physiology
lecture (8) part(1)

hearing (ability to perceive sounds)

hearing threshold (0dB at 1000 Hz)

the ear is divided to:

- external ear: collect sound waves and channels them inward
- middle ear(tympanic cavity): conveys sound vibration to the oval window (make the sound louder)
- inner ear : houses the receptors

the larger intensity(dB) , the the louder is the sound . 1 dB= 10 x increase in sound intensity

external ear

- Auricle: outside part , collect sound waves
- external auditory canal: connects the outer ear to the middle ear, channels the sound waves inward
- tympanic membrane (eardrum): divides external ear and middle ear, transmission of sound waves to vibrations

middle ear

- ossicles : three small bones , Malleus incus and stapes (mis), connect and transmit the sound vibrations to the inner ear.
- Eustachian tube : links the middle ear with the back of the nose, equalize the pressure in the middle ear, lined with mucous .

inner ear

- Oval window of cochlear canal: where the vibrations will enter the inner ear through
- Endolymph fluid in the canal of Cochlea
  cochlea also contains the nerves for hearing
- Hair cells (auditory receptors)
- Vestibule : This contains receptors for balance.
- Semicircular canals : This contains receptors for balance.

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the auditory function +physiology of hearing :

auricle (collect sound) → external auditory canal → primary tympanic membrane vibrates (small vibrations larger surface area) → ossicles (MIS)(amplify) → oval window (larger vibrations small surface area) → pressure waves in perilymph → move into endolymph → basilar membrane vibrates → stereocilia bend → neural signal generated in cochlear nerve fibers.

vibrations at oval window are 20 times more vigorous than tympanic membrane

Sound waves of various frequencies cause certain regions of the basilar membrane to vibrate more intensely than other regions

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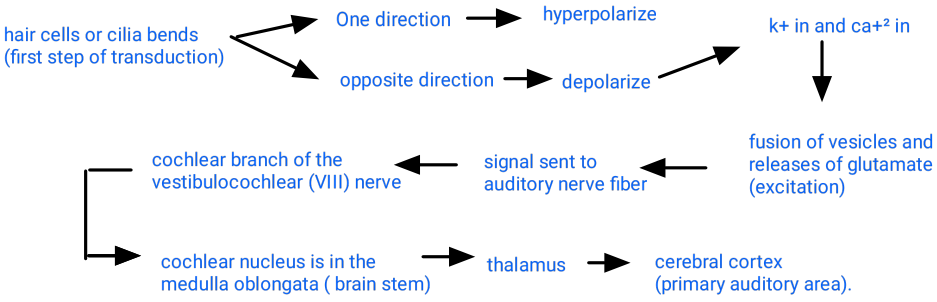
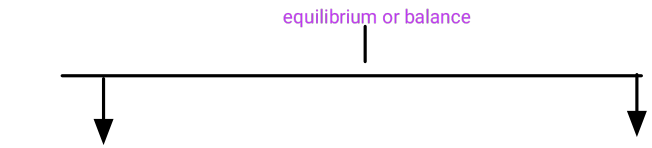
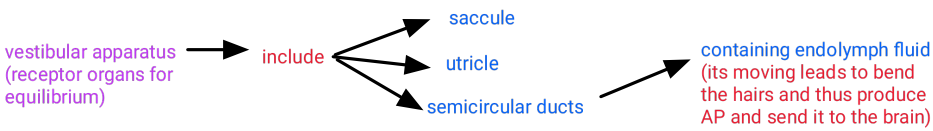
the auditory pathway (bilateral pathway):



hair cells or cilia are attached to a tectorial membrane (fixed membrane)





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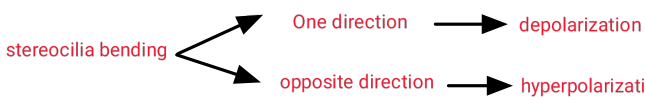
the walls of both the utricle and the saccule (oriented horizontally and vertically) contain a small, thickened region called a macula.

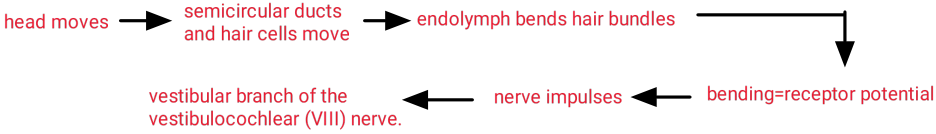
The two maculae (perpendicular), are the receptors for static equilibrium.

maculae = supporting cells+ hair cells (sensory receptors) (containing stereocilia)



The three semicircular ducts (containing a group of hair cells and supporting cells) function in dynamic equilibrium.

dynamic equilibrium:



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the equilibrium pathway :