



## NIDCD Fact Sheet | Hearing and Balance

# Balance Disorders

### What is a balance disorder?

A balance disorder is a condition that makes you feel unsteady or dizzy. If you are standing, sitting, or lying down, you might feel as if you are moving, spinning, or floating. If you are walking, you might suddenly feel as if you are tipping over.

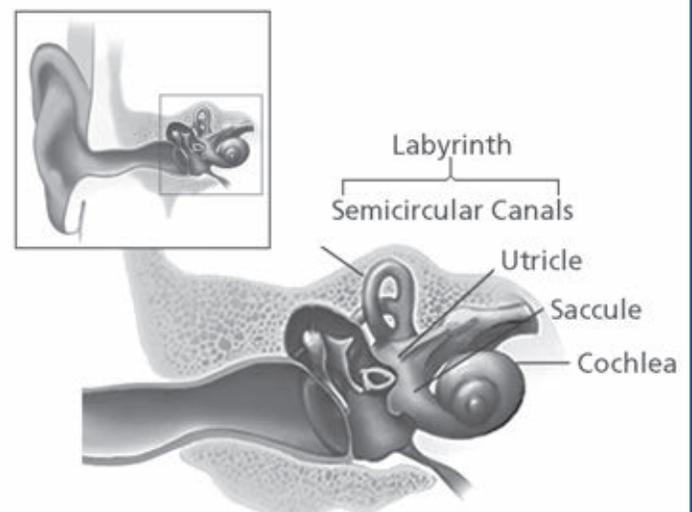
Everyone has a dizzy spell now and then, but the term “dizziness” can mean different things to different people. For one person, dizziness might mean a fleeting feeling of faintness, while for another it could be an intense sensation of spinning (vertigo) that lasts a long time.

Experts believe that more than four out of 10 Americans, sometime in their lives, will experience an episode of dizziness significant enough to send them to a doctor. Balance disorders can be caused by certain health conditions, medications, or a problem in the inner ear or the brain. A balance disorder can profoundly impact daily activities and cause psychological and emotional hardship.

### What are the symptoms of a balance disorder?

If you have a balance disorder, you may stagger when you try to walk, or teeter or fall when you try to stand up. You might experience other symptoms such as:

### Structures of the balance system inside the inner ear



*Credit: NIH Medical Arts*

- ▶ Dizziness or vertigo (a spinning sensation)
- ▶ Falling or feeling as if you are going to fall
- ▶ Lightheadedness, faintness, or a floating sensation
- ▶ Blurred vision
- ▶ Confusion or disorientation.

Other symptoms might include nausea and vomiting, diarrhea, changes in heart rate and blood pressure, and fear, anxiety, or panic. Symptoms may come and go over short time periods or last for a long time, and can lead to fatigue and depression.

### **What causes balance disorders?**

There are many causes of balance problems, such as medications, ear infections, a head injury, or anything else that affects the inner ear or brain. Low blood pressure can lead to dizziness when you stand up too quickly. Problems that affect the skeletal or visual systems, such as arthritis or eye muscle imbalance, can also cause balance disorders. Your risk of having balance problems increases as you get older.

Unfortunately, many balance disorders start suddenly and with no obvious cause.

### **How does my body keep its balance?**

Your sense of balance relies on a series of signals to the brain from several organs and structures in the body, which together are known as the vestibular system. The vestibular system begins with a maze-like structure in your inner ear called the labyrinth, which is made of bone and soft tissue.

Within the labyrinth are structures known as semicircular canals. The semicircular canals contain three fluid-filled ducts, which form loops arranged roughly at right angles to one another. They tell your brain when your head rotates or moves up or down. Inside each canal is a gel-like structure called the cupula [KEW-pyew-lah], stretched like a thick drumhead across its duct. The cupula sits on a cluster of sensory hair cells. Each hair cell has tiny, thin extensions called stereocilia that protrude into the cupula.

When you turn your head, fluid inside the semicircular canal moves, causing the cupula to flex, which bends the stereocilia. This bending creates a nerve signal to the brain to tell it which way your head has turned.

Between the semicircular canals and the cochlea lie two otolithic [oh-toe-LITH-ic] organs: fluid-filled pouches called the utricle [YOU-trih-cull] and the saccule [SACK-kewl]. These organs tell your brain the position of your head with respect to gravity, such as whether you are sitting up, leaning back, or lying down, as well as when your head is moving in a straight line, such as up, forward, or sideways.

The utricle and the saccule also have sensory hair cells lining the floor or wall of each organ, with stereocilia extending into an overlying gel-like layer. Here, the gel contains tiny, dense grains of calcium carbonate called otoconia [oh-toe-CONE-ee-ah]. Whatever the position of your head, gravity pulls on these grains, which then move the stereocilia to signal your head's position to your brain. Any head movement creates a signal that tells your brain about the change in position.

When you move, the vestibular system detects mechanical forces, including gravity, that stimulate the semicircular canals and the otolithic organs. These organs work with other sensory systems in your body, such as your vision and your musculoskeletal sensory system, to control the position of your body at rest or in motion. This helps you maintain stable posture and keep your balance when you're walking or running. It also helps you keep a stable visual focus on objects when your body changes position.

When the signals from any of these sensory systems malfunction, you can have problems with your sense of balance. If you have additional

problems with motor control, such as weakness, slowness, tremor, or rigidity, you can lose your ability to recover properly from imbalance. This raises the risk of falling and injury.

## What are some types of balance disorders?

There are more than a dozen different balance disorders. Some of the most common are:

- ▶ **Benign paroxysmal positional vertigo (BPPV) or positional vertigo:** A brief, intense episode of vertigo triggered by a specific change in the position of the head. You might feel as if you're spinning when you bend down to look under something, tilt your head to look up or over your shoulder, or roll over in bed. BPPV occurs when loose otoconia tumble into one of the semicircular canals and weigh on the cupula. The cupula doesn't flex properly and sends wrong information about your head's position, causing vertigo. BPPV can result from a head injury, or can develop just from getting older.
- ▶ **Labyrinthitis [lab-buh-rinth-EYE-tiss]:** An infection or inflammation of the inner ear that causes dizziness and loss of balance. It is often associated with an upper respiratory infection, such as the flu.
- ▶ **Ménière's [main-YEHRZ] disease:** Episodes of vertigo, hearing loss, tinnitus (TIN-nih-tuss, a ringing or buzzing in the ear), and a feeling of fullness in the ear. It may be associated with a change in fluid volume within parts of the labyrinth, but the cause or causes are still unknown. Read the NIDCD fact sheet "Ménière's Disease" at <http://www.nidcd.nih.gov/health/balance/pages/meniere.aspx> for more information.
- ▶ **Vestibular neuronitis [new-ron-EYE-tiss]:** An inflammation of the vestibular nerve that can be caused by a virus, and primarily causes vertigo.

- ▶ **Perilymph fistula [PERRY-limf FIS-tew-lah]:** A leakage of inner ear fluid into the middle ear. It causes unsteadiness that usually increases with activity, along with dizziness and nausea. Perilymph fistula can occur after a head injury, dramatic changes in air pressure (such as when scuba diving), physical exertion, ear surgery, or chronic ear infections. Some people are born with perilymph fistula.
- ▶ **Mal de Debarquement [dee-BARK-ment] syndrome (MdDS):** A feeling of continuously rocking or bobbing, typically after an ocean cruise or other sea travel. Usually the symptoms go away a few hours or days after you reach land. Severe cases, however, can last months or even years, and the cause remains unknown.

## How are balance disorders diagnosed?

Diagnosis of a balance disorder is difficult. To find out if you have a balance problem, your doctor may suggest that you see an otolaryngologist. An otolaryngologist is a physician and surgeon who specializes in diseases and disorders of the ear, nose, neck, and throat.

The otolaryngologist may ask you to have a hearing examination, blood tests, an electronystagmogram (a test that measures eye movements and the muscles that control them), or imaging studies of your head and brain. Another possible test is called posturography. For this test, you stand on a special movable platform in front of a patterned screen. The doctor measures how your body responds to movement of the platform, the patterned screen, or both.

## How are balance disorders treated?

The first thing a doctor will do if you have a balance problem is determine if another health condition or a medication is to blame. If so, your doctor will treat the condition, suggest a



*Dislodging otoconia using the Epley maneuver.*  
Credit: NIDCD

different medication, or refer you to a specialist if the condition is outside his or her expertise.

If you have BPPV, your doctor might recommend a series of simple movements, such as the Epley maneuver, which can help dislodge the otoconia from the semicircular canal. In many cases, one session works; other people need the procedure several times to relieve their dizziness.

If you are diagnosed with Ménière's disease, your doctor may recommend that you make some changes to your diet and, if you are a smoker, that you stop smoking. Anti-vertigo or anti-nausea medications may relieve your symptoms, but they can also make you drowsy. Other medications, such as gentamicin (an antibiotic) or corticosteroids may be used. Although gentamicin may reduce dizziness better than corticosteroids, it occasionally causes permanent hearing loss. In some severe cases of Ménière's disease, surgery on the vestibular organs may be needed.

Some people with a balance disorder may not be able to fully relieve their dizziness and will need to find ways to cope with it. A vestibular rehabilitation therapist can help you develop an individualized treatment plan.

Talk to your doctor about whether it's safe to drive, as well as ways to lower your risk of falling and getting hurt during daily activities, such as when you walk up or down stairs, use the bathroom, or exercise. To reduce your risk of injury from dizziness, avoid walking in the dark. You should also wear low-heeled shoes or walking shoes outdoors. If necessary, use a cane or walker and modify conditions at your home and workplace, such as by adding handrails.

### **When should I seek help if I think I have a balance disorder?**

To help you decide whether to seek medical help for a dizzy spell, ask yourself the following questions. If you answer "yes" to any of these questions, talk to your doctor:

- ▶ Do I feel unsteady?
- ▶ Do I feel as if the room is spinning around me?
- ▶ Do I feel as if I'm moving when I know I'm sitting or standing still?
- ▶ Do I lose my balance and fall?
- ▶ Do I feel as if I'm falling?
- ▶ Do I feel lightheaded or as if I might faint?
- ▶ Do I have blurred vision?
- ▶ Do I ever feel disoriented—losing my sense of time or location?

## How can I help my doctor make a diagnosis?

You can help your doctor make a diagnosis and determine a treatment plan by answering the questions below. Be prepared to discuss this information during your appointment.

1. The best way I can describe my dizziness or balance problem is:\_\_\_\_\_.
2. How often do I feel dizzy or have trouble keeping my balance?
3. Have I ever fallen?
  - ▶ When did I fall?
  - ▶ Where did I fall?
  - ▶ Under what conditions did I fall?
  - ▶ How often have I fallen?
4. These are the medicines I take (include prescription medications and over-the-counter medicine, such as aspirin, antihistamines, or sleep aids):
  - ▶ Name of medicine:\_\_\_\_\_.
  - ▶ How much (milligrams) \_\_\_\_\_ and how often (times) \_\_\_\_\_ per day
  - ▶ The condition I take this medicine for is:\_\_\_\_\_.

## What research is being done on balance disorders?

Findings from animal studies may help researchers determine if inner-ear structures destroyed by aging, medications, infections, or trauma can someday be regrown in people with balance problems. Researchers supported by the National Institute on Deafness and Other Communication Disorders (NIDCD) are identifying the molecular mechanisms that regulate the development of the inner ear in mice.

Recent discoveries have included several of the genes that help direct the formation of the semicircular canals and the otoconia.

Other NIDCD-supported scientists are testing vestibular prostheses—miniature devices similar to cochlear implants—to regulate the function of balance organs in the inner ear and ease dizziness. One of these devices is currently being tested in human volunteers. The NIDCD is also funding other research projects to bring similar devices to clinical trials.

Researchers are studying the effectiveness of different types of exercises to treat balance disorders. In one NIDCD-funded study, researchers used virtual reality technology to simulate the aisles of a grocery store. The researchers are testing whether practicing in the virtual store will lessen episodes of dizziness in real-world, visually complex environments.



## Where can I find additional information about balance disorders?

The NIDCD maintains a directory of organizations that provide information on the normal and disordered processes of hearing, balance, taste, smell, voice, speech, and language. Visit the NIDCD website at <http://www.nidcd.nih.gov> to see the directory.

Use the following keywords to help you search for organizations that can answer questions and provide information on balance disorders:

- ▶ Balance
- ▶ Vertigo
- ▶ Dizziness
- ▶ Ménière's Disease

### More NIDCD fact sheets on balance and other vestibular disorders:

- ▶ Ménière's Disease
- ▶ Vestibular Schwannoma and Neurofibromatosis

Visit the NIDCD website at <http://www.nidcd.nih.gov> to read, print, or download fact sheets.

For more information, additional addresses and phone numbers, or a printed list of organizations, contact us at:

#### NIDCD Information Clearinghouse

1 Communication Avenue  
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<http://www.nidcd.nih.gov>

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