MATRIC NUMBER: 17/MHS01/033

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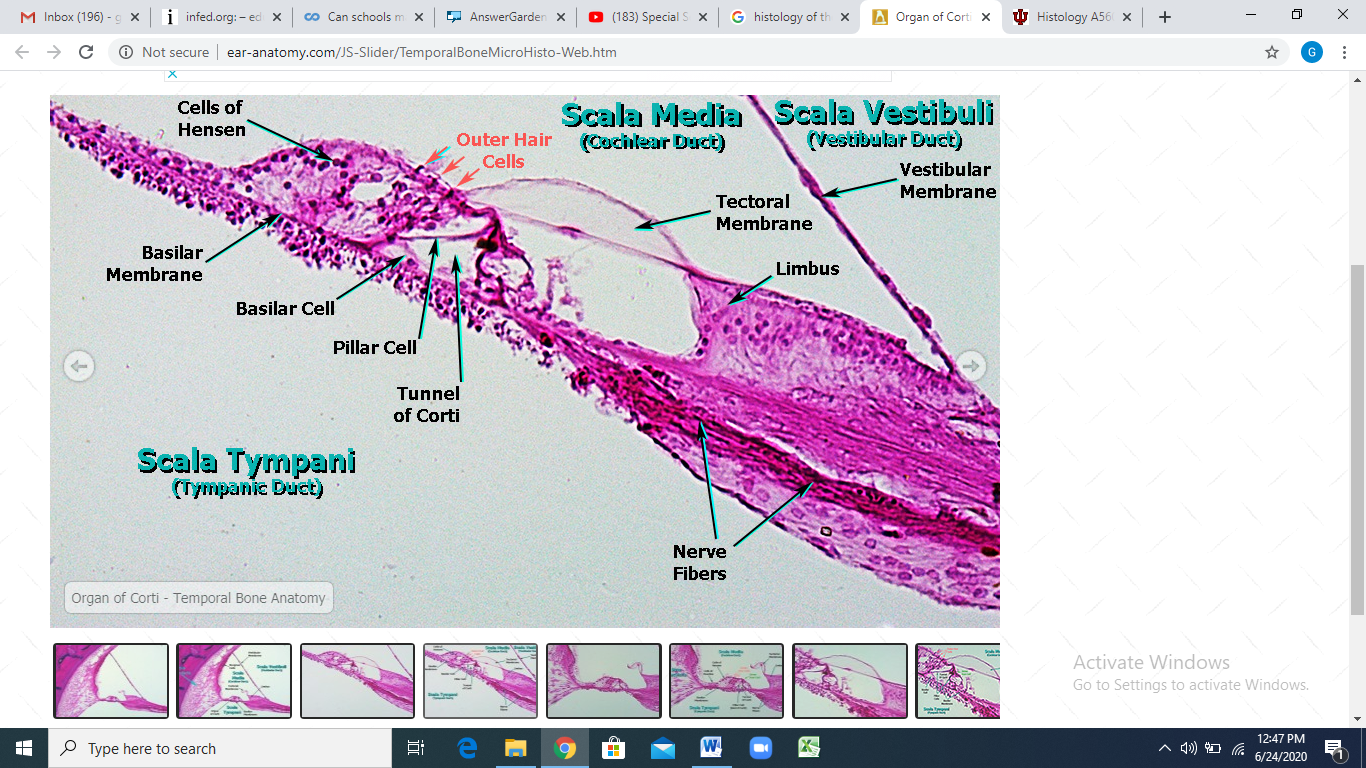
LEVEL: 300L

COURSE CODE: ANATOMY 305

COURSE TITLE: HISTOLOGY OF SPECIAL SENSES AND NEUROHISTOLOGY

ASSIGNMENT TITILE: HISTOLOGY OF THE EAR

ASSIGNMENT: WITH THE AID OF A DIAGRAM, DISCUSS THE HISTOLOGY OF THE ORGAN OF CORTI.



**DIAGRAM OF THE ORGAN OF CORTI**

The organ of Corti is the structure within the cochlear that turns the vibrations of sound-waves into electrical impulses.

It is a specialized sensory epithelium that allows for the transduction of sound vibrations into neural signs.

It is located on the basilar membrane, the membrane that separates the cochlear duct (scala media) from the tympanic duct (scala typani).

The organ of Corti contains two types of hair cells:

1. Inner hair cells.
2. Outer hair cells.

**Inner Hair Cells**

These transduce sound from vibrations to neural signals via the shearing action of their stereocilia. They are specialized in the mechano-electrical transduction. There are almost **3500 cells** disposed in one line along the length of the basilar membrane, close to the inner pillar cells.

They are connected to type I neuron peripheral fibers of spiral ganglion, these connection are very divergent (10/1). The **luminal part** of the cell is formed by bundles of stereocilia, whose tips are connected by filamentous structures called tip links. It is immersed in endolymph.

The **basal part** is immersed in normal extracellular fluid.

Inner hair cells account for approximately 90-95% of the sensory input to the auditory system.

**Outer Hair Cells**

They serve the function of acoustic pre-amplifiers which improve frequency selectivity, by allowing the organ of Corti to become attuned to specific frequencies, like those of speech or music. There are about 12,000 of them, disposed in three parallel lines. They are surrounded by outer phalangeal cells.

The apices of these cells and their phalangeal cells are joined together to form the reticular membrane (also called reticular lamina or apical cuticular plate) that separates endolymph in the scala media from underlying corticolymph and perilymph of the scala tympani.

They have contractile activity. The fibrous tectorial membrane rests on top of the stereocilia or the outer hair cells. Lateral to the outer hair cells and phalangeal cells are other support cells.

Outer hair cells account for only ~5-10% of the sensory input into the auditory system. The primary function of outer hair cells is actually to contract when stimulated, thus "pulling" on the tectoral membrane thereby stimulating the inner hair cells.

**CLINICAL ANATOMY**

Loss of INNER HAIR CELLS in a particular region of the cochlea would result in an almost complete inability to detect specific frequencies regardless of how loud they are. The deafness could only be corrected with a cochlear implant.

Loss of OUTER HAIR CELLS in a particular region of the cochlea would result in a "threshold shift" whereby sound of a particular frequency could still be detected (because the inner hair cells are still intact), but it would have to be LOUDER to make up for the fact that there are no outer hair cells to help stimulate the inner hair cells. This type of hearing loss can be compensated by a hearing aid.

REFERENCE:

Diagram: <http://ear-anatomy.com/JS-Slider/TemporalBoneMicroHisto-Web.htm>