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COURSE: HISTOLOGY OF SPECIAL SENSES AND NEUROHISTOLOGY

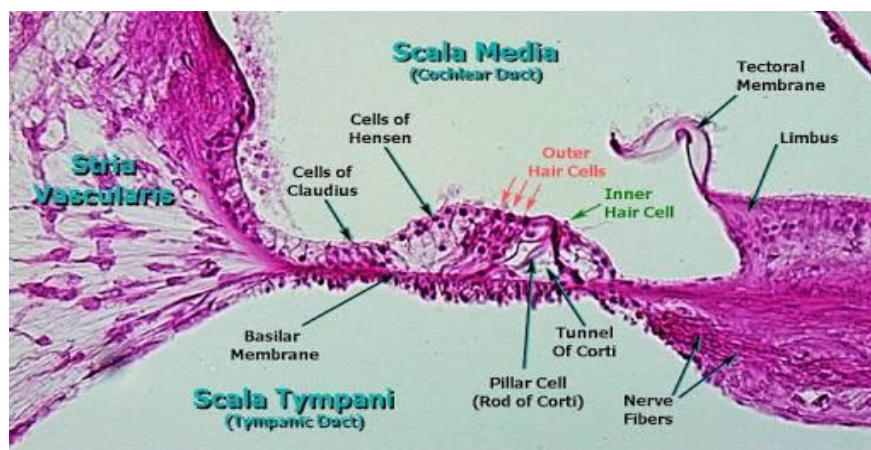
LECTURER: DR. ADESHINA ADEKEYE

QUESTION

With the aid of a diagram, write on the histology of the organ of Corti .

ANSWER

The Organ of Corti is a specialized sensory epithelium that allows for transduction of sound vibration into neural sounds. It is situated on the basilar membrane and is spread like a ribbon along the entire length of the basilar membrane. It is made up of epithelial cells that are arranged in a complicated manner. The cells include the true receptor cells or hair cells and supporting cells which are given different names depending on their location.



The cells of the organ of Corti are covered from above by a gelatinous mass called the **memebrana tectoria**. It consists of delicate fibres embedded in a gelatinous matrix. A tunnel can be seen situated between the inner and outer rod cells and this tunnel contains a fluid called **cortilymph**. The base of the tunnel lies above the basilar membrane.

To the internal side of the **inner rod/pillar cells** there is a single row of **inner hair cells** and it is supported by tall cells lining the tympanic lip of the internal/inner spiral sulcus. On the outer side of the **outer rod/pillar cells** are three or four **outer hair cells**. The outer hair cells do not lie directly on the basilar membrane, but are supported by **phalangeal cells of Dieters** which rest on the basilar membrane. To the outer side of the tall supporting phalangeal cells and outer hair cells are the tall **cells of Hensen**, which are also supporting cells. Still more externally the outer spiral sulcus is lined by cubical cells known as the **cells of Claudius**.

The **Hair cells** bear a number of hairs which are in fact stereocilia. Each cell is piriform or columnar and shorter than the rod cells. Both outer and inner hair cells have afferent and efferent nerve endings, with the inner hair cells much more heavily innervated. The cell bodies of the afferent bipolar neurons are located in a bony core of the modiolus and constitute the **spiral ganglion**.

No kinocilium is present on the hair cells, allowing symmetry on the cells that is important for their role in sensory transduction.

Two major types of columnar supporting cells are associated with the hair cells of the organ of Corti.

Pillar/ rod cells are stiffened by bundles of keratin and outline a triangular, tunnel-like space between the outer and inner hair cells another structure important in sound transduction.

Phalangeal cells intimately surround and directly support both inner and outer hair cells, almost completely enclosing each inner hair cell but only the basal ends of the outer hair cells.

Stereocilia of hair cells detect movements of the spiral organ. Sound waves collected by the auricle of the external ear cause the tympanic membrane to vibrate, which causes movement of the ossicles in the middle ear. The large size of the tympanic membrane compared to the oval window and the mechanical properties of the ossicle chain connecting these two membranes allow for optimal transfer of energy between air and perilymph, from sound waves to vibrations of tissues and fluid-filled chambers.

