

Management of Vestibular-Related Dizziness in Geriatrics

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MEDBRIDGE

Background

- Director of the Geisinger Otolaryngology Vestibular and Balance Center
- Clinical practice consists of vestibular rehabilitation and vestibular lab testing:
 - Outpatient (90%)
 - ER/acute care/inpatient rehabilitation (10%)
- Adjunct faculty at Misericordia University and the University of Scranton

Background (cont.)

- Research interest in BPPV and Superior Canal Dehiscence
- Additional MedBridge Online Vestibular Course Offerings
 - Vestibular Disorders
 - Identification and Management of BPPV
 - Office/Bedside Evaluation
 - Case Studies, Rehabilitative Treatment Design, and Advanced Concepts

Disclosures

- Financial
 - None
- Non-financial
 - None

Chapter One

Introduction / Anatomy and Physiology of the Vestibular System

Poll Question One

How often do you complete Dix-Hallpike testing on geriatric individuals presenting with complaints of imbalance?

- a. Never
- b. Always
- c. Only if they complain of episodes of vertigo

Introduction

- Approximately 40% of all “dizziness” is estimated to be “otologic”¹
- Adults with symptomatic vestibular dysfunction are estimated to have a 12-fold increase in the odds of falling²
- Falls are the leading cause of injury and death among older adults³

1. Hain
2. Agrawal, 2009
3. Ambrose, 2013

Introduction (cont.)

- Oghalai¹
 - 9% with unrecognized BPPV in an inner-city geriatric population
 - Patients with unrecognized BPPV were more likely to have
 - Reduced activities of daily living scores
 - Sustained a fall in the previous three months
 - Depression
- Kollen
 - 11% of 75 year old's with BPPV²

1. Oghalai, 2000

2. Kollen, 2012

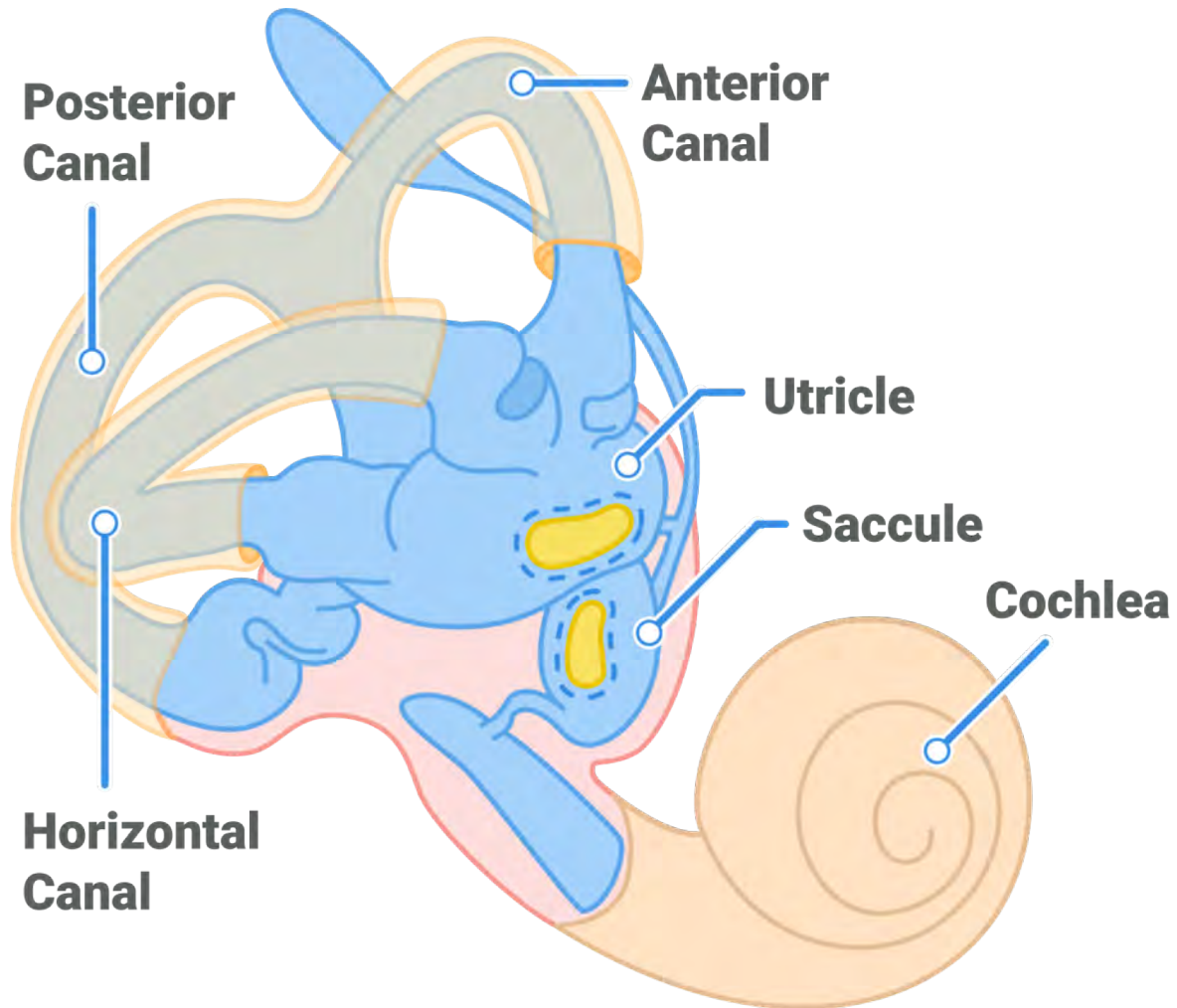
Introduction (cont.)

- Elderly women with BPPV have a substantially higher predictive risk for both osteoporotic and traumatic hip fracture compared to age-matched controls¹
- In elderly subjects with BPPV, falls were reduced by 64% following canalith repositioning maneuvers²

1. Nakada, 2018

2. Jumani, 2017

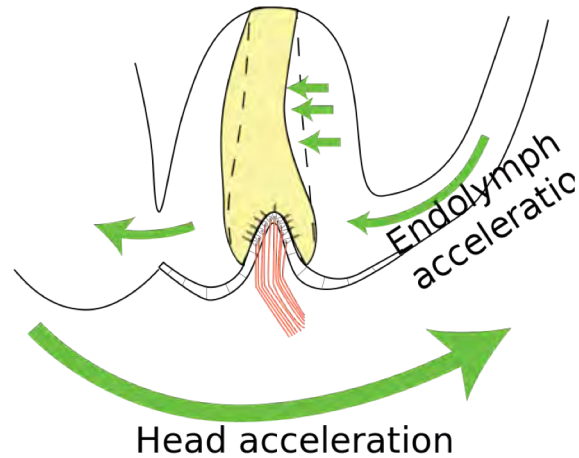
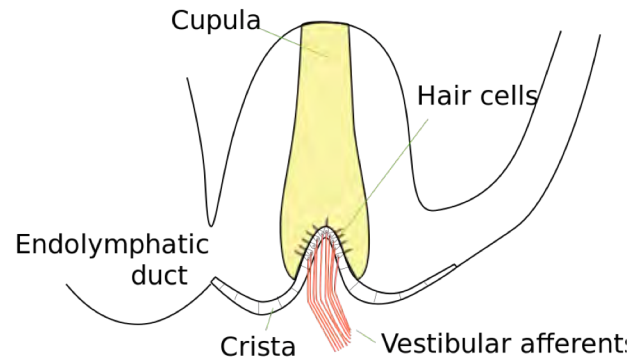
Inner Ear



Demonstration

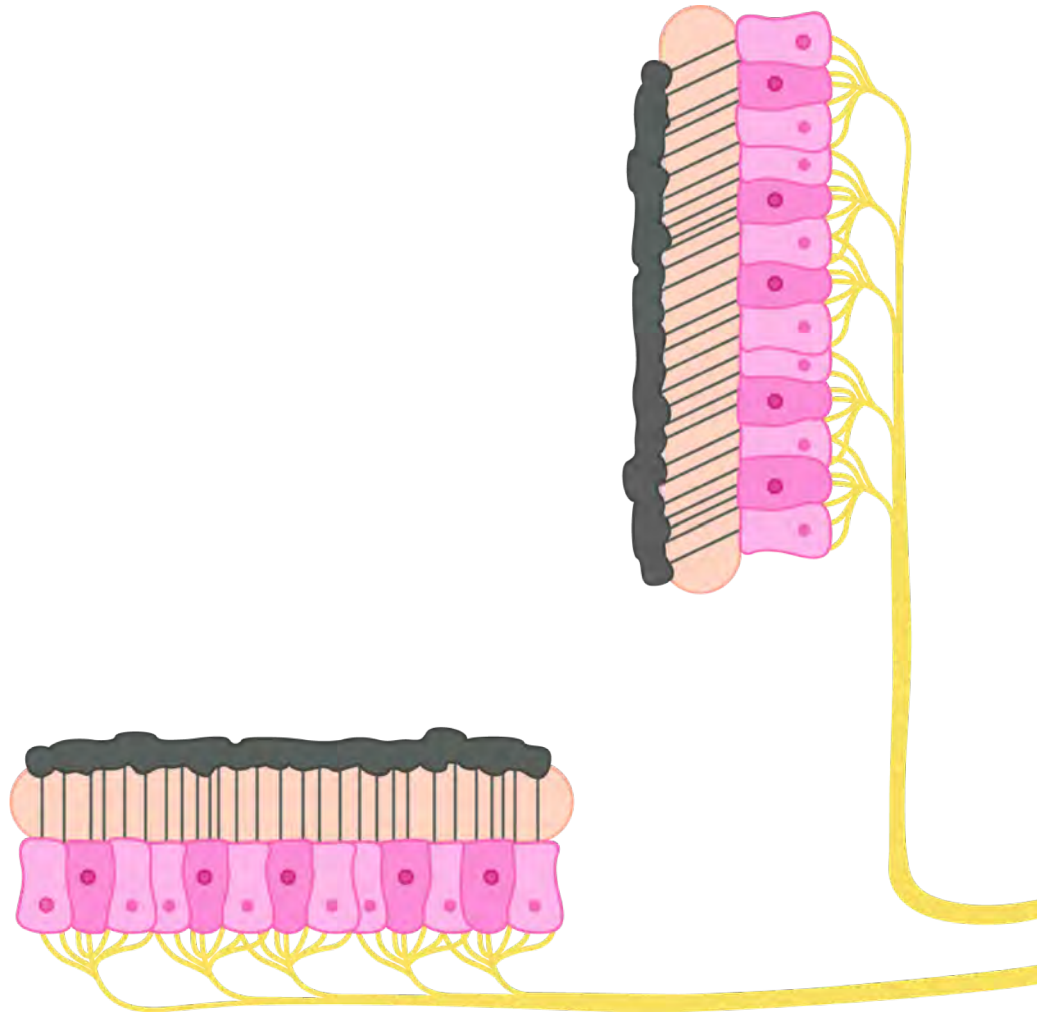
Inner Ear (cont.)

Ampulla



https://commons.wikimedia.org/wiki/File:Blausen_0328_EarAnatomy.png
https://commons.wikimedia.org/wiki/File:Ampulla_of_SemicircularCanal.svg

Otoliths are Gravity Sensitive

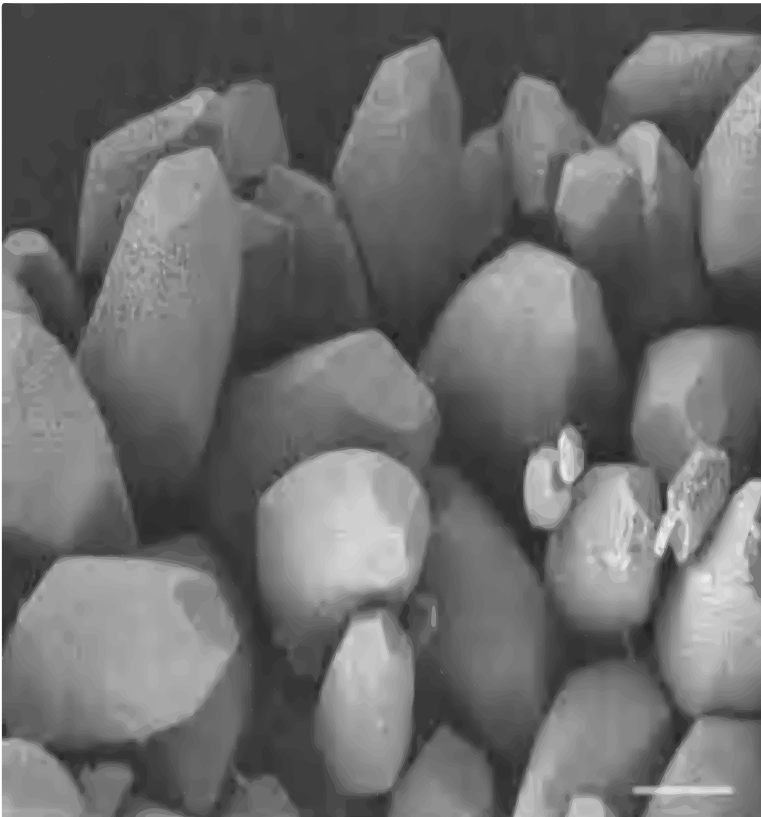


Otoconia: Age Related Degeneration

Middle Age

vs.

Old Age



Jang 2006

Otoconia: “Linking” Filaments



Age-Related Changes in the Vestibular System

- Linear regression in hair cell count with age
 - Hair cell degeneration appears greater in the semicircular canals in comparison to the otoliths¹
- Substantial age related neuronal degeneration at the vestibular nuclei and cerebellum

1. Merchant, 2000

Chapter Two

Critical Elements of the History

Terminology

- **Dizziness:** distortion of spatial awareness
- **Vertigo:** illusion of rotation or linear movement
- **Oscillopsia:** gaze instability
- **Unsteadiness:** imbalance (observable)
 - Dysequilibrium: subjective sense of instability (non-observable)
 - Pulsion: Imbalance with a directional preponderance
- **Lightheadedness/presyncope:** feeling of faintness, impending loss of consciousness

Provocative Factors

- Positional: change in placement of the ear with respect to gravity
- Orthostatic: alteration in position of the body with respect to gravity
- Head motion
- Hyperventilation/exercise

vs.

- None: spontaneous

Provocative Factors (cont.)



Provocative Factors (cont.)



Hyperventilation-induced Nystagmus



Meniere's Attack



Associated Cochlear Complaints

- Hearing loss
 - Unilateral vs. bilateral
 - Temporally related to dizziness
 - Acute or gradual
- Tinnitus
 - Low or high pitch
 - Pulsatile?
- Fullness
- Consider
 - Meniere's
 - Labyrinthitis
 - Ramsay Hunt Syndrome
 - Vestibular schwannoma
 - Superior canal Dehiscence
 - Labyrinthine trauma/temporal bone fracture
 - AICA stroke

Timing

- Fleeting with head movement: chronic peripheral vestibular hypofunction or central vestibular dysfunction
- Fleeting with sound/straining: superior canal dehiscence
- Seconds: BPPV
- Minutes: TIA

Timing (cont.)

- Hours: Meniere's
- Day(s): acute vestibular loss (vestibular neuritis, labyrinthitis, anterior vestibular artery ischemia)
- Constant: CNS or psych-related dizziness

Red Flags: CNS

- Diplopia
- Dysarthria
- Crossed sensory disturbances
- Limb incoordination
- Intractable hiccups
- Dysphagia
- Profound postural instability/unable to stand or walk unassisted due to dizziness

Poll Question Two

How often is Dix-Hallpike testing completed in subjects presenting to the ER who are diagnosed with BPPV?

- a. Always
- b. 75%
- c. 50%
- d. Less than 25%

Chapter Three

Nystagmus Identification

Nystagmus Identification (cont.)



Nystagmus Identification (cont.)



Nystagmus Identification (cont.)



Nystagmus Identification (cont.)



Nystagmus Identification (cont.)



Nystagmus Identification (cont.)



Nystagmus Identification (cont.)



Nystagmus Identification (cont.)



Chapter Four

Benign Paroxysmal Positional Vertigo (BPPV): Etiology, Testing, and Differential Diagnosis

BPPV: Provocative Activities

- Common provocative activities
 - Bed mobility (rolling or supine to sit)
 - Arising from recliner/couch
 - Reaching for object on floor, under cupboard or top shelf
 - Grooming (washing hair, eye drops, dressing)
 - Working under the car, carpentry, painting
 - Dental chair
 - Diagnostic procedures involving head dependency (CT, MRI, surgery)
- Features that most strongly predict positive testing for BPPV¹
 - Dizziness lasting less than 15 sec and onset with turning over in bed

1. Noda 2011

BPPV Mechanism

Canalithiasis¹

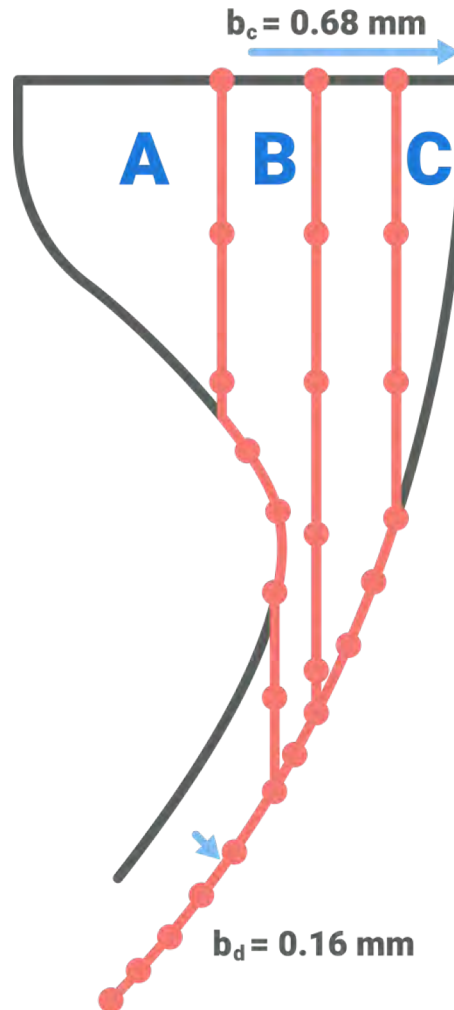
- Free floating debris within the semicircular canal creating a pressure current following a change in position of the canal in relation to gravity. Debris is a likely a cluster a cross-linked utricular otoconia with underlying otolithic membrane.²
- Variable latency, range: 1 to 40 seconds, mean 4.25 seconds³
- Nystagmus with symptoms following the latency, mean 14 seconds³
- “Reversal” of nystagmus observable about 75% of trials with return to sitting following Dix-Hallpike testing³

1. Parnes and McClure 1992

2. Kao 2017

3. Walter & Andera 2018

Mathematical Model for BPPV



Squires et al 2004

Predisposing Factors

- Age (under 3% under age of 40 years old)¹
- Female over male (2:1)
- Genetic, chromosome #15?²
- Inner ear disease (termed “secondary BPPV”)
 - Labyrinthitis
 - Vestibular neuritis
 - Ischemic event
 - Meniere’s³
 - Bilateral incomplete ototoxicity⁴
 - S/p stapedectomy⁵
- Osteopenia/osteoporosis⁶
- Serum Vitamin D levels⁷
- Head trauma/sudden acceleration or deceleration of the head⁸

1. Walter 2011, unpublished data

2. Gizzi 1998, 2014

3. Karlberg 2000

4. Black 2005

5. Magliulo 2005

6. Vibert 2003, Jeong 2009, Talaat 2014, Chan 2017, Wu 2017

7. Jeong 2012, Talaat 2014, Han 2017

8. Gordon 2004

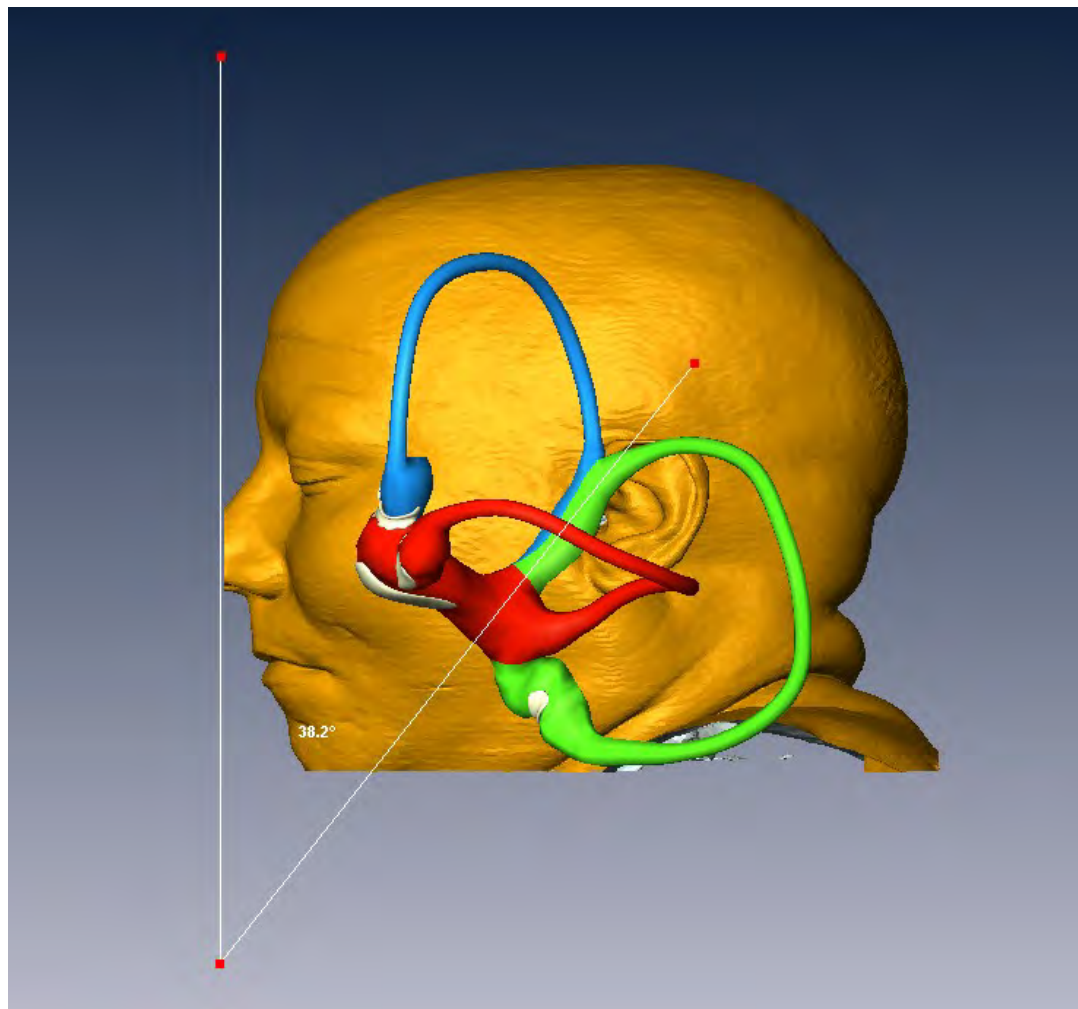
Testing Maneuvers: BPPV

- Posterior canal
 - Dix-Hallpike = Hallpike = Barany = Nylen-Barany
 - Sidelying Test
- Horizontal canal
 - Roll test



Robert Barany

Testing Maneuvers: BPPV (cont.)



Source: Michael Teixido MD

“Loaded” Dix-Hallpike, recommend flexing head 30 degrees in the plane of the posterior canal and holding for 30 seconds prior to placing the subject supine



Special Consideration: Kyphosis

May not need a pillow under the torso or to extend the head over the edge of the bed



Special Consideration



“Right Sidelying Test” to Identify Right Posterior Canal BPPV



“Roll Test” to Identify Horizontal Canal BPPV

- Performed to identify horizontal canal BPPV variant
- Head inclined 30 degrees from a horizontal plane
- Rotation performed over 60 degrees to each side, observe for nystagmus
- In patients with cervical ROM restriction consider log-rolling the patient from left to right with head fixed on the body



“Roll Test” to Identify Horizontal Canal BPPV (cont.)



“Roll Test” to Identify Horizontal Canal BPPV (cont.)



Summary: Eye Movements for Common BPPV and Variants

- Posterior Canal BPPV: Canalithiasis
 - Torsion ipsilateral to the ear down and upbeat nystagmus lasting seconds
 - Torsional component is accentuated with gaze towards the earth, vertical component enhanced with gaze to the ceiling
 - Nystagmus tends to reverse with return to sitting
- Horizontal Canal BPPV: Canalithiasis
 - Geotropic nystagmus lasting seconds, more intense with the affected ear down

Alternative Causes of Positional Dizziness/Nystagmus

- Orthostatic hypotension
- Cupular density disorders:
 - Blood product in endolymph¹
 - Intoxication
 - Infection (elevated protein levels in endolymph)
- Peripheral vestibular hypofunction
- CPA mass/stroke
- Cerebellar degeneration
- Multiple sclerosis lesions
- Chiari malformation
- Migrainous positional vertigo
- Anxiety/phobia
- Malingering

1. Kim 2014

Chapter Five

Canalith Repositioning Maneuvers: Posterior and Horizontal Canal

Treatment: Maneuvers

- Evidence
 - Level A: American Academy of Neurology (AAN) 2008
 - American Academy of Otolaryngology: “Recommendation” 2008
 - Cochrane database¹
 - Systemic review²
- Vestibular sedatives are counterproductive for BPPV³

1. Hilton 2004
2. Helminski 2010
3. Manning 1992

Surgical Treatment: Semicircular Canal Occlusion (cont.)



Modified Left Epley for Posterior Canal BPPV



Modified Epley “Notes” for Posterior Canal BPPV

- Nystagmus elicited throughout a maneuver should be in a **consistent direction**
 - This is a positive prognostic indication of successful treatment¹
- Performance of a chin tuck in position “E” may assist in migration of otoconia toward the utricle
- An absence of imbalance or vertigo with returning to a seated position after the maneuver is likely a positive prognostic finding of successful treatment
- A reversal of nystagmus with return to a seated position after the maneuver may be a negative prognostic finding, treatment should be repeated¹

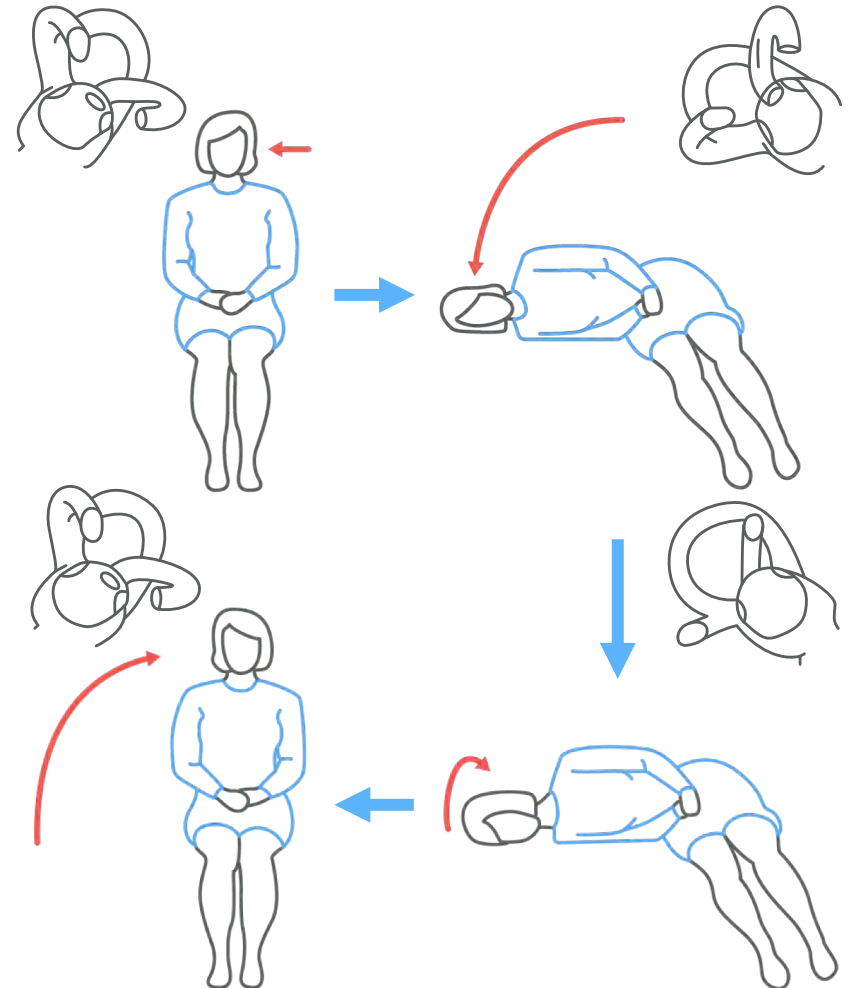
1. Oh 2007

Modified Right Epley, Altered to Sidelying



Modified Gufoni's Maneuver for Left Horizontal Canal BPPV, Canalithiasis Type

- The patient sits on the side of a treatment table with the head straight ahead
- The patient is steadily moved into a sidelying position on the unaffected side and remains in this position for 30 seconds after the nystagmus subsides
- The head of the patient is steadily turned 45° or more downward, and this position is held for one minutes
- Slowly return patient to the seated position to conclude the maneuver



Right Gufoni's Maneuver



Repeated Right Gufoni's Maneuver



Modified Gufoni's Maneuver

- Advisable to repeat maneuver, minimal risk of debris re-entry into the horizontal or posterior canal
- Consider treating the opposite side if the maneuver does not appear effective after several cycles
 - Clinician may have misidentified the affected side with roll testing
- Nausea/emesis production is more common when testing and treating horizontal canal BPPV

Post-maneuver Instructions

- Avoid affected ear dependency one to two days (number needed to treat: ten patients)¹
 - Sleep in recliner
 - Slightly elevate head end of bed: wedge/extra pillow
 - Sleep on unaffected side to reduce recurrence²
- Relocated otoconia may stabilize within minutes following a maneuver³
- Dark cells may resorb the loose particles

1. Hunt, 2012

2. Shigeno 2012, Li 2013

3. Otsuka, 2010

Poll Question Three

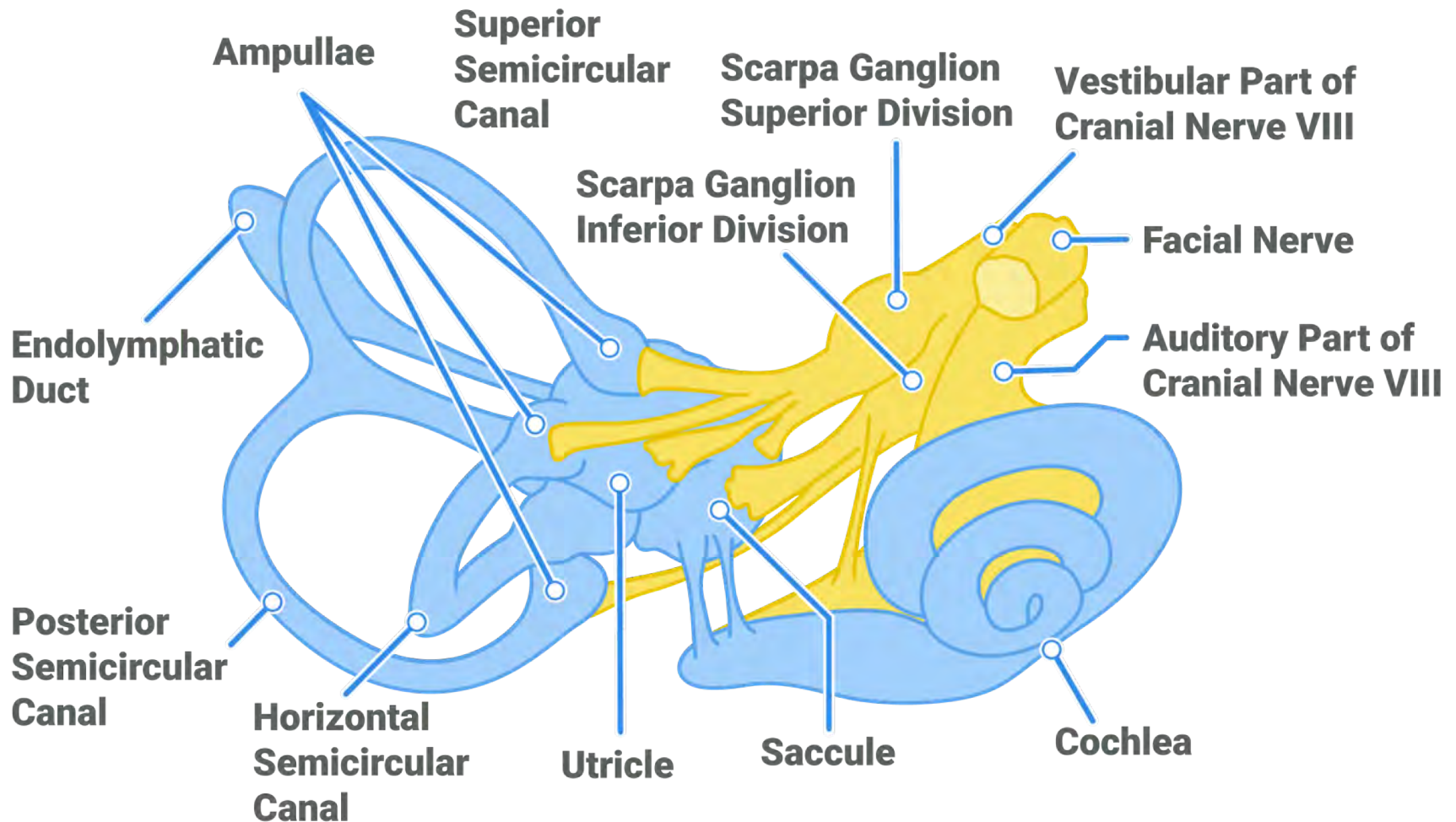
Vestibular rehabilitation, for individuals with vestibular loss, does **not** reduce which of the following?

- a. Head motion induced oscillopsia
- b. Spontaneous nystagmus
- c. Postural instability

Chapter Six

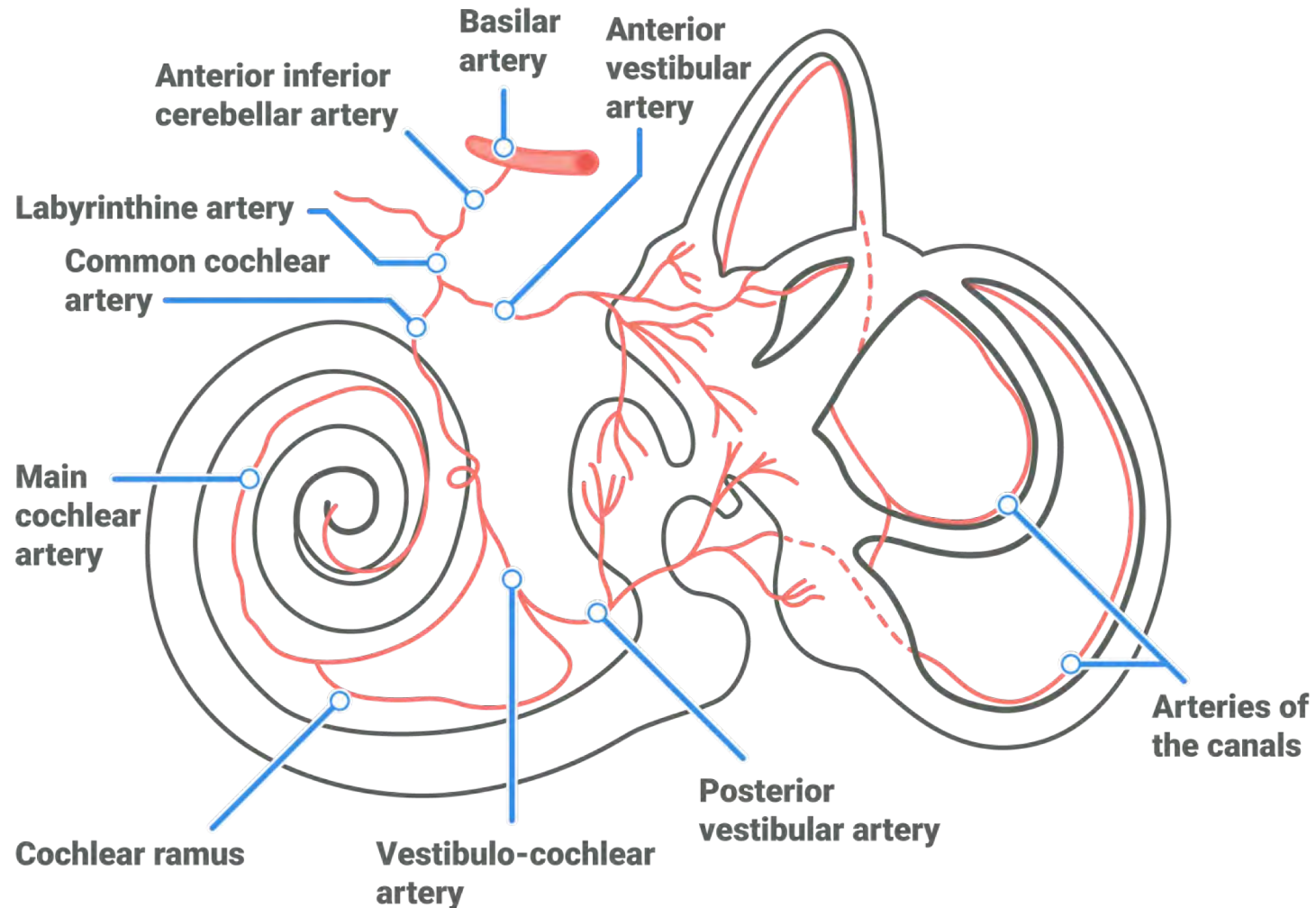
Identification of Vestibular Hypofunction

Identification of Vestibular Hypofunction



Identification of Vestibular Hypofunction

(cont.)



Acute Unilateral Vestibular Loss

- Spontaneous onset of vertigo (ongoing for days), accentuated with mobility attempts / head movement
- Associated nausea/vomiting, diaphoresis and imbalance
- No associated auditory symptoms with vestibular neuritis or anterior vestibular artery ischemia
- Associated acute hearing loss more likely with labyrinthitis or temporal bone fracture

Bilateral Vestibular Disorders

- Typically caused by ototoxic agents
 - Aminoglycosides: Gentamycin, Streptomycin
 - Incidence of ototoxicity
 - Approximately 10% of all patients/about 20% in patients with renal impairment
- Loss is usually permanent¹
- Common complaints include oscillopsia and imbalance, possibly hearing loss
 - Vertigo only if loss is sequential in nature

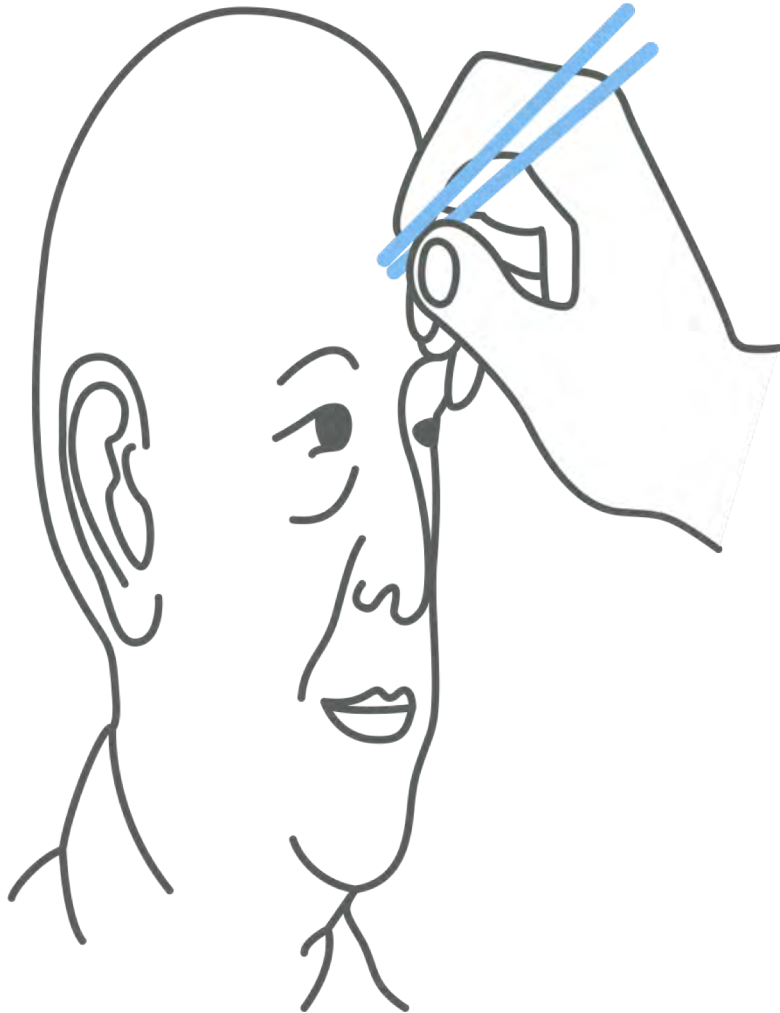
1. Zingler 2009

Oscillopsia

Courtesy of Dan Gold DO

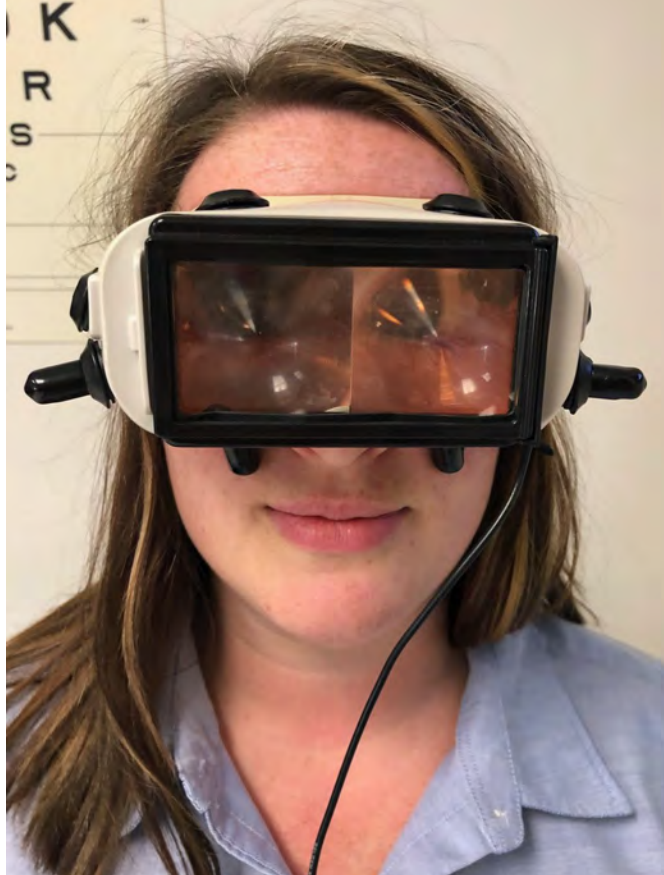


Auditory Screen



- Assess if hearing is intact to finger rub which approximates 30 db. at 4,000 hz
- “Weber Test” for unilateral hearing loss: vibrating tuning fork placed on top of head, if sound lateralizes suggests a potential ipsilateral conductive or contralateral sensorineural hearing loss
 - 512 Hz fork is optimal

Frenzel Lenses



Infrared Video Goggles



Infrared Video Goggles (cont.)



Gaze Stability Assessment

- Spontaneous Nystagmus
- Gaze evoked Nystagmus
- Pursuit
- Saccades
- Static vs. dynamic visual acuity
- Head Impulse Test
- Post head-shaking induced Nystagmus
- Hyperventilation induced dizziness/nystagmus
- Mastoid vibration

Spontaneous and Gaze-evoked Nystagmus

- Peripheral
 - Mixed horizontal/torsional
 - Uni-directional with gaze testing
 - Present with fixation present on a short term basis (less than a week)
 - Enhanced or exclusively present with fixation removed
- Central
 - Vertical, torsional or pure horizontal
 - Direction-changing with gaze testing
 - More likely to be present on a chronic basis
 - Fixation removal may increase or decrease intensity of nystagmus

Sub-acute Vestibular Loss



Dynamic Visual Acuity



Head Impulse Testing



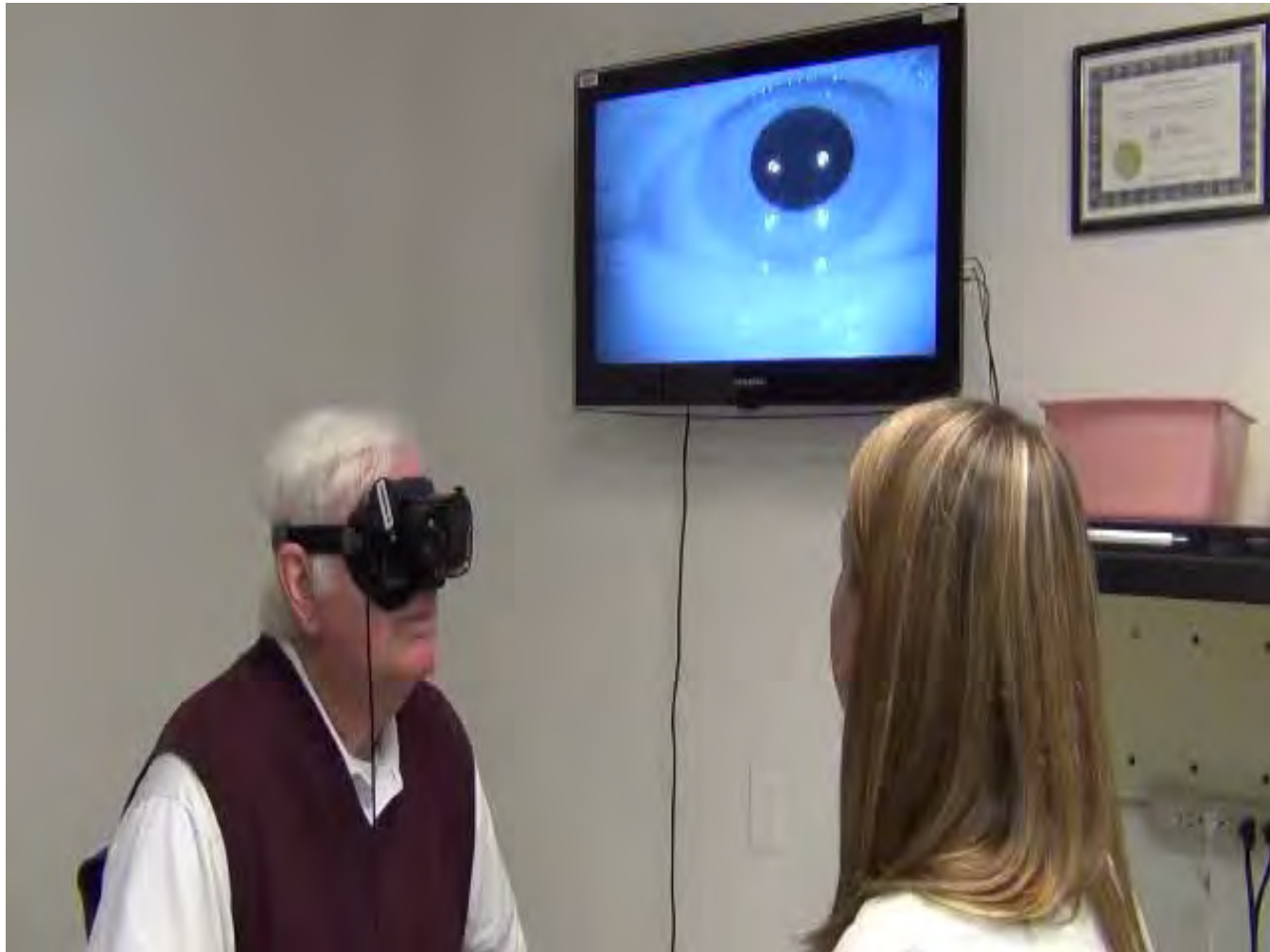
Head Impulse Testing (cont.)



Head-shake Induced Nystagmus



Mastoid Vibration



Modified Clinical Test of Sensory Interaction for Balance (mCTSIB)

(cont.)



Chapter Seven

Vestibular Rehabilitative Treatment of Vestibular Hypofunction

VOR Recovery



Compensation for Oscillopsia: Mechanisms

- Preprogrammed saccades (embedded in head movements)
- Modification of saccade amplitudes with combined head and eye following (saccade amplitude decreased to compensate for a decreased VOR)
- Blinks with head movement
- Utility of smooth pursuit to maintain gaze stabilization may be enhanced by about 10%
- Reweighting of sensory cue utilization (cerebellar function)
- Cervical ocular reflex enhancement? (limited to low frequencies)

Compensation for Oscillopsia: Mechanisms (cont.)



Compensation for Oscillopsia: Mechanisms (cont.)



Compensation for Oscillopsia: Mechanisms (cont.)



Compensation for Oscillopsia: Mechanisms (cont.)



Compensation for Oscillopsia: Mechanisms (cont.)



VRT: Gaze Stabilization

Additional considerations

- Vary axis of rotation (yaw, pitch, not roll)
- Include rotations and **translations**
- Monitor and progress acceleration/frequency of the patient's head movements
- Progress from hand-held targets to objects in periphery
- Vary target distance
- Alter the visual target utilized (progressing to busy visual environments)
- Alter the sensory environment

Progressing the Exercises

Consider progressing the exercises below by performing them with eyes closed, head movement, increasing surface compliancy, reduce visual input (eyes closed, increase eye to target distance, remove vision), increasing the speed of the activity

Seated head turns

Sidelying to/from sitting

Stance: feet together, semi-tandem to tandem (sharpened Romberg)

Toe taps on step / cone to promote single limb stance

Marching

Single limb stance

Sit to stand drills

Forward bending (bow)

Squatting

Figure 8 walking

Pivot turns 90, 180, 270 deg

Gait with head movement

Tandem gait

Step up/down drills

Gait with ball toss

Gait with eyes closed

Pivot turns with gait

Balance beam walking

Gait on uneven surfaces / ramps

Trampoline

Tilt board

Toss tennis ball over shoulder, pivot and catch

Kickball with a tennis ball against a wall

Obstacle course

Gait challenges with mental distraction

Jumping rope

Mall walking towards and against crowds

Encourage participation in ball sports

Chapter Eight

Indications for Medical/Surgical Management

Meniere's Disease

Diagnostic criteria¹

- Two or more episodes of **spontaneous** vertigo of at least 20 minutes to 12 hours
- Audiometrically documented low to medium frequency sensorineural hearing loss
- Fluctuating aural symptoms (tinnitus/fullness)
- Exclusion of other causes

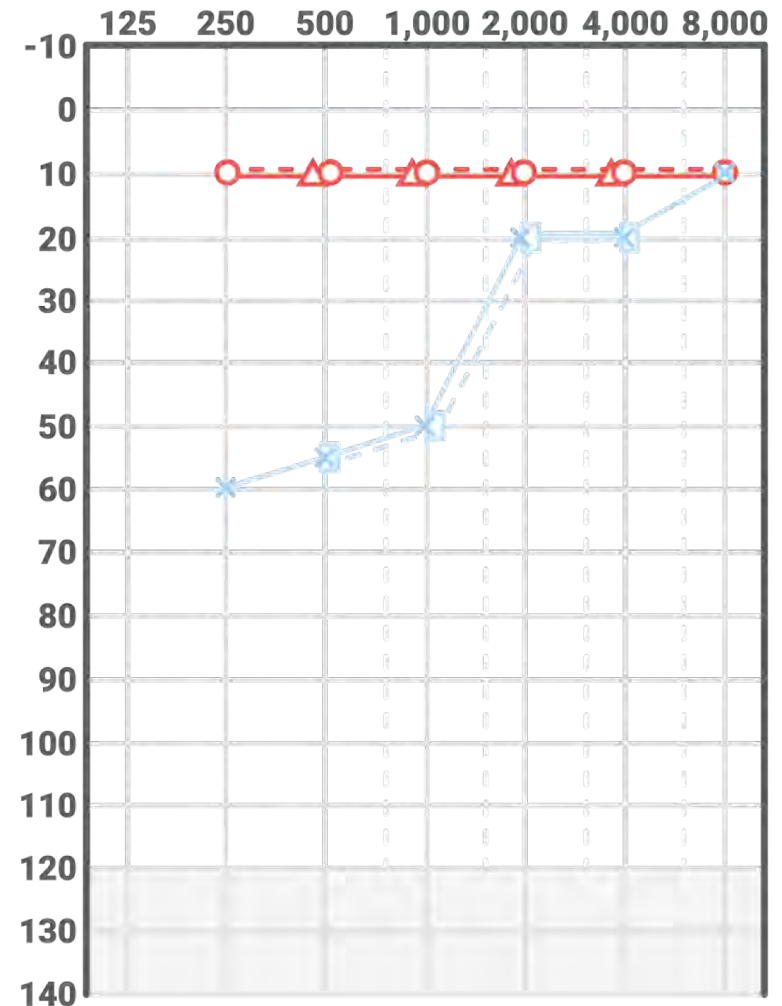


Prosper Meniere
1799-1862

1. AAO-HNS updated 8/2015

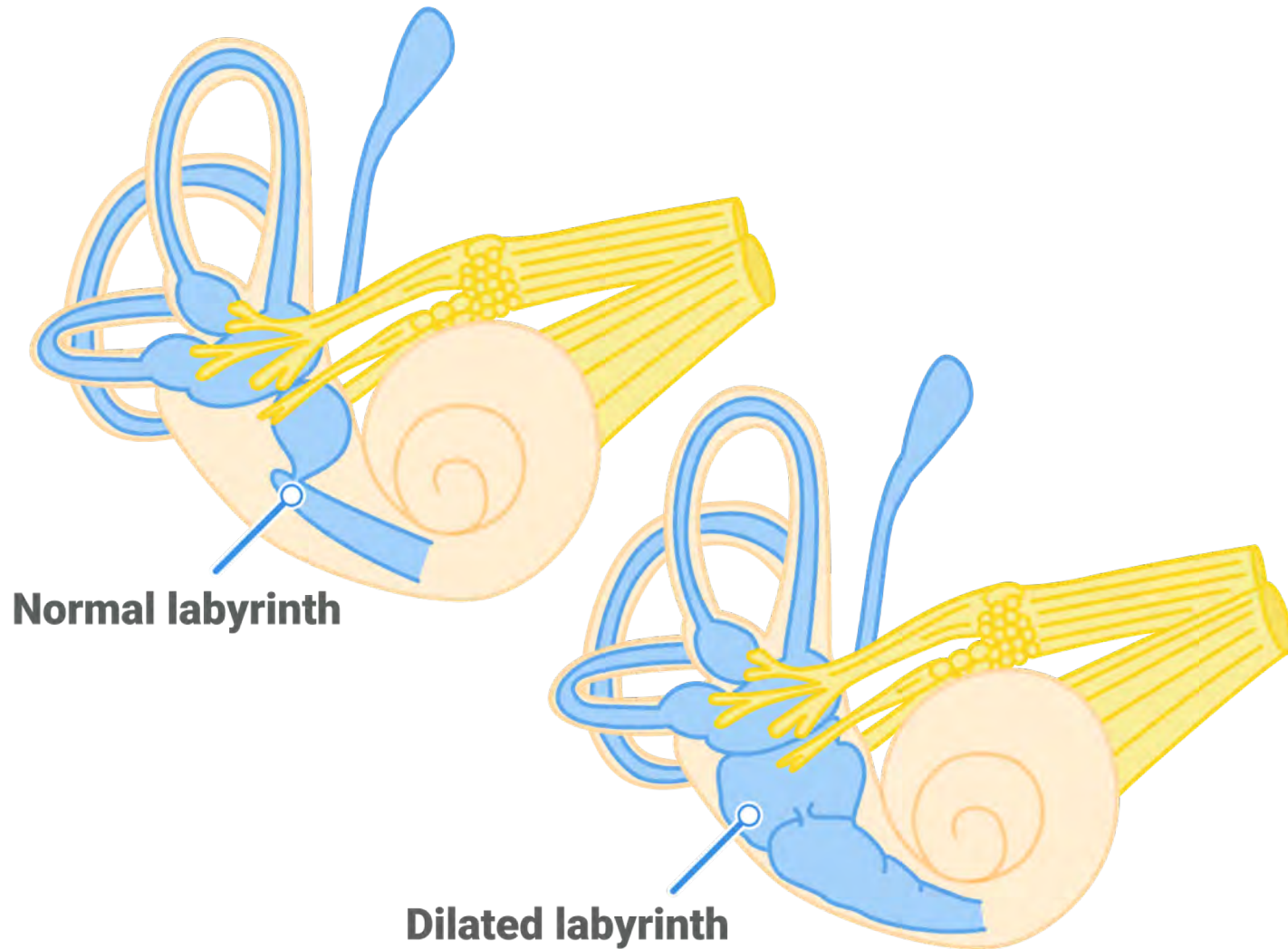
Meniere's Disease: Testing

- Fluctuant, low frequency, asymmetric hearing loss on serial audiograms
- Head impulse test is typically negative¹
- Uni-directional nystagmus with mastoid vibration bilaterally and caloric weakness are the most common abnormal test findings



1. Rubin 2017

Hydrops: Dilated Labyrinth



Meniere's Disease

- Males = females
- Onset commonly in adulthood
- Duration of active vertiginous episodes averages about seven years
- 0.2% of the US population¹
- Bilateral involvement in about 19% of patients with Meniere's²

1. Wladislavosky-Waserman et al, 1984

2. Vrabec 2007

Meniere's Disease (cont.)



Meniere's Disease (cont.)

- Medical management: conservative
 - Vestibular suppressants during acute attacks only
 - Limit sodium intake
 - Dyazide (diuretic)¹
 - Steroids?
 - Oral²
 - Intratympanic³
- Ablative management: required in approximately 1/3 of cases⁴ to control episodic vertigo and/or drop attacks
 - Low dose transtympanic gentamycin injections⁵
- If transtympanic gentamycin fails
 - Vestibular nerve section
 - Labyrinthectomy

1. Van Deelen & Huizing 1986

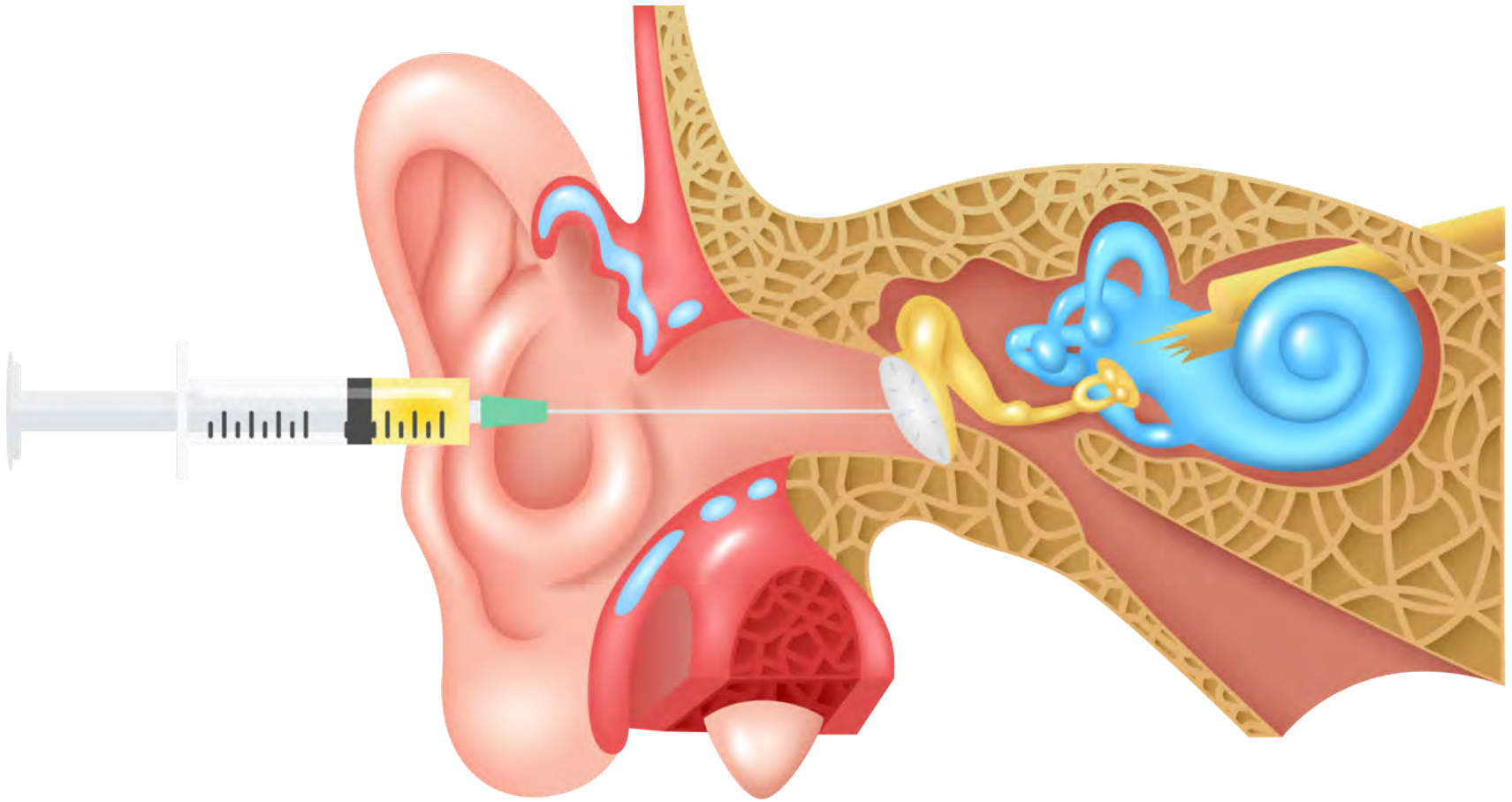
2. Morales-Luckie 2005

3. Jumaily 2017

4. Vrabec 2007

5. Huon 2012

Trans-tympanic Gentamycin



Meniere's Disease (cont.)

Rehabilitative therapy?

- Not indicated in patients with frequent attacks of spontaneous vertigo
- Fair potential for the patient with non-fluctuant imbalance, without frequent acute attacks of spontaneous vertigo
- Secondary BPPV
- Good potential following gentamycin injection/surgical intervention

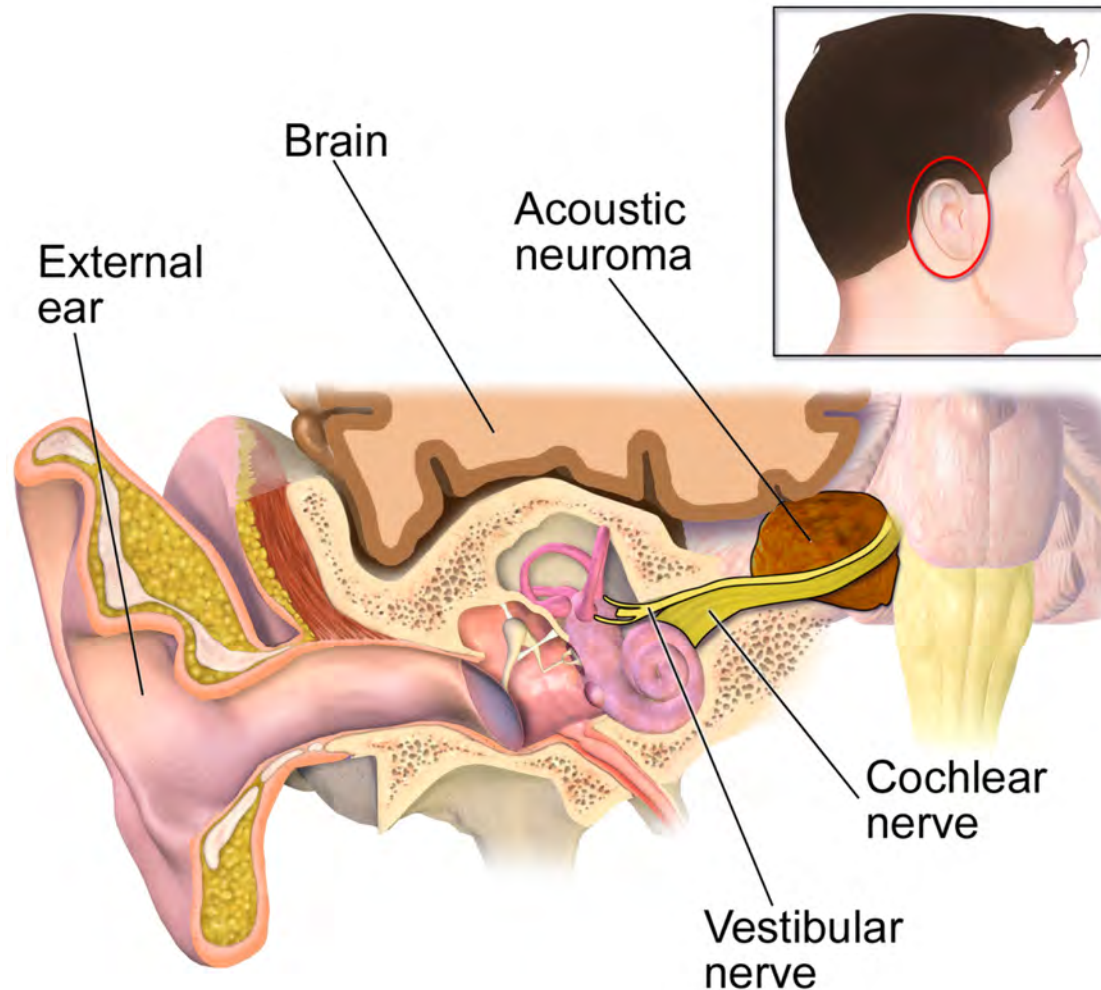
Acoustic Neuroma (Vestibular Schwannoma)

- Tumor occurring on the VIIIth (vestibular-cochlear) cranial nerve
 - Origin is the inferior vestibular nerve > superior
- Lifetime incidence 1/1000, accounts for 85% of cerebellar-pontine angle tumors
- Gadolinium-enhanced MRI of the IAC (Internal auditory canal) is the gold standard for identification
 - CT is insensitive

Acoustic Neuroma (Vestibular Schwannoma) (cont.)

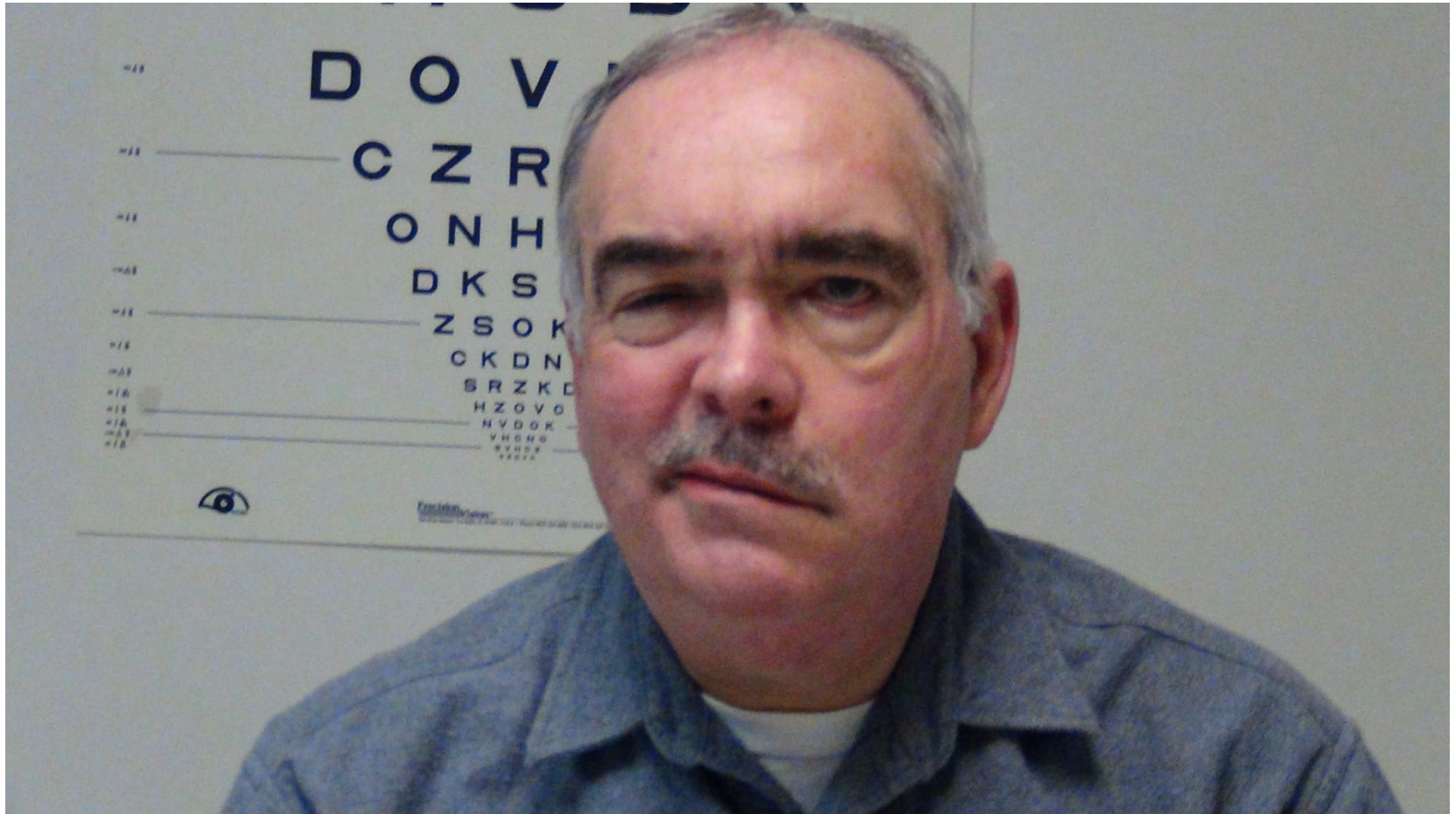
- Symptoms may include progressive sensorineural hearing loss, tinnitus and imbalance
 - **Vertiginous attacks are not common (loss is typically gradual)**
- Presenting symptoms (n=119)¹
 - Hearing loss: 95%
 - Tinnitus: 65%
 - Imbalance/dizziness: 46%

Acoustic Neuroma (Vestibular Schwannoma) (cont.)

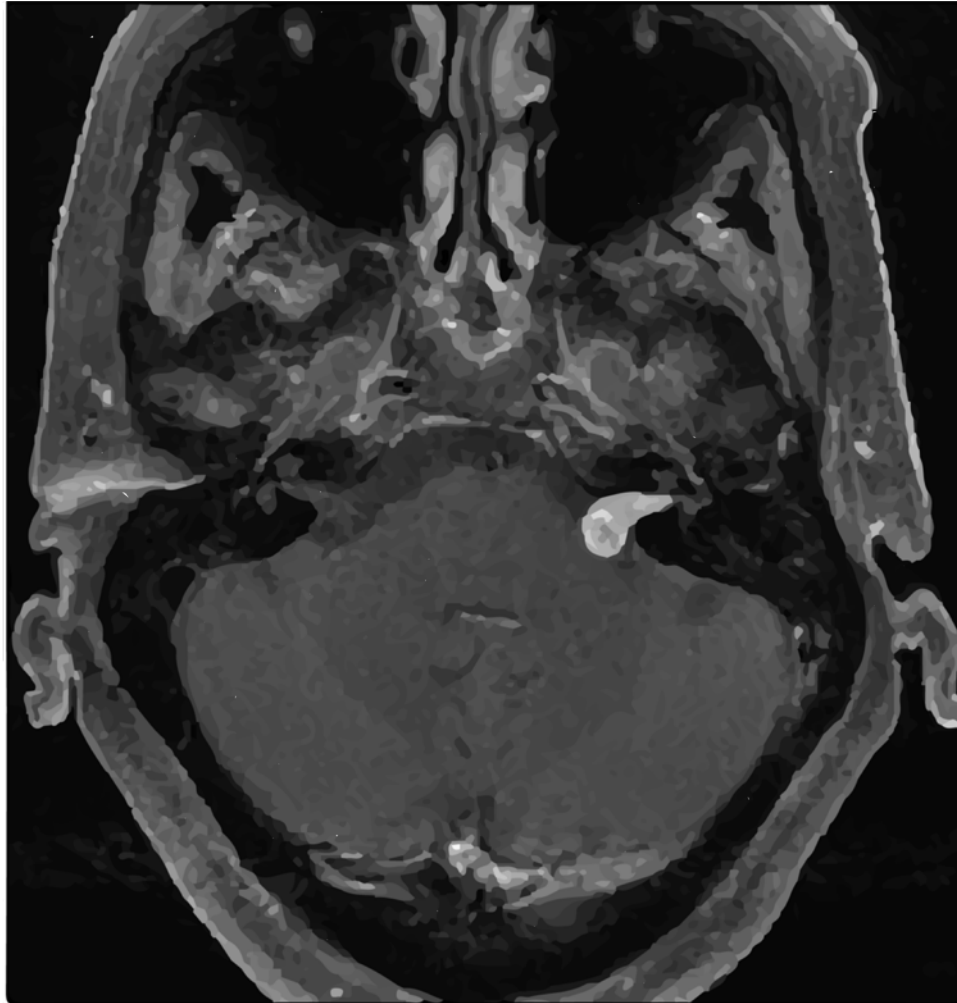


https://commons.wikimedia.org/wiki/File:Blausen_0009_AcousticNeuroma.png

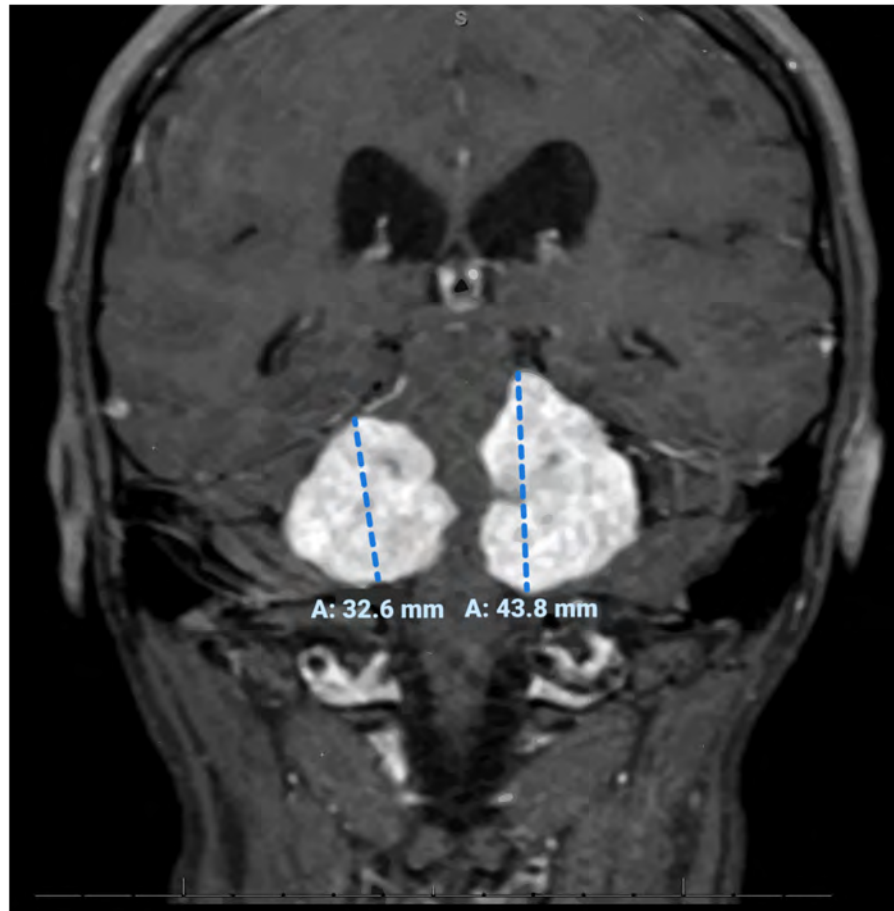
Acoustic Neuroma (Vestibular Schwannoma) (cont.)



Acoustic Neuroma (Vestibular Schwannoma) (cont.)



Acoustic Neuroma (Vestibular Schwannoma) (cont.)



Management

- Watchful waiting: serial MRI/audiogram/vestibular studies to monitor the mass
- Surgical removal (size of mass over 2.5 cm)
 - Facial nerve preservation about 90%
 - Hearing preservation
 - Superior vestibular nerve about 75%
 - Inferior vestibular nerve about 28%²
- Radiosurgery
 - Size of mass under 2.5 cm

1. Data from Jacob et al (2007)

Conclusion: Summary Points

- Vestibular related dizziness is very common in an elderly population and is associated with falls and impaired ADLs
- Emphasize timing, triggers and associated symptoms during history taking, not dizziness type
- Consider including head impulse and head positioning tests routinely when examining subjects with complaints of dizziness/falls

Conclusion: Summary Points (cont.)

- Canalith repositioning maneuvers are typically effective for managing BPPV
- Consider vestibular rehabilitation for subjects with head motion induced oscillopsia and imbalance who have findings of vestibular loss
- Vestibular rehabilitation is not likely to be helpful for subjects with spontaneous attacks of dizziness only

Question and Answer Session

Compensation for Vestibular Loss: Postural Control Exercises

Jeff Walter DPT, NCS

Consider progressing the exercises below by performing them with eyes closed, head movement, increasing surface compliancy, reduce visual input (eyes closed, increase eye to target distance, remove vision), increasing the speed of the activity

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Sidelying to/from sitting

Stance: feet together, semi-tandem to tandem (sharpened Romberg)

Toe taps on step /cone to promote single limb stance

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Single limb stance

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Figure 8 walking

Pivot turns 90, 180, 270 deg

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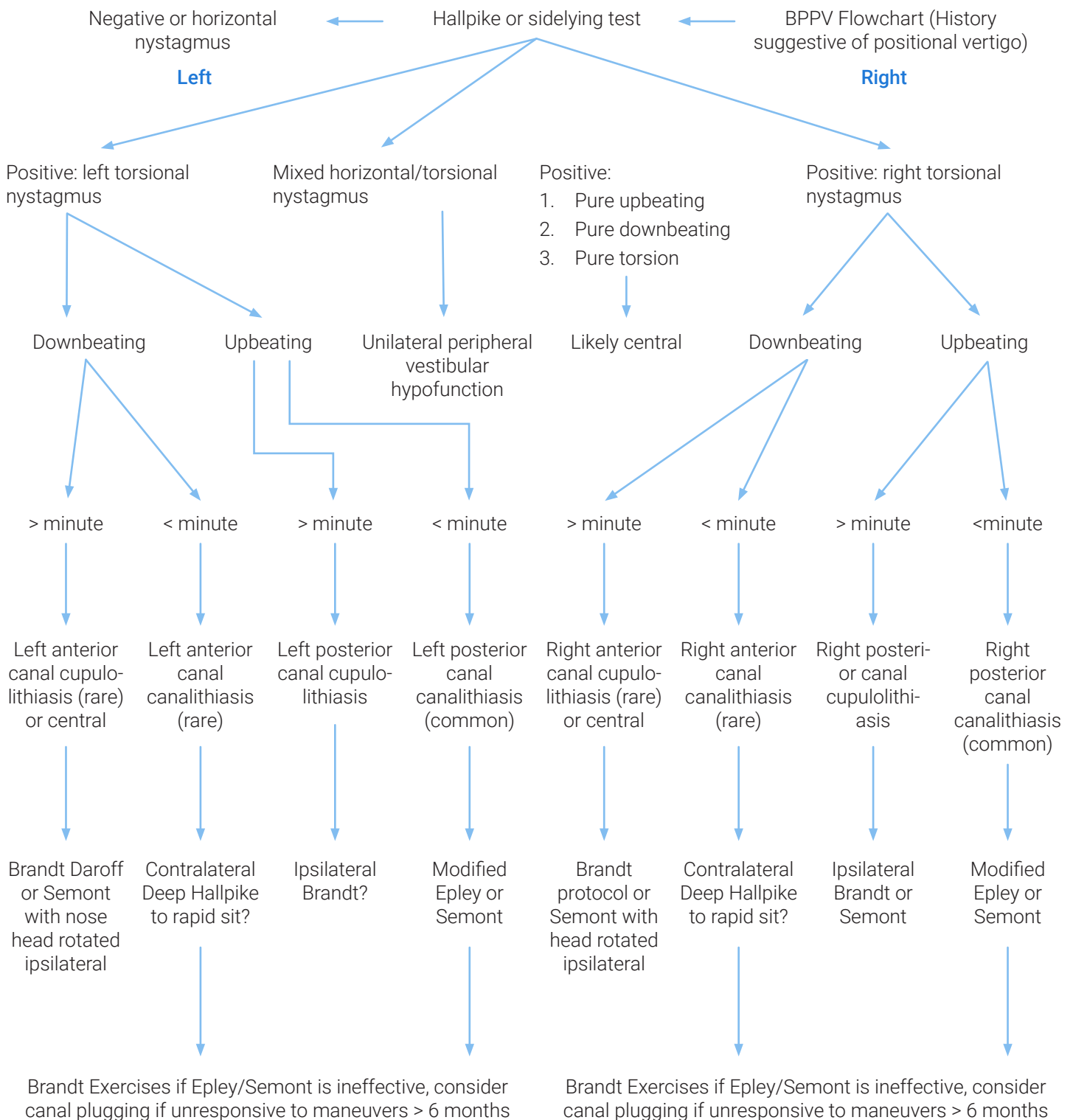
Jumping rope

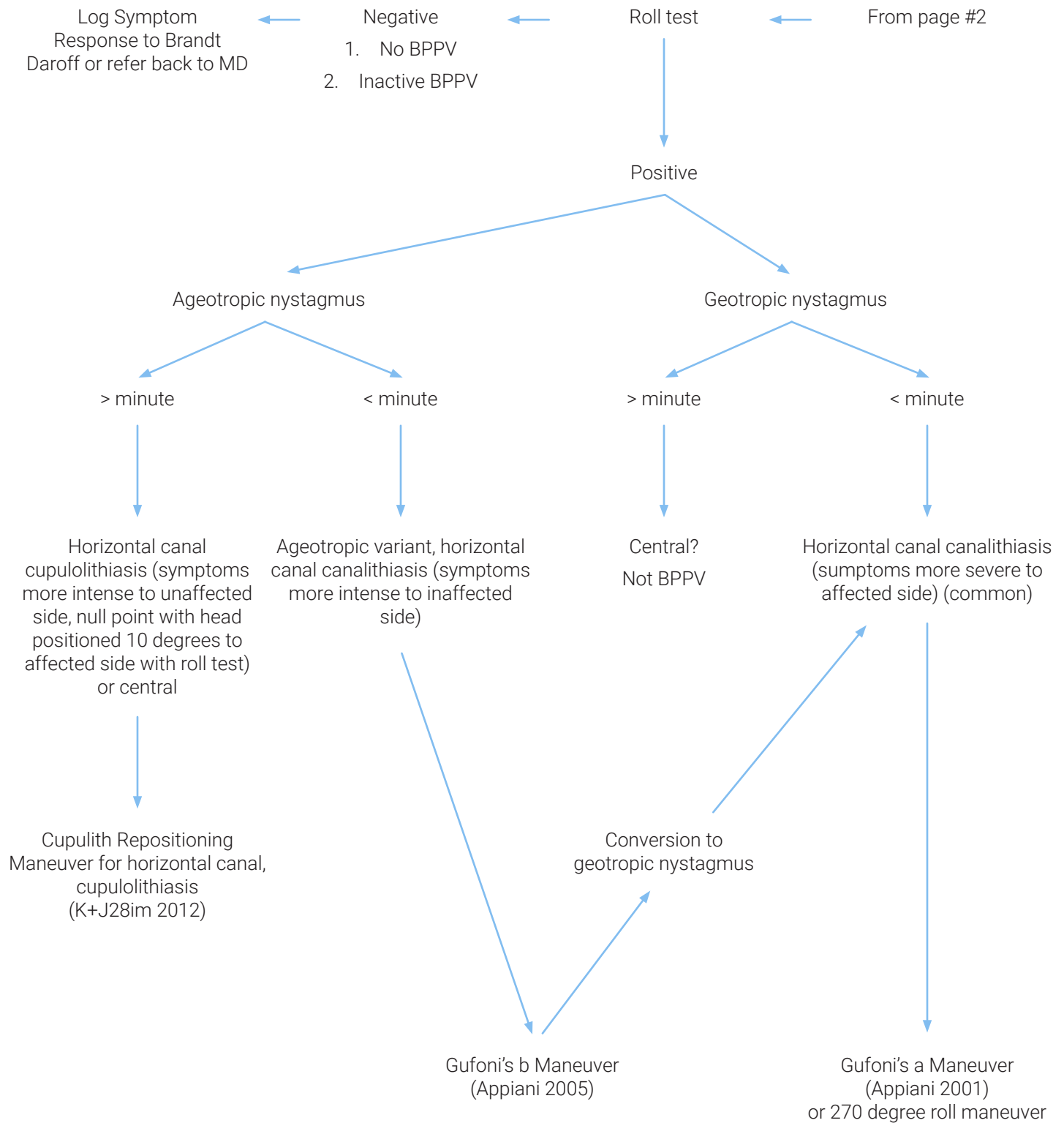
Mall walking towards and against crowds

Encourage participation in ball sports

BPPV Flowchart

Jeff Walter DPT, NCS





BPPV

Jeff Walter DPT, NCS

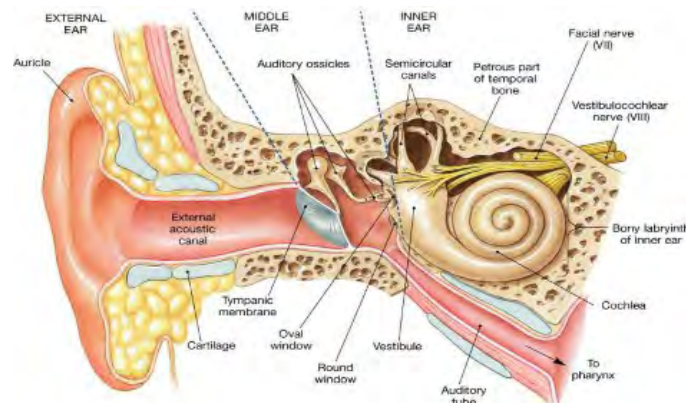
BPPV is short for:

- B**enign: not life-threatening
- P**aroxysmal: recurrent, sudden intensification of symptoms
- P**ositional: related to a change in the position or the ear
- V**ertigo: sensation of rotation/spinning

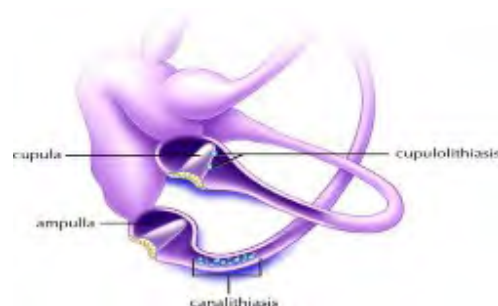
This condition is quite common, especially in adults over the age of 40. It is typically treatable with repositioning maneuvers.

What is BPPV?

BPPV is a dysfunction within the vestibular organ of the inner ear which is responsible for motion detection. The vestibular organ is utilized to assist in maintaining balance, especially during head movement.



A portion of your balance organ normally contains crystals (otoconia = “ear rocks”) composed of calcium carbonate, the canals do not. The crystals can become dislodged and travel into the fluid-filled canals. After making a position change, e.g. rolling onto the involved ear, looking up to the ceiling, or lying back in bed, these crystals will move in the canals. This creates the illusion of spinning (vertigo) and imbalance. Nausea and vomiting can occur. Quick, pulsating movements of your eyes (nystagmus) also tends to be present due to connections between the inner ear and control of eye movement. The dizziness and vertigo do not tend to occur when stationary, the symptoms are strictly evoked with position changes of the head. BPPV is more likely with aging, head trauma / concussion, sleeping with one ear down in bed on a regular basis, osteoporosis, surgeries or dental procedure that involve vibration, other disease to the inner ear or a genetic predisposition. Females are more commonly affected than males.



How does my clinician know whether I have BPPV?

Head positioning tests and observation of your eyes can be used to confirm the diagnosis. Additional tests are used to rule out other more potentially serious causes of vertigo.

What are my treatment options?

There are four options:

1. Repositioning maneuvers performed by a clinician.

Initially, this is the preferred treatment since the clinician will be able to ensure safety and provide further education. Most cases (90%) of BPPV can be treated in 1-3 treatment sessions. In rare cases, BPPV may involve both ears.

2. Repositioning maneuvers performed by yourself.

After successful treatment, you may be instructed in maneuvers you could perform at home to address potential recurrences. Approximately 50% of all individuals with a history of BPPV can experience another episode within five years of the first one.

3. No treatment.

The symptoms can resolve without any treatment in some instances, however the time course is highly variable. The crystals may dissolve in the fluid within the canal. In general, it is not recommended to leave this condition untreated. Falls, imbalance and depression are more common in individuals with untreated BPPV.

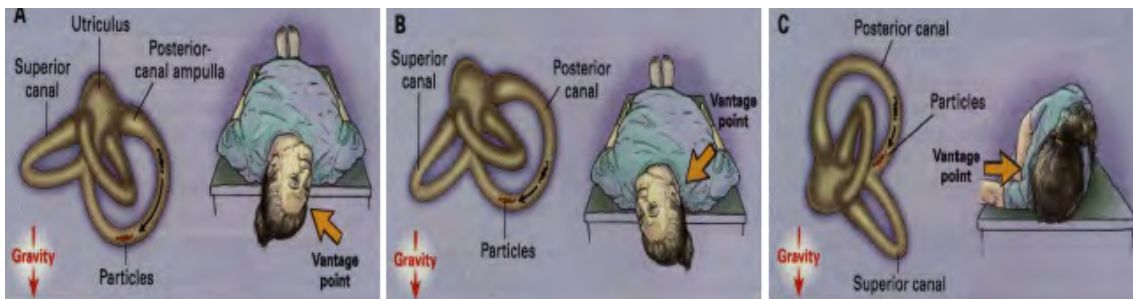
4. Surgery.

Rarely, and only in very severe cases where maneuvers have not provided relief, surgery may be indicated to place a plug into the involved canal to prevent the crystals from becoming entrapped. This would be completed by an Otologist.

Medications (e.g. Meclizine / Antivert) are not typically recommended to address BPPV

What are repositioning maneuvers?

A number of repositioning maneuvers could be used depending on which canal the crystals traveled into. One of the maneuvers most commonly used is the one pictured below.



What do I do after an office treatment?

It is recommended to sleep with your head slightly elevated or on your uninvolved side for 1-2 days after each treatment. This will give your body time to reabsorb the crystals and prevent them from escaping back into one of the canals..

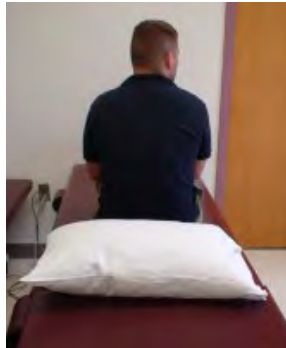
What are my treatment options?



How do I treat myself if the same symptoms recur?

You should only attempt these self-treatment maneuvers if they have been specifically recommended by your clinician and after careful instruction. **It is not advised to try these maneuvers unless it is recommended by a clinician!** Make sure you have another person standing close by since you may experience symptoms, such as a spinning sensation (vertigo), imbalance, and/or nausea during the maneuver. You can perform this exercise on a flat bed. You will need a thick pillow that will be positioned under your shoulders and upper back during the maneuver. The following photos demonstrate a maneuver for RIGHT BPPV. You should perform a mirror image of this maneuver if you have been diagnosed with LEFT BPPV.

1. Sit in the middle of a twin-sized bed to leave enough room to roll onto the side opposite the involved ear. Turn your head half-way to the involved side (this is typically the ear closest to the ground when you experience symptoms of BPPV during your daily activities and often the ear you tend to sleep on).



2. Keep half-way looking over your shoulder and lie back in one steady motion. The pillow should be underneath your upper back and shoulders (NOT under your head and neck) and your head should hang back over the edge of the pillow resting on the bed. You may experience dizziness in this position. Hold on to the bed and do not move your head. Hold this position until the symptoms subside and for at least 30 seconds. If the symptoms are continuous, discontinue the maneuver and see a vestibular therapist or physician specializing in BPPV treatment.



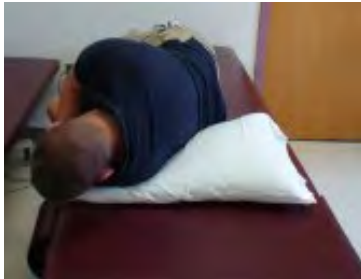
3. Steadily roll your head (do **not** lift it off the bed) toward the other side until it is turned half-way over your opposite shoulder. Hold this position for 30 seconds. You may or may not experience dizziness in this position.



4. Bend the knee on the involved side.



5. Turn your body onto the uninvolved side so that you lie all the way on your shoulder. Tuck your chin into your bottom shoulder. You may experience dizziness in this position. Have another person stand close to that side of the bed and hold onto you if necessary. Hold this position for 30 seconds.



6. Drop your feet over that edge of the bed and slowly sit up like a windshield wiper, do not roll onto your back. Once you are seated, turn your head to midline while it is still slightly bent forward. Have another person stand or sit close to you and hold onto your shoulders. You may feel imbalanced and should wait for at least 2 minutes before standing up.



This handout was originally developed by Silke Reddington SPT
 Jeff Walter PT, DPT, NCS provided oversight and updates
 Special thanks to Tim Hain MD and www.dizziness-and-balance.com for use of anatomical illustrations

Helpful Vestibular Websites/Apps

Jeff Walter DPT, NCS

www.vestibularseminars.com

Established by Jeff Walter PT, DPT, NCS as a supplement to vestibular rehab courses. **Video files of common office examination/treatment techniques, eval forms and templates for common diagnoses, vestibular model videos, vestibular glossary, quiz, references, course listing.**

www.dizziness-and-balance.com

Established by Timothy C. Hain MD, a neurologist from Chicago. **Great site for clinician and patient education.**

<http://novel.utah.edu>

Excellent compilation of eye movement videos

<http://www.neurology.org/cgi/content/full/70/6/454/DC1>

Head impulse test videos

<http://web.missouri.edu/~proste/tool/vest/index.htm>

Outcome measures with scoring forms

www.vestibular.org

Find a local vestibular PT, pt handouts

<http://deedee.dbi.udel.edu/MichaelTeixidoMD/VestibularDiagnoses.html>

Helpful vestibular animations from Michael Teixido MD

<https://www.youtube.com/channel/UC4Az8JyL2vulBQJQdVVchVw>

You tube channel with teaching videos developed by Michael Teixido MD

<http://www.neuropt.org/special-interest-groups/vestibular-rehabilitation/resources>

Vestibular SIG APTA

<http://www.otometrics.com>

Vestibular testing equipment

<http://www.micromedical.com/>

Vestibular testing equipment

<http://www.onbalance.com/>

Balance testing equipment

<http://www.exrx.net/Store/VHI/Kits/BalanceVestibularRehab.html>

Illustrated balance and vestibular exercises

http://www.nidcd.nih.gov/health/hearing/acoustic_neuroma.asp

Info on acoustic neuroma

<https://nora.cc/images/documents/VOMS.pdf>

Copy of VOMS Vestibular Ocular-Motor Screen

<https://www.impacttest.com/pdf/VOMSExam.pdf>

VOMS

"aVOR" app for i-phone, vestibular ocular reflex training tool

<https://youtu.be/KLt2LtISPmQ>

New England Journal of Medicine BPPV teaching videos

www.sralab.org

Resource for outcome measures utilized in vestibular rehabilitation

Keys to Preventing Falls

Jeff Walter DPT, NCS

Falls are not just a result of the aging process and can be prevented with a few simple changes. By adding some of the following ideas to your lifestyle, you can lower your risk of falling:

1. **Begin a regular exercise program**

Exercise is one of the most important ways to reduce your likelihood of falling. It makes your muscles and bones stronger and helps you feel better. Exercise is also helpful in improving your balance and coordination. Be sure to ask your doctor if exercise is safe for you and what type of exercise program would be most beneficial.

Also consider consulting a physical therapist for need of:

- Assistive device for walking
- Orthotic assessment
- Balance training
- Safety/adaptive equipment

2. **Make your home environment safer**

About 50% of falls occur at home and can be prevented by:

- Removing things you can trip over (such as electrical cords, papers, books, clothes, and shoes) from stairs and places where you walk.
- Removing small throw rugs or use double-sided tape to keep the rugs from slipping.
- Keeping items you use often in cabinets you can reach easily without using a step stool or stooping.
- Having grab bars put in next to your toilet and in the tub or shower.
- Using non-slip mats in the bathtub and on shower floors.
- Improving the lighting in your home. As you get older, you need brighter lights to see well. Lampshades or frosted bulbs can reduce glare. Use night-lights in the bedroom, hallways, and bathroom.
- Having handrails and lights put in on all staircases.
- Wearing shoes that give good support and have thin non-slip soles. Avoid wearing slippers and athletic shoes with deep treads.

3. **Have your health care provider review your medications.**

Have your doctor or pharmacist look at all the medications you are taking and review the possible side effects with you. As you get older, the way some medications work in your body can change. As a result, some medications or combinations of medications can lead to drowsiness or lightheadedness and cause falls. It is also important to clearly label your medications to allow for proper administration.

4. **4. Have your vision checked**

Poor vision can increase your chances of falling so it is important to have your eyes checked by an eye doctor. You may be wearing the wrong glasses or have a condition such as glaucoma or cataracts that impairs your vision.

Patient History (Initial Evaluation)

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Patient Name:

Age:

Occupation:

Referring Physician:

System Review

Other current medical issues:

Joint pain? Y/N Neck pain? Y/N Back pain? Y/N Ability to lay supine for position maneuvers if needed? Y/N

PMH

Heart conditions	High blood pressure	Hypotension	DM	High cholesterol	HA's or migranes
History of infection	Recent antibiotic use	Osteoporosis	CA	Falls	Head trauma
MS	CVA: any residual effects?				

Red Flags: have you currently been experiencing unexplained

- | | | | |
|-------------------------|---------------------|------------------------------|-------------------------------|
| · Abnormal fatigue | · Blurred vision | · Unexplained weight | · Bowel or bladder difficulty |
| · SOB | · Double vision | loss/gain | · Passed out recently or lost |
| · Slurred speech | · Numbness/tingling | · Unexplained weakness/ loss | consciousness? |
| · Difficulty swallowing | · Poor coordination | of strength in arms/legs | |

Hearing loss? Y/N

Side? Right / None / Left

Tinnitus: Right / Left

Has the loss been **gradual** or **sudden**?

Hearing test (Audiogram) done recently? Y/N

Medical Tests

MRI CT scan Smoke? Y/N Drink? Y/N

History of current issue:

Date of onset: What were you doing when it came on?

Vertigo (spinning)

Imbalanced (unsteadiness)

Faint (light head/pass out)

Spontaneous (nothing you think you can do to trigger it) or is it brought on by positional changes or non-specific head movements?

Worse with?

Laying down in bed	Rolling over in bed R/L	Standing up quickly	Pitching head back
Sitting up in bed	Looking side to side?	Bending forward	BPPV

How long did your last episode last?

Seconds

BPPV
SCD

Minutes

BPPV
TIA

Hours

Meniere's

Days

Neuritis
Labyrinthitis
Vestibular ischemia

Weeks

CNS
Psychiatric

Are there any other symptoms that come along with the dizziness?

Nausea	Vomiting	Loss of balance	Oscillopsia	Headache	Diplopia
Visual loss	Dysarthria	Sensory disturbances	Limb incoordination	Falls	Hiccups

What relieves your symptoms?

Does sneezing, coughing, holding your breath or specific sounds exacerbate your dizziness? Superior Canal Dehiscence
Associated sensitivity to lights, sounds or odors with your dizziness? Hormonally triggered? Headaches? Migraine related dizziness

Is your dizziness recurring?

How often does an episode recur?

Duration of recurrences?

Improving/worse/same?

Prior treatment?

Physical Exam

1. Smooth Pursuits (H-test) : WNL/ saccadic, Abnormal ocular ROM
2. Saccades (Nose to finger) : WNL Abnormal
3. Auditory Screen : (Weber) Negative Lateralizes: Right/ Left
4. Cervical Screen: WNL Limited:
5. Head Thrust: WNL Positive: Right/ Left / Bilateral
6. Heave Test : WNL Positive: Right/ Left / Bilateral
7. Balance (Romberg):
Standing level/ firm surface Eyes Open WNL Sway: Mild/ Moderate/ Severe / LOB
Standing level/ firm surface Eyes Closed WNL Sway: Mild/ Moderate/ Severe / LOB
8. CTSIB:
Standing on foam Eyes Open WNL Sway: Mild/ Moderate/ Severe / LOB
Standing on foam Eyes Closed WNL Sway: Mild/ Moderate/ Severe / LOB
9. Gait: Standard WNL Unsteady With head vertical movements: WNL Unsteady
Eyes closed: WNL Unsteady Tandem gait: WNL Unsteady
With head horizontal rotation: WNL Unsteady Comments
10. Sensation: Left LE : WNL/intact Diminished Absent
Right LE : WNL/intact Diminished Absent
11. Proprioception: Left LE : WNL/intact Impaired Absent
Right LE : WNL/intact Impaired Absent
12. Gaze Stability with fixation: negative or (1°, 2°, 3°) Nystagmus: Right / Left
13. Gaze Stability without fixation: negative or (1°, 2°, 3°) Nystagmus: Right / Left
14. Head Shake without fixation (10 sec) negative Nystagmus/ direction
15. Hyperventilation with out fixation (40 sec): negative Nystagmus/ direction

Identification of Anterior/Posterior Canalithiasis or Cupulolithiasis

16. Hallpike Dix: Left / Right WNL Nystagmus R / L / up / down torsion: R / L Duration:
With fixation present:
17. Sit Patient up: Left / Right WNL Nystagmus R / L / up / down torsion: R / L Duration:
With fixation present:
18. Hallpike Dix: Left / Right WNL Nystagmus R / L / up / down torsion: R / L Duration:
With fixation present:
19. Hallpike Dix: Left / Right WNL Nystagmus R / L / up / down torsion: R / L Duration:
With fixation present:

- **Posterior Canal BPPV:** Torsion ipsilateral to the ear down and upbeat **Canalithiasis** duration: < 60 sec
- **Anterior Canal BPPV:** Torsion ipsilateral to the ear down and downbeat **Cupulolithiasis** duration: > 60 sec

Identification of Horizontal Canalithiasis

20. Roll Test:	Left	WNL	Nystagmus R / L / up / down With fixation present:
	Right	WNL	Nystagmus R / L / up / down With fixation present:

torsion: R / L Duration:

torsion: R / L Duration:

- **Horizontal Canal BPPV:** Canalithiasis
- **Horizontal geotropic** (toward with ground) < 60 sec
- **Dynamic Visual Acuity:** WNL Degraded

Horizontal Canal BPPV: Cupulolithiasis

Horizontal ageotropic (away from the ground) > 60 sec

Lines with head motion

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MedBridge

Management of Vestibular-Related Dizziness in Geriatrics

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