Physiology of balance

The semicircular canals and the vestibule (utricle and saccule) are concerned with balance, or equilibrium . The arrangement of the three semicircular canals, one in each plane, allows perception not only of the position of the head in space but also of the direction and rate of movement. Any change of position of the head causes movement in the endolymph bathing the hair cells, which distorts them and stimulates the sensory receptors in the utricle, saccule and ampullae. The resultant nerve impulses are transmitted by the vestibulae nerve, which join the cochlear nerve to form the vestibulocochlear nerve. The vestibular branch passes first to the vestibular nucleus, then to the cerebellum.

The cerebellum also receives nerve impulses from the eyes and proprioceptors (sensory receptors) in the skeletal muscles and joints. The cerebellum coordinates incoming impulses from the vestibular nerve , the eyes and proprioceptors. Thereafter, impulses are transmitted to the cerebrum and skeletal muscles , enabling perception of body position and any adjustment needed to maintain posture and balance. This maintains upright posture and fixing of the eyes on the same point, independently of head movement .