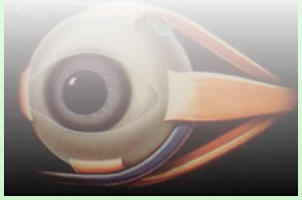
DIZZINESS and VERTIGO

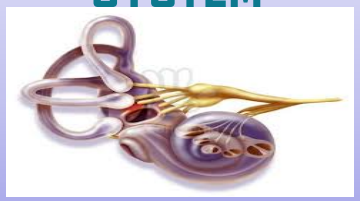
Professor Khader J. Abdulbaqi

MD. PhD

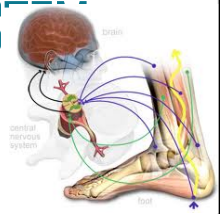
VISUAL SYSTEM

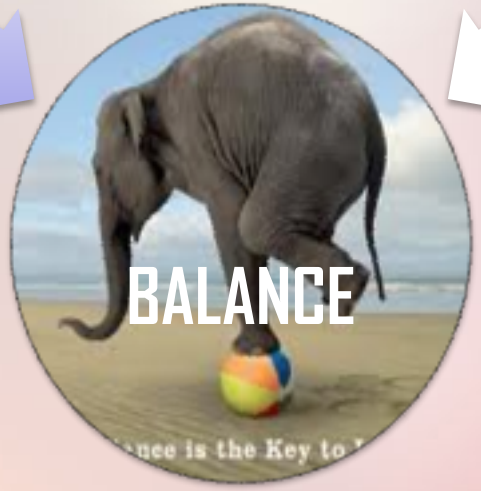


VESTIBULAR SYSTEM

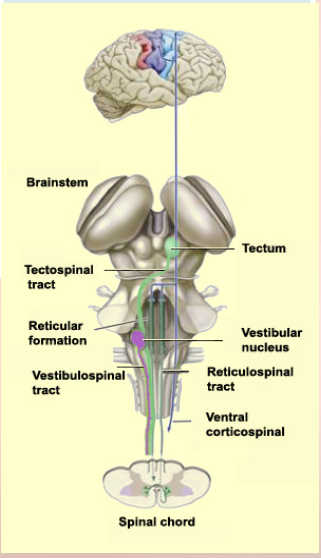


PROPRIOCEPTIVE SYS

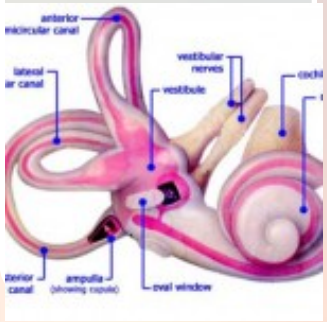


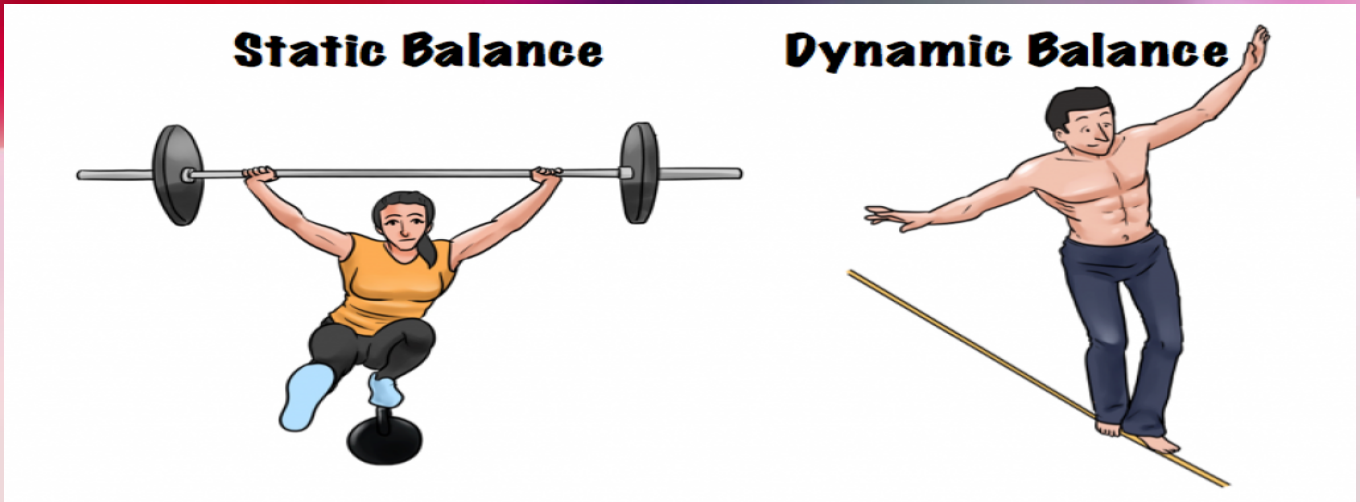


Central



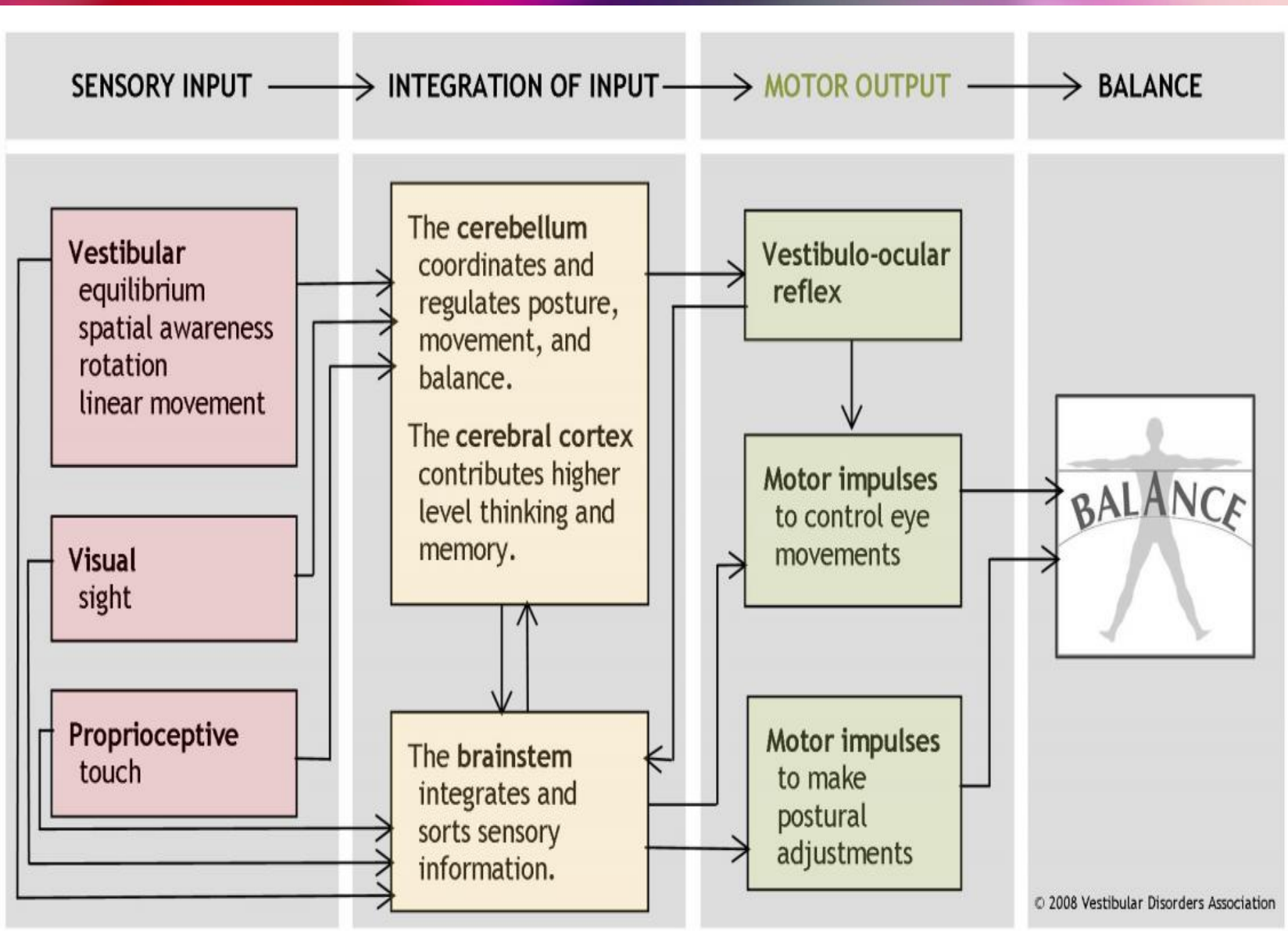
Peripheral





Static balance is the ability to maintain control of a position whilst **remaining stationary** - for example, balancing on one leg or holding a headstand.

Dynamic balance is the ability to maintain balance and control of the body whilst **moving**, such as hopping, jumping, riding a bike or snowboarding.


SENSORY INPUT
INTEGRATION OF INPUT
MOTOR OUTPUT
BALANCE
Vestibular
equilibrium
spatial awareness
rotation
linear movement
Visual
sight
Proprioceptive
touch
The cerebellum coordinates and regulates posture, movement, and balance.
The cerebral cortex contributes higher level thinking and memory.
The brainstem integrates and sorts sensory information.
Vestibulo-ocular reflex
Motor impulses to control eye movements
Motor impulses to make postural adjustments
BALANCE
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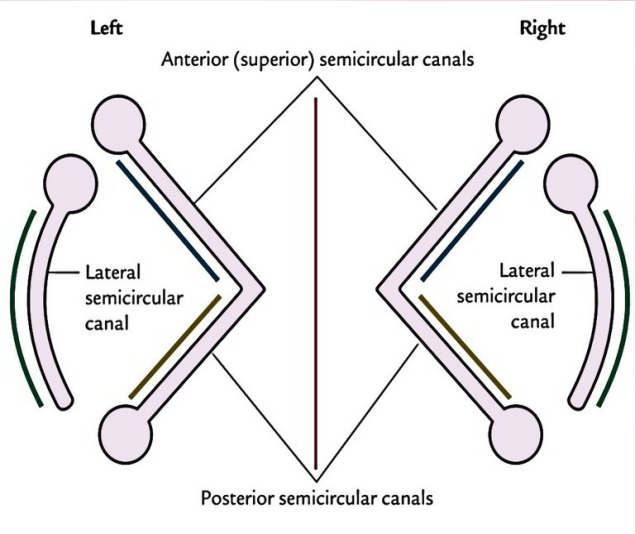
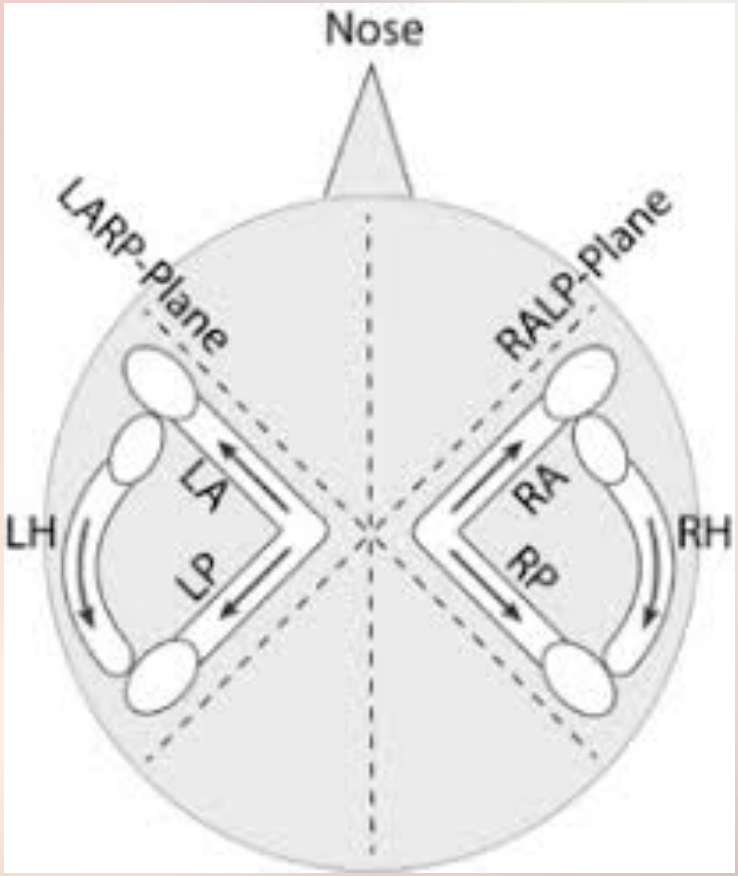
SEMICIRCULAR CANALS

❖the canals are organized into functional pairs wherein both members of the pair lie in the same plane.

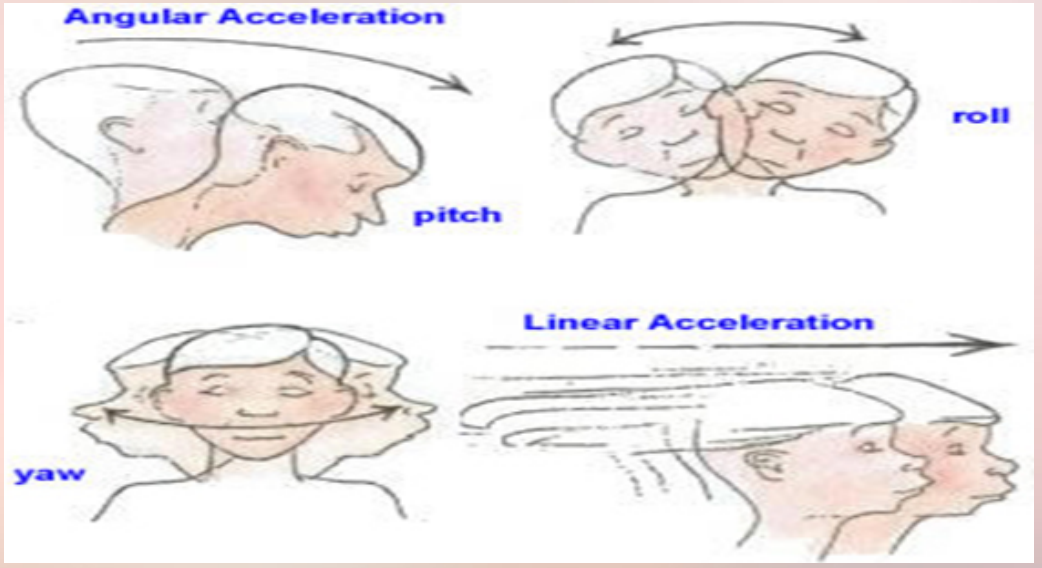


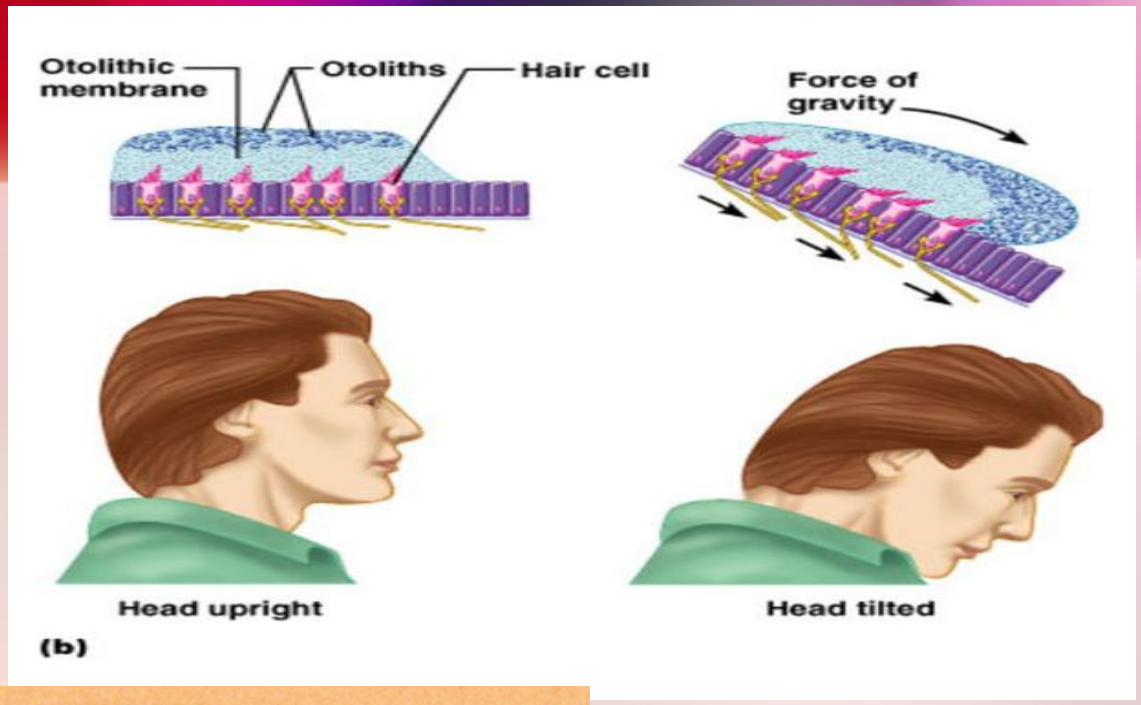
❖**Any rotation in that plane is excitatory to one of the members of the pair and inhibitory to the other.**

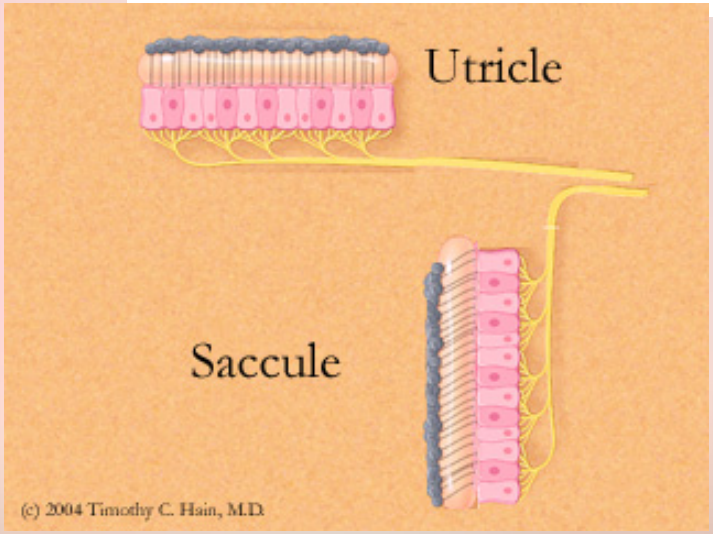


SEMICIRCULAR CANALS

- The necessary stimulus for the canal is an angular acceleration and decelration




Otolithic membrane
Otoliths
Hair cell
Force of gravity
Head upright
Head tilted
(b)


Utricle
Saccule
(c) 2004 Timothy C. Hain, M.D.

MACULAE

- The maculae of the utriculus and sacculus consist of neuroepithelium, supporting cells, blood vessels, and nerve fibers.
- The utricular macula is oriented in the horizontal plane, and the saccular macula is oriented in the vertical plane

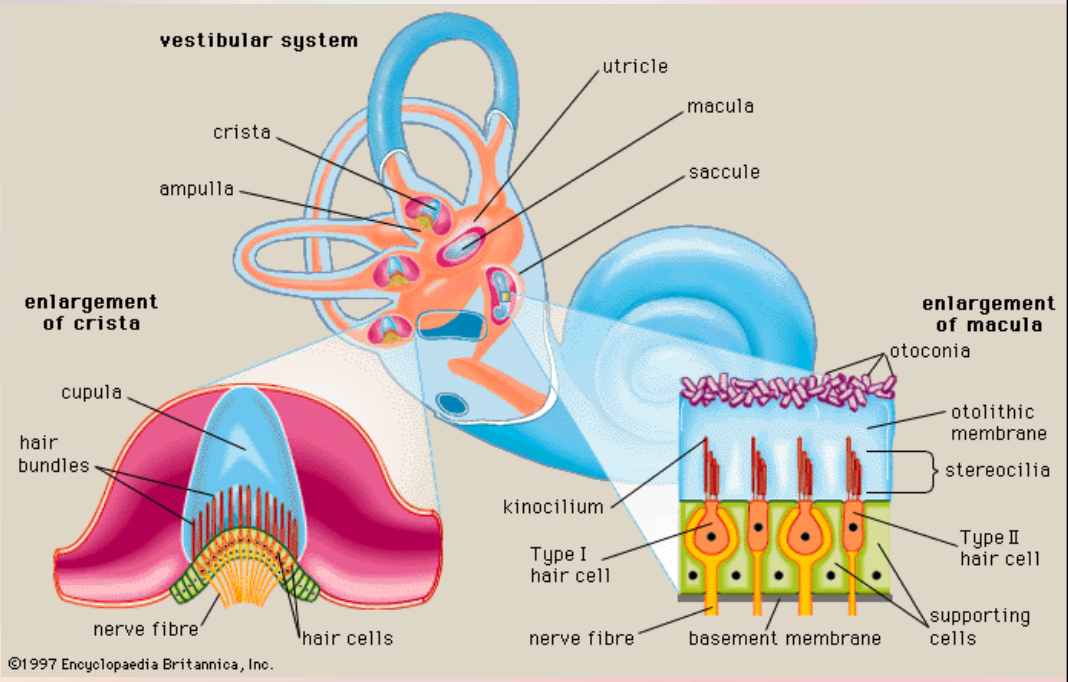
Objective to be addressed:

- Understanding vestibular system.
- Difference between dizziness and vertigo.
- Recognizing the most common etiologies .
- Diagnostic approach to affected patient.
- Characteristics of central vs. peripheral vertigo.
- Treatment Considerations.

Peripheral Vestibular Labyrinth

- 3 semicircular canals
  -- rotational movement(**angular**)
  -- cupula

- 2 otolithic organs
  -- utricle & saccule
  -- **linea**r acceleration and deceleration
  -- macula



Dizziness types

- Presyncopal faintness
- Disequilibrium
- Light-headedness
- Vertigo
- Oscilopsia

Vertigo

- Vertigo is a symptom of illusory movement(rotational)
- It is a symptom, not a diagnosis
- It is only one type of dizziness
- The evaluation of this complaint often creates anxiety in the clinician !
  - The seemingly endless differential diagnosis !
  - enormous impact on the lives of those afflicted !

Epidemiology

- Vestibular disorders are frequently encountered not just by neuro-otologists but also by emergency department & primary care providers.
- **Male-to-female** ratio of **1:2.7**
- Three times more frequently in the **elderly**
- Interestingly, although 70% of vertigo sufferers consulted a physician, >½ the participants with clear-cut vestibular vertigo received a diagnosis of a nonvestibular disorder, often leading to a costly workup!

Aetiology of vertigo

Vestibular

- Benign paroxysmal positional vertigo
- Vestibular neuritis
- Meniere disease
- Herpes zoster oticus (Ramsay Hunt)
- Labyrinthine concussion
- Perilymphatic fistula
- Semicircular canal dehiscence
- Cogan's syndrome
- Recurrent vestibulopathy
- Acoustic neuroma
- Drug induced (aminoglycosides)
- Otitis media
- labyrinthitis
- Cholesteatoma
- Postsurgical

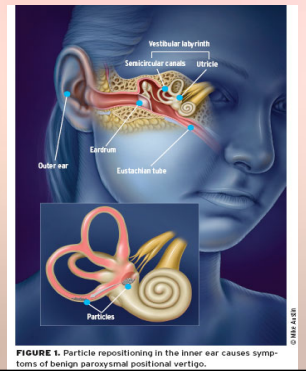
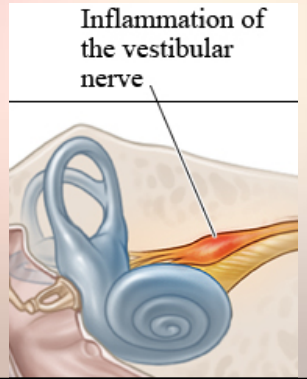
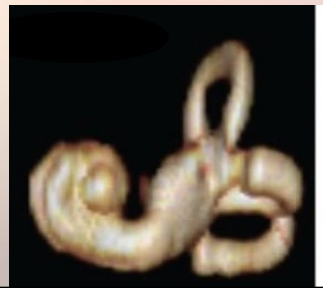
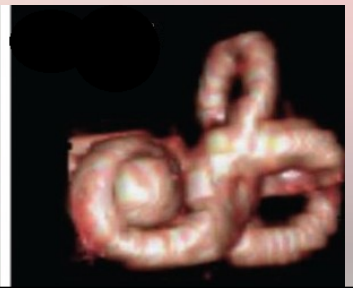
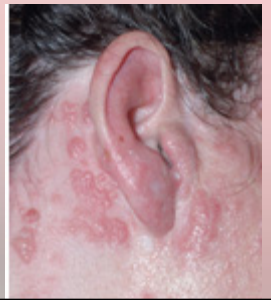


FIGURE 1. Particle repositioning in the inner ear causes symptoms of benign paroxysmal positional vertigo.









Aetiology of vertigo

Central

- Migrainous vertigo
- Brainstem ischemia
- Cerebellar infarction and hemorrhage
- Chiari malformation
- Multiple sclerosis
- Episodic ataxia type 2

Non-specific dizziness:

Causes

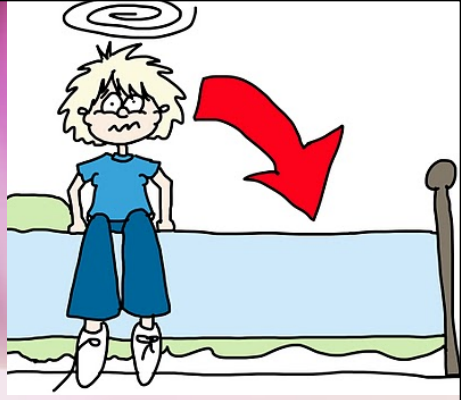
- **Cardiovascular**
  - Arrhythmias
  - Reduced cardiac output
  - Carotid artery stenosis
  - Arteriosclerosis
  - Hypotension (postural)
- **Proprioception**
  - Arthritis
- **Metabolic**
  - DM
  - Hypothyroidism
  - Hypercholesterolaemia
  - Anaemia
- **Peripheral neuropathy**
  - DM
  - Renal or hepatic failure
  - Alcohol
  - Vasculitis
  - Infections
    - Leprosy, TB, syphilis
  - Vitamin deficiencies
    - B1, B6, B12
  - Genetic - Refsum's disease
  - Toxins
    - Lead, metronizadole
- **Psychogenic**

History

- **Allow to distinguish vertigo from other types of dizziness and to make a hypothesis about the site and type of lesion.**

- **Vertigo**
  - **Time course**
    - **Vertigo is never a permanent symptom even if vestibular lesion is permanent.**
    - **Vertigo can occur as single or recurrent episodes and may last seconds, minutes, hours, or days.**
  - **Severe vertigo may occur with both acute central and peripheral lesions.**

- **Postural instability**



Aggravating and provoking factors

- Specific head movements or postures
- Coughing, sneezing, exertion, or loud noises (Tullio phenomenon)
- Head trauma.
- Barotrauma, middle ear surgery, straining with weight lifting & bowel movement
- Recent hyperextension injury to the neck.
- Recent viral symptoms
- Swimming
- Anxiety
- Watching 3D movie .

- Associated symptoms
  - Nausea and vomiting
  - **Hard of hearing ,tinnitus ,& fullness.**
  - diplopia, dysarthria, dysphagia, weakness, or numbness.
  - Focal neck pain.
  - Headache, photophobia, and sonophobia. visual aura.
  - Shortness Of Breath, palpitations, and sweating .

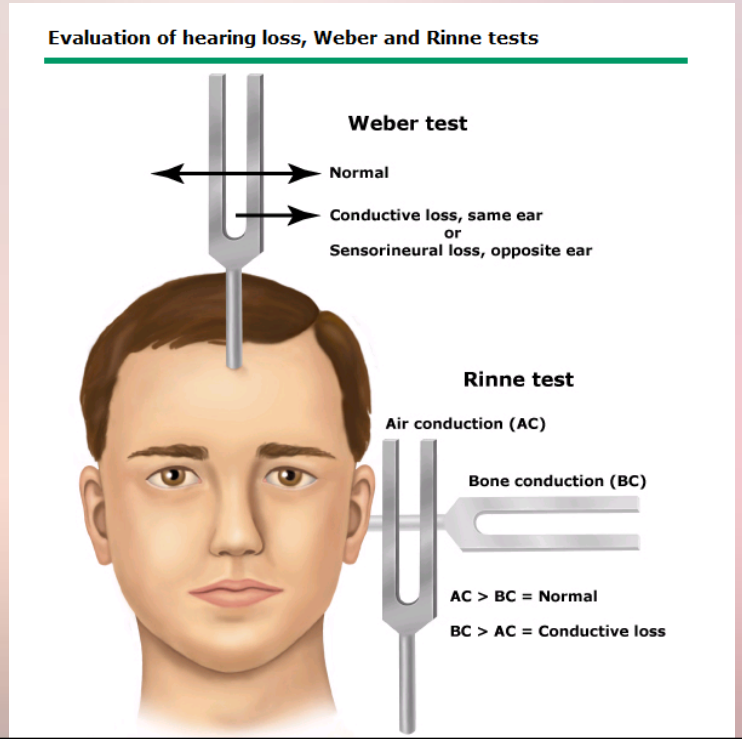
- Prior medical history
  - A prior history of migraine
  - stroke risk factors
  - Past head trauma
  - barotraumas
  - family history
  - medications causing
    - vestibular (cisplatin, aminoglycosides)
    - cerebellar (eg,phenytoin) toxicity.

Examination

- General examination
- Otologic examination
- Ophthalmologic examination “ nystagmus “
- Positional testing “Dix-Hallpike”
- Neurologic exam
  - gait
  - Posture
    - Romberg’s
    - Unterberger’s
  - Cranial nerves
  - Cerebellar
- Cardiovascular examination

Otologic examination

- Otoscopic examination
- Bedside tests of hearing
- The Weber and Rinne tests



Nystagmus

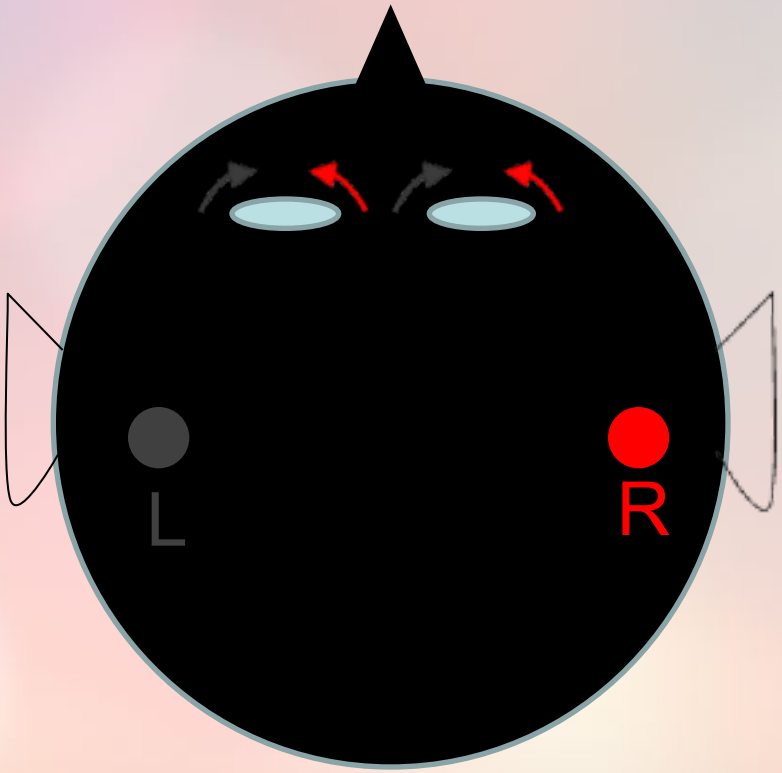
- Rhythmic oscillation of the eyes.
- **In acute vertigo ➲ spontaneous nystagmus**
- Peripheral lesion➲ fast phase is away from affected side.
- Nystagmus ↑ in frequency and amplitude with gaze toward ➲ fast phase.

- **Type of nystagmus.**
  - A mixed horizontal-torsional nystagmus
  - purely horizontal, but it is never purely torsional or vertical.
  - Vertical nystagmus with central lesions & may chang direction

- **Visual fixation** ➲ suppress peripheral lesion nystagmus
  ➲ does not suppress central nystagmus
  - Frenzel lenses

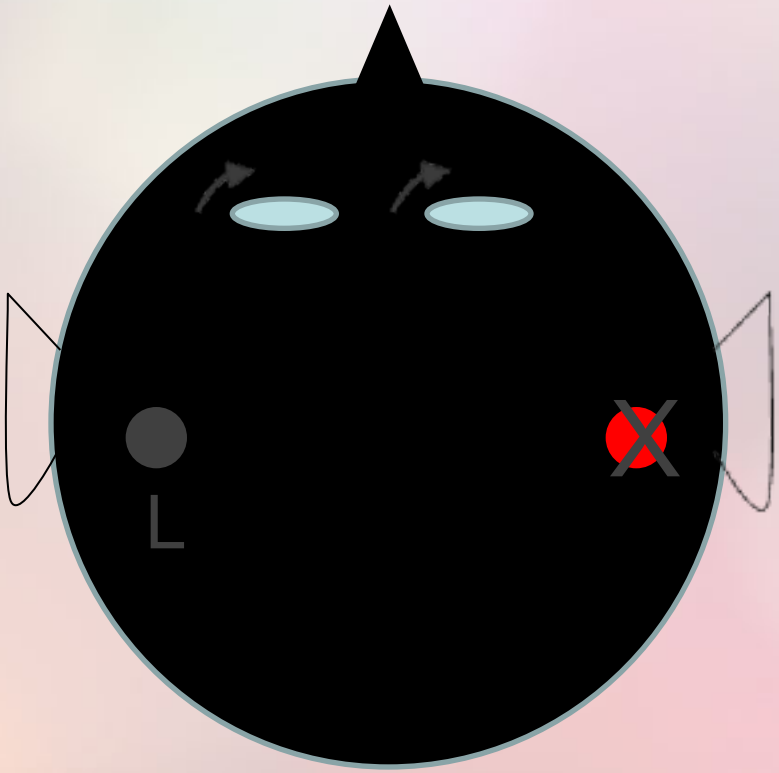
Nystagmus

Normal labyrinths



Eyes central

Abnormal **Right** Labyrinth



Slow drift to right
Rapid corrective flick to left

= **Left** nystagmus

Dix-Hallpike maneuver

- Tests for canalithiasis of the PSCC, which is the most common cause of BPPV.
- provoke vertigo and nystagmus if PSCC **canalithiasis** is present in **the lower ear.**
  - **latency** ➲ few seconds and last less than 30 seconds.
  - **beating horizontally and torsionally**
  - **After patient sits up**, the nystagmus recur, but in the opposite direction.
  - should be **repeated** to same side; with each repetition the intensity & duration diminish.

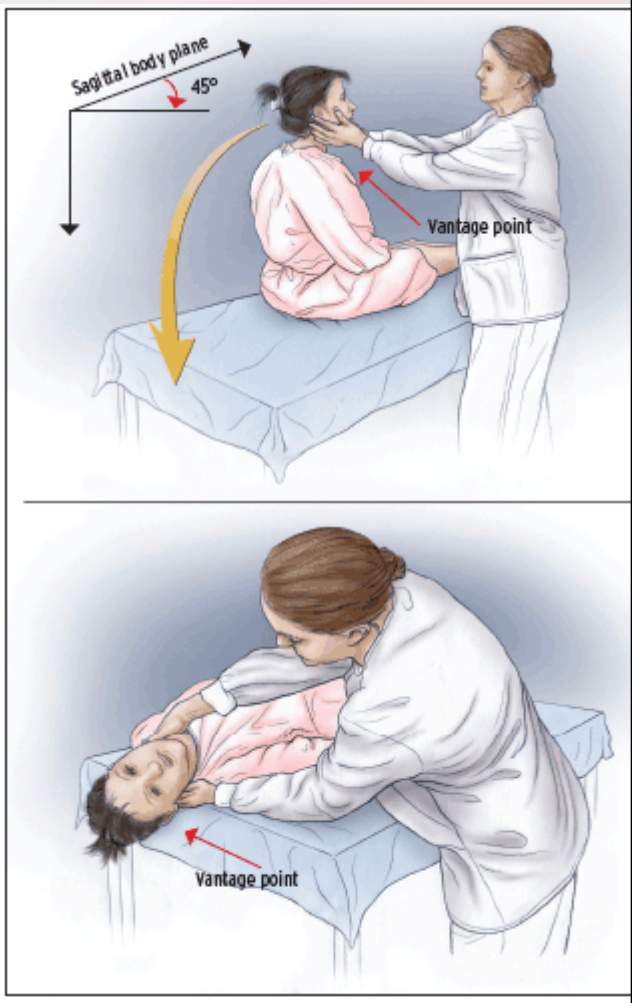


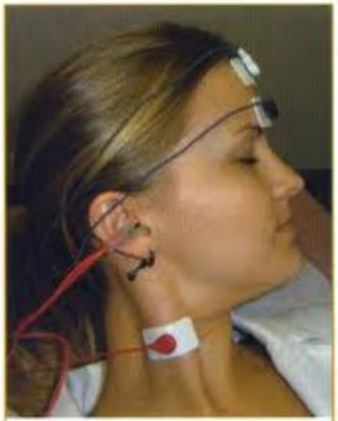
FIGURE 3. The Dix-Hallpike test

Dix-Hallpike maneuver for positional nystagmus

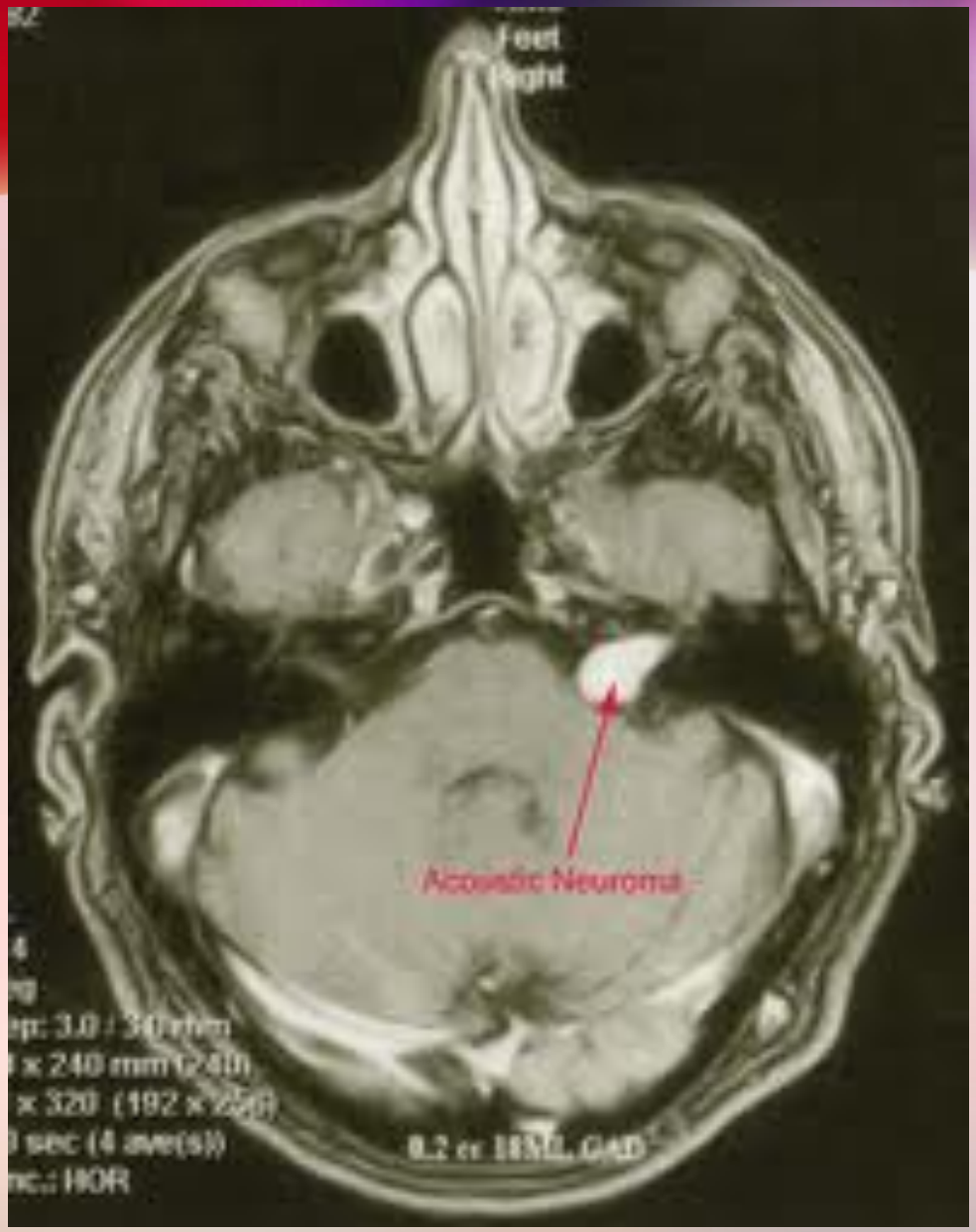
	Peripheral disorder	Central disorder
Latent period before onset of positional nystagmus	2 to 20 seconds	None
Duration of nystagmus	Less than 1 minute	Greater than 1 minute
Fatiguability	Fatiguing with repetition	Nonfatiguing
Direction of nystagmus	Only one type, usually horizontal/rotatory	May change direction with a given head position
Intensity of vertigo	Severe	Less severe, sometimes none

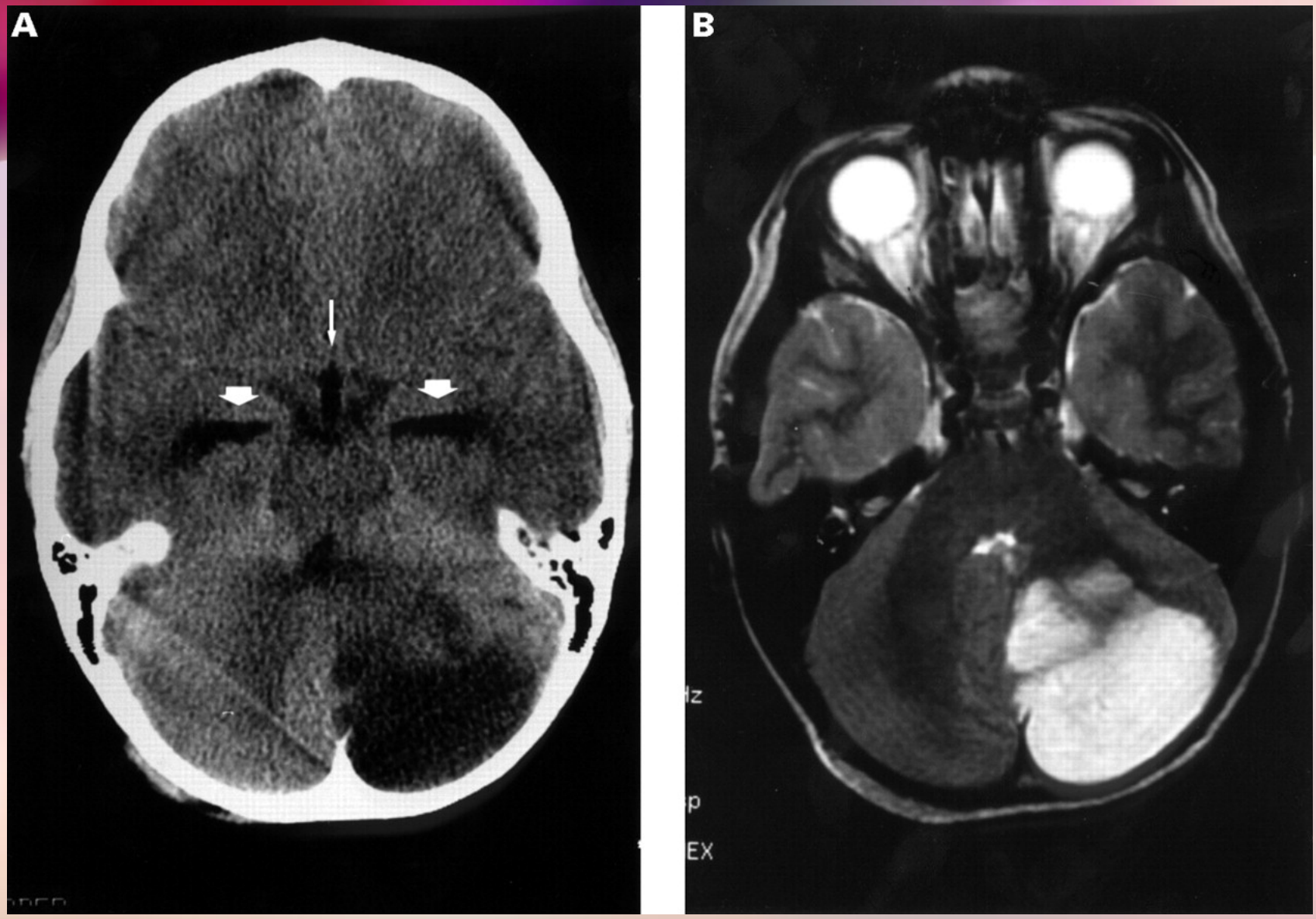
DIAGNOSTIC TESTS

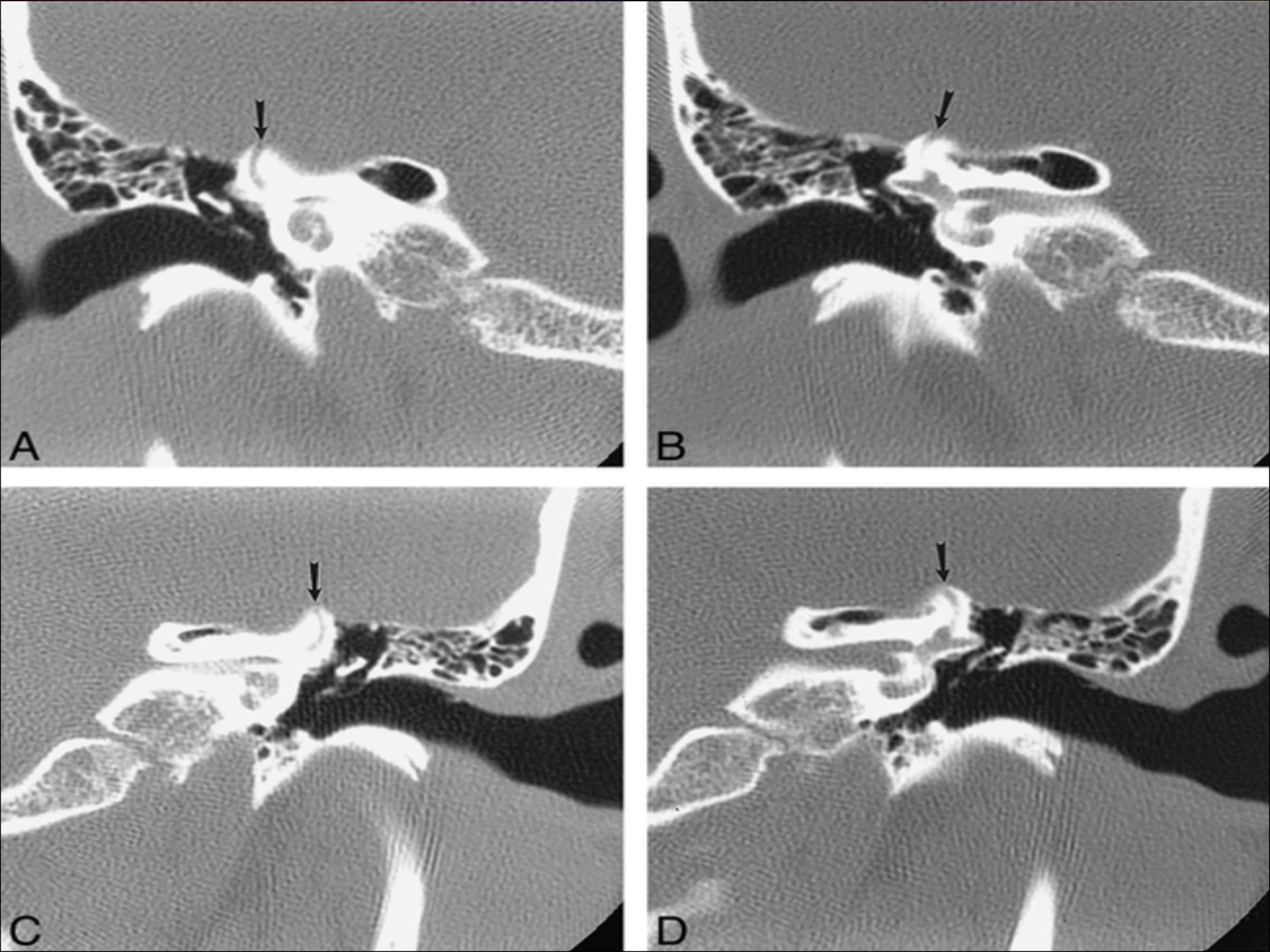
- Laboratory tests
- Audiometry
- MRI / MRA / CT
- Electronystagmography and video nystagmography
- Vestibular evoked myogenic potentials
- Brainstem auditory evoked potentials
- Electrocochleography

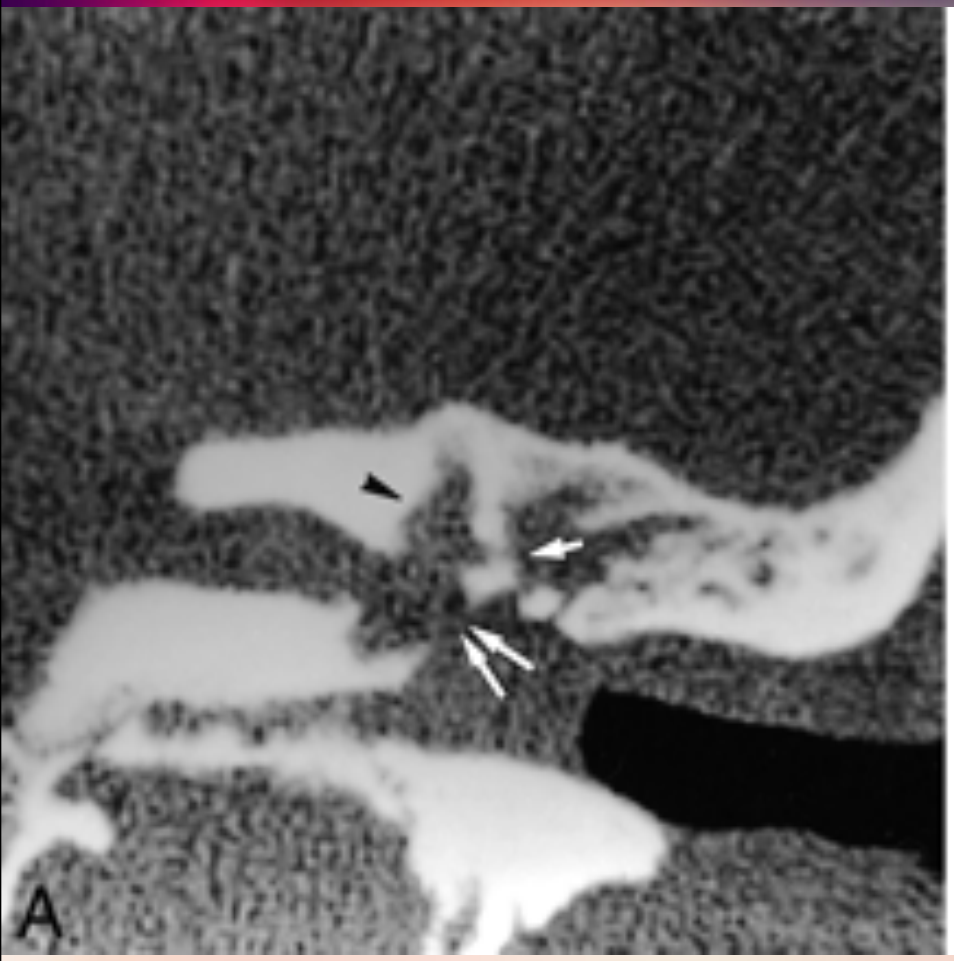


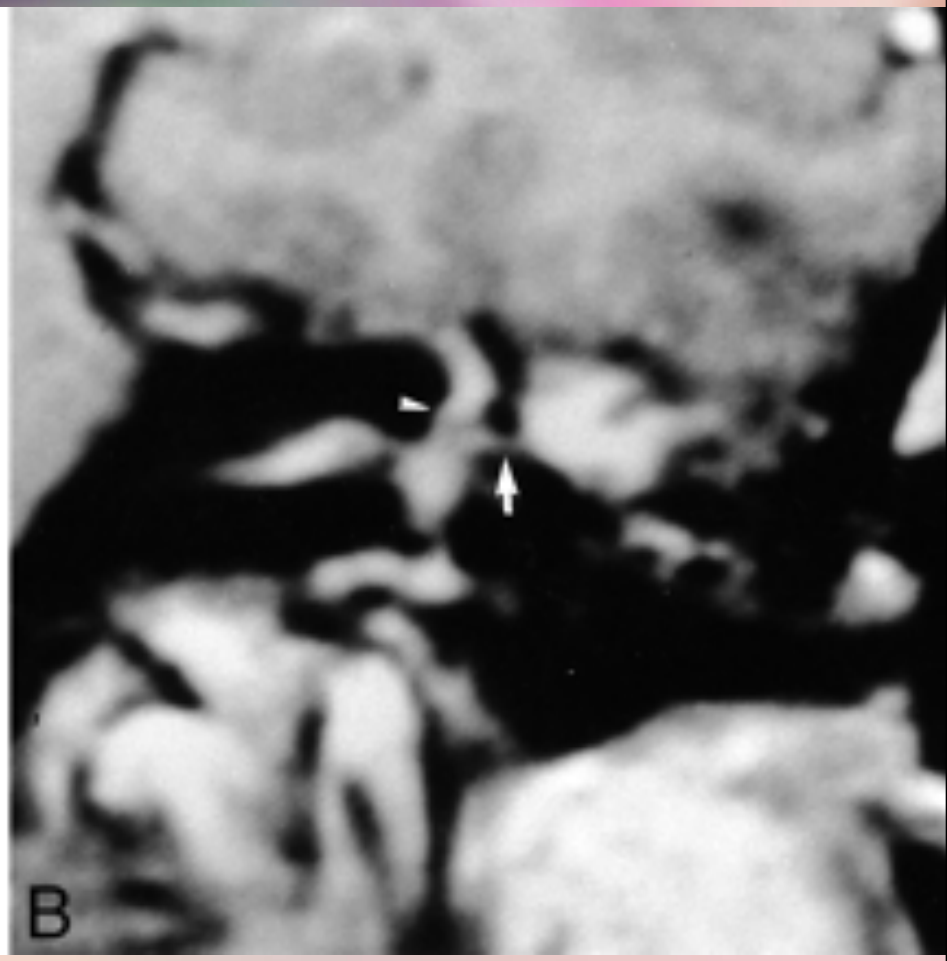
Electrode montage and contraction of the right SCM sternocleidomastoid muscle.






A
B
C
D






Precautions & instructions
Symptomatic treatment
Vertigo Treatment
Specific therapy
Rehabilitation

Pharmacotherapy

- **Antihistamine** ; *diphenhydramine* ,dimenhydrinate, cinnarizine ,meclizine.

- **Benzodiazepams** ; alprazolam , clonazepam , diazepam, lorazepam
- **Antiemetics** ; domperidone , *metaclopromide*, *ondansteron* ,*prochlorperazine*
- **Diuretics**
- **Corticosteroids**
- **Histamin analogues : Betahistin**
- **Immunosuppressive agents**
- **For acute emergency word , what to use ???**

Exercise therapy & Vestibular Rehabilitation **Physiotherapy**

- Promoting vestibular compensation
- Habituation
- Enhancing adaptation of VOR & VSR
- May have initial exacerbation

Vestibular Rehabilitation

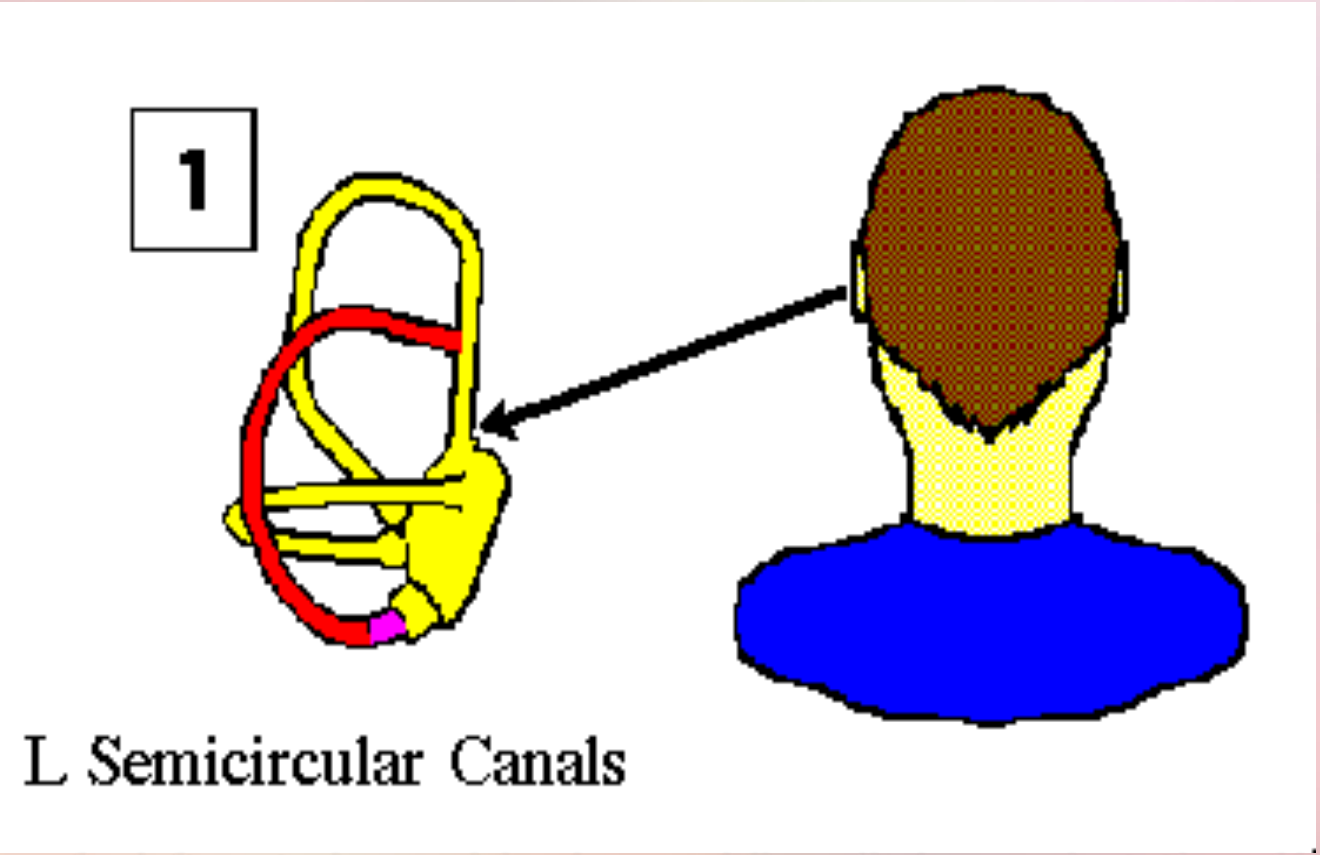
- Most agree that vestibular exercises can improve dizziness and postural confidence in the short term.

- Ideally, should begin immediately after symptom onset because of evidence of a critical period of adaptation and compensation that are seen in animal studies.

BPPV Particle **repositioning** maneuvers:

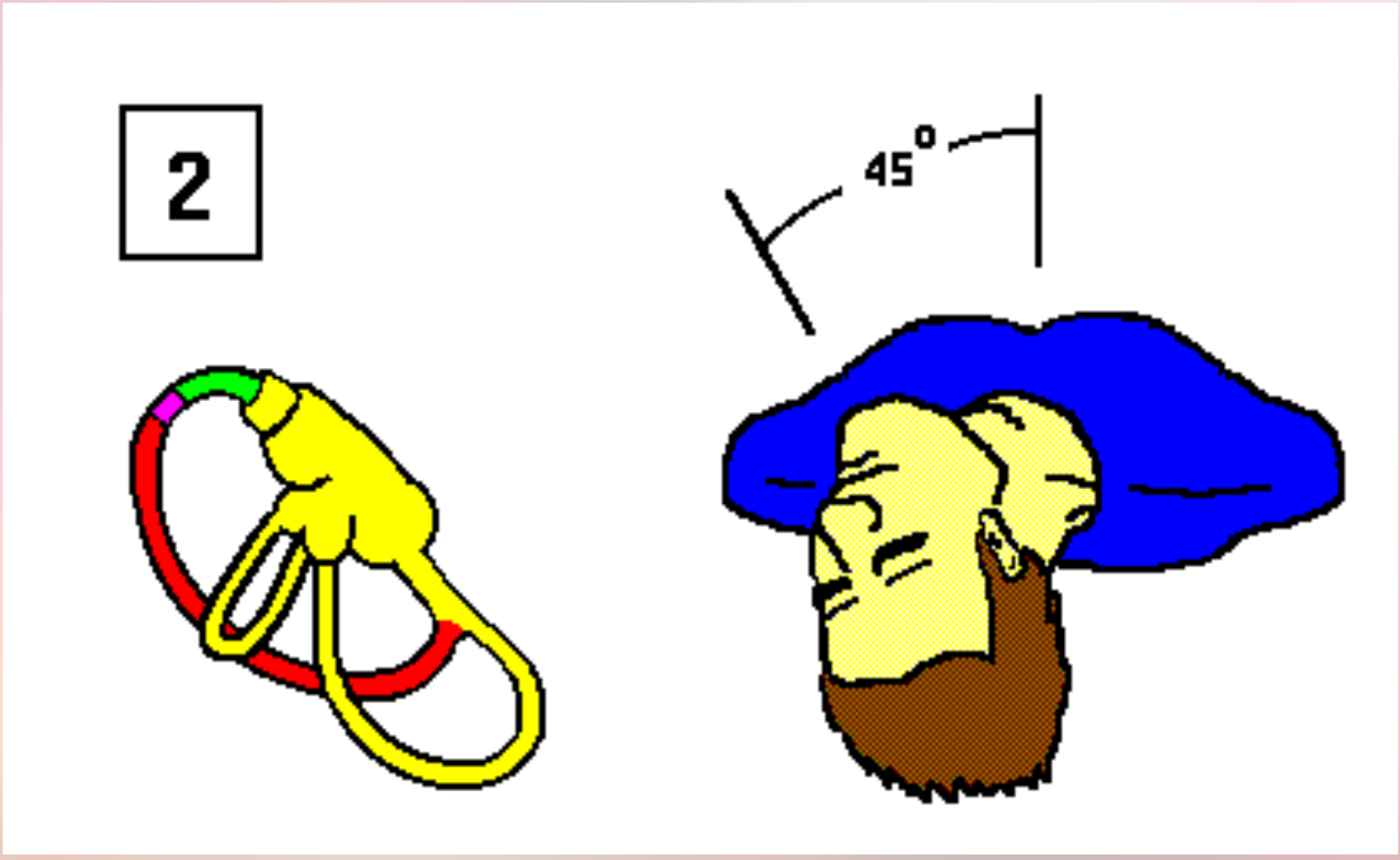
- The **Epley** maneuver and modified Epley
- The Semont maneuver and modified Semont
- The brandt & Darrof
- The epply omniax system

Epley maneuver

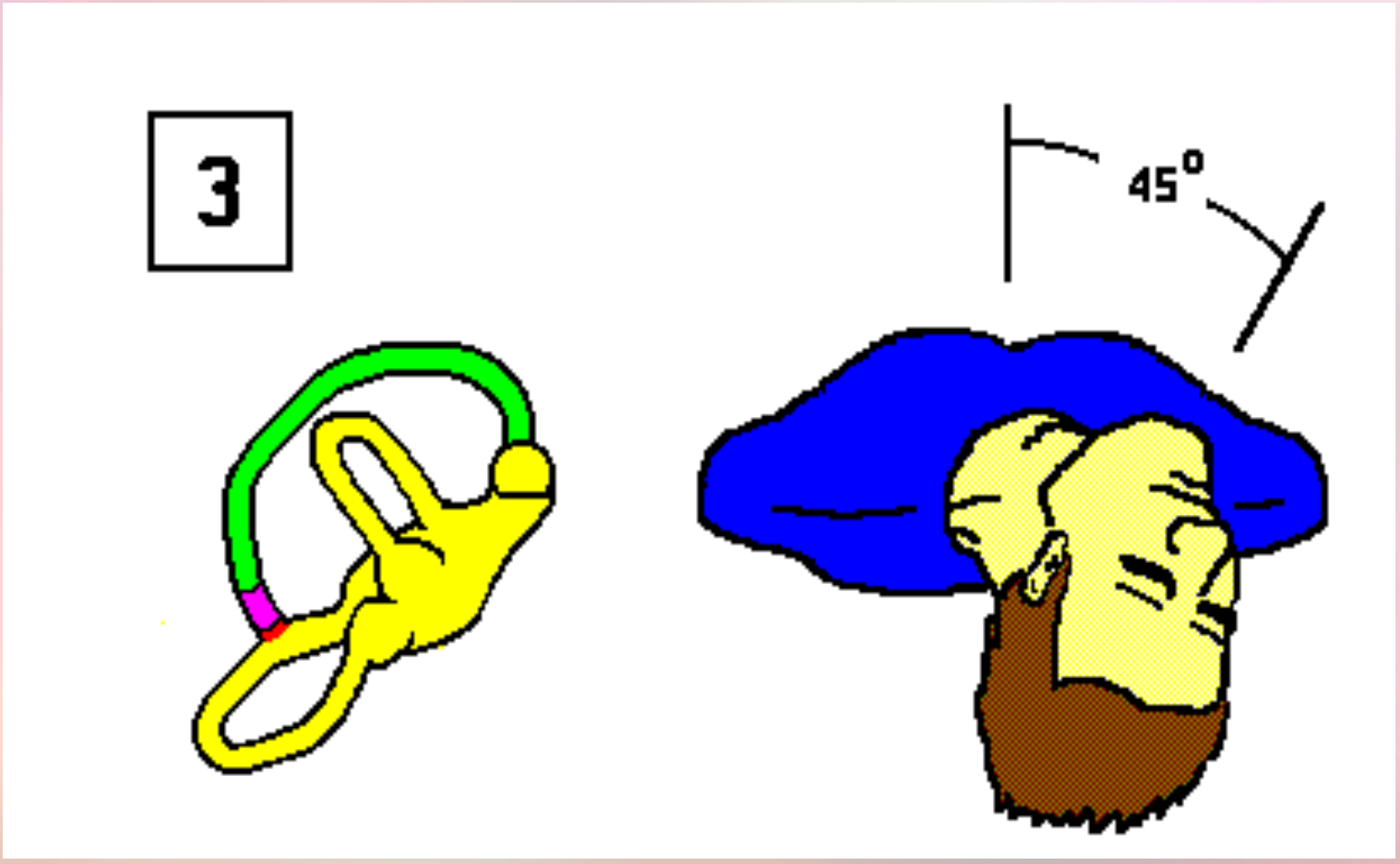


Positioning sequence for left posterior semicircular canal (in red) shows orientation of left labyrinth and gravitating canaliths (in violet). 1,The patient is seated with operator behind. An ultrasonic oscillator may be used and is started at this point.

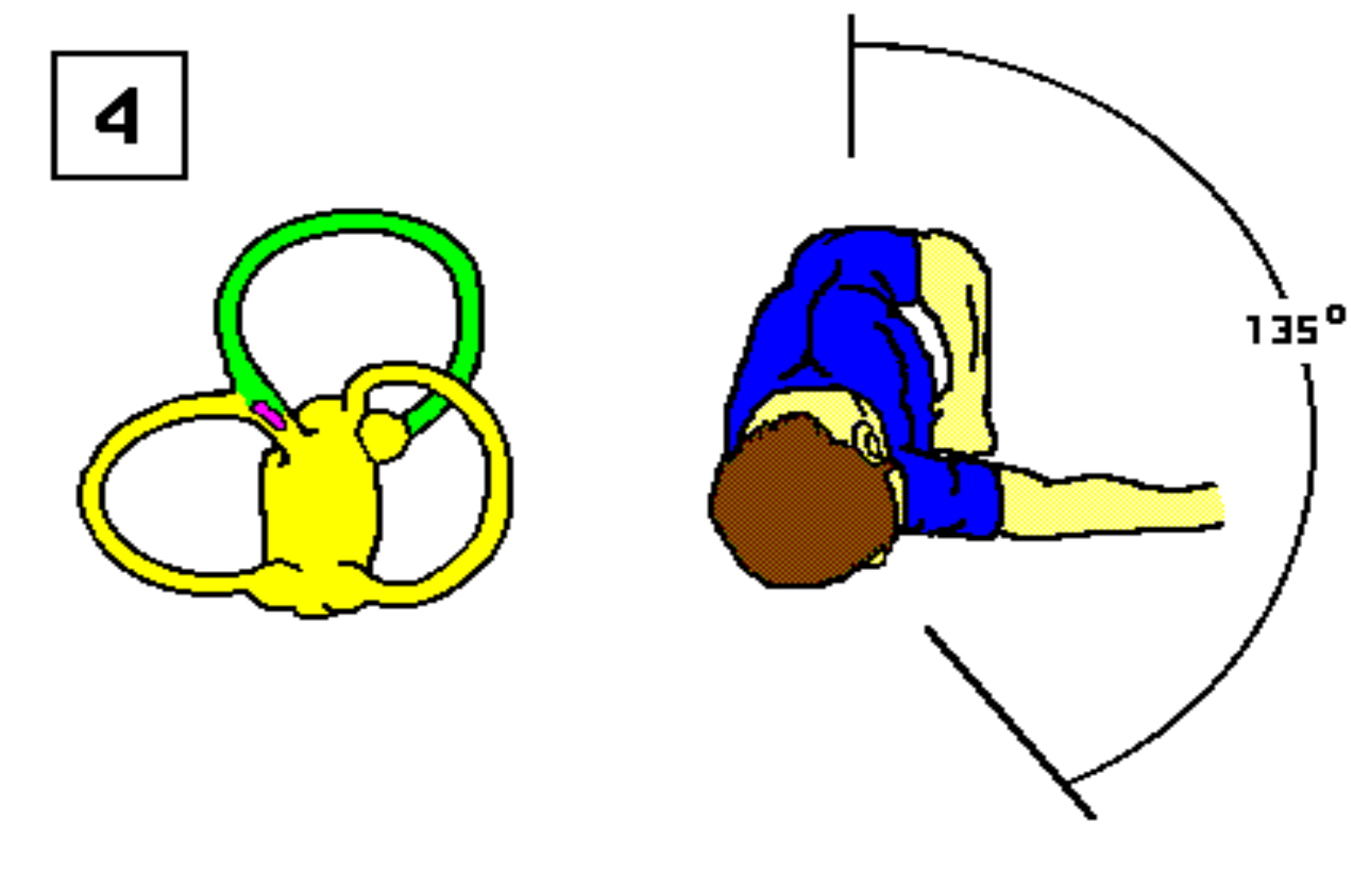
2, Head is placed over end of table, 45 degrees to left, with head extended. (Canaliths gravitate to center of posterior semicircular canal, the "cleared" portion now shown in green.)



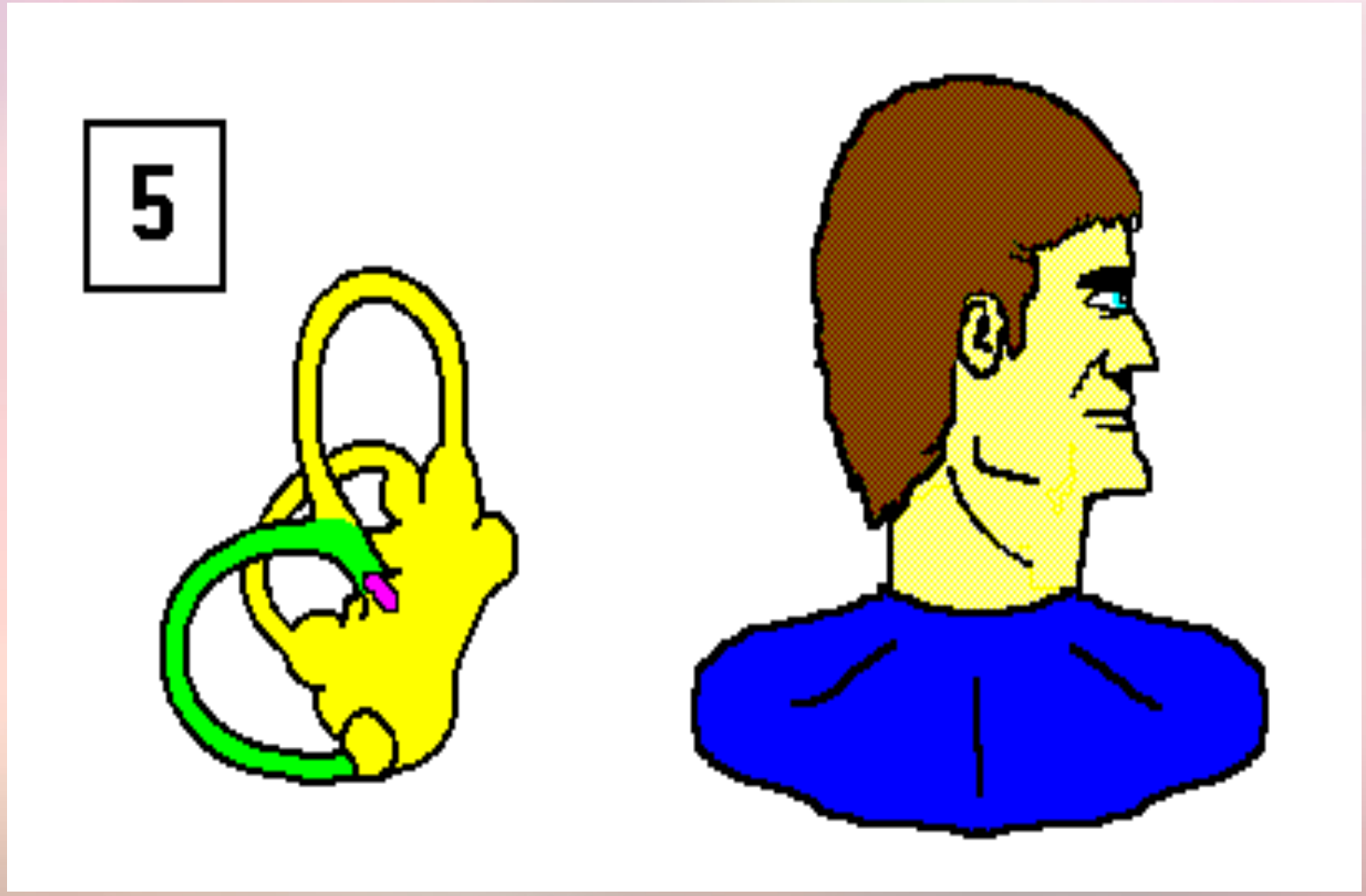
3, Head is rotated 45 degrees to right; head is kept well extended in process of coming from position 1. (Canaliths reach common crus.)



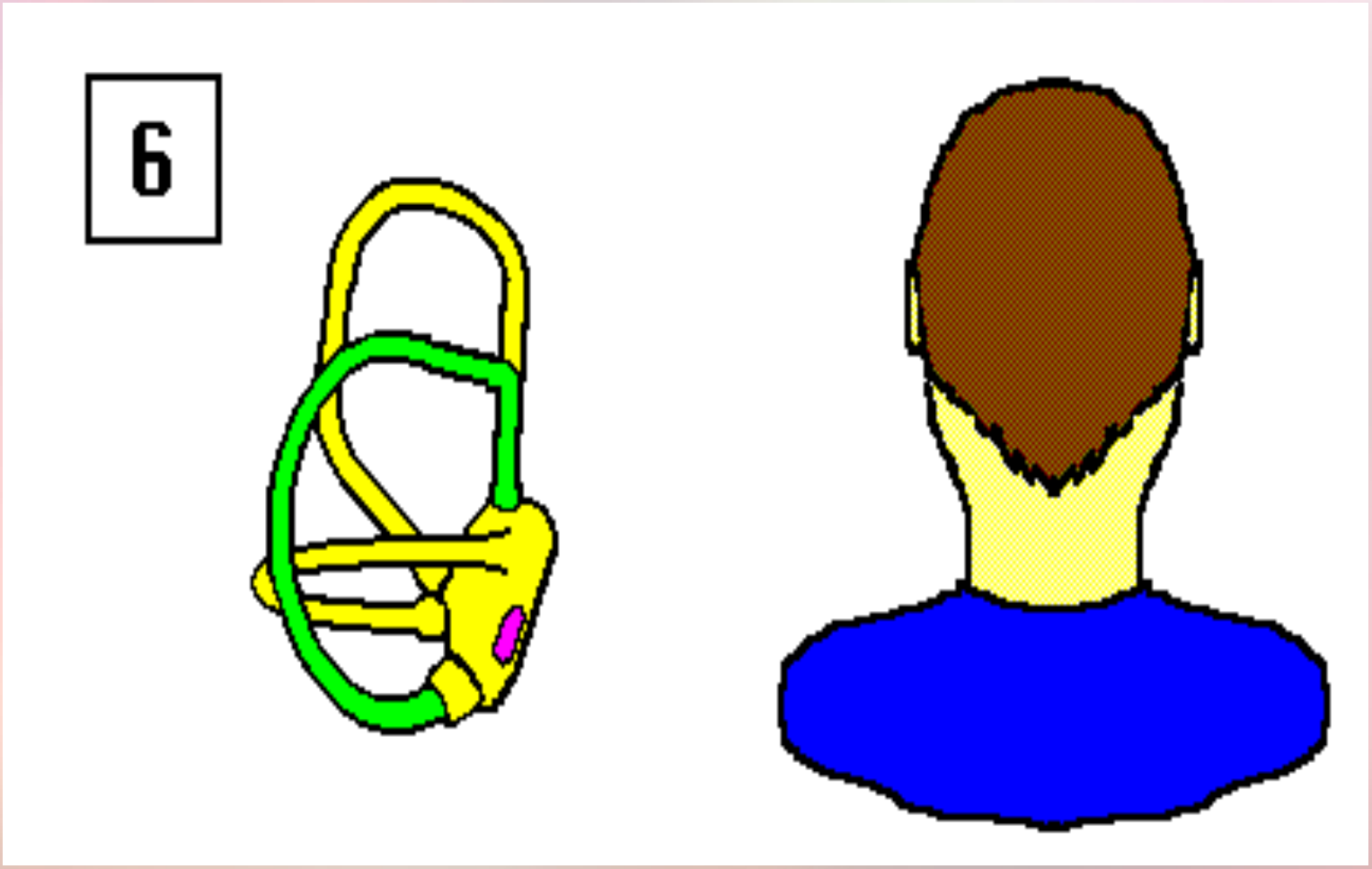
4, Head (and body) are rotated until facing downward 135 degrees from supine



5, Patient is brought to sitting position; head is kept turned to right in process of coming from position 3. (Canaliths enter utricle.)



6, Head is turned forward with chin down about 20 degrees.



Betahistine in addition to EPLEY in PSCC BPPV.

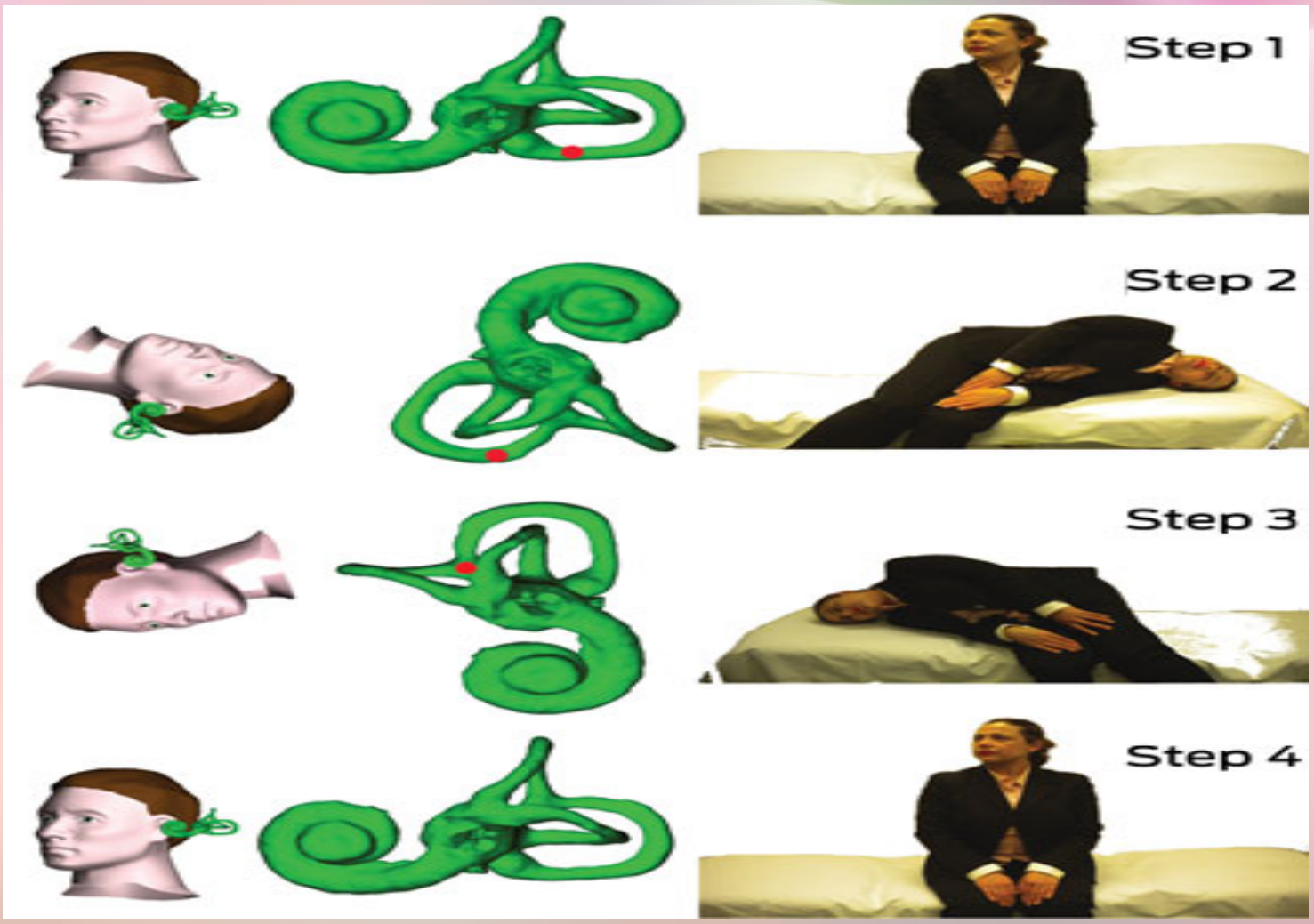
- Betahistine in addition to Epley maneuver is more effective than Epley maneuver alone or combined with placebo with regard to improvement of symptoms in certain patients.

- However, future clinical studies covering more patients to investigate the benefit of medical treatments in addition to Epley maneuver are needed

The Epley Maneuver

- **Contraindications**
  - **Unstable heart disease**
  - **High grade carotid stenosis**
  - **Severe neck disease**
  - **Ongoing CNS disease (TIA/stroke)**
  - **Pregnancy beyond 24th week gestation (relative)**

SEMONT FOR TTT OF LT PSCC BPPV WITH LIMITED NECK MOVEMENT



BPPV - Brandt & Daroff

Brandt & Daroff, 1980

Surgical treatment of peripheral vertigo

- Surgical therapy of chronic peripheral vestibular dysfunction includes:

  - Exploration for **fistulas**
  - Endolymphatic **shunts**
  - **Destructive end organ surgery**: labyrinthectomy, medical labyrinthectomy (with aminoglycosides), vestibular nerve section, singular nerve neurectomy, pscc obliteration

Vertigo as a migraine trigger !

- While patients may well have basilar migraine or migrainous vertigo, alternatively, another disorder causing episodic vertigo (e.g., benign paroxysmal positional **vertigo** or Ménière disease) may be **triggering** migraine headaches!

MUCHAS GRACIAS
THANK YOU