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ASSIGNMENT TITTLE: HISTOLOGY OF EAR

QUESTION: With the aid of a diagram, write an essay on the histology of an organ of corti.

The Organ of Corti is a part of the cochlear and is a specialized sensory epithelium that allows transduction of sound vibrations into neural signal. It is also contained within the scala media. The Organ of Corti is a long strip of tissue that extends the length of the scala media, from the base of the cochlear to its apex. Tissue sections of the cochlea typically contain several appearances of the organ of Corti, as the organ is sliced in each of the helix.

The fluid environment for the organ of Corti is endolymph, which fills the scala media. (Endolymph is secreted by cells of the stria vascularis). Within the complex strip of tissue that comprises the organ of Corti are specialized sensory hair cells. The entire complex (the whole organ of Corti) rests on the basilar membrane. This basilar membrane supports the basal ends of the hair cells in the organ of corti. The apical ends of hair cells touch the tectorial membrane, a “shelf” of jelly that is supported immovably on the spiral lamina. When the basilar membrane flexes in respond to sound waves (i.e. pressure waves delivered to inner-ear ossicles), the organ of Corti, including its hair cells, also moves. Thus, when the basilar membrane is moved by pressure waves (i.e. sounds), the hair cells move relative to the tectorial membrane, causing stimulatory deflection of the apical ends of the hair cells. The Organ of Corti consists of two functionally distinct classes of hair cells and supporting cells.

INNER HAIR CELLS:

These cells are specialized in the mechanoelectrical transduction. There are almost 3500 cells disposed in one line along all the basilar membrane. They are connected to type I neuron peripheral fibres of spiral ganglion, these connection are very divergent. The luminal part of the cell is immerged in endolymph; the basal one is immerged in normal extracellular fluid. The luminal portion is formed by bundles of stereocilia, whose tips are connected by filamentous structures called tip-links.

OUTER HAIR CELLS:

These cells are acoustical pre-amplifiers. They are almost 12000, disposed in three parallel lines. These cells are connected to type II amyelinic neurons, the connections are very convergent. They have also an afference from superior olivary nucleus. They have contractile activity.

SUPPORTING CELLS:

These cells are of four different types: Corti pillars, Hensen cells, Deiters cells and Claudius cells.

The membranous labyrinth is filled with endolymph and surrounded by perilymph. Endolymph is a unique fluid, with high potassium concentration and very low sodium concentration. This endolymph provides the proper ionic environment for hair cells function. Endolymph is secreted by cells of the stria vascularis, along the scala media of the cochlea. The stria vascularis resembles a stratified cuboidal epithelium, but unlike any proper epithelium, these tissues contain capillaries among cuboidal cells.

Perilymph is similar to ordinary interstitial fluid. Perilymph fills the spaces of the bony labyrinth surrounding the membranous labyrinth. In the vestibular system (surrounding the saccules, utricle, and semicircular canals), perilymph simply provides a cushioning support for the membranous labyrinth. In the cochlear, perilymph of the ascending scala vestibule and descending scala tympani conveys pressure waves( sound) across the scala media. Pressure waves flex the basilar membrane and thereby stimulate hair cells of the organ of Corti.



