

RAJI UMMI-SALMA ONIZE

18/ENG08/020

BIOMEDICAL ENGINEERING

ASSIGNMENT

QUESTION

DISCUSS THE PHYSIOLOGY OF BALANCE

ANSWER

Balance is defined as the ability of the body to maintain equilibrium. A sensory apparatus in the inner ear named vestibule, helps the body to maintain its postural equilibrium. This vestibular system is essential for coordinating head balance and also eye movements.

The vestibule connects the cochlea and the semicircular canal (have function associated with balance). The two structures, saccule and utricle in the vestibule contribute in the maintenance of balance.

The bony tubes in the inner ear called the bony labyrinth, which is filled with a fluid called perilymph. Along with that membranous labyrinth can be seen and it is filled with a fluid called endolymph. Here some hairy cells can be found, the hairy cells of Corti. The final end of the inner ear has round window which is connected with cranial nerve (vestibulo-cochlear nerve) and this is connected with the cerebellum and the spinal cord.

Balance

The changes in the environment are easily sensed by the semicircular canal. This produces endolymph waves in the canal. This allows the movement of hair cells within their base. Based on the gravity changes and the movement of head, the hairy cells of the utricle and saccule get stimulated and thereby sense the position of head. Small dense

areas of nerve fibers called macule are seen in the saccule and utricle. The macule of saccule is aligned vertically and macule of utricle is oriented horizontally. Each macule contains fine hair cells which are covered by an otolithic membrane covered by calcium crystals. These calcium crystals stimulate position hairs and provoke nerve impulses based on position changes and this information is transmitted to the brain and cerebellum