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# Dizziness

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# Dizziness: General

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- Common complaint
- Open-ended questions
- Categorize
  - » Dysequilibrium - Unsteady
  - » Lightheaded - As if you might pass out
  - » Vertigo - Sensation of movement

# Dizziness: Differential

## Vertigo

### Peripheral

- Physiologic
- Benign positional vertigo
- Vestibular neuronitis
- Recurrent vestibulopathy
- Meniere's
- Labyrinthine trauma
- Labyrinthine infarct
- C-P angle tumor
- Otosclerosis
- Herpes zoster oticus
- Cholesteatoma
- Perilymph fistula
- Aminoglycoside ototoxicity

### Central

- Vertebrobasilar TIA
- Cerebellar stroke
- Brainstem stroke
- Subarachnoid hemorrhage
- Basilar migraine
- Posterior fossa mass
- Demyelinating disease
- Hyperventilation
- Vertiginous epilepsy

## Dysequilibrium

### Abnormal sensory input

- Visual loss or distortion
- Vestibular/cochlear
- Peripheral neuropathy
- Spinal cord disease

### Abnormal central integration

- Dementia
- Degenerative disease
- Metabolic encephalopathy
- Drug effects
- Space occupying lesions
- Temporal lobe epilepsy
- Postconcussive syndrome
- Vascular etiology
- Somatization disorder
- Panic attack
- Hyperventilation syndrome

### Abnormal motor response

- Pyramidal tract disease
- Extrapyramidal disease
- Cerebellar disease
- Spinal cord disease
- Peripheral neuropathy

## Lightheaded

### Vasovagal

- Orthostatic hypotension
- Cardiopulmonary
- CHF
- Arrhythmia
- Valvular stenosis
- Subaortic stenosis(IHSS)
- Angina equivalent
- Tamponade
- Anemia/blood loss
- Atrial myxoma
- Pulmonary embolism
- Pulmonary hypertension
- Hyperventilation syndrome
- Psychiatric
- Somatization disorder
- Panic attack
- Carotid sinus sensitivity
- Glossopharyngeal neuralgia
- Vertebrobasilar disease
- Subclavian steal syndrome
- Vertebrobasilar TIA
- Systemic mastocytosis
- Hypoglycemia

# Dizziness: Dysequilibrium

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- Unsteadiness

- » Usually standing

- Cause

- » Multifactorial
- » Age
- » Sensory, motor, or central integration

- Treatment

- » Correct cause?
- » Medication review
- » Balance exercises
- » Walking aid

# Dizziness: Lightheaded

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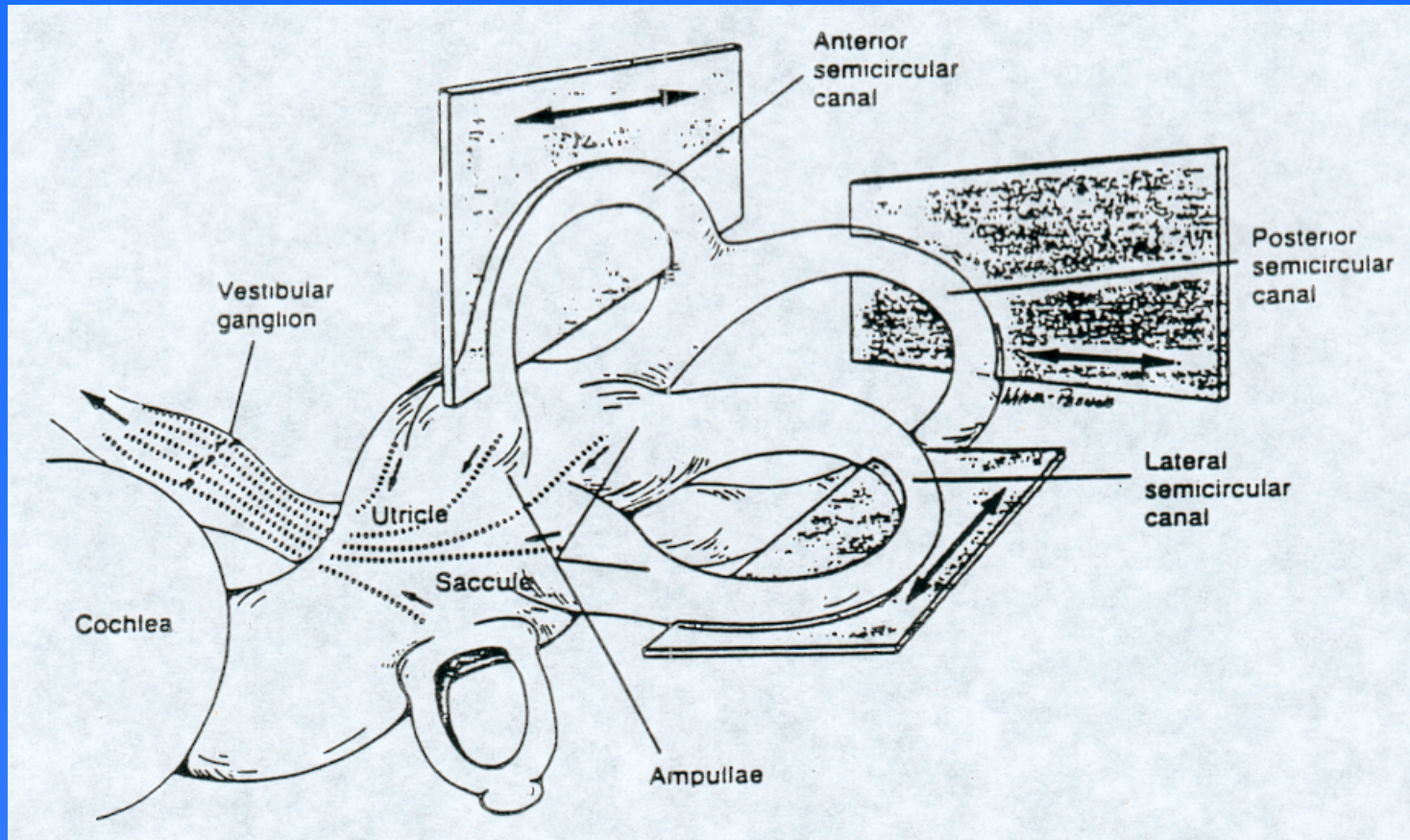
- Many of the causes result in low cerebral blood flow (presyncope)
- Cause
  - » Cardiopulmonary
  - » Hypoglycemia
  - » Psychiatric
  - » Cerebrovascular insufficiency
- Assoc. symptoms
  - » SOB
  - » Chest pain
  - » Tingling
  - » Tunnel vision
  - » Diaphoresis
  - » Pale color
  - » Gen weakness
  - » Nausea

# Dizziness: Vertigo

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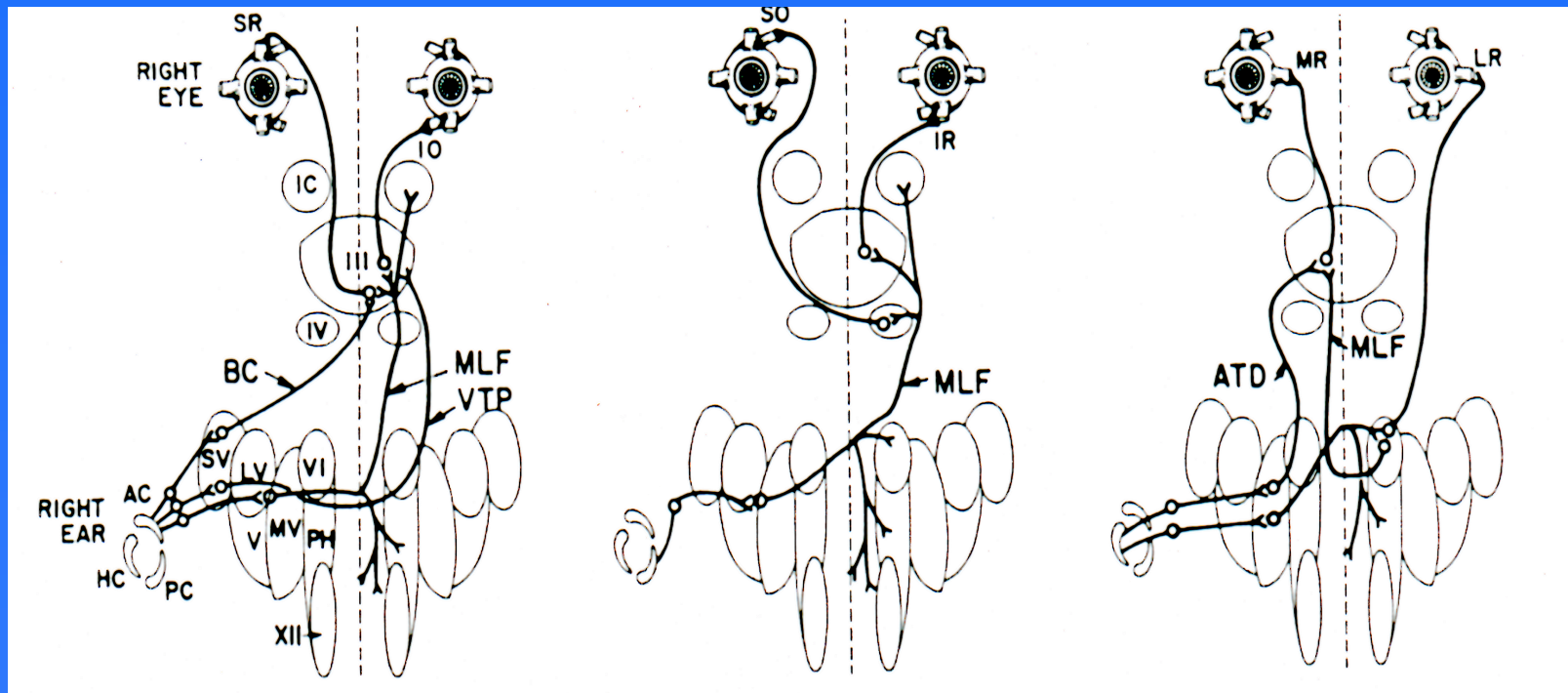
- Spinning
- Vestibular system
  - » Nystagmus
  - » Constant vs positional
  - » Central vs peripheral
- Work-up
  - » Exam
  - » Electronystagmogram
  - » MRI
- Treatment
  - » Drugs
    - Benzodiazepine
    - Scopolamine
    - Other
  - » Repositioning
  - » Surgery

# Semicircular Canals



# Vestibulo-ocular System

## Excitatory projections by canal



Anterior

Posterior

Horizontal



# Dizziness: Vertigo

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- Spinning
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    - Other
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  - » Surgery

# Dizziness: Vertigo

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	<u>Constant</u>	<u>Positional</u>
Duration	>15 mins.	< 2 mins.
Movement	Worse	Worse

# Dizziness: Vertigo

	<u>Peripheral</u>	<u>Central</u>
Nystagmus	Uni-directional (Horiz, horiz/rot, vert/rot)	Uni- or multi-directional
Vertical only	No	Yes
Rotational only	No	Yes
Assym of eyes	No	Yes
Pendular	No	Yes
N/V	Yes	Yes
Central features	No	Yes
Tinnitus/hearing	Sometimes	Unusual
Fixation	Inhibits nystag	No change
Head thrust	Correction (ipsilateral)	No correction usually

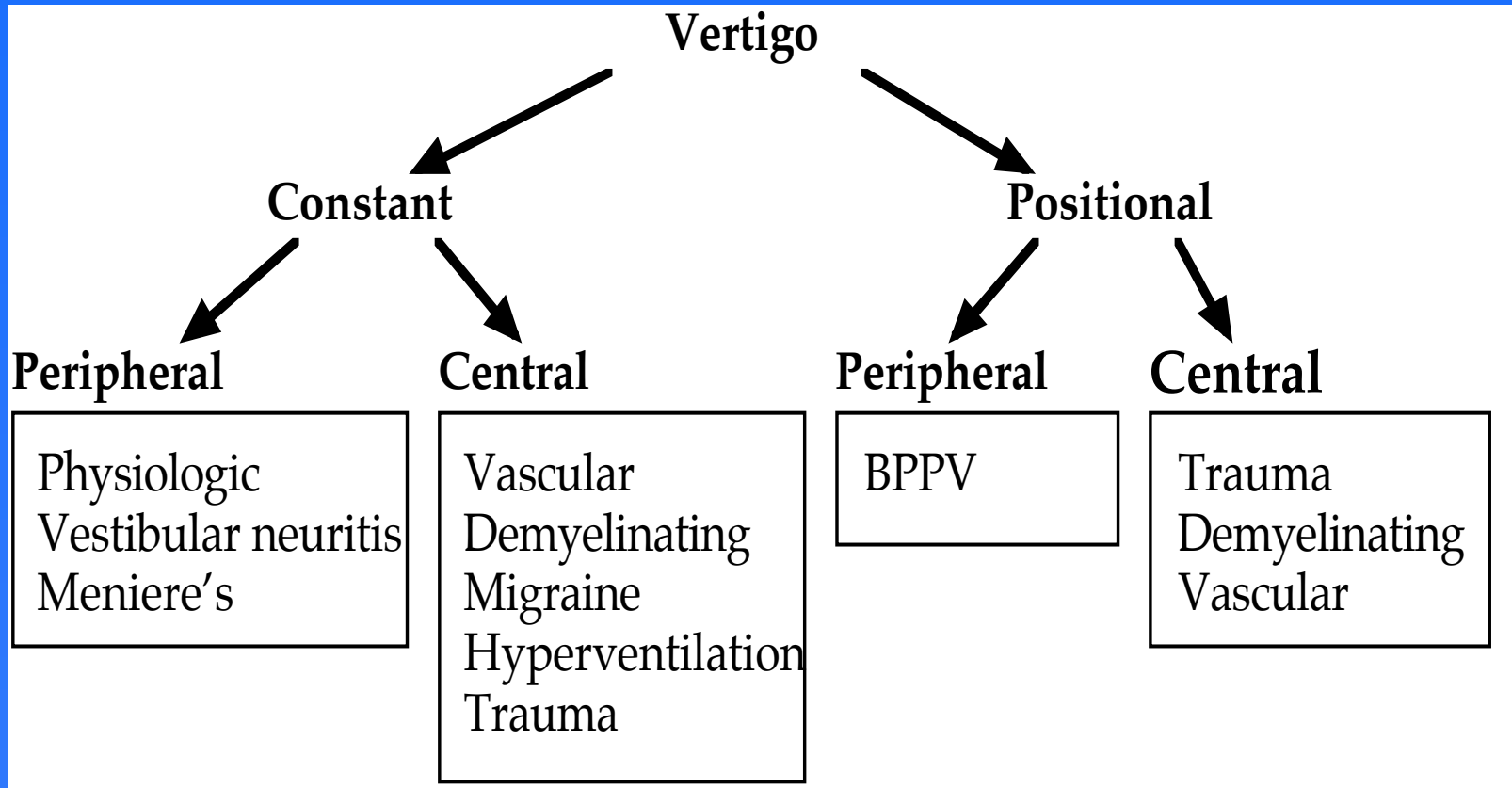
# Head Thrust

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## Head Thrust Video

<http://www.youtube.com/watch?v=BmNCEhN61gM&feature=related>

# Flow Chart



# Dizziness: Vertigo

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- Spinning
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  - » MRI
- Treatment
  - » Drugs
    - Benzodiazepine
    - Scopolamine
    - Other
  - » Repositioning
  - » Surgery

# Case

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A 27 year-old male complains of dizziness starting 3 hours ago that is becoming more severe. He describes spinning. Your exam is remarkable for horizontal nystagmus to the right no matter which way he looks. There are no other findings.

- A. Vestibular neuritis
- B. Benign positional vertigo
- C. Meniere's disease
- D. Central vertigo (e.g. stroke, MS)

# Acute Peripheral Vestibulopathy

- Vestibular neuritis
  - » Without auditory symptoms
- Labyrinthitis
  - » With auditory symptoms
- Clinical
  - » Sudden onset
  - » Constant
  - » Unidirectional nystag
  - » Fixation helps
  - » Days to weeks
- Viral?
  - » Valacyclovir\* not helpful
- Treatment
  - » Steroids\* acutely
    - Prednisone 120mg qd with 3 wk taper
  - » Valium
  - » Scopolamine
  - » Anti-emetics

\*Strupp, et. al. NEJM 2004;351:354



# Case

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A 67 year-old female complains of recurrent spinning that lasts 2-12 hours. She also has tinnitus and hearing loss in the right ear. Your exam in the office does not reveal nystagmus while she is asymptomatic. There are no other findings.

- A. Vestibular neuritis
- B. Benign positional vertigo
- C. Meniere's disease
- D. Central vertigo (e.g. stroke, MS)

# Meniere Disease

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- Clinical

- » Fluctuating/progressive hearing loss
- » Fluctuating tinnitus
- » Episodic vertigo
  - Minutes to hours
  - May result in baseline dysequilibrium
- » Aural fullness
- » Sudden falls w/o loss of consciousness “Otolithic catastrophe of Tumarkin”
- » Unilateral usually. Bilateral 20-40%

# Meniere Disease

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- Pathophysiology
  - » Endolymphatic hydrops
  - » Endolymph and perilymph mix
- Audiogram
  - » Low frequency hearing loss
- ENG
  - » Reduced vestibular response on the affected side
- Imaging
  - » MRI can rule out rare acoustic neuromas, MS and Chiari malformation

# Meniere Disease

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- Treatment

- » Low salt diet
- » Avoid caffeine, alcohol, nicotine
- » Diuretics
- » Steroids
- » Valium, anti-nausea drugs
- » Surgery (various)

# Case

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A 32 y.o. male feels dizzy several times a day when he moves his head to the left. He describes a spinning sensation that lasts 1 minute with the environment moving from left to right. The exam reveals nystagmus with head maneuvers. There are no other findings.

- A. Vestibular neuritis
- B. Benign positional vertigo
- C. Meniere's disease
- D. Central vertigo (e.g. stroke, MS)

# Benign Positional Vertigo

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- Etiologies

- » Head injury
- » Viral
- » Idiopathic

- Canalolithiasis

- » Calcium deposit in a semicircular canal
- » 90% posterior canal

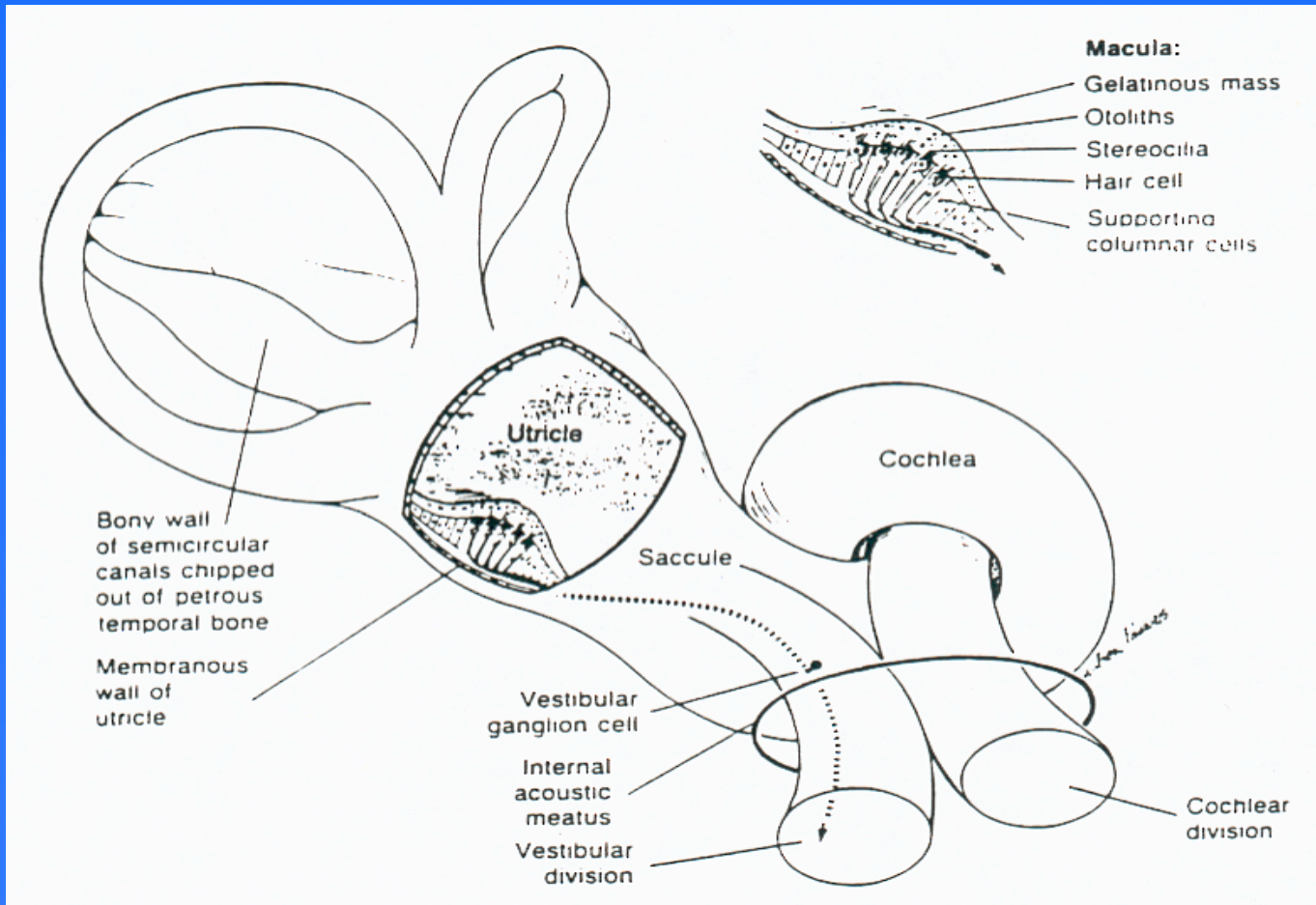
- Clinical

- » Positional nystagmus
- » Hallpike maneuver

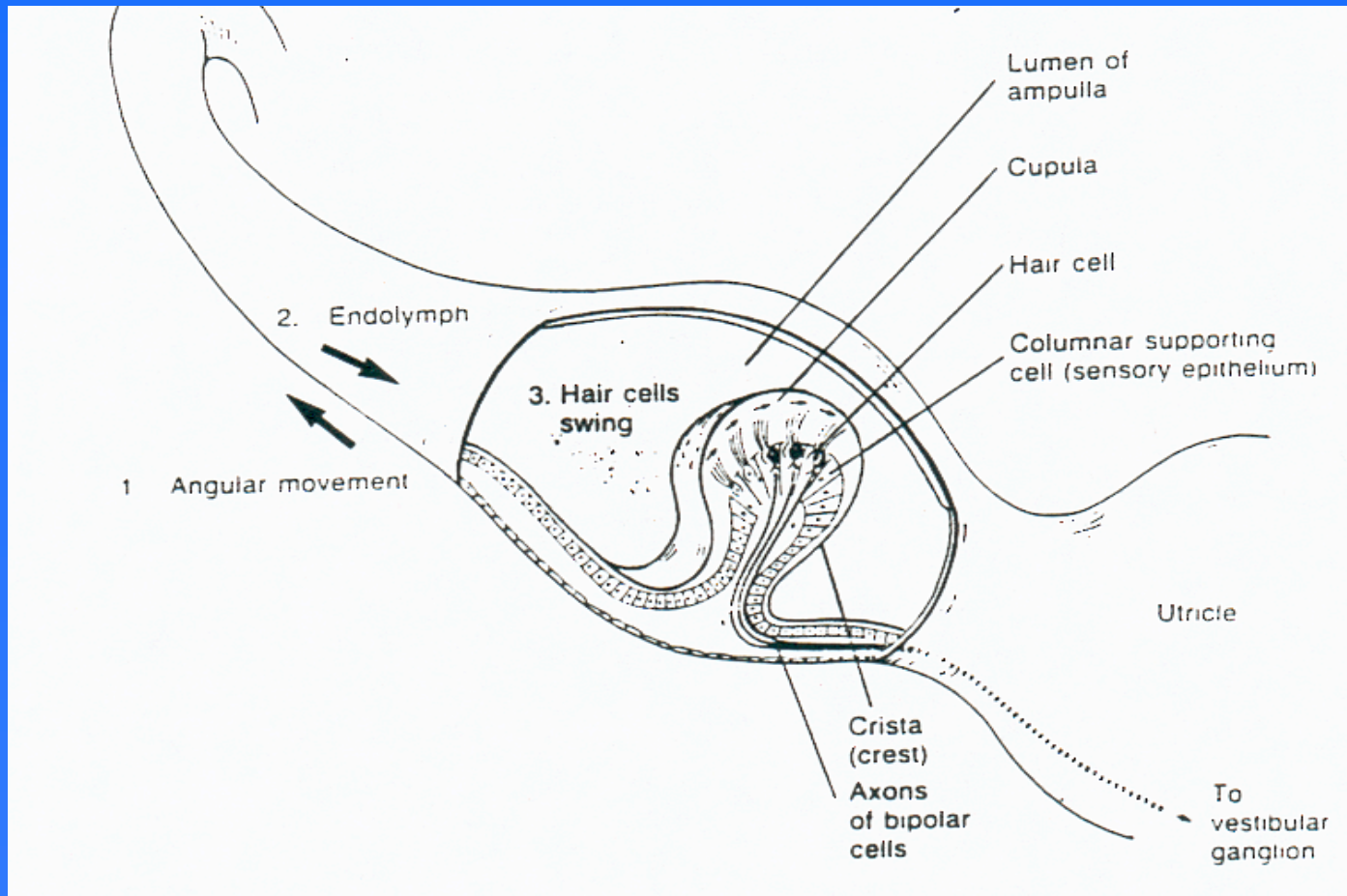
- Treatment

- » Epley maneuver

# Utricle and Otoliths



# Cupula





# BPV: Canal Type

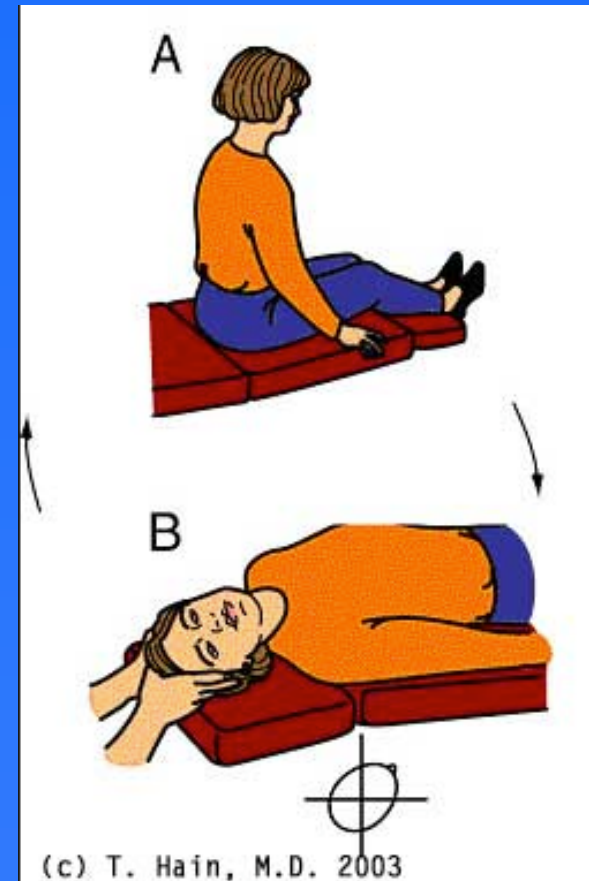
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<u>Canal</u>	<u>Freq</u>	<u>Nystagmus</u>
Posterior	90%	Geotropic <u>torsional</u> upbeat
Horizontal	6%	Horizontal direction changing
Anterior	4%	Ageotropic torsional <u>downbeat</u>

# Hallpike-Dix



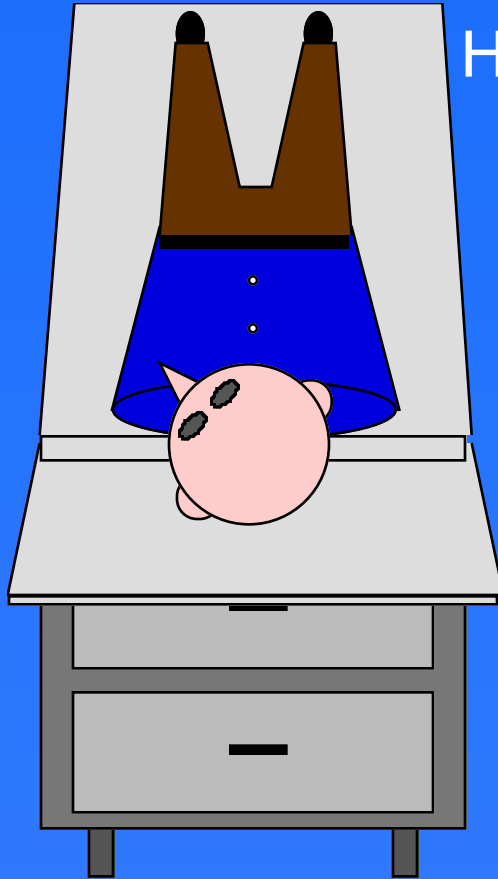
<http://www.phimaimedicine.org/2010/04/471-sign.html>



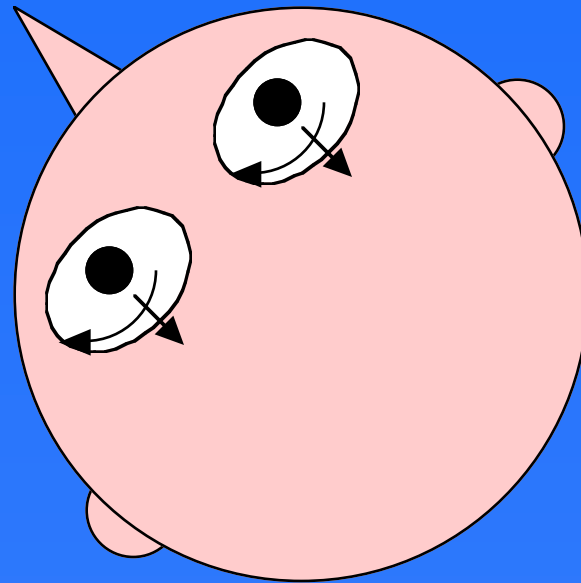
(c) T. Hain, M.D. 2003

<http://www.dizziness-and-balance.com/disorders/bppv/dix%20hallpike.htm>

# Left Posterior Canal BPV



Hallpike maneuver



Nystagmus: Geotropic torsional  
Upbeat

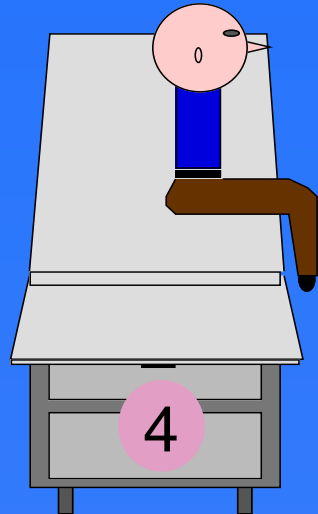
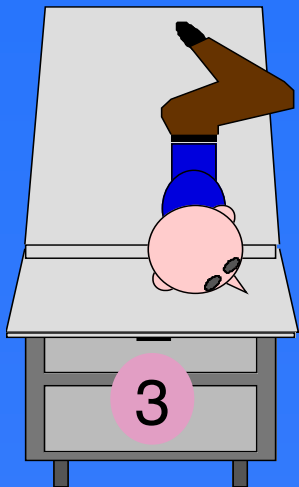
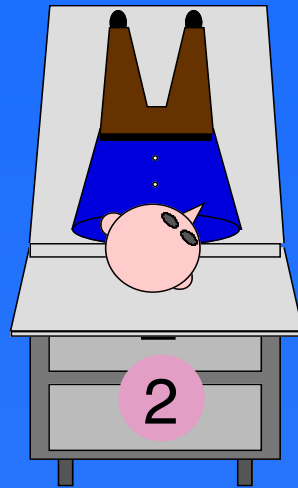
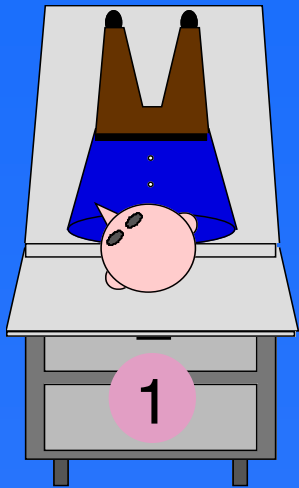
# BPV

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## Right ear BPV

<http://www.youtube.com/watch?v=fBDXQchKapU&feature=related>

# Left Epley



- 4 positions
- 1st position is Hallpike
- 30-60 secs. in each position
- Nystagmus may be seen in any position.
- 80% effective the first time. Repeat if fails.
- Reverse for right ear

# BPV

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## Epley Maneuver

<http://www.youtube.com/watch?v=pa6t-Bpg494>

# Case

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An 82 year-old male presents to the ER by ambulance after sudden onset left hemiparesis, dysarthria, right face numbness, and dizziness. He describes the feeling of falling forwards since onset about 30 minutes ago. Your exam demonstrates upbeat nystagmus in addition to weakness and numbness.

- A. Vestibular neuritis
- B. Benign positional vertigo
- C. Meniere's disease
- D. Central vertigo (e.g. stroke, MS)

# Case

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A 67 year-old male presents to the ER with acute onset dizziness, nausea, and vomiting since onset 30 minutes ago. PMH significant for HTN, DM, ASCVD, and hyperlipidemia. Your exam shows mild horizontal nystagmus to the right only, and inability to walk.

- A. Vestibular neuritis
- B. Benign positional vertigo
- C. Meniere's disease
- D. Central vertigo (e.g. stroke, MS)



# Acute Ischemic Vestibular Syndrome

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## ● Clinical

- » Stroke risk factors
- » Inability to walk
- » Headache
- » Fixation doesn't help
- » Central features
  - \*\*May not be present

## ● Location

- » Brain stem
- » Cerebellum

## ● Brain imaging

- » MRI is best

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END