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1) 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 respond to rotational movement(angular acceleration);and the utricle and saccule within the vestibule, which respond to changes in the position of the head with respect to gravity(linear acceleration). The information these organs deliver is pro proprioceptive in character, dealing with events within the body itself, rather than exteroc eptive, dealing with events outside the body, as in the case of response of the cochlea to the sound. Functionally these organs are closely related to the cerebellum and to the reflex centers of the spinal cord and brainstem that govern the movements of the eyes, neck, and limbs.

THE CENTAL VESTIBULAR SYSTEM

The information from the vestibular apparatus is continuously offset by the somatosensory information from the brain and neck area, as well as from other joints, for the cental nervous system to acquire information about the posture of the entire body. The four vestibular nuclei involved are the nucleus superior of Bechterew, nucleus inferior of Roller, nucleus medalis of Schwalbe and nucleus laterals of Deiters. This is also true for muscular reflexes activated to maintain body balance.

Particularly interesting are the vestibulo-ocular reflexes, which connect the vestibular apparatus with the eye muscles. This is, for instance, important for rotational movements. Vestibular nystagmus is a slow, vestibular induced eye movement followed by a fast return movement. Example, if a person sitting in a chair turns to the right, the sensory cells in the right semicircular duct is activated. They project through vestibular nuclei to nuclei of the eye muscle and cause an eye movement to the left. Vision stabilization follows. The fast return movement is mediated centrally and follows the turning movement.