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# Audiology Department

## Patient Information

# The Balance System

## Document history

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In order to balance we use information from three main senses:

1. The balance organ in each inner ear (see Figure 1)
2. Vision
3. Proprioception or somatosensory inputs (sensors in your feet, muscles and joints)

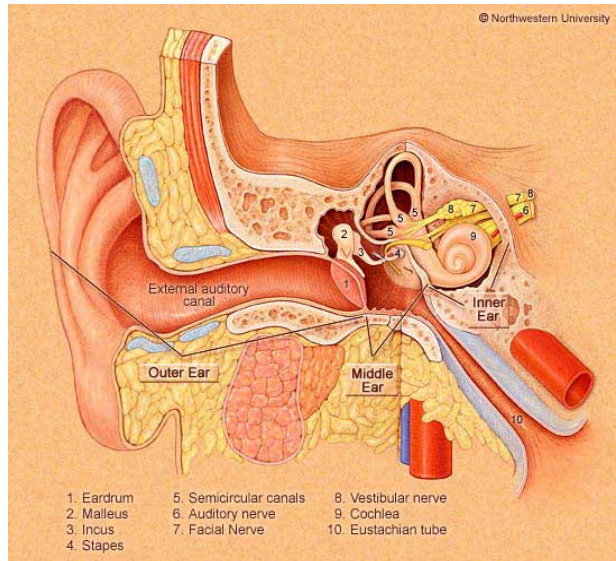


Figure 1. The Ear: see point 5 on diagram - the semicircular canals of the balance organ, see point 8 on diagram - the vestibular or balance nerve.

Information from the three senses regarding the orientation of your head and body is sent via the balance nerve to your brain where the information is combined. Of particular importance to balance are the areas of the brain called the brainstem and the cerebellum. The balance system works not only to maintain postural stability but also to stabilize your head and to ensure clear vision during head movement. The flow of information regarding your body orientation is used by your brain to decide upon your body's response. Your brain may decide to move your body overall, move your neck muscles, or move your eyes. These movements usually occur via reflexes and so you are not necessarily aware of conscious decisions being made regarding your movements.

Each balance organ is divided into three semicircular canals and two otolith organs (see Figure 2). The semicircular canals sense angular movements (for example, head turns) and the otoliths sense linear movements (for example, going up or down in a lift). With movements of your head and/or body, fluid in the different areas of the balance organ will move across tiny sensory hair cells. This stimulates the hair cells, resulting in information regarding the movements being sent to the brain via the balance nerve.

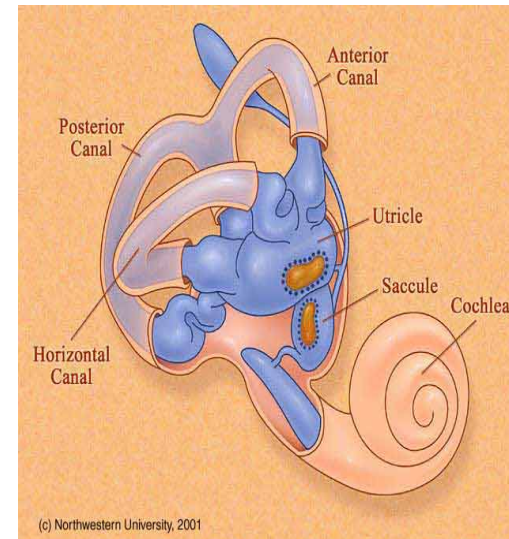


Figure 2. The Balance Organ: note the three semi-circular canals: anterior, horizontal and posterior; and the two otoliths: the saccule and the utricle.

Problems with any part of the balance system; including the balance organs, vision and/or proprioception, can lead to problems with dizziness and/or imbalance. In some conditions the balance organ in one ear may become impaired. In this case it can be the difference in messages sent to your brain by each balance organ regarding your movements that can lead to dizziness and/or imbalance. The brain can often learn to compensate for this asymmetry in messages and symptoms improve with time.

### Acknowledgements

Figures, with permission, from Hain TC. <http://www.dizziness-and-balance.com/disorders/bppv/otoliths.html>, 02/12/2008.