Divisions Of The Ear

- External Ear
- Middle Ear
- Inner Ear
- Central Auditory Nervous System
Structures of the Outer Ear

Pinna
- Collect sound
- Localization
- Resonator
- Protection
External Auditory Canal

- Extends from the pinna to the tympanic membrane
- 1 1/2 inch in length
- Protects the eardrum
- Wax
Structures of the Middle Ear

- Tympanic Membrane
- Tympanic Cavity
- Ossicles
- Middle Ear Muscles
- Eustachian Tube
- Mastoid
Tympanic Membrane

- The eardrum separates the outer ear from the middle ear
- Creates a barrier that protects the middle and inner areas from foreign objects
- The eardrum vibrates in response to sound pressure waves.
- Changes acoustic energy into mechanical energy
Ossicles

- Malleus (hammer)
- Incus (anvil)
- Stapes (stirrup) smallest bone of the body
Middle Ear Muscles

- Tensor tympani
  - Attached to malleus

- Stapedius
  - Attached to stape

- Middle Ear Muscle Function:
  - Help maintain ossicles in proper position
  - Protect inner ear from excessive sound levels
  - This protective reflex termed "acoustic reflex"
Eustachian Tube

- The ET connects the front wall of the middle ear with the nasopharynx.
- It operates like a valve, which opens during swallowing and yawning.
- It equalizes the pressure on either side of the eardrum, which is necessary for optimal hearing.
Mastoid

- Bony ridge behind the auricle
- Connect with middle ear
- Can get infected (Mastoiditis)
Function of Middle Ear

- Conduction
- Protection
- Transducer
- Amplifier
Amplifier

- The middle ear enhances the transfer of acoustical energy in two ways:
  - The area of the eardrum is about 17 times larger than the oval window
    - The effective pressure (force per unit area) is increased by this amount.
  - The ossicles produce a lever action that further amplifies the pressure
Structures of the Inner Ear

- Cochlea
- Vestibule
- Semicircular canals
Snail-shaped organ with a series of fluid-filled tunnels
converting mechanical energy into electrical energy
It contains *Organ of Corti* (end organ of hearing)
Traveling Waves
Vestibular System

- Consists of vestibule and three semi-circular canals
- Shares fluid with the cochlea
- Controls balance
- No part in hearing process
Central Auditory Pathway

- Pathway between cochlea and auditory cortex
- Cochlear nerve
- Cochlear nucleus
Causes of Tinnitus

- Local causes
  Every ear disease can be associated with deafness

- General Causes
  Cardiovascular disease
  Neurological conditions
Classification of Tinnitus

- Unilateral or bilateral
- Subjective or objective
- Pulsatile or non pulsatile
Key Points in History

- Accompanying ear disease
- History of noise exposure
- Trauma
- Ototoxic medications
- Systemic Diseases
THANK YOU