Disorders of Balance:
Dizziness and Vertigo

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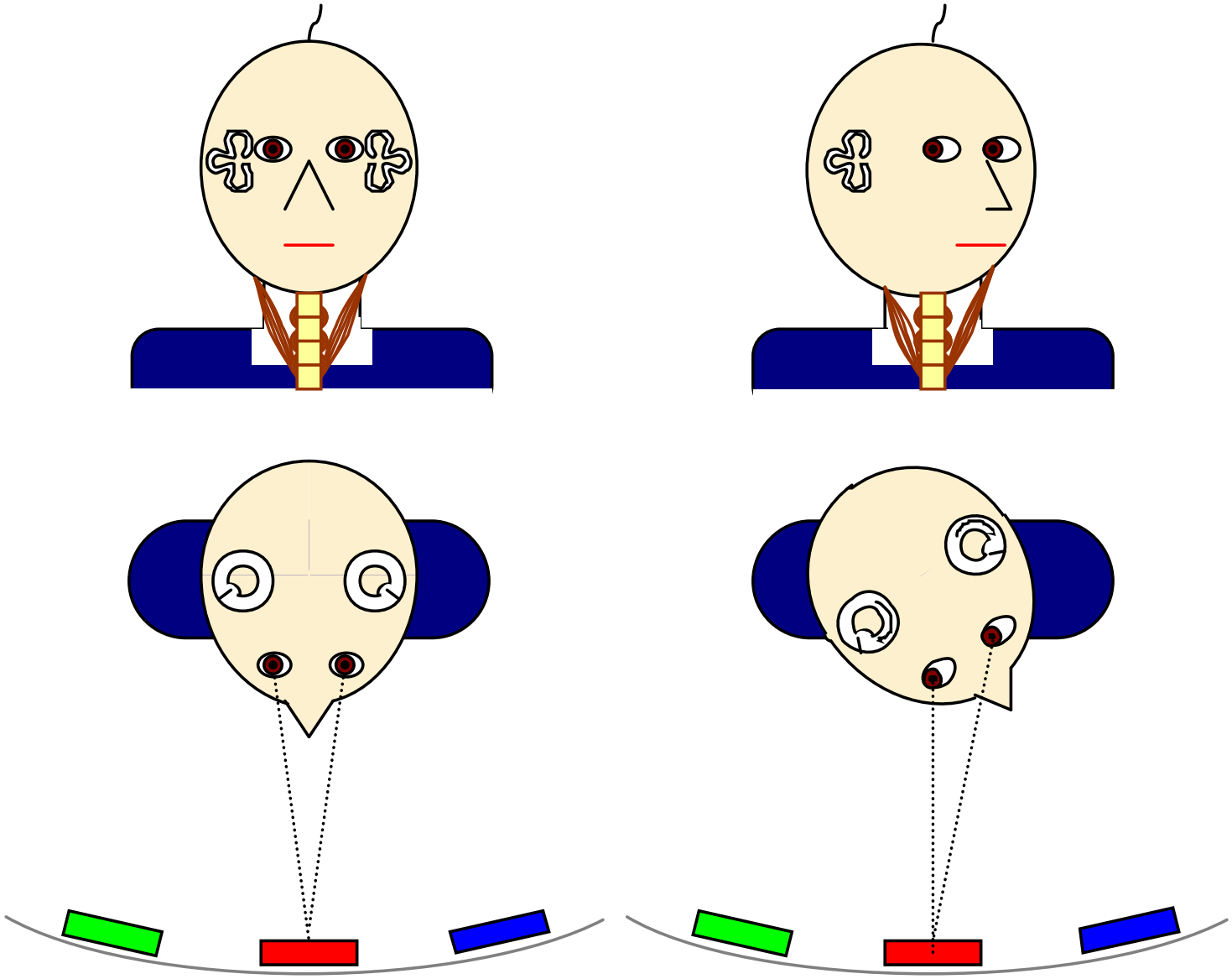


The Components of the Balance System

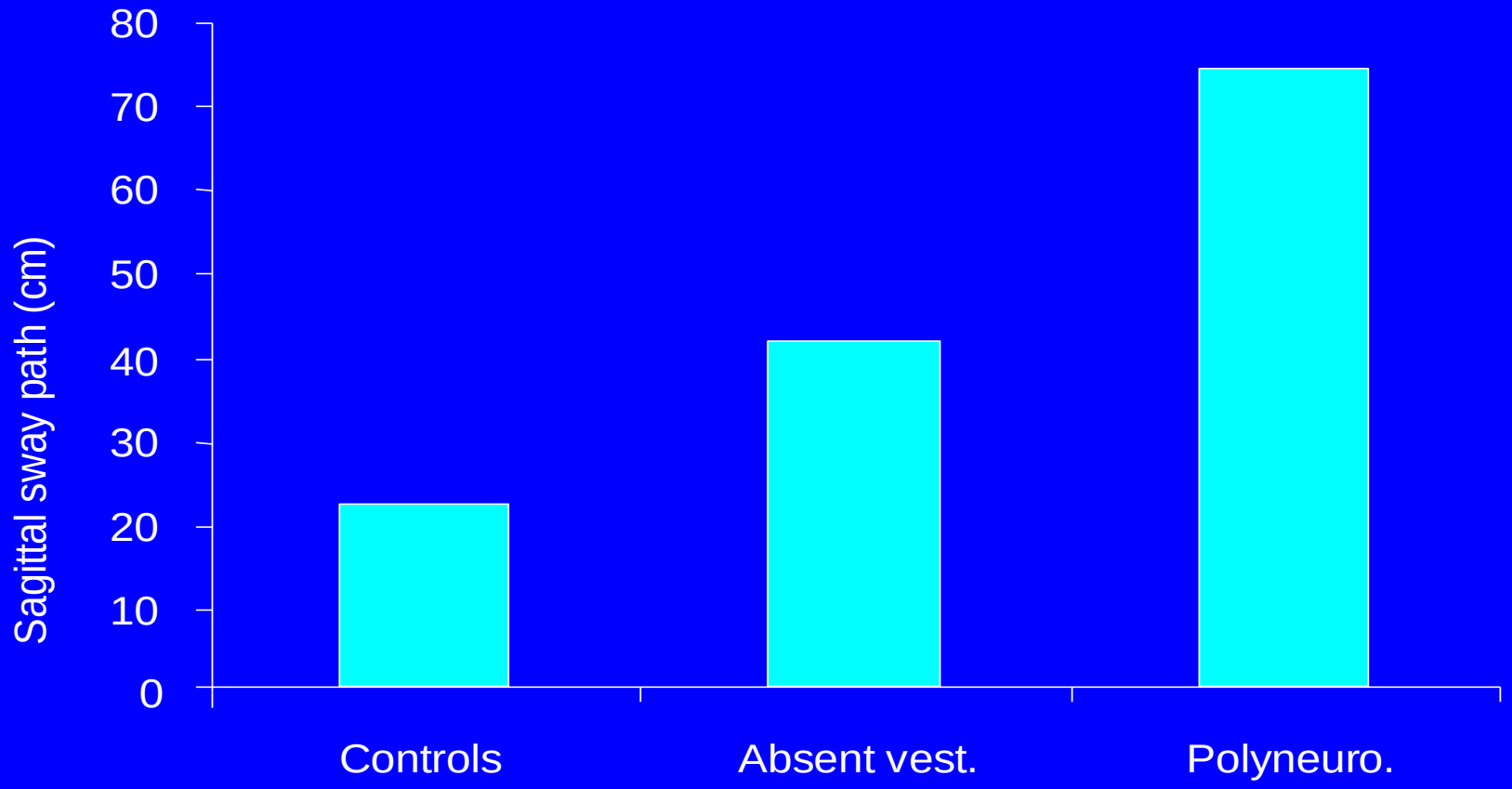
Three inputs:

- Vestibular
- Visual
- Proprioceptive
- (+ cognition)

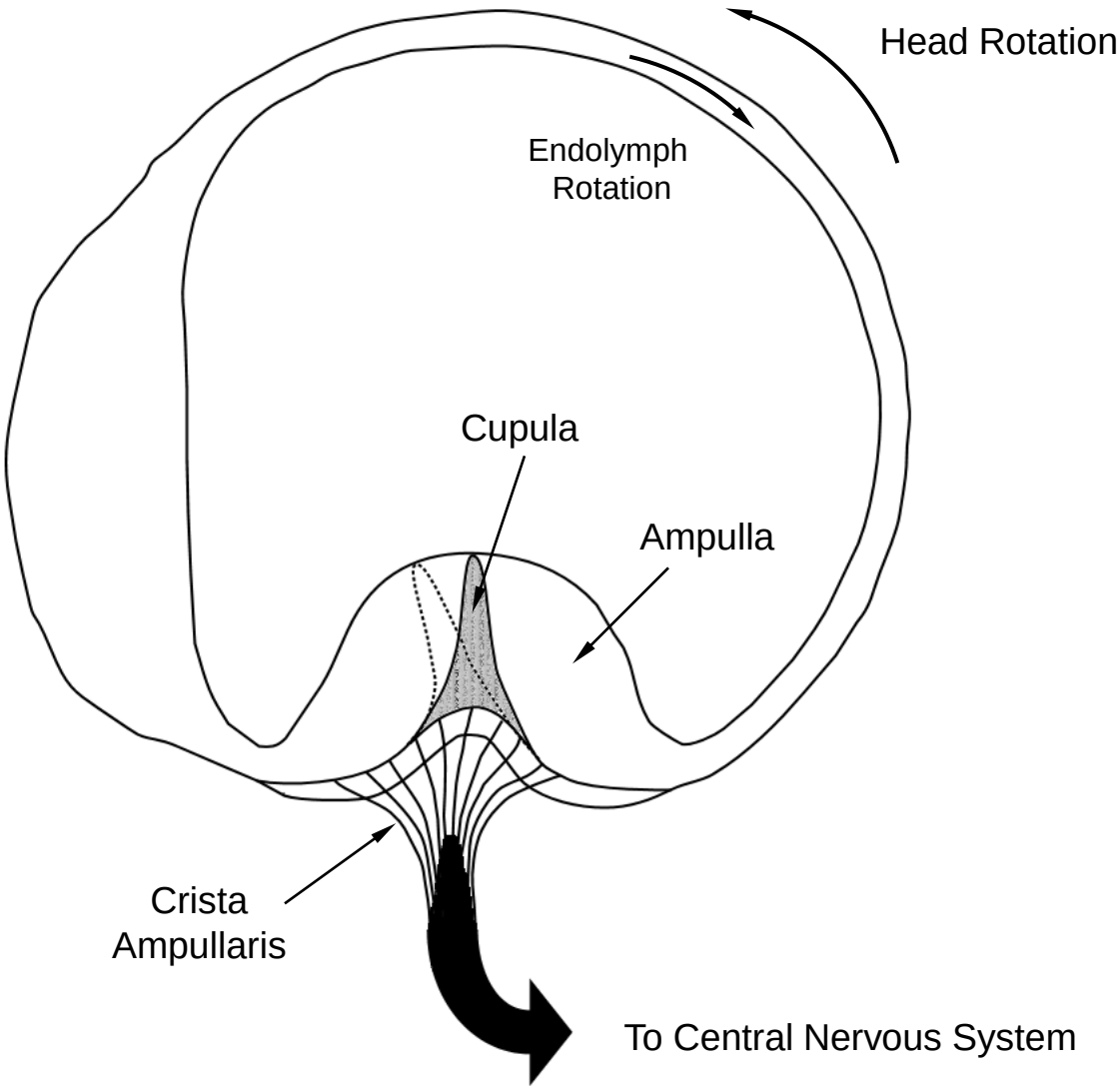
Four outputs:

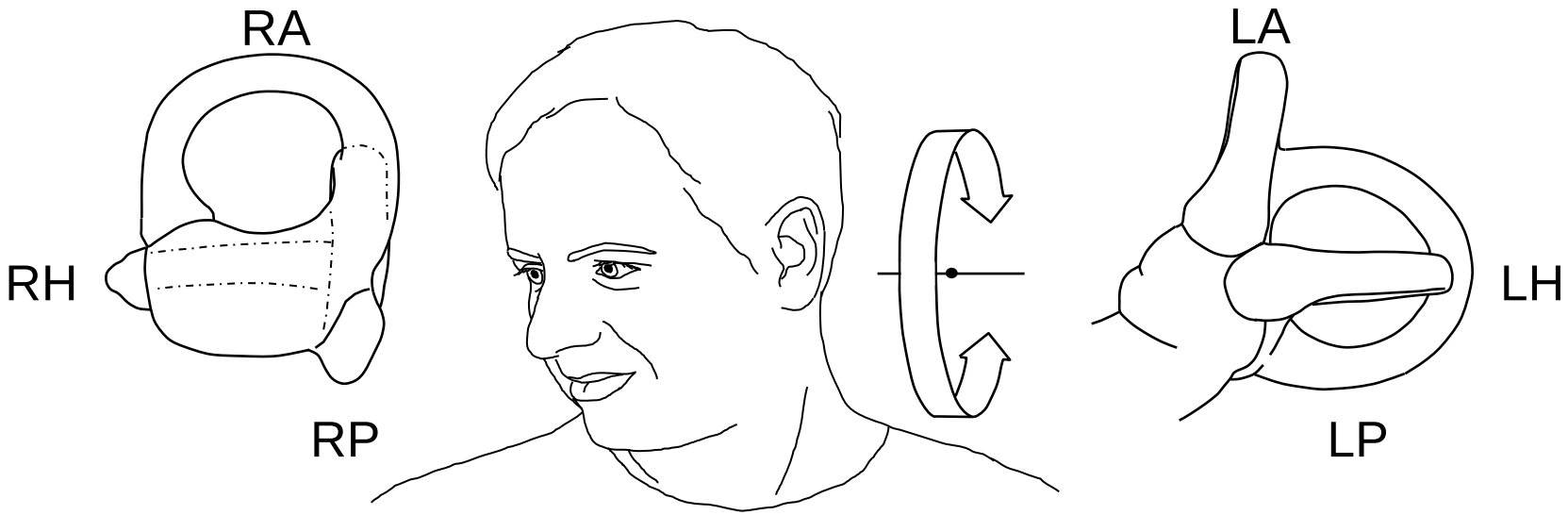
- Conscious perception
- Eye movements
- Body movements
- Autonomic (visceral)

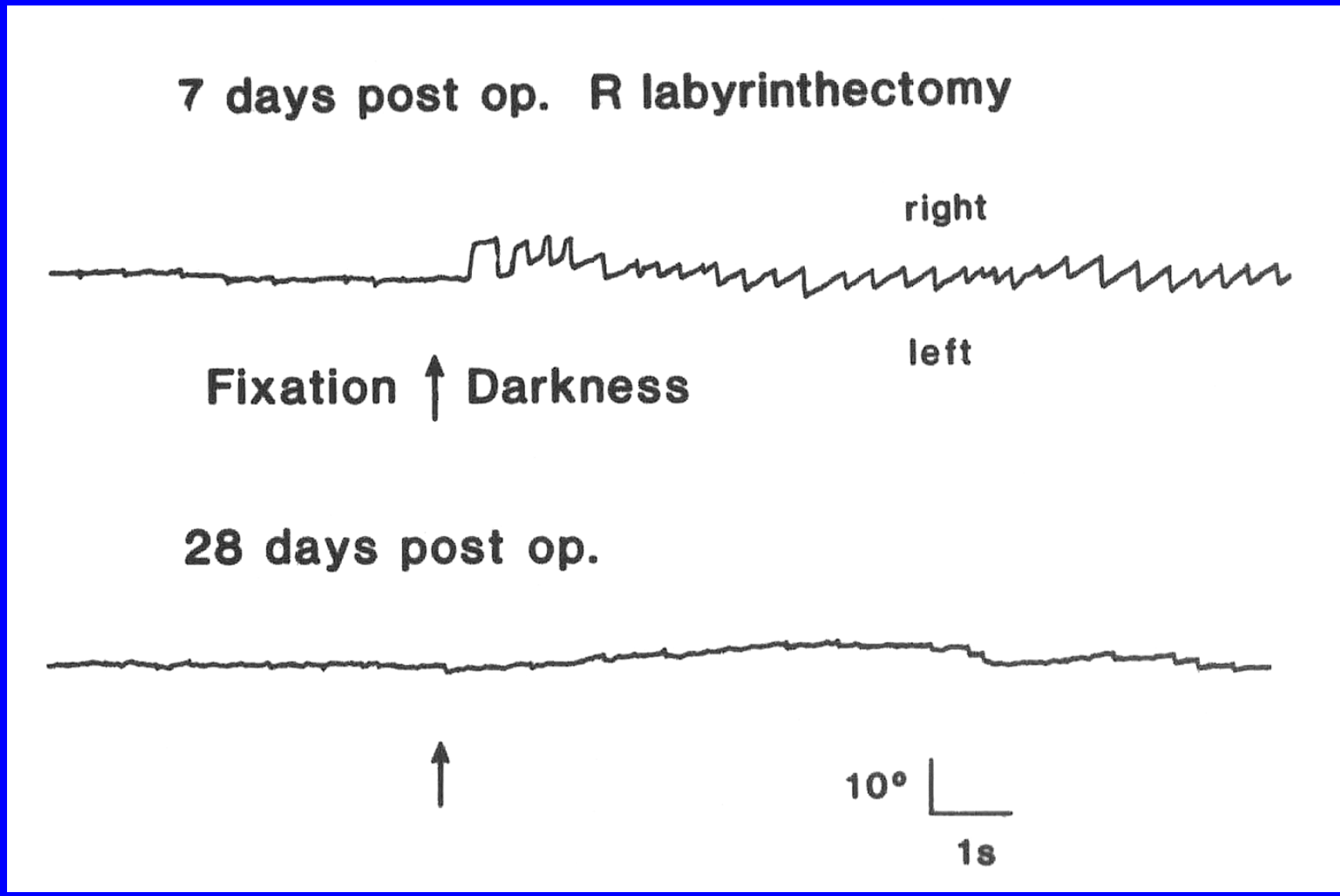
Sway in vestibular and proprioceptive loss with eyes open



VESTIBULO-OCULAR REFLEXES (VOR)

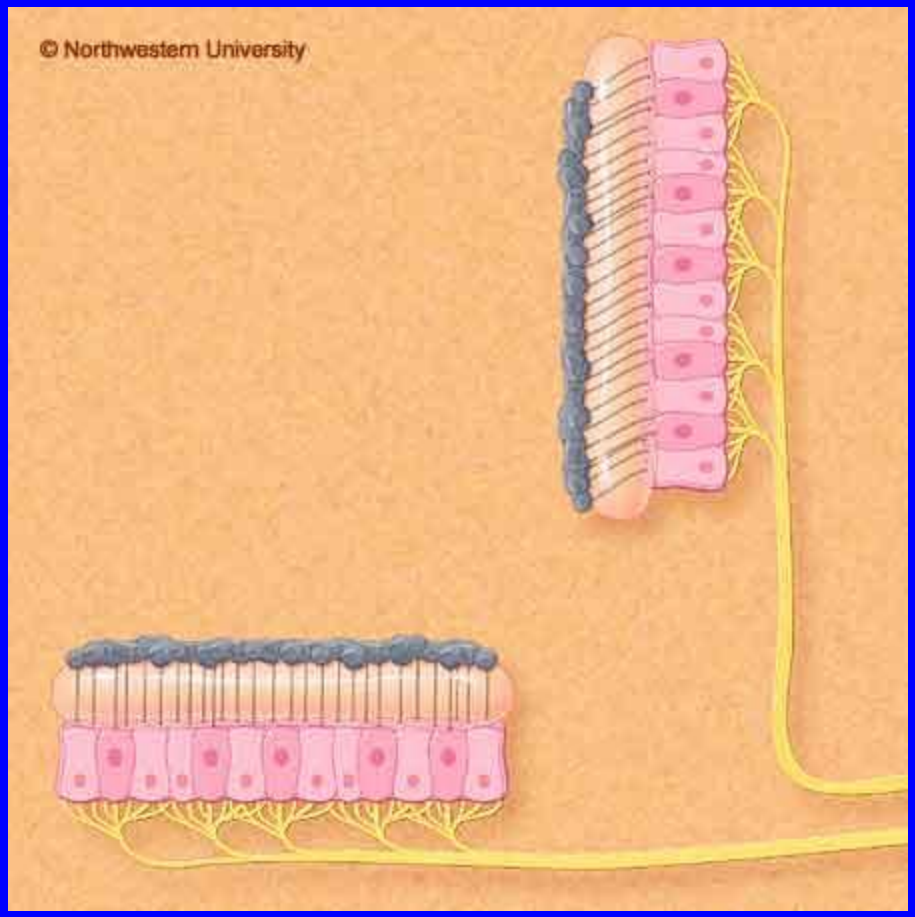

Head Rotation
Endolymph
Rotation
Cupula
Ampulla
Crista
Ampullaris
To Central Nervous System


RA
RH
RP
LA
LH
LP


7 days post op. R labyrinthectomy
right
left
Fixation
Darkness
28 days post op.
10°
1s

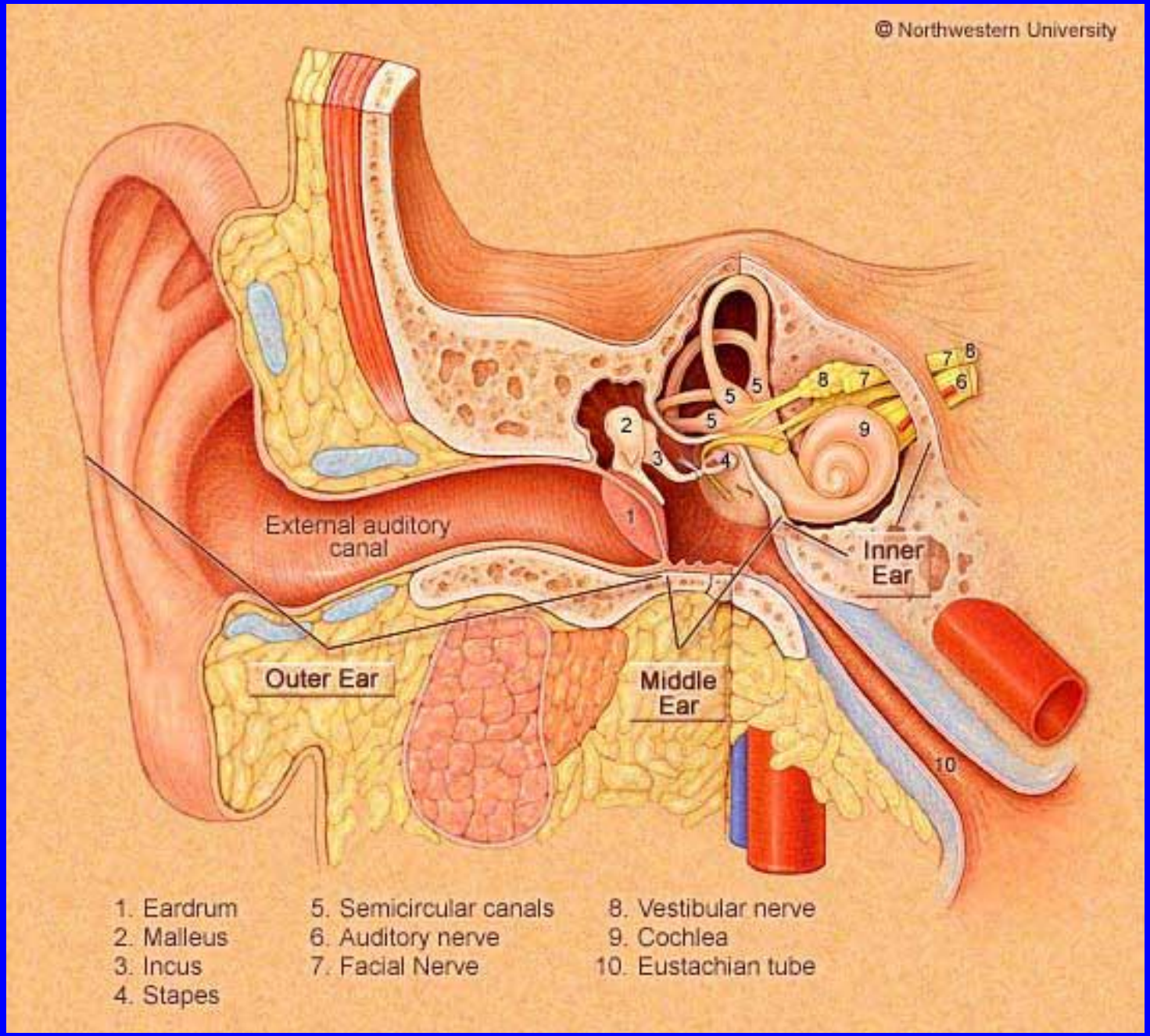
Clinical physiology of the vestibulo-ocular reflex (VOR)

- Vestibular tone
- Lesion induced asymmetry
- Visual suppression of nystagmus
  - VOR suppression
- Vestibular compensation



Utricule

Sacculus


© Northwestern University
External auditory canal
Outer Ear
Middle Ear
Inner Ear
1. Eardrum
2. Malleus
3. Incus
4. Stapes
5. Semicircular canals
6. Auditory nerve
7. Facial Nerve
8. Vestibular nerve
9. Cochlea
10. Eustachian tube

Symptoms

- Vertigo: Illusion of movement
  - usually rotational or ‘true vertigo’
- Dizziness, giddiness: more vague
- Unsteadiness: off balance

Balance disorders: Vertigo and Dizziness

- 1/4 people experienced dizziness at some time
  - 80% severe enough to see a doctor (Kroenke 1992)
- 1/2 experience dizziness in people 75+ years (Downton and Andrews 1990)
- 1/4 referrals to ENT and neurology clinics

Disorders of Balance

- Peripheral vestibular disorders: labyrinth and VIII nerve
  - eg, vestibular neuritis, bppv, Meniere's disease.
- Central vestibular disorders: CNS (brainstem/cerebellum)
  - eg, stroke, MS, tumours

Vestibular Disorders

- **Acute**: Vestibular Neuritis ('labyrinthitis')
  Labyrinthine concussion
- **Intermittent**: Benign Paroxysmal Positional Vertigo (bppv)
- **Recurrent**: Meniere's Disease - rare
  Migraine - common
- **Progressive**: Acoustic Neuroma (8th nerve)

Acute unilateral vestibular lesion

- A syndrome
- Many ethiologies

Clinical physiology of the vestibulo-ocular reflex (VOR)

- Angular acceleration: 3 SCCs
- Linear acceleration: 2 otolith organs
- Ocular, spinal, autonomic and cortical connections

Vestibular projections

- Vestibulo-ocular >>> Nystagmus
- Vestibulo-spinal >>> Unsteadiness
- Vestibulo-autonomic >>> Nausea
- Vestibulo-cortical >>> Vertigo

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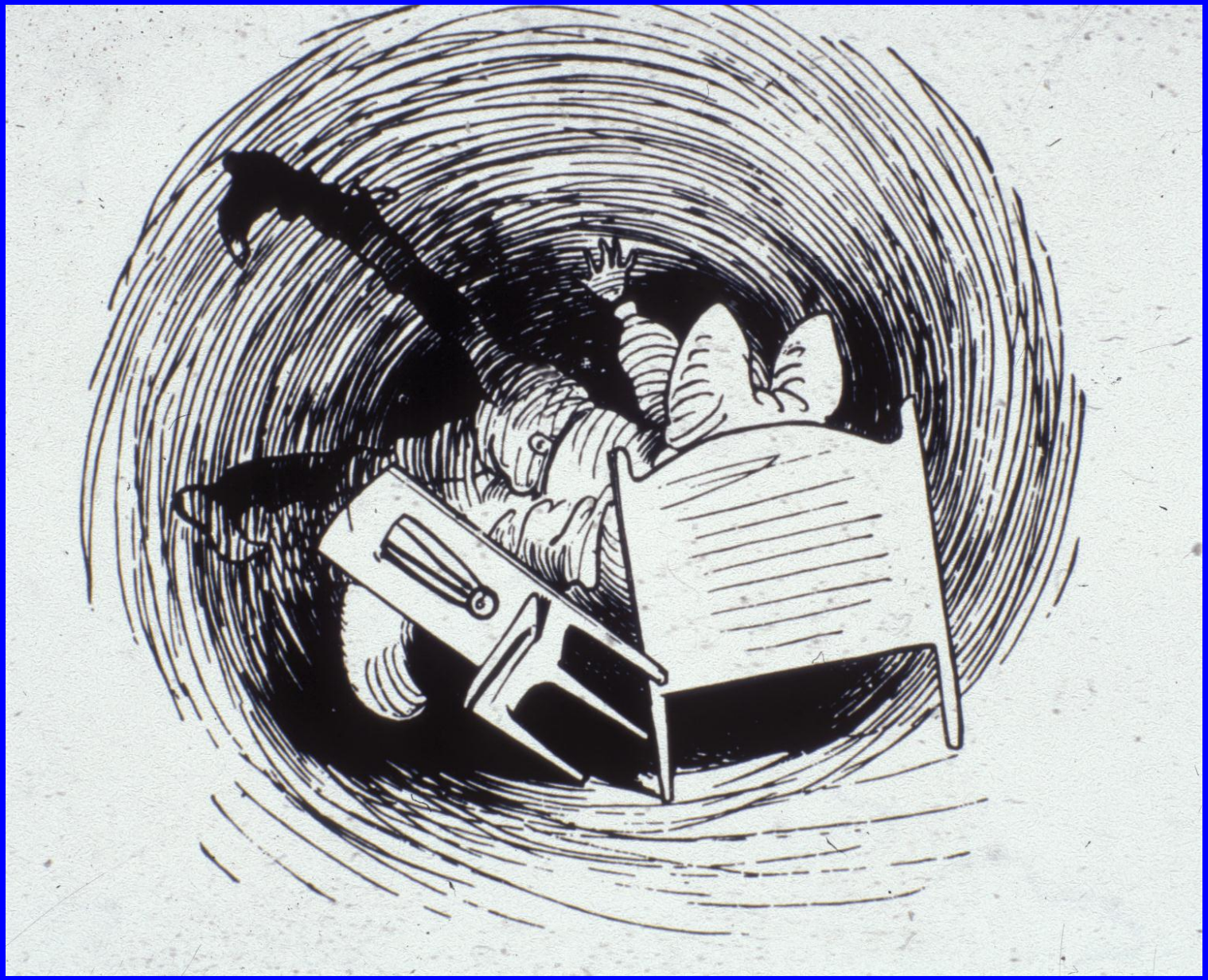
Vestibular neuritis
(= vest neuronitis, viral labyrinthitis)

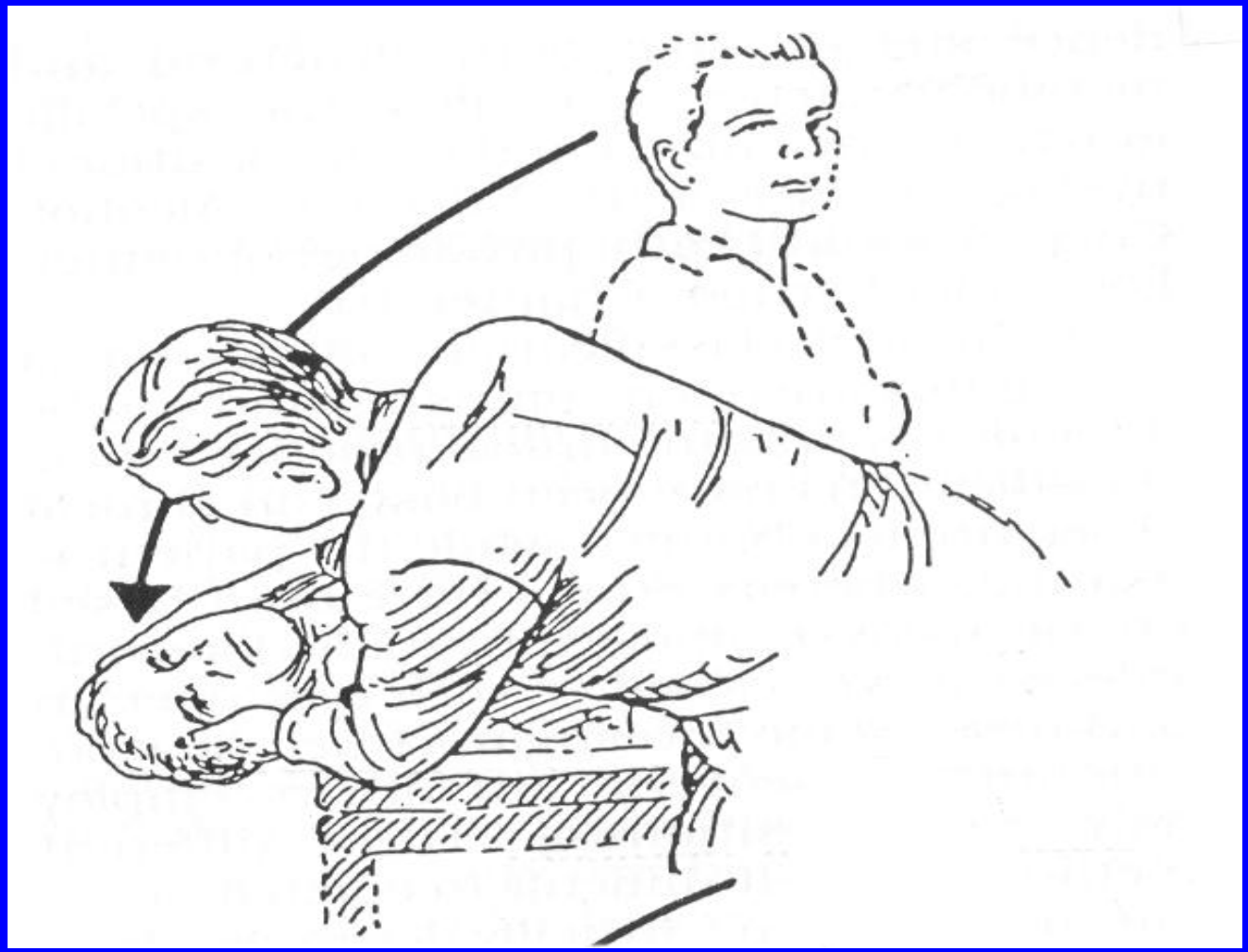
- Sudden, unilateral vestibular loss
  (vertigo, nausea, unsteadiness, nystagmus)
- Hearing spared
- No CNS symptoms or findings
- Viral ‘flavour’: after URTI; mini-epidemics
- Days to weeks

Intermittent vestibular disorder

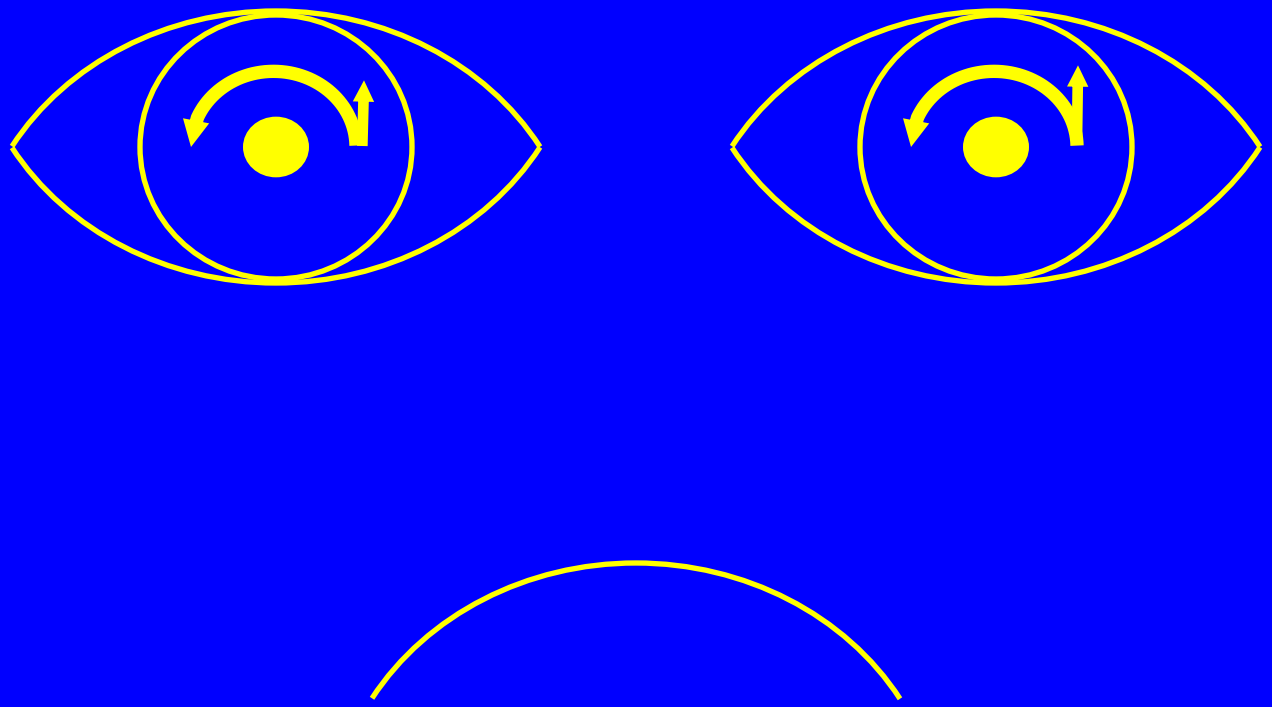
- Benign Paroxysmal Positional Vertigo (BPPV)
- B
- P
- P
- V

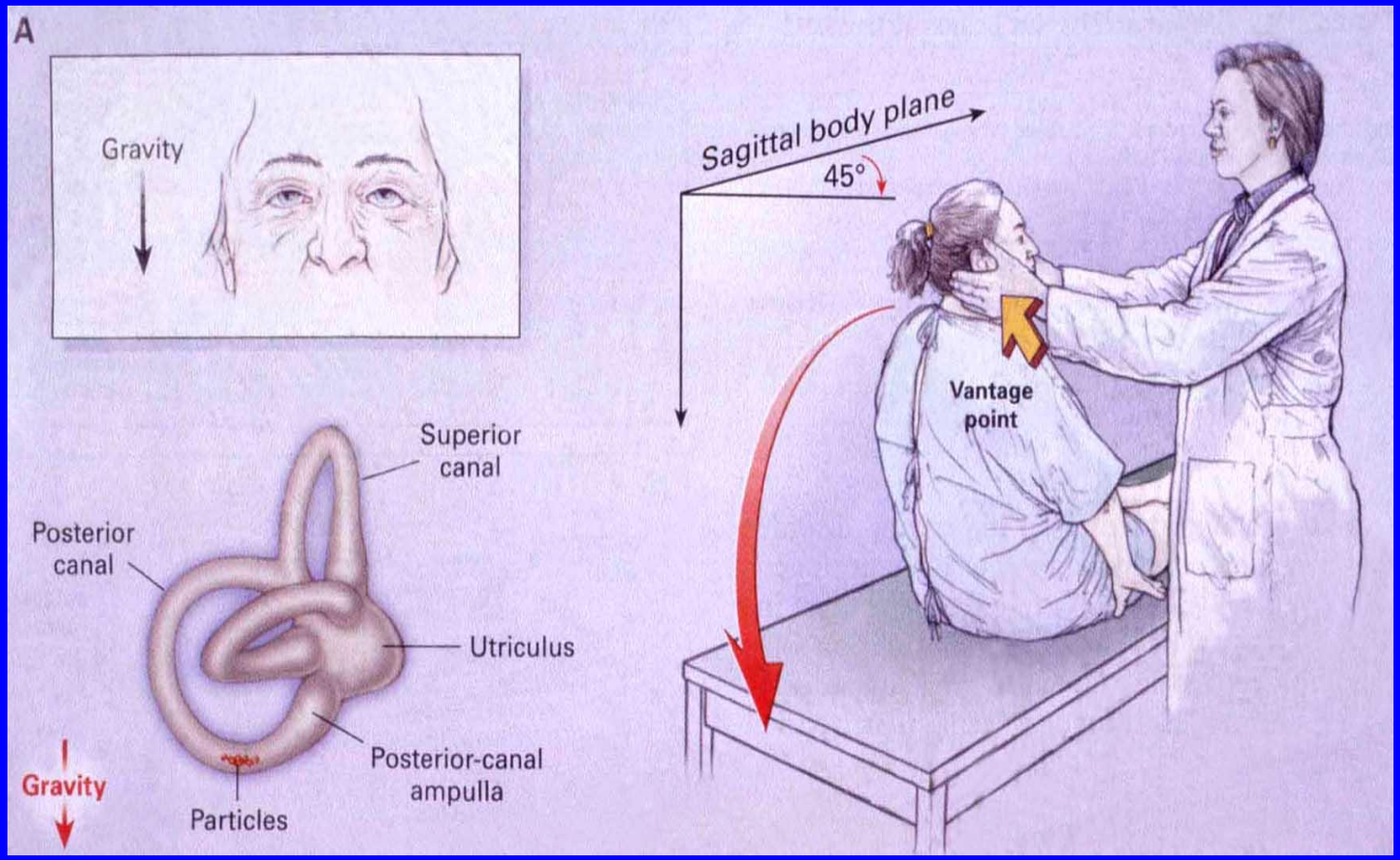


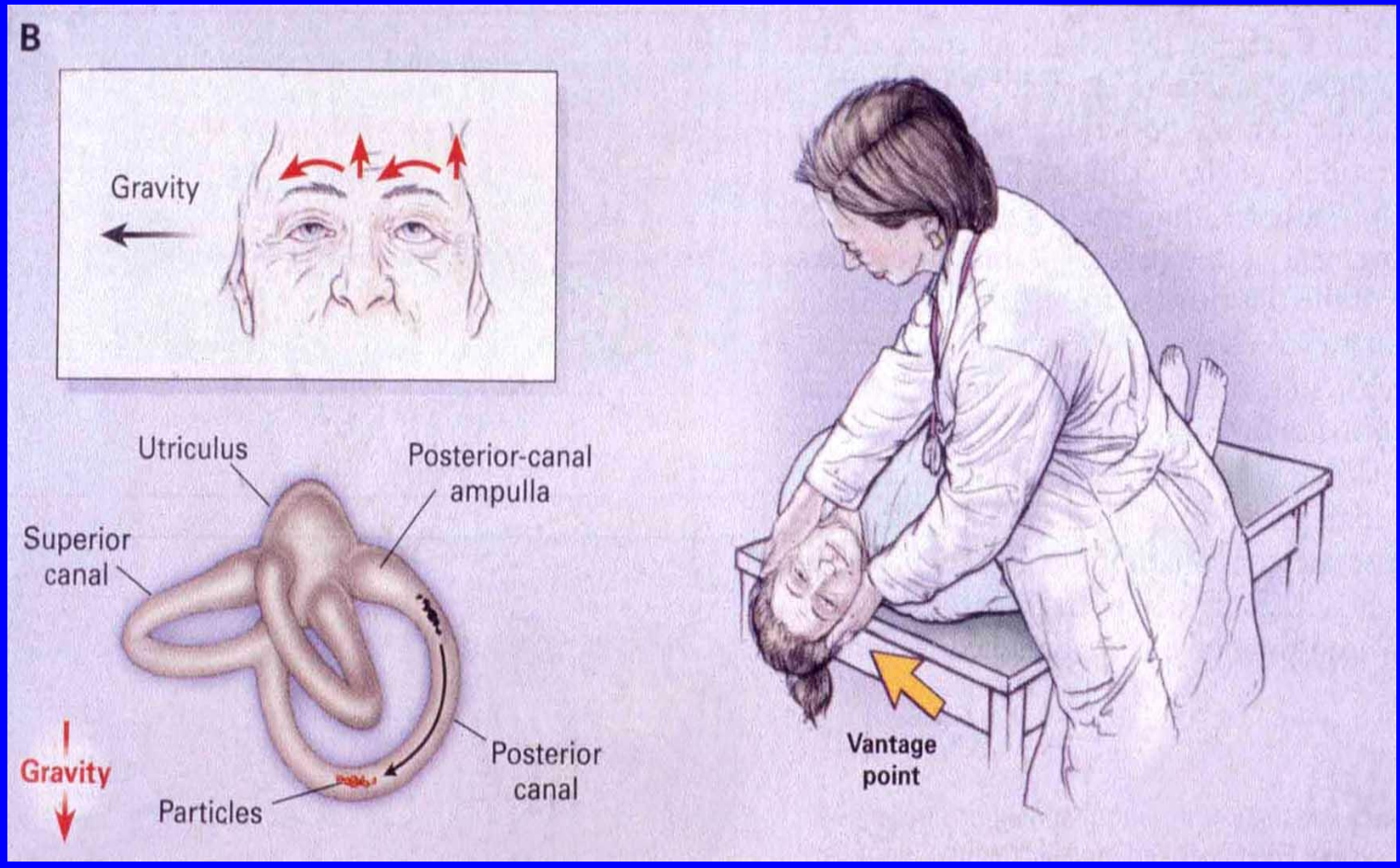
HALLPIKE MANŒUVRE



Nystagmus in right BPPV in the right ear down position




A
Gravity
Superior canal
Posterior canal
Utriculus
Gravity
Posterior-canal ampulla
Particles
Sagittal body plane
45°
Vantage point


B
Gravity
Utriculus
Posterior-canal ampulla
Superior canal
Gravity
Particles
Posterior canal
Vantage point

A

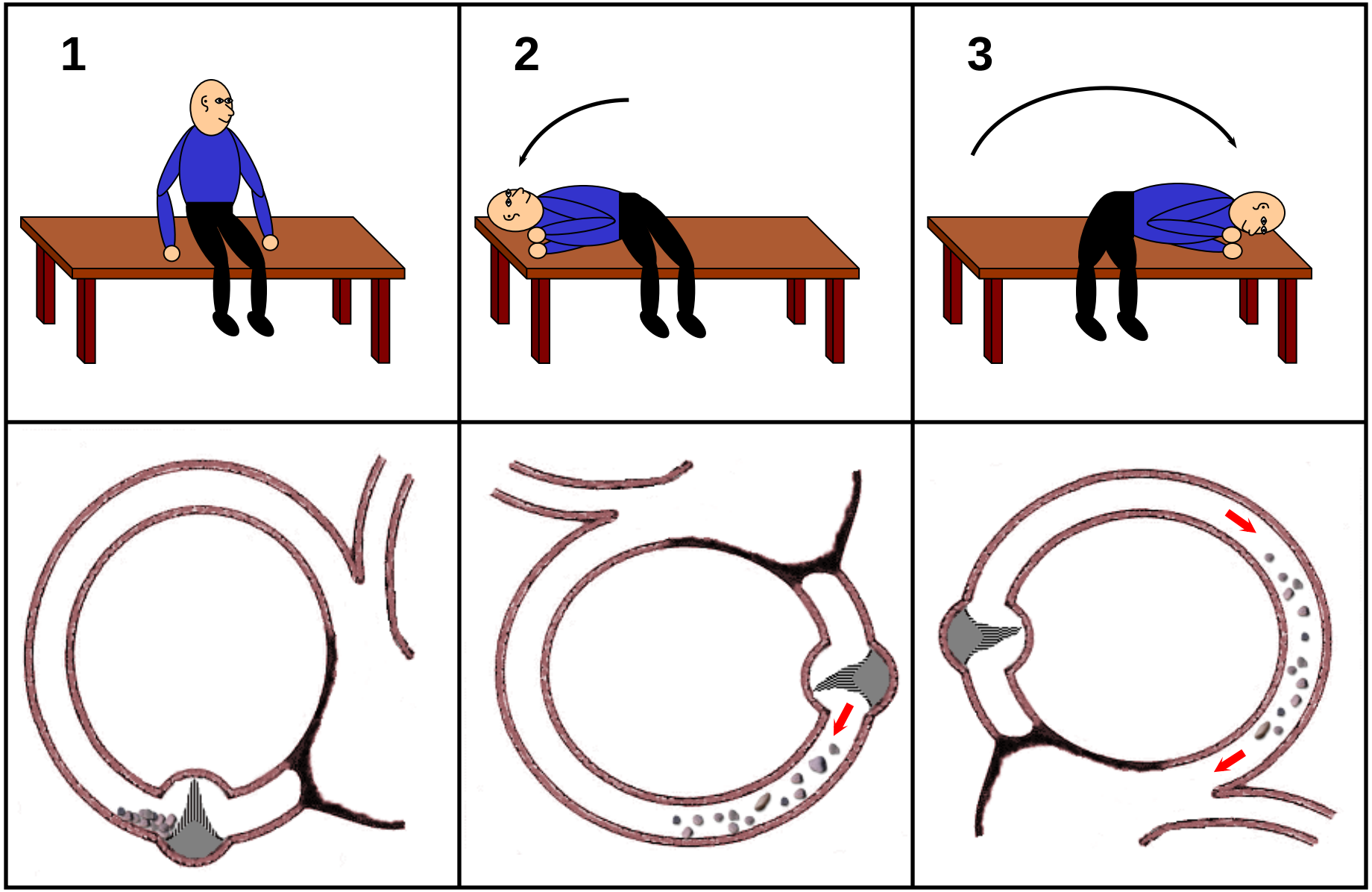
B

B

Conventional Hallpike

Modified Hallpike: useful before Semont treatment – next slide)

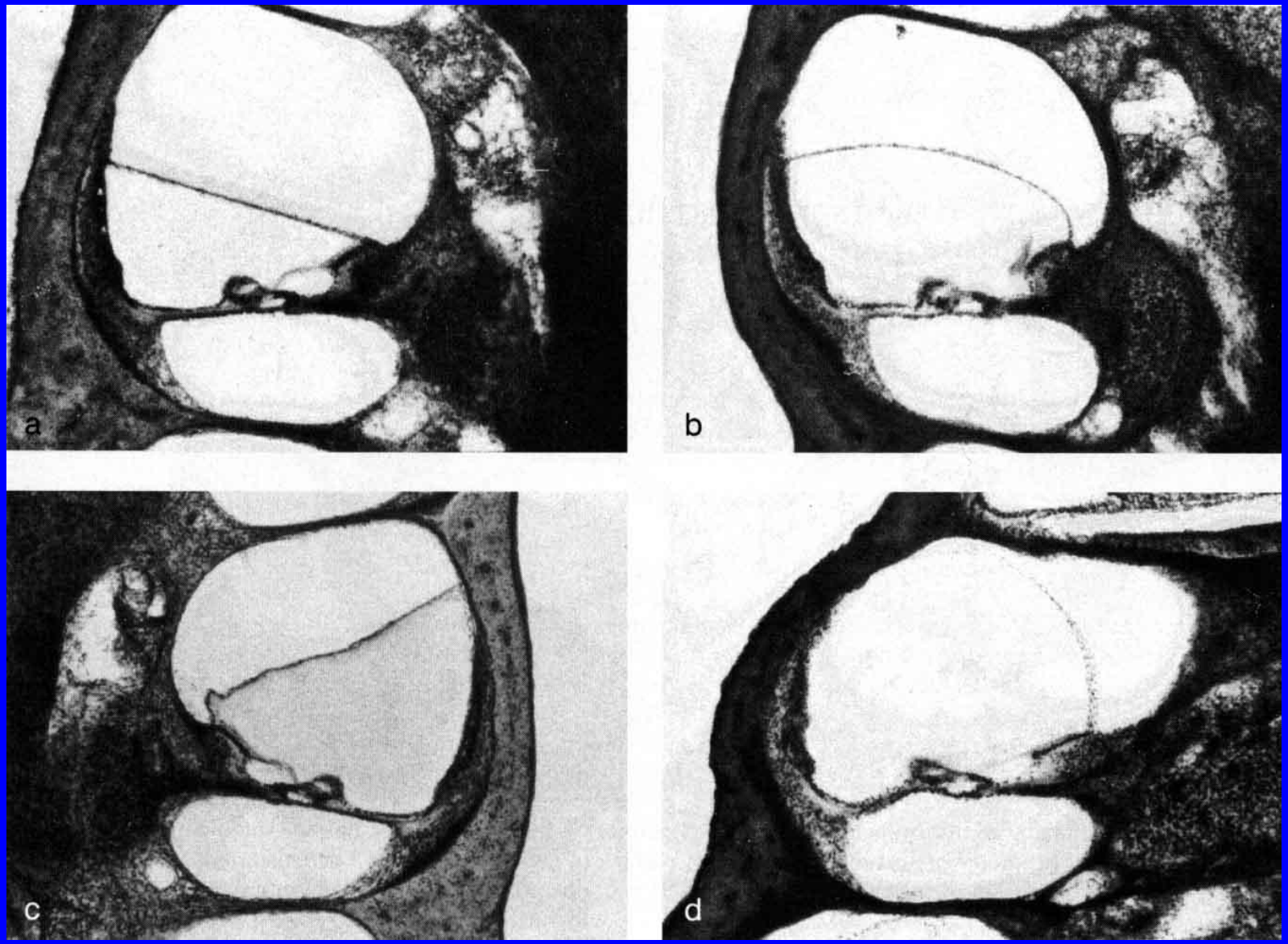
Semont repositioning manoeuvre



Recurrent vestibular disorder

- Meniere's disease:
- Build up of endolymphatic pressure ('hydrops')
- Hearing impaired
  - Meniere's triad: vertigo, tinnitus and deafness

Endolymphatic hydrops (animal model)

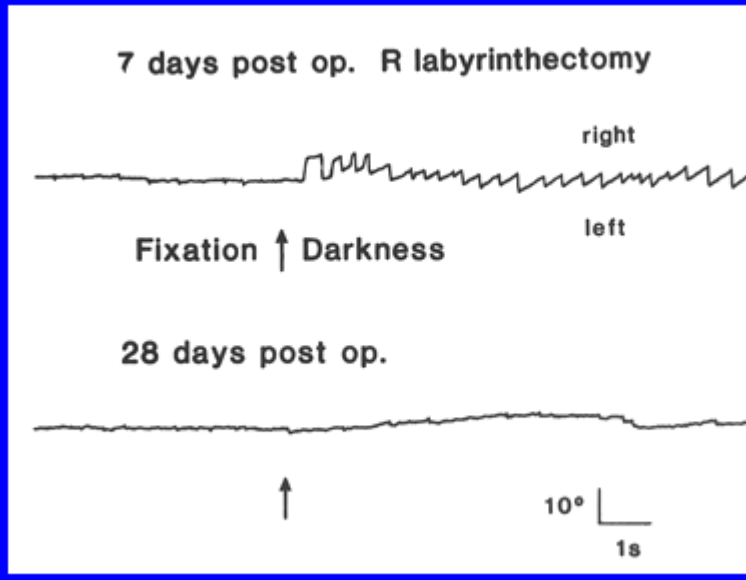


Recurrent vestibular disorder

- Migraine:
- History of migraine
- Migraine symptoms during vertigo attack
- Hearing usually spared
- Response to treatment

‘Chronic’ vestibular disorder

- The ‘DIZZY’ patient
- Many aetiologies
- Anxiety a confounding factor
- Reasons for chronicity:
  - lack of full vestibular compensation
  - inadequate testing
  - idiosyncratic reactions (‘perceptual style’)

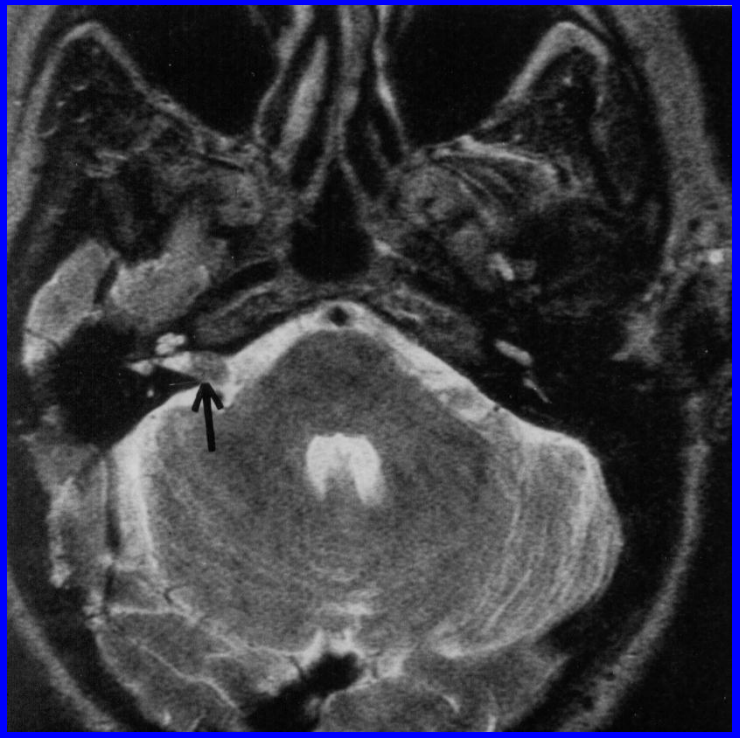


Central Vestibular Disorders
(Brainstem and Cerebellum)

- Acute Brainstem or Cerebellar lesion:
  - eg MS or Vascular
  - Always enquire about brainstem: diplopia, facial numbness, speech
- Chronic/Progressive:
  - Cerebellar Degeneration


ET:16
R
6
6
FSE
TR:3000
TE:108/Ef
EC:1/1 32kHz


ET:16
R
6
6
L
6
3
FSE
TR:3000
TE:108/Ef
Ex:/3865



To ‘v’ or not to ‘v’

NOT ALL ‘DIZZIES’ ARE VESTIBULAR:

* Heart disorders
* Presyncopal episodes
* Orthostatic hypotension
* Anaemia
* Hypoglicemia
* Psychological
* Gait disorders (e.g. Parkinsonian syndromes)