

# KEEPING YOUR BALANCE

## EVAL & MANAGEMENT OF INNER EAR BALANCE DISORDERS

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Fairbanks Hearing & Balance Center at the ENT Clinic

## THE STATS

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- 🔗 Vestibular vertigo (inner ear) accounts for 1/3 of dizziness symptoms in the medical setting.
- 🔗 Dizziness/vertigo symptoms are ranked among the **most frequent complaints** in primary care but remains *unexplained* 40-80% of the time.



## QUALITY OF LIFE

- 🔗 In a study...
  - 1/3 of a sample of people, aged 65-75, reported that dizziness *degraded their quality of life*.
  - 11.5% with chronic dizziness and 33.4% with chronic balance issues reported *difficulty in performing activities of daily living* (i.e. bathing, dressing, etc.).



## QUALITY OF LIFE - FALLS

- 🔗 People with vestibular dysfunction can have a nearly **8 fold increase in the odds of falling!**
- 🔗 Falls are the leading cause of fatal and non-fatal injuries in persons age 65 and older.
- 🔗 Medical care for balance disorders, including falls, exceeds \$1 billion/yr in the USA!

## THE PROFESSIONALS

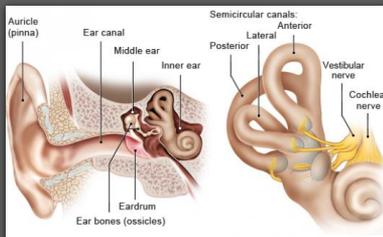
## WHO CAN HELP?

- 🔗 Physician:
  - Primary Care Provider, Ear Nose Throat, Cardiology, Neurology, Endocrinology, Podiatry, Emergency Medicine
- 🔗 Allied Health Professional:
  - Nurse practitioner, physician's assistant, audiologist, physical therapist, occupational therapist, chiropractor
- 🔗 Alternative Providers:
  - Naturopath, acupuncturist, massage therapist, nutritionist

## THE EAR

### The Vestibular System

## VESTIBULAR SYSTEM

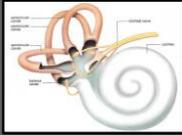


## VESTIBULAR SYSTEM

- 3 Semicircular Canals
  - Rotation (horizontal), lateral flex (lateral), and nodding (posterior)
  - Active movement of the head
- Otolith Organs
  - Utricle = horizontal
  - Saccule = Vertical
  - Position of the head when not in motion

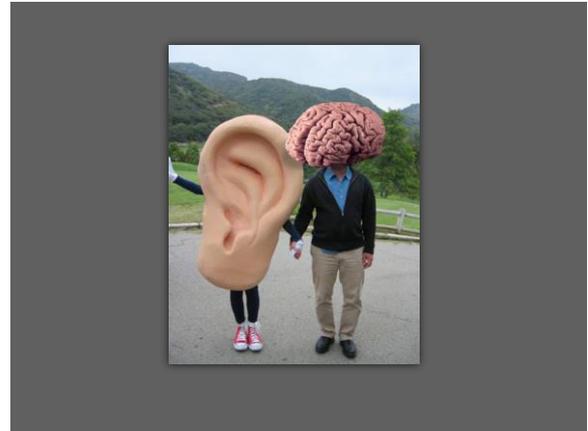


Balance is dependent on many factors including sensory input from:

Ears 

Eyes 

Sensory Systems 



# WHAT IS DIZZINESS?

What do you mean by "dizzy?"



- 🌀 Lightheadedness
- 🌀 "Swimming" sensation
- 🌀 Loss of balance/Imbalance
- 🌀 Feeling unsteady
- 🌀 Spinning/motion (Vertigo)
- 🌀 "Off"
- 🌀 "Woozy"

## ARE YOU EXPERIENCING ANY RELATED SYMPTOMS?

YES	NO		
<input type="checkbox"/>	<input type="checkbox"/>	Difficulty hearing?	
<input type="checkbox"/>	<input type="checkbox"/>	Noise in your ears?	
<input type="checkbox"/>	<input type="checkbox"/>	Does the noise change dizziness?	
<input type="checkbox"/>	<input type="checkbox"/>	Fullness or stuffiness in ears?	
<input type="checkbox"/>	<input type="checkbox"/>	Does this change when you have not eaten for a long time?	
<input type="checkbox"/>	<input type="checkbox"/>	Pain in your ears?	
<input type="checkbox"/>	<input type="checkbox"/>	Have you ever had ear surgery?	
<input type="checkbox"/>	<input type="checkbox"/>	Do you get dizzy after exertion or overactivity?	
<input type="checkbox"/>	<input type="checkbox"/>	Do you get dizzy when you have not eaten for a long time?	
<input type="checkbox"/>	<input type="checkbox"/>	Do you have migraines, or a family history of migraines?	
<input type="checkbox"/>	<input type="checkbox"/>	Do you get upset, nervous, and anxious easily?	
<input type="checkbox"/>	<input type="checkbox"/>	Is your dizziness connected with your menstrual cycle?	
<input type="checkbox"/>	<input type="checkbox"/>	Did you wear new glasses recently?	
<input type="checkbox"/>	<input type="checkbox"/>	Double vision or spots before the eyes?	
<input type="checkbox"/>	<input type="checkbox"/>	Blurred vision or blindness?	
<input type="checkbox"/>	<input type="checkbox"/>	Numbness of face and/or extremities?	
<input type="checkbox"/>	<input type="checkbox"/>	Weakness or clumsiness in arms or legs?	
<input type="checkbox"/>	<input type="checkbox"/>	Difficulty with speech?	
<input type="checkbox"/>	<input type="checkbox"/>	Difficulty with swallowing?	
<input type="checkbox"/>	<input type="checkbox"/>	Tingling around the mouth?	

## FURTHER DESCRIBE THE SYMPTOMS...

YES	NO	
<input type="checkbox"/>	<input type="checkbox"/>	My dizziness is constant.
<input type="checkbox"/>	<input type="checkbox"/>	My dizziness is in attacks.
		If in attacks, how often? _____
		How long do they last? _____
		Do you have any warning that the attack is about to start? _____
<input type="checkbox"/>	<input type="checkbox"/>	Are you completely free of dizziness between attacks?
<input type="checkbox"/>	<input type="checkbox"/>	Does your dizziness occur only in certain positions?
<input type="checkbox"/>	<input type="checkbox"/>	Do you know of any possible cause of your dizziness? If so, what? _____
<input type="checkbox"/>	<input type="checkbox"/>	Did you ever injure your head or neck? _____
		When did your dizziness first start? _____
		Does anything make the dizziness worse? If so, what? _____
		Does anything make the dizziness better? If so, what? _____

## ASSOCIATED CONDITIONS

- 🕒 Viral or bacterial infections;
- 🕒 Foreign objects into the ear canal;
- 🕒 Blood pressure changes;
- 🕒 Vascular problems (i.e. Diabetes);
- 🕒 Medicines or drugs;
- 🕒 Central disorders (i.e. Multiple Sclerosis);
- 🕒 Visual disorders;
- 🕒 Head injury (i.e. concussion);
- 🕒 Knee replacements/Joint issues...

## WHEN IT'S AN EMERGENCY!

- 🕒 Chest pains
- 🕒 Numbness or tingling
- 🕒 Falling or problems walking
- 🕒 Weakness in the legs or arms
- 🕒 Blurred vision
- 🕒 Slurred speech
- 🕒 Sudden hearing loss
- 🕒 Severe neck stiffness
- 🕒 Head trauma or injury
- 🕒 High fever

## PREPARING FOR YOUR APPOINTMENT

At Fairbanks Hearing & Balance Center

- 🕒 You're likely to first see your family doctor or a general practitioner.
- 🕒 Eventually, your primary care doctor may refer you to a number of specialists, including ENT and/or Audiology.



## BEFORE YOUR APPOINTMENT

- 🕒 **Write down any symptoms you're experiencing:** duration and frequency of episodes; how long until you feel back to normal after an episode; etc.
- 🕒 **Write down key personal information:** any major stresses or recent life changes.
- 🕒 **Make a list of all medications,** as well as any vitamins or supplements, that you're taking.
- 🕒 **Write down questions to ask your doctor,** such as what's the best next step in your diagnosis or treatment plan. Also, don't hesitate to ask questions during your appointment.

## AUDIOLOGY

- 🕒 Case history and physical ear examination
- 🕒 A comprehensive hearing test
  - Not only reveals the quality of your hearing, but also may help determine if the source of hearing problems is in the inner ear or the nerve that connects the inner ear to the brain
- 🕒 Tinnitus evaluation (if necessary)
  - Pitch and loudness matching

The purpose of this scale is to identify difficulties that you may be experiencing because of your dizziness or unsteadiness. Please answer "Yes," "No," or "Sometimes" to each question. Answer each question as it pertains to your dizziness or unsteadiness problem only.

	(4)	(2)	(1)
	Yes	Sometimes	No
1. Because of your problem, do you feel depressed? (E)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Does walking down a sidewalk increase your problem? (P)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Because of your problem, is it difficult to concentrate? (E)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Because of your problem, is it difficult for you to walk around your house in the dark? (P)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Does bending over increase your problem? (P)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Because of your problem, do you restrict your travel for business or recreation? (P)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Does your problem interfere with your job or household responsibilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Because of your problem, are you afraid to leave your home without having someone accompany you? (E)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Because of your problem, have you ever been embarrassed in front of others? (E)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Does your problem significantly restrict your participation in social activities such as going out to dinner, going to the movies, dancing or to parties? (F)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>TOTAL SCORE:</b>	<b>Total:</b>	<b>Total:</b>	<b>Total:</b>

## EAR, NOSE, THROAT

- 🔗 A complete and comprehensive history of the illness
- 🔗 A complete and comprehensive ENT/Neurologic examination
- 🔗 Recommendation for further studies or treatment as indicated by Audiologist

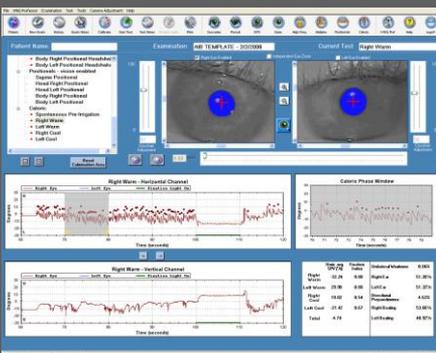
## BALANCE TESTING

- 🔗 There are several tests that assess function of the inner ear. Some or all of these tests can yield abnormal results in a person with a balance disorder.
  - Videonystagmography (VNG)
  - Vestibular-Evoked Myogenic Potentials (VEMP)
  - Rotary Chair Testing
  - Posturography

## VNG



- 🔗 Evaluates balance function by assessing eye movement.
- 🔗 While wearing infrared camera goggles, the patient is asked to perform 3 tasks:
  - Follow a series of target movements,
  - Move into various body and head positions,
  - And finally, warm and cool water or air are introduced into the ear canal while the pupil movement is measured.
- 🔗 Abnormal findings are generally indicative on an inner ear disorder.



## VEMP – COMING SOON!

- Measures the function of important sensors in the inner ear that help you detect acceleration movement.
  - These sensors have a slight sensitivity to sound and are connected to a neck reflex.
- While wearing sensors on the neck and an earphone in each ear, the patient is asked to:
  - Flex their neck muscle while a safe, loud sound is presented to one ear at a time.
- The contractions measured serve as an indirect measure of inner ear function.



## ROTARY CHAIR TESTING

- Like a VNG, this measures inner ear function based on eye movement.
- In this case, stimulus to your inner ear is provided by movement of a special rotating chair precisely controlled by a computer.



## POSTUROGRAPHY

- 🔗 This computerized test reveals which part of the balance system — vision; inner ear function; or sensations from the skin, muscles, tendons and joints — you rely on the most and which parts may cause problems.
- 🔗 While wearing a safety harness, you stand in bare feet on a platform and are asked to keep your balance under various conditions.



## ADDITIONAL TESTING

- 🔗 **Imaging**
  - MRI = Excellent for soft tissue, spine, and brain...
  - CT = excellent for bone, chest, lungs...
- 🔗 **Auditory Brainstem Response (ABR)**
  - This is a computerized test of the hearing nerves and hearing centers of the brain. It can help detect the presence of a tumor disrupting the function of auditory nerves.

## COMMON BALANCE DISORDERS

VERTIGO DIFFERENTIAL DIAGNOSIS	
<b>VERTIGO</b>	
Acoustic neuromas/schwannoma	Motion sensitivity
Allergy, vestibular hydrops	ME, esp. when sensory abnormalities
Autoimmune disease	Other CNS: Arnold-Chiari, infections, etc.
Barotrauma	Otosclerosis
Bilateral Migraine	Otitotoxicity
Benign Intracranial hypertension (BII)	Paralytic facial palsy (PLF)
BPV	Peripheral vestibulopathy, chronic hydrops
Central vestibulopathy; neurological findings	Ramsay-Hunt/ herpes zoster
Cerebellar: Stroke or tumor	Recurrent Vestibulopathy (RV)
Cervical vertigo	Sudden DNH
Cogan's syndrome	Temporal bone fracture, typically longitudinal
Diabetes	TMJ
Height-induced vertigo, anxiety, psychiatric factors	Tullio's phenomenon
Idiopathic vertigo	Vestibocochlear insufficiency/ischemia
Infectious labyrinthitis	Vestibular atelectasia
Intermittent tubotympanitis	Vestibular Epilepsy
Labyrinthine congestion, trauma, post-concussion syndrome, CMT w/ or w/o LDC	Vestibular neuronitis
Lateral congenital cystitis	Wallenberg syndrome
Meniere's disease (Cochlear/vestibular)	
Meniere's syndrome, vestibular hydrops	
<b>PREVINCLOPE</b>	<b>Multisensory DYS-EQUILIBRIUM:</b>
Arrhythmia, cardiac	Includes possible visual impairment, gait disturbance
Non-specific	Post-vestibularis
Osteotic hypotension	

## MENIERE'S DISEASE

### DEFINITION/SYMPOMS

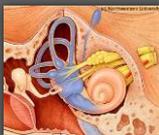
- 🔗 An inner ear disorder that causes:
  - Spontaneous episodes of vertigo (sensation of spinning), lasting minutes to hours;
  - Fluctuating hearing loss;
  - Ringing/buzzing/roaring in the ear (tinnitus);
  - And sometimes a feeling of fullness or pressure in your ear.
- 🔗 Typically affects only one ear.

### DEFINITION/SYMPOMS

- 🔗 More likely to occur in people in their 40s and 50s, and is more likely to occur in women.
- 🔗 Although considered a chronic condition, various treatment strategies can help relieve symptoms and minimize the disease's long-term impact on your life.

### CAUSES

- 🔗 The cause of Meniere's disease isn't well understood.
- 🔗 It appears to be the result of the abnormal volume or composition of fluid in the inner ear, but may be due to multiple factors.



### TREATMENT - LIFESTYLE

- 🔗 Dietary changes: limit salt and caffeine, be sure to eat regularly
- 🔗 Manage stress/anxiety
- 🔗 Manage migraines
- 🔗 Smoking cessation



## TREATMENT - MEDICAL

- 🕒 Medications for vertigo (motion sickness/anti-nausea)
- 🕒 Diuretics to reduce fluid retention
- 🕒 Balance rehabilitation therapy
- 🕒 Hearing aids
- 🕒 Injected medications (steroids)
- 🕒 Surgery



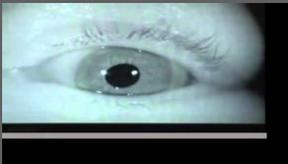
## BENIGN PAROXYSMAL POSITIONAL VERTIGO

## DEFINITION

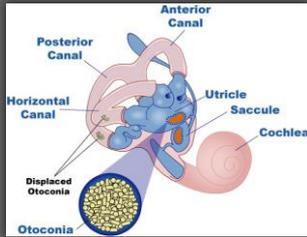
- 🕒 BPPV is one of the most common causes of vertigo, characterized by:
  - Brief episodes of mild to intense dizziness,
  - Triggered by specific changes in the position of your head (i.e. such as tipping your head up or down, lying down, turning over or sitting up in bed)
- 🕒 It's rarely serious except when it increases the chance of falls.

## SYMPTOMS

- 🕒 Immediate onset of vertigo following a provoking movement.
- 🕒 Duration is brief (<1 minute).
- 🕒 You may feel lightheadedness, or unsteadiness following the episode.
- 🕒 You may have a sensation of blurred vision associated with the sensation of vertigo.
- 🕒 Nausea and vomiting are possible.



## CAUSES



## RISK FACTORS

- 🕒 About 50%, professionals cannot find a specific cause for BPPV.
- 🕒 Risk factors include:
  - Age >60,
  - Head injury,
  - Balance disorder that may make you more susceptible to BPPV.

## TREATMENT

- 🕒 Canalith repositioning maneuver
- 🕒 Surgical



## VESTIBULAR DISORDERS

Neuritis and Labyrinthitis

## DEFINITION

- 🕒 A disorder that affects the cranial nerve of the inner ear.
  - This nerve sends balance and head position information from the inner ear to the brain.
- 🕒 When this nerve becomes swollen (inflamed), it disrupts the way the information would normally be interpreted by the brain.
  - In neuritis, just balance portion of the nerve is affected.
  - In labyrinthitis, hearing and balance portions are affected.

## SYMPTOMS

- 🕒 Sudden, severe vertigo for hours-days;
- 🕒 Initial nausea and vomiting;
- 🕒 Dizziness and balance difficulties that last days-weeks;
- 🕒 Sudden hearing loss and tinnitus (labyrinthitis);
- 🕒 Concentration difficulties;
- 🕒 Inability to tolerate quick movements following episode.

## CAUSES

- 🕒 Viral infection of the inner ear,
- 🕒 Swelling around the vestibulocochlear nerve (caused by a virus),
- 🕒 Or a viral infection that has occurred somewhere else in the body.
  - Herpes virus (causes cold sores, shingles, chickenpox),
  - Measles,
  - Flu,
  - Mumps,
  - Hepatitis,
  - And polio.

## TREATMENT

### Managing symptoms:

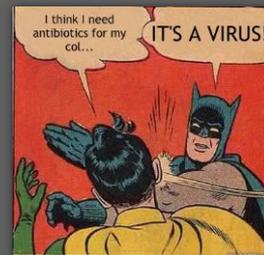
- 🕒 Reduce nausea – drugs may be given. If severe enough, patients may be admitted to the hospital and given IV fluids to treat dehydration.
- 🕒 Reduce dizziness – vestibular suppressant drugs may be used.
  - Should be used no longer than three days; not recommended for long-term use and may make recovery more difficult.
- 🕒 Sometimes steroids are also used.



## TREATMENT

### Treating a virus.

- 🕒 If a virus is thought to be the cause of the vestibular neuritis, antiviral medicine such as acyclovir is used.
- 🕒 Antibiotics are **not** used to treat vestibular neuritis because this disorder is not caused by bacteria.



## TREATMENT

### Balance rehabilitation program.

- 🕒 If symptoms last longer than a few weeks, a vestibular physical therapy program may be recommended.

### Hearing loss rehabilitation.

- 🕒 Sudden hearing loss and tinnitus can be detrimental to concentration, localization, and quality of life.
- 🕒 Implant and traditional hearing device systems now exist.

## FALL PREVENTION

## TODAY'S SOCIETY IS MORE ACTIVE THAN EVER...

🔗 Every year, more than 2 million Americans fall and sustain serious injury.

🔗 \$3 billion dollars in health care costs...

- Not including pain, disability, lawsuits, loss of independence, deterioration in well-being, and impact on other family members!



## WHO'S MORE LIKELY TO FALL?

### After the age of 50:

1. Cells begin to deteriorate
2. Muscle strength begins to decrease
3. Tendons and ligaments lose flexibility and limit motion
4. Artery hardening is accelerated
5. Additive side-effects from increased medication intake

## TIPS FOR FALL PREVENTION

## YOUR HEALTH

1. Have hearing and vision check-ups regularly.
2. Get up slowly.
3. Use a cane or walker to help maintain balance on uneven ground or slippery surfaces.
4. Exercise to improve your strength, muscle tone, and coordination.

## AT HOME

- 🔗 Keep walking paths clear.
- 🔗 Never stand on a chair.
- 🔗 Be sure stairways have sturdy hand rails.
- 🔗 Install grab handles and nonskid mats where necessary.
- 🔗 Use shower chairs and bath benches.
- 🔗 Avoid walking in the dark.



## MORAL OF THE STORY...

🔗 ...you do NOT have to live with dizziness!

🔗 85% of all dizziness and balance problems can be accurately diagnosed and successfully treated following a thorough evaluation.

## THANK YOU!

*Lily Hughes, AuD*  
*Board Certified Audiologist*

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