

Vestibular Rehabilitation: Evidence-Based Management of the Patient with Dizziness and Balance Dysfunction

Anna Lisa de Joya, PT, DSc, NCS

Philippine Nurses Association
of Metro Houston

September 27, 2014

TIRR
MEMORIAL[®]
HERMANN
Rehabilitation & Research

Objectives

At the end of the course, the participant will be able to:

- Describe the current incidence and prevalence of vestibular dysfunction
- Understand the impact of dizziness and balance dysfunction on a patient's daily activities and quality of life
- Describe etiology/pathology of common vestibular disorders
- Recognize characteristics of common vestibular disorders
- Understand the different rehabilitation techniques for common vestibular disorders
- Identify indications for vestibular rehabilitation referral

INTRODUCTION

A 360-degree panoramic view of a courtyard. In the center, a tall, vibrant green wall rises vertically. The sky above is a deep blue, filled with soft, white, fluffy clouds. On either side of the green wall, the curved walls of buildings are visible. The building on the right has a textured, light-colored facade and a window with white blinds. The building on the left is made of reddish-brown brick. The overall scene is bright and clear, with a slight fisheye distortion at the edges.

**WHAT IS
DIZZINESS???**

Dizziness

- Dizziness = symptom = conscious sensation
- Dizziness ≠ diagnosis or disease
- “medically indistinct term which laypersons use to describe a variety of conditions”
(www.medterms.com)
- can be associated with disorders of many body systems as well as multisystem disease and adverse drug reactions (Boissonault, 2005)

Symptoms/Terms

- Vertigo
- Lightheadedness
- Motion sickness/Visual sensitivity
- Disequilibrium
- Anxiety/Fear Produced/Psychological Symptoms
- Nausea/Vomiting
- Oscillopsia



90 M

>17 years experience vertigo or balance problems

69 M

> 40 years old had a vestibular dysfunction (Agrawal et al. 2009)

8 M

Chronic problem with balance (NIDCD ,2006-2008)

2.4 M

Chronic problem with dizziness (NIDCD ,2006-2008)

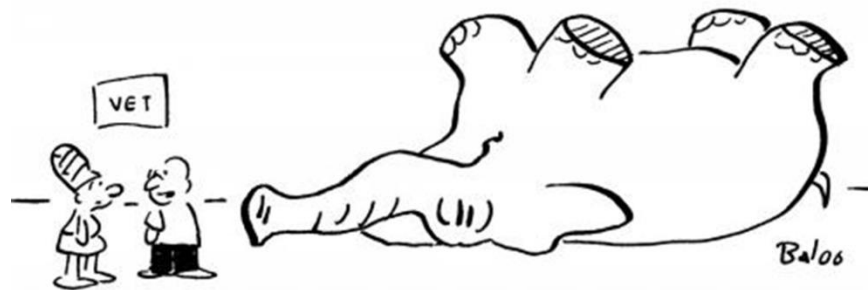


- > 50 % of the accidental deaths in the elderly are due to balance-related falls → frequently associated with dizziness
- Dizziness and falls:
 - Account for 5-10% of physician visits
 - Affect 40% of those over age 40
 - The leading cause for physician visits for people over the age of 65

Dizziness and Vertigo

Rank among the MOST frequent complaints in primary care. (Neuhauser et al, 2008)

Can be caused by many different medical conditions
BUT 45% of medical cases are due to vestibular disorders. (National Institute on Deafness and Other Communication Disorders)

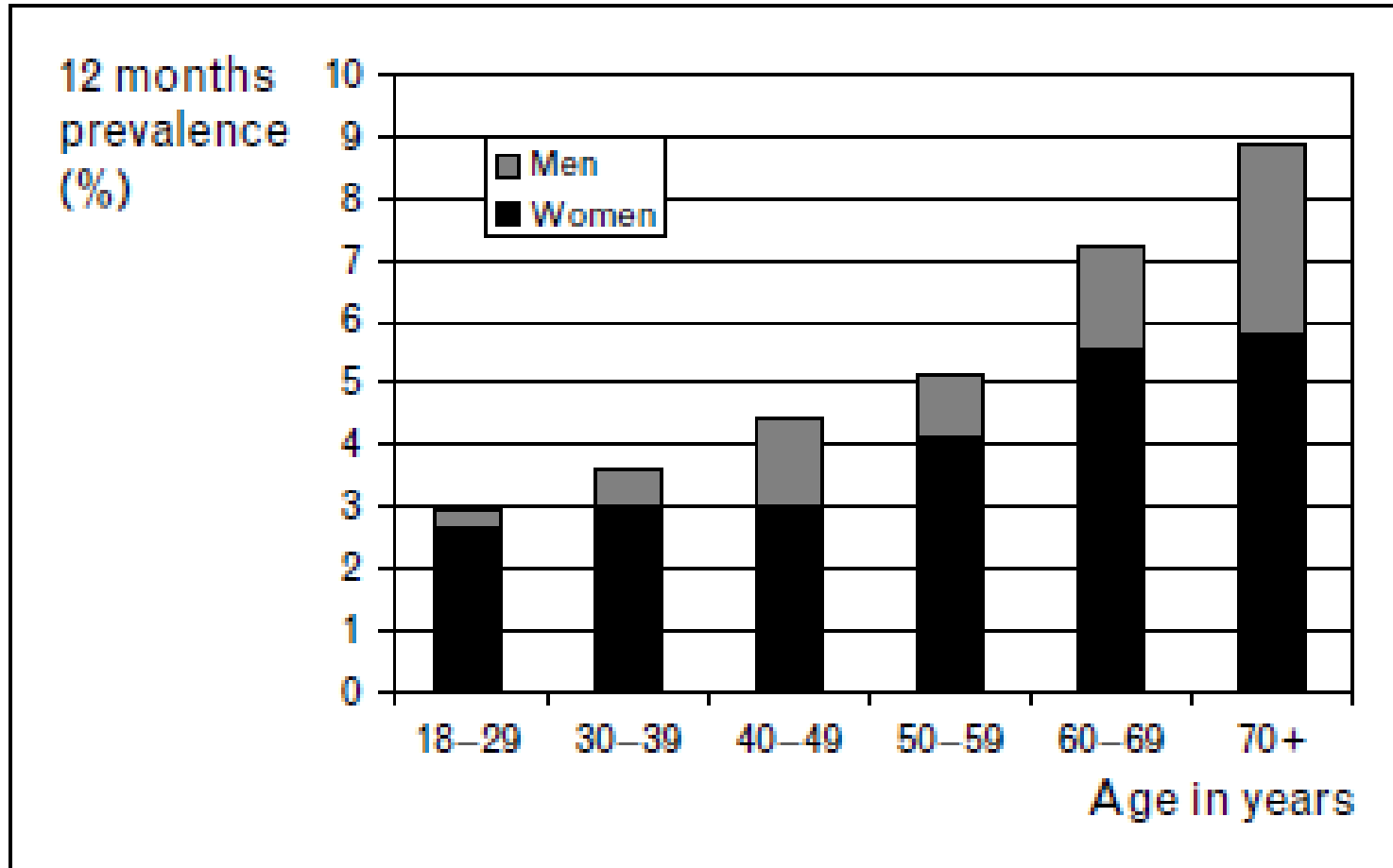


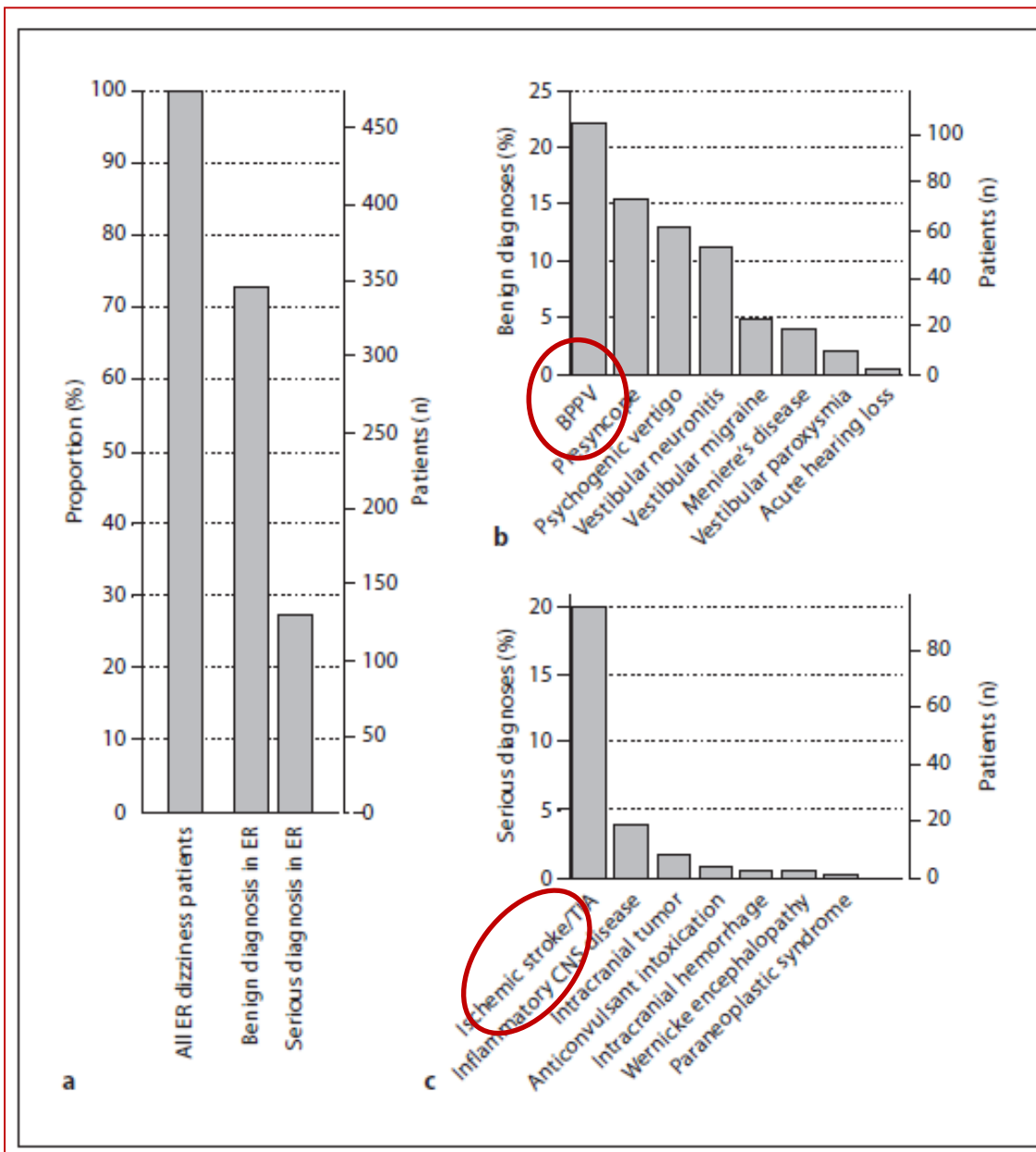
"It may be his inner ear."



- 4-avg # of physicians consulted
- 1-imaging series completed
- 1-ER visit
- 1-Psychiatric referral
- 52-number of months in search of a solution

Lifetime prevalence of vertigo in adults 18-79 y/o





Dizziness in Patients Over 60 Years of Age 1994-2000

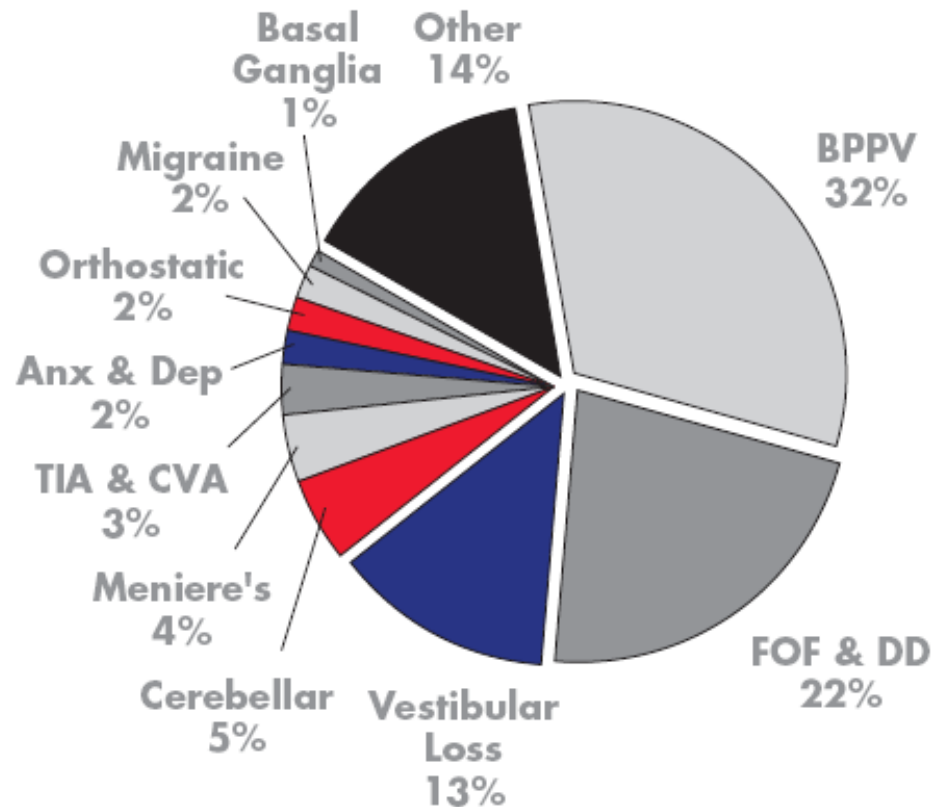
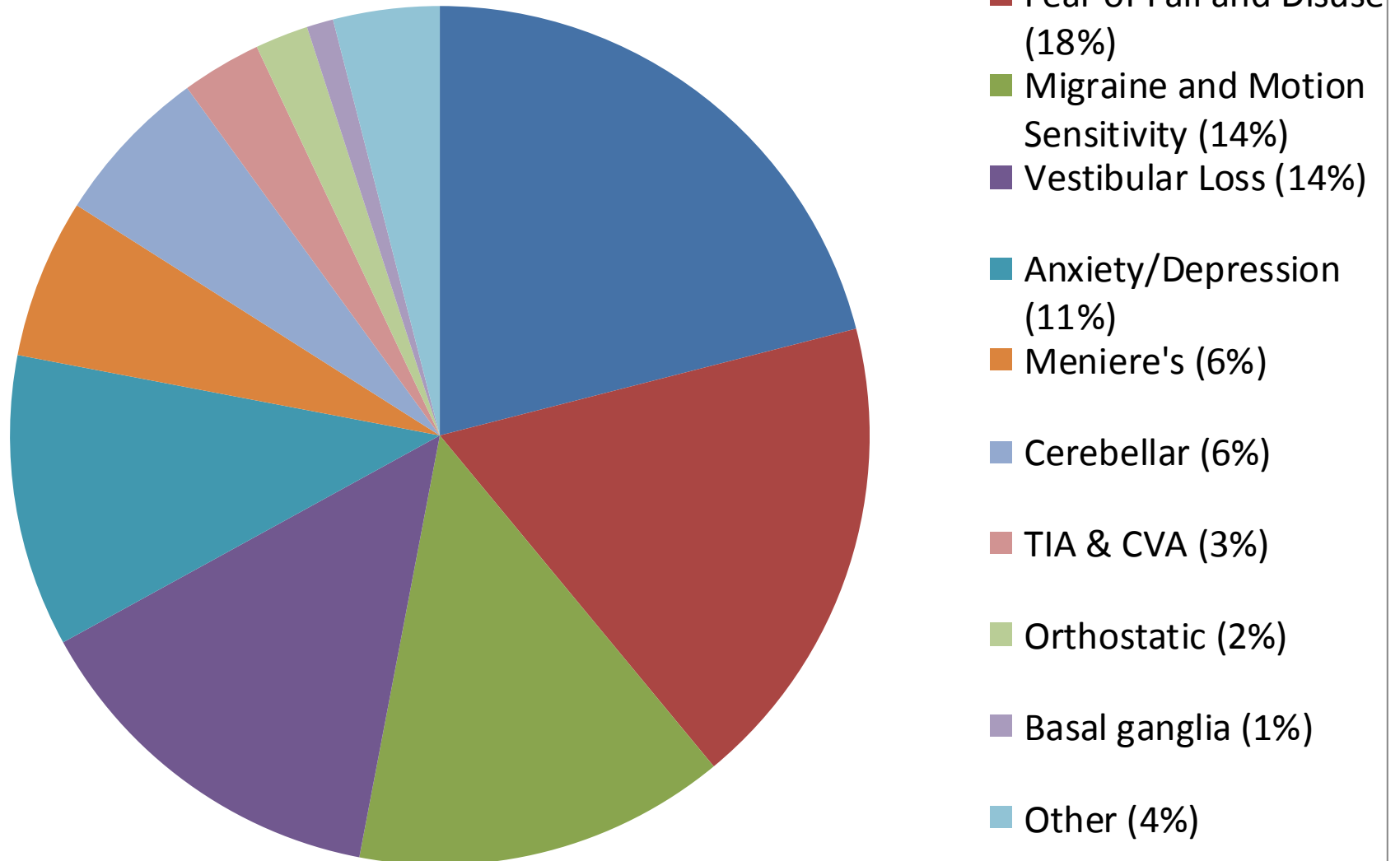


Figure. The etiology of vestibular involvement in patients over 60 years of age.

BPPV, benign paroxysmal positional vertigo; **CVA**, cerebrovascular accident; **DD**, disuse dysequilibrium; **FOF**, fear of falling; **TIA**, transient ischemic attack.

Causes of Dizziness



Who's at risk?

- Neurologic
- Geriatric
- Orthopedic
- Pediatric
- Cardiopulmonary
- Metabolic
- Current modern warfare
- Sports (concussion)

ANYONE

> 1 B / year

BALANCE

> 8 B / year

FALLS



Dizziness and imbalance...

- in a sample of persons 65-75 y/o, 1/3 reported dizziness and imbalance degraded their QOL
- 33% report it affects professional activities
- 14% report they changed or abandoned their profession

...DEGRADED QUALITY OF LIFE

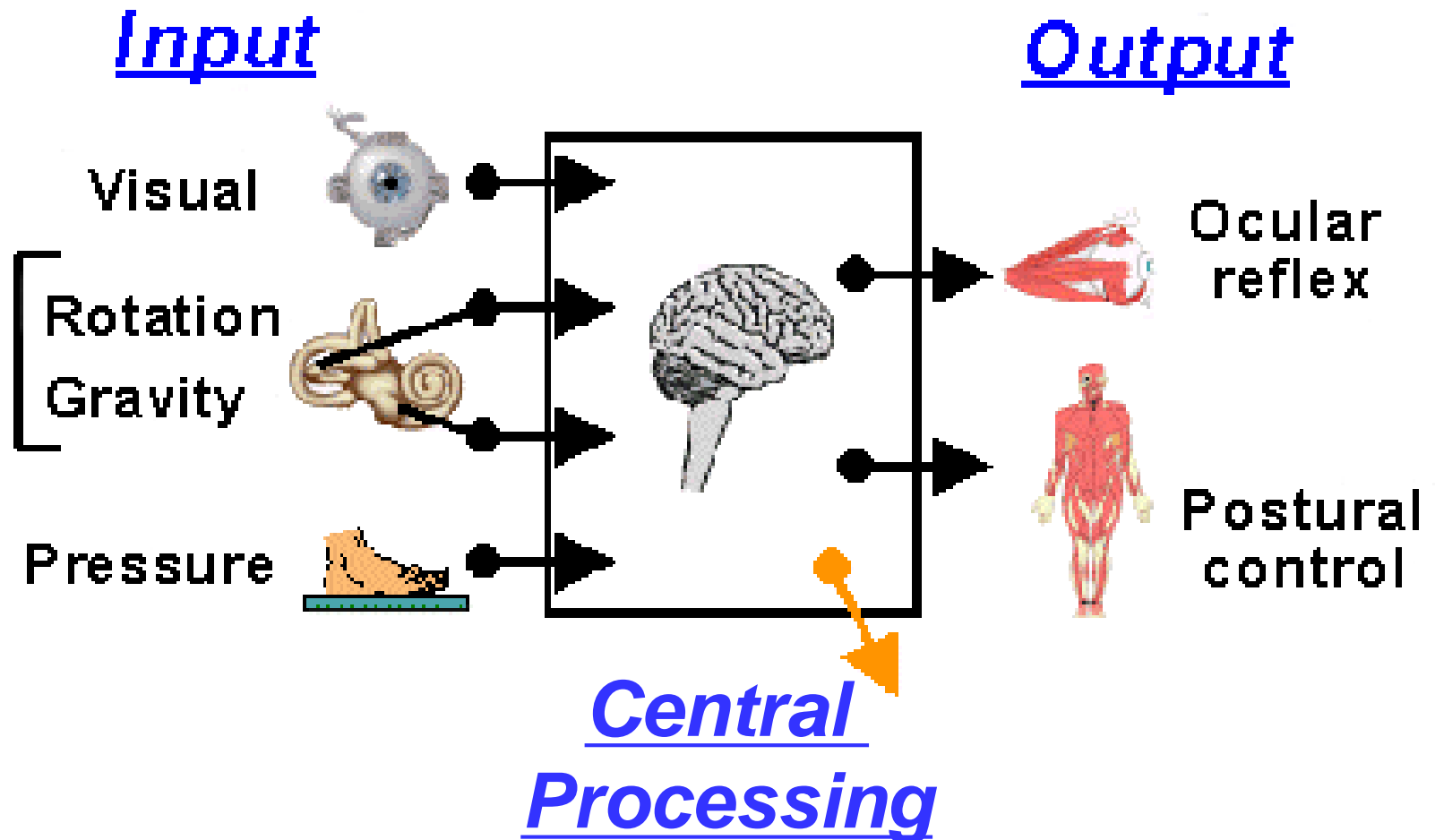


THE VESTIBULAR SYSTEM

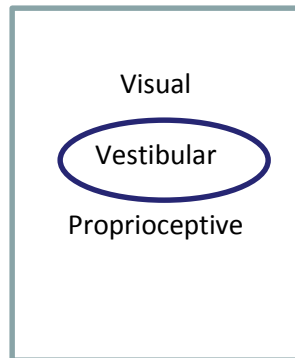
“The vestibular system senses head position and acceleration in order to develop a subjective awareness of head orientation and movement in space, and to produce vestibular reflexes for equilibrium.” (Tusa, 2011)



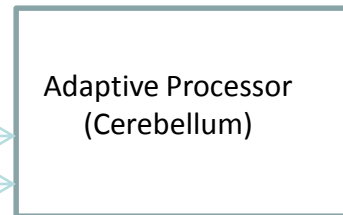
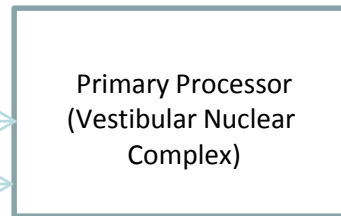
Organization of the Vestibular System



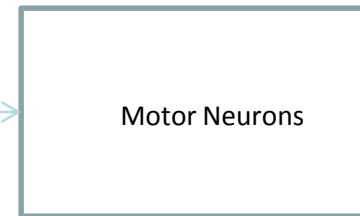
Sensory Input



Central Processing



Motor Output



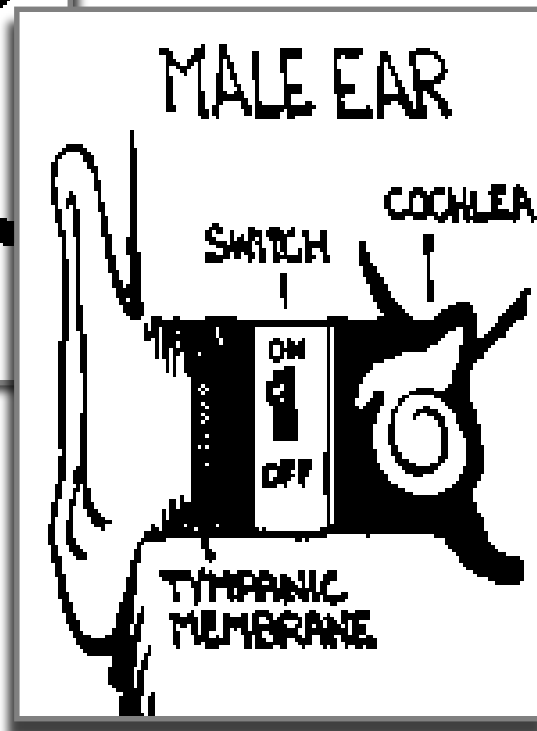
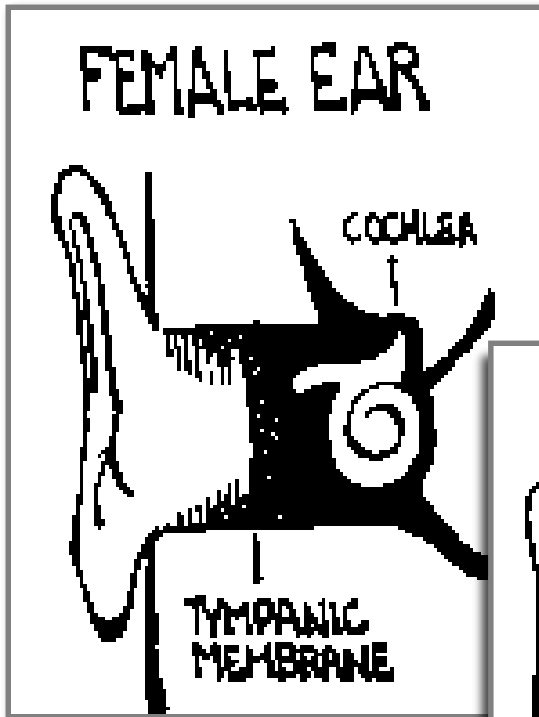
Eye Mov't

Positional Mov't

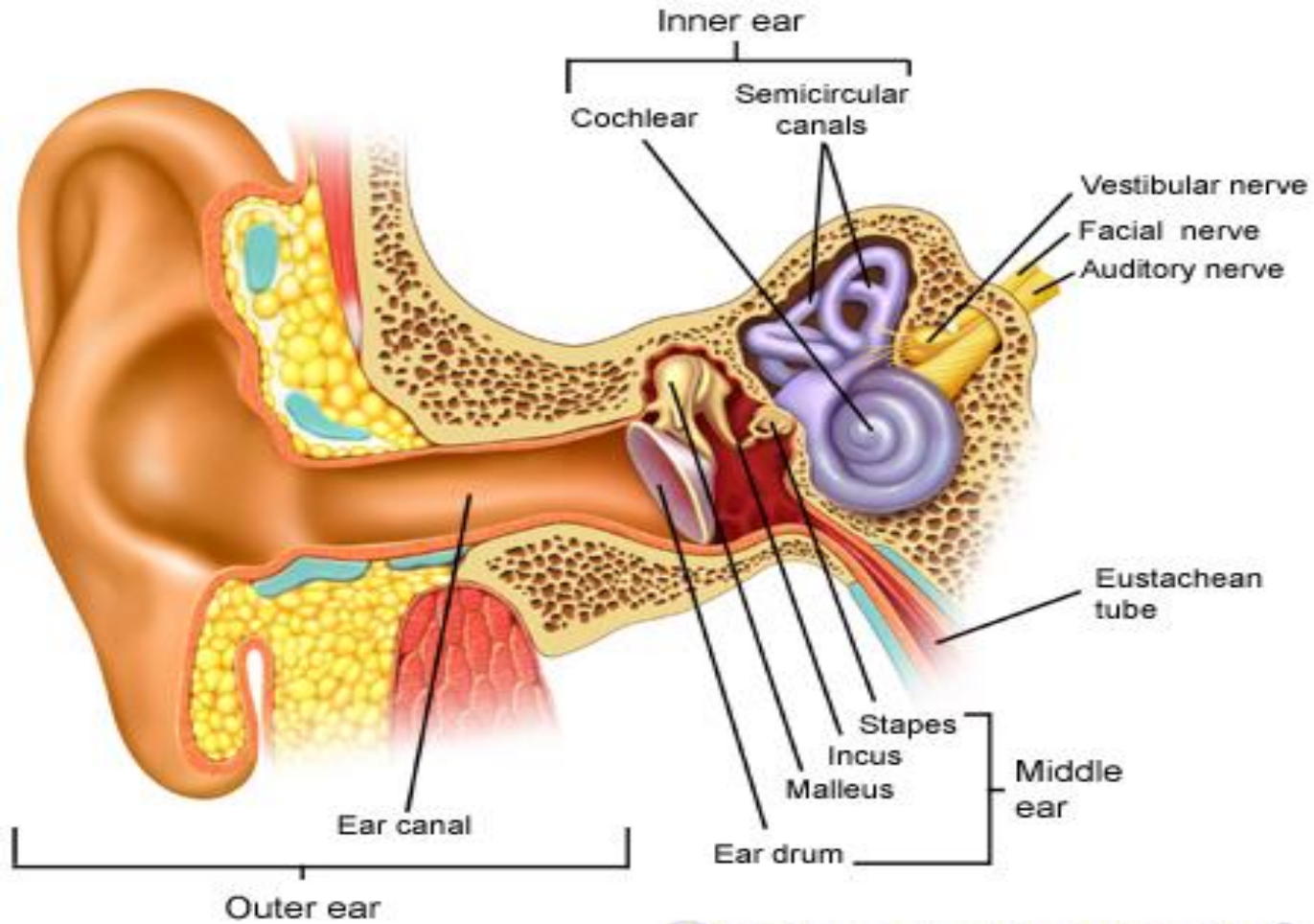
Organization of the Vestibular System

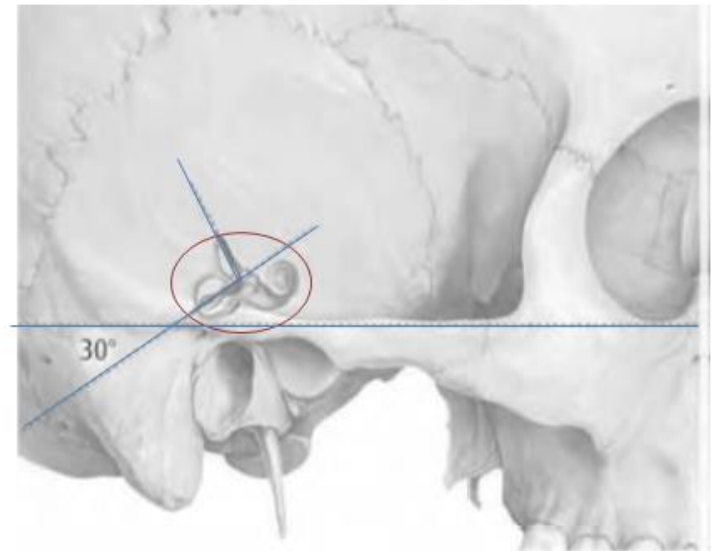
-Herdman, 2007

Vestibular Anatomy and Physiology



Peripheral Vestibular System





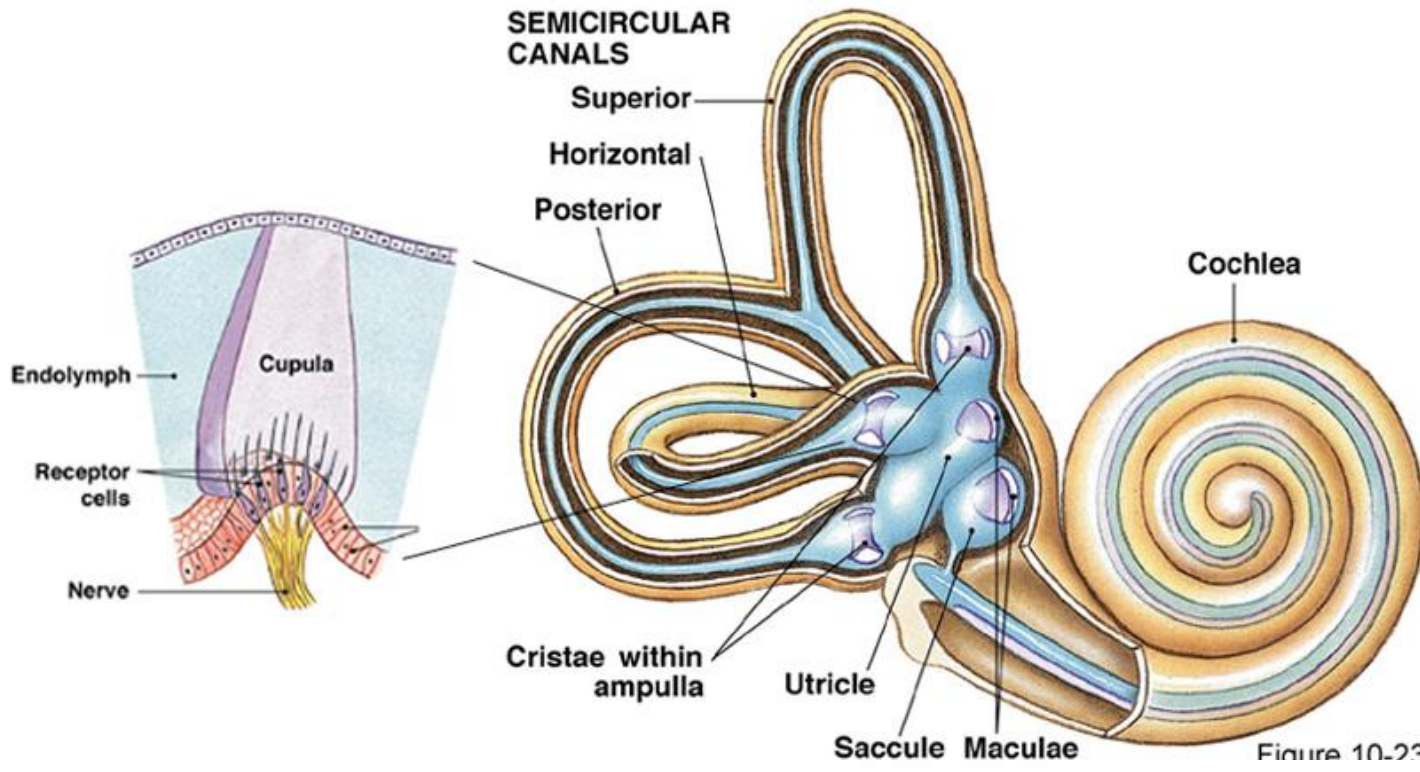
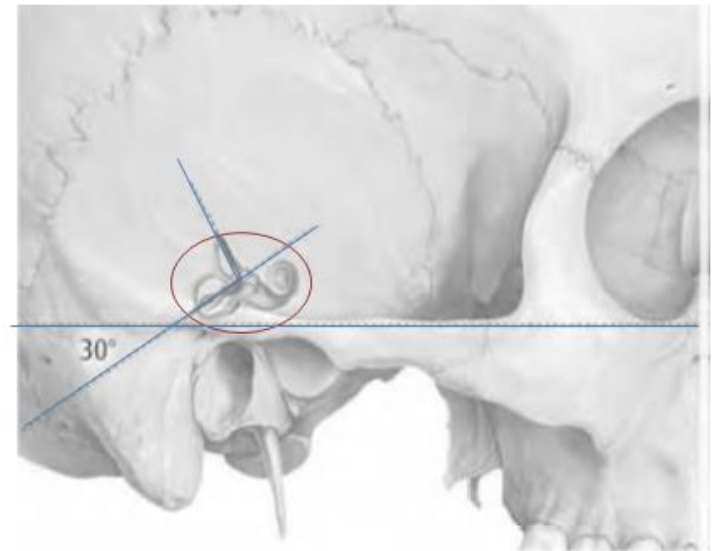
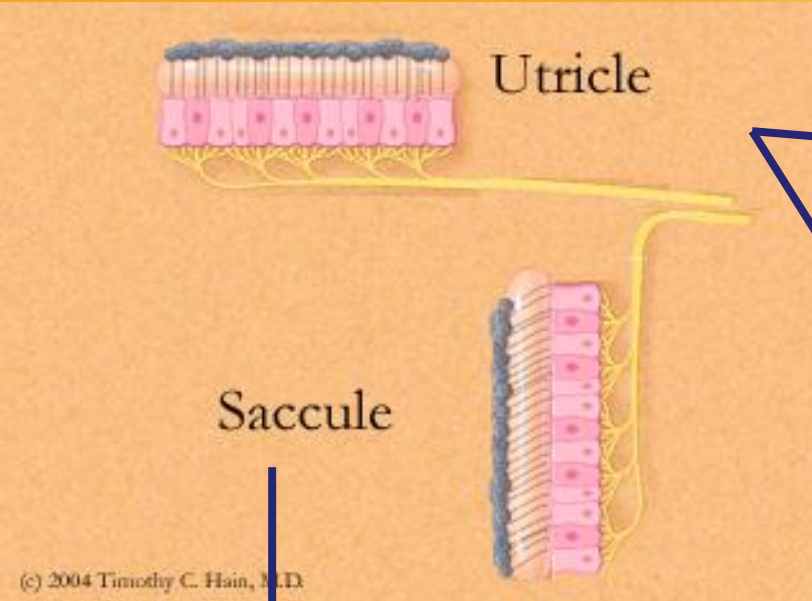


Figure 10-23

Copyright © 2007 Pearson Education, Inc.

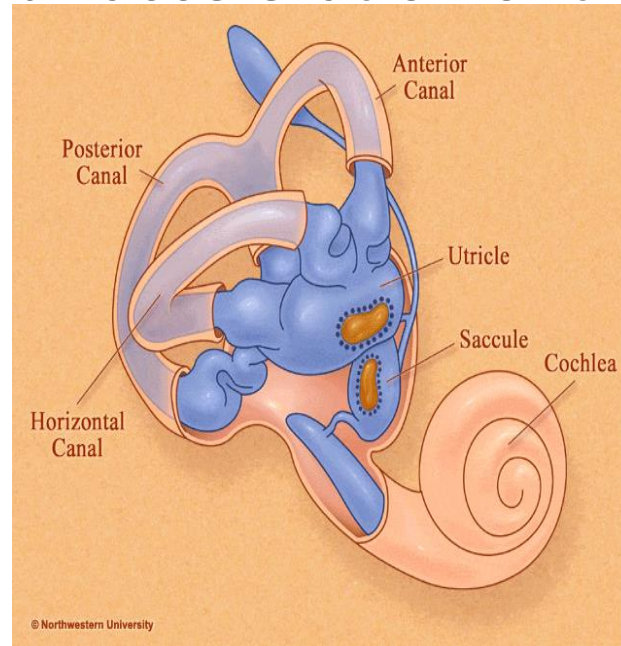


Sensory Organs: The Otoliths

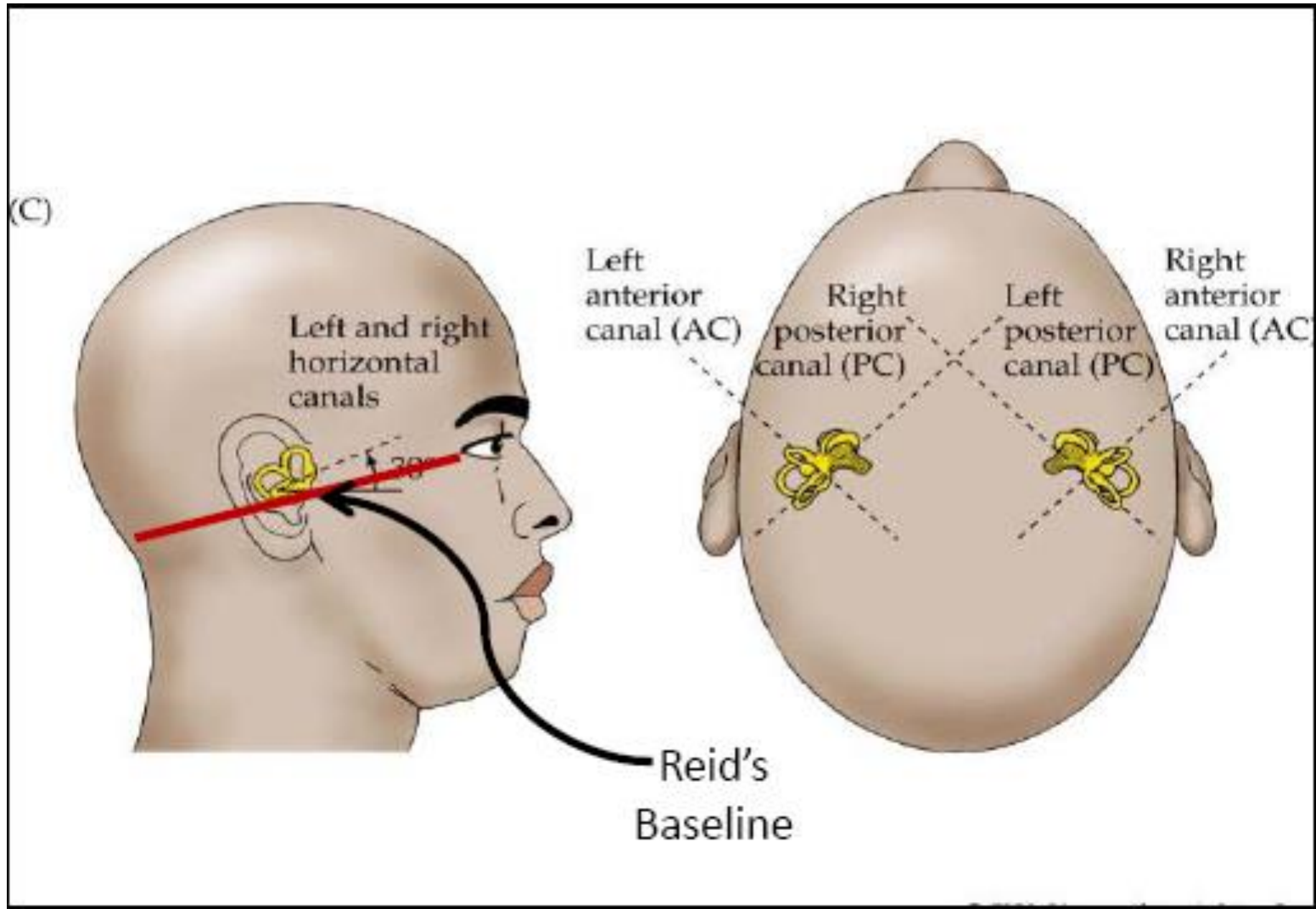


Peripheral: The semicircular canals

- 3 semicircular canals lie perpendicular to each other
- Each end of the SCC widens to form the ampulla
- Senses *angular* acceleration of the head



Sensory Organs: The Semicircular Canals



Peripheral: Hair cells

- Basic sensory element of the peripheral sensory apparatus
- Present in the saccule, utricle and ampulla of the semicircular canals

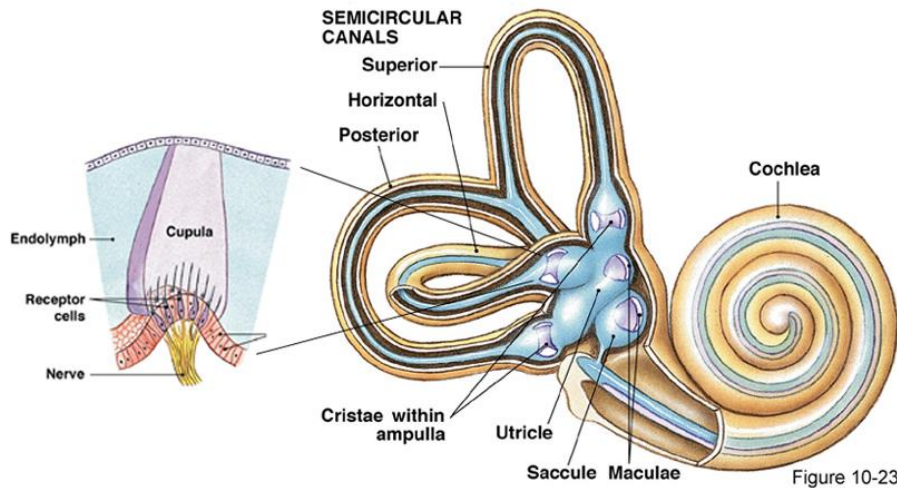
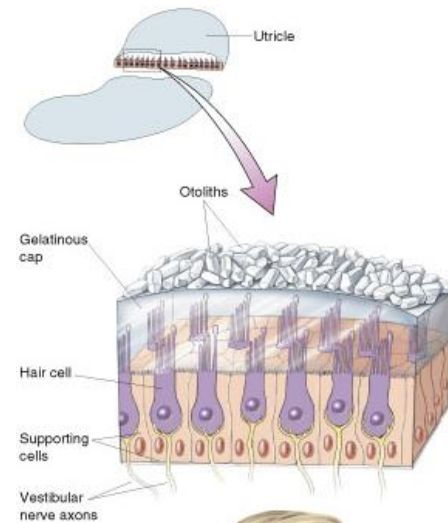
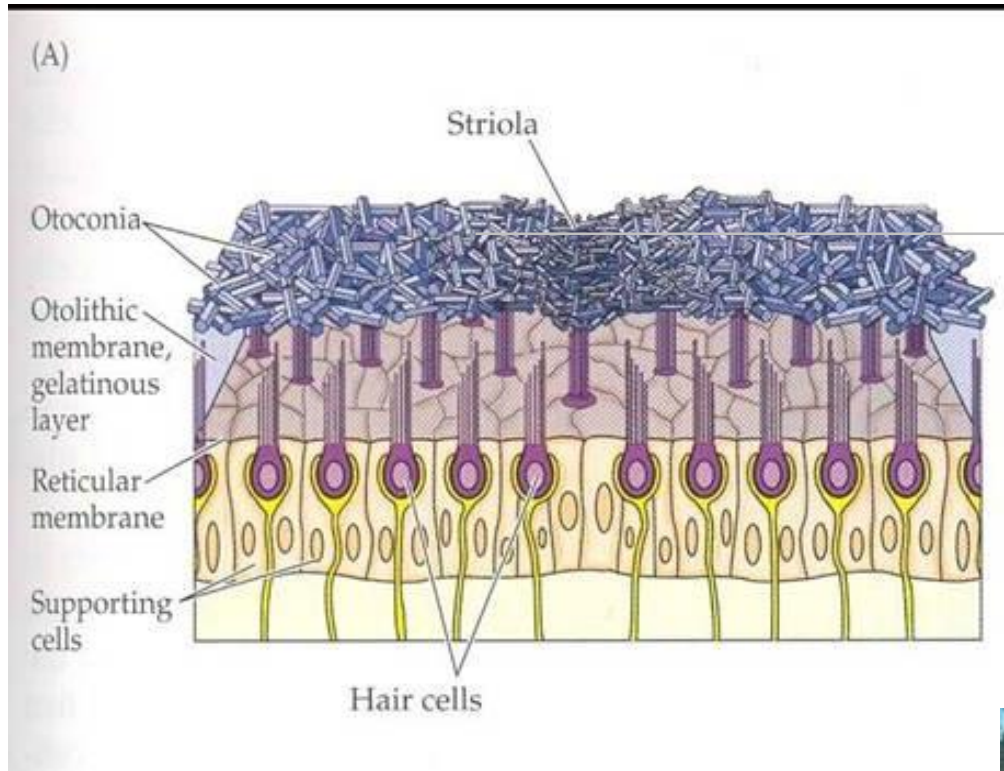


Figure 10-23
 Copyright © 2007 Pearson Education, Inc., publishing as Benjamin Cummings.



Head straight

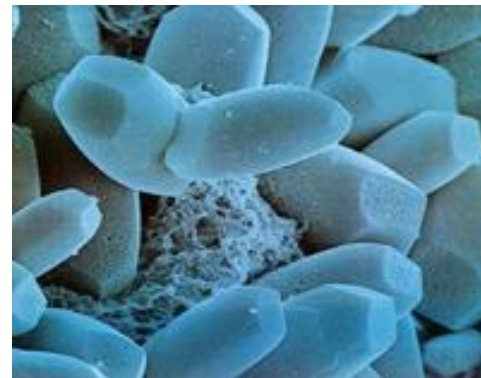
Hair Cells in the Otoliths



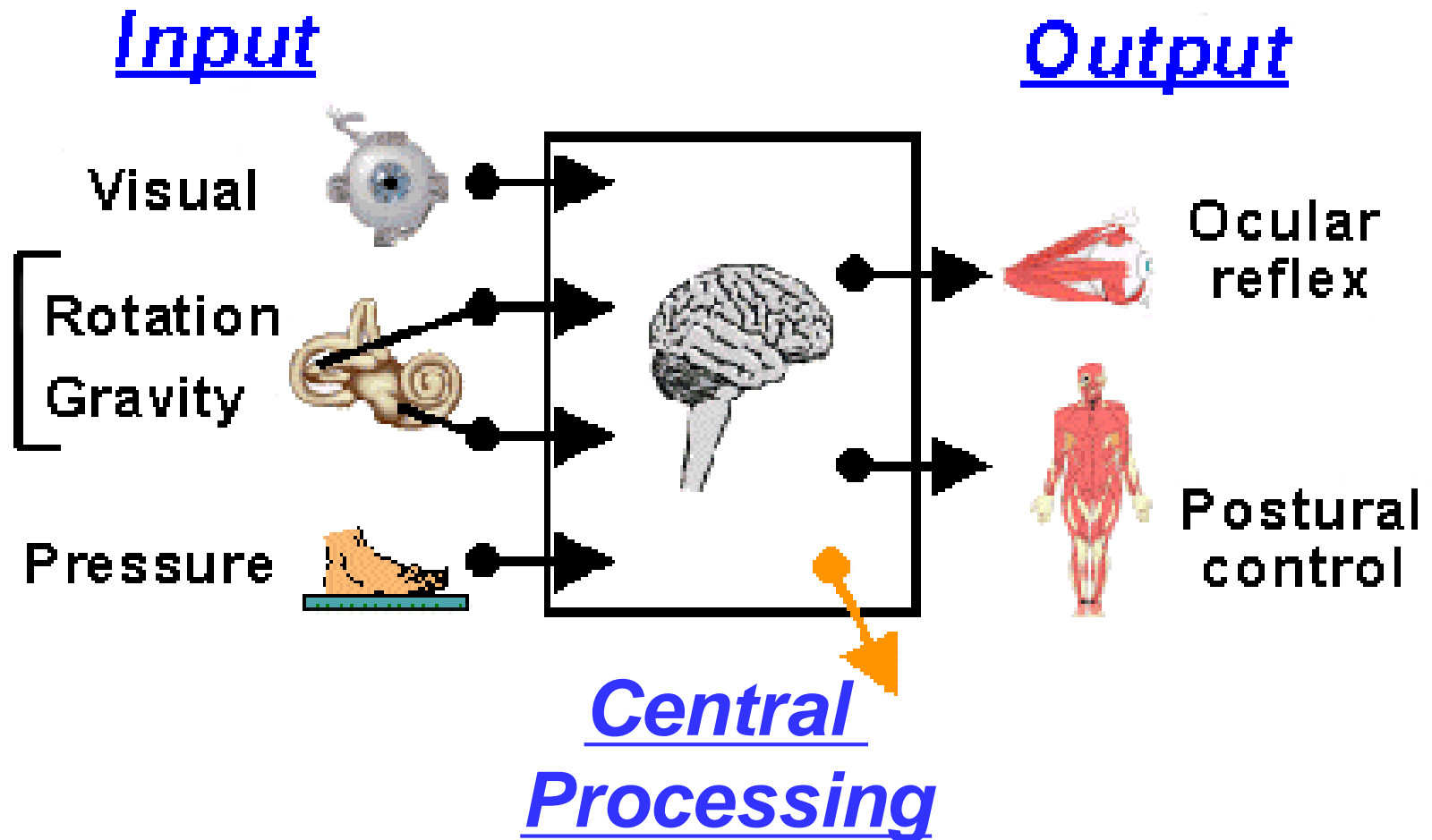
Each hair cell has a number of small *cilia* and one very large cilium, *kinocilium*

Gelatinous membrane (the *cupula* in the SCC) is on top of the hair cells.

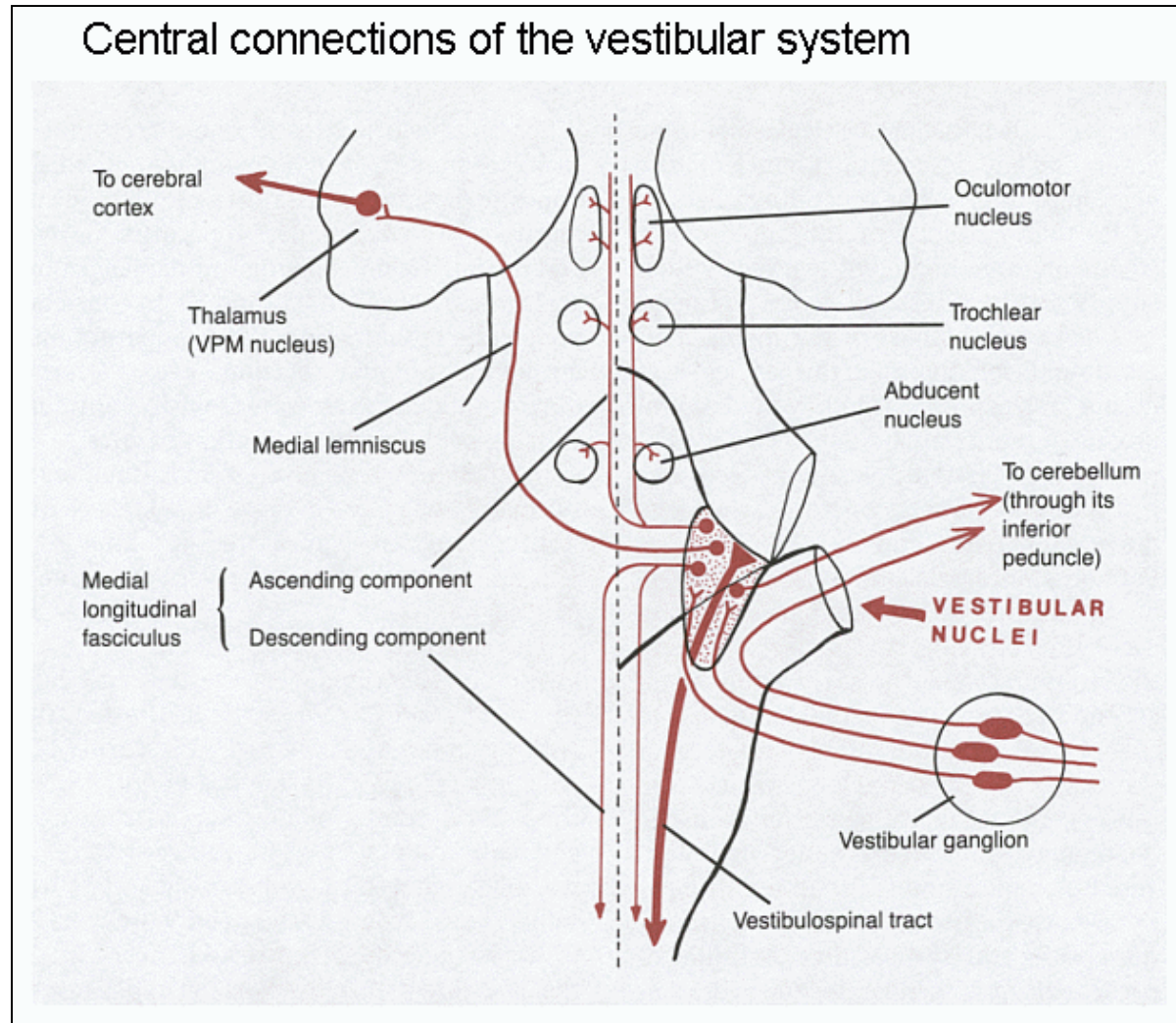
In the otoliths, calcium carbonate crystals called *otoconia* are on top of gelatinous membrane.



Organization of the Vestibular System



Central Processing of Vestibular Input



Central: Cerebellum

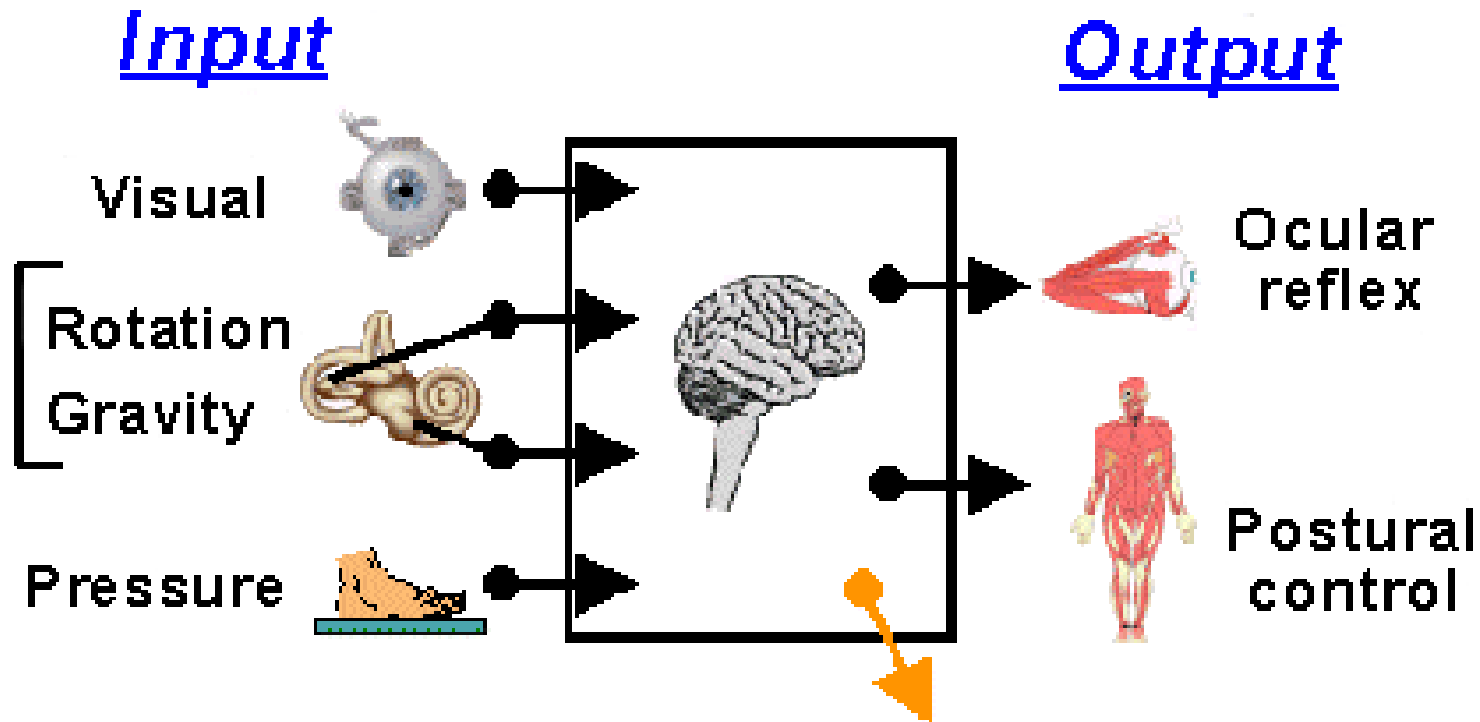
- Input: vestibular nuclei
- Output: vestibular nuclei
- Primary role: to serve as an adaptive processor and monitor vestibular performance

Vascular Supply

- Vertebro-basilar arterial supply supplies blood to the peripheral and central vestibular system
- PICA
 - Most important arteries for central vestibular system
 - Supply to cerebellar hemispheres, dorsolateral medulla (vestibular nuclear complex)
- Basilar artery
 - Principal artery of pons
- AICA
 - important branch of basilar artery
 - Sole BS to peripheral vestibular system via labyrinthine artery

Motor Output System

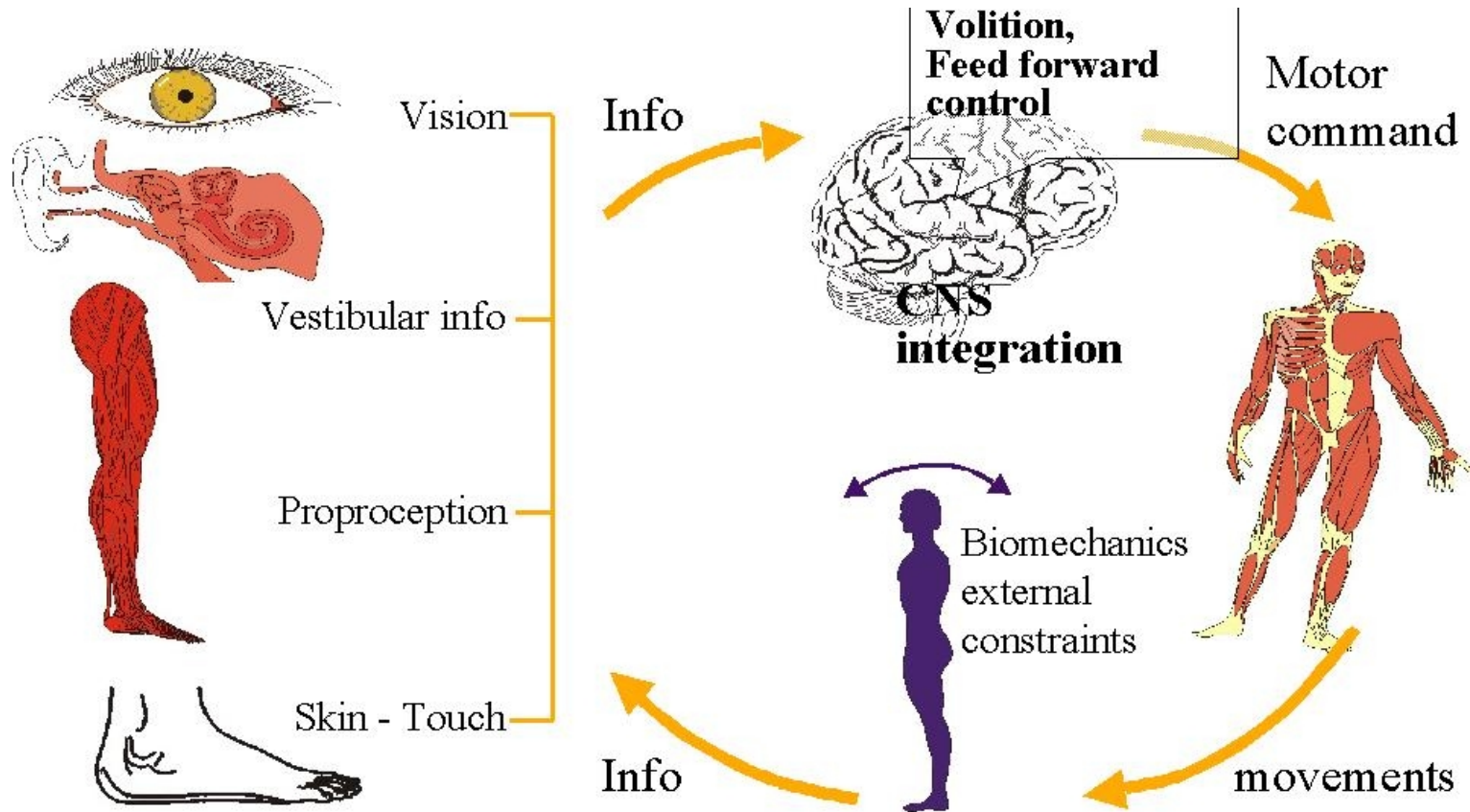
- Ocular muscles: VOR
- Spinal cord: VSR



Motor: Vestibulo-Ocular Reflex

- To maintain gaze stability during head motion
- To maintain gaze stability, must generate eye movement to MATCH head movement.

Motor: Vestibulo-Spinal Reflex

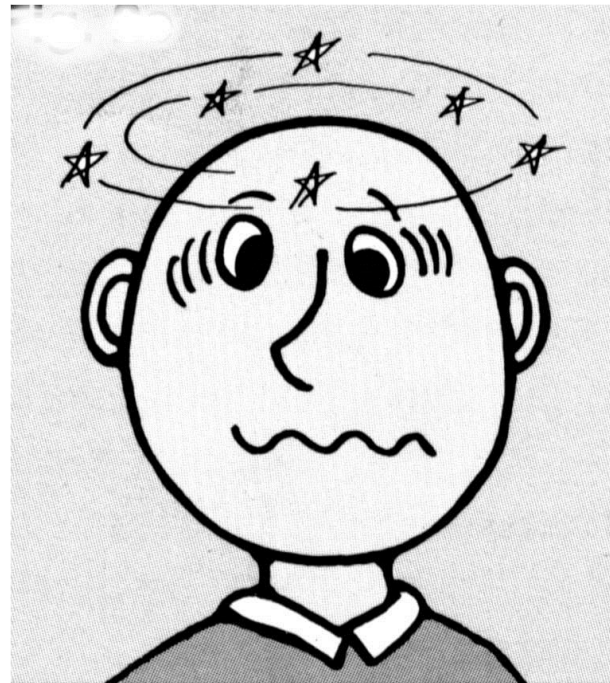


Peripheral vs Central Disorders

VESTIBULAR SYSTEM DISORDERS

Peripheral Vestibular Disorders

- Reduced Vestibular Function
- Distorted Vestibular Function
- Fluctuating Vestibular Dysfunction



Reduced Vestibular Function

- Decreased sensitivity of peripheral sensory apparatus to stimuli
- Examples: labyrinthitis, acoustic neuroma, age-related degeneration of hair cells, ototoxicity
- May be unilateral or bilateral and partial or complete
- Unilateral: vertigo, dysequilibrium, impaired gaze stability
- Bilateral: no vertigo, dysequilibrium, gait ataxia, oscillopsia
- Vestibular rehab: evidence supports this

Acute Vestibular Neuritis

- Disrupts the superior division of the vestibular nerve
- Results in a mixed horizontal and torsional nystagmus
- Symptoms: intense vertigo, nausea, and disequilibrium that persist for days
- Symptoms begin to resolve within a few days and patient is left with a *dynamic deficit* (vertigo and disequilibrium induced by rapid head movements) which can last for weeks and months until central compensation occurs
- Due to a viral infection of the vestibular nerve (neuritis) or fluid in the labyrinth (labyrinthitis)

Bilateral Vestibular Loss: Etiology

| BVL | Etiology | Hearing |
|-----|--------------------------------|------------------|
| | Idiopathic or hereditary | Usually impaired |
| | Sequential vestibular neuritis | Usually spared |
| | Ototoxicity | Usually spared |

Bilateral Vestibular Loss

- Poor Outcome
 - Ototoxicity
- Good Outcome
 - Familial vestibulopathy
 - Idiopathic bilateral vestibulopathy
 - Sequential bilateral vestibular neuritis

Bilateral Vestibular Loss

- Ototoxicity
 - Gentamicin is more toxic to hair cells in the vestibular portion of the inner ear than the hearing portion, so a loss of hearing should not be a criterion for diagnosing ototoxicity
 - Vertigo is not common because vestibular loss is bilateral

Distorted Vestibular Function

- Inaccurate transduction of sensory stimuli within the peripheral sensory apparatus
- Due to mechanical disruption
- Example: BPPV
- Symptoms: position or motion induced vertigo, dysequilibrium
- Very strong evidence to support CRM for BPPV

Benign Paroxysmal Positional Vertigo

- Symptoms: sudden onset, vertigo of short duration provoked by a change in head/body position, imbalance with standing and walking, may last for a day or multiple days or weeks
- Resolves spontaneously
- Signs: positive provocative maneuvers (Dix-Hallpike for posterior and anterior BPPV; Roll test for horizontal BPPV)
- Treatment: canalith repositioning maneuvers
- Prognosis: excellent
- Lesion site: most common is posterior semi-circular canal

Fluctuating Vestibular Function

- Occasional disruptions in vestibular input in peripheral sensory apparatus
- Examples: Meniere's disease, perilymphatic fistula
- Etiologies: idiopathic, autoimmune, trauma, infection
- Symptoms: episodic or persistent vertigo, hearing loss, tinnitus, dysequilibrium
- Due to fluctuating nature, difficult for CNS to compensate when sensory input fluctuates

Central Vestibular Disorders

- Vascular disorders: Ischemia or hemorrhage to brain stem or cerebellum
- Most commonly involved vessels:
 - Vertebral
 - Basilar
 - Anterior inferior cerebellar arteries
 - Posterior inferior cerebellar arteries

Central Vestibular Disorders

- Symptoms: vertigo, nausea, nystagmus, ataxia, dysequilibrium
- Clinical signs: visual field deficits, diplopia, headache, impaired smooth pursuits, impaired VORc, sensory loss, hemiparesis
- Less evidence to support vestibular rehabilitation

Central Vestibular Disorders

- Vascular Disorders
 - Cerebellar Infarctions
 - PICA Infarct
 - Lateral Medullary Infarct/Wallenberg's Syndrome
 - AICA/Lateral Pontomedullary Infarct
- Traumatic Brain Injury
 - Labyrinthine Concussion
 - Hemorrhage into Labyrinth
 - Hemorrhage into BS
 - ↑ ICP

Central Vestibular Disorders

- Concussion/mTBI
 - Sports-related
 - Falls
 - Motor Vehicular Accident
 - Blast injuries

Concussion (Zurich Consensus 2012)

- a complex pathophysiological process affecting the brain, induced by biomechanical forces
- Common features :
 - caused either by a direct blow to the head, face, neck or elsewhere on the body with an “impulsive” force transmitted to the head
 - rapid onset of short-lived impairment of neurological function that resolves spontaneously
 - may result in neuropathological changes, but the acute clinical symptoms largely reflect a **functional disturbance** rather than a structural injury
 - results in a graded set of clinical symptoms that may or may not involve loss of consciousness; resolution of the clinical and cognitive symptoms typically follows a sequential course

Central Vestibular Disorders

- Cerebellar Degeneration
- Cerebellar Tumors
- Multiple Sclerosis



Transient Ischemic Attack (TIA)

- TIAs from vertebrobasilar insufficiency (VBI) provoke episodes of dizziness that are abrupt and only last a few minutes
 - Watch for other symptoms: visual changes, unsteadiness, weakness, speech
 - May have vertigo due to vascular distribution
- Patients usually have known cerebrovascular disease or risk factors for the disease

Migraine

- Spells (dizziness, motion sensitivity, light/noise sensitivity) last 4-60 minutes and may/may not have headache component
- Diagnosis of exclusion
- Modification: decrease risk factors of foods, avoid nicotine, maintain regular sleep schedule, avoid hypoglycemia, exercise, avoid exogenous estrogen
- If strict avoidance does not work, daily anti-serotonergic drug is used
- Valproic acid and beta-blockers are most effective prophylactic drugs
- PT useful for education on health promotion and wellness program

Red flags

- TIA's may present with sudden vertigo or complaints of hearing loss that lasts minutes
 - REHAB NOT APPROPRIATE!!! REFER TO NEUROLOGIST
- Lightheadedness may be described as the sensation of an impending faint or a feeling of unsteadiness or falling
 - Pre-syncopal light-headedness is from poor blood perfusion to the brain and should be referred to physician

Treatment Goals

- Reduce dizziness
- Appropriate use of ankle and hip strategies
- Establish home exercise program
- Improve interaction of visual-vestibular-somatosensory inputs

Non-Vestibular Disorder

- Fear of Fall & Disuse Disequilibrium
- Leukoaraiosis & Normal Pressure Hydrocephalus

Non-Vestibular Disorder

- Good Outcome
 - Disuse disequilibrium with fear of fall: most common cause of non-vestibular imbalance; readily responds to gait and balance therapy
- Poor Outcome
 - Normal pressure hydrocephalus: gait and imbalance may respond to VP shunt; balance does not generally improve with PT → reduce fall risk
 - Leukoaraiosis: in some cases, poor recover, so focus on reducing fall risk and education

Non-Vestibular Disorder: Disuse Disequilibrium

- Progressive decline in muscle bulk, ROM, reflex time with age
- Lack of exercise in the elderly lead to disuse equilibrium
- Fear of fall result of disuse disequilibrium; exacerbates disuse disequilibrium by reducing participation in HEP
- No significant orthopedic or neurologic problems
- Normal vestibular examination
- Fall risk with testing
- Chronic instability, dizziness
- PT: HEP with balance exercises, increase activity

Non-Vestibular Disorder: Normal Pressure Hydrocephalus

- Gait apraxia and impaired righting reflex
- Urinary incontinence
- Cognitive decline
- Management: VP shunt; Home health evaluation
- Limited PT: fall risk prevention

Orthostatic Hypotension

- Lightheadedness upon change in position, mental slowing, dizzy, nausea, syncope
- Causes:
 - medications, neurological disorders
- Diagnosis: based on a drop in systolic pressure by 20 mm HG or more + symptoms onset
 - If patient is symptomatic but no change in BP, they are ‘orthostatic intolerant’
 - Either way: assess medications, hydration, increase salt intake

Panic Attacks

- This is an anxiety disorder that causes intense fear or discomfort that reaches a crescendo within 10 minutes
- Frequently associated with dizziness, nausea, shortness of breath, sweating, paresthesia
- Chronic anxiety may present with dizziness
- SSRI's have been shown to be effective for anxiety and dizziness
- Behavioral modification is also effective

Meniere's Disease

- Symptoms: low pitched form of tinnitus, ear fullness, and hearing loss associated with vertigo that lasts hours to days
- With repeat attacks, sustained low-frequency hearing loss and constant tinnitus develop
- Pathologic mechanism: decreased reabsorption of endolymph in endolymphatic sac
- Etiology: Idiopathic or following virus/infection
- Diagnosis: fluctuating hearing loss on audiogram
- Management
 - restrict sodium intake to < 2 grams/day (increased salt intake triggered attacks); avoid alcohol, caffeine (chocolate) → may decrease frequency of dizzy spells; some patients need a diuretic
- Vestibular exercises not useful because generally recover from attacks quickly

Superior Canal Dehiscence

- Symptoms are caused by a thinning or complete absence of the part of the temporal bone overlying the superior SCC
- Symptoms:
 - autophony (person's own speech or other senses are heard loudly in affected ear)
 - dizziness, vertigo, chronic disequilibrium (sound induced or at rest); hyperacusis
 - low-frequency conductive hearing loss
 - fullness in the affected ear; fatigue, headache; pulsatile tinnitus
- Diagnosed by CT scan
- Surgical Repair: Gap in temporal bone repaired by surgical resurfacing or plugging superior SCC via middle fossa craniotomy

Motion Sensitivity

- Dizziness, nausea, malaise after motion
- Thought to be caused by a conflict between movement information in sensory channels like visual-vestibular conflict or conflict between an actual and an anticipated sensory input
- Areas thought to produce symptoms:
 - Cerebellar nodulus
 - Medullary vomiting center
- PT: improve use of the different sensory cues, habituation

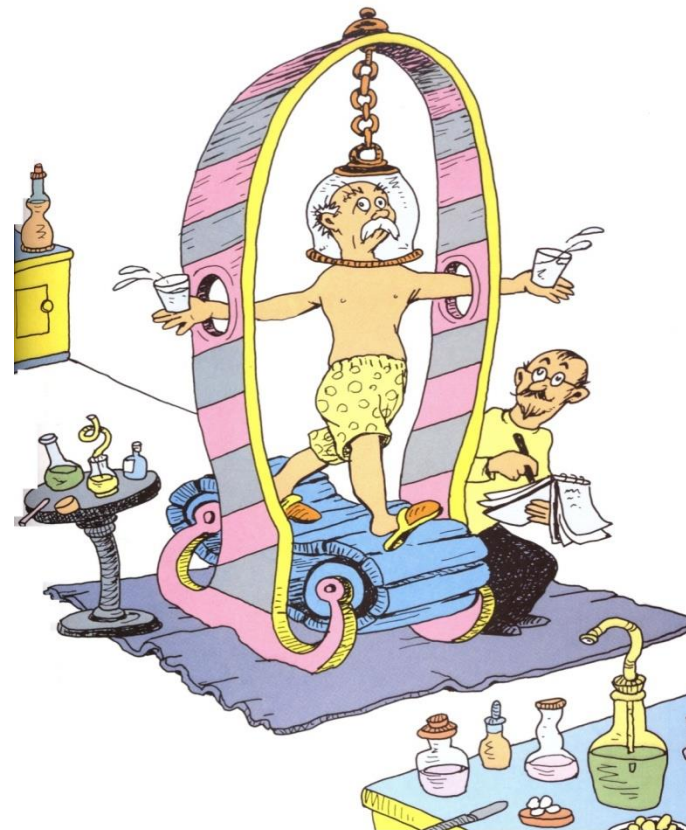
Mal de Debarquement Syndrome

- Refers to prolonged and inappropriate sensations of mov' t after exposure to motion
- Follows a 7-day sea trip or extended plane travel, train travel and space flight
- Symptoms include swaying and rocking with imbalance
- Persists for a month or longer
- Treatment: conventional medications not effective; benzodiazepines most effective; effectiveness of vestibular rehab is unknown

VESTIBULAR REHABILITATION

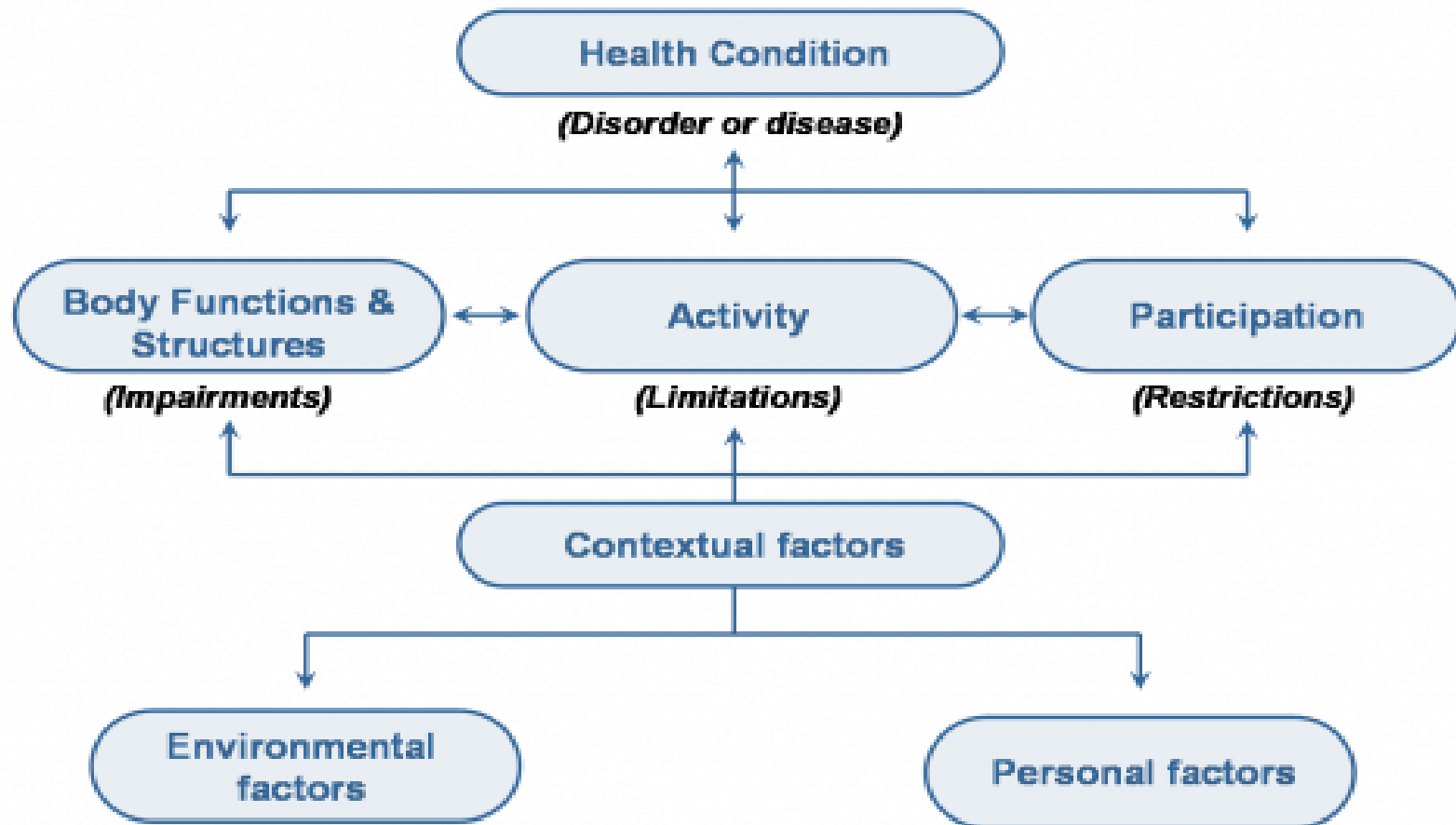
Vestibular Rehabilitation

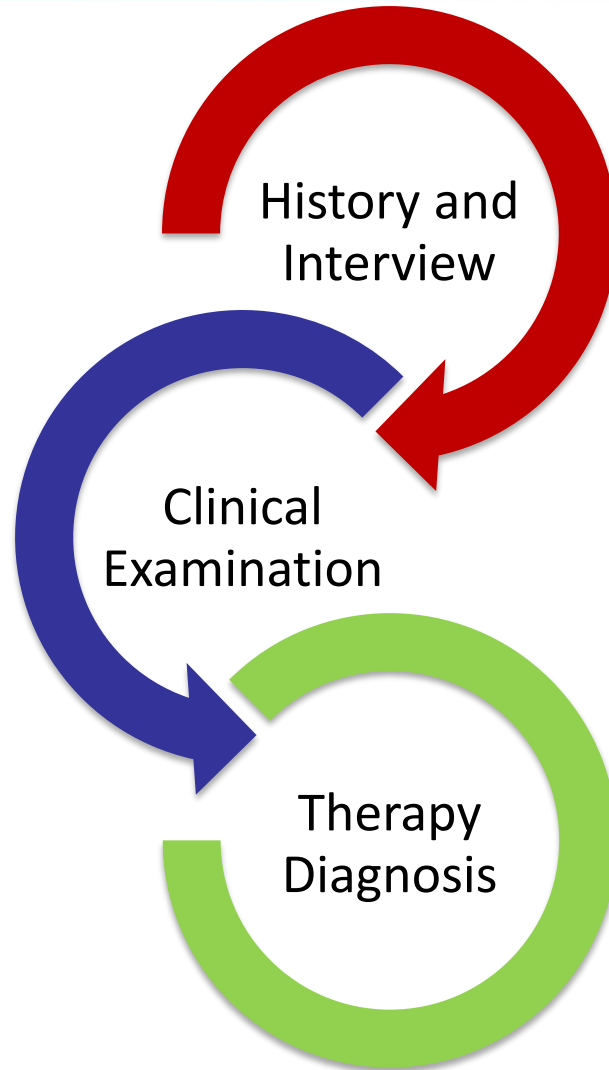
An exercise approach to manage persistent dizziness and dysequilibrium in individuals with vestibular dysfunction.



SEUSS (1986)

ICF Model





Patient history is the most important part of the evaluation.

Key elements

Symptoms

Tempo

Circumstance



History Taking: Elements that help with diagnosis

| DISORDER | TEMPO | SYMPTOMS | CIRCUMSTANCES |
|----------------------------|----------------------------------|---|--|
| Vestibular Neuritis | Acute dizziness (\leq 3 days) | Vertigo, disequilibrium, nausea, vomiting, oscillopsia | Spontaneous, exacerbated by head movements |
| BVL or > 3 days from a UVL | Chronic dizziness (>3 days) | Dizzy, disequilibrium, occasionally oscillopsia | Induced by head movts, walking, exacerbated when walking in the dark or on uneven surfaces |
| BPPV | Spells, seconds | vertigo., nausea | Positional: lying down, sitting, up, turning over in bed, bending |
| Orthostatic hypotension | Spells, seconds | Lightheadedness | Positional: standing up |
| TIA's | Spells: mins | Vertigo, light headed, disequilibrium | spontaneous |
| Migraine | Spells: mins | Vertigo, dizziness, motion sickness | Usually movt –induced |
| Meniere's disease | Spells: hrs | Vertigo, disequilibrium, ear fullness from hearing loss, tinnitus | Spontaneous, exacerbated by head movement |

History Taking

- Other helpful components
 - Impact on patient's life
 - Past medical history
 - Medications
 - Patient's belief for cause of dizziness



History Taking: Elements that lead to goals for management

- Past medical history
- Medications
- Sensations: subjective complaints of dizziness
- Impact on functional activities
- Perceived disability
- Fall history
- Confidence in Balance
- Interference with Daily Activities
- Barriers to Recovery



Patient History...Also Consider

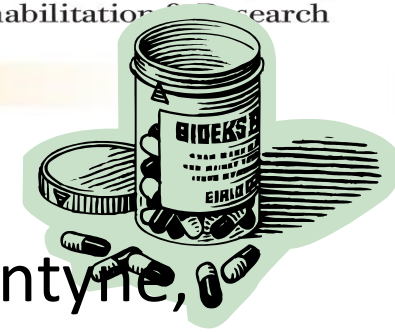
Ear disease/surgery, associated symptoms (hearing loss, nausea, vomiting)

Social History: living arrangements, transportation, job duties, responsibilities at home

Caffeine, Nicotine, Alcohol intake

Nutrition, Fitness Level

Patient goals



Importance of Medication Review

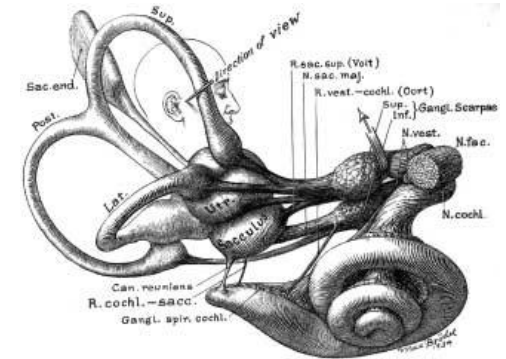
- May cause subjective dizziness
 - Especially in patients older than 65 (Ballantyne, 1984)
- May cause dysequilibrium and lightheadedness (may/may not spare hearing)
- Side effects
 - Drowsiness, cognitive deficits, interference with daily activities
- Risk of falls increases (Hartikainen et al, 2007; Hien le et al, 2005)

Clinical Exam

- Assists in confirming a suspected diagnosis obtained from history (Kroenke et al., 1989)
- Will expedite the accuracy and efficiency of clinical process and decision making

Clinical Exam

- Vital signs
- Vestibular Factors
- Non-Vestibular Factors



Vestibular Factors: Visual-Vestibular Exam

- Eye ROM
- Nystagmus
- Smooth Pursuit
- Saccades
- VOR exams
- Vergence
- Positional Manuevers





Vestibular Factors

- Balance Outcome Measures



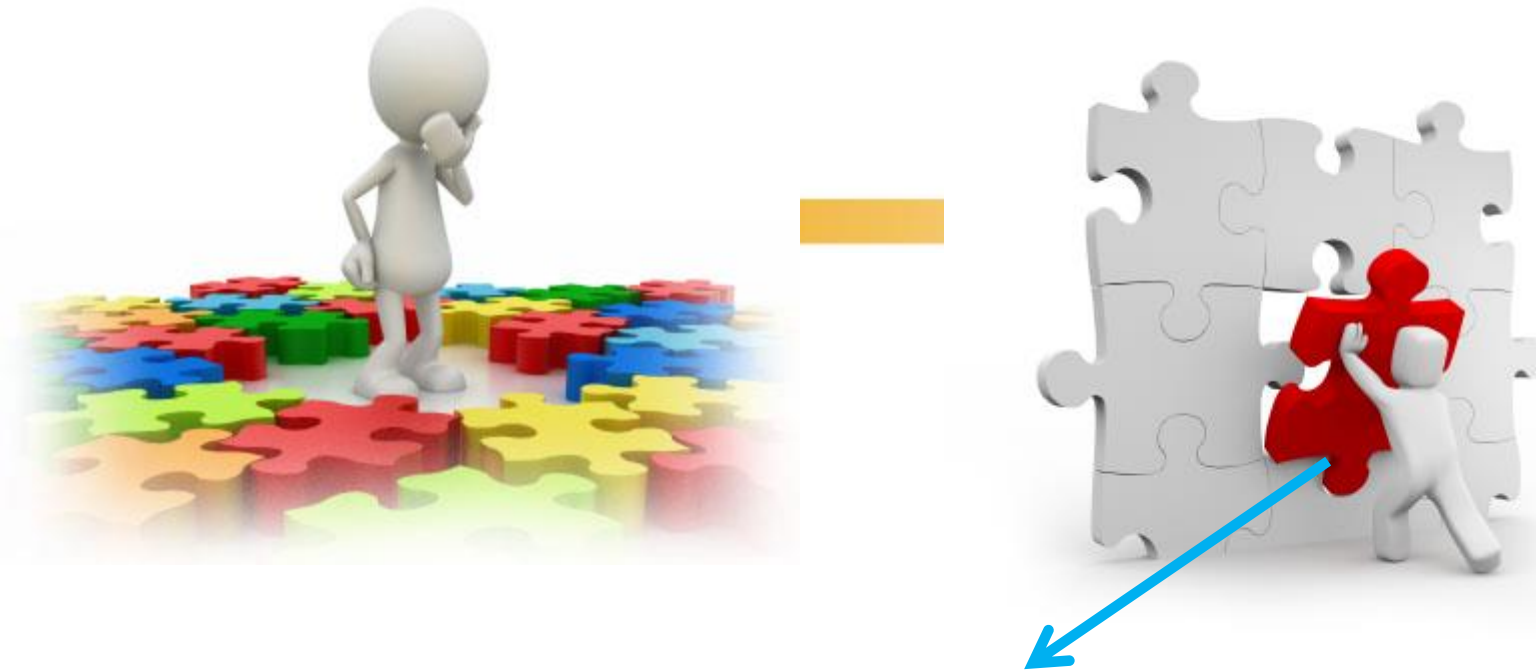
Vestibular Factors

Measuring Participation

- Dizziness Handicap Inventory (DHI)
- Activities-Specific Balance Confidence Scale (ABC)
- SF-36: Quality of Life
- Vestibular Activities and Participation (VAP)
- Vestibular Rehab Benefits Questionnaire (VRBQ)

Non-Vestibular Factors

- ROM
- Strength
- Endurance
- Coordination/Ataxia
- Gait Velocity
- Orthopedic considerations
- Psychological considerations



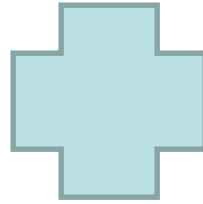
Vestibular Rehabilitation

Exercises that....

- ✓ **habituate** symptoms
- ✓ promote **adaptation** and **substitution**
- ✓ improve **balance and dynamic postural control**
- ✓ to improve general **conditioning**

Mechanisms of Recovery

- Habituation
- Adaptation
- Substitution



HABITUATION

Habituation

In order to **decrease**

the symptom, you must

systematically provoke

the symptom.

Habituation Exercises

- Involves systematically provoking symptoms by having patient perform several repetitions of 2 or 3 of the movements or position changes that causes mild to moderate symptoms
- **Motion Sensitivity Quotient**



Habituation Exercises

- Peripheral and Central disorders
 - 82% of the patients reported improved symptoms
 - Peripheral: 90% achieved successful outcomes by discharge
 - Less successful in central disorder due to head injury
 - Least successful in bilateral vestibular hypofunction → Therefore, NOT advocated in the treatment of BILATERAL VESTIBULAR LOSS!!!

Habituation Exercises

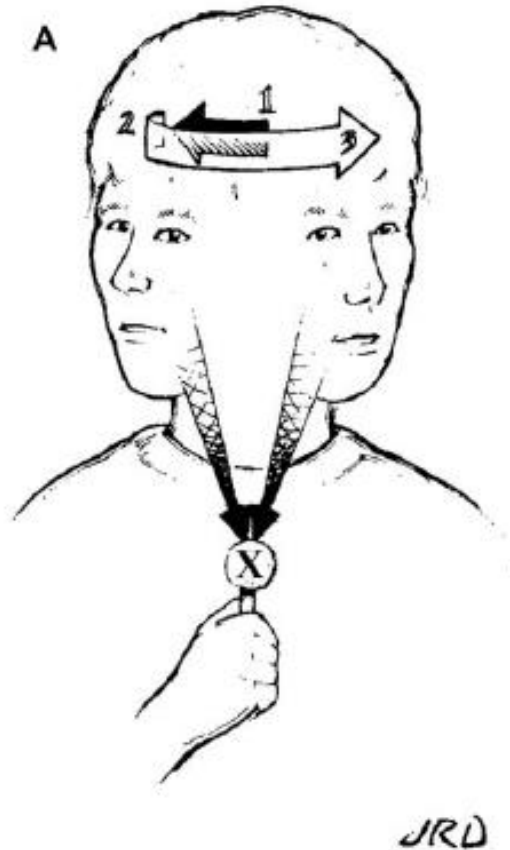
- It works!!!
 - Unilateral vestibular hypofunction
 - Effective in older adults...but younger individuals do better
 - Compliance is a must!!!
 - Modify the dosage: shorter/larger ROM, speeds, frequency

ADAPTATION

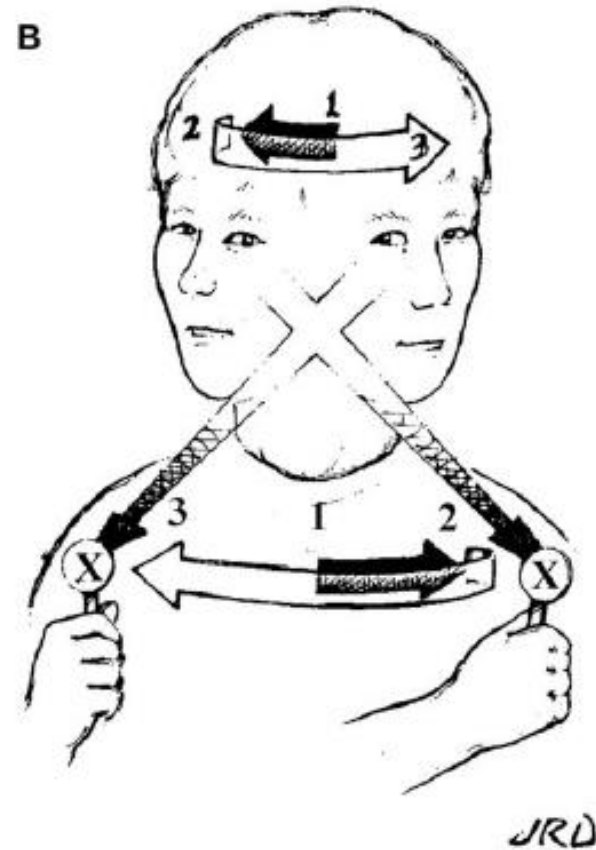


The potential for the **remaining**
vestibular system to **adjust** its
output according to the
demands placed on it.

Adaptation Exercises



X1 Viewing



X2 Viewing

Adaptation Exercises

- Functional goals with adaptation
 - Turn head while conversing with others
 - Brush teeth
 - Perform household chores
 - Walk in school hallways to recognize others
 - Ride in a car and identify signs
 - Safely cross busy street while turning head to check traffic
 - Transpose document into computer
 - Shop in grocery store and recognize items

SUBSTITUTION

Substitution

The goal is to **substitute** alternative
strategies for **missing** vestibular
function.

Substitution

- Substitution for VOR includes:
 - ✓ Cervical Ocular Reflex
 - ✓ Use of Smooth Pursuit
 - ✓ Central Programming of Eye Movements
- Substitution for the VSR includes
 - ✓ the use of visual, somatosensory cues, or both to maintain stability

Balance Exercises

- Challenging sensory and dynamic conditions
- Static conditions
- Dynamic conditions



Conditioning Exercises

- Progressive walking
- Increase physical activity



Things to consider when prescribing exercises

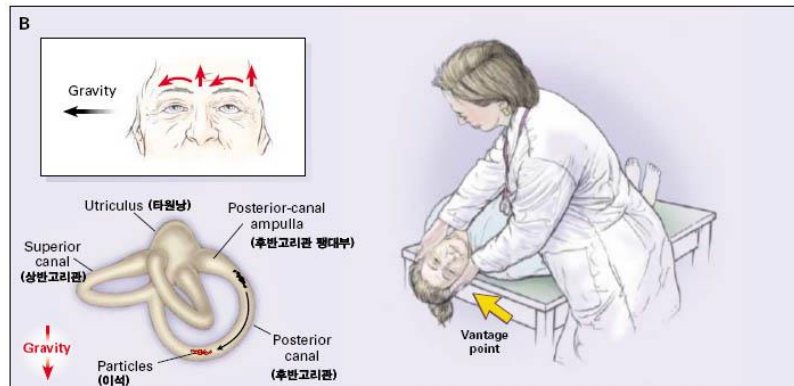
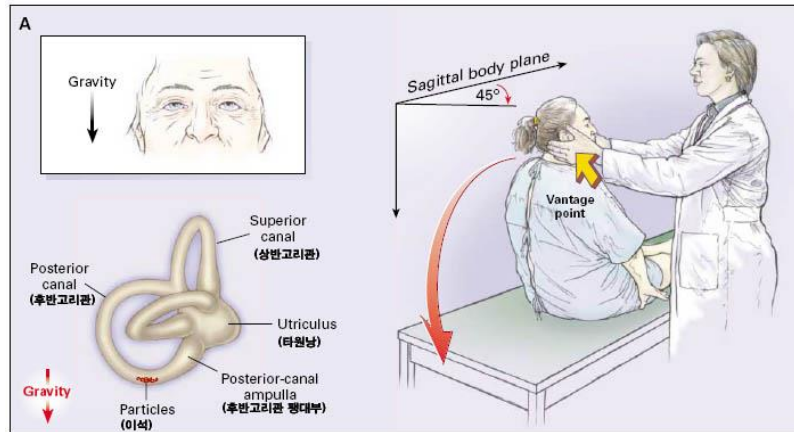
- Fewer exercises performed correctly are more effective than more exercises performed incorrectly
- Must pick the right strategy for the right patient to be effective:
 - **Substitution**: bilateral vestibular loss
 - **Adaptation**: unilateral vestibular loss
 - **Habituation**: central disorders, motion sensitivity (this can be unilateral vestibular loss if very motion sensitive)
- Treatment frequency and duration:
 - Unilateral vestibular loss: 4-6 weeks, 1x/week, HEP
 - Bilateral vestibular loss: 4-12 weeks, 1x/week, HEP, regular exercise

REPOSITIONING MANUEVERS

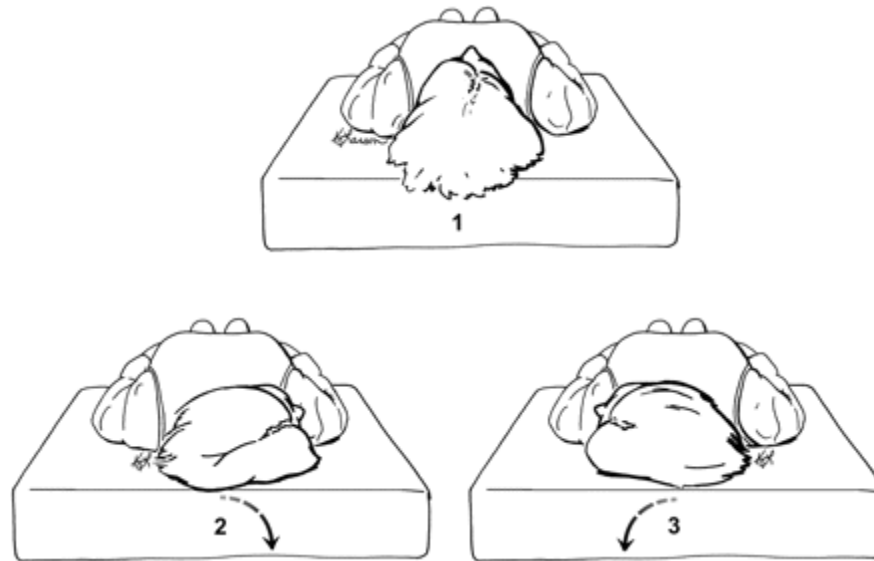
Types of BPPV

| | Posterior | Horizontal | Anterior |
|----------------------|-------------------|--|---------------------|
| Estimated Frequency | 81-89% | 8-17% | 1-3% |
| Provocative Manuever | Dix-Hallpike | Roll Test | Dix-Hallpike |
| Nystagmus direction | Upbeat, torsional | Horizontal (geotropic or apogeotropic) | Downbeat, torsional |

Clinical Exam: Dix-Hallpike Test



Clinical Exam: Sidelying Roll Test



Canalithiasis vs. Cupulolithiasis

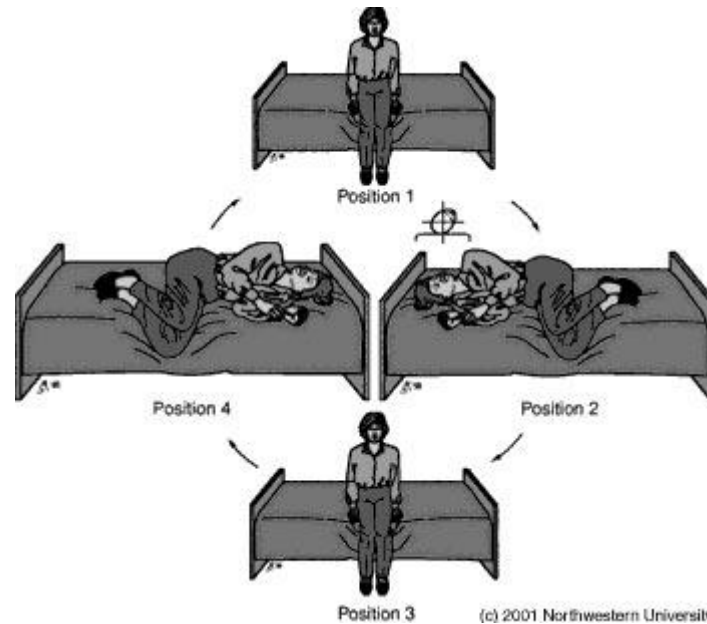
- **Canalithiasis**
 - Otoconia freely floating in the SCC and fall to lowest point in canal
 - Movement of otoconia induces flow of endolymph and deflection of cupula
- **Cupulolithiasis**
 - Otoconia adherent to cupula, canal becomes sensitive to gravity

Treatment options for BPPV



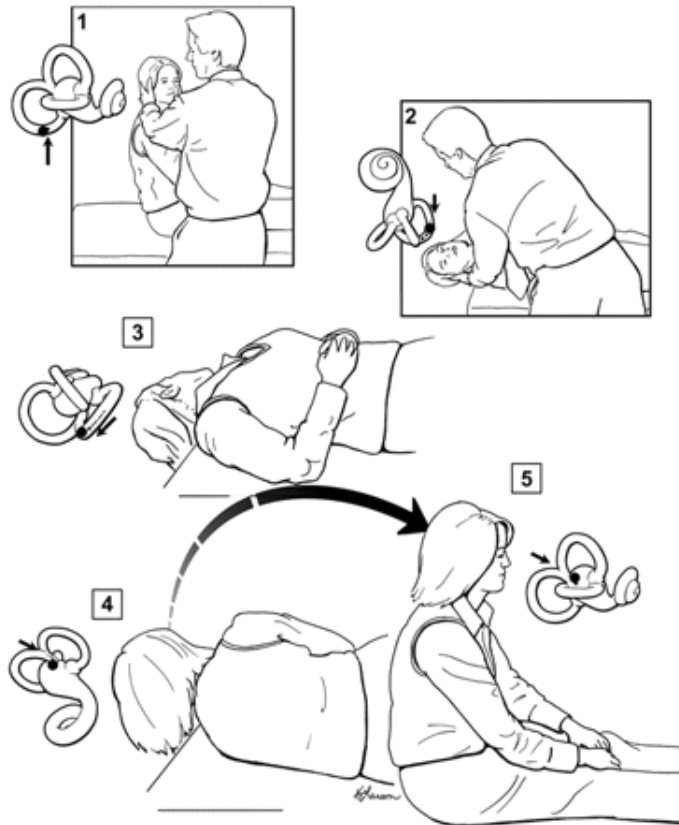
Wait and see...

Treatment options for BPPV



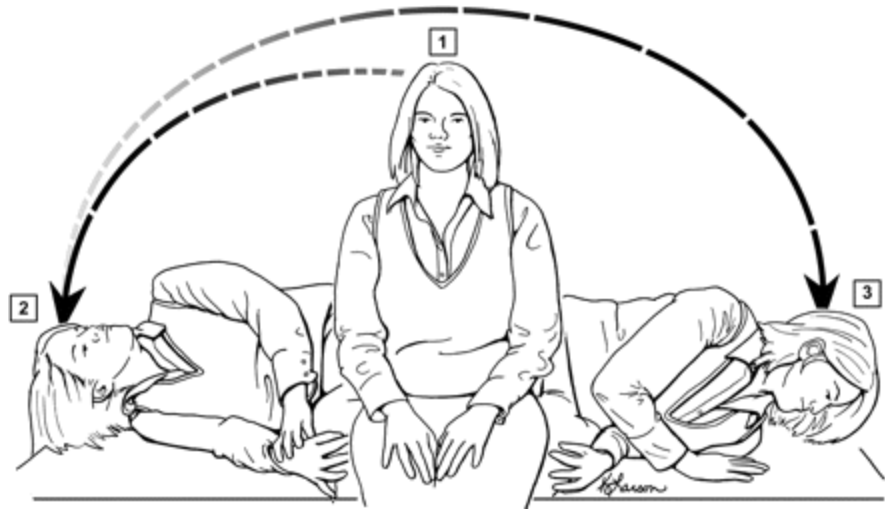
Brandt & Daroff Exercises, 1980

Canalith Repositioning Manuever (CRM)



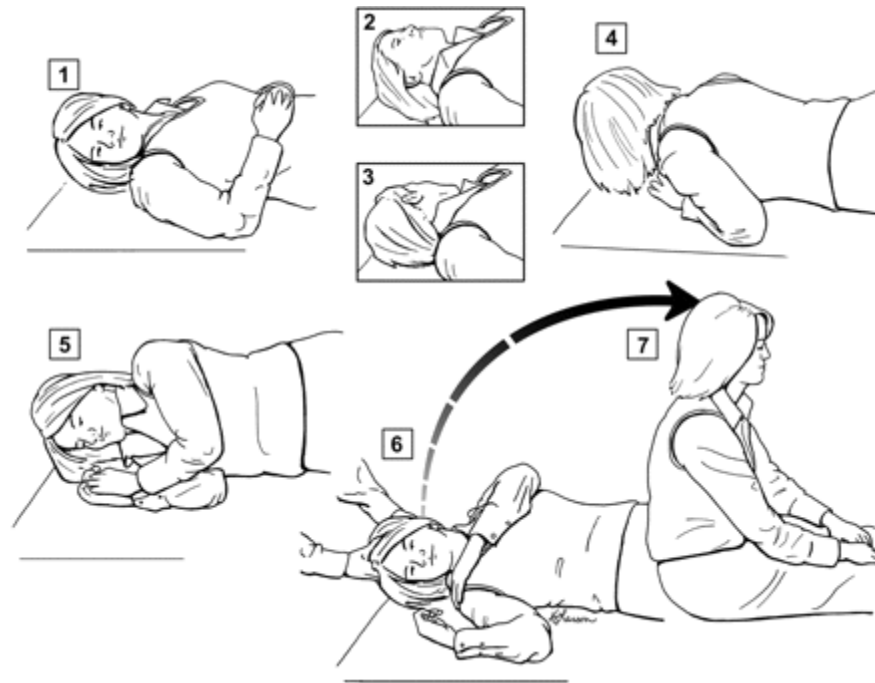
Anterior or Posterior Canalithiasis

Liberatory Manuever (Semont)



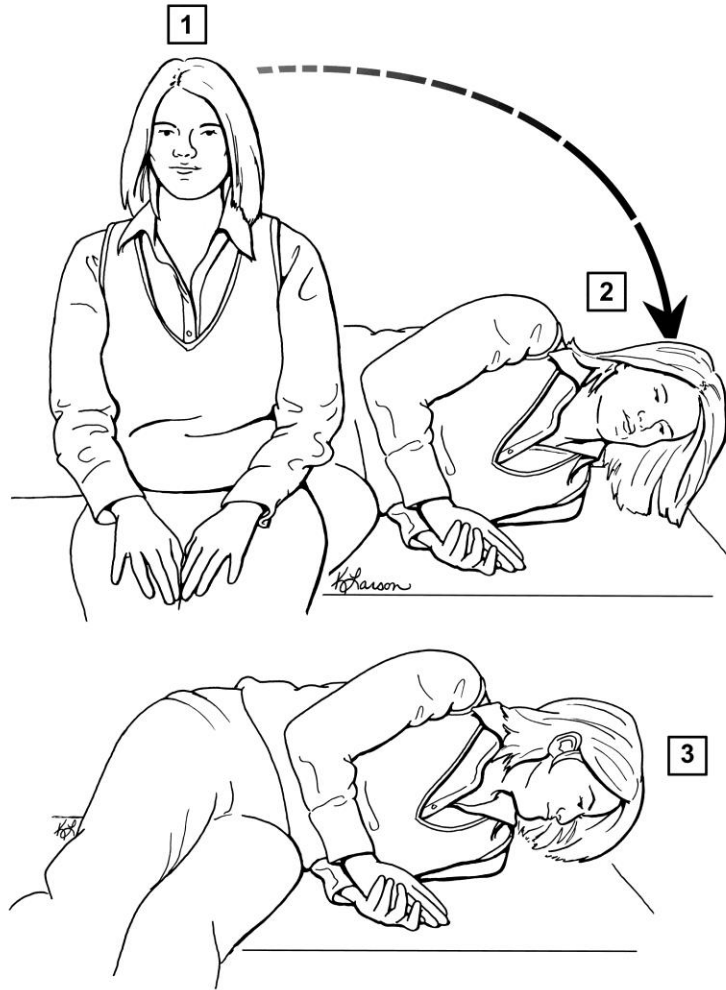
Anterior or Posterior Cupulolithiasis

Barbecue Roll Manuever



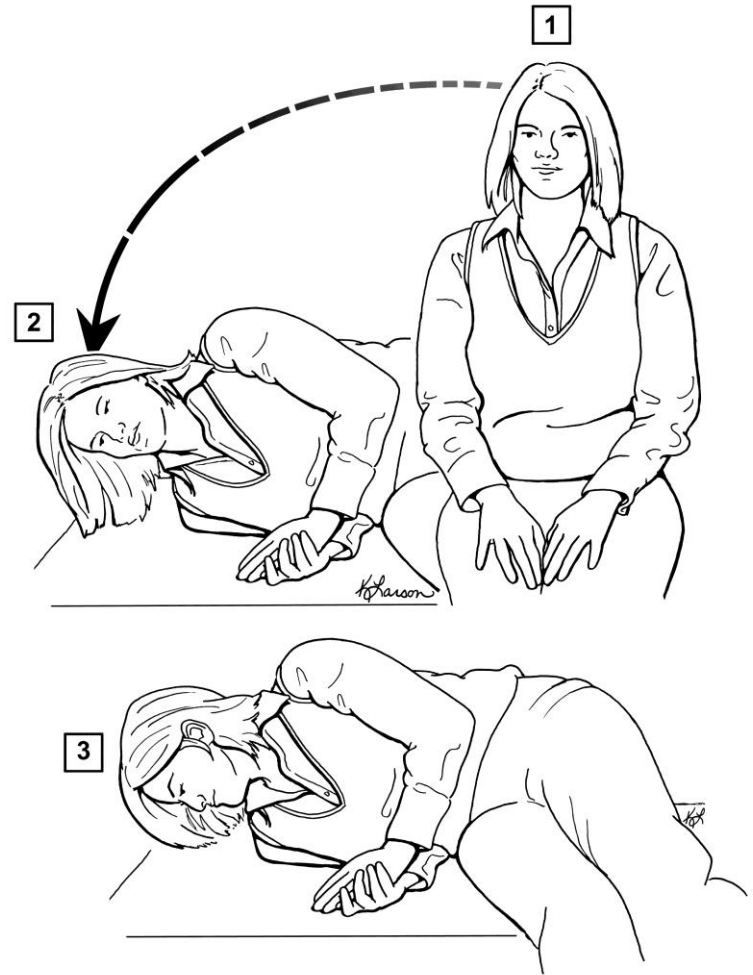
Geotropic

Appiani



GEOTROPIC

Gufoni

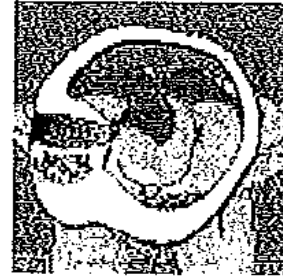


APOGEOTROPIC

HC Epiglottitis

**Modified Semont
maneuver for HC**

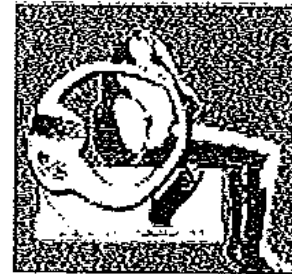
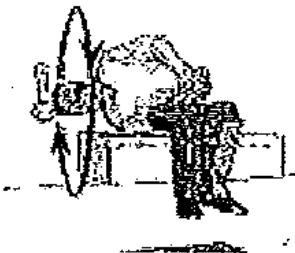
*(Casani A, et al.
Laryngoscope 2002)*



(A)



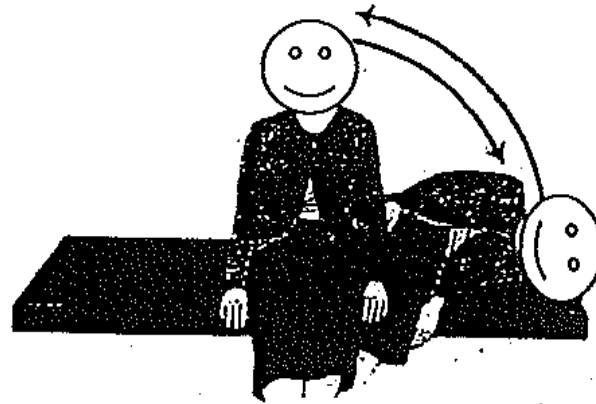
(B)



(C)

APOGEOTROPIC

Modified “Brandt-Daroff” for Horizontal BPPV Cupulolithiasis



APOGEOTROPIC

SUMMARY OF TREATMENT

Modifiers of Treatment

- Activity Level
 - Basic ADLS
 - Balance
 - Fall history
 - Driving
 - Work
- Personal factors
 - Visual: cataracts, macular degeneration
 - Somatosensory: peripheral neuropathy
 - Musculoskeletal: cervical, back, arthritis
 - CNS: CVA, cerebellar
 - Psychological: coping strategy, anxiety
- Environmental factors
 - Family support, transportation, home situation

Summary of Treatment

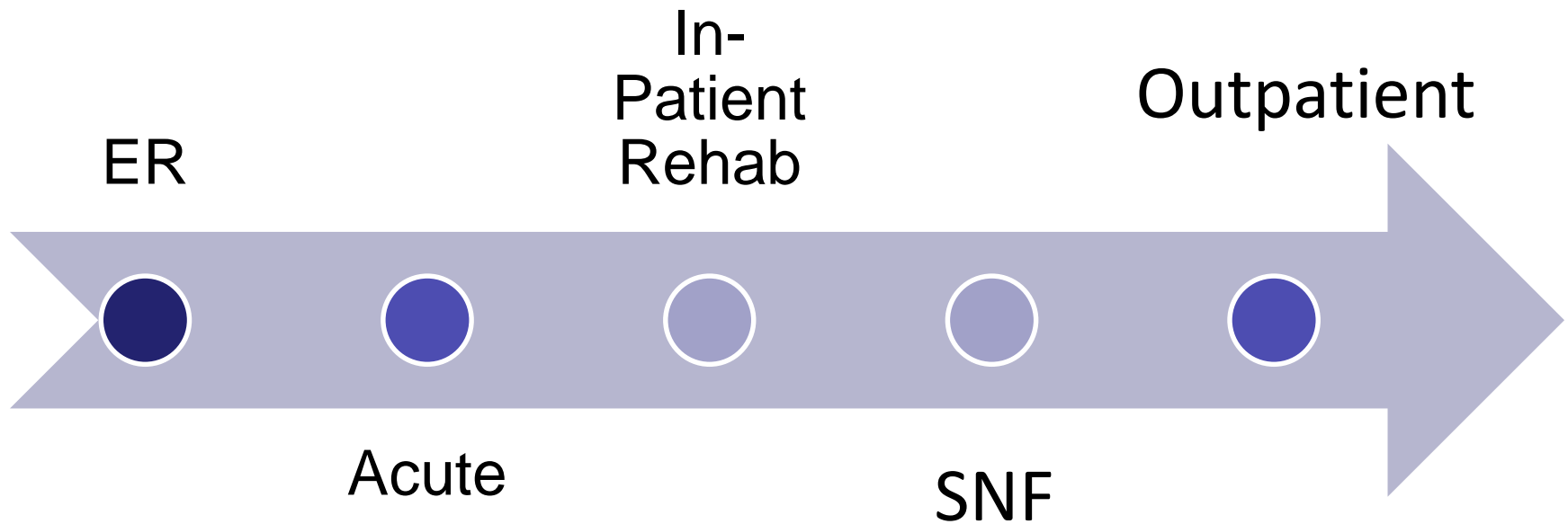
| | |
|---|---|
| | |
| <i>Reduced vestibular function (ie, vestibular hypofunction):</i> | <ul style="list-style-type: none">➤ Adaptation and Substitution |
| <i>Distorted vestibular function (ie, BPPV):</i> | <ul style="list-style-type: none">➤ Canalith repositioning manuevers➤ Liberatory manuevers➤ Habituation (Brandt-Daroff) |
| <i>Central vestibular disorders:</i> | <ul style="list-style-type: none">➤ VORcancellation➤ Habituation exercises |
| All patients with vestibular dysfunction | <ul style="list-style-type: none">➤ Improve postural control to retrain VSR➤ Motor and sensory organization➤ Conditioning exercises |

REFERRAL TO VESTIBULAR REHABILITATION

When to Refer to Vestibular Rehabilitation

- Acute or Chronic Dizziness
- Balance problems
- History of falls
- Difficulty performing ADLs
- Difficulty with transfers, walking
- Difficulty participating in social roles

Referrals to Vestibular Rehabilitation





PATIENT SCENARIOS

Case 1

- 12 year old male complained of dizziness and disequilibrium that fluctuated from day to day. Patient dated the symptoms to head trauma during a football game 10 months before PT evaluation.
- The patient's mother reports that patient was struck by another player on the right side of the head and sustained (+) LOC at time of the injury. Patient had his helmet on.

Case 1 continued

- Patient is symptomatic with rapid head movements, and difficulty ambulating in dimly lit environments.
- Headaches occurred irregularly, exacerbated by fatigue.
- Reports of difficulty concentrating, difficulty reading and using the computer.
- No positional dizziness, no insomnia, anxiety or personality change.

Case 1 continued

- Head CT: normal
- Patient had used meclizine but continues to experience dizziness and disequilibrium.

Case 1 continued

- Symptoms: dizziness, decreased concentration, difficulty reading, headaches, dizziness with head movements, blurry vision with head movements, difficulty with balance/gait in dimly lit environments
- Tempo: chronic, lasts hours
- Circumstance: fatigue

Case 1 continued



Case 1 continued



Case 2

- 42 year old female with sudden and severe onset of vertigo and nausea after having flu like illness 6 weeks ago preventing her from being able to work, walk, or perform many aspects of daily life (reports crawling to get around house short distances).
- Prescribed vestibular suppressant (such as meclizine) at ER to take as needed and reports that she is feeling better, but still has dizziness and imbalance.
- ENT: Abnormal caloric testing indicating reduced function of Rt vestibular system; Normal hearing

Case 2 continued

- Symptoms: dizziness is described as room spinning and sometimes reports blurry vision
- Tempo: episodic, short duration
- Circumstance: dizziness is worse with head movement such as when driving and it is hard to walk and talk with somebody or walk in the dark

Case 2 continued

- Differential Diagnosis?
- Refer to Vestibular Rehabilitation?

Case 3

- 68 year old male with imbalance and dizziness for which he initially went to the ER where he was prescribed a vestibular suppressant (such as meclizine).
- He reports that he feels more imbalanced in addition to the dizziness
- He reports that this has happened a couple times in the past few years.

Case 3 continued

- Symptoms: dizziness is room spinning (vertigo)
- Tempo: short duration and episodic
- Circumstance: occurs when he rolls over in bed and looks up to take something off a shelf

Case 3 continued

- Differential Diagnosis?
- Refer to Vestibular Rehabilitation?

Case 4

- 17 year old with TBI from falling out of a tree. Pt presents to in patient rehab therapy walking with RW and reports imbalance upon standing and when getting out of bed.
- Nobody has addressed dizziness yet because of focus on TBI which required craniectomy and cranioplasty.

Case 4 continued

- Symptoms: imbalance and room spinning
- Tempo: short duration and episodic
- Circumstance: upon standing and getting out of bed

Case 4 continued

- Differential Diagnosis?
- Refer to Vestibular Rehabilitation?

Take Home Points

- Dizziness is a major health problem.
- Dizziness and balance dysfunction can affect QOL.
- Vestibular dysfunction can be associated with peripheral and/or central disorder.
- Vestibular Rehabilitation is an evidence-based approach to address vestibular disorders.



References

- Alghwiri AA, Whitney SL, Baker CE, Sparto PJ, Marchetti GF, Rogers JC, Furman JM. The development and validation of the Vestibular Activities and Participation measure. *Arch Phys Med Rehabil* 2012. Article in press.
-
- Ballantyne J, Ajodhia J. Iatrogenic dizziness. In: Dix MR, Hood JD, editors. *Vertigo*. Chichester, NY: John Wiley and Sons; 1984. 217-247.
- Boissonault WG. *Primary Care for the Physical Therapist: Examination and Triage*. Elsevier Saunders, 2005, St Louis.
- Colledge NR, Wilson JA, Macintyre CA, et al. the prevalence and characteristics of dizziness in an elderly community. *Age Aging*. 1994;23:117-120.
- [Dannenbaum E](#), [Chilingaryan G](#), [Fung J](#). Visual vertigo analogue scale: an assessment questionnaire for visual vertigo. [J Vestib Res](#). 2011;21(3):153-9.
-
- Definition of dizziness. Search performed at: www.medterms.com Accessed September 7, 2011.
- [Eleftheriadou A](#), [Skalidi N](#), [Velegrakis GA](#). Vestibular rehabilitation strategies and factors that affect the outcome. [Eur Arch Otorhinolaryngol](#). 2012 Apr 21.
-
- Goebel JA. The ten-minute examination of the dizzy patient. *Seminars in Neurology*, 2001. 21;391-398.

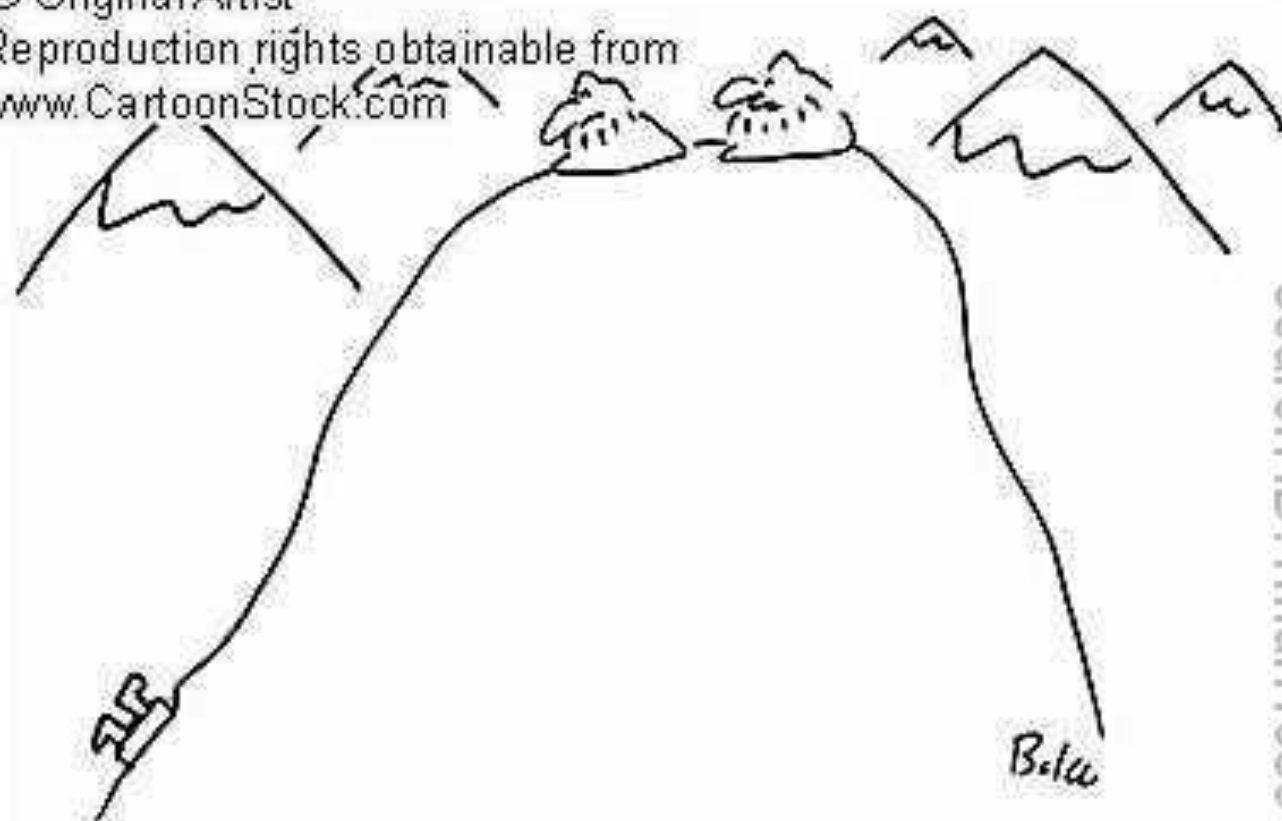
References

- Hartikainen S, et al. Medication as a risk factor for falls – critical systematic review. *Journals of Gerontology, Series A, Biological Sciences and Medical Sciences*, 2007. 62: 10, 1172–1181.
- Herdman SJ. Vestibular Rehabilitation 3rd. Edition. Philadelphia: F.A. Davis Company, 2007.
- Hien Le, Cumming RG, Cameron ID, et al. Atypical antipsychotic medications and risk of falls in residents of aged care facilities. *Journal of the American Geriatrics Society*, 2005. 53(8), 1290-1295.
-
- Karatas M. Central vertigo and dizziness. Epidemiology, differential diagnosis, and common causes. *Neurologist*. 2008;14:355-364.
- Kerber KA, Brown DL, Lisabeth LD, et al. Stroke among patients with dizziness, vertigo, and imbalance in the emergency department: a population based study. *Stroke*. 2006;37:2484-2487.
- Kroenke K, Mangelsdorff D. Common symptoms in ambulatory care: incidence, evaluation, therapy, and outcome. *Am J Med* 1989;86:262-6.
- Kroenke K, Lucas CA, Rosenberg ML, et al. Causes of persistent dizziness; a prospective study of 100 patients in ambulatory care. *Ann Intern Med*. 1992;117:898.
- [Morris AE](#), [Lutman ME](#), [Yardley L](#). *Int J Audiol*. 2009 Jan;48(1):24-37. Measuring outcome from vestibular rehabilitation, part II: refinement and validation of a new self-report measure.

References

- [Neuhauser HK](#). Epidemiology of vertigo. [Curr Opin Neurol](#). 2007 Feb;20(1):40-6.
-
- Schenkman M, Deutsch JE, Gill-Body KM. An integrated framework for making in neurologic physical therapist practice. *Phys Ther*. 2006;86:1681–1702.
- Scherer MR, Schubert MC. Traumatic brain injury and vestibular pathology as a comorbidity after blast exposure. *Phys Ther*. 2009; 89:980–992.
-
- Sullivan KJ, Hershberg J, Howard R, Fisher BE. Neurologic differential diagnosis for physical therapy. *Journal of Neurologic Physical Therapy*. 2004;28:162–168.
- [Tusa RJ](#). Bedside assessment of the dizzy patient. [Neurol Clin](#). 2005 Aug;23(3):655-73, v.
-
- Tusa RJ. *Dizziness*. *Med Clin N Am*. 2009;93:263-271.
-

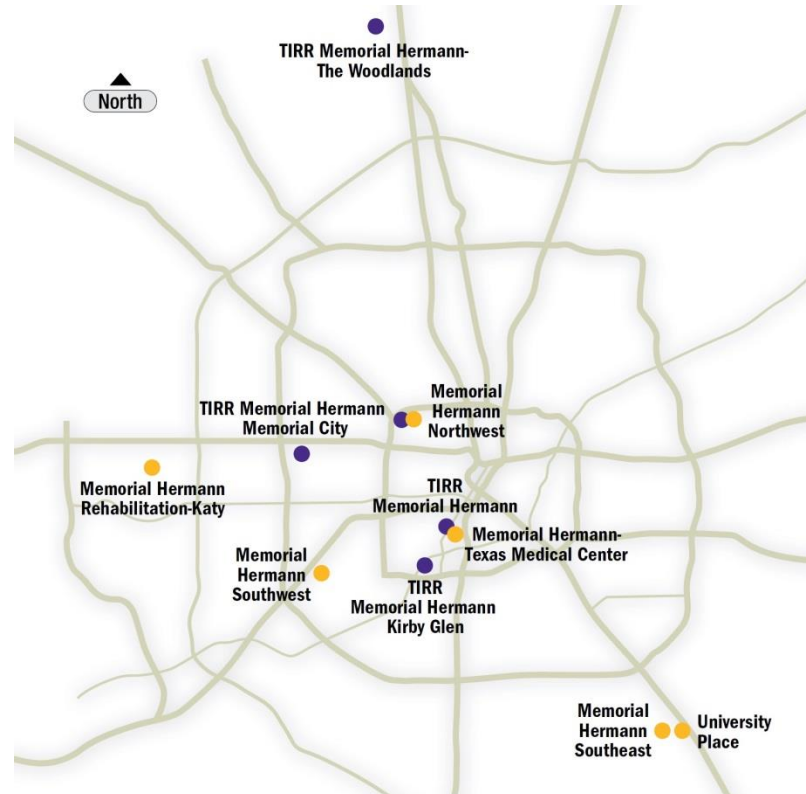
© Original Artist
Reproduction rights obtainable from
www.CartoonStock.com



search ID: rman1685

"I *warned* him that this was no place
for a guy with inner-ear problems."

TIRR Memorial Hermann Rehab Network



To make referrals or schedule appointments
CALL: 1.800.REHAB (73422)
FAX: 713.797.5988

Thank You!

- Anna de Joya, PT, DSc, NCS
- TIRR Memorial Hermann
 - Inpatient Rehabilitation
 - Outpatient Rehabilitation
 - Strength Unlimited
- Anna.Dejoya@memorialhermann.org
- Office Phone: 713.797.7627



MEMORIAL[®]
HERMANN