

The Human Ear

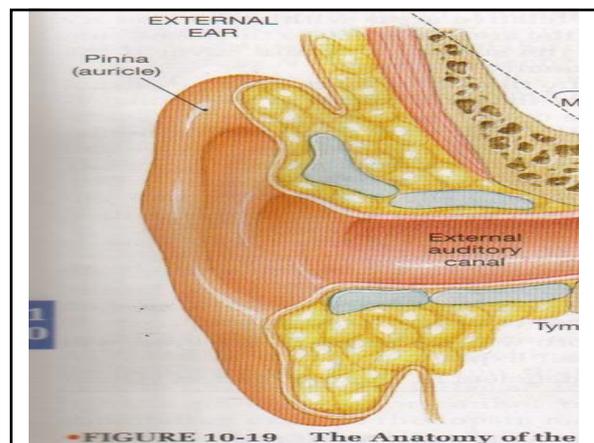
The senses of equilibrium and hearing are provided by the inner ear, a receptor complex located in the temporal bone of the skull. The basic receptors, or hair cells, are simple mechanoreceptors.

The complex structure of the inner ear and the different arrangements of accessory structures account for the abilities of the hair cells to respond to different stimuli and thus to provide the input for two senses.

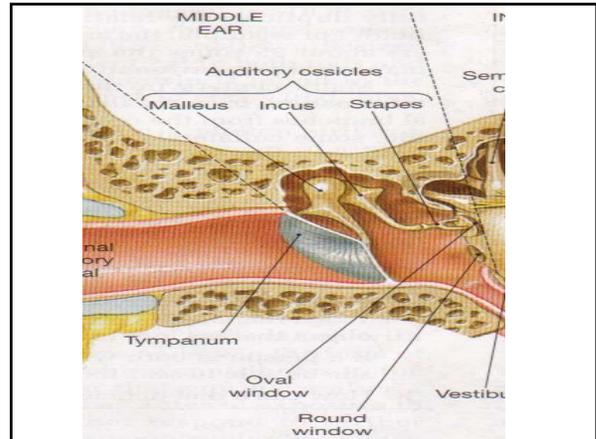
1. Equilibrium- which informs us of the position of the body in space by monitoring gravity, linear acceleration, and rotation.
2. Hearing- which enables us to detect and interpret sound waves.

The ear is divided into three anatomical regions: the external ear, the middle ear, and the inner ear.

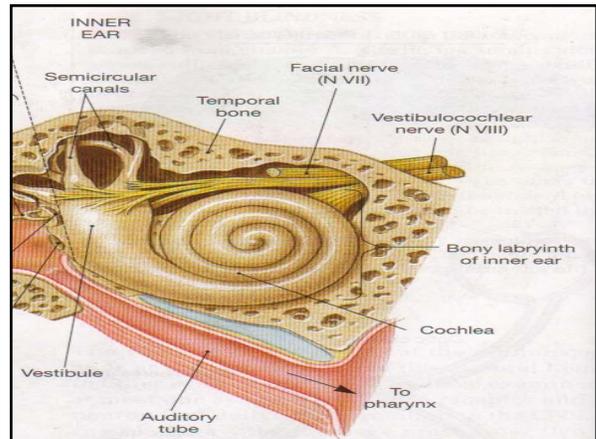
External ear- is the visible portion, collects and directs sound waves to the eardrum.



Middle ear- is a chamber located in a thickened portion of the temporal bone, collect and amplify sound waves and transmit them to a portion of the inner ear.



Inner ear- concerned with hearing, contains the sensory organs responsible for equilibrium sensations.



Outer ear- contains the Pinna, External auditory canal and the tympanic membrane.

Pinna- outer portion

External auditory canal- the passage way for sound to the ear drum

Tympanic membrane- ear drum

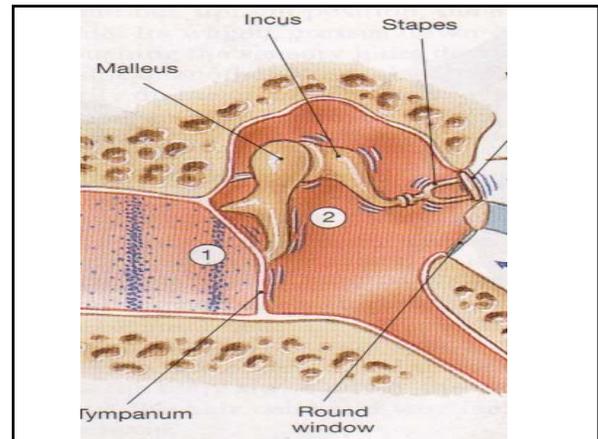
The middle ear- called tympanic cavity, filled with air, contains the auditory ossicles, and magnifies sound.

Auditory ossicles- the bones of the middle ear.

Malleus- called hammer, first bone attached to the eardrum.

Incus- called anvil, middle ear bone

Stapes- called the stirrup, attaches to the oval window



Inner ear- contains, membranous labyrinth, bony labyrinth, vestibule, saccule, utricle, semicircular canals, vestibular complex, and cochlea.

Membranous labyrinth- contains the receptors

Bony labyrinth- is a shell of dense bone that surrounds and protects the membranous labyrinth.

Vestibule- contains two sacs called saccule and utricle that contains receptors that provide sensation of gravity and linear acceleration.

Semicircular canals- stimulated by rotation of the head or dynamic equilibrium.

Cochlea- provides the sensation of hearing.

Hair cells- line the inner ear, communicates with a sensory neuron by continually releasing small quantities of neurotransmitter.

What is dynamic and static equilibrium?

Dynamic equilibrium- refers to when the head and body are moved suddenly.

Static equilibrium- maintains our posture and stability when the body is motionless.

How do we hear?

1. Sound waves arrive at the tympanic membrane or eardrum
2. The vibration of the tympanum causes movement of the auditory ossicles

3. The movement of the stapes at the oval window establishes pressure waves in the perilymph of the vestibular duct.

4. The pressure waves distort the basilar membrane on their way to the round window of the tympanic duct.

5. The vibration of the basilar membrane causes the vibration of hair cells against the tectorial membrane.

6. Information about the region and intensity of stimulation is relayed to the CNS over the cochlear branch of N VIII.

Now, lets look at hearing deficits on page 298. That cover the ear, next we will discuss all the parts of each organ system.