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PHYSIOLOGY OF BALANCE

The vestibular system is the sensory apparatus of the inner ear that helps the body maintain its postural equilibrium .The information furnished by the vestibular system is also essential for coordinating the position of the head and the movement of the eyes .There are two sets of end organs in the inner ear , or labyrinth; the semicircular canals which , which responds to changes in the position of the head with respect to gravity(linear acceleration). The information these organs deliver is proprioceptive in character , dealing with events within the body itself , rather than exteroceptive , dealing with events outside the body as in the case of the responses of the cochlea to sound. Functionally these organs are closely related to the cerebellum and to the reflex center of the spinal cord and brainstem that govern the movements of the eyes, neck and limbs

Although the vestibular organs of the cochlea arederived embryologically from thr same formation , the otic vesicle , their association in the inner ear seems to be a matter more of convenience than necessity . From both the developmental and the structural point of view,the kinship of the vestibular organs with the lateral line system of the fish is readily apparent . The lateral line system is made up of a series of small sense organs located in the skin of the head and along the sides of the body of fishes . Each organ contains a crista , sensory hair cells , and a cupula , as found in the ampullae of the semicircular ducts . The cristae respond to waterborne vibrations and pressure changes.

The anatomists of the 17th and 18th centuries assumed that the entire inner ear , including the vestibular apparatus, is devoted to hearing . They were impressed by the orientation of the semicircular canals , which lie in three planes more or less perpendicular to one another and believed that the canals must be designed for localizing a source of sound in space .The first investigator to present evidence that the vestibular labyrinth is the organ of equilibrium was French experimental neurologist Marie jean pierre flourens , who in 1824 reported a series of experiments in which he had observed abnormal head movements in pigeons after he had cut each of the semicircular canals in turn . The plane of the movement was always the same as that of the injured canal. Hearing was not affected when he cut of the nerve fibres to these organs, but it was abolished when he cut those to the basilar papilla ( the birds uncoiled cochlea).it was not until almost half a century later that the significance of his findings was appreciated and the semicircular canals were recognized as sense organs specially concerned with the movements and position of the head .