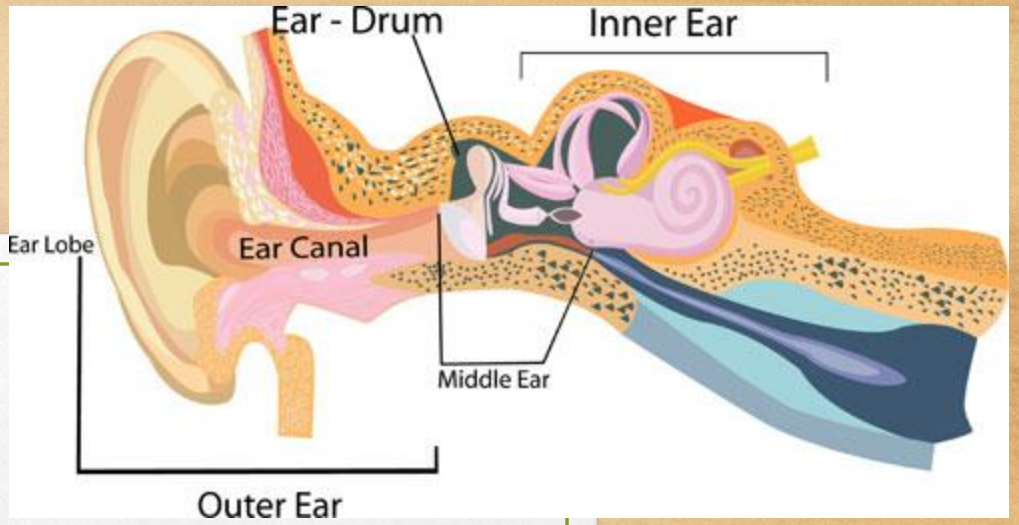

PNS module

Lab. 2

Hearing

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2024

Deafness

Deafness is impairment of auditory acuity either partial or even Complete.

It is the most Common hearing disorders which are accompanied by marked increase in threshold of that sensation.

Deafness may or may not accompanied by a less common hearing disorder called tinnitus (ringing sensations) which is attributed mostly to irritation of the hair cells or the vestibulo-cochlear nerve.

Tinnitus occurs also in meniere's syndrome, fevers and other diseases.

Types of Deafness

A- Conductive deafness in which there is a block of sound wave transmission from external ear till the oval window.

Causes of conductive deafness:-

1-Obstruction in the external auditory canal like wax, insects, fungus infections or very common foreign bodies.

2-Rupture drum.

3- Qtitis externa or otitis media i.e. inflammation of external or middle ear.

4 - Presbyacusis (senile deafness) i.e. loss of elasticity and mobility of bony ossicles which occurs commonly due to aging process.

5 - Eustachian tube obstruction as occurs in common cold or sore throat.

6 - Tumors of the external ear.

7- Tonsillitis or adenoid.

- **B-Nerve deafness or perceptive deafness** which is more serious than conductive deafness and is less curable. It occurs due to any defect in auditory transmission from oval window till the auditory Cortex.

Causes of perceptive deafness:-

1- Chronic exposure to high pitched sound as in noisy factories or in air ports which lead to destruction of delicate hair ceils in organ of Corti.

2- Sudden exposure to very high sound like guns.

3- Excessive use of some drugs as streptomycin and garamycin during treatment of TB which lasts for months.

4- Meniere's disease (increase in endolymph pressure).

5- Vascular lesion in auditory pathway (thrombosis or hemorrhage)

6- Tumor or traumatic lesion in some areas in the brain

7- As complication of meningitis or encephalitis.

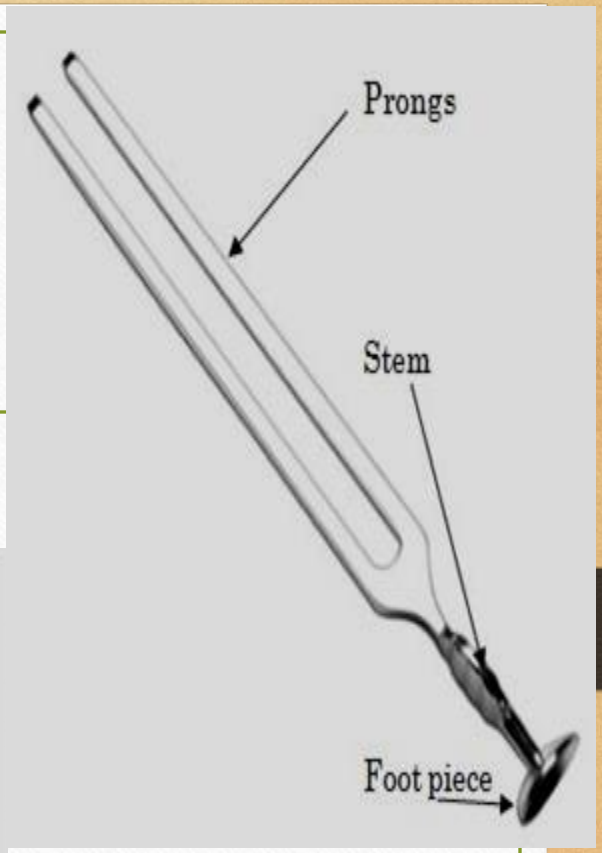
8-Carbon monoxide poisoning which causes damage to auditory areas.

9- Vascular or degenerative lesions in the auditory cortex.

Hearing tests

1- Weber's test

Definition :- Compare bone conduction in both ears .



Vibrating tuning Fork

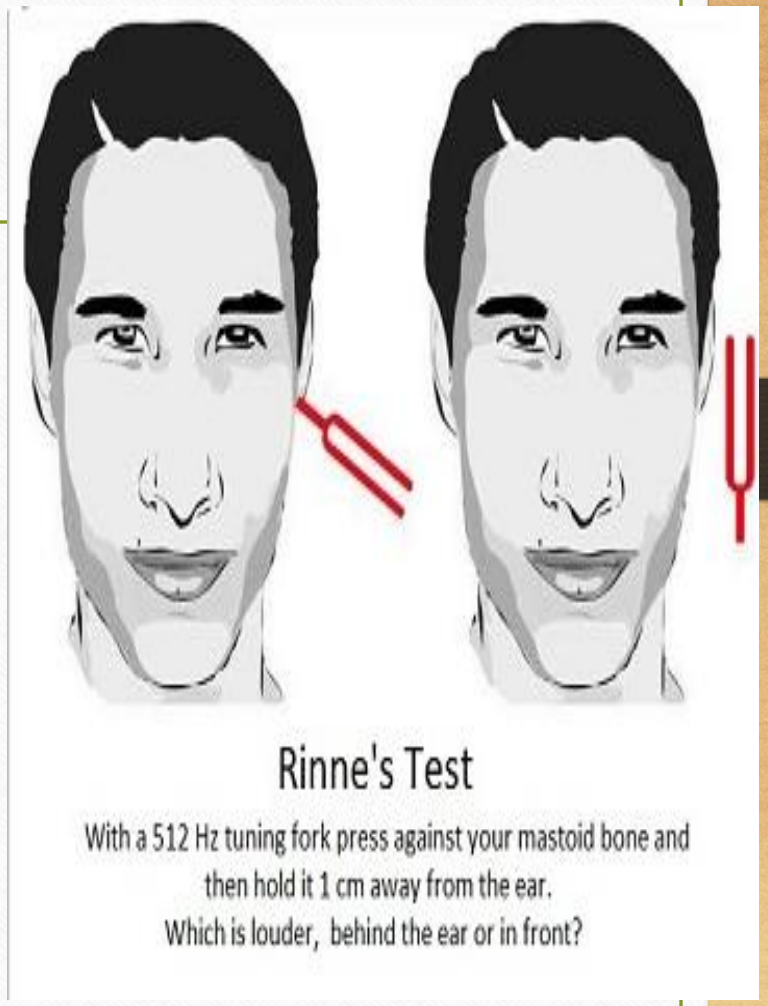
- **Procedure**
- The base of the vibrating tunning fork is placed on the middle of the forehead of the subject.
- **Normal :** vibration are heard equally in both ears
- **Nerve deafness:** the vibration is better (louder) in the normal ear
- **Conductive deafness**: the vibration is better louder in the affected ear

2- Rinne's test.

- **Definition :-** Compare air and bone conduction in one ear

Procedure

The base of the vibrating tunning fork is placed on the mastoid process of the subject while the external auditory canal of this ear is blocked. Until the patient is no longer hears it after that the external auditory canal is unblocked and the tunning fork is held in front of ear



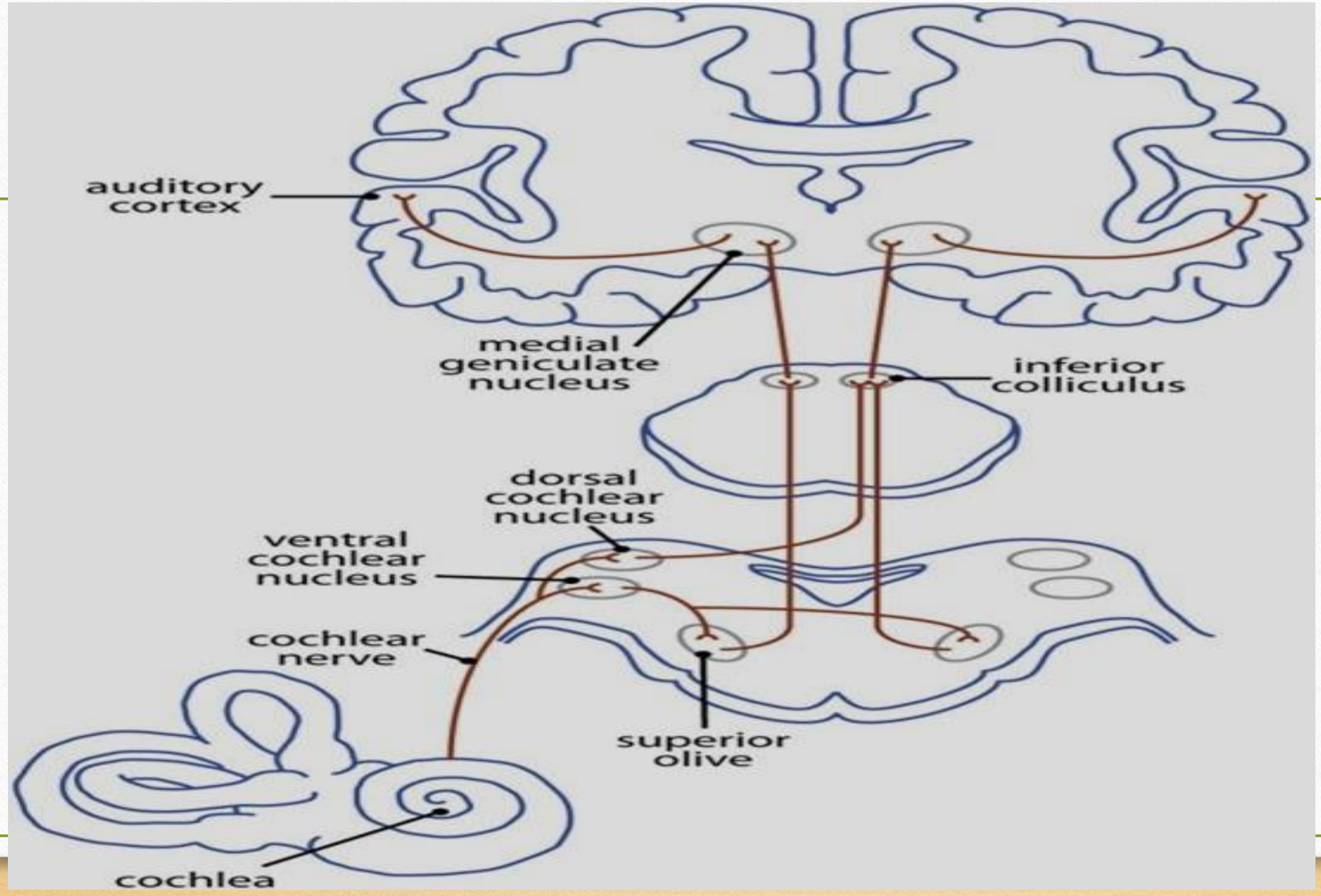
- **Normal:** air conduction is better than bone conduction (40 seconds) **Rinne positive**

- **Conductive deafness** : Bone conduction is better than air conduction (**Rinne negative**)
- **Nerve deafness**: air conduction is better than bone conduction But both are less than normal (< 40 seconds) **Reduced Rinne positive**

3- Schwabach's test

- **Definition :-** Compare bone conduction between the **subject** and the **examiner** provided that the **examiner** is normal .
- **Normal : equal** time of hearing
- **Nerve deafness** : the **examiner** is better .
- **Conductive deafness** : the **patient** is better (due to loss of outside effect of noise).

Auditory Pathway



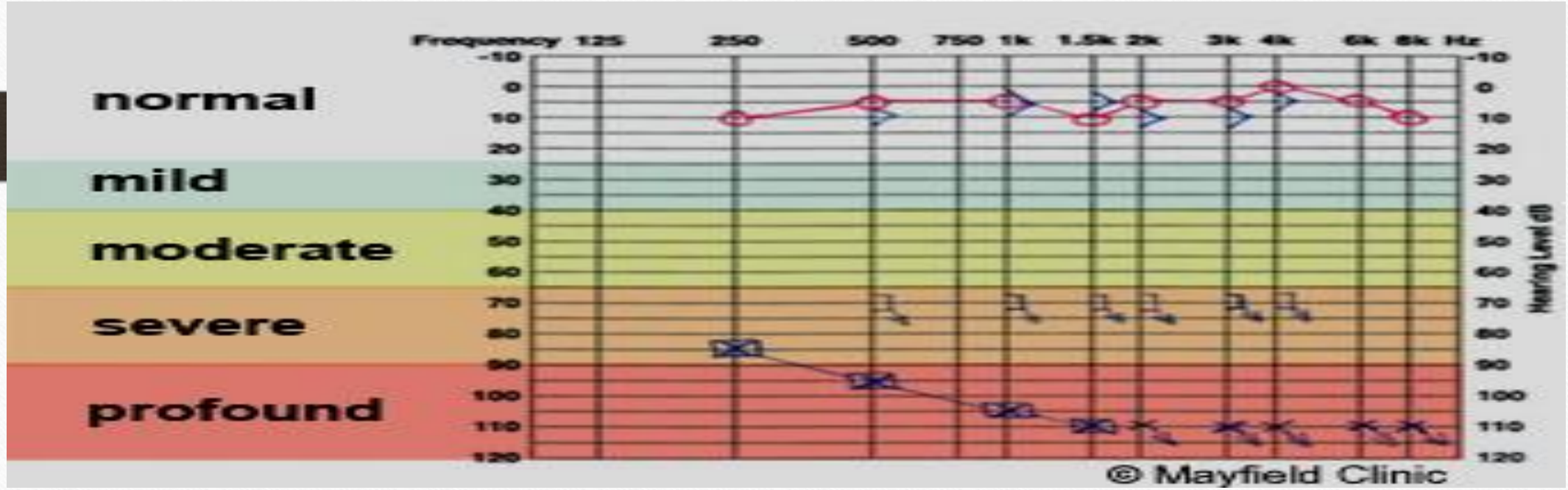
2-Audiometry

- The audiometry tests are conducted in a quiet sound-proof room. Earphones will be placed on your head. You will be asked to sit still and not talk.
- The earphones are connected to a machine that will deliver the tones and different sounds of speech to your ears, one ear at a time.
- The audiologist will ask you to raise your hand when you hear a sound. For example, if you hear a sound with your left ear, raise your left hand; if you hear a sound with your right ear, raise your right hand.
- The audiologist will record each tone at the lowest possible volume that you were able to hear it.
- Before or after the general audiometry test, tuning forks are also used to conduct the Rinne and Weber tests. Each test evaluates the potential for different kinds of hearing loss.

- An audiometry exam tests how well your hearing functions. It tests both the intensity and the tone of sounds, balance issues, and other issues related to the function of the inner ear.
- **A pure tone audiometry test:** measures the softest, or least audible, sound that a person can hear. During the test, you will wear earphones and hear a range of sounds directed to one ear at a time.

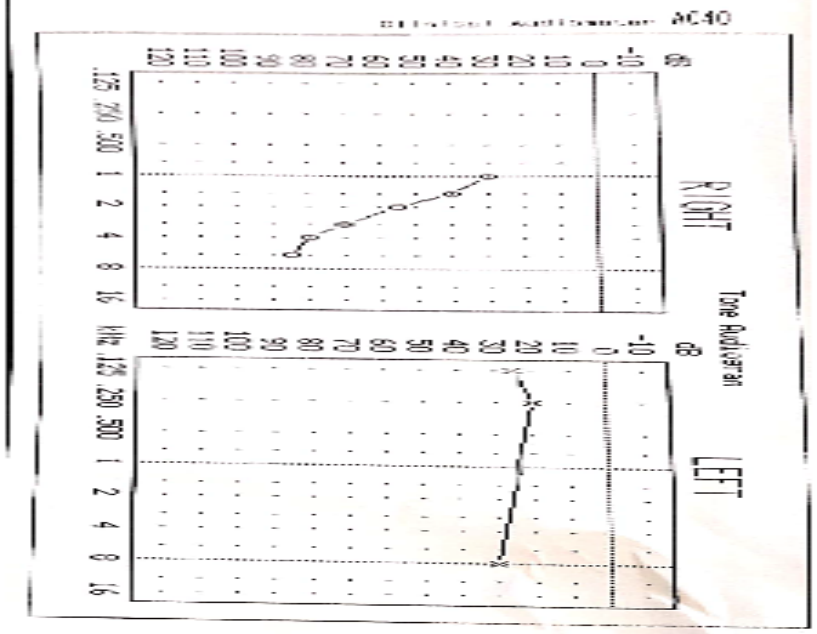
- The loudness of sound is measured in decibels (dB). A whisper is about 20 dB, loud music ranges 80-120 dB, and a jet engine is about 180 dB. The tone of sound is measured in frequencies (Hz). Low bass tones range 50-60 Hz, high-pitched tones range 10,000 Hz or higher. Normal hearing range is 250-8,000 Hz at 25 dB or lower.
- **A word recognition test:** (also called speech discrimination test) assesses a person's ability to understand speech from background noise. If your speech discrimination is poor, speech may sound garbled. Word recognition scores can be helpful in predicting the usefulness of a hearing aid.
- **A tympanometry test:** detects problems such as fluid/wax buildup, perforated eardrum, ossicle bone damage, or tumors in the middle ear.

Audiogram of a patient with an acoustic neuroma shows hearing loss in the left ear. The red line is the right ear. The blue line is the left ear.



Interacoustics

Subject Information .....



- **Hearing loss is often described as follows:**

-Normal = less than 25 db HL

-Mild = 25-40 db HL

-Moderate = 41-65 dB HL

-Severe = 66-90 db HL

-Profound = more than 90 db HL

Thank You