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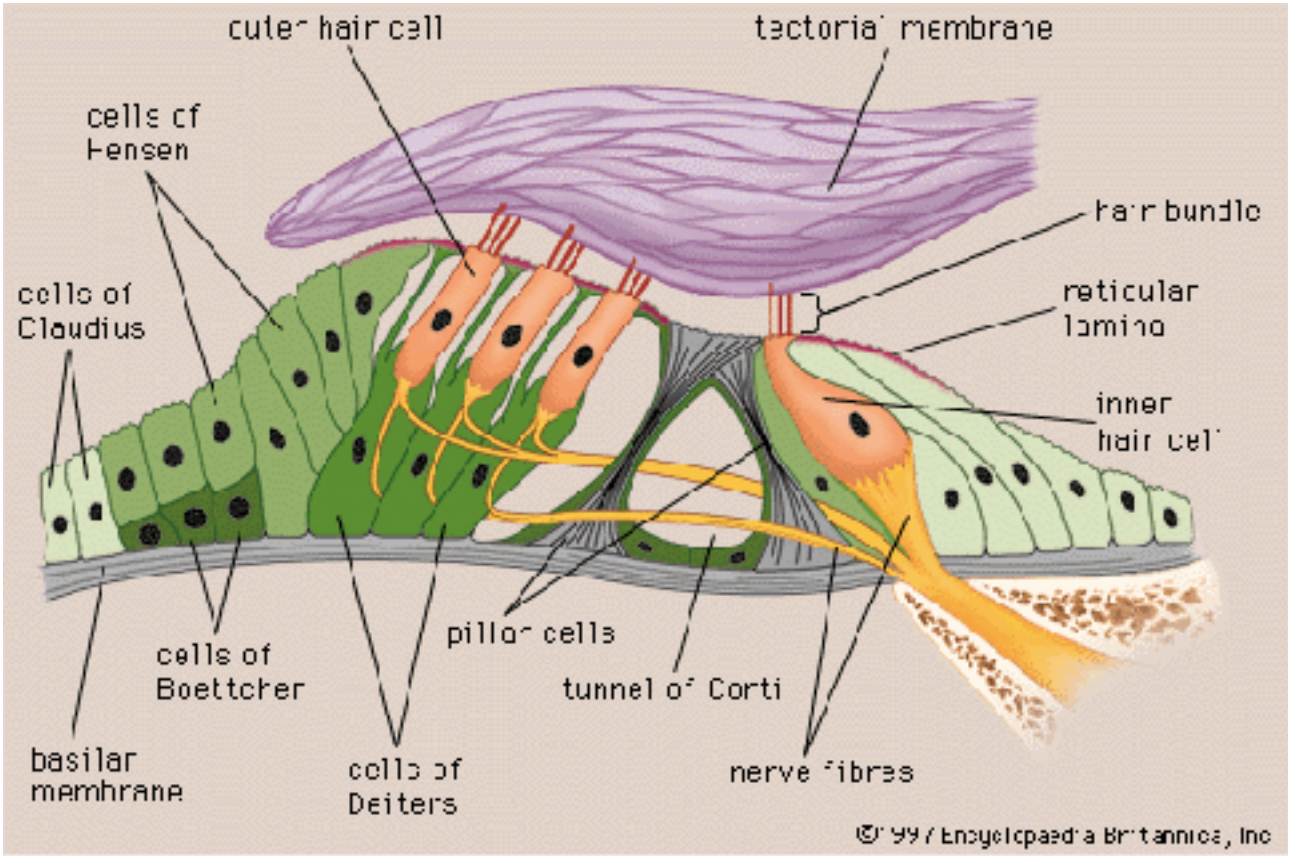
COURSE: NEUROHISTOLOGY

QUESTION

1) With the aid of a diagram, write an essay on the histology of an organ of Corti.

ANSWERS

HISTOLOGY OF AN ORGAN OF CORTI



THE DIAGRAM OF AN ORGAN OF CORTI

The Organ of Corti is an organ of the inner ear located within the cochlea which contributes to audition. The spiral organ of Corti is so called because (like other structures in the cochlea) it extends in a spiral manner through the turns of the cochlea. It is seen in sections to be placed on the basilar membrane and to be made up of epithelial cells that are arranged in a complicated manner.

COMPONENTS OF THE ORGAN OF CORTI

- The Organ of Corti includes three rows of outer hair cells that have stereocilia (but no kinocilium) on their apical border and synapse with bipolar neurons of the cochlear(spiral) ganglion of CNVIII(vestibulocochlear nerve). The outer hair cells are in contact with the tectorial membrane rich in tectorin.
- one row of inner hair cells which are given different names according to their location.

Vibrations caused by sound waves bend the stereocilia on these hair cells via an electromechanical force. The hair cells convert mechanical energy into electrical energy that is transmitted to the central nervous system via the auditory nerve to facilitate audition.

The Organ of Corti are covered from above by a gelatinous mass called MEMBRANA TECTORIA.

NOTE: The organ of Corti responds to sound

- Cells of the spiral organ enclose a triangular cavity called the tunnel of Corti (or cuniculum internum).

- The base of the tunnel lies over the basilar membrane. It has a sloping inner wall that is formed by internal rod cells; and a sloping outer wall that is formed by external rod cells. To the internal side of the inner rod cells there is a single row of inner hair cells. The inner hair cell is supported by tall cells lining the tympanic lip of the internal spiral sulcus.

- The outer hair cells do not lie on the basilar cells but are supporting cells which includes

a) ***PHALANGEAL CELLS(of dieters)***: They rest on the basilar membrane. It consists of : Outer Phalangeal Cells (they are tall columnar, they do not reach the free surface of organ of Corti) and Inner Phalangeal Cells (located deep to the inner hair cells).

NOTE: Space of Nuel which is a fluid filled gap around unsupported regions of the outer hair cells helps in the communicantion with inner tunnel.

b) ***CELLS OF HENSEN***: To the outer side of the outer hair cells and phalangeal cells, there are tall supporting cells called the cells of Hensen.

c) ***CELLS OF CLADIUS***: It is located more externally the outer spiral sulcus is lined by cubical cells and these cells are called Cladius cells.

NOTE: A narrow space the CUNICULUM EXTERNUM intervenes between the outermost hair cells and the cells of Hensen.

d)***CORTI PILLARS***: The central portions are deflected to form the walls of inner tunnel; apical portion contact each other.

NOTE: The edges of the phalanges of adjoining phalangeal cells unite with each other to form a membrane called the ***reticular lamina***. The reticular lamina also receives contributions from the heads of hair cells.

CLINICAL CORRELATE

1) HEARING LOSS:

The Organ of Corti can be damaged by excessive sound levels, leading to noise induced impairment. The most common kind of hearing impairment, sensorineural hearing loss, includes as one major cause the reduction of function in the organ of Corti.

Specifically, the active amplification function of the outer hair cells is very sensitive to damage from exposure to trauma from overly loud sounds or certain ototoxic drugs. Once outer hair cells are damaged, they do not regenerate and result is a loss of sensitivity and an abnormally large growth of loudness the part of the spectrum that the damaged cells serve.