



Brief ear anatomy

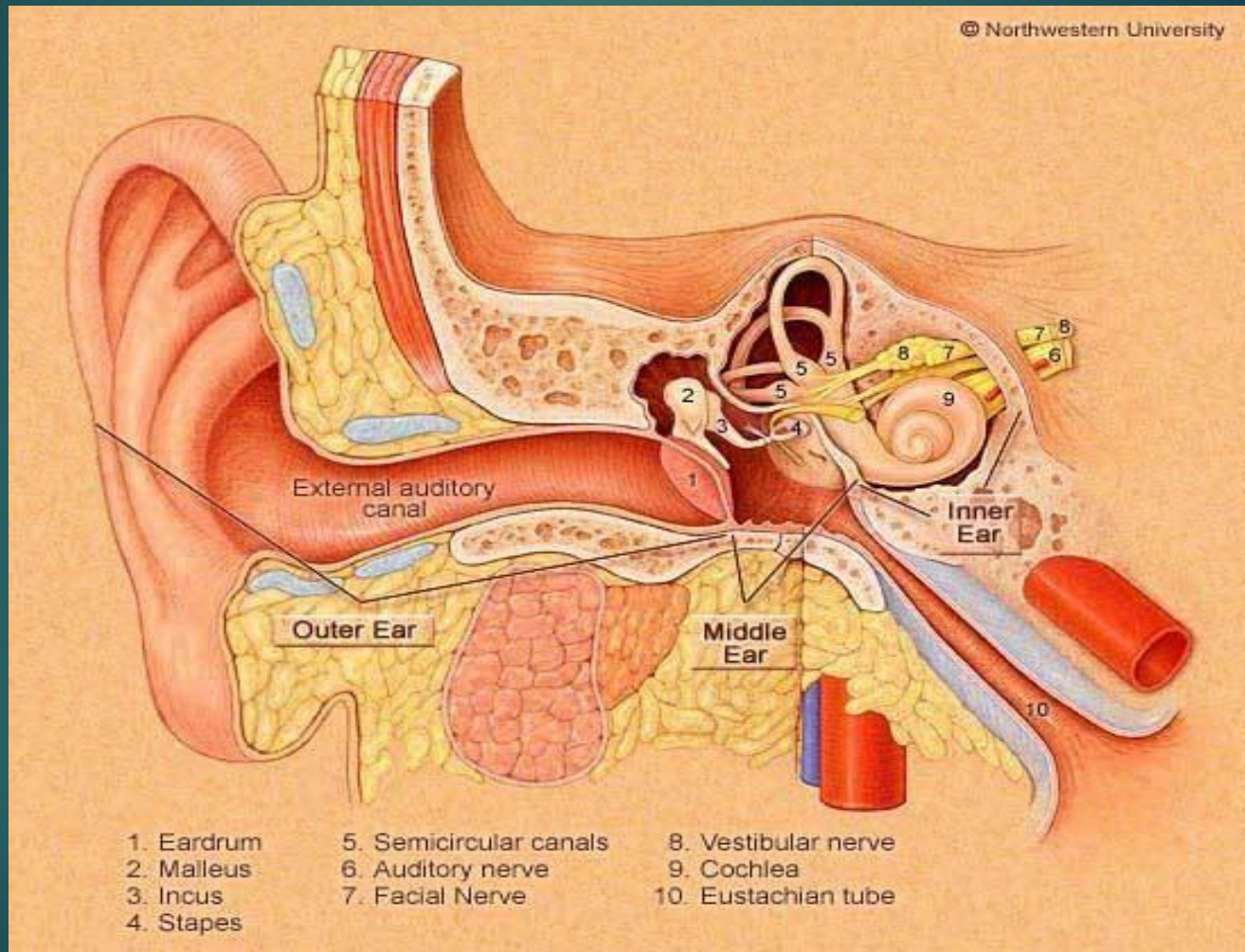
Otitis Externa, Acute Otitis media

Objectives



- Gross applied anatomy of the ear
- Nerve supply of the external and middle ears and the principles of referred earache
- Central connection of the vestibulo-cochlear nerve
- Physiology of the external, middle and inner ears

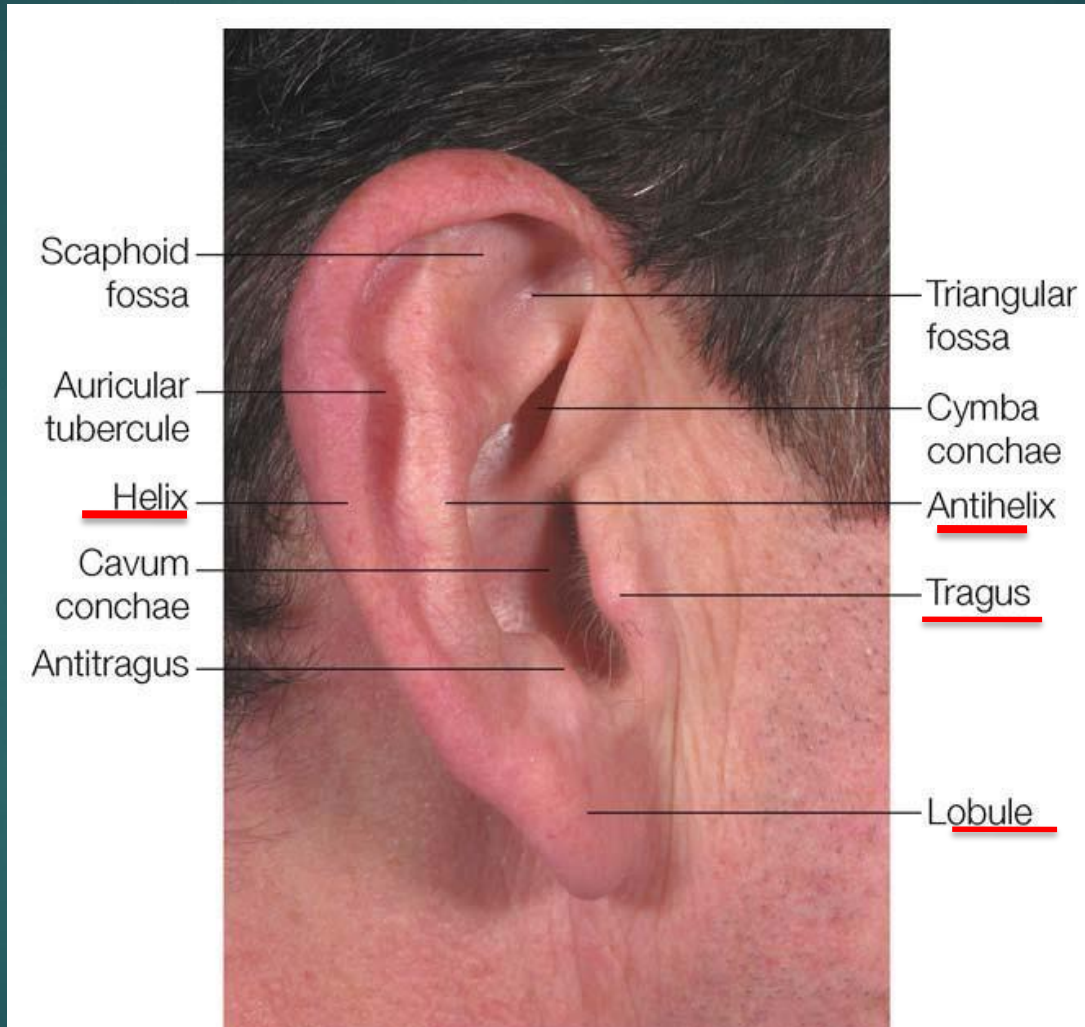
ANATOMY OF THE EAR

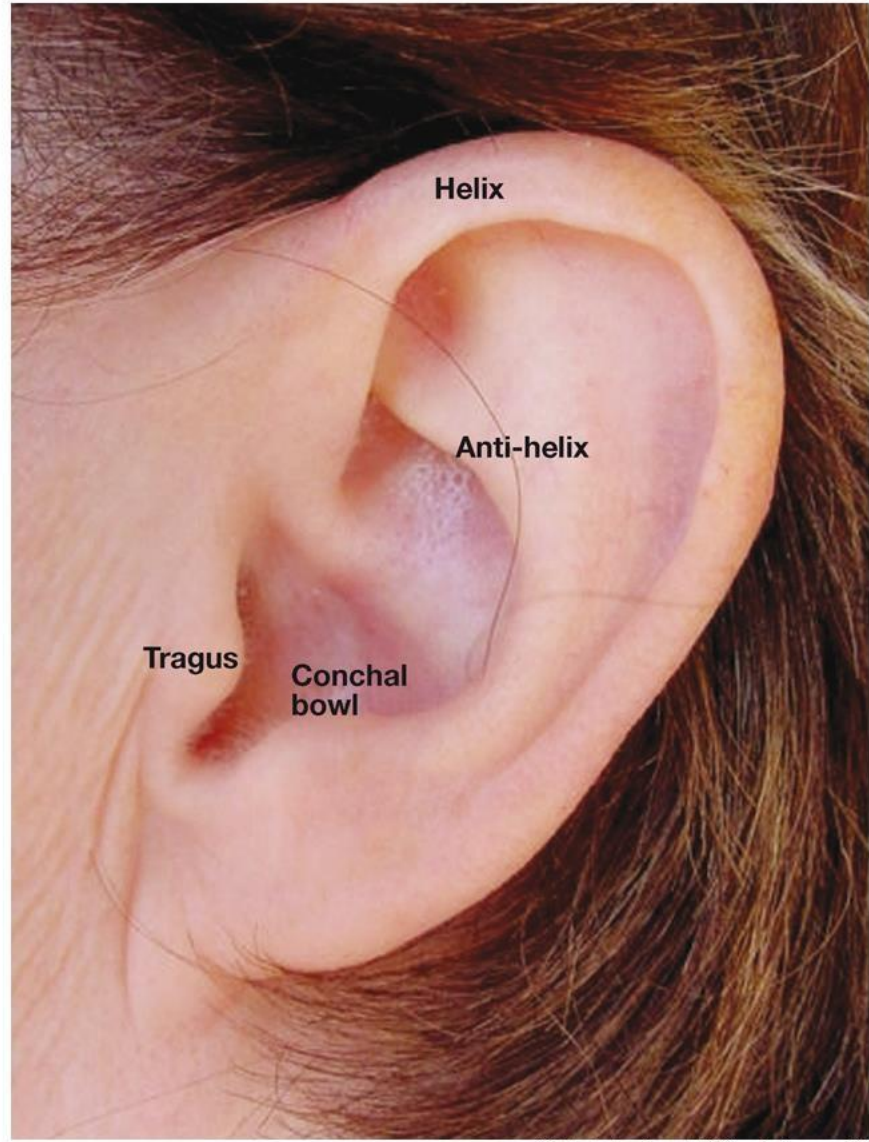


EXTERNAL EAR



The Auricle





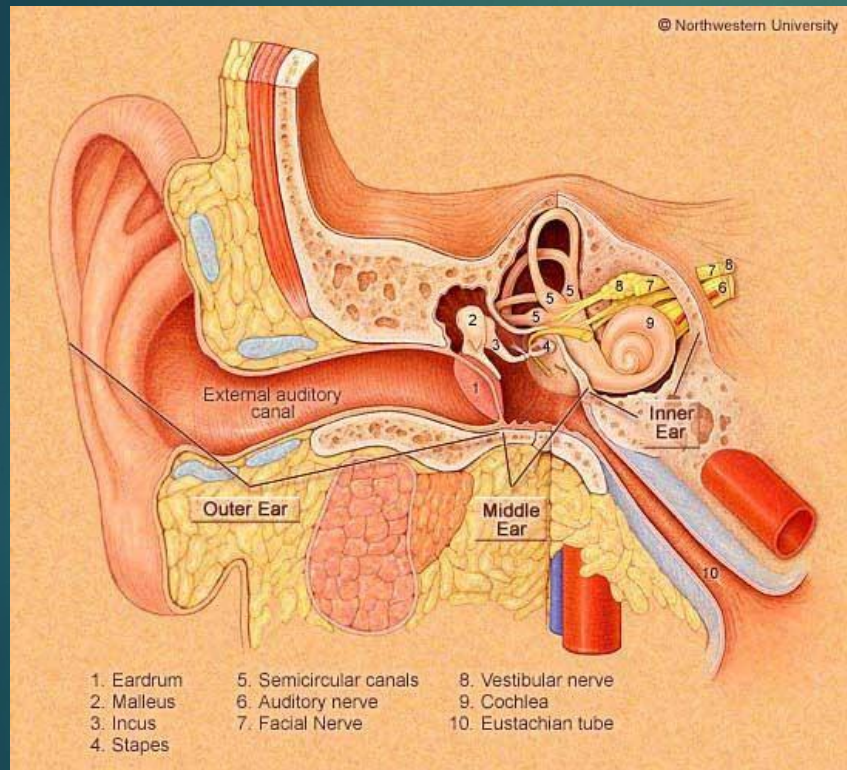


Perichondritis



Erysipelas

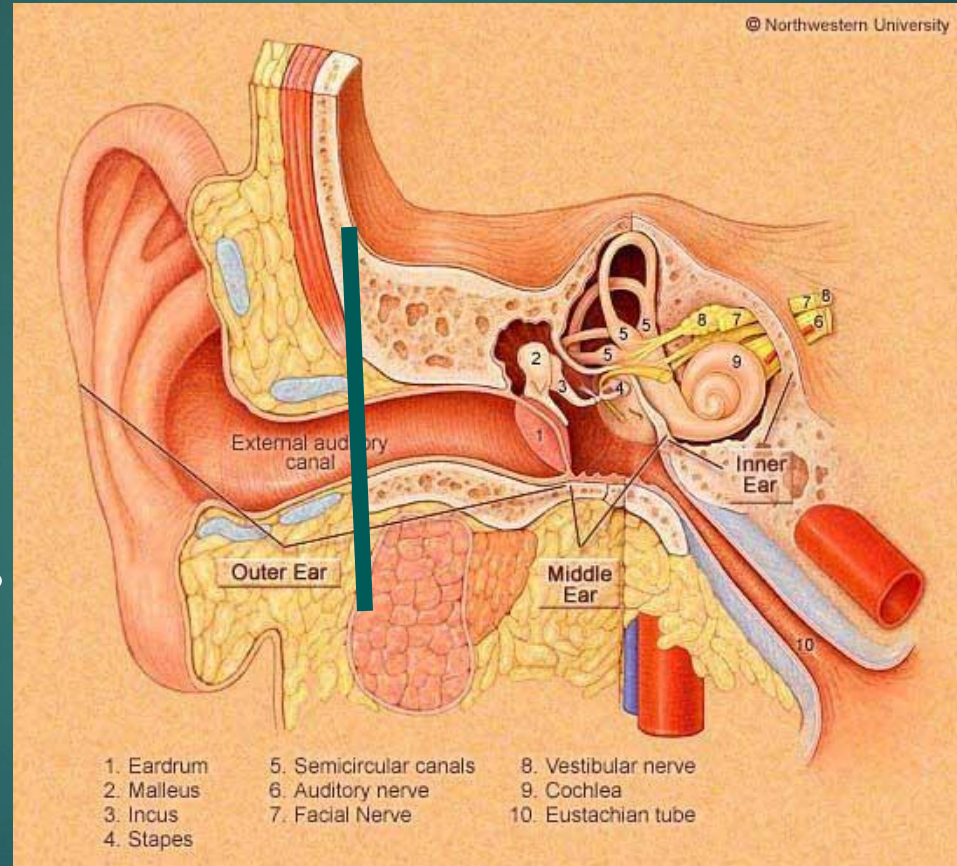
The External Auditory Canal



The External Auditory Canal

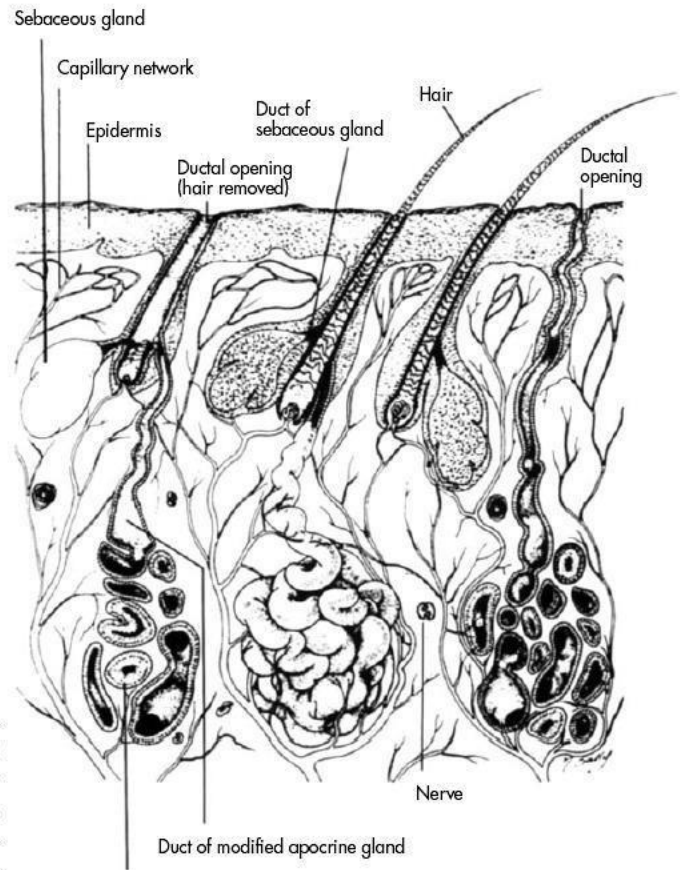
Lateral Third:

- Cartilagenous
- Hair follicles
- Ceruminous glands
- Sebaceous glands

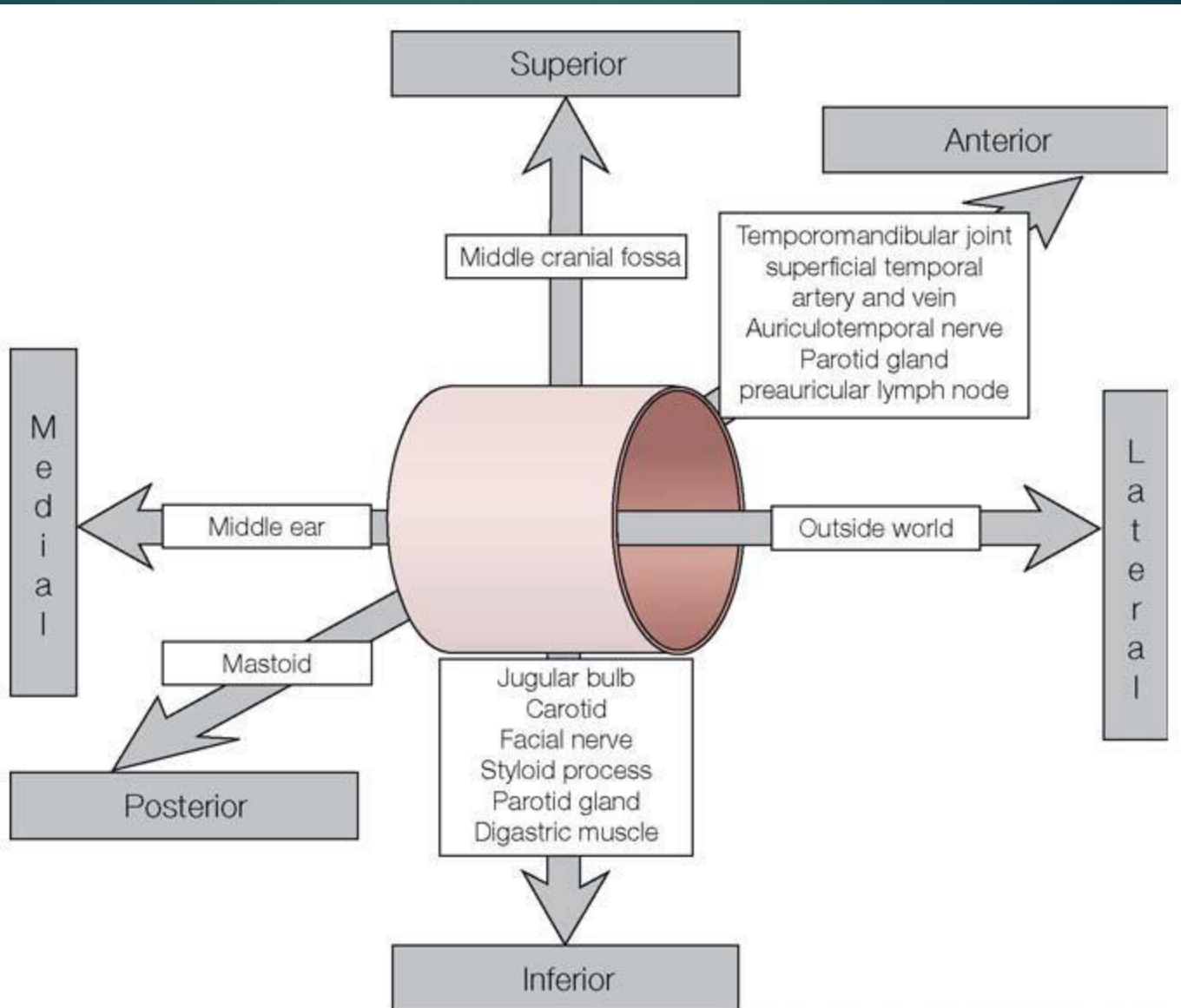


Medial Two Thirds:

- Bony
- Develops after birth



Relations of EAM

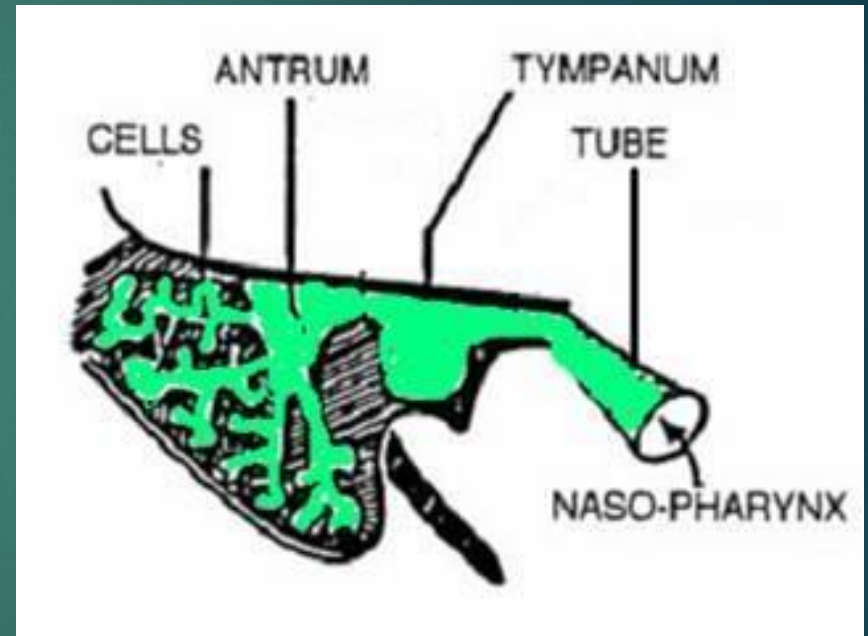


ANATOMY OF THE EAR

- External Ear
- Middle Ear Cleft
- Inner Ear

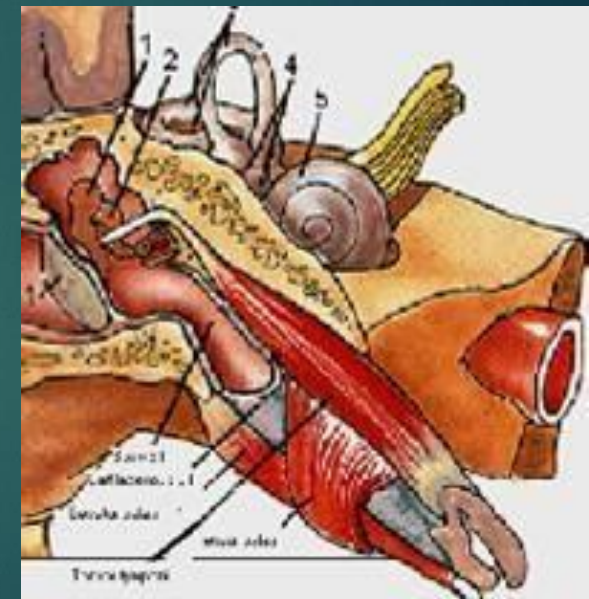
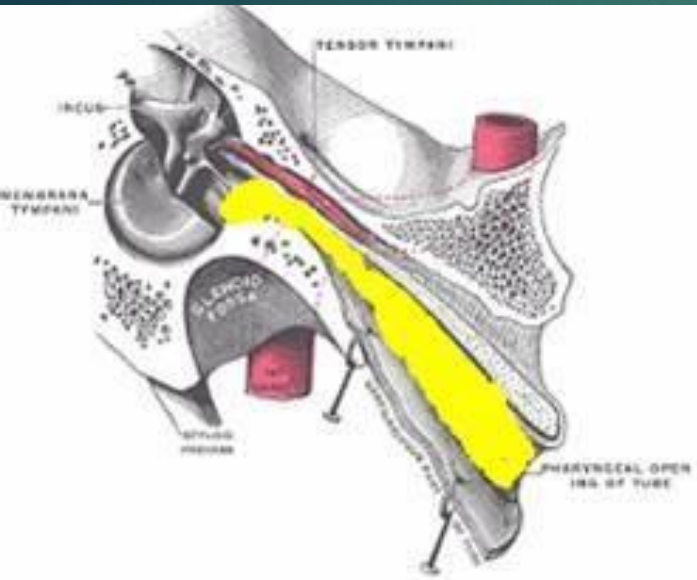
MIDDLE EAR CLEFT

- Eustachian
(Pharyngo-tympanic)
Tube
- Tympanum (Middle
Ear Cavity)
- Mastoid Antrum and
Air Cells



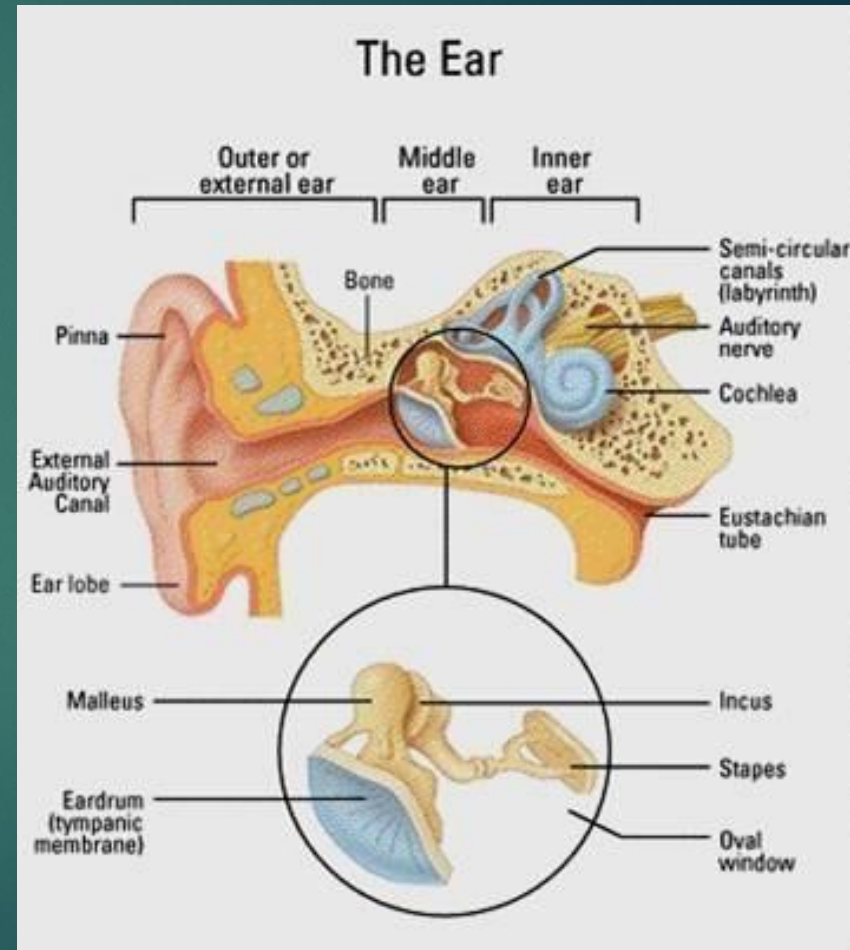
MIDDLE EAR CLEFT

- Eustachian (Pharyngo-Tympanic) Tube



MIDDLE EAR CLEFT

- Eustachian (Pharyngo-Tympanic) tube
- Tympanic cavity (Middle ear cavity)



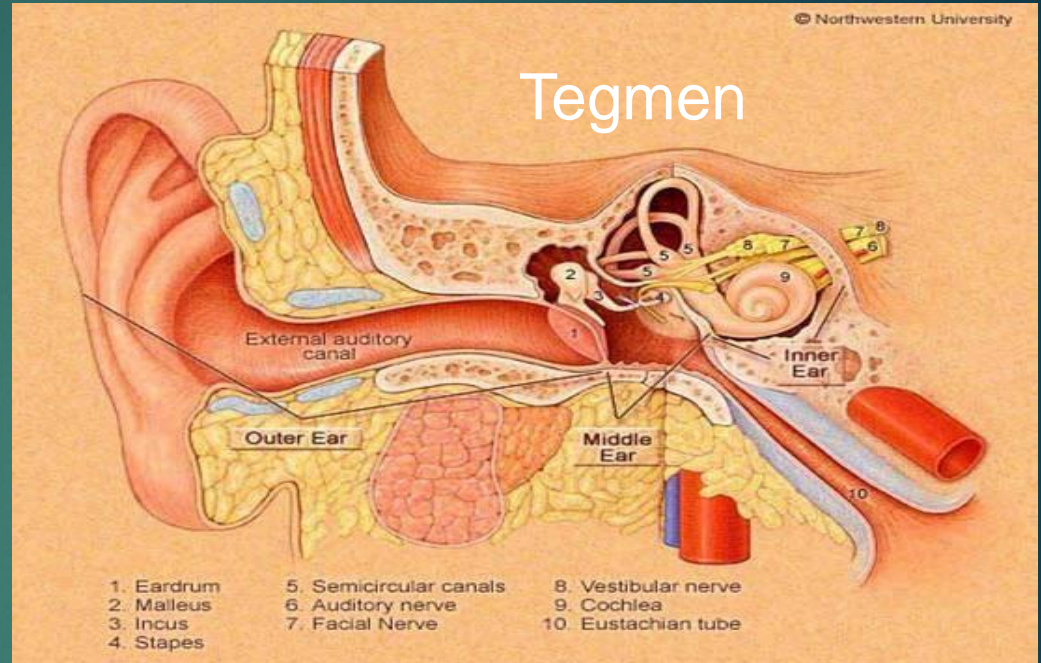
WALLS OF TYMPANIC CAVITY

- Roof
- Floor
- Anterior wall
- Posterior wall
- Lateral wall
- Medial wall



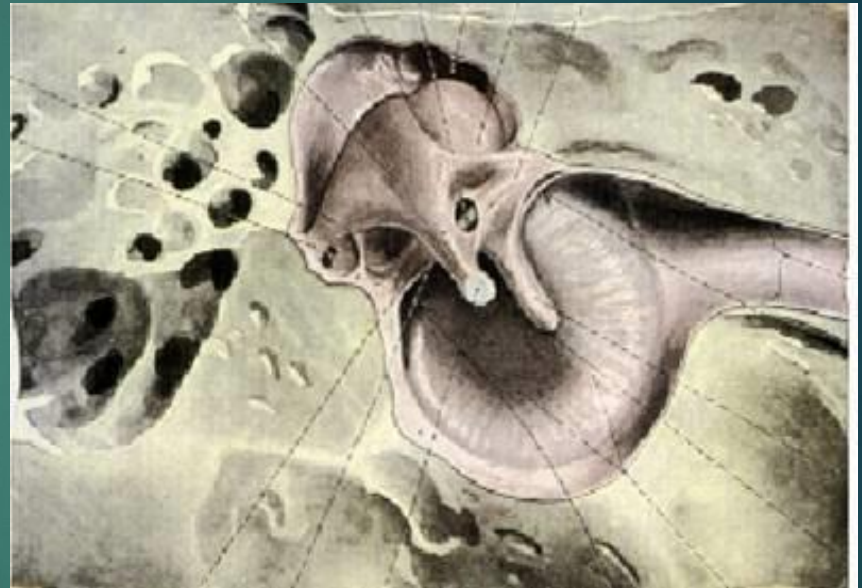
WALLS OF TYMPANIC CAVITY

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- Floor



WALLS OF TYMPANIC CAVITY

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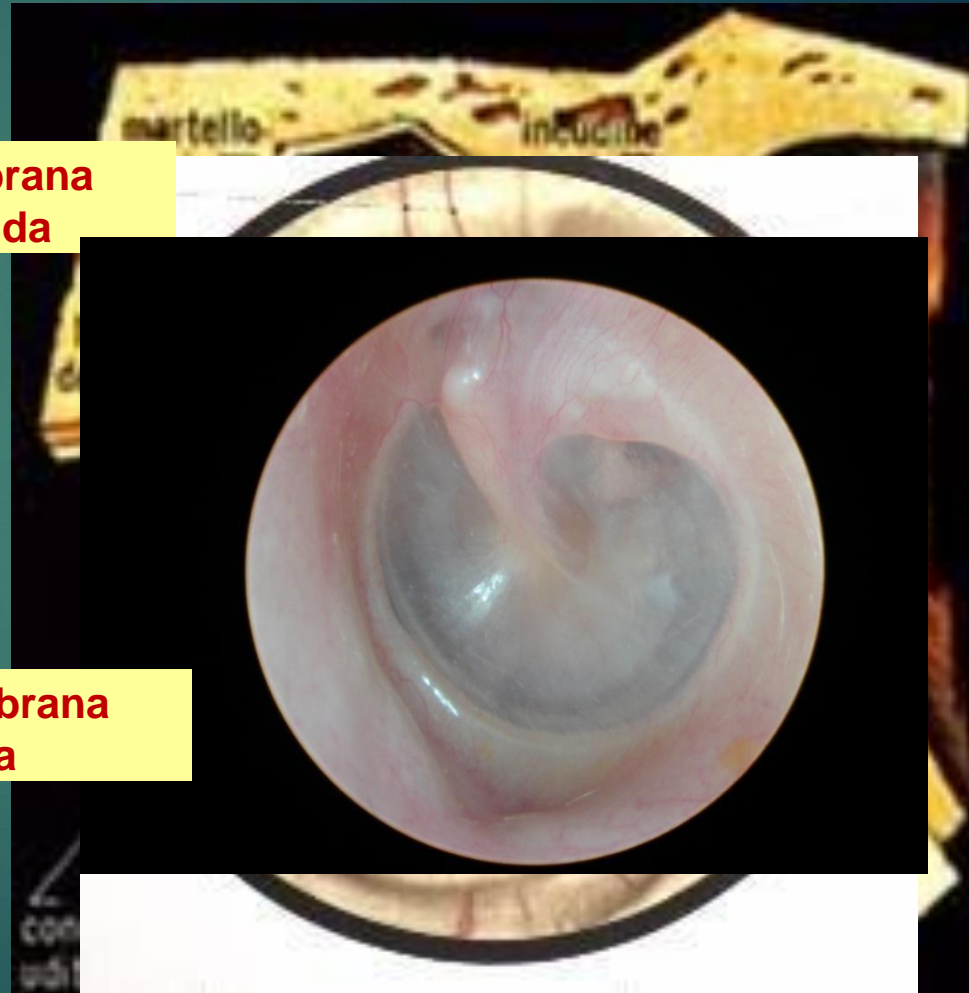


WALLS OF TYMPANIC CAVITY

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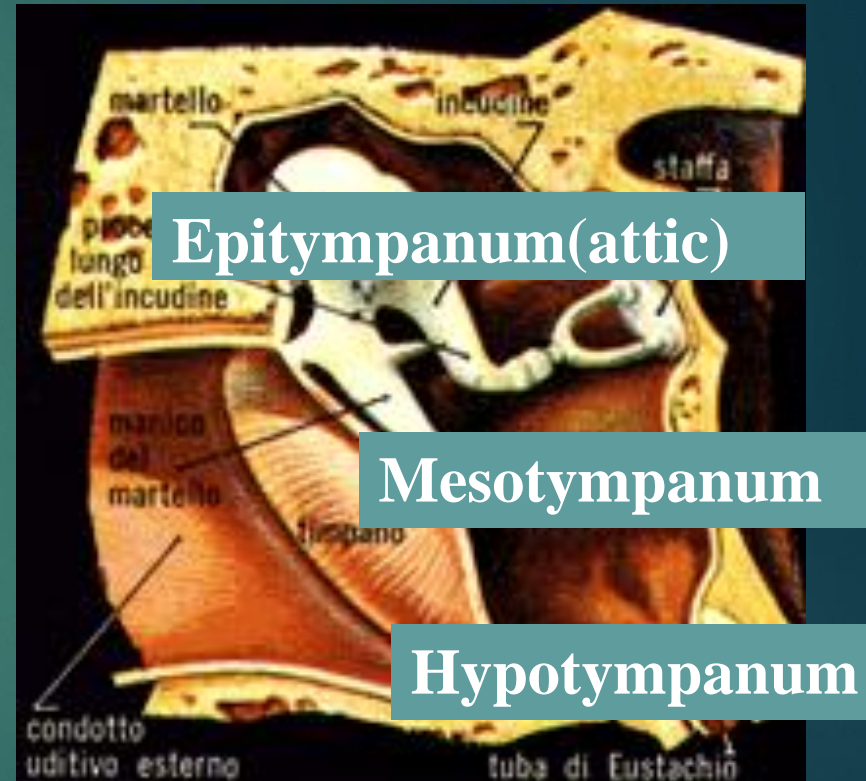
**Membrana
Flaccida**

**Membrana
Tensa**



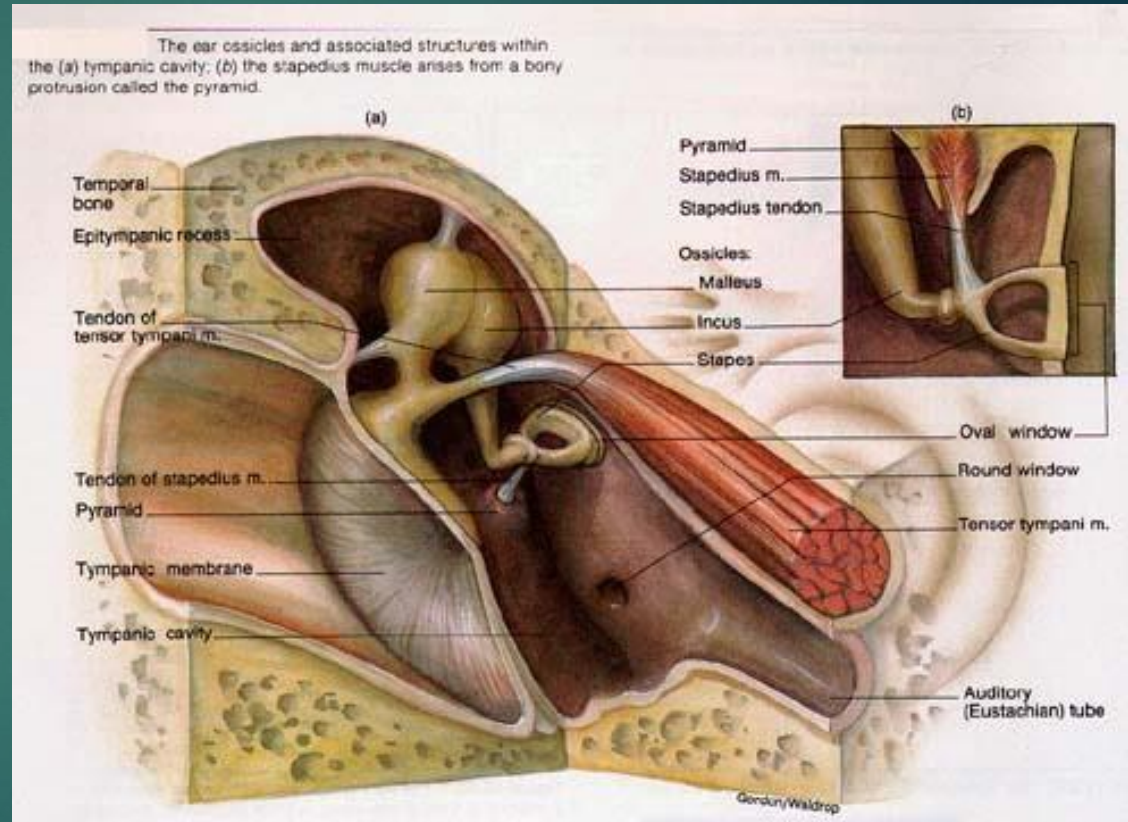
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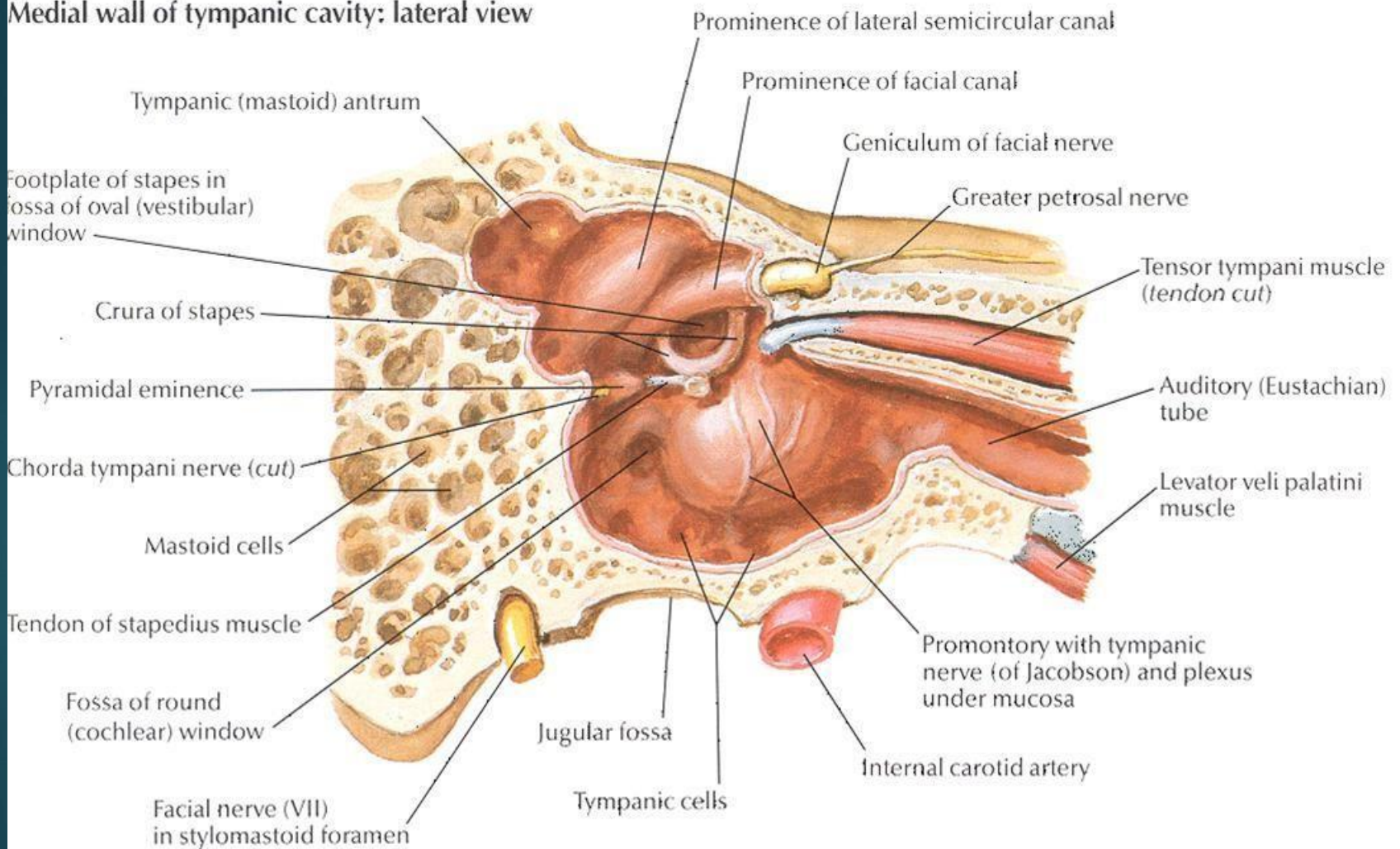


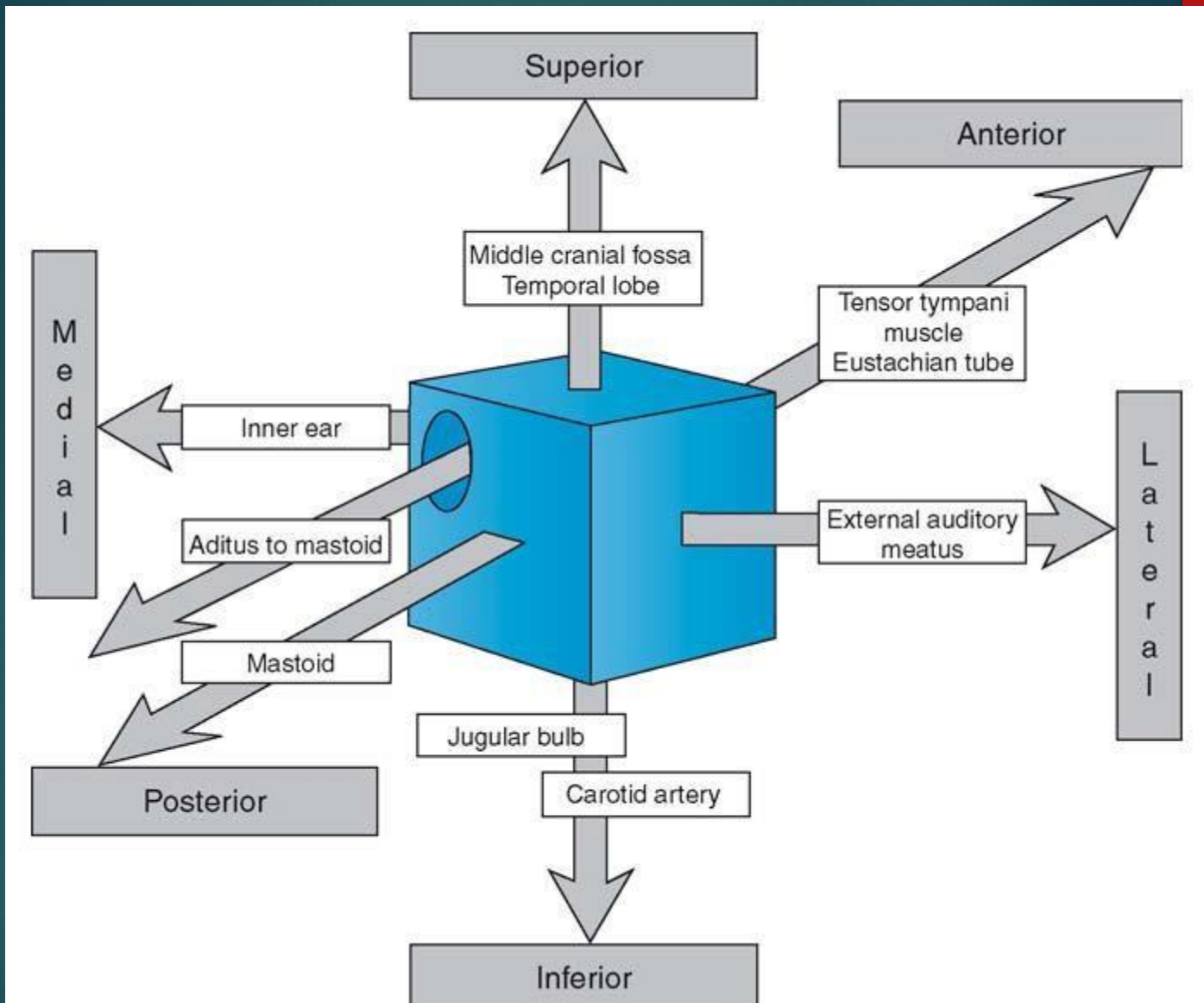
WALLS OF TYMPANIC CAVITY

- Roof
- Floor
- Anterior wall
- Posterior wall
- Lateral wall
- Medial wall



Medial wall of tympanic cavity: lateral view

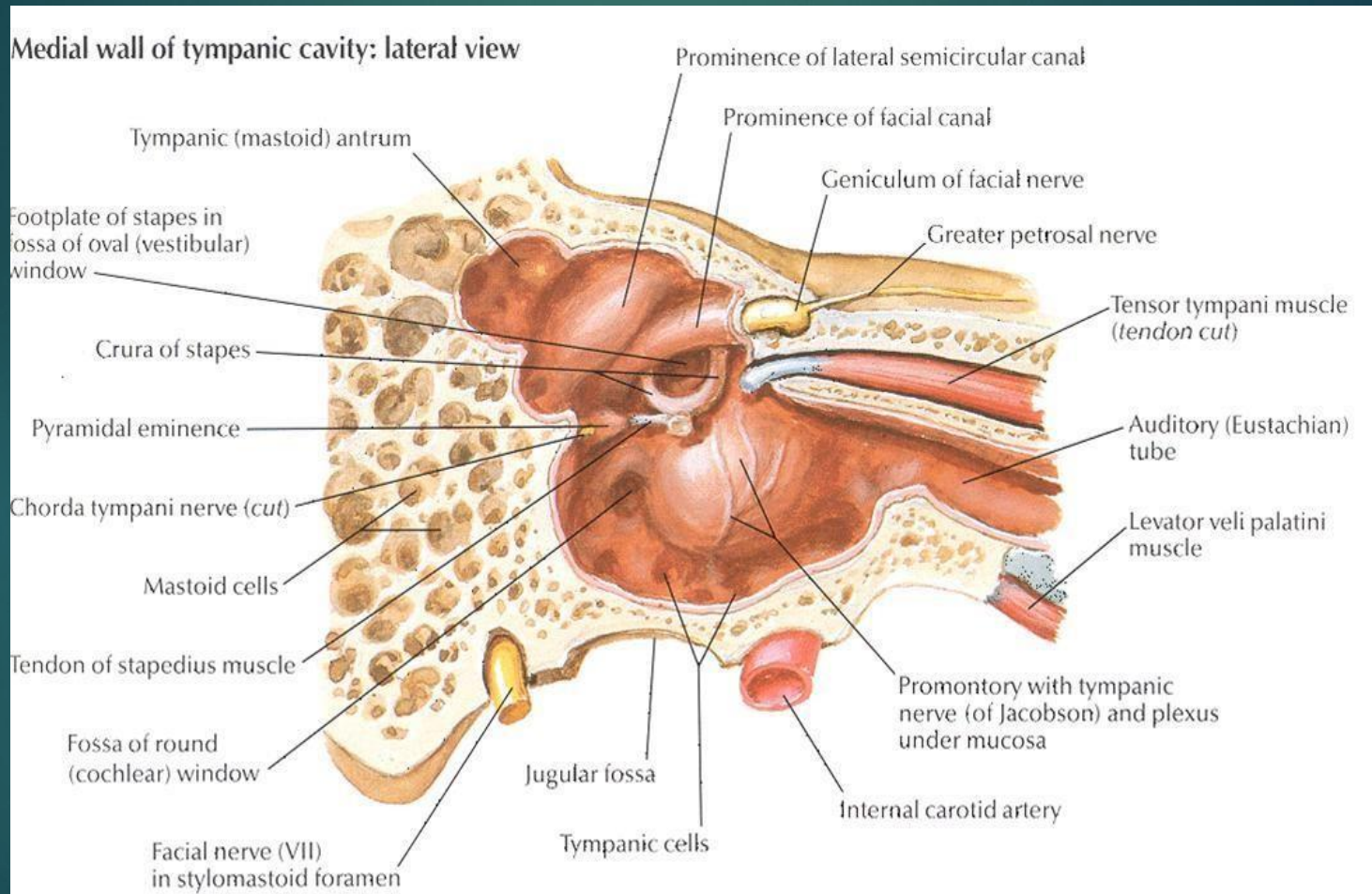




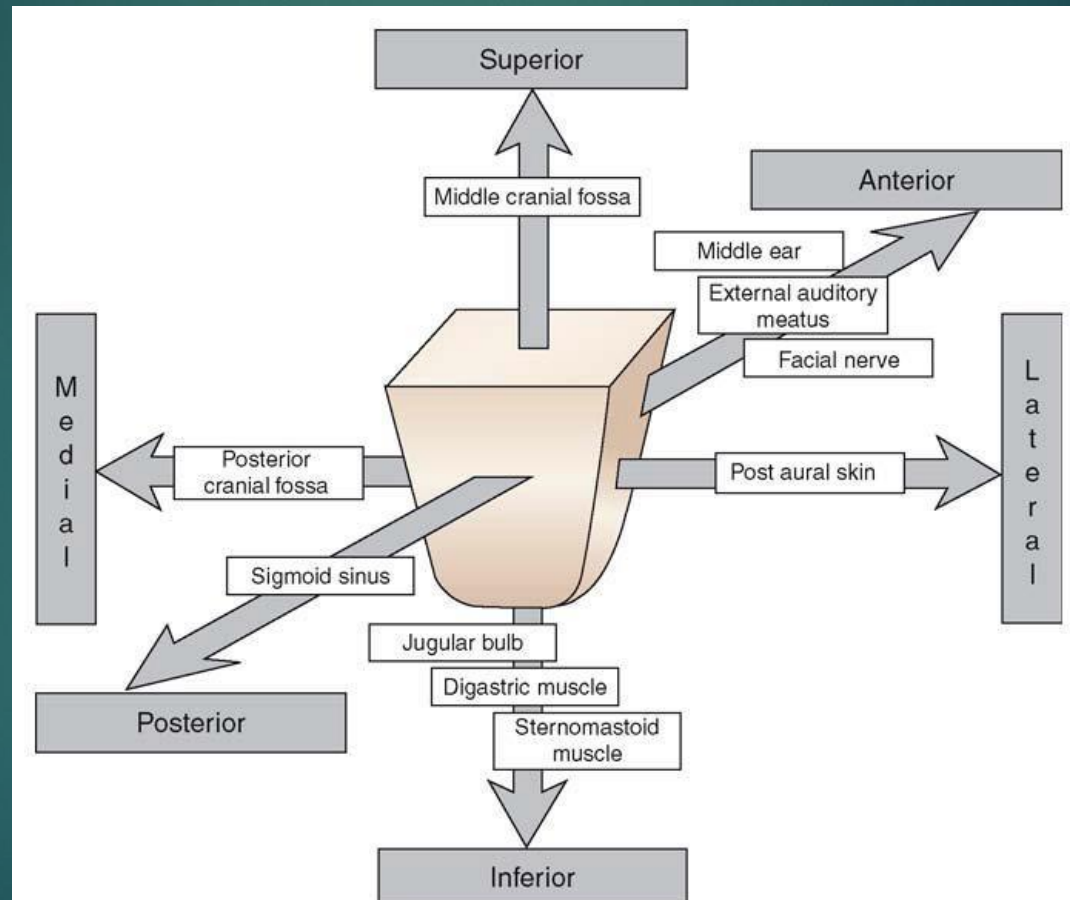
MIDDLE EAR CLEFT

- Eustachian (Pharyngo-tympanic) Tube
- Tympanic (Middle Ear) Cavity
- Mastoid antrum and air cells

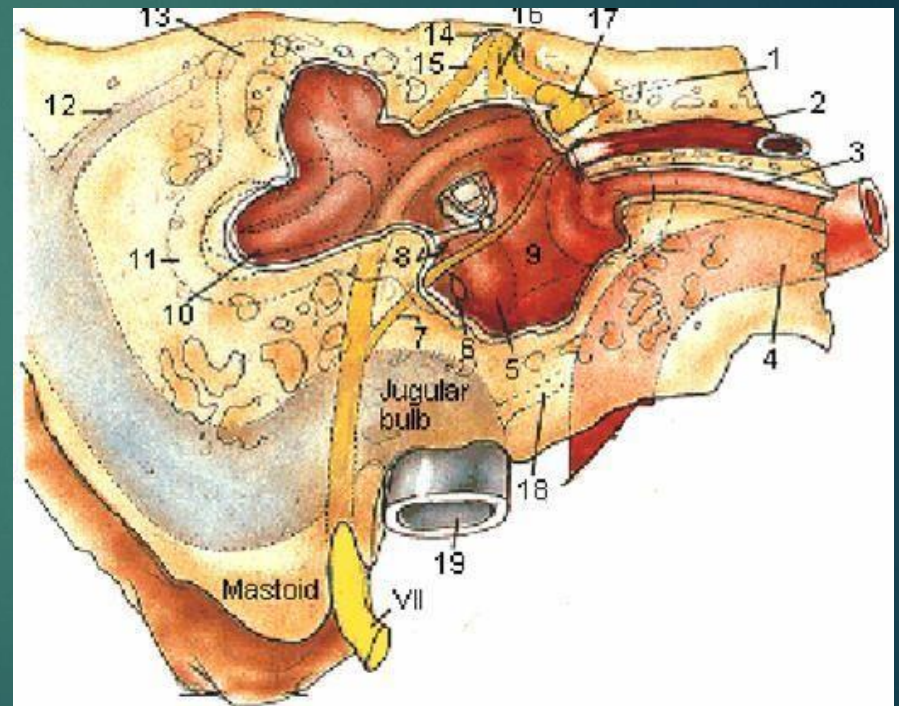
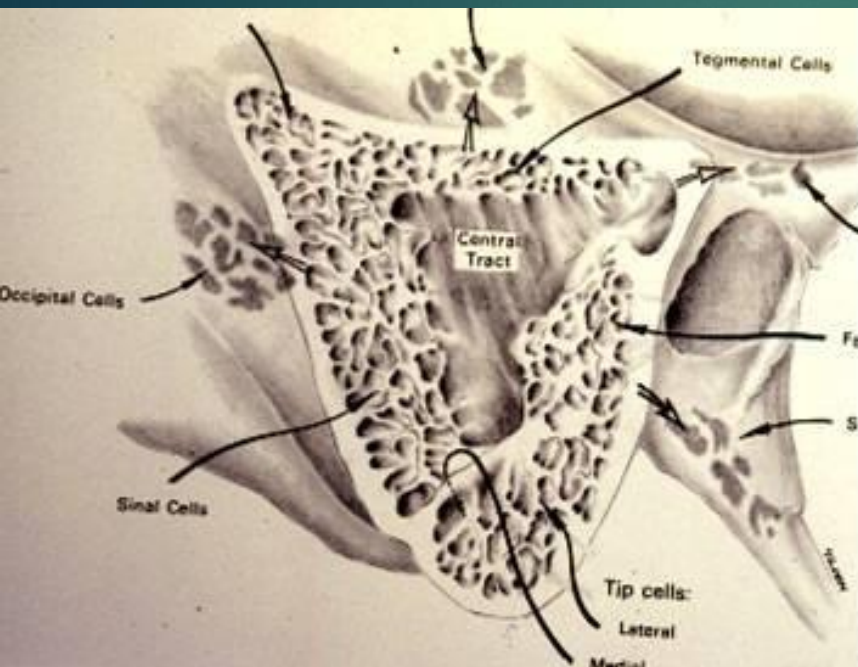
Mastoid Antrum & Air cells



Relationships of the mastoid antrum.

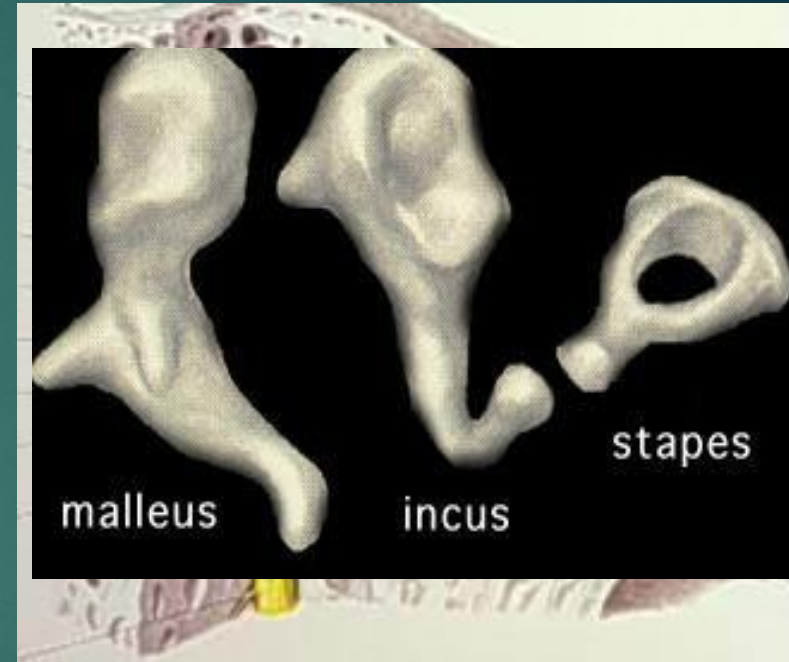


Mastoid Antrum & Air cells

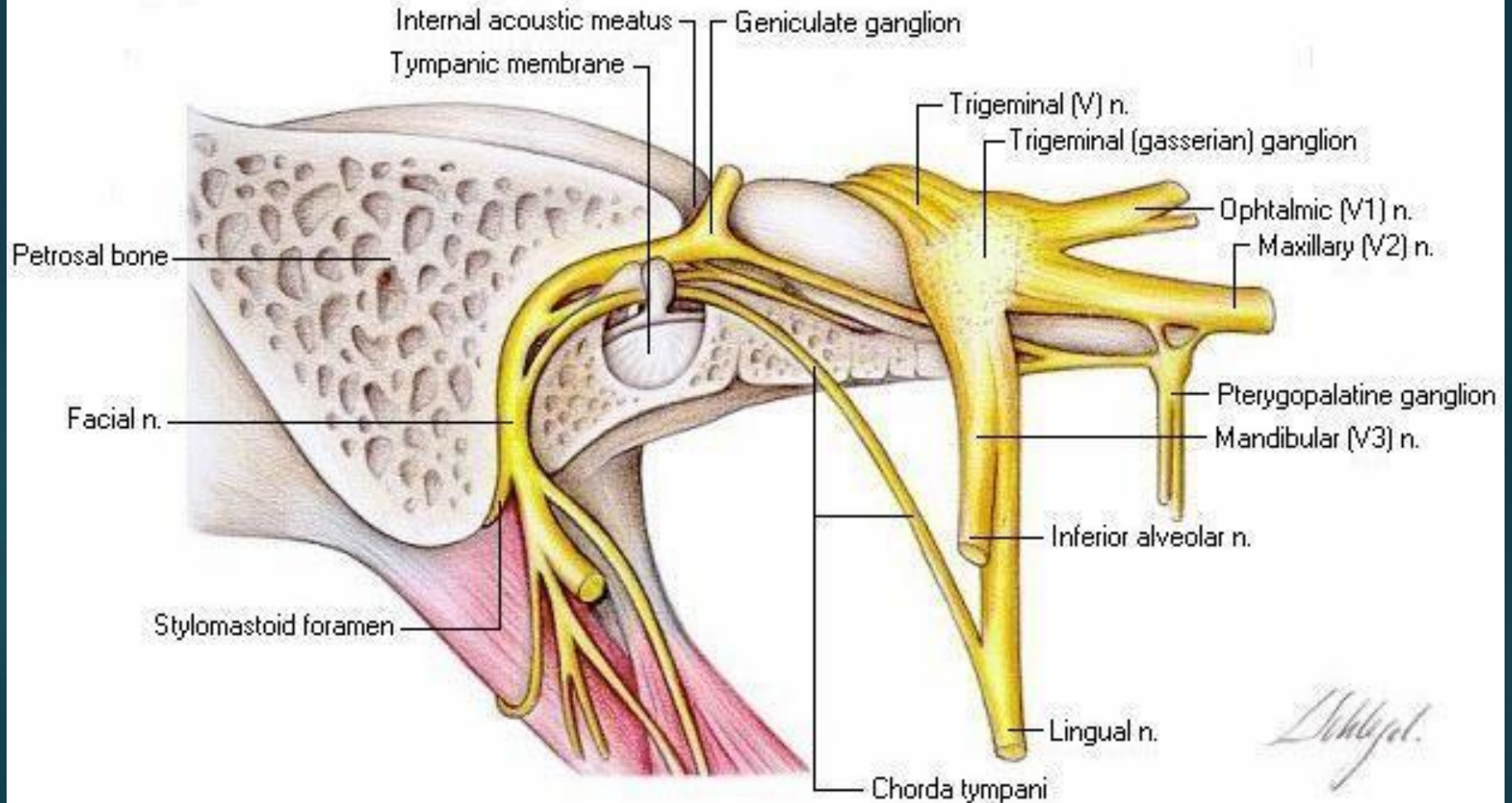


CONTENTS OF MIDDLE EAR CAVITY

- Air
- Ossicles
Malleus, Incus, & Stapes
- Muscles
Tensor Tympani & Stapedius
- Nerves
Chorda Tympani & Tympanic Plexus



FACIAL (VII) AND TRIGEMINAL (V) NERVES, IN SITU, IN THE PETROUS PYRAMID



LINING OF MIDDLE EAR

Mucous membrane : ciliated columnar
anteriorly and cuboidal or flat elsewhere

SENSARY SUPPLY OF MIDDLE AND EXTERNAL EAR

- Cervical II & III (great auricular and lesser occipital)
- V cranial nerve (auriculotemporal)
- IX cranial nerve (tympanic or Jacobson's)
- X cranial nerve (auricular or Arnold's)
- ? VII cranial nerve

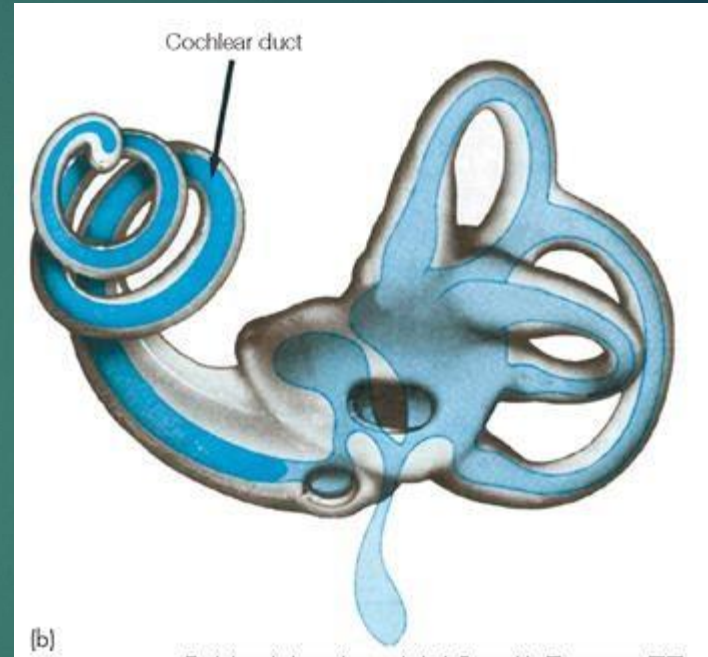
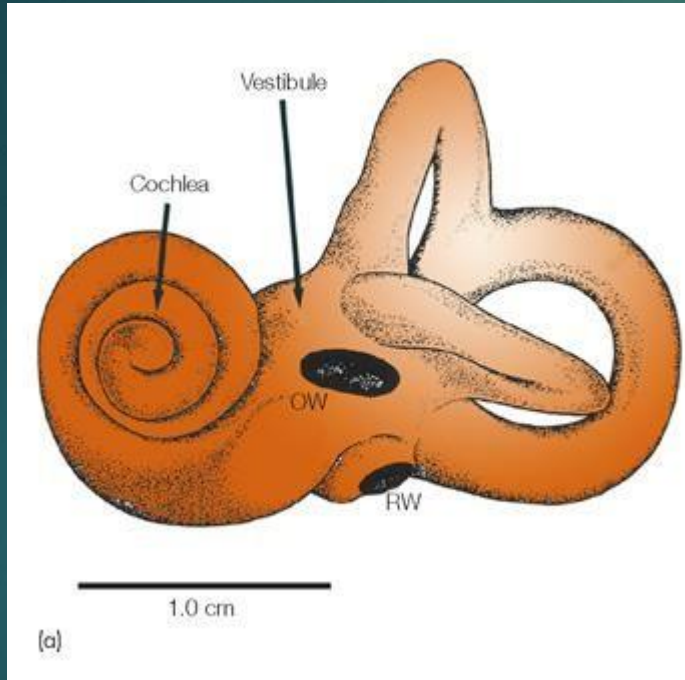
Referred Earache

- Pain in the ear due to a disease in an area supplied by a nerve that also supply the ear.

Referred Earache

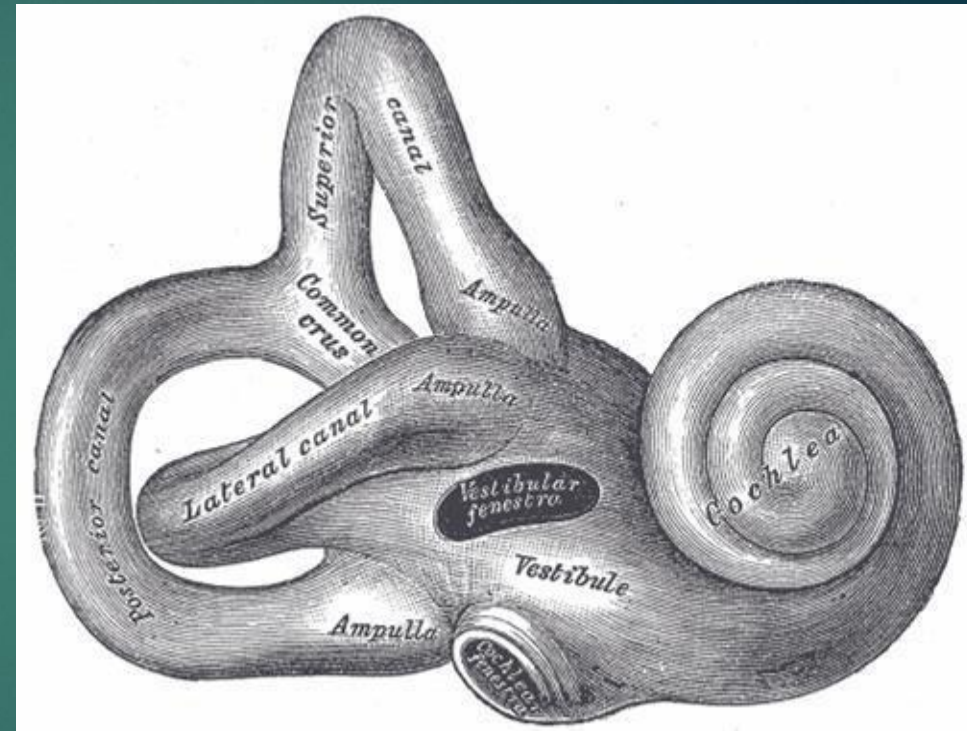
- Cervical II & III
 - Cervical spondylosis, neck injury etc.
- V cranial nerve
 - Dental infections, sinonasal diseases etc.
- IX cranial nerve
 - Tonsillitis, post-tonsillectomy, carcinoma etc.
- X cranial nerve
 - Tumors of hypopharynx, larynx & esophagus

ANATOMY OF INNER EAR



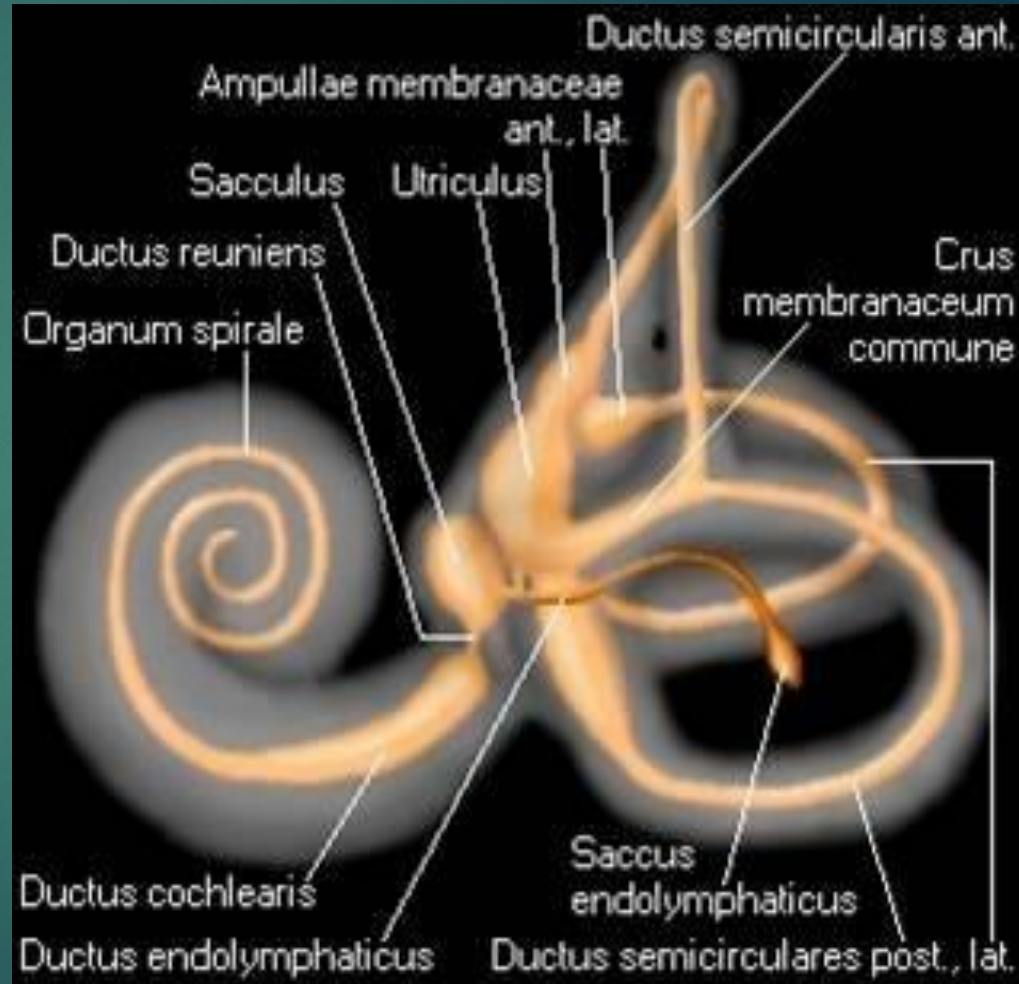
Osseous Labyrinth

- Bony Cochlea
- Vestibule
- Bony semicircular canals



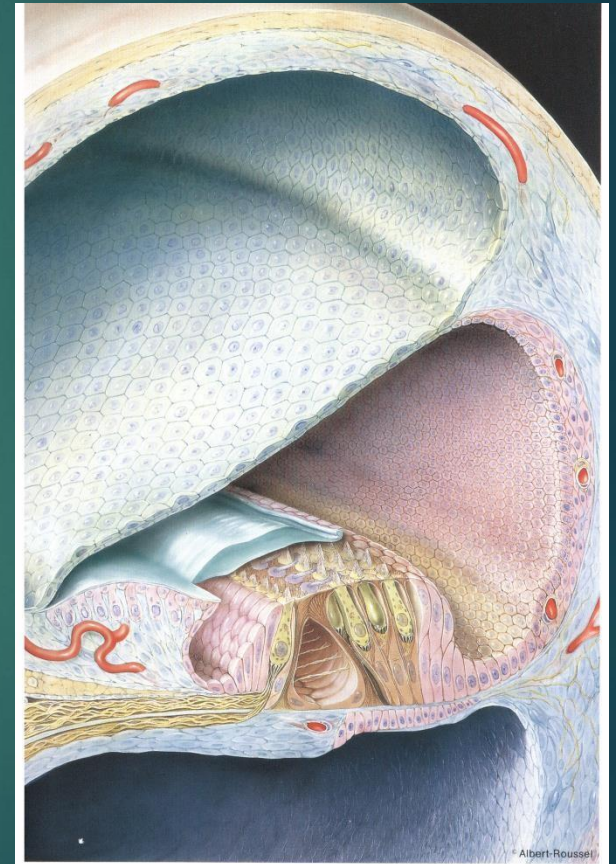
CONTENTS OF THE BONY LABYRINTH

- Perilymph
- Membranous labyrinth
 - Cochlear duct
 - Sacculle and utricle
 - Membranous semicircular ducts



CONTENTS OF MEMBRANOUS LABYRINTH

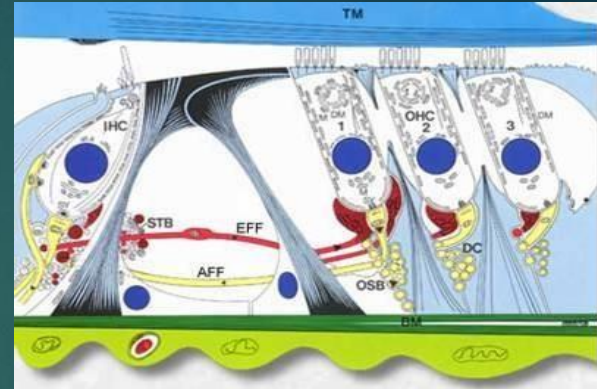
- Endolymph
- Sensory epithelium
 - Cochlea: *organ of Corti*
 - Utricle & saccule: *maculae*
 - Semicircular canals: *cristae*



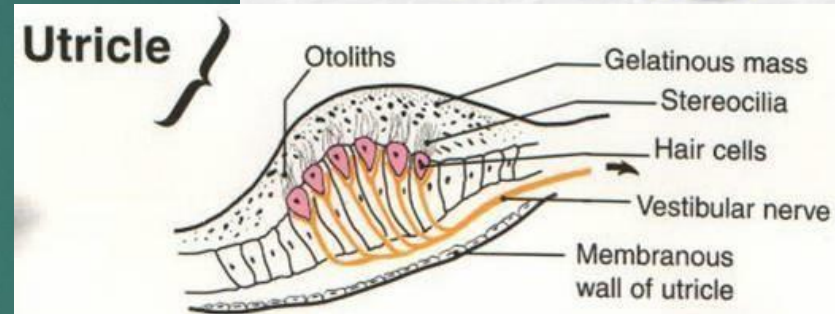
INNER EAR SENSORY EPITHELIUM



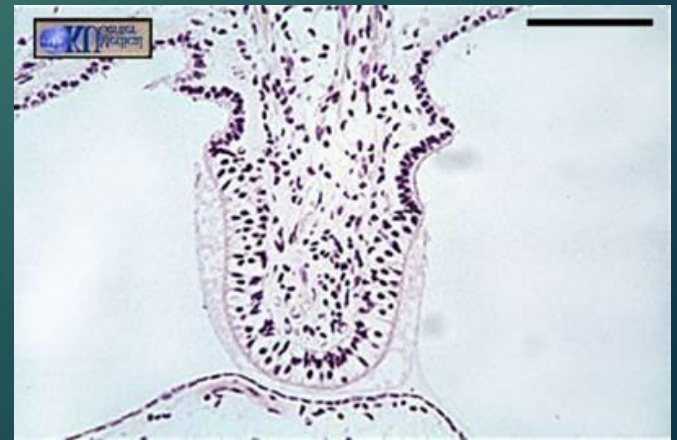
- Cochlea: *organ of Corti*



- Utricle & saccule: *maculae*

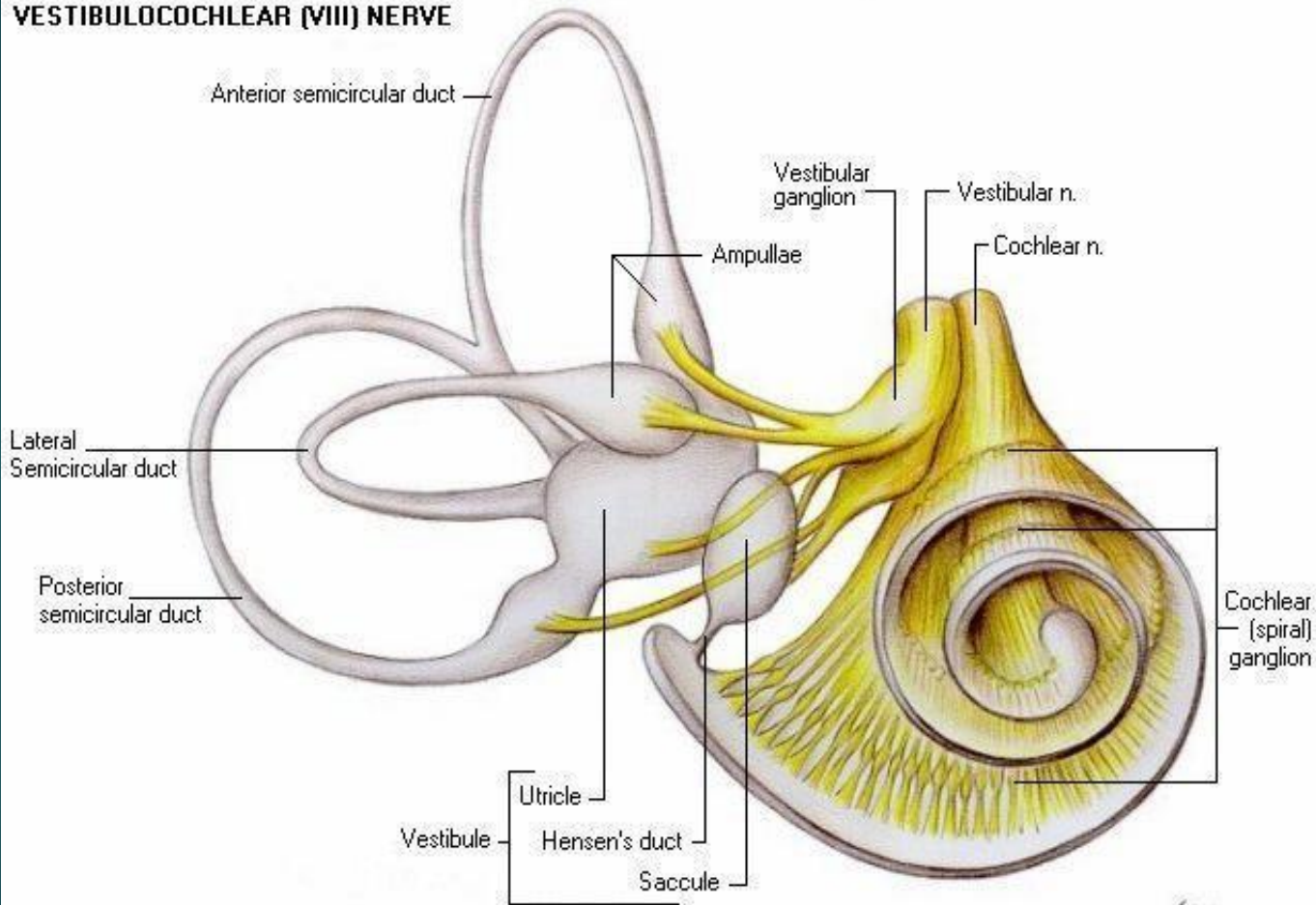


- Semicircular canals: *cristae*

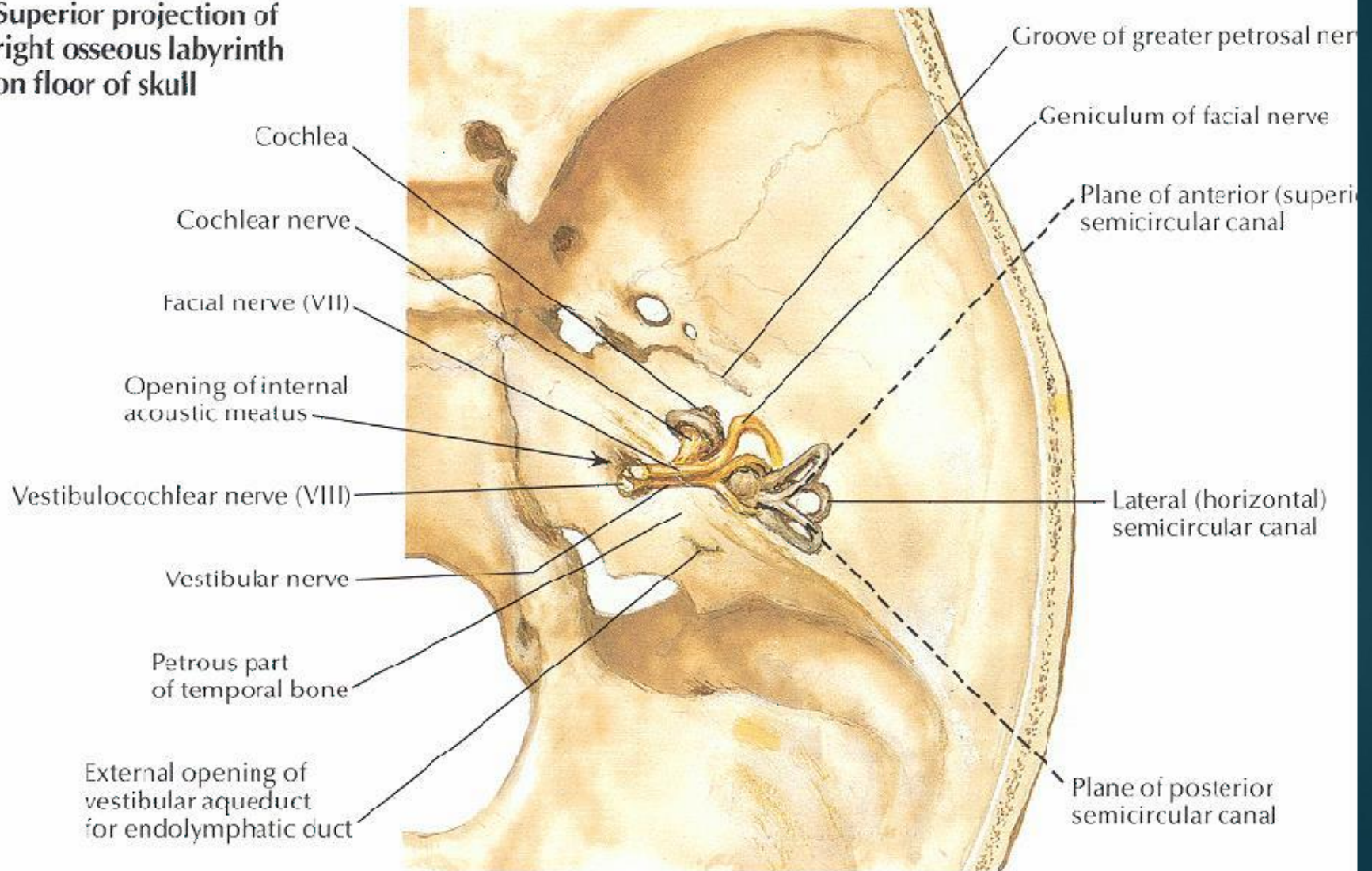


THE VESTIBULO-COCHLEAR NERVE

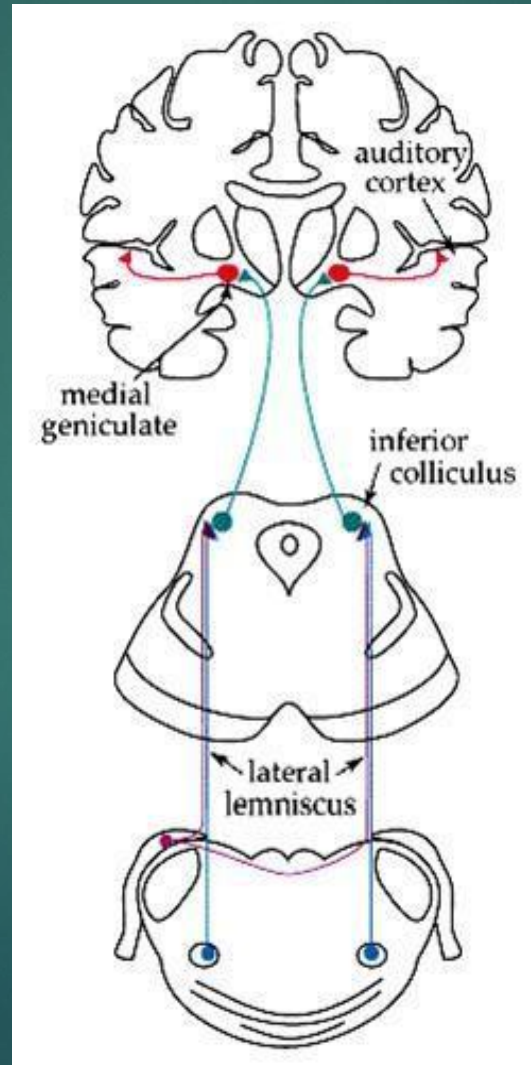
INTERNAL EAR AND VESTIBULOCOCHLEAR (VIII) NERVE



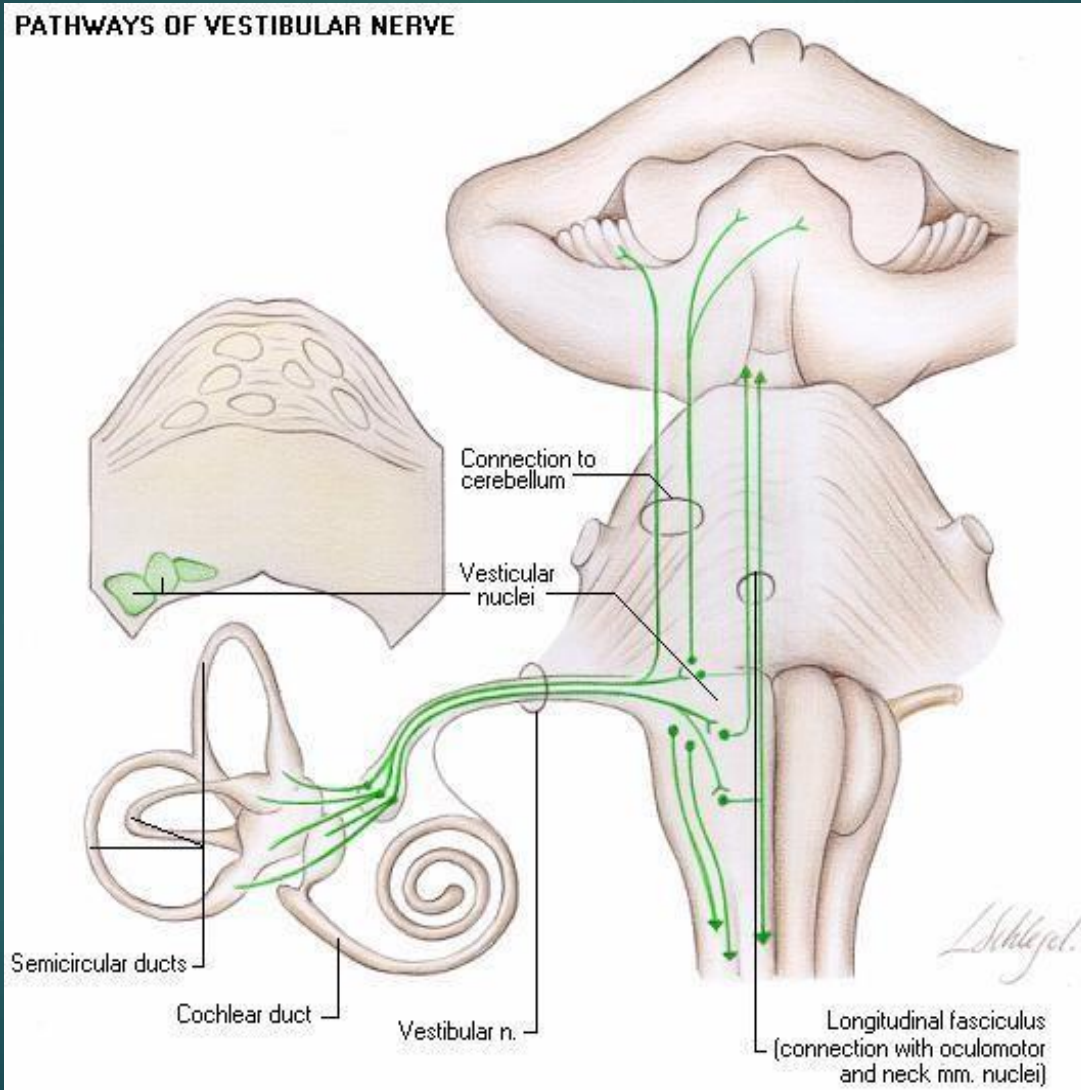
**Superior projection of
right osseous labyrinth
on floor of skull**



CENTRAL CONNECTIONS OF COCHLEAR NERVE



CENTRAL CONNECTIONS OF VESTIBULAR NERVE



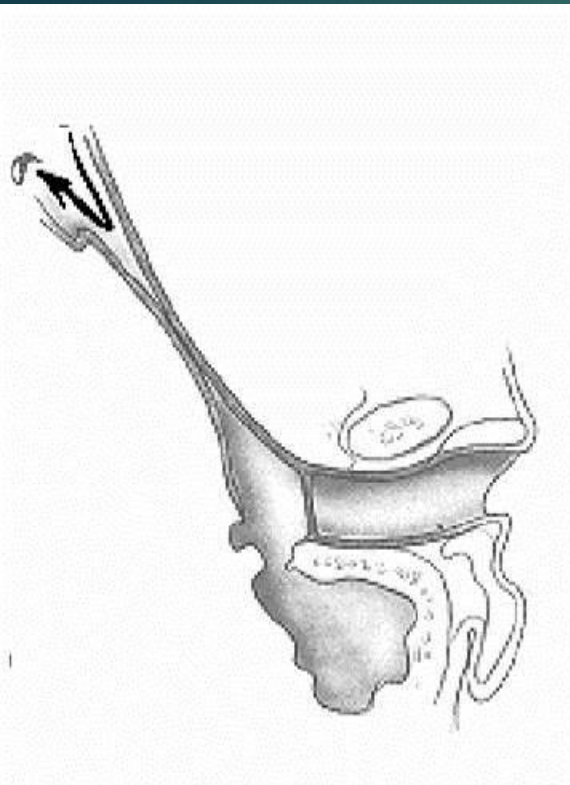


PHYSIOLOGY OF THE EAR

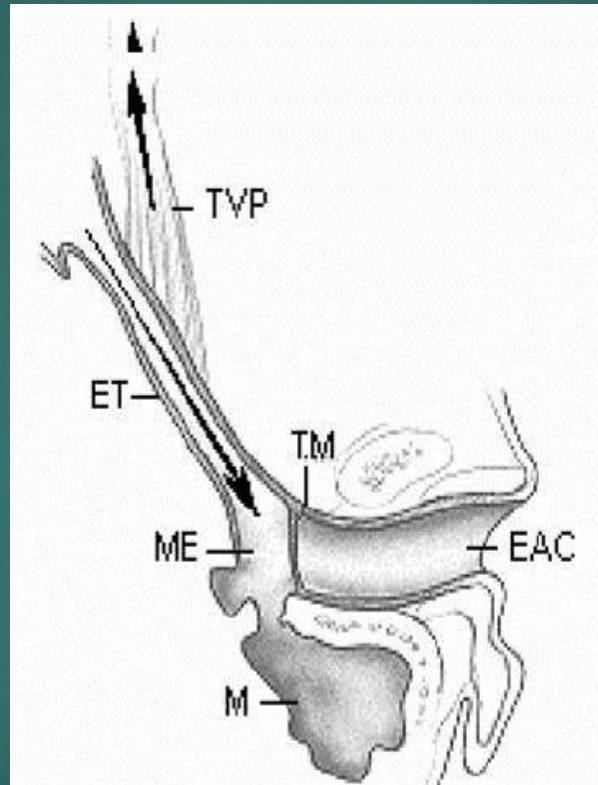
FUNCIONS OF THE EXTERNAL EAR

- Protection of the middle ear
 - Curvature
 - Cerumen
- Auditory functions:
 - Sound conduction
 - Increase sound pressure by the resonance function

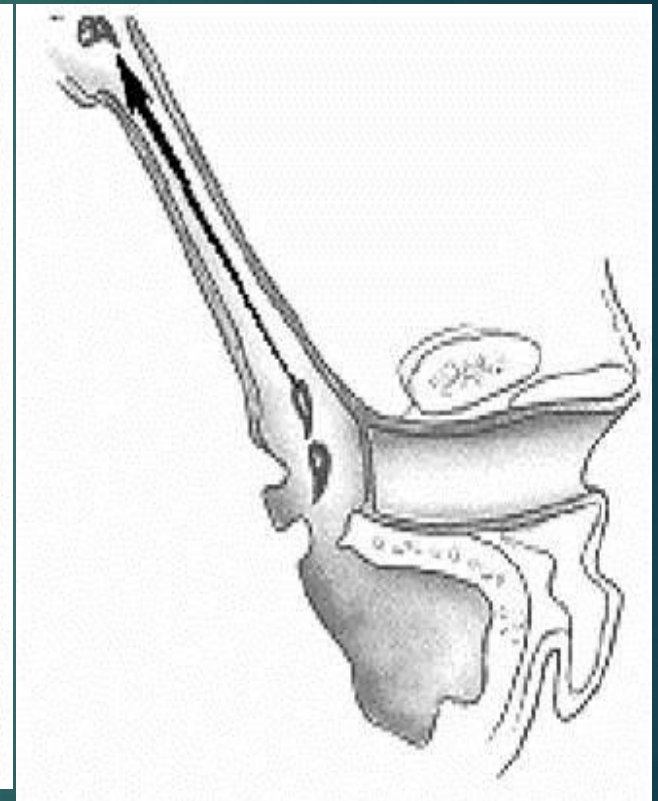
FUNCTIONS OF THE EUSTACHIAN TUBE



Protection



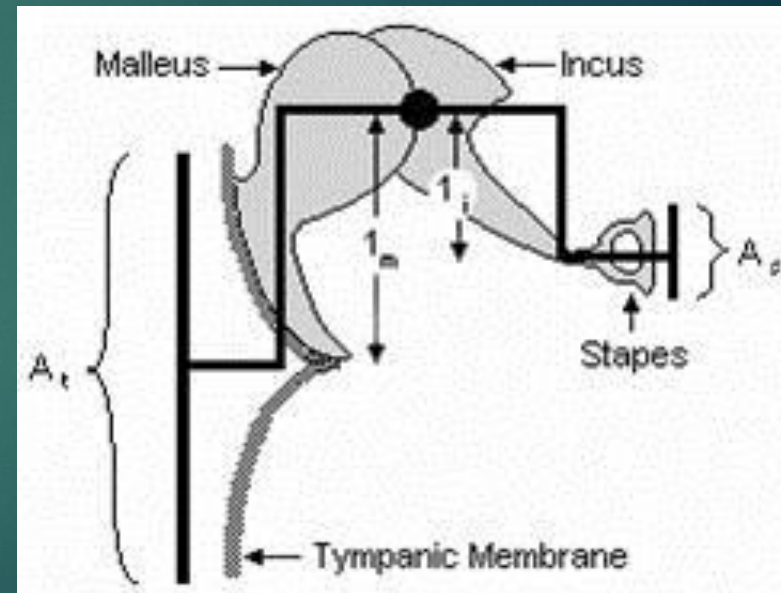
Ventilation



Drainage

FUNCIONS OF THE MIDDLE EAR

- Conduction of sound
- Transformer mechanism
 - Hydraulic action
 - Ossicular leverage

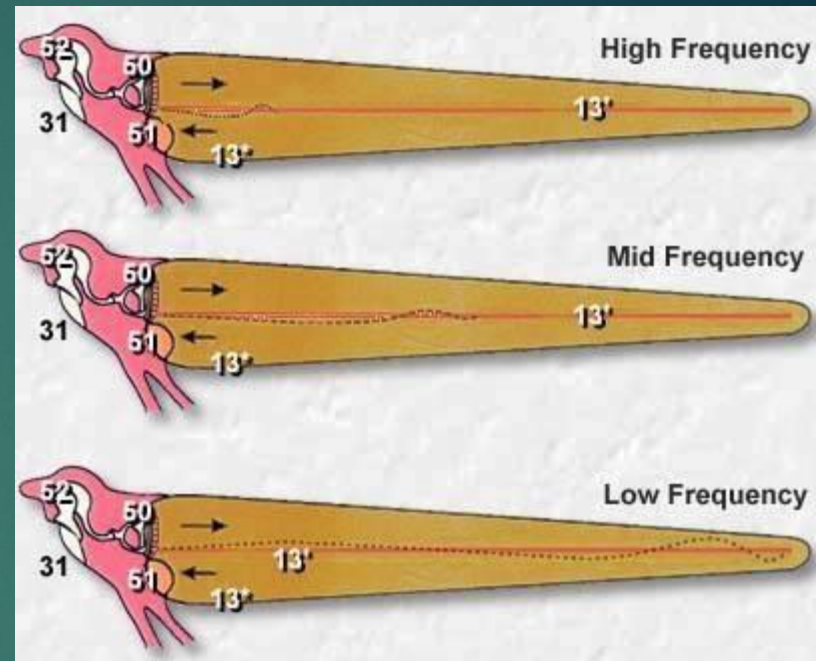


FUNCIONS OF THE MIDDLE EAR

- Conduction of sound
- Transformer mechanism
 - Hydraulic action
 - Ossicular leverage
- Protection to the inner ear
 - stapedial reflex

FUNCTIONS OF THE INNER EAR

- **Hearing Function:**
 - Transduction of sound to action potentials



Middle & Inner Ear

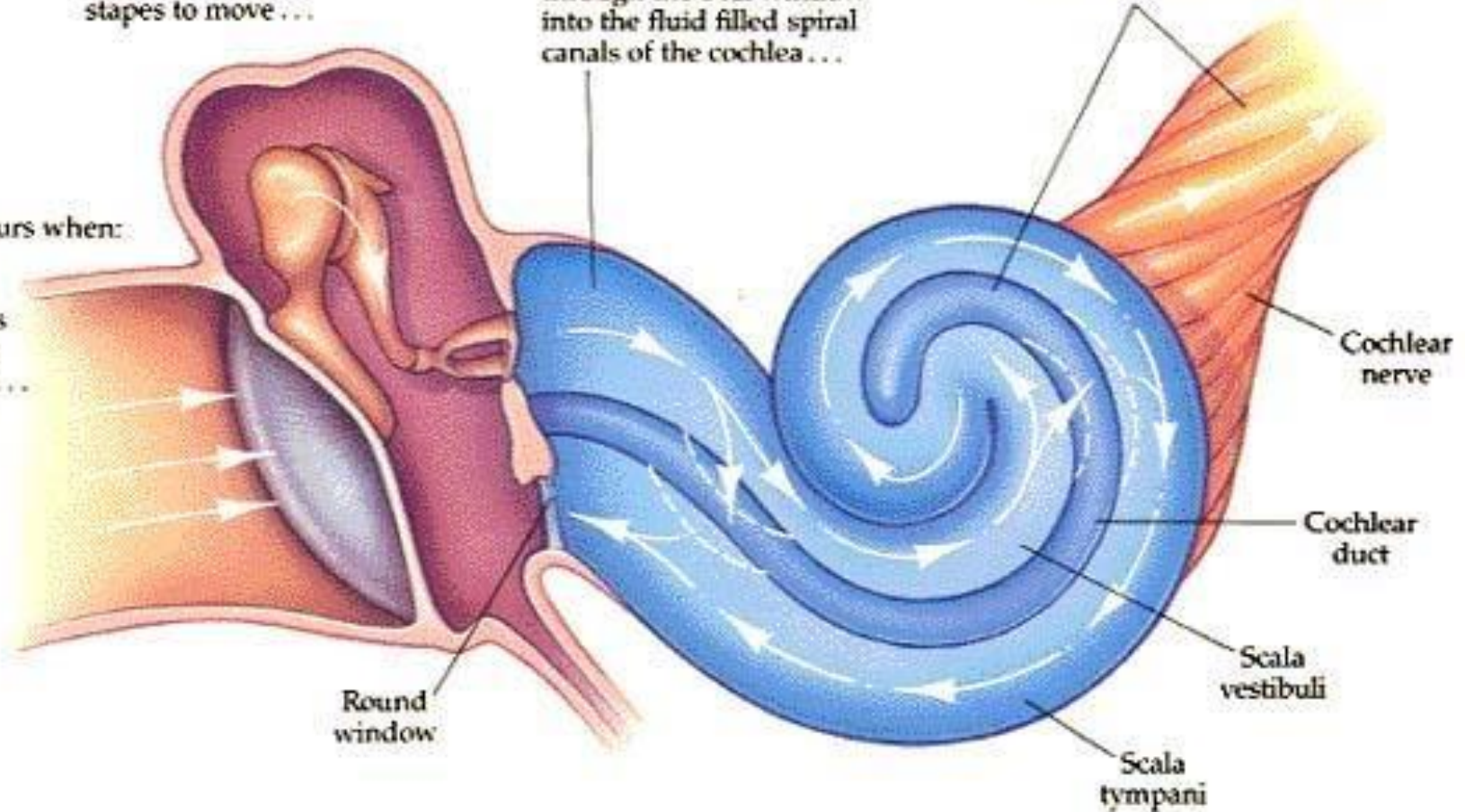
2) causing the ossicles to vibrate and the footplate of the stapes to move ...

3) the sound vibrations pass through the oval window into the fluid filled spiral canals of the cochlea ...

4) and are transmitted to the cochlear duct where they set off nerve impulses which are carried to the brain via the cochlear nerve.

Hearing occurs when:

1) sound vibrations strike the eardrum ...



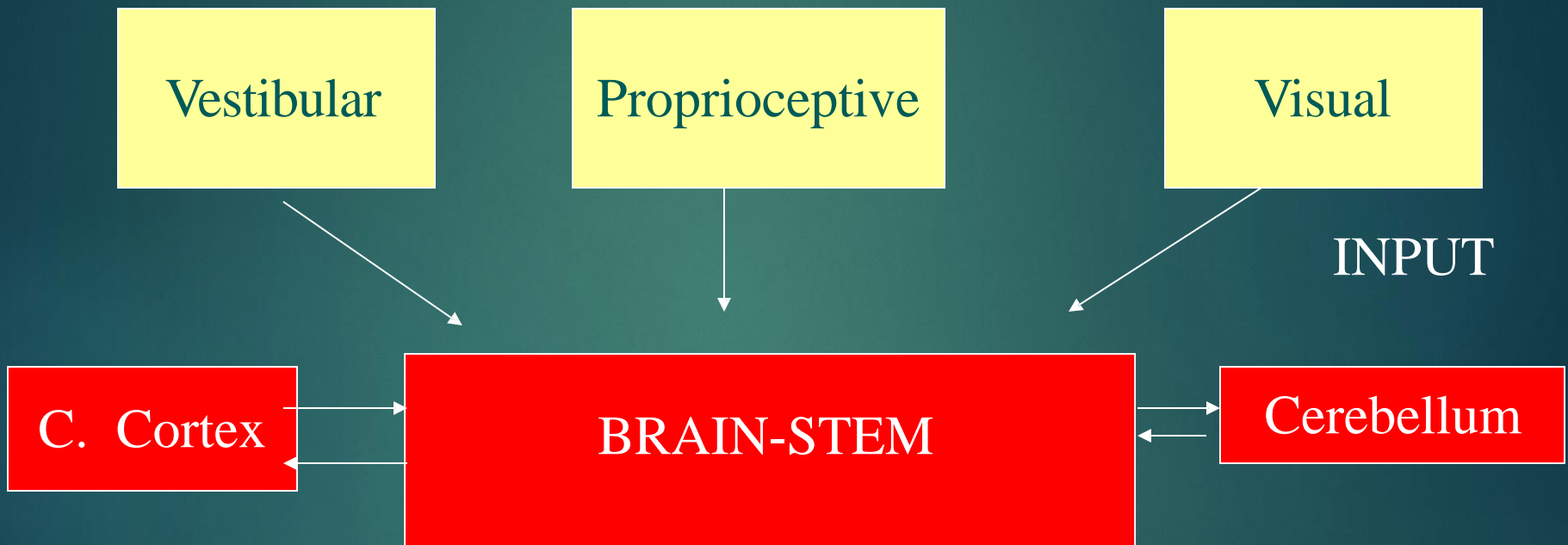
FUNCTIONS OF THE INNER EAR

- **Hearing Function:**
 - Transduction of sound to action potentials
- **Vestibular Function:**
 - Participate in maintaining body balance

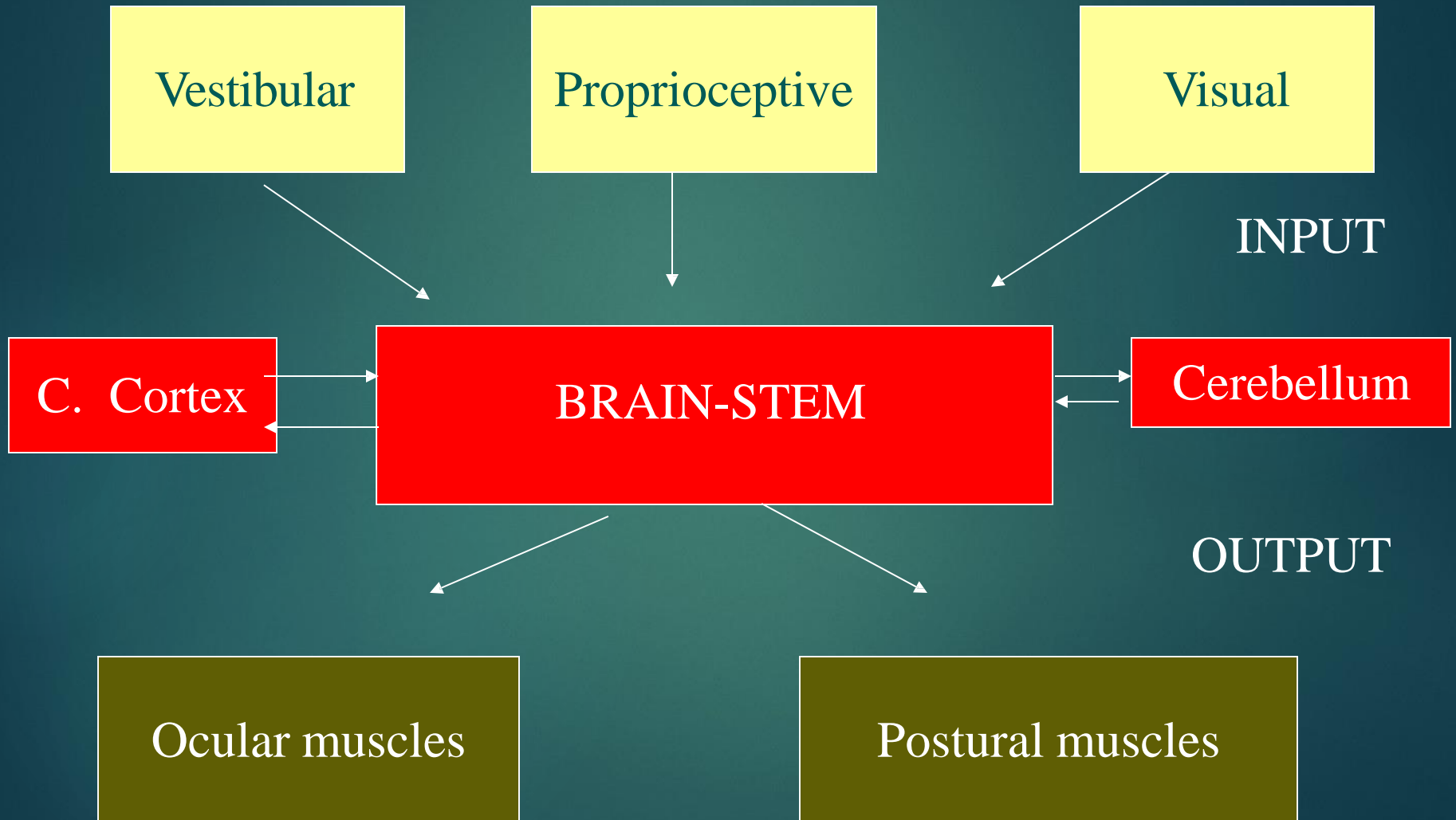
THE BALANCE SYSTEM



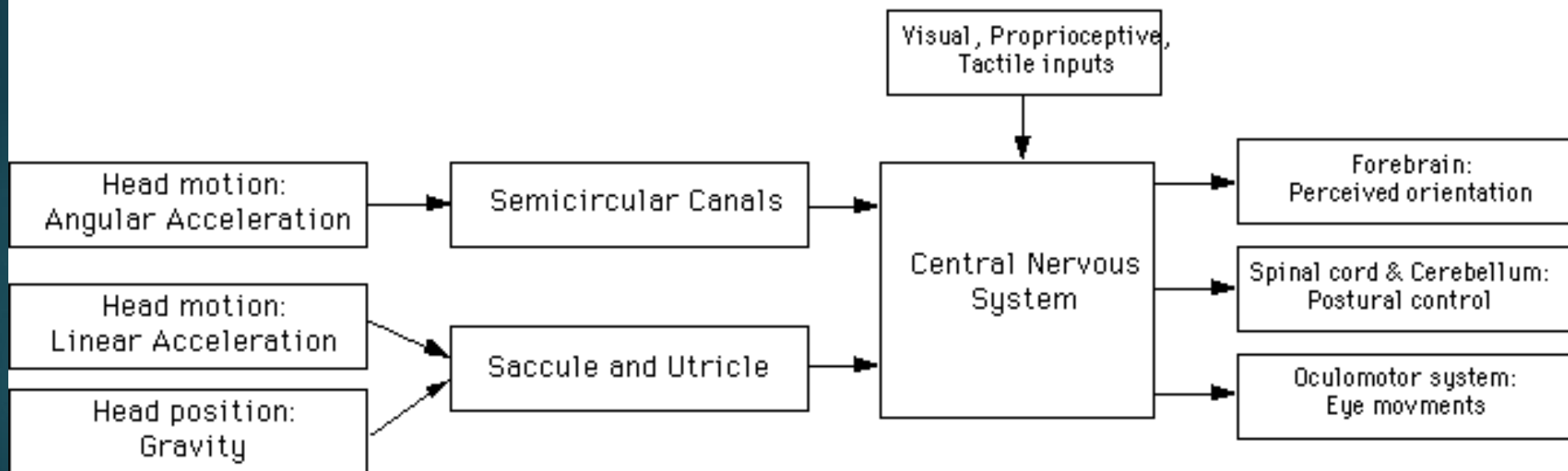
THE BALANCE SYSTEM



THE BALANCE SYSTEM



VESTIBULAR SYSTEM



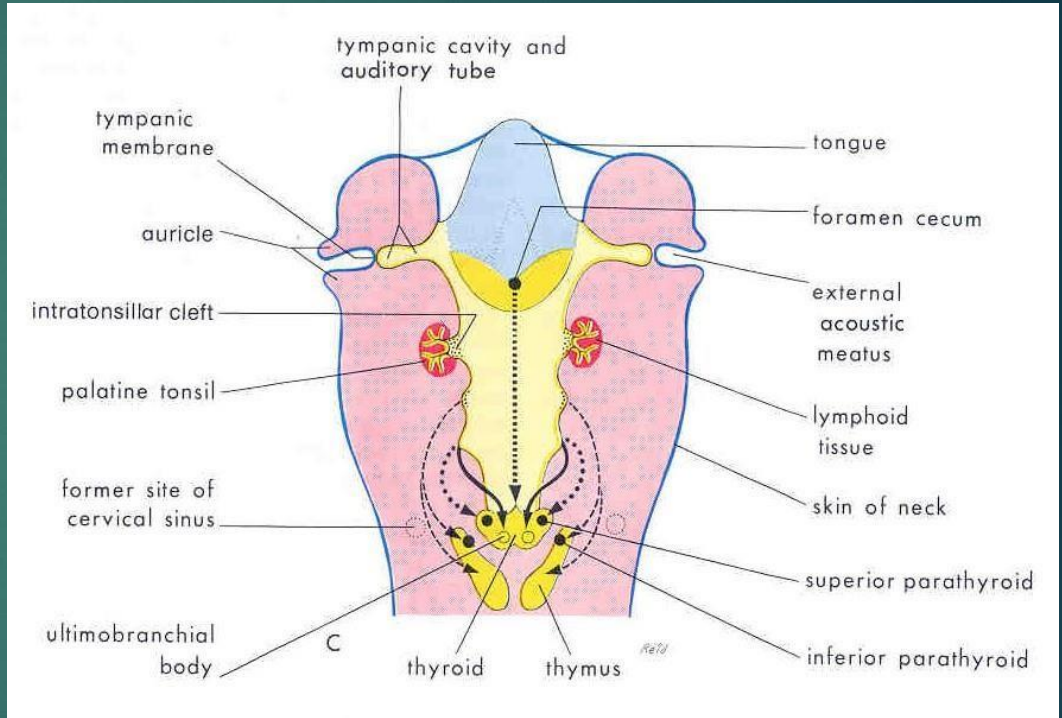
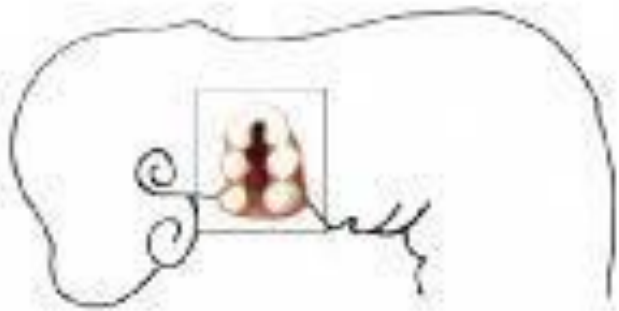
Objectives



- Recognize the congenital anomalies of the external ear
- Diagnose and treat wax accumulation
- Diagnose and treat the common external ear inflammatory conditions
- Discuss the pathology, clinical features and management of AOM

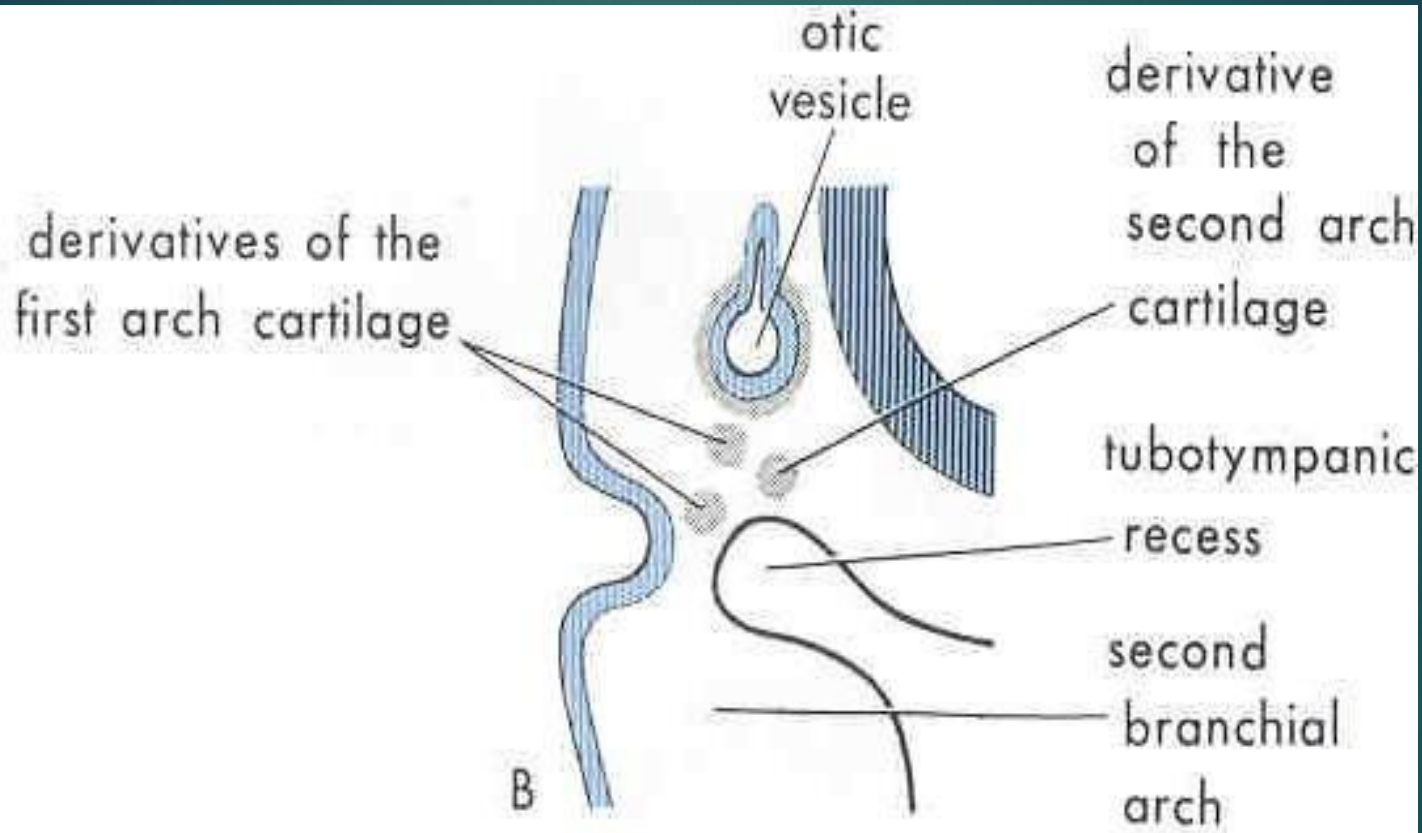
DEVELOPMENT OF THE EAR

- External ear: 1st pharyngeal cleft & arch
- Middle ear: 1st pharyngeal pouch & 1st and 2nd arches



DEVELOPMENT OF THE EAR

- External ear: 1st pharyngeal cleft & arch
- Middle ear: 1st pharyngeal pouch & 1st and 2nd arches
- *Inner ear: Ectoderm of hindbrain*

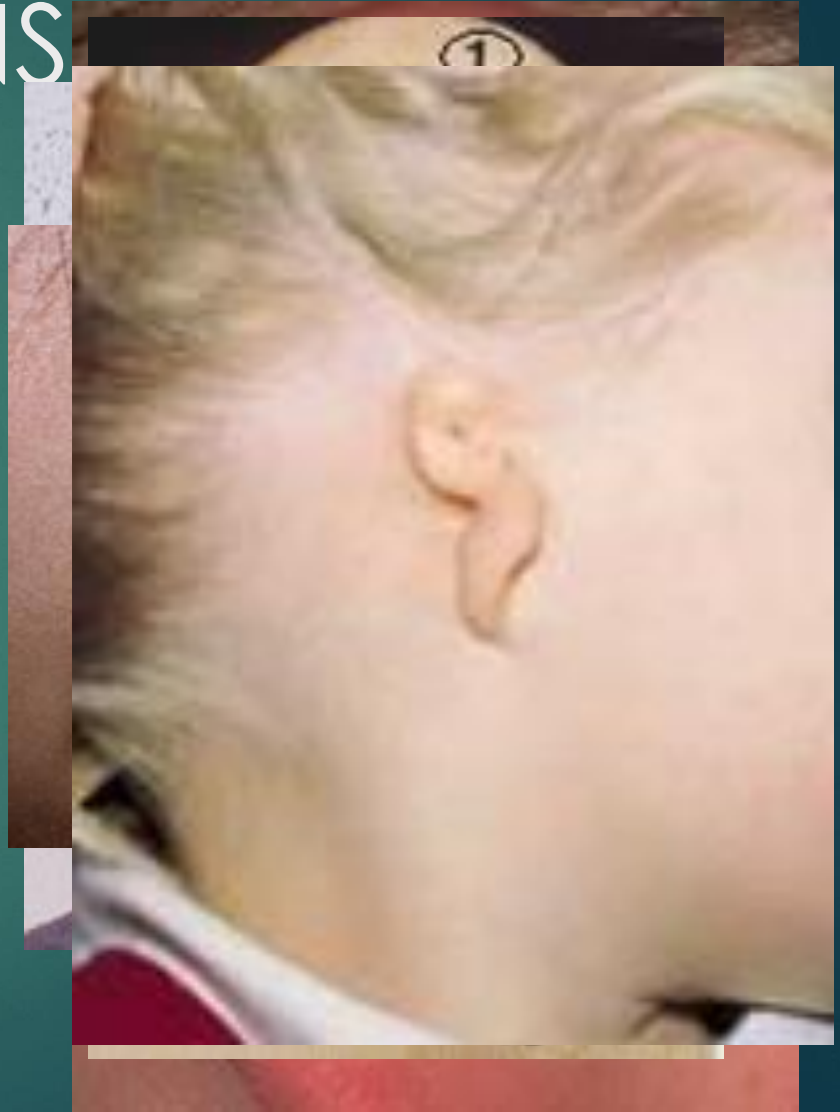




DISEASES OF THE EXTERNAL EAR

CONGENITAL MALFORMATIONS

- Anotia & microtia
- Accessory auricle
- Preauricular sinus
- Protruding ear





TRAUMA TO THE AURICLE

- Lacerations
- Hematoma auris



Complication



Cauliflower ear

PERICHONDritis OF THE PINNA

- Usually follow trauma (hematoma auris, surgical, frostbite, burn) or otitis externa
- Commonly caused by *Pseudomonas*
- Fever, pain, redness and swelling
- Treatment is by antibiotics





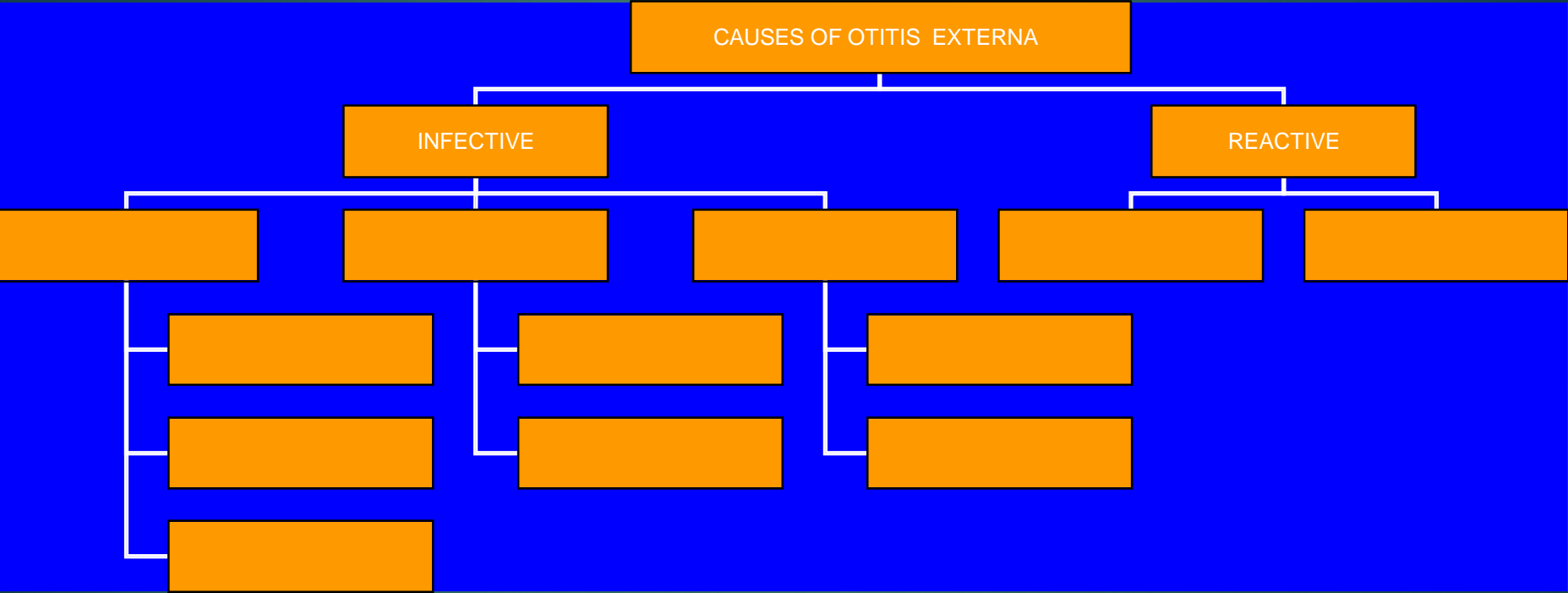
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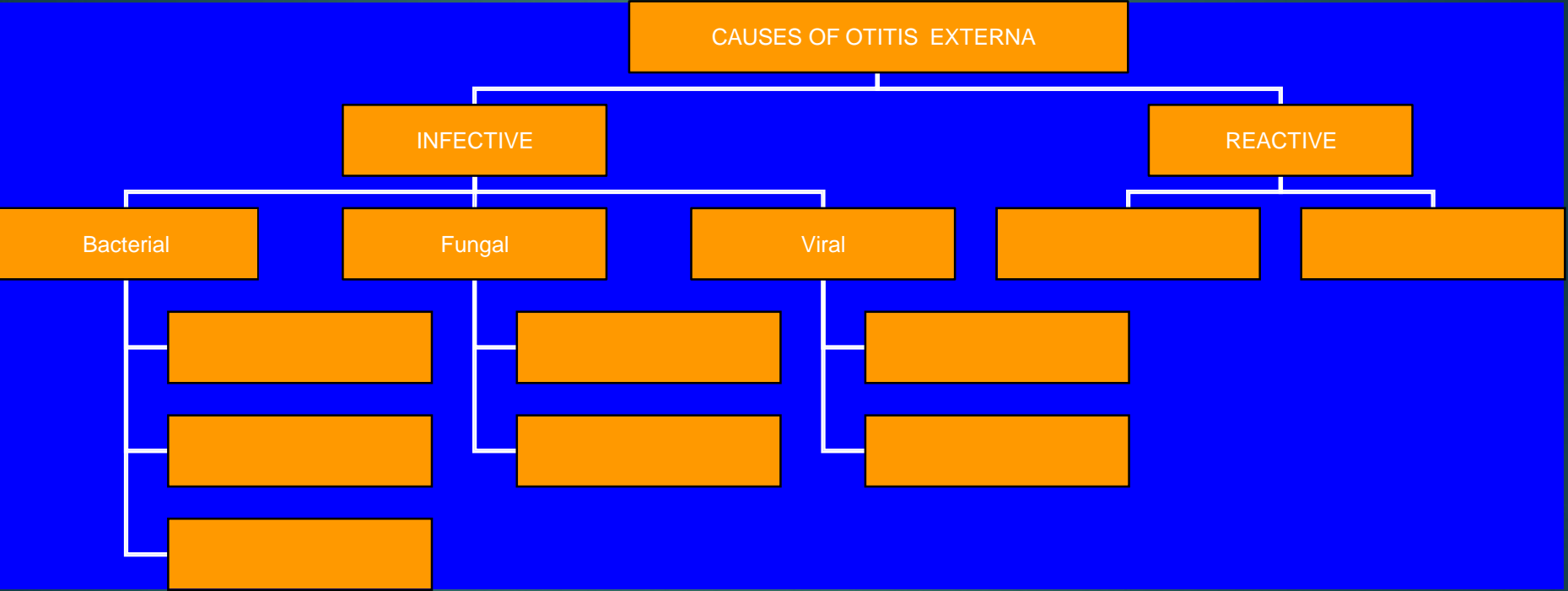
OTITIS EXTERNA

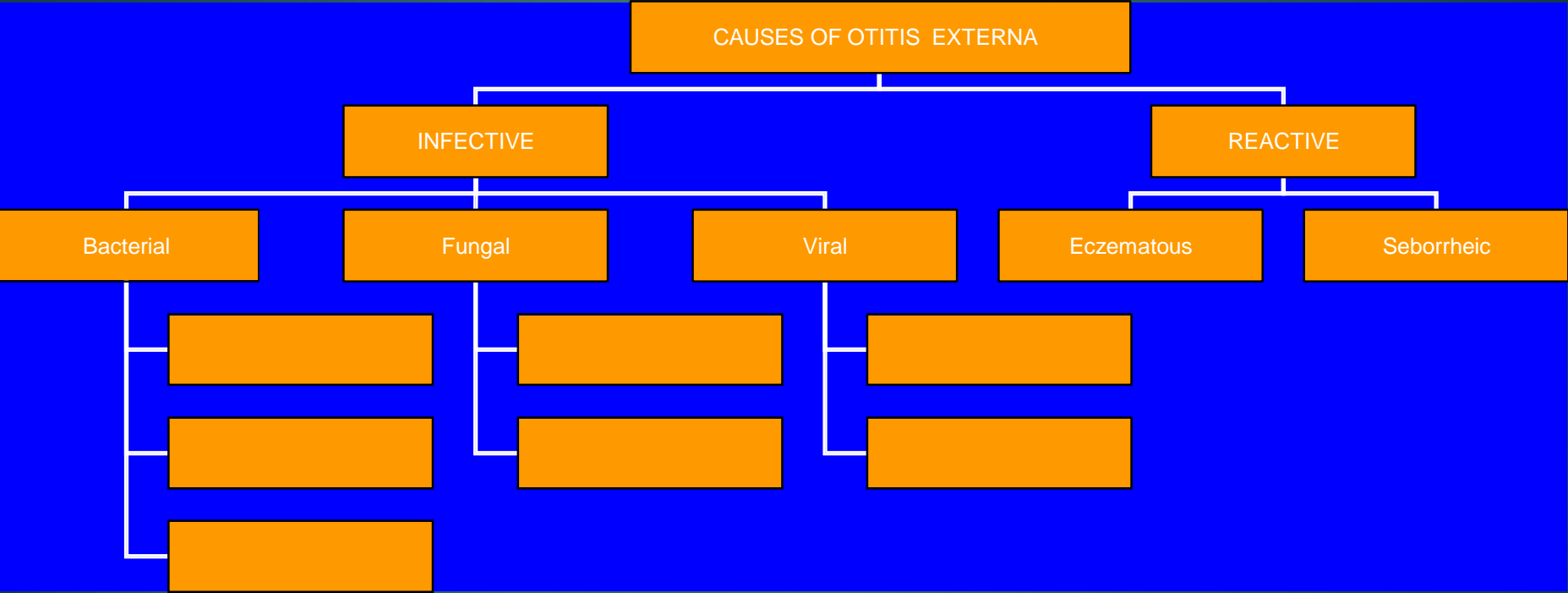
DEFINITION

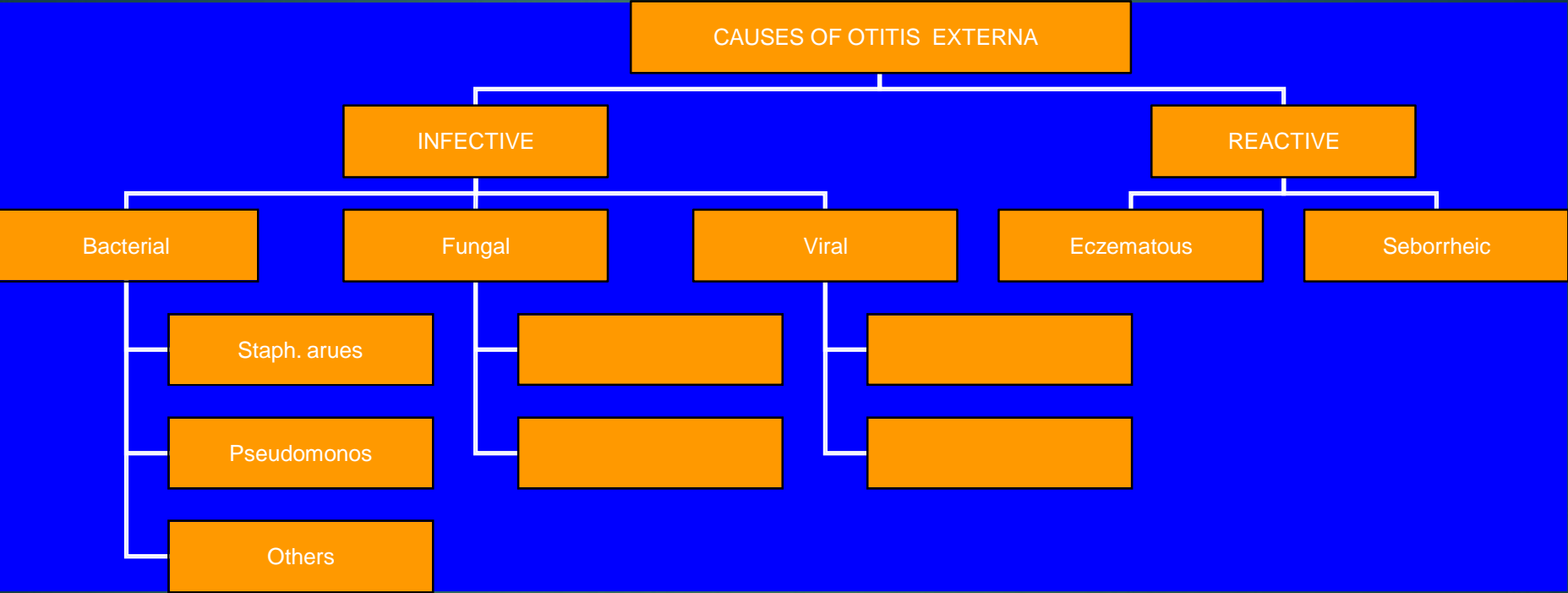
- ▶ An acute or chronic infection of the whole

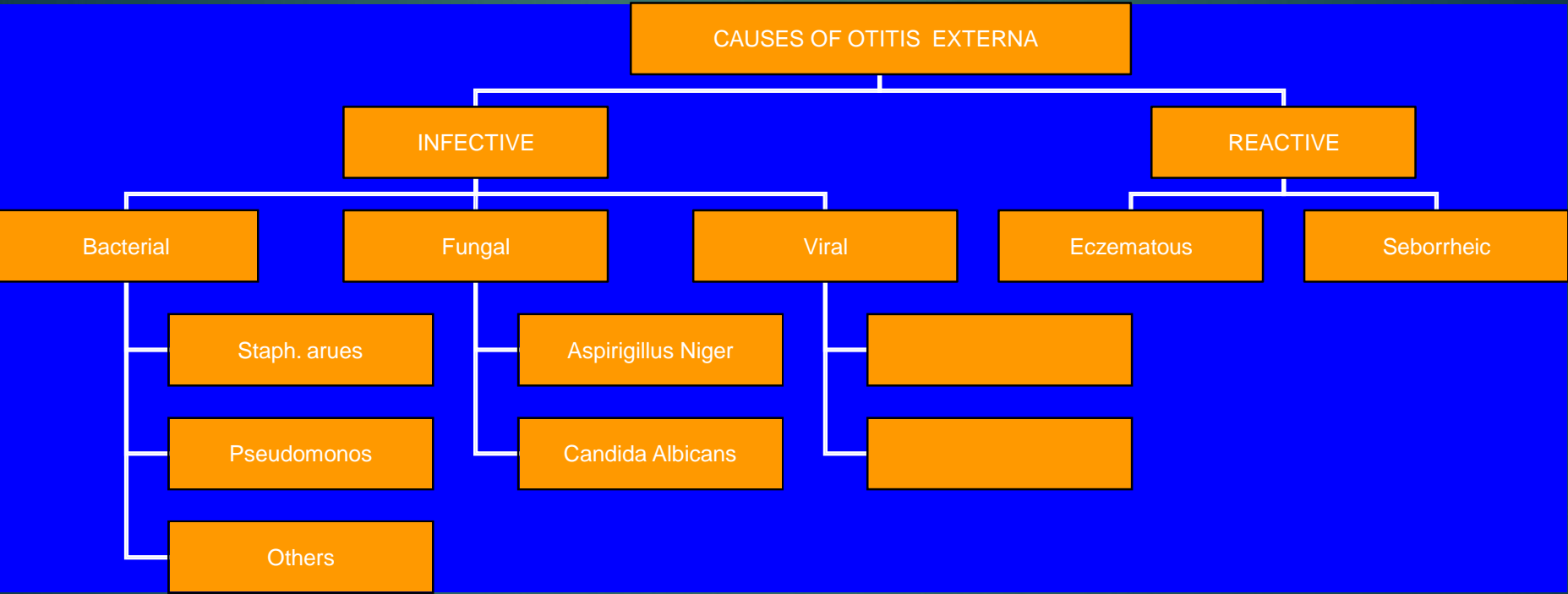
or a part of the skin of the external ear canal

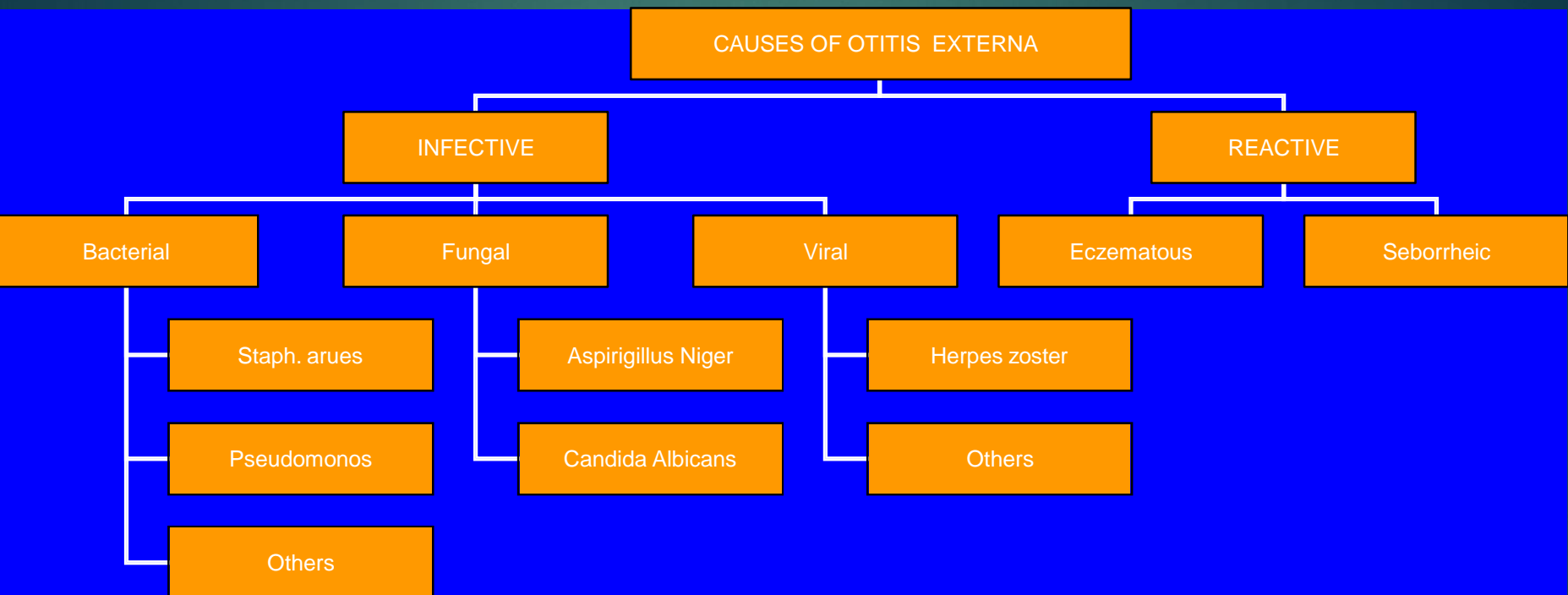












CLINICAL FEATURES OF OTITIS EXTERNA

- Itching
- Pain
- Tenderness and swelling
- Otorrhea
- Deafness
- Changes in the lumen and skin of EAM

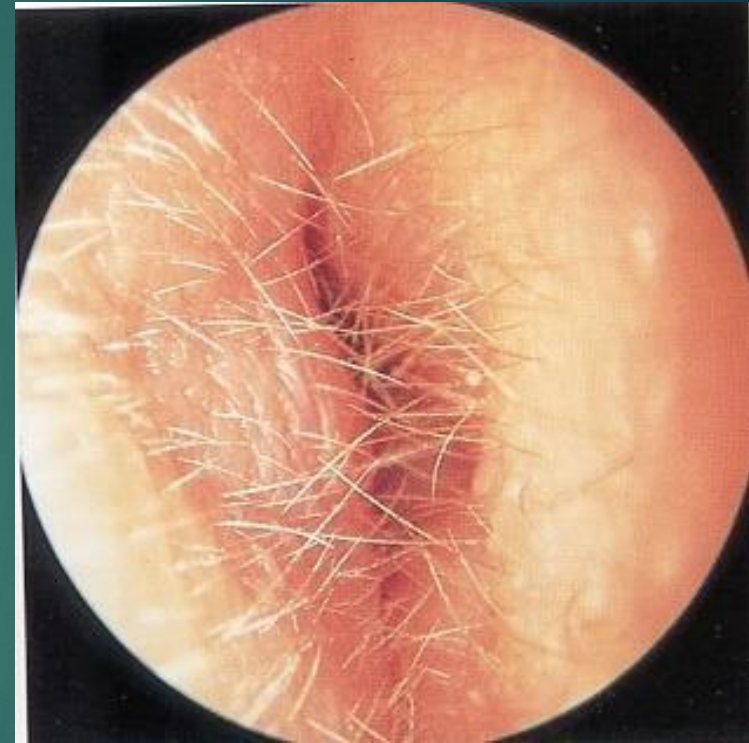
CLINICAL TYPES OF OTITIS EXTERNA

- Localize O.E (furuncle)



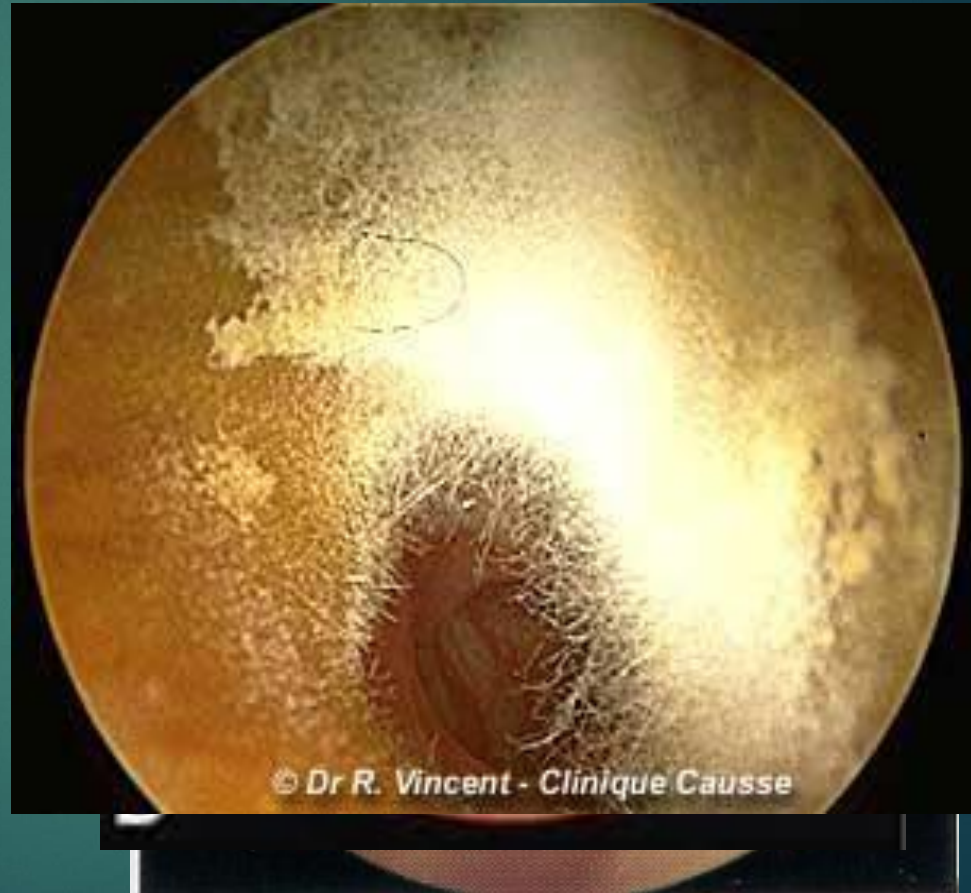
CLINICAL TYPES OF OTITIS EXTERNA

- Localize O.E (furuncle)
- Diffuse infective O.E.



CLINICAL TYPES OF OTITIS EXTERNA

- Localize O.E (furuncle)
- Diffuse infective O.E.
- Otomycosis



CLINICAL TYPES OF OTITIS EXTERNA

- Localize O.E (furuncle)
- Diffuse infective O.E.
- Otomycosis
- Bullous myringitis



CLINICAL TYPES OF OTITIS EXTERNA

- Localize O.E (furuncle)
- Diffuse infective O.E.
- Otomycosis
- Bullous myringitis
- Herpetic O.E.



CLINICAL TYPES OF OTITIS EXTERNA

- Localize O.E (furuncle)
- Diffuse infective O.E.
- Otomycosis
- Bullous myringitis
- Herpetic O.E
- Eczematous and seborrheic O.E.



CLINICAL TYPES OF OTITIS EXTERNA

- Localize O.E (furuncle)
- Diffuse infective O.E.
- Otomycosis
- Bullous myringitis
- Herpetic O.E
- Eczematous and seborrheic O.E.

MANAGEMENT OF OTITIS EXTERNA

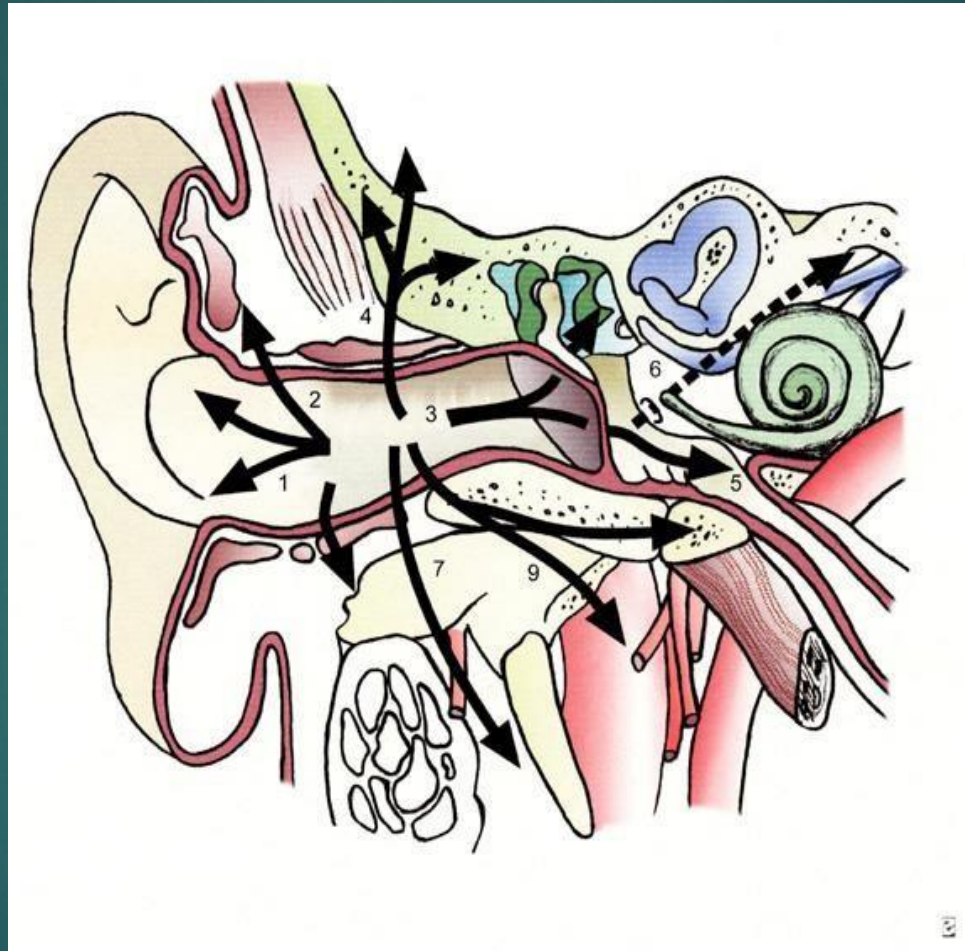
- Swab for culture and sensitivity
- Ear toilet
- Keep the ear dry
- Local medications
- Systemic medications
- Surgery may be required in chronic cases



NECROTIZING (MALIGNANT) OTITIS EXTERNA

- An acute **Pseudomonas** infection of the skin of the external ear canal which has spread to the adjacent bone. It occurs mostly in **elderly diabetic** patients.

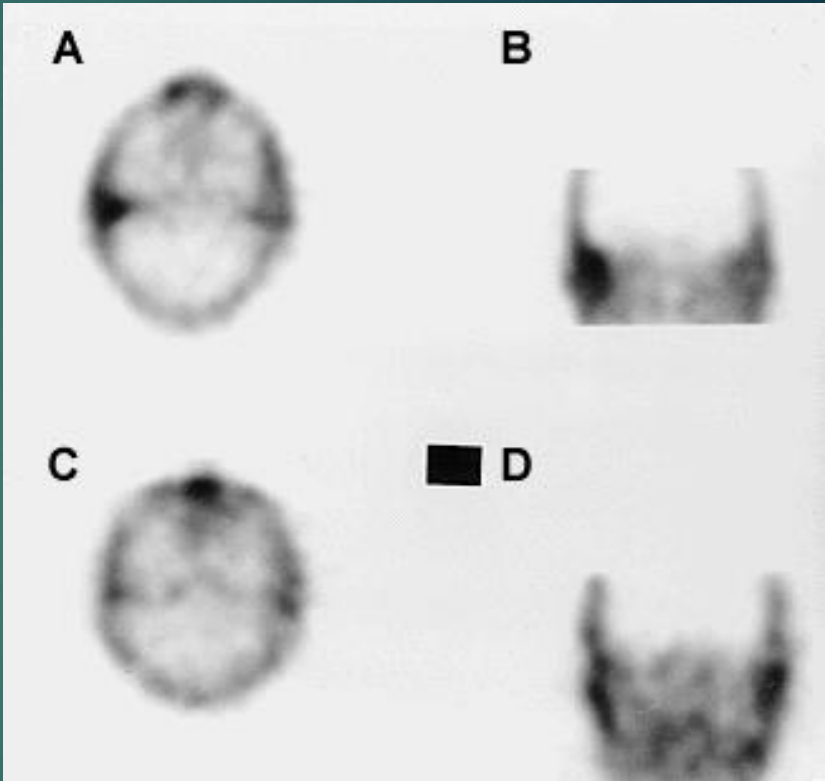
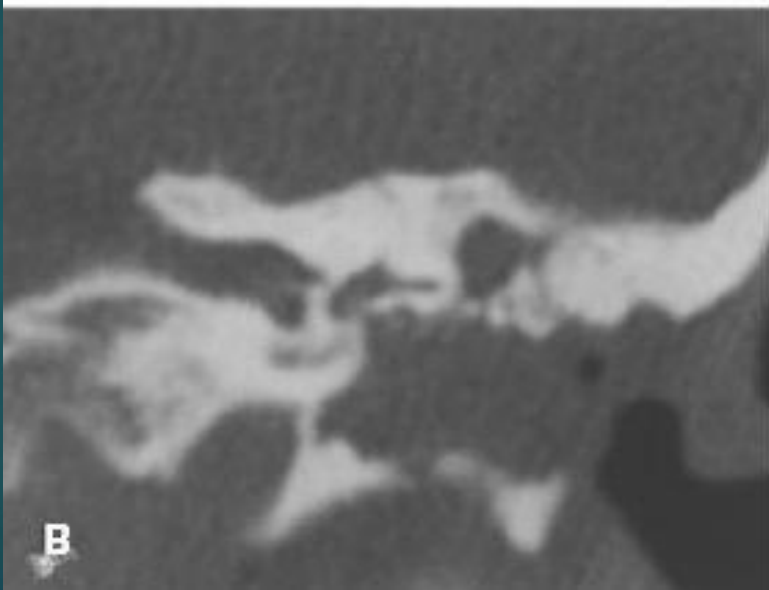
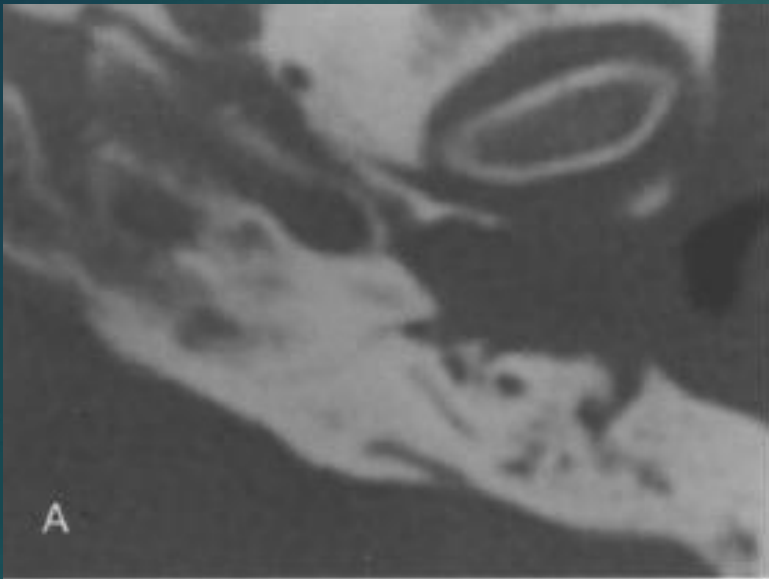
Complications



DIAGNOSIS

- Diabetes
- Advanced age
- Severe otalgia
- Granulation tissue
- Cranial nerve involvement
- Radiology






TREATMENT



- Control of diabetes
- Anti Pseudomonas antibiotics
- Local treatment and debridement
- The role of surgery remains controversial



MISCELLANEOUS CONDITIONS OF THE EXTERNAL EAR

WAX



- Mixture of ceruminous and sebaceous glands secretion
- Normally is expelled from the canal aided by movements of the jaw
- When accumulated it may cause deafness, earache or tinnitus



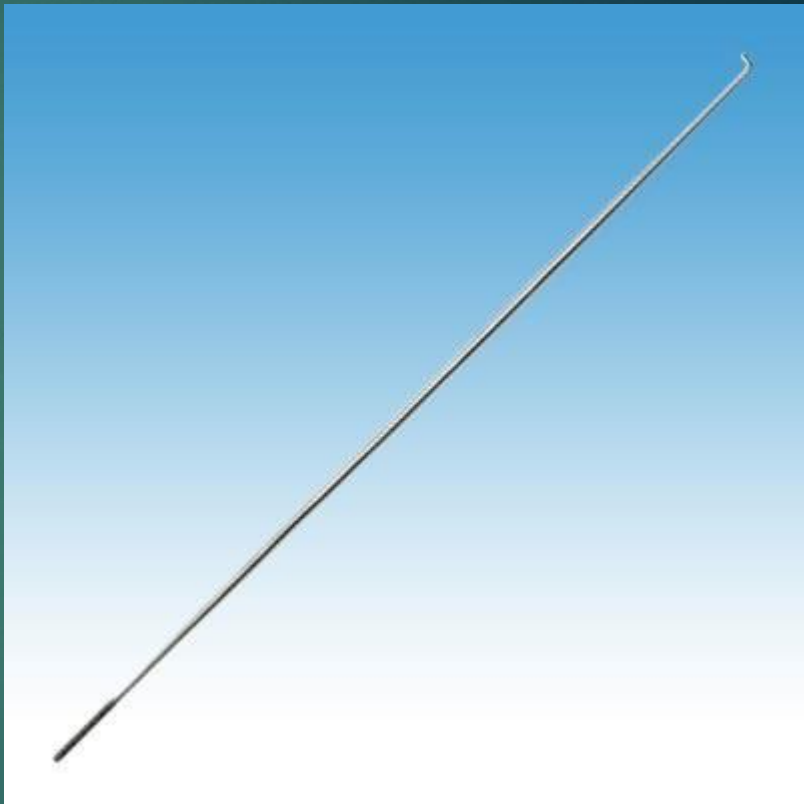
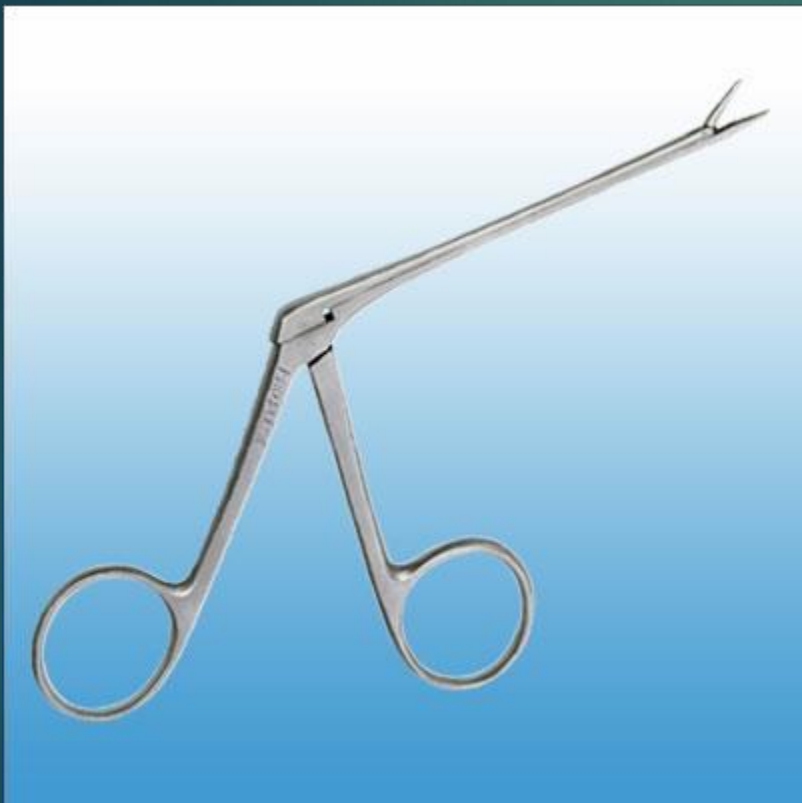
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WAX

- ▶ Treatment is by removal using syringing, suction or instrumentation





KERATOSIS OBTURANS

- Accumulation of desquamated epithelium in the **bony** canal
- It may be associated with sinusitis, bronchiectasis or primary ciliary dyskinesia
- Usually cause deafness and pain
- Treatment is periodic removal



ACUTE OTITIS MEDIA

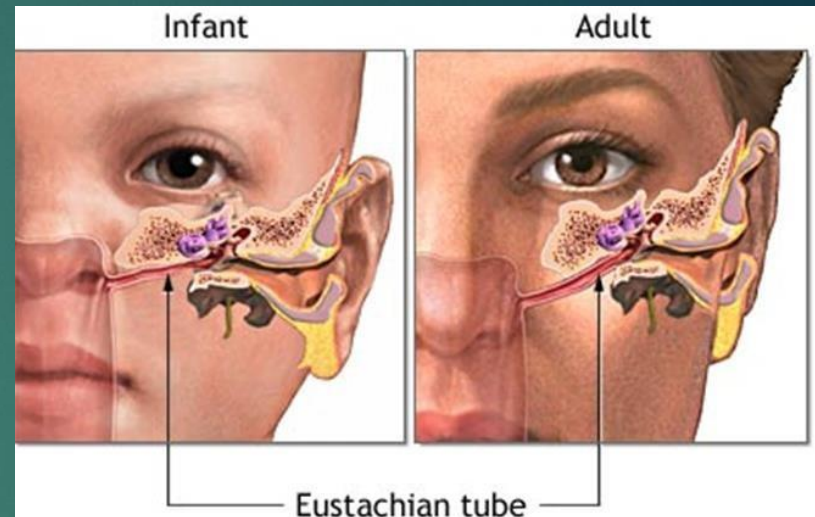
DEFINITION



Acute infection of the mucous membrane
lining of the middle ear cleft

PREDISPOSING FACTORS

- Age
- Maleness
- Bottle feeding
- Climate
- Crowded living conditions
- Heredity
- Associated conditions: cleft palate, primary immunodeficiency, Down syndrome, and cystic fibrosis



ROUTE OF INFECTION



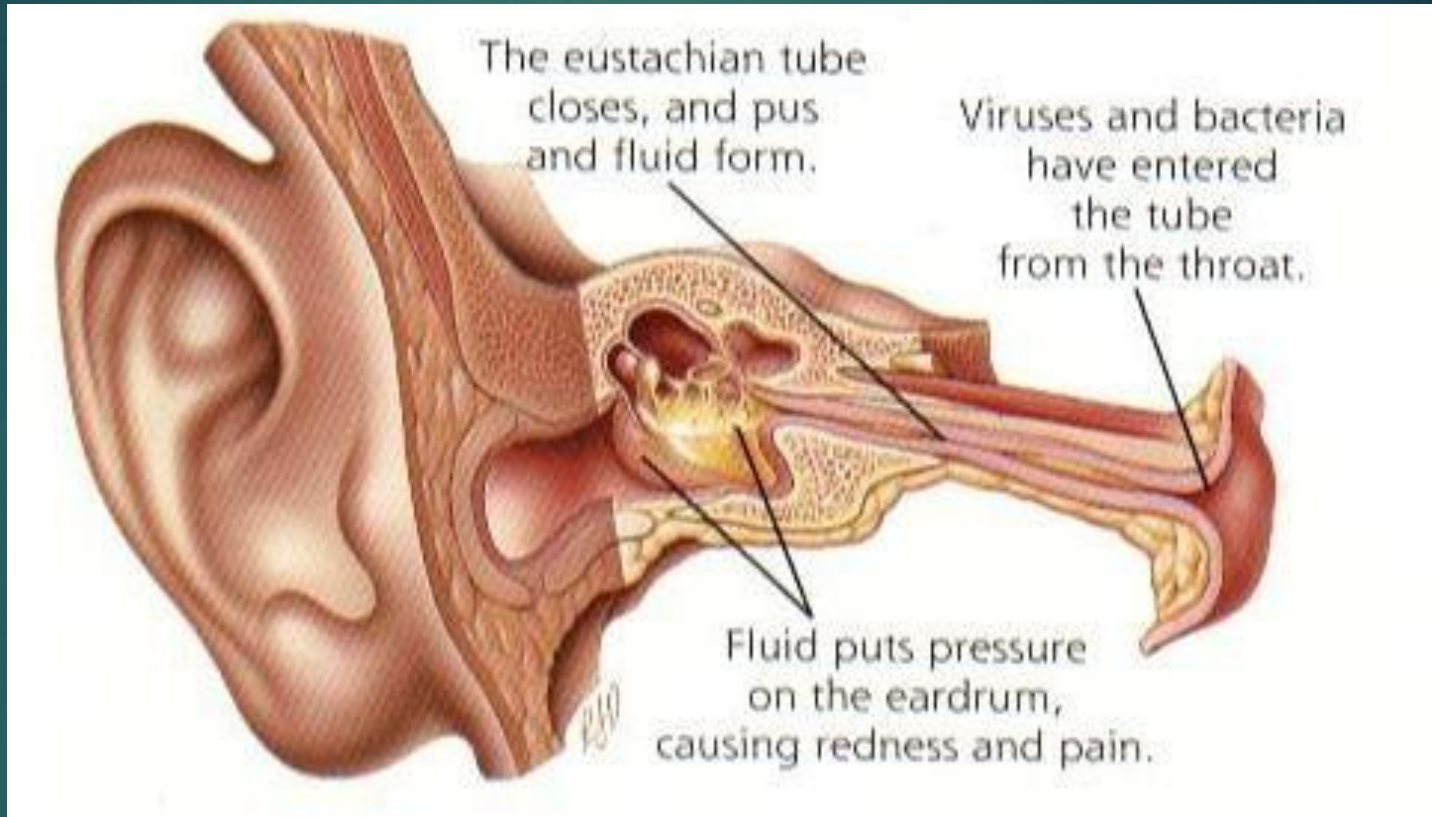
- Eustachian tube
- External auditory canal
- Blood borne

BACTERIOLOGY



- Streptococcus pneumonia
- Haemophilus influenzae
- Branhamella catarrhalis
- Streptococcus pyogens
- Staphylococcus aureus

PATHOLOGY



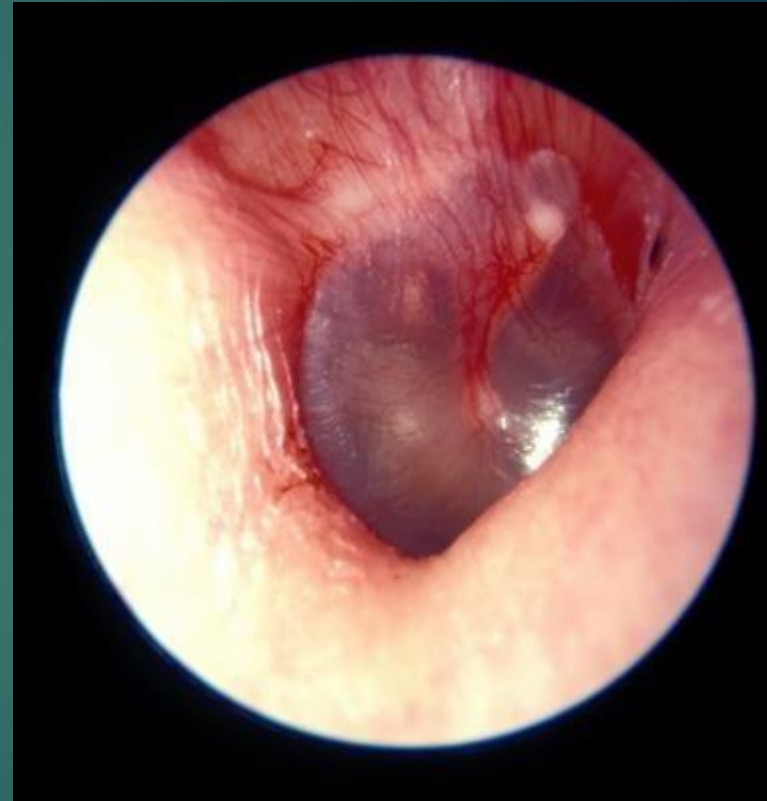
CLINICAL PICTURE



- Tubal occlusion
- Suppurative inflammation
- Tympanic membrane rupture
- Resolution

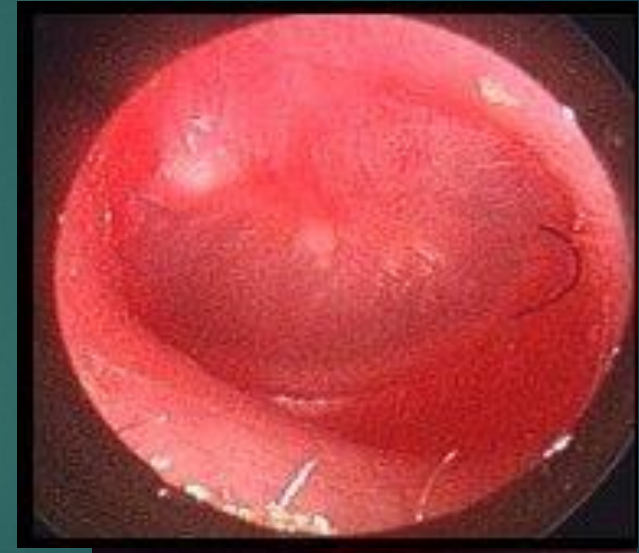
CLINICAL PICTURE

- Tubal occlusion
Discomfort, autophony, retracted drum
- Suppurative inflammation
- Tympanic membrane rupture
- Resolution



CLINICAL PICTURE

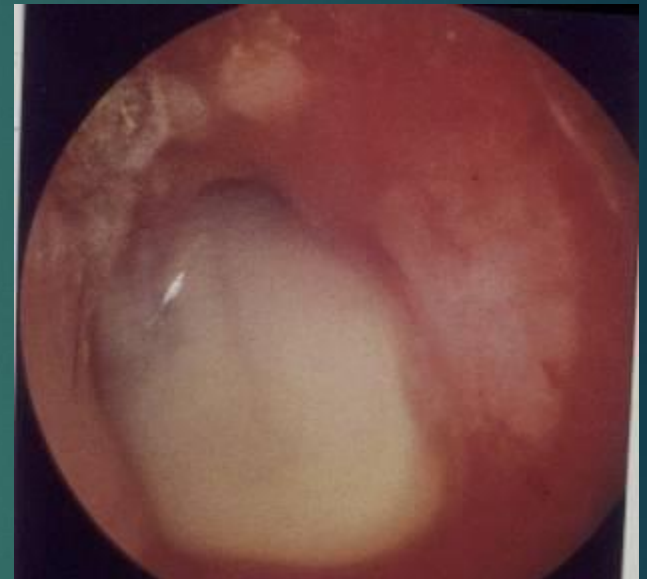
- Tubal occlusion
Discomfort, autophony, retracted drum
- Suppurative inflammation
Fever, severe earache, deafness, bulging drum
- Tympanic membrane rupture
- Resolution



CLINICAL PICTURE

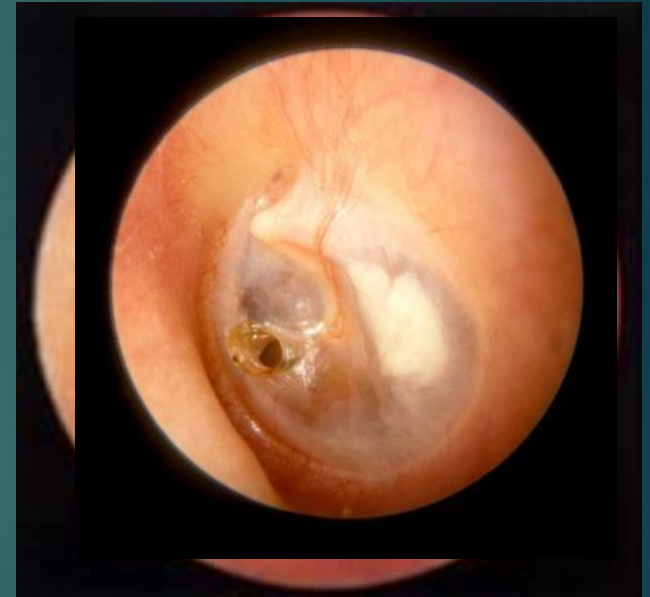


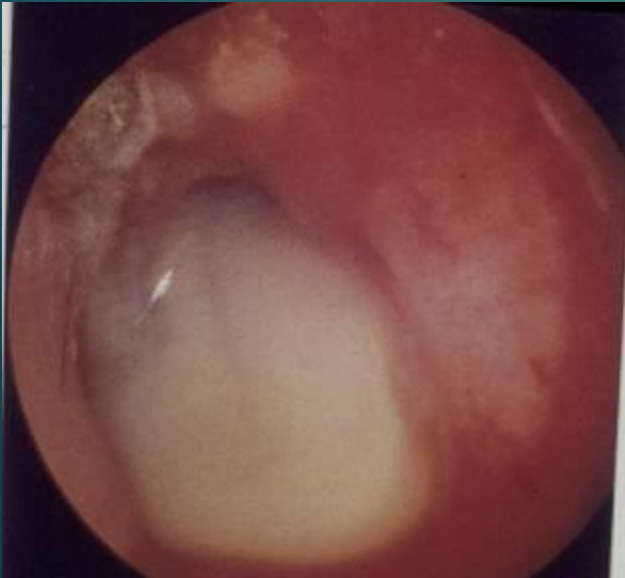
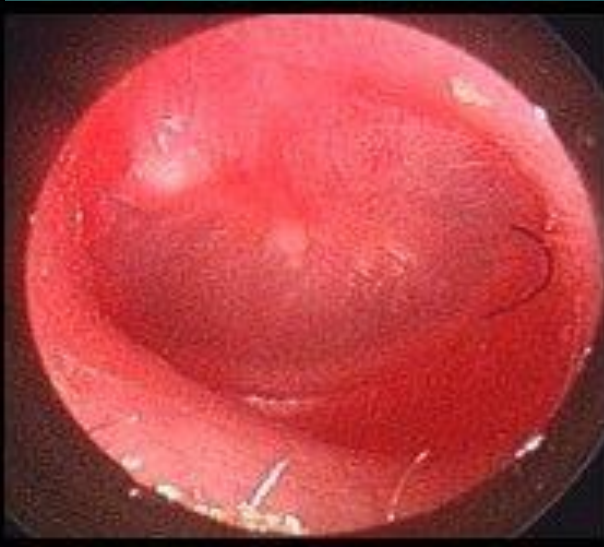
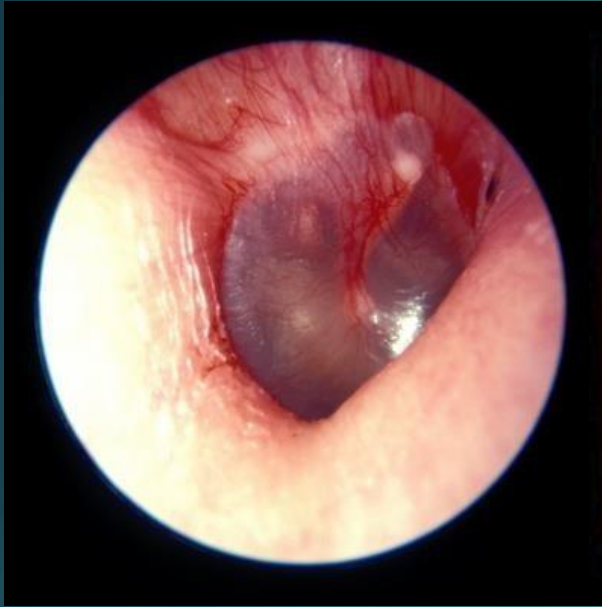
- Tubal occlusion
Discomfort, autophony, retracted drum
- Suppurative inflammation
Fever, sever earache, deafness, bulging drum
- Tympanic membrane rupture
 - Otorrhea... temp. & earache subside
- Resolution



CLINICAL PICTURE

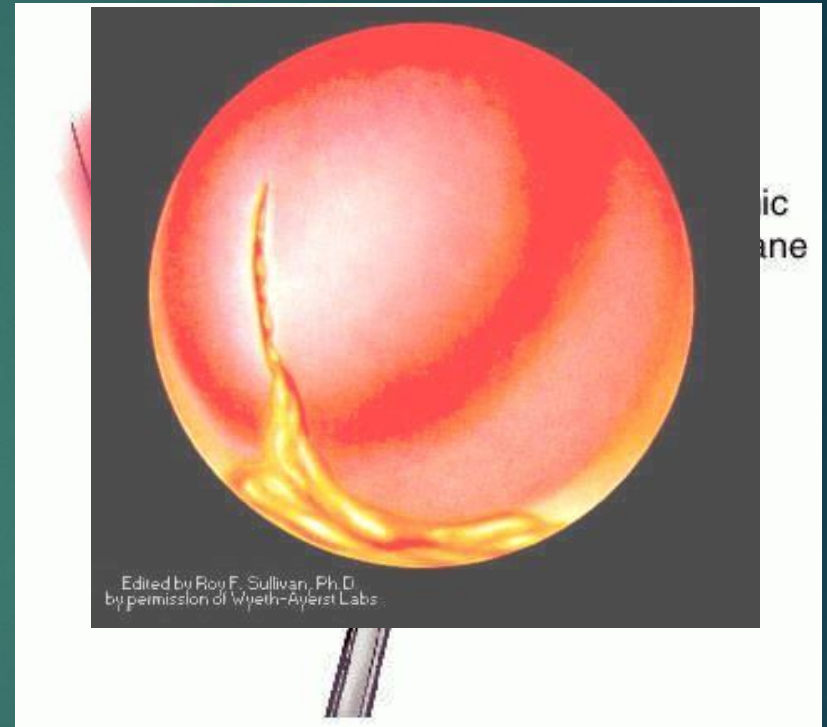
- Tubal occlusion
Discomfort, autophony, retracted drum
- Suppurative inflammation
Fever, sever earache, deafness, bulging drum
- Tympanic membrane rupture
 - Otorrhea... temp. & earache subside
- Resolution





TREATMENT

- Symptomatic
- Antimicrobials
 - Amoxicillin/clavulanic acid
 - Tri-methoprim-sulphamethoxazole
 - Cefaclor, cefixime
 - Erythromycin-sulfisoxazole
- Decongestant
- Myringotomy
- Ear toilet and local antibiotics





RECURRENT ACUTE OTITIS MEDIA

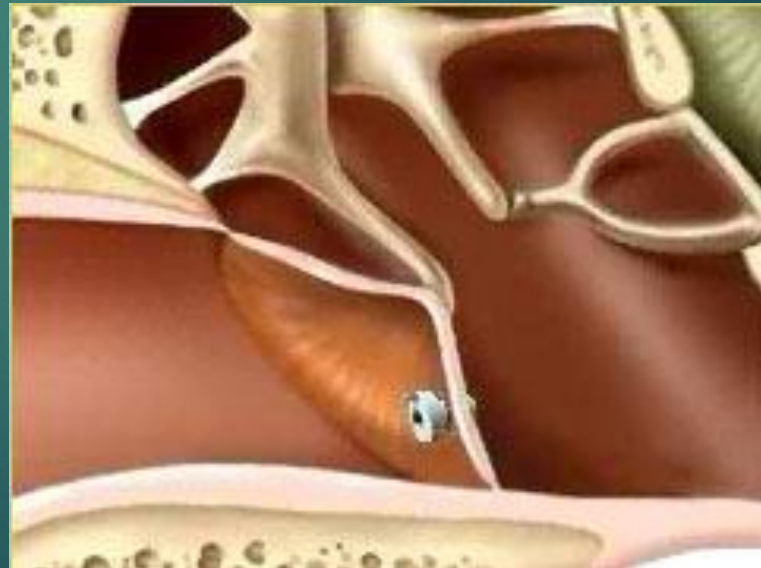
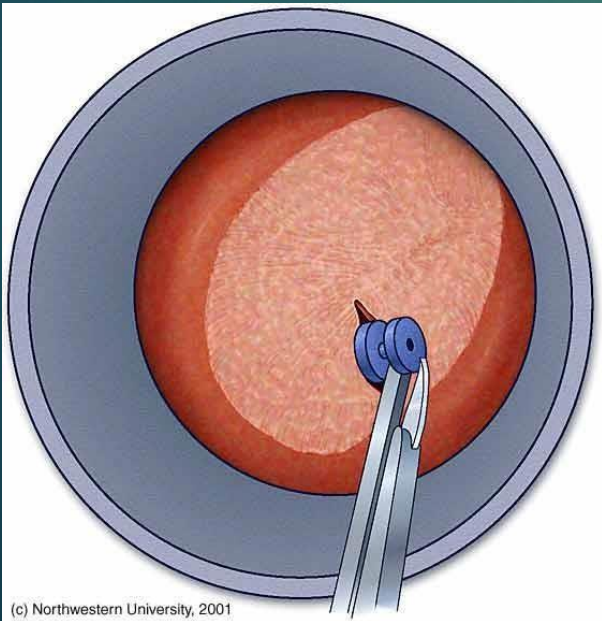
DEFINITION

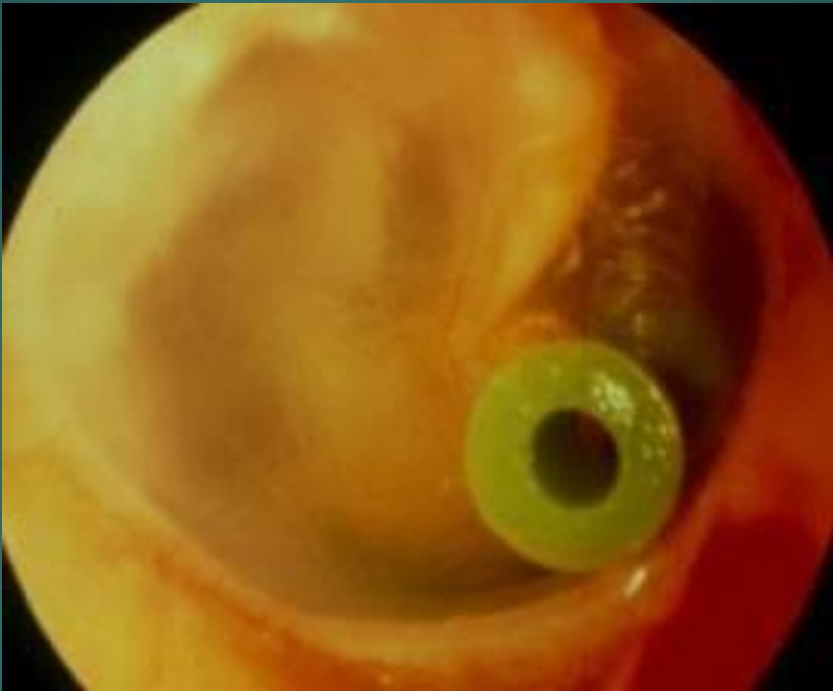


- Three or more attacks over a 6-months period

TREATMENT

- Long-term low dose antimicrobials
- Ventilation tube insertion





THANK
YOU

