



Causes of Dizziness

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Dizziness, vertigo, and disequilibrium are common symptoms reported by adults during visits to their doctors. They are all symptoms that can result from a peripheral vestibular disorder (a dysfunction of the balance organs of the inner ear) or central vestibular disorder (a dysfunction of one or more parts of the central nervous system that help process balance and spatial information). Although these three symptoms can be linked by a common cause, they have different meanings, and describing them accurately can mean the difference between a successful diagnosis and one that is missed. *Dizziness* is a sensation of lightheadedness, faintness, or unsteadiness. Unlike dizziness, *vertigo* has a rotational, spinning component, and is the perception of movement, either of the self or surrounding objects. *Disequilibrium* simply means unsteadiness, imbalance, or loss of equilibrium that is often accompanied by spatial disorientation.

Almost everyone experiences a few seconds of spatial disorientation at some point—for example, when a person watches a 3-D movie in the theater and

momentarily perceives an illusion of moving or falling as the images rush past. However, frequent episodes of vertigo—whether lasting only for a few seconds or days on end—are a primary sign of a vestibular dysfunction, especially when linked to changes in head position. By contrast, dizziness can be a primary sign of a vestibular disorder in addition to a broad array of cardiovascular, neurological, metabolic, vision, and psychological problems. It is also quite possible that a person may have a combination of problems, such as a degenerative vestibular disorder along with a visual deficit such as cataracts or a neurological disorder such as a stroke.

Because of the many possible causes of dizziness, getting a correct diagnosis can be a long and frustrating experience.

Dizziness caused by vestibular disorders

The body maintains balance with sensory information from three systems:

- vision
- proprioception (touch sensors in the feet, trunk, and spine)
- vestibular system (inner ear)

Definitions

Dizziness: a sensation of light-headedness, faintness, or unsteadiness. Dizziness does not involve a rotational component.

Vertigo: the perception of movement or whirling—either of the self or surrounding objects.

Disequilibrium: unsteadiness, imbalance, or loss of equilibrium; often accompanied by spatial disorientation.

Spatial disorientation: a sensation of not knowing where one's body is in relation to the vertical and horizontal planes.

Sensory input from these three systems is integrated and processed by the brainstem. In response, feedback messages are sent to the eyes to help maintain steady vision and to the muscles to help maintain posture and balance.

A healthy vestibular system supplies the most reliable information about spatial orientation. Mixed signals from vision or proprioception can usually be tolerated. When sitting in a car at a railroad crossing, seeing a passing train may cause the sensation of drifting or moving, and feeling a soft, thick carpet underfoot as opposed to a solid wood floor can produce a floating sensation. However, compensating for vestibular system abnormalities is more problematic.

Just as a courtroom judge finds in favor between two sides presenting competing evidence, the vestibular system serves as the tie-breaker between conflicting forms of sensory information. When the vestibular system malfunctions, it can no longer help resolve moments of sensory conflict, resulting in symptoms such as dizziness, vertigo, and disequilibrium.

Specific vestibular system problems

Vestibular dysfunction is most commonly caused by head injury, aging, and viral infection. Other illnesses, as well as genetic and environmental factors, may also cause or contribute to vestibular disorders. For more detailed information about specific vestibular system problems, please visit www.vestibular.org. Causes of dizziness related to vestibular system dysfunction are listed below.

- An *acoustic neuroma* is a benign tumor growing on the vestibulo-cochlear nerve.
- *Autoimmune inner ear disease* occurs when the defense capabilities of a malfunctioning immune system harm the cells of the body that affect the ear. Specific diagnoses include Cogan's syndrome, Wegener's granulomatosis, systemic lupus, Sjogren's syndrome, and rheumatoid arthritis, among others.
- *Benign paroxysmal positional vertigo* (BPPV) is a condition resulting from loose debris (otoconia) that collects within a part of the inner ear. In addition to head injury, BPPV can occur due to the degeneration of inner-ear

- hair cells during the natural process of aging.
- *Cervicogenic dizziness* is a clinical syndrome of disequilibrium and disorientation in patients with neck problems that include cervical trauma, cervical arthritis, and others.
 - *Cholesteatoma* is a skin growth that occurs in the middle ear behind the eardrum.
 - An *enlarged vestibular aqueduct* houses the fluid-filled endolymphatic duct, which is connected to the endolymphatic sac. The function of the duct and the sac are affected when the aqueduct is larger than normal.
 - *Labyrinthitis* and *vestibular neuritis* are inflammations caused by a viral infection that can result in damage to hearing and vestibular function (labyrinthitis) or damage to vestibular function only (vestibular neuritis).
 - *Mal de débarquement* is a sensation of rocking or movement that persists after a cruise or other form of travel.
 - *Ménière's disease*, or *primary endolymphatic hydrops*, involves abnormalities in quantity, composition, or pressure of the endolymph (one of the fluids within the inner ear). It is a progressive condition.
 - *Middle ear pressure changes*, such as from colds or allergies, can result from swelling of the Eustachian tube or the presence of fluid in the middle ear.
 - *Migraine associated vertigo* (MAV) is typically characterized by head pain with symptoms associated with vestibular impairment such as dizziness, motion intolerance, spontaneous vertigo, sensitivity to light and sound, tinnitus, imbalance, and spatial disorientation.
 - *Otitis media* is a bacterial infection of the middle ear and *meningitis* is a bacterial infection of the brain covering that may spread to the inner ear.
 - *Otosclerosis* is an abnormal growth of bone of the middle ear that prevents structures within the middle and inner ear from working properly.
 - *Ototoxicity* is caused by exposure to certain drugs or chemicals (e.g., intravenous aminoglycoside antibiotics) that damage the inner-ear nerve hair cells or the vestibulo-cochlear nerve.
 - *Perilymph fistula*, caused by injury, is a tear or defect in the oval or round window, which are small, thin membranes that separate the middle ear from the fluid-filled inner ear.
 - *Superior canal dehiscence* is an opening in the bone overlying the uppermost semicircular canal within the inner ear.
 - *Secondary endolymphatic hydrops* involves abnormalities in quantity, composition, or pressure of the endolymph.
 - *Vascular compression of the vestibular nerve* is an irritation of the vestibular portion of the vestibulo-cochlear nerve by a blood vessel.

Non-vestibular causes of dizziness

Dizziness can be linked to a wide array of problems and is particularly commonly linked to blood-flow irregularities from cardiovascular problems. Non-vestibular causes of dizziness are listed below.

- An *aneurysm* is a weak spot in an artery wall that balloons out and allows blood to leak into the vessel walls. An aneurysm is a catastrophic event that can cause severe dizziness and difficulty with walking.
- An *arrhythmia* is an irregular or abnormal heartbeat and can result in low blood flow to the brain, causing one to faint or feel faint.
- *Atherosclerosis* is hardening or narrowing of the vertebral arteries. In older people who have high blood pressure, plaque is sometimes deposited within the arteries. This narrows the interior of the arteries and impedes blood flow. Heredity may be a factor in development of this condition.
- *Carotid sinus reflex* works rapidly in younger people but sometimes is much slower in older people, especially those with circulatory problems. The carotid sinus is very sensitive to decreases in blood pressure in the carotid artery. With a drop in blood pressure, the reflex constricts blood vessels in the lower extremities and dilates vessels in the head to maintain a normal blood pressure in the head and adequate blood flow to the brain.
- A *defective heart valve* usually involves the aortic valve, which when shut down (*aortic stenosis*) prevents the proper amount of blood from flowing to the brain.
- *Dehydration* can produce lightheadedness through its effect on multiple systems.
- People with severe *degenerative arthritis* of the spine can develop bone spurs that may press on the vertebral arteries and interfere with blood supply to the brain.
- *Embolism* can occur when an embolus, or blood clot, forms around a heart valve that is not working properly, or is released within the arteries to the brain, causing a stroke. The effects of a stroke may include temporary dizziness. However, if the embolus travels to the vestibular system, it can cause severe dizziness.
- A *heart attack* rarely causes dizziness; when it does, lack of blood to the brain is the cause.
- *Hyperventilation* is a condition resulting from rapid breathing, when more carbon dioxide than normal is expelled. When this happens, the level of carbon dioxide in the blood falls and affects the function of brain cells, causing temporary dizziness.

- Certain *medications*, including some prescription and over-the-counter drugs, can cause temporary dizziness.
- *Nervous-system disorders* such as *peripheral neuropathies* (diminished nerve function in the legs or feet) and *multiple sclerosis* can cause unsteadiness.
- *Orthostatic hypotension* is common in older people, especially those with circulatory problems and *diabetes*. When a person has low blood pressure and pooling of blood in the lower part of the body while sitting or laying down, the process of standing up quickly can cause dizziness and fainting. Normally, body reflexes accommodate such position changes. However, when circulation problems impair these compensation mechanisms, faintness occurs.
- *Osteoarthritis* is a joint disease that can narrow the openings in the neck vertebrae (bones) through which blood vessels flow. Blockage of these vertebral arteries results in an inadequate blood supply to the base of the brain or brainstem—where the balance information is controlled. This causes symptoms of dizziness and lightheadedness. The condition is termed *vertebral basilar insufficiency*. If this arterial narrowing takes place gradually over time, other arteries may enlarge and take over some of the function of the affected vessels. This event, called *development of a collateral blood supply*, can't happen if the arterial narrowing occurs suddenly (for example, if an embolus completely shuts off the blood supply). In such cases, death by stroke may result.
- *Stress, tension, or fatigue* may cause the brain stem to function less efficiently, resulting in some loss of automatic reflex control of balance. This leads to elevated levels of activity for the cerebral cortex as it works to help maintain balance through the control of voluntary muscle movements. Lightheadedness and unsteadiness can result.
- A *tumor* may affect the brain stem, the cerebellum (the coordination center of the brain), or the part of the cerebral cortex that controls voluntary muscle movements.
- *Vasovagal syndrome* is a nervous-system response that causes sudden loss of muscle tone in peripheral blood vessels.
- *Vision disturbances* can occur when a person adjusts to bifocals or a new eyeglass prescription, or must compensate for reduced vision due to cataracts.

Dizziness caused by multiple sensory deficits

Maintaining balance and equilibrium can be very difficult when more than one neurologic problem exists. A mild vestibular disorder can be much more problematic when accompanied by a

visual deficit. The ability to compensate for a vestibular disorder is compounded when there is also a deficit with proprioception due to disease or an injury and severe dizziness can result. Careful evaluation, including a complete medical history noting all potential causes of dizziness, is essential to correct diagnosis and treatment.

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