

The descriptions below represent the most common causes of dizziness:

***Benign Paroxysmal Positional Vertigo (BPPV):***

BPPV is a disease of the inner ear's gravity perception mechanism. Within the semicircular canals (inner ear tubes) are small crystals composed of calcium carbonate; the same substance contained in oyster shells. Normally, the crystals rest on a membrane that allows the brain to perceive the position of the head relative to gravity. These crystals can become dislodged and float around in the semicircular canals. This causes an aberration in the brain's perception of gravity, which induces the sensation of spinning or vertigo. This vertigo always is associated with moving the head in certain positions, such as looking up, turning over in bed, or lying down. This vertigo typically lasts about 30 seconds, but nausea may last longer. BPPV typically is diagnosed by using nystagmography to record characteristic eye movements during head positioning. BPPV is best treated with specialized maneuvers (canalith repositioning maneuvers), which involve turning the head so that the crystals move back into their normal position. These maneuvers are effective over 80% of the time. Very rarely, surgery may be required to alleviate positional vertigo.

***Ménière's Disease:***

Ménière's disease is relatively rare compared to other more common disorders such as vestibular neuritis and benign paroxysmal positional vertigo. This condition affects 46 out of every 100,000 people and most patients are over the age of forty. A typical Ménière's attack involves a severe spinning vertigo with imbalance as well as nausea and vomiting. Characteristically, the attacks are accompanied by fluctuations of hearing and sometimes tinnitus (ringing in the ears). Most patients with Ménière's describe fullness in one or both ears. The attacks usually last about four hours, but fatigue and nausea may persist for days. Ménière's disease is caused by abnormal accumulations of fluid in the inner ear and increases of inner ear pressure. The diagnosis often can be made with an accurate history and hearing tests alone, however, specialized tests such as electronystagmography, vestibular evoked myogenic potentials, and electrocochleography may be necessary. The treatment consists of medications, a special low salt diet, and only rarely, surgery. Vestibular rehabilitation is considered to be helpful only in cases of persistent, non-fluctuating inner ear injury.

***Ototoxicity:***

Ototoxicity is the term used to describe damage to the ear caused by toxic substances. This occurs when individuals come into contact with drugs or chemicals that are poisonous to the inner ear or to the nerve that supplies the inner ear (vestibulocochlear nerve). Because the inner ear is involved in both hearing and balance, ototoxicity can result in problems with either or both of these senses. Symptoms vary considerably from drug to drug and person to person. They range from mild imbalance to severe vertigo, tinnitus (ringing in the ears) to total hearing loss. If symptoms involve both the right and left inner ears, the patient may not have vertigo or hearing loss, but severe imbalance and blurred vision caused by poor stabilization of the eyes. This also causes the inability to tolerate head movement. The diagnosis is based upon the patient's history, symptoms, and test results. Tests that may be used to determine how much hearing or balance function has been lost include the vestibular autorotation test (VAT), electronystagmography (ENG), computerized dynamic posturography (CDP), auditory brainstem response (ABR), and pure tone audiometry. The goal of treatment is to help the brain become accustomed to the changed information from the inner ear and to assist the individual in developing other ways to maintain balance. Greater use of vision and muscle sensory information (proprioception) can be developed through formal physical therapy and a program of general physical conditioning and exercise.

***Vestibular Neuritis:***

In Vestibular neuritis, dizziness is attributed to a viral infection of the vestibular nerve. In older patients, this can be secondary to ischemic damage to the inner ear or vestibular nerve. The vestibular nerve carries information from the inner ear to the brain and this allows the brain to determine the position of the head and body in space and about head movement. When one of the two vestibular nerves is affected, there is an imbalance between the two sides, and vertigo appears. If hearing loss also is associated with the dizziness, the problem is called "labyrinthitis." The symptoms of both vestibular neuritis and labyrinthitis typically include dizziness or vertigo, disequilibrium or imbalance, and nausea. At onset, the dizziness is constant and may occur without head movement. After a few days to a week, symptoms are often only precipitated by sudden head movements. For the first several days, dizziness and nausea can be treated with suppressive medications. Long-term use of medications, however, can actually impede full recovery. Vestibular rehabilitation is the definitive treatment for the symptoms associated with this vestibular neuritis.

***Acoustic Neuroma:***

Acoustic neuromas, also known as vestibular schwannomas, are non-malignant tumors of the eighth cranial nerve. Most commonly they arise from the covering cells (Schwann cells) of the inferior vestibular nerve. These cells provide the insulation of the nerves, much like the insulation around an electrical wire. Acoustic neuromas usually cause hearing loss, but may not cause dizziness or imbalance. Acoustic neuromas are relatively rare as only about 10 tumors are newly diagnosed each year per million persons in the United States. Diagnosis is made with MRI after changes are detected on audiometry and brain stem auditory evoked responses. Treatment options for acoustic neuromas include surgery and radiation.

***Migraine-Associated Dizziness:***

Although most think of migraine as a terrible headache and nothing more, migraine is actually a complex disorder of the brain that affects 12% of all people. About 20% of people with migraine have migraine with aura. An "aura" is a symptom that can be localized to a specific brain region. Visual changes (flickering lights, dark spots, etc.) are the most common auras associated with migraine. It is well known that an aura is caused by a wave of decreased brain cell activity that spreads over the surface of the brain. A common historical misconception about migraine aura is that it is caused by "constricted blood vessels" or "decreased blood flow." This simply is not the case. Although visual changes are the most common auras, dizziness also can be a symptom caused by migraine aura if decreased brain cell activity occurs in the vestibular system.

Nevertheless, the phenomenon of migraine aura does not explain all cases of dizziness in migraine patients. In fact, studies have shown that the prevalence of vertigo in migraine may be as high as 42% (Kurizky et al, 1981). Vertigo secondary to migraine can be very difficult to diagnose, especially in patients without head pain. [Yes. It is possible to suffer from migraine without having headaches!] It often is difficult to distinguish migraine-associated vertigo from Ménière's disease in these patients. It is our experience that migraine-associated dizziness is extremely common and migraine-induced dizziness is a subject of research at our center.

***Perilymph Fistula:***

A perilymph fistula is a tear or defect in the oval window or round window (the thin membranes between the middle and inner ears). When a fistula is present, changes in middle ear pressure will directly affect the inner ear, stimulating the balance and/or hearing structures and causing several symptoms. These include dizziness, vertigo, imbalance, nausea, and vomiting. Some

people experience ringing or fullness in the ears, and many notice a hearing loss. Most people with fistulas find that their symptoms get worse with changes in altitude (elevators, airplanes, or travel over mountains). Additionally strenuous activity or straining can trigger symptoms. Head trauma is the most common cause of perilymph fistula, however, other activities such as weight lifting or scuba diving can cause this problem. Often fistula can be diagnosed by applying pressure to the ear while measuring eye movements. Often, perilymph fistulas will heal spontaneously with rest, but sometimes surgery is required.

***Transient Ischemic Attack (TIA) and Stroke:***

TIAs and stroke are caused by low blood flow to the brain. When the areas of the brain that control balance (brain stem and cerebellum) suffer from low or absent blood flow, dizziness and imbalance can occur. Sometimes dizziness can occur if the vertebral arteries in the neck become narrow (vertebral stenosis). When a patient with vertebral stenosis turns his or her head in certain directions, the arteries can be pinched off and blood flow to the brain can be diminished. Dizziness or vertigo is much more often caused by inner ear problems, however, TIA and stroke are frequent causes of imbalance.

***Orthostatic Hypotension:***

This is a very common cause of dizziness, especially in the elderly. Orthostatic hypotension is a decrease in blood pressure that occurs when an individual stands up after sitting or laying down. The drop in blood pressure is caused by pooling of blood in the legs. If blood pools in the legs, less blood is pumped by the heart to the brain and dizziness or lightheadedness occurs. Orthostatic hypotension is generally treated with hydration, elastic stockings, and sometimes with medications. The diagnosis is made by measuring the blood pressure and heart rate in the recumbent and standing positions while the patient's symptoms are documented.

***Cardiac Arrhythmias:***

An arrhythmia is an electrical conduction abnormality of the heart. An arrhythmia can lead to an irregular heartbeat that causes less blood to be pumped to the brain and this can lead to dizziness. In general, cardiac arrhythmias can be treated with medications, but sometimes a pacemaker may be required.