% Americans seeking healthcare[4]
- BPPV continues to remain the most common cause of acute vertigo but it's not the *only* cause
- Continued variances in treatment from specialties
  - For BPPV, ENTs prescribed Epley maneuver vs emergency physicians and PCPs preferred betahistine hydrochloride[3]
- Research shows 35.4% of US adults aged 40 years and older (69 million Americans) had vestibular dysfunction[1]

Sakumura J, Gans R. Fall Risk Management in Audiology and ENT Practice: The Role of Cognitive, Vestibular, and Auditory Function: This is significant multidisciplinary interest in modifying risk factors for falling in the population of older adults. *Hearing Review.* 2023;30(3):16-20.

- "Patients presenting to providers with generic complaints of imbalance, recent falls, or dizziness should undergo postural stability testing, comprehensive neurodiagnostic evaluation of the audio-vestibular system, and cognitive screening as the first step of a fall risk management program."
- "Patients with hearing loss should be counseled about the effect of untreated hearing loss on postural stability and the increased fall risk, even in individuals as young as 40 years of age."

Comorbidity	Association With Fall Risk
Hearing Loss	Risk of falling 3x higher in patients with hearing loss compared to those with normal hearing. (Viljanen et al. 2009; Lin & Ferrucci 2012; Tin-Lok Jian, Li, & Agarwal, 2016).
Cognitive Impairment	Patients with mild cognitive impairment 14X more likely to have degraded postural stability and elevated fall risk. (Chua, Fauble, & Gans, 2022)
Vestibular Dysfunction	Adults with vestibular dysfunction 12X increase in risk of falling (Agarwal et al. 2004)

Collaboration in the

Care for Vestibular Patients

Vestibular Physical Therapists

the

Primary Care Provides

for

Vestibular Patients

The Challenge

“There can be few physicians so dedicated to their art that they do not experience a slight decline in spirits on learning that their patient’s complaint is of dizziness”

“This frequently means that after exhaustive inquiry it will still not be entirely clear what it is that the patient feels wrong and even less so why he feels it.”

Mathews, W.B.: Practical Neurology, 1975

Charcot's Assertion

In the last analysis we see only
what we have been taught to see.

Referral to Vestibular Physical Therapy

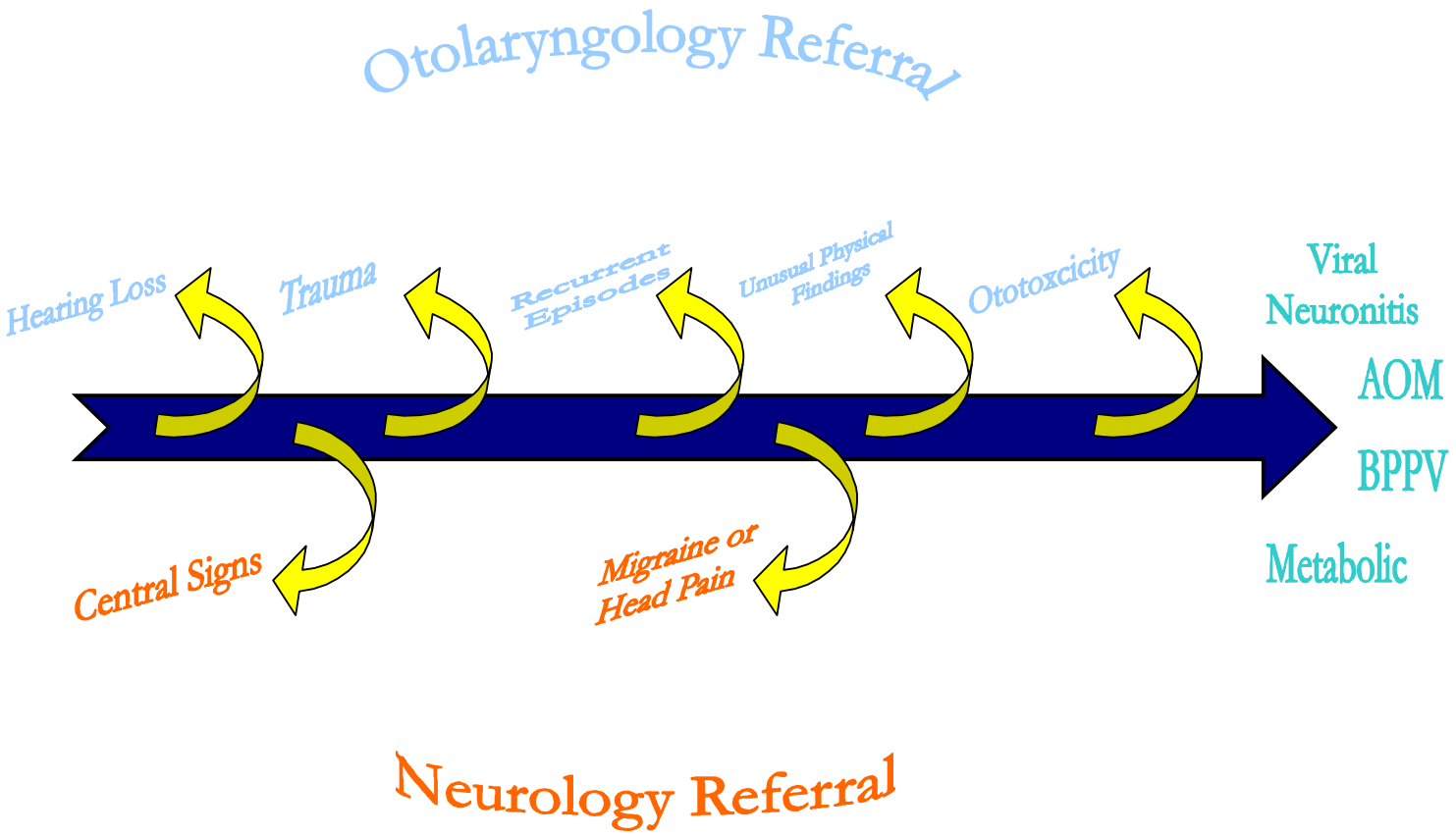
Indications

- BPPV
- Vestibular Hypofunction
  - unilateral or bilateral
- Uncompensated Peripheral Vestibular Lesion
- Visual Motion Sensitivity
- Concussion / TBI
- Generalized Loss of Balance

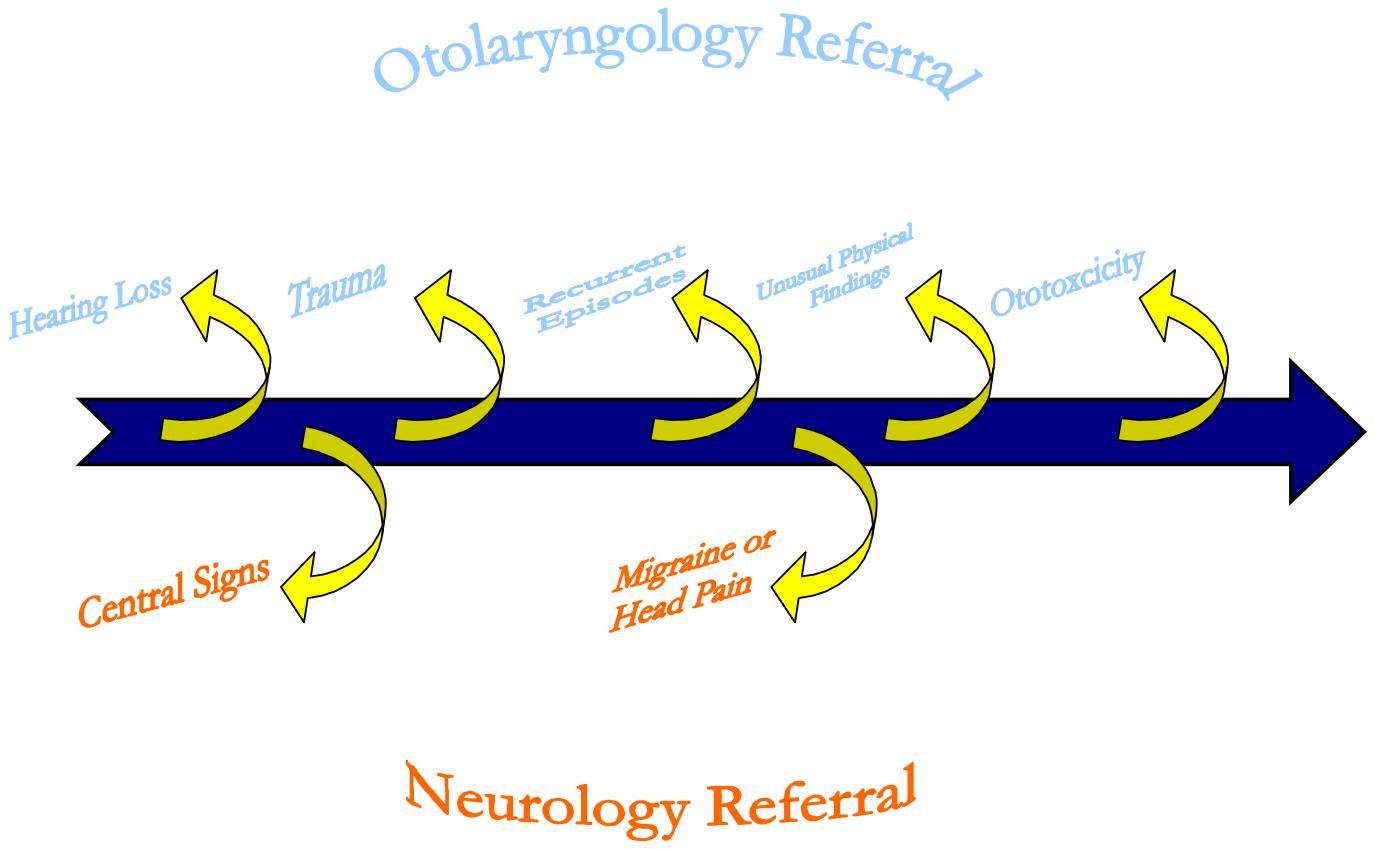
Contraindicated

- Spontaneous Vertigo without Precipitating Cause
- Fluctuation or Unstable Vestibular or CNS Lesion

When to Refer



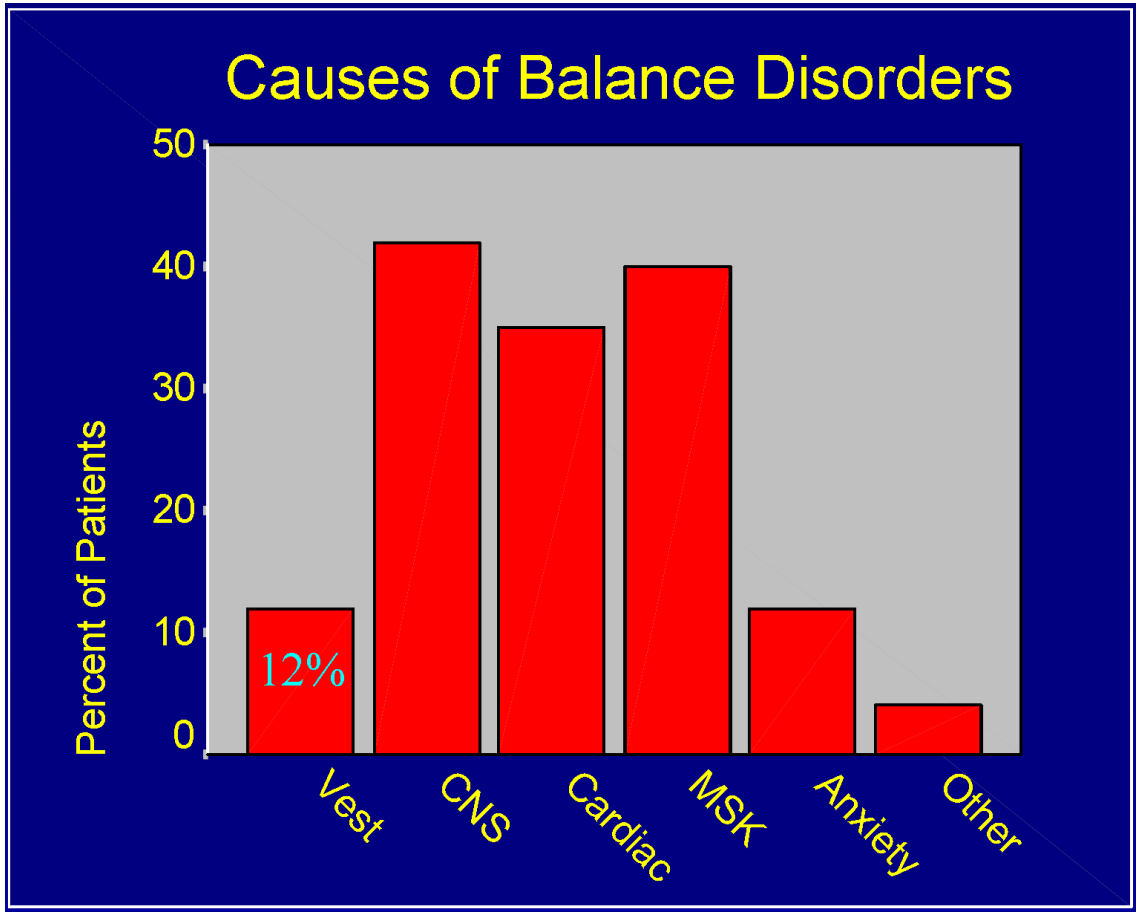
When to Refer



Vestibular PT

- BPPV
- Vestibular Hypofunction
- Cervical Vertigo
- Concussion
- Multifactorial Dizziness of Aging

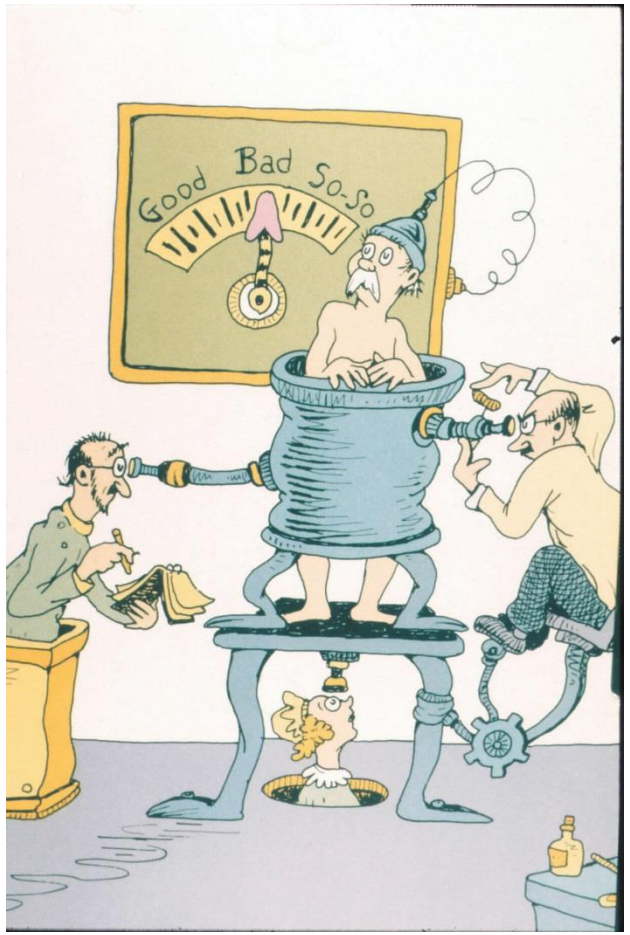
Common Causes of Balance Disorders



Common Medical Causes of Dizziness

- Cardiovascular (23-43%)
  - Orthostatic hypotension
    - “I get dizzy when I stand up from bed in the morning”
  - Arrhythmia
- Infection (4-40%)
- Medication (7-12%)
  - The most common side effect
  - Common withdrawal symptom
- Hypoglycemia (4-5%)

Non-Otology Exam



- General Exam
- Cardiovascular
- Neurology
- Psychiatric

- Ophthalmology
- Neurophthalmology

Metabolic Exam

- TSH
- BUN, Creatinine
- ANA, Sed Rate, Rheumatoid Factor
- Cholesterol
- FBS or 5hr GTT
- FTA and RPR or VDRL

Review of Medications

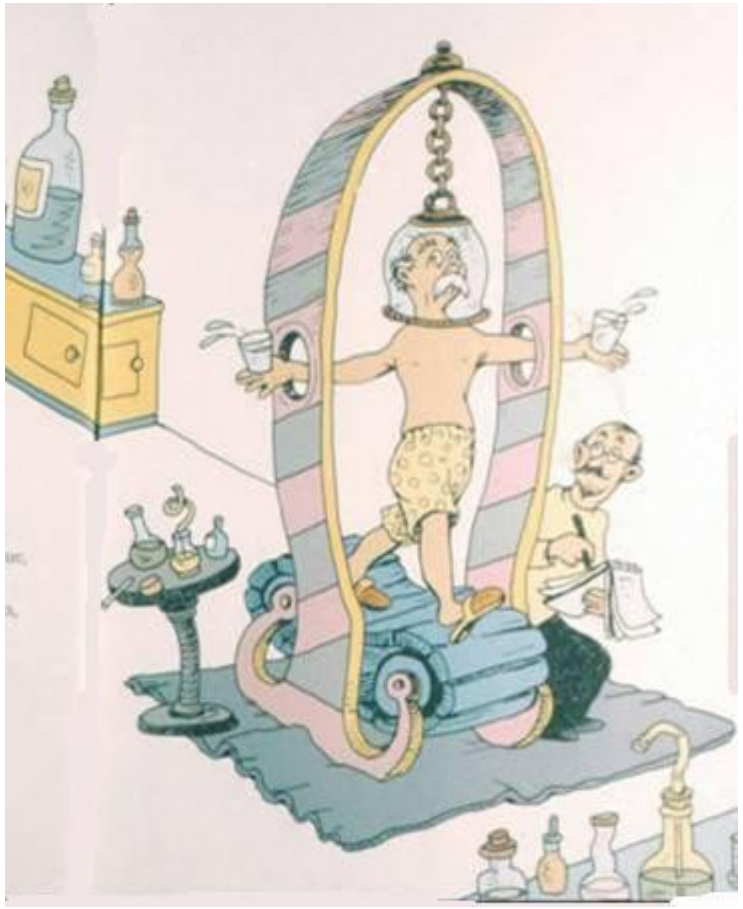
- Anti-epileptics
- Benzodiazepines
- Antihypertensives
- Anti-depressants

Antibiotics		
Quinolones and fluoroquinolones	Aminoglycosides	Macrolides
Cinoxacin	Kanamycin	Erythromycin
Levoxacin	Amikacin	Azithromycin
Ciprofloxacin	Tobramycin	Clarithromycin
	Gentamycin	
Diuretics		
Ethacrynic acid, Furosemide, Hydrochlorothiazide		
Anti-hypertensive		
ACE inhibitors	ARBs	Calcium-channel blockers
Enalapril	Irbesartan	Lacidipine
Zofenopril		Amlodipine
		Nicardipine
Mucolytics		
Carbocysteine		
Anti-inflammatory		
NSAIDs	Salicylates	Analgesics
Ibuprofen	Acetylsalicylic acid	Acetaminophen
Celecoxib		
Diclofenac		
Disketoprofene		
Ketorolac		
Naproxen		
Anti-depressants		
Mirtazapine, Paroxetine, Sertraline, Amitriptyline, Doxepin, Trazodone		
Cholesterol-lowering		
Simvastatin, Atorvastatin		
Anti-fungals		
Amphotericin B, Flucytosine, Itraconozole, Flucanazole		
Anti-malarials		
Chloroquine		

Psychogenic Causes of Dizziness

- Anxiety
  - Hyperventilation / Panic
- Persistent Postural Perceptive Dizziness
- Somatization Disorder (Neurotic)
  - A significant focus on physical symptoms that results in problems functioning
  - Chronic dizziness
  - Numerous bodily ailments
- Agoraphobia
- Malingering
  - Easy Disability

Neuro-Otologic Exam



History

- General
  - Describe first episode
  - Define the dizziness symptom
    - Vertigo
    - Lightheaded
    - Woozy
  - Duration of Attack
  - Is it Episodic
  - Antecedent Symptoms
    - duration, frequency, resolution
- Associated auditory symptoms
  - Fluctuation
  - Tinnitus
- Associated neurological symptoms
  - Visual changes
  - Loss of consciousness
  - Loss of strength or paresis
- Associated medical history
  - Medications
  - Drug use
  - Trauma
  - Social history

The Ultimate Vestibular Lesion

Labyrinthectomy

Physical Exam

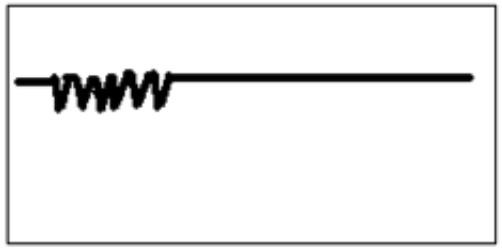
- Otologic exam
- Cranial nerve exam
- Cerebellar exam
  - Gait
  - Rhomberg
- Neuro Otologic exam
  - Spontaneous nystagmus
    - Central vs. Peripheral
  - Hallpike
  - Fistula test
  - Fukuda step test
- Audiometric exam

Differential Diagnosis
Peripheral Vertigo

- Benign Positional Vertigo
- Vestibular Neuritis
- Labyrinthitis
- Meniere's Disease
- Migraine Vertigo
- Delayed Ipsilateral Endolymphatic Hydrops
- Perilymph Fistula
- Autoimmune Vestibular Dysfunction
- Ototoxicity

Trajectory of disease

Benign Positional Vertigo



Vestibular Neuronitis

Meniere's Disease

“Diagnostic Matrix”

		VERTIGO	
		Recurrent Episodes	Non Recurrent Persistent
Hearing Loss	+	Meniere’s	Labyrinthitis
	-	BPPV Migraine Vertigo	Vestibular Neuronitis

Conditions that don't fit "The Matrix"

- Progressive dysequilibrium of aging
- Migraine-associated dizziness
- Cervical vertigo
- Ipsilateral delayed endolymphatic hydrops

Progressive Dysequilibrium of Aging

- Aged patient brought by adult children
- Gradual downward trajectory: gait instability and falls
- Multi-system decline: CNS, ear, vision and proprioception
- General physical deconditioning
- Physical Therapy consult
  - Need every neuron firing
- General Medicine consult
- Others
  - ENT
  - Ophthalmology
  - Neurology

Migraine Vertigo

ICHD Criteria

- Five episodes moderate to severe intensity
  - Last 5 minutes to 72 hours
- Previous history of migraine
- One or more migraine symptoms with 50% of vestibular episodes
  - Photophobia / Phonophobia
  - Aura
  - Hemi-cranial, Pulsatile, Severe intensity
- NO other explanation

Common Associations

- Start at a young age
- Migraine runs in the family
- Anticipation
- Often a pause in headaches for years before the start of vertigo
- Very long duration
- No hearing loss

Treatment of Migraine Vertigo

Over 50 YO

- Nortriptyline 10 mg qHS increase weekly to 50 mg max

Under 50 YO

- Female
  - Topamax 25 mg QD increase weekly
- Male
  - Propanalol LA 60 mg QD slowly increase to max of 120 mg

Cervical Vertigo
Risk Factors

- Whiplash
- Cervical disc disease
- Degenerative arthritis
- Ergonomic stress injury

Quantitative Vestibular Testing

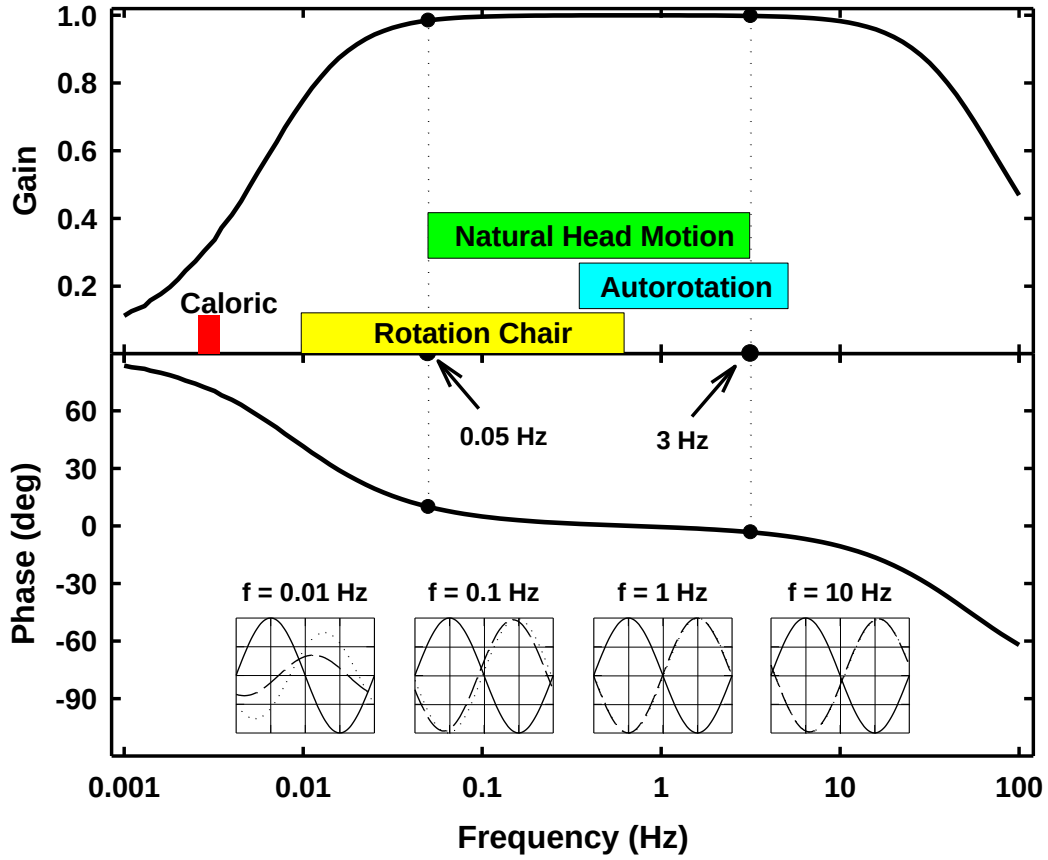
- Diagnosis unclear
- Prolonged symptoms unresponsive to conservative treatment
- Screen for central disorders
- Evaluate prior to medical or surgical ablation procedures
- Documentation of vestibular deficits

Vestibular Testing

- VNG
- vHIT
- VEMP
- ECoG
- Rotary Chair
- Posturography

Responses to Sinusoidal Rotation

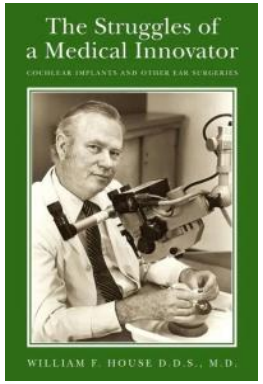
Slow-Component Eye Velocity vs. Head Velocity

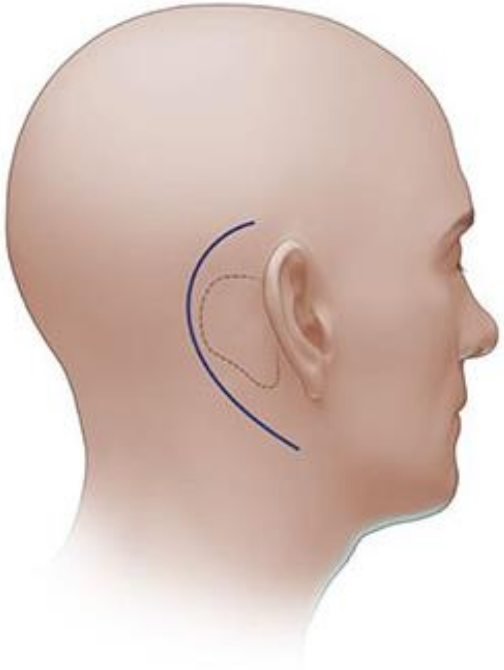


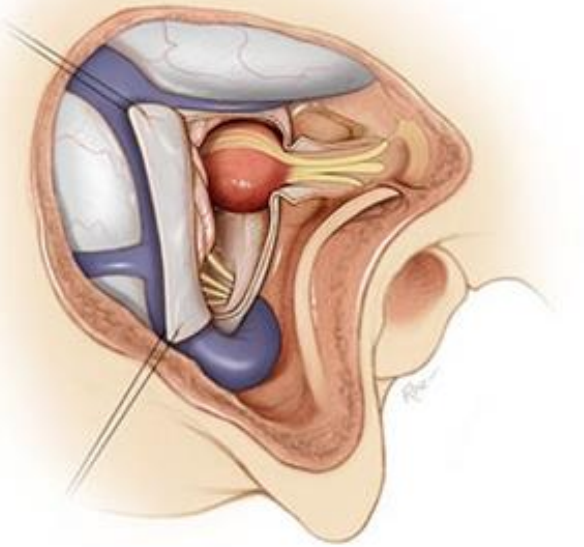
Physician Specialists

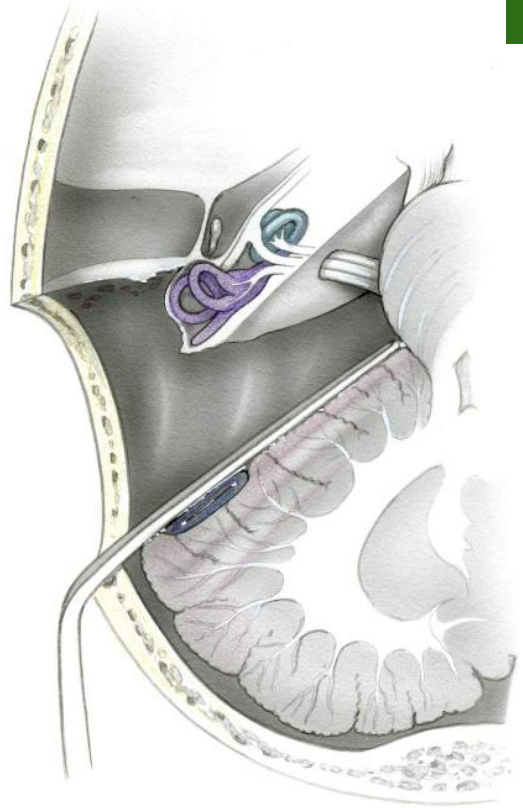
- Otolaryngologist
  - Five years of training after Medical School
  - Multiple areas of special interest
    - Head and Neck Cancer
    - Rhinology
    - Facial Plastic Surgery
    - Laryngology
    - Otology
    - Pediatric ENT
  - Board Certification
    - Completion of accredited medical school
    - Completion of an ACGME accredited residency program
    - Successful completion of three-part licensure exam
- Otology/Neurotology
  - Three areas of special interest
    - Hearing
    - Vestibular function
    - Facial nerve disorders
  - First certified in 2004 by the ABOHNS
    - Took 18 years to agree on and develop criteria for certification
  - Only one other ENT subspecialty has certification
    - Complex Pediatric ENT

Development of Neurotology

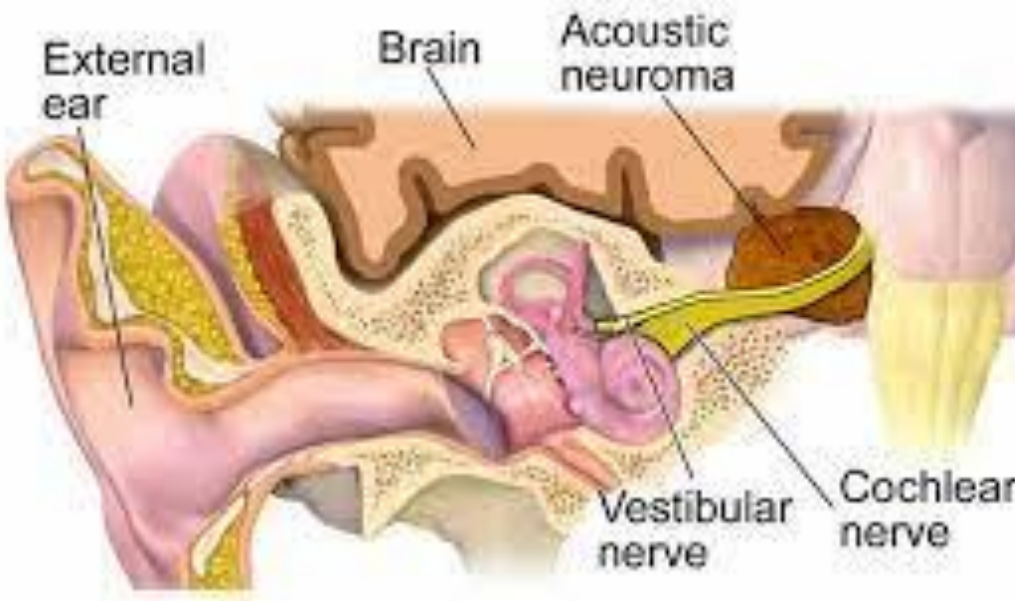


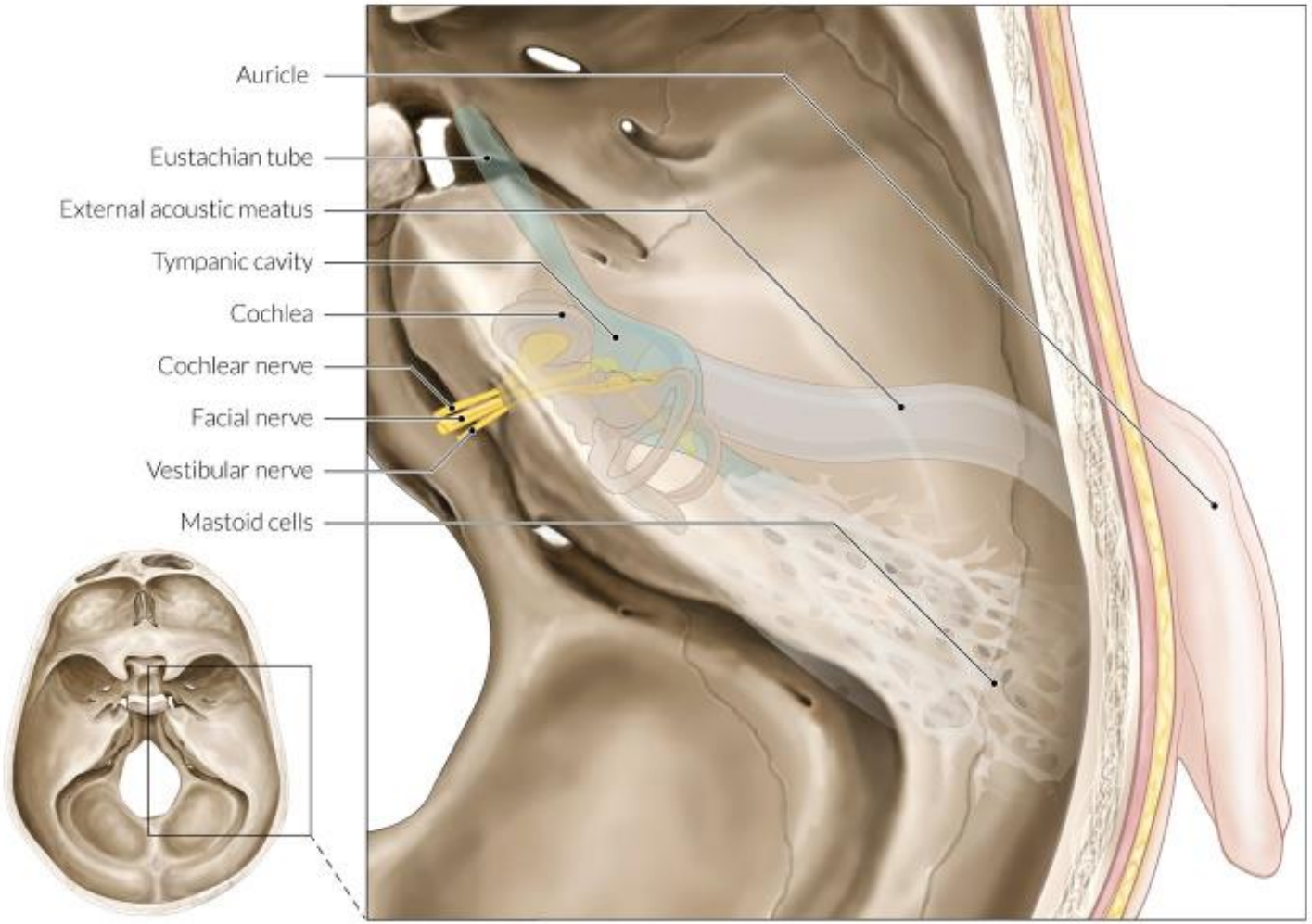






Otology vs Neurotology





Recurrent BPPV

	N of Studies Assessed	N of Studies with Statistical Significance	Recurrence/ Non-Recurrence (Cases)	Recurrence (%)
Advanced Age	18	6	976/2069	32.05%
Female gender	15	5	962/2037	32.08%
Meniere's disease	6	5	71/109	39.44%
Trauma	12	4	94/176	34.81%
Osteopenia/Osteoporosis	6	2	90/134	40.18%
Vitamin D deficiency	4	2	150/236	38.86%
Diabetesmellitus/Hyperisulinism/Hypergl-ycemia	9	6	361/314	53.48%
Hypertension	8	6	1081/853	55.89%
Hyperlipidemia	5	3	1495/710	67.80%
Cardiovascular disease	6	3	237/701	25.27%
Migraine	7	2	161/225	41.71%
Bilateral/multicanal BPPV	5	2	21/42	33.33%
Cervical osteoarthrosis	2	1	8/5	61.54%
Sleep disorders	1	1	14/26	35.00%

Rotational Chair Testing

- “Gold standard” in identifying bilateral vestibular lesions
- Used to monitor for progressive bilateral vestibular loss (gentamicin toxicity)
- Used to quantify bilateral vestibular loss – vestibular rehab vs. balance training
- Useful in testing children that will not allow caloric irrigations
- Used with borderline caloric tests when water calorics cannot be used

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Audiology

- Training
- AuD (Doctor of Audiology)
  - Assessment and diagnosis, treatment and management of auditory and vestibular loss
    - Audiologic evaluation
      - Pure tone air/bone, SRT, WRS, middle ear analysis
    - Tinnitus
    - Central auditory processing

Audiology

- Continued -
  - Amplification
    - Hearing aids, BAHA's
  - Cochlear implants
  - Cerumen management
  - Hearing loss prevention
    - Noise, ototoxicity

Audiology

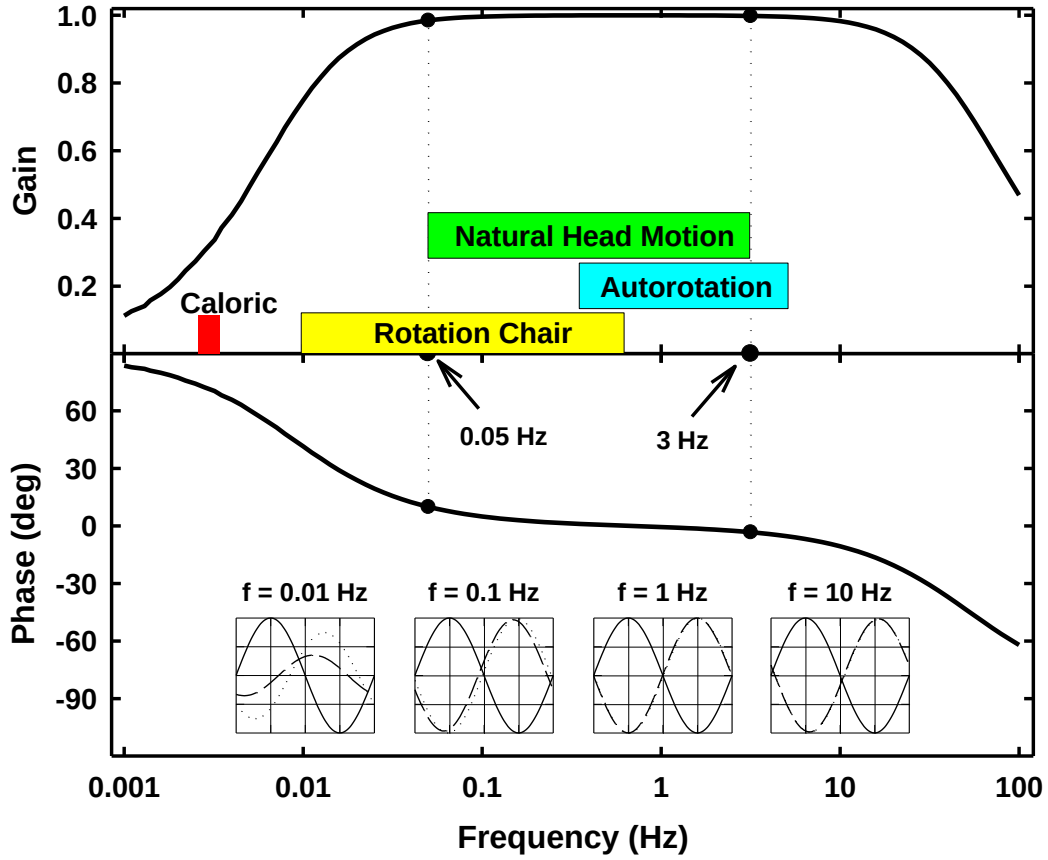
- Vestibular/balance disorders
  - Diagnosis, treatment and management
    - VNG
    - ECoG
    - VHIT
    - cVEMP/oVEMP
    - ABR/OAE
    - Rotary chair
    - CDP

Audiology

- VNG
  - Videonystagmography
    - Oculomotor
    - Positional/positioning
    - High frequency head shake
    - **Caloric testing**

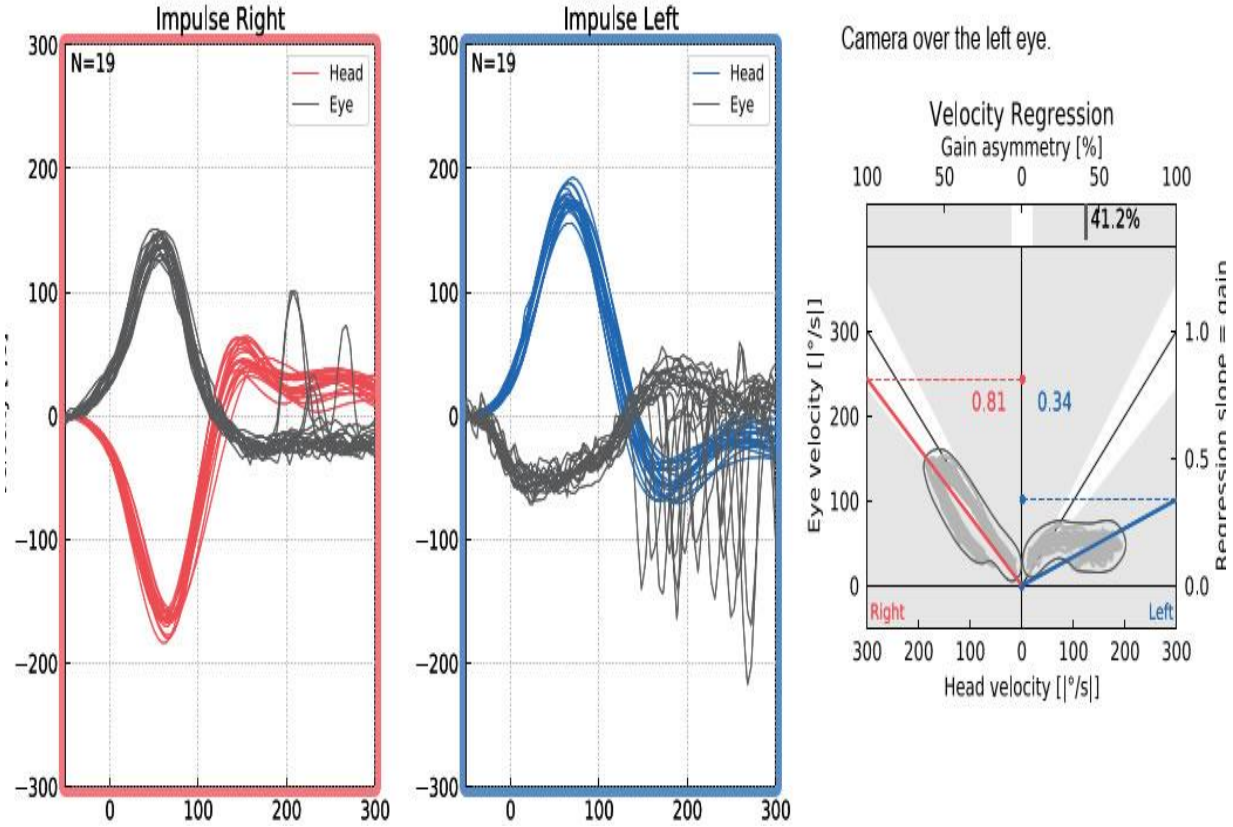
Responses to Sinusoidal Rotation

Slow-Component Eye Velocity vs. Head Velocity



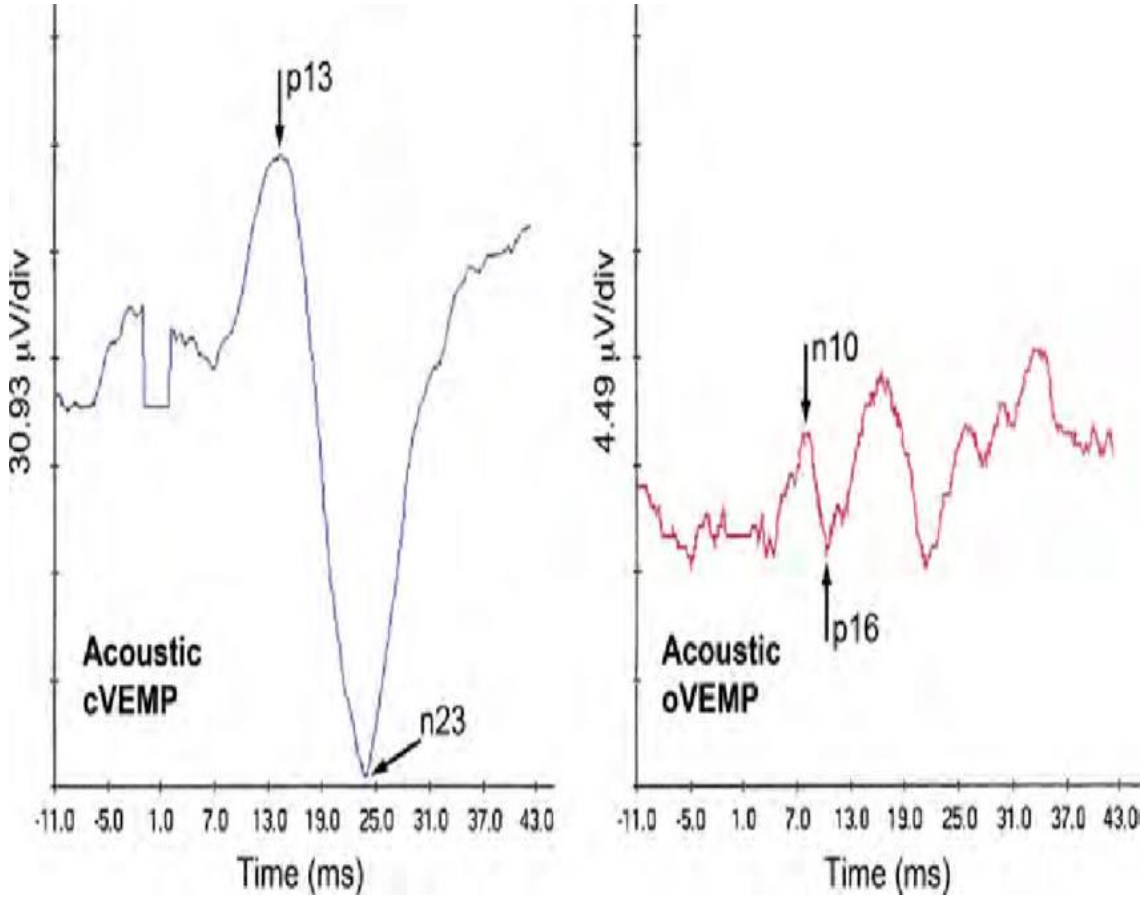
Audiology

- vHIT
  - Video head impulse test
    - Quantitative assessment of the VOR
      - Overt and covert saccades



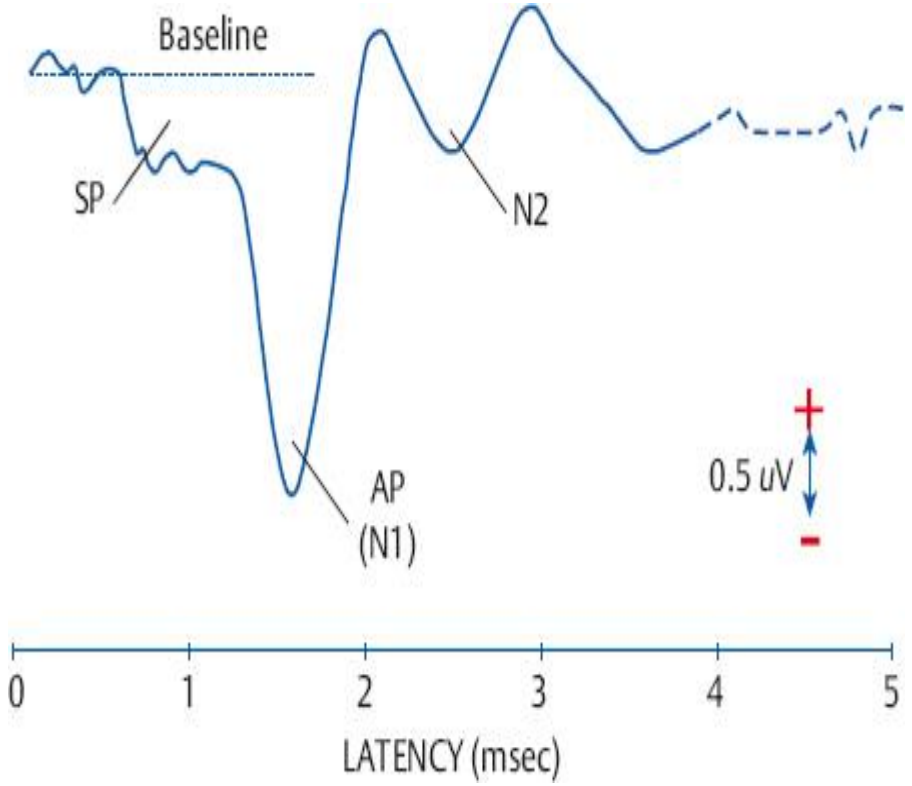
Audiology

- cVEMP/oVEMP
  - Cervical myogenic evoked potential
    - Saccule and inferior vestibular nerve
    - SSCD
    - migraine
  - Ocular myogenic evoked potential
    - Utricle and superior vestibular nerve



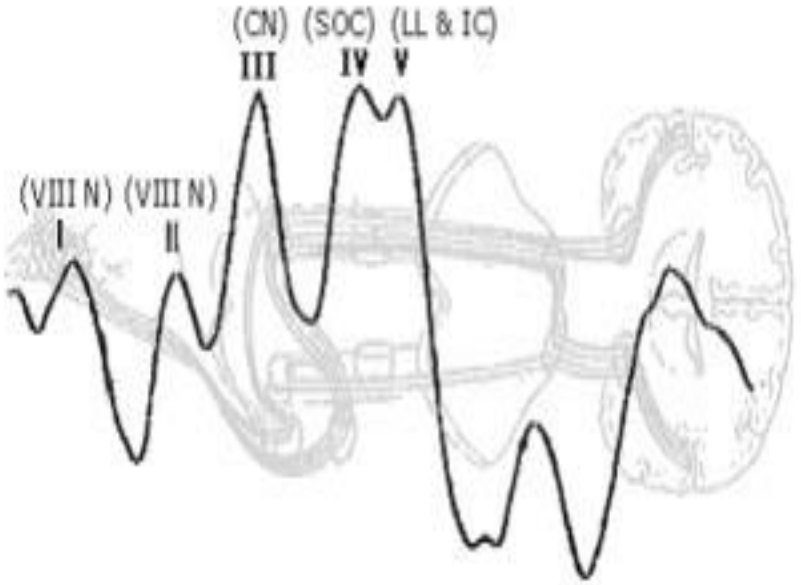
Audiology

- ECoG
  - Electrocochleography
    - ABR variant
    - Enlarged sp/ap ratio specific for endolymphatic hydrops/meniere's disease



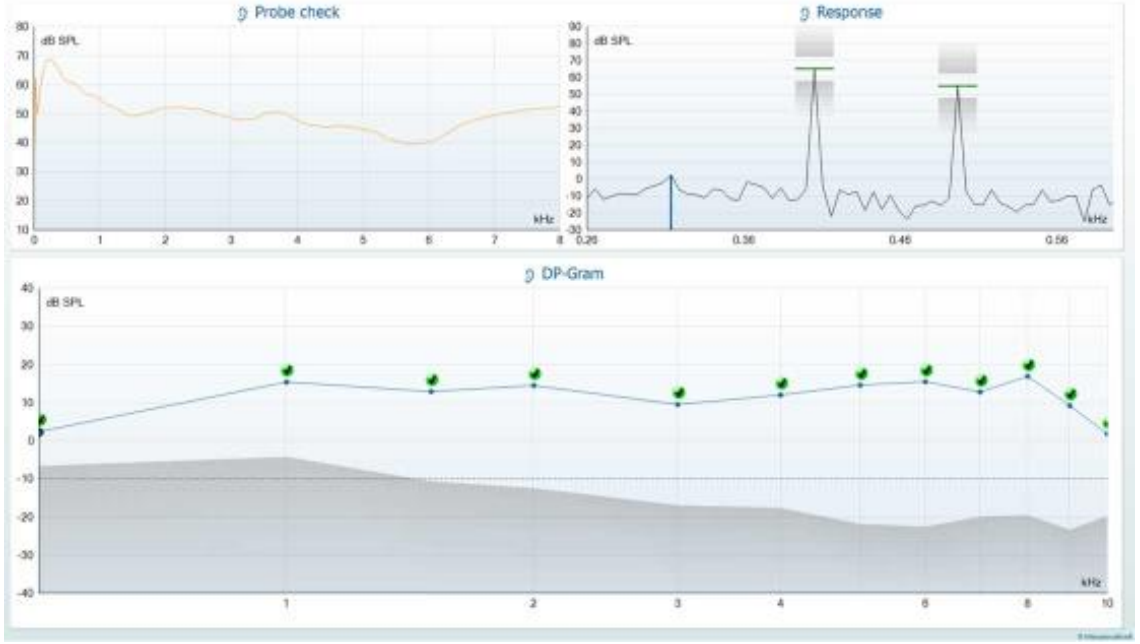
Audiology

- ABR
  - Auditory Brainstem Response
    - Useful in diagnosing retrocochlear pathology (acoustic neuroma/vestibular schwannoma)



Audiology

- OAE
  - Otoacoustic emissions
    - Assess status of cochlear hair cell function

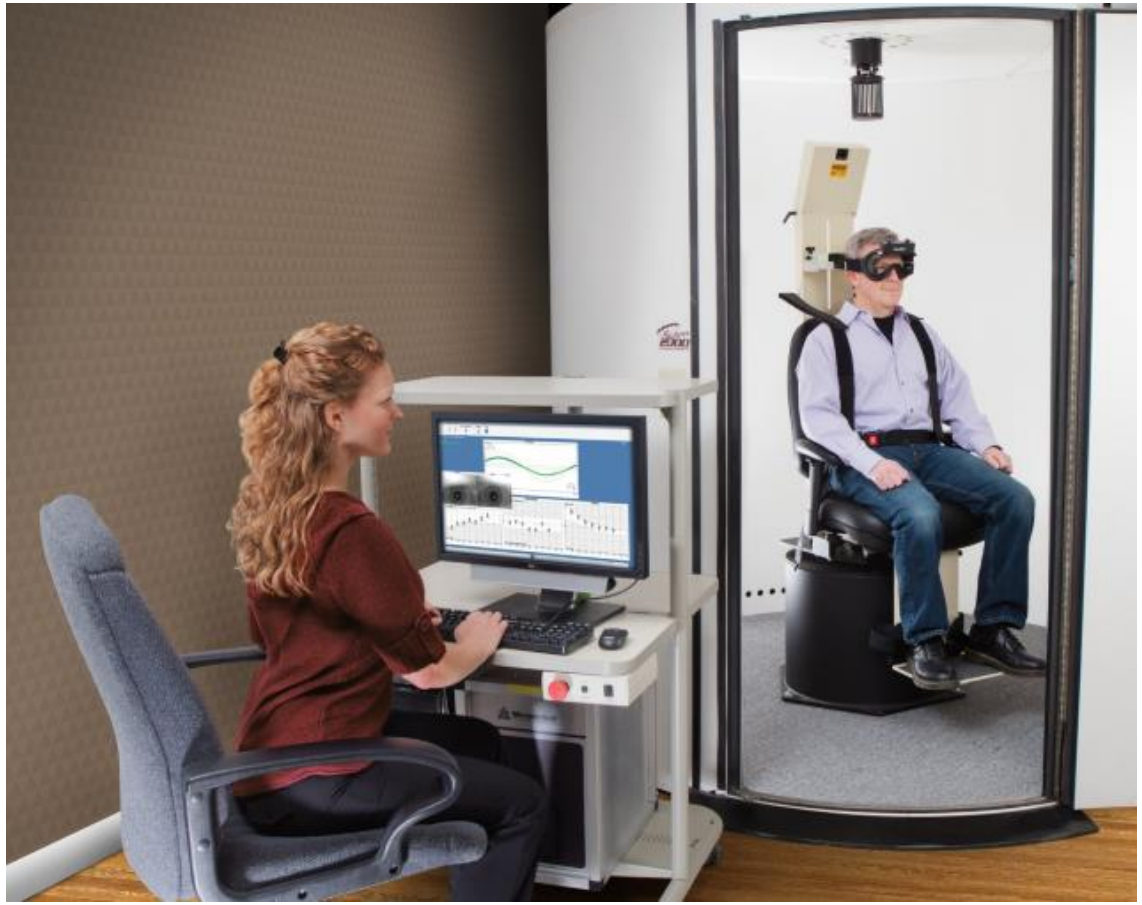


Audiology

- CDP
  - Computerized Dynamic Posturography
    - Evaluates functional balance
      - Visual
      - Proprioceptive
      - Vestibular

Audiology

- Rotary Chair
  - Identify and quantify bilateral vestibular loss
    - Confirm caloric bilateral weakness



Audiology

- No one test to evaluate the peripheral/central vestibular system
- Not all audiologists perform vestibular testing
- Comprehensive vestibular testing not available at all audiology/ENT practices

Audiology

- When should be consulted at various levels across the continuum/what should trigger a referral
  - Acute care/outpatient care:
    - New onset hearing loss/tinnitus - changes to hearing/tinnitus
    - Aural fullness/pressure

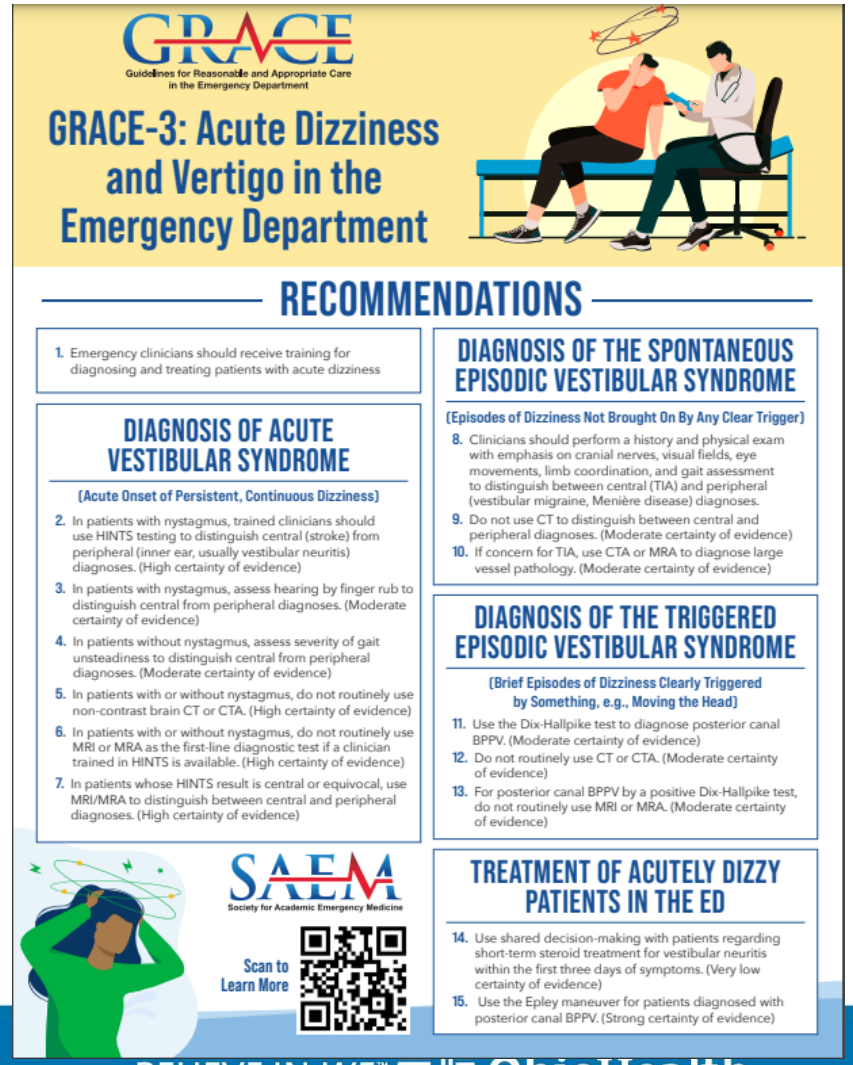
Vestibular Rehabilitation

- Purpose: to facilitate compensation after peripheral and central vestibular dysfunction has occurred, with the goals of decreasing symptoms of dizziness and vertigo, improving balance, and facilitating a return to previous activities.[Miles]

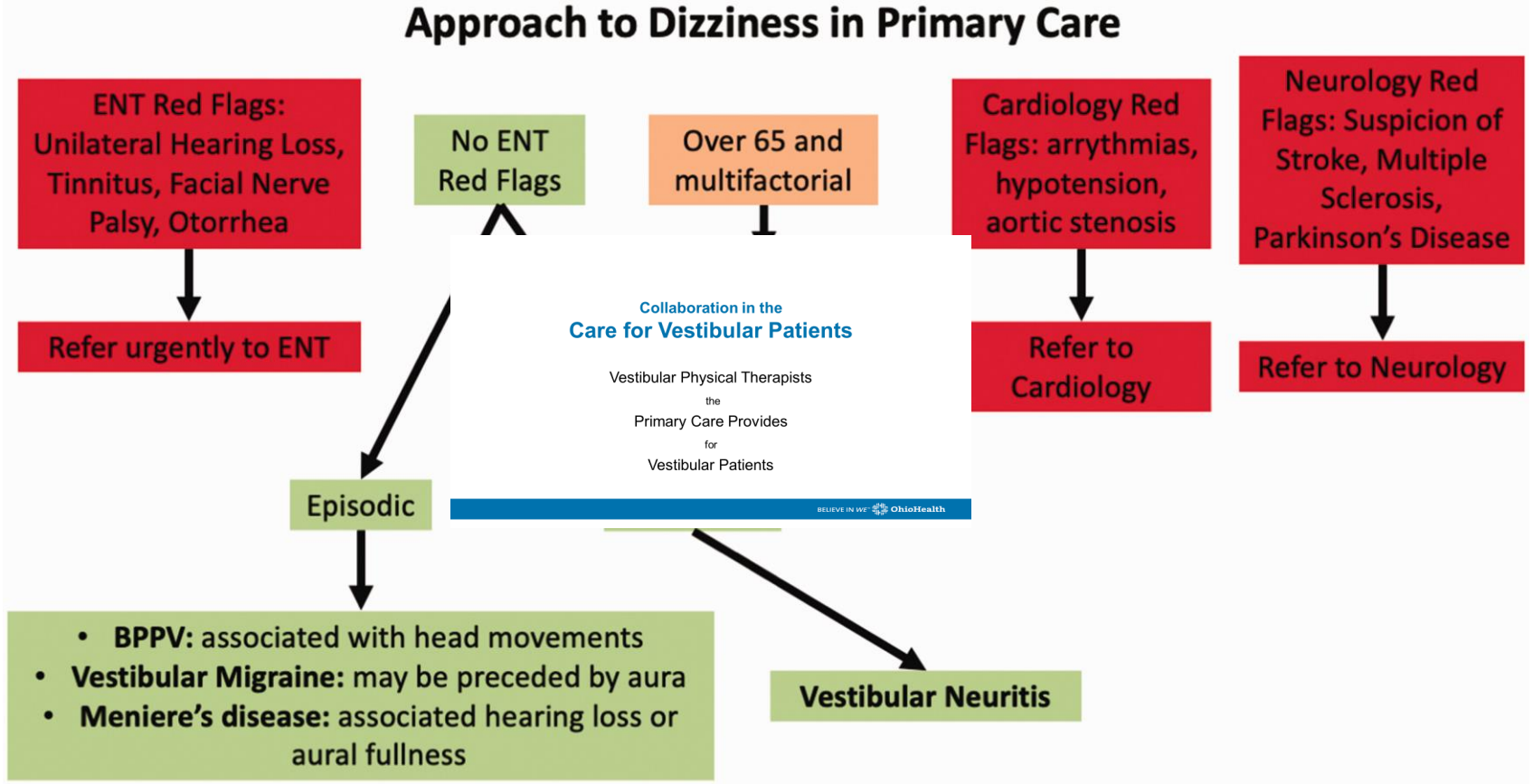
- Present in acute care, home health, and outpatient rehab

Acute/Emergency Care

- GRACE-3 by Society for Academic Emergency Medicine (SEAM)
- Diagnosis of Acute Vestibular Syndrome, Spontaneous Episodic Vestibular Syndrome, Triggered Episodic Vestibular Syndrome
- Vestibular PT can assist in differentiating between central and peripheral: are we utilizing them enough/are there enough available?



Hayois L, Dunsmore A. Common and serious ENT presentations in primary care. *InnovAiT*. 2023;16(2):79-86.



Vestibular Rehab Initiation

- 2022: APTA Clinical Practice Guideline (CPG) for Vestibular Hypofunction: initiation of VPT within first *2 weeks* of onset is recommended
- BPPV treatment:
  - Those with late intervention for BPPV were more likely to experience residual dizziness within a 3 month period[Seok]
  - Not just the Epley-*18* different maneuvers currently cited
- Early vestibular exercises in persons with an acute vestibular disorder resulted in better DHI scores, less anxiety, less reliance on visual cues, and better gait.[6]
- We are evidence-based practitioners
  - BPPV and Hypofunction Guidelines
  - Bárány society guidelines and diagnostic criteria

Patient Education Fact Sheets

- Patient education/fact sheets
  - Arabic, Chinese, English, Portuguese, Spanish

- Acoustic Neuroma
- After BPPV Repositioning
- Aging and Dizziness
- AICA Stroke
- Anxiety and Stress Dizziness
- Benign Paroxysmal Vertigo of Childhood
- Bilateral Vestibular Loss
- BPPV
- Cervicogenic Dizziness
- Cochlear Implants
- Common Vestibular Function Tests
- Concussion
- How Does the Balance System Work
- Importance of Sleep in Individuals with Dizziness
- Labyrinthitis
- Mal De Debarquement
- Meniere's Disease
- Orthostatic Hypotension
- Persistent Postural-Perceptual Dizziness
- Physical Therapy and the VOR
- Posterior Inferior Cerebellar Artery Stroke
- Recognizing Vestibular Problems in Children
- Space and Motion Sensitivity
- Superior Canal Dehiscense
- Symptoms with Exercise
- Trauma and Inner Ear Problems
- Unilateral Vestibular Hypofunction
- Vestibular Migraines
- Vestibular neuritis
- White Matter Disease
- Why See a PT for Dizziness

Diagnoses to consider referring

- Acute/Chronic Unilateral Vestibular Hypofunction (UVH)
- Acute/Chronic Bilateral Vestibular Hypofunction (BVH)
- BPPV (18+ maneuvers-Epley doesn't fix it all!)
- Central Vestibular Dysfunction (CVA, brain injury-TBI or mTBI/concussion, migraine/vestibular migraine)
- Presbystasis (disequilibrium of aging)
- Presbyvestibulopathy (unsteadiness, gait disturbance, and/or recurrent falls in the presence of mild bilateral vestibular deficits)
- Movement or visually provoked dizziness/Visual Vertigo/Situational Vertigo
- Persistent Postural-Perceptual Dizziness (3PD)
- Cervicogenic dizziness (CVD)

4 Question Vestibular Screening Tool

- This article's focus is on screening patients for a vestibular disorder rather than ruling out a central disorder
- This study aimed to develop a new tool for application in the acute hospital setting for non-emergent vestibular disorders when patients present with dizziness and enable referral of appropriate patients to vestibular PT.

Stewart, V., Mendis, M. D., Rowland, J., & Choy, N. L. (2015). Construction and Validation of the Vestibular Screening Tool for Use in the Emergency Department and Acute Hospital Setting. *Archives of Physical Medicine and Rehabilitation, 96*(12), 2153-2160.

4 Question Vestibular Screening Tool

Ask the Patient the following 4 questions:

- Do you have a feeling that things are spinning or moving around?
- Does bending over or looking up at the sky make you feel dizzy?
- Does lying down and/or turning over in bed make you feel dizzy?
- Does moving your head quickly from side to side make you feel dizzy?

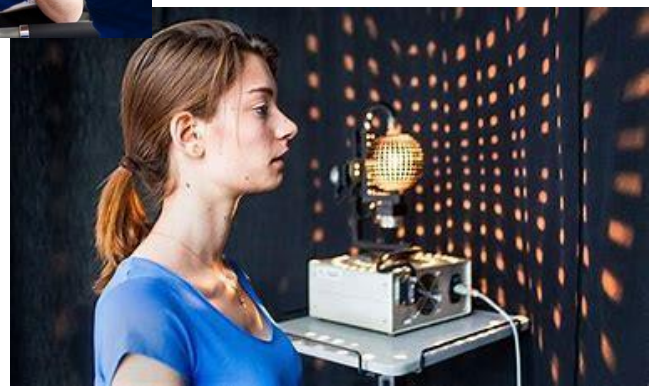
4 Question Vestibular Screening Tool

- Scoring:
  - 0 points for answering “no”
  - 1 point for answering “sometimes”
  - 2 points for answering “yes”

- *8 points total **– scores of 4 or greater= presence of a likely vestibular** disorder and should be referred to vestibular PT
  - This tool is better at ruling in non-emergent vestibular issues than ruling them out
  - The positive predictive value of this tool is 89% = should result in few over referrals but has the chance to result in a small number of false negatives (patients with a vestibular disorder who score <4)

What do we do with patients?

- BPPV assessment and treatment
- Visual-vestibular integration
- Balance training to minimize visual dependency
- Optokinetic stimulation
- Cardiopulmonary training
- Manual techniques
- Habituation/Exposure therapy
- Autonomic Nervous System/Vagus Nerve training



How to find a vestibular rehabilitation provider?

- Academy of Neurologic Physical Therapy provider map
- VEDA provider map (also includes audiology, neurology, otology, neurotology, etc.)
  - Consider that anyone at varying levels of education can ask to be put on these lists
- Check local medical systems websites
  - OSU
  - OhioHealth
- Empower your patients to ask
  - What training/competency has the therapists received?
  - How long has they been practicing VRT?

OhioHealth Physician Group ENT

- Dr. Ghiath Alnouri, MD
- Dr. Wayne Robbins, DO
- Dr. Chris Selinsky, DO

- Dr. Susan LaChance, AuD
- Dr. Abigail Stevens, AuD

Location: 5193 W Broad St Ste 100, Cols, OH 43228

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Thank you!

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