Some questions you should be able to answer by the end of this lecture:

- Where (anatomically) may/may you not wear an earring?
- Why should you throw you earbuds away?
- What makes it possible to hear whispered "sweet nothings"?
- Why should airlines give you gum to chew on descent?
- Why does syringing an old lady’s ear with cold tapwater make her dizzy?
- How does the ear differentiate between low & high-pitched sounds?
- Why do your ears ring after a rave party?
Ear: The 3 Parts:

External Ear:
- Pinna
- External Auditory Meatus
- Drum (Tympanic Membrane)
Ear: The 3 Parts:

Middle Ear Cleft:
- Middle Ear itself
- Eustachian Tube
- Mastoid Air Cell System
Ear: The 3 Parts:

**Inner Ear: “The Labyrinth”**
- Cochlea
- Vestibule: Utricle
- Saccule
- Semicircular Canals
- Vestibulocochlear Nerve --> CNS
External Ear:

- Pinna
- External Auditory Meatus
- Drum (Tympanic Membrane)

Tissues:

- Skin incl
  - Wax
  - Hairs
- Cartilage
  - Perichondrium
- Bone
- Eardrum

Function:

- Desquamation, migration
- Protection, migration
- protection, expulsion
- Seals off Middle Ear
Middle Ear Cleft:

- Middle Ear itself
  - Eustachian Tube
  - Mastoid Air Cell System
Middle ear Cleft: parts:

- **Middle ear per se:**
  - Mesotympanum
  - Epitympanum ("attic")
  - Hypotympanum

- **Eustachian Tube**

- **Mastoid:**
  - "Antrum"
  - Aditus
  - Air cells

Left M.E.Cleft
Middle ear anatomy: contents:

- Eardrum
- Ossicles:
  - malleus
  - incus
  - stapes
- Oval Window
- Round Window
- Facial Nerve
Middle ear Physiology:

- Aeration:
  - Eustachian tube
  - Mastoid air cell “reservoir”

- Mucosa

- Sound amplification
  - TM
  - Ossicles
Middle ear Physiology:

- Aeration:
  - Eustachian tube
  - Mastoid air cell “reservoir”

- Mucosa

- Sound amplification
  - TM
  - Ossicles
Middle ear Physiology:

- Aeration:
  - Eustachian tube
  - Mastoid air cell “reservoir”

- Mucosa

- Sound amplification
  - TM
  - Ossicles
Ear: The 3 Parts:

Inner Ear: “The Labyrinth”
- Cochlea
- Vestibule: Utricle
  - Saccule
- Semicircular Canals
- Vestibulocochlear Nerve --> CNS
THE INNER EAR:

- Cochlea
- Vestibule: Utricle
- Saccule
- Semicircular Canals
- Vestibulocochlear Nerve --> CNS
The Inner Ear: Cochlea:

- Twisted tube:
  - Basal turn to apex
- 3 Compartments:
  - Scala tympani
  - Scala media
  - Scala vestibuli
- Basilar membrane & hair cells
The Inner Ear: Cochlea: Function:

HEARING:

Sound wave travels up Basilar Membrane

Pitch (frequency) determines place of max. displacement

Hair cells of Organ of Corti on Basilar Membrane transform movement into electrical impulses => Cochlear Nerve => Cerebral Cortex
INNER EAR: PHYSIOLOGY:

Vestibulocochlear nerve (VCN)

- Cochlea
  - Hearing
- Vestibular labyrinth
  - Saccule + Utricle
  - Static position + linear acceleration
  - Maculae: Hair cells + statoconial membrane
- Semicircular canals
  - Angular acceleration
- Ampullary crista: Hair cells + cupulae
EQUILIBRIUM: ANATOMY & PHYSIOLOGY OF VESTIBULAR APPARATUS

- Bony Labyrinth contains membranous
- (Outer) Perilymph ~ Extracellular Fluid
- (Inner) Endolymph ~ Intracellular Fluid ($\uparrow$K, $\downarrow$Na)
EQUILIBRIUM:
ANATOMY & PHYSIOLOGY OF VESTIBULAR APPARATUS

MACULA (of utricle & saccule)

- Hair cells
- Statoconial membrane (CaCo3 crystals in mucopolysaccharide bed)
- Static position & linear acceleration
EQUILIBRIUM:
ANATOMY & PHYSIOLOGY OF VESTIBULAR APPARATUS

MACULA (of utricle & saccule)

- Hair cells
- Statoconial membrane (CaCo3 crystals in mucopolysaccharide bed)
- Static position & linear acceleration
EQUILIBRIUM: ANATOMY & PHYSIOLOGY OF VESTIBULAR APPARATUS

AMPULLARY CRISTA:
- Dilated ampulla at end of semicircular canal
- Hair cells
- Cupula
- Angular acceleration
EQUILIBRIUM: ANATOMY & PHYSIOLOGY OF VESTIBULAR APPARATUS

SEMICIRCULAR CANALS:
- Orientated in 3 different spacial planes
- at +/- right angles
- able to track exact direction of acceleration