Dizziness …

- No consensus definition; Imprecise complaint
  - encompasses varied and myriad diagnoses

- Prevalence in adults >65 years old
  - 4-30%
  - Increases 10% for every 5 years of age

- ♂ < ♂

- Consequences of falls in the Elderly!
Pathophysiology of Dizziness

1. Age-related decline in visual acuity in the sensory and motor pathways
   - depends on sensory inputs from vestibular / proprioception / visual
   - deterioration of integration systems w/ the CNS
   - e.g. loss of hair cells in the labyrinth / vibration & touch thresholds decline with age / failure of depth perception / dark adaptation

2. Environmental causes
   - increased use of medications e.g. side effects of dizziness

3. Pathologies – worsening the age-related decline

### Causes of dizziness in different clinical settings

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Patients</td>
<td>532</td>
<td>118</td>
<td>212</td>
<td>319</td>
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<tr>
<td>Average age</td>
<td>68</td>
<td>68</td>
<td>67</td>
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<tr>
<td>Factors</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
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<tr>
<td>Benign positional vertigo</td>
<td>36</td>
<td>12</td>
<td>17</td>
<td>-</td>
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<tr>
<td>Vestibular neuronitis</td>
<td>6</td>
<td>4</td>
<td>16</td>
<td>1</td>
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<tr>
<td>Other vestibular</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
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<tr>
<td>Benign positional vertigo</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td>1</td>
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<tr>
<td>Benign positional vertigo</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Pseudohypertension</td>
<td>1</td>
<td>23</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Photophobia</td>
<td>15</td>
<td>15</td>
<td>19</td>
<td>10</td>
</tr>
</tbody>
</table>

**Vertigo**

- “the sensation of motion when no motion is occurring”
- acute asymmetric provocation of the vestibular system
- “Illusion” of motion
  - “spinning” / “tilting” / “moving”
- **Central vs Peripheral**
  - semicircular canals / otoliths / vestibular nerve (peripheral)
  - vestibular nerve complex / vestibulocerebellum / brainstem / spinal cord / vestibular cortex (central)
  - e.g. BPPV / Meniere’s Disease
  - e.g. Cerebrovascular disease / Acoustic Neuroma

**Vertigo**

- **PERIPHERAL**
  - Benign Positional Vertigo
  - Meniere’s disease
  - Post-traumatic vertigo
  - Viral Neurolabyrinthitis

- **CENTRAL**
  - Brainstem ischemia
  - Multiple sclerosis
  - Posterior fossa tumors
  - Basilar migraine, etc.
Presyncope

- Feeling faintness / lightheadedness
- Cerebrovascular hypoperfusion secondary to cardiovascular problem
- Drop in SBP/DBP – 20/10mmHg
- BUT ... older people usually describe dizziness on standing from a supine position w/o BP changes
- Consider postprandial hypotension – drop in 20mmHg in sitting or standing position within 1-2 hours of eating a meal

Pathophysiology of Pre-Syncope

Cardiovascular Dysfunction
- Arrhythmias
- Sinus Arrest
- Obstructive (aortic stenosis)
- Carotid sinus syncope

Vascular Orthostatic Hypotension
- Drug-induced
- Vaso-vagal syncope
- Volume depletion
- Autonomic insufficiency
Disequilibrium

- Feeling of imbalance / unsteadiness on standing or walking
- Visual or proprioceptive abnormalities with or without vestibular system involvement
- Causes:
  - Visual (refractory errors / cataract / macular degeneration)
  - Proprioceptive (neuropathies)
  - Musculoskeletal (arthritis / muscle weakness / deconditioning)
  - Gait (CVA / PD / cerebellar)

Psychogenic

- Diagnosis of exclusion
- Vague feeling
- Assoc with hx of anxiety or depressive symptoms
- Examples:
  - Hyperventilation
  - Anxiety neurosis
  - Hysterical neurosis
  - Affective disorders

Mixed

- Combination of 2 or more of the above types.
- Most common
- Consider medications
  - Anxiolytics
  - Antidepressants
  - Antihistamines
  - Antihypertensives
  - Angelosomes
  - Anticholinergics
  - NSAIDs

| Clinical feature distinguishing peripheral and central causes of dizziness |
|-------------------------------------------------|-----------------|-----------------|
| Clinical feature                               | Peripheral      | Central         |
| Onset                                          | Sudden          | Gradual         |
| Duration of episodes                           | Seconds to hours, rarely greater than 24 h | Seconds to days |
| Visceral symptoms (nausea, vomiting, diarrhea) | Yes             | Rarely          |
| Auditory symptoms (hearing loss, tinnitus,ural fullness) | Often | Rarely |
| Neurologic symptoms                            | Rarely          | Often           |
| Nystagmus                                       |                |                 |
| Direction                                       | Horizontal and torsional, never vertical | Horizontal, torsional, vertical, and direction changing |
| Fatigable                                       | Yes             | No              |
| Onset                                          | Delayed         | Immediate       |
| Decreases with visual fixation                 | Yes             | No              |

History ... History ... History!

- Describe the sensation of dizziness
- Timing / Triggers / Progression of symptoms
- Frequency / Duration
- “True” Vertigo?
  - Limit / Narrow potential Dx
  - Limit / Narrow work-up
- Distinguish between central and peripheral

### Symptoms of Dizziness

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysequilibrium: imbalance or unsteadiness</td>
<td>Loss of vestibular, proprioceptive, visual,</td>
</tr>
<tr>
<td>while standing or walking</td>
<td>motor function, joint pain or instability,</td>
</tr>
<tr>
<td></td>
<td>and psychological factors</td>
</tr>
<tr>
<td>Light-headedness or syncope</td>
<td>Decreased blood flow to the brain</td>
</tr>
<tr>
<td>Sense of rocking or swaying as if on a ship</td>
<td>Vestibular system adapts to continuous, passive</td>
</tr>
<tr>
<td>(mal de débarquement)</td>
<td>motion and must readapt once environment is</td>
</tr>
<tr>
<td></td>
<td>stable: Anxiety</td>
</tr>
<tr>
<td>Motion sickness</td>
<td>Visual-vestibular mismatch</td>
</tr>
<tr>
<td>Nausea and vomiting</td>
<td>Simulation of malaise</td>
</tr>
<tr>
<td>Oscillopsia: illusion of visual motion</td>
<td>Head-induced: severe, bilateral loss of the VOR</td>
</tr>
<tr>
<td></td>
<td>Anxiety, depression, and somatoform disorders</td>
</tr>
<tr>
<td>Floating, swimming, rocking, and spinning</td>
<td>Skew deviation</td>
</tr>
<tr>
<td>inside of head (psychologically induced)</td>
<td>Instability of tonic neural activity to vestibular</td>
</tr>
<tr>
<td>Vertical diplopia</td>
<td>cerebral cortex</td>
</tr>
<tr>
<td>Vertigo: rotation, linear movement, or tilt</td>
<td></td>
</tr>
</tbody>
</table>

### Timing / Onset of Dizziness

<table>
<thead>
<tr>
<th>Onset</th>
<th>Potential Diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute</td>
<td>- Vestibular Neuritis</td>
</tr>
<tr>
<td></td>
<td>- Labyrinthitis</td>
</tr>
<tr>
<td></td>
<td>- Central medullary syndrome (PICA)</td>
</tr>
<tr>
<td>Intermittent: Seconds</td>
<td>- BPPV</td>
</tr>
<tr>
<td></td>
<td>- TIA’s e.g. vertebrobasilar insufficiency</td>
</tr>
<tr>
<td></td>
<td>- Menière’s Disease</td>
</tr>
<tr>
<td></td>
<td>- Orthostatic Hypotension</td>
</tr>
<tr>
<td></td>
<td>- Migraine</td>
</tr>
<tr>
<td></td>
<td>- Motion sickness</td>
</tr>
<tr>
<td></td>
<td>- Panic attacks</td>
</tr>
<tr>
<td>Chronic Dizziness</td>
<td>- Anxiety / Depression</td>
</tr>
<tr>
<td></td>
<td>- Bilateral vestibular deficit</td>
</tr>
<tr>
<td></td>
<td>- Otolgia</td>
</tr>
</tbody>
</table>
### History...

- Associated symptoms
  - Hearing loss
  - Ear fullness
  - Diplopia
  - Dysarthria
  - Tinnitus

  e.g. Meniere’s Disease – recurrent dizziness / ear fullness / tinnitus / fluctuating hearing loss
  e.g. Acoustic Neuroma – hearing loss / tinnitus BUT no ear fullness
  e.g. Meniere’s Disease / CNS Disease / BPPV - recurrent dizziness
  Psychogenic and central dizziness – continual dizziness

<table>
<thead>
<tr>
<th>Provoking Factors</th>
<th>Possible Diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in head position</td>
<td>Acute labyrinthitis; BPPV; Cerebellopontine angle tumour; MS; Perilymphatic fistula</td>
</tr>
<tr>
<td>Spontaneous episodes</td>
<td>Acute vestibular neuritis; CVA; Meniere’s Disease; Migraine; MS</td>
</tr>
<tr>
<td>Recent URTI</td>
<td>Acute vestibular neuritis</td>
</tr>
<tr>
<td>Stress</td>
<td>Psychogenic</td>
</tr>
<tr>
<td>Immunosuppression</td>
<td>Herpes zoster</td>
</tr>
<tr>
<td>Changes in ear pressure, head trauma, excessive straining, loud noises</td>
<td>Perilymphatic fistula</td>
</tr>
</tbody>
</table>

### Essential Physical Examination

- Orthostatic hypotension (Lying and Standing BP @ 3 mins)
- Nystagmus
  - Horizontal or rotatory: peripheral
  - Vertical: central
- Cranial nerve examination
  - Verteobasilar ischaemia / infarction
- Timed up and Go test – Gait abnormalities
- Dix – Hallpike maneuver
**Dix-Hallpike Maneuver**

1) Paroxysmal vertigo with rotary nystagmus
2) Latency 1-2 seconds between completion of the maneuver and onset of vertigo and nystagmus
3) Fatigability (decrease in intensity of vertigo and nystagmus with testing)

**Other Ix**

- **Blood tests**
  - FBC / Renal Panel / B12 / Folate / TFT’s / Glucose

- **ECG**
  - 24 hour holter

- **Tilt Table Testing**
  - Indicated in patients with postural hypotension / syncope

- **ENT referral**
  - Audiomtery – Meniere’s Disease vs Acoustic Neuroma

- **Neuroimaging**
  - MRI is superior to CT scan for posterior fossa lesions

**Management**

- Identify the cause

- Vestibular suppressants – effective symptomatic relief for acute vertigo but not helpful in chronic dizziness
  - long term use may exacerbate dizziness

- Vestibular rehabilitation can help suppress the symptoms with both peripheral and central dizziness
  - provokes dizziness and repeated until they can no longer be tolerated
  - may worsen dizziness
  - central adaptation improves movement related dizziness

**Self-treatment of benign positional vertigo using Epley’s maneuver**
When to refer to a Neurologist / ENT?

- Presence of ANY CNS symptoms or signs
- “Red Flags”
  - Focal neurology
  - Ataxia out of proportion to vertigo
  - Pure vertical (upbeat or downbeat) nystagmus
  - Direction changing or gaze evoked nystagmus
  - Other eye movement abnormalities
    - Gaze palsy
    - Skew deviation (vertical misalignment of eyes)
- Presence of auditory associations especially is asymmetric
  - Hearing loss
  - Tinnitus
  - Pressure
  - Aural fullness
- Signs of suppurative middle ear disease
- Auditory / Vestibular symptoms triggered by pressure changes

http://www.singhealth.com.sg/PatientCare/ConditionsAndTreatments/Pages/Exercise-Vertigo.aspx

Thank you for your attention