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## SYMPTOMS

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### CONFLICTING SIGNALS

Symptoms appear when the central nervous system receives conflicting messages from the visual system and the vestibular system in the inner ears.

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## ARTICLE

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5018 NE 15th Ave.  
Portland, OR 97211  
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info@vestibular.org  
vestibular.org

# What is Motion Sickness?

Originally adapted with permission from a publication by the American Academy of Otolaryngology–Head and Neck Surgery, Alexandria, Virginia, with edits by Dr. Jeremy Hinton.

Motion sickness is the most common medical problem associated with travel.

### WHAT IS MOTION SICKNESS?

Some people experience nausea and even vomiting when riding in an airplane, automobile, or amusement park ride. This is called motion sickness. Motion sickness is often caused by multi-axial motion and acceleration, especially if the eyes are seeing one thing while the body experiences another. An example of this would be if a person was sitting in the back seat of a car looking out the side window while the car accelerates down a hill and turns a corner at the same time. The sensation is often temporary, but for many it continues for a prolonged period of time, resulting in extreme discomfort and anxiety.

Early symptoms of motion sickness may include nausea, increased salivation, belching, feeling clammy (diaphoretic), hyperventilating, and a feeling of general unease. Because hyperventilation and progressive nausea are so unsettling, many people will report a feeling of impending doom that can lead to serious complications such as difficulty breathing, blood pressure drops (especially orthostatic hypotension), and even passing out (syncope). Motion sickness itself will not cause these symptoms, but can lead to a person feeling overwhelmed.

Many people experience motion sickness when riding on a boat or ship. This is called seasickness even though it is the same disorder. Motion sickness and seasickness are usually just a minor annoyance and do not signify any serious medical illness. However, some travelers are

incapacitated by it, and a few even suffer symptoms for several days after the trip. In extreme instances people may develop Mal de Debarquement (MdDS) - literally, sickness of disembarkment - which can last weeks, months or even years ([see VeDA's article on MdDS](#)).



Everyone has the potential to experience motion sickness, but some people, about 10% of the overall population, are more susceptible. Groups that have been found to be more likely to experience motion sickness include:

- Women more often than men (*Pregnant women especially*)
- People of Chinese descent
- Children between the ages 2 and 12 years

## THE ANATOMY OF BALANCE

Your sense of balance is maintained by a complex interaction of the following parts of the nervous system:

- The **inner ears** (also called the labyrinth), which monitor the directions of motion, such as turning or forward-backward, side-to-side, and up-and-down motions.
- The **eyes**, which monitor where the body is in space (i.e., upside down, right-side up, etc.) and also directions of motion.
- The **skin pressure receptors** such as in the seat and feet, which tell what parts of the body are down and touching the ground.
- The **muscle and joint sensory receptors**, which tell what parts of the body are moving.
- The **central nervous system** (the brain and spinal cord), which processes all the bits of information from the four other systems in order to coordinate it.

Some people describe a balance problem by saying they feel dizzy, lightheaded, unsteady, or giddy. This feeling of imbalance or disequilibrium, without a sensation of turning or spinning, is sometimes due to an inner ear problem.

“Vertigo” comes from the Latin verb “to turn.” People who experience this often say that they feel like they or their surroundings are turning or spinning. Vertigo is frequently due to an inner ear problem.

Dizziness, vertigo, and motion sickness all relate to the sense of balance and equilibrium. Researchers in space and aeronautical medicine call this sense spatial orientation, because it tells the brain where the body is “in space” – what direction it is pointing, what direction it is moving, and if it is turning or standing still.

The symptoms of motion sickness and dizziness appear when the central nervous system receives conflicting messages from the visual system and the vestibular system in the inner ears.



For example, suppose you are riding through a storm in an airplane and the plane is being tossed about by air turbulence. Your head is moving, triggering the hair cells in your inner ear. Your body is moving, triggering your skin and muscle receptors. But your eyes do not detect this motion because all you see is the inside of the airplane. Thus, your brain receives conflicting messages from these four systems and you might become “air sick.”

Another example is if you are sitting in the back seat of a moving car reading a book. Your inner ear and skin receptors will detect the motion of your travel, but your eyes see only the pages of your book. You could become “car sick.”

You might also suffer from dizziness, vertigo and/or nausea due to an inner ear dysfunction. Suppose you suffer inner ear damage on only one side from a head injury or an infection. The damaged inner ear does not send the same signals as the healthy ear. This gives conflicting signals to the brain about the sensation of rotation, and you could suffer a sense of spinning or vertigo, as well as nausea.

Because of the pervasive use of screen technology in Western civilization, which will often simulate motion, a new phenomenon has occurred with motion sickness when the body is not in motion and a person is viewing a screen. This has been called **pseudo-motion sickness** and is caused by the conflicting information between the visual and vestibular systems: the eyes are detecting motion while the vestibular system is not. The conflict causes the same symptoms as classic motion sickness.



## WHAT CAN I DO FOR MOTION SICKNESS?

The main cause of motion sickness is a conflict in sensory information between your visual and vestibular system, so the best means to manage symptoms are to prevent them from occurring.

- Always ride where your eyes will see the same motion that your body and inner ears feel, such as the front seat of a car while looking at the distant scenery. If you are on a boat you can go up on the deck and watch the motion of the horizon. When in an airplane either sit by the window of the airplane and look outside and/or choose a seat over the wings, where the motion is the least.
- Do not read while traveling if you are subject to motion sickness, and do not sit in a seat facing backward.
- Do not watch or talk to another traveler.
- Avoid strong odors and spicy or greasy foods immediately before and during your travel.



There are a variety of medications and homeopathic treatments that have been shown to be quite effective in managing motion sickness directly as well as managing the symptoms of nausea and indigestion. Some of these include:

- Take one of the varieties of motion sickness medicines before your travel begins, as recommended by your physician. Some of these medications can be purchased without a prescription (i.e., Dramamine, Bonine, Marezine, etc.).
- Scopolamine as a tablet and/or patch worn behind the ear has regularly been shown to be effective in managing motion sickness. The main side effect of scopolamine in any form is dry mouth.
- Antihistamines have been shown to be effective. The main side effect is drowsiness.

## WHAT YOU CAN DO

Here are a few strategies if you suffer from motion sickness:

Ride in the front seat of a car while looking at the distant scenery.

On a boat, go up on the deck and watch the motion of the horizon.

On an airplane, sit by the window and look outside or choose a seat over the wings.

- Stronger medicines such as tranquilizers and nervous system depressants will require a prescription from your physician.
- Acupuncture and acupressure have been shown to have a positive effect on the treatment of motion sickness. Acupressure bands worn around the wrist have shown a modest effect to prevent motion sickness.
- Drinking ginger ale or ginger tea or eating candied ginger is often helpful.
- Eating light and easily digested foods can help manage symptoms of nausea during bouts of motion sickness.
- Medical research has not yet investigated the effectiveness of popular folk remedies such as soda crackers and Seven-Up or cola syrup over ice for motion sickness.

**Remember:** Most causes of dizziness and motion sickness are mild and self-treatable disorders. But severe cases, and those that become progressively worse, deserve the attention of a physician with specialized skills in diseases of the ear, nose, throat, equilibrium, and neurological systems. If the symptoms are strongly altering your ability to balance and be safe, seeking consultation is certainly warranted.



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