



SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

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Department of Biomedical Engineering

Course Name: 19BMB301 Diagnostic & Therapeutic Equipment

III Year : V Semester

Unit 4- Sensory Equipment

**Topic : Test of Hearing And
Pure tone Audiometry**



Objective

- * The usual primary purpose of pure-tone tests is to determine the type, degree, and configuration of hearing loss.
- * To plot the frequency intensity recording and construct the audiograms.
- * To interpret the audiograms



IN THIS PRACTICAL WE WILL DO

- **TUNNING FORK TESTS**

- **AUDIOMETRY**



BEFORE GOING FOR ACTUAL PRACTICAL LET US EXPLAIN THE

● TERMINALOGY



Air conduction

- This test assesses sensitivity when the signal is transmitted through the outer, middle, and inner ear and then through the brain to the cortex. Testing may be performed using headphones, insert earphones.



Bone conduction

- This technique assesses sensitivity when the signal is transmitted through the bones of the skull to the cochlea and then through the auditory pathways of the brain. This type of testing bypasses the outer and middle ear.



Masking

Masking presents a constant noise to the non-test ear to prevent crossover from the test ear. The purpose of masking is to prevent the non-test ear from detecting the signal (line busy), so only the test ear can respond.



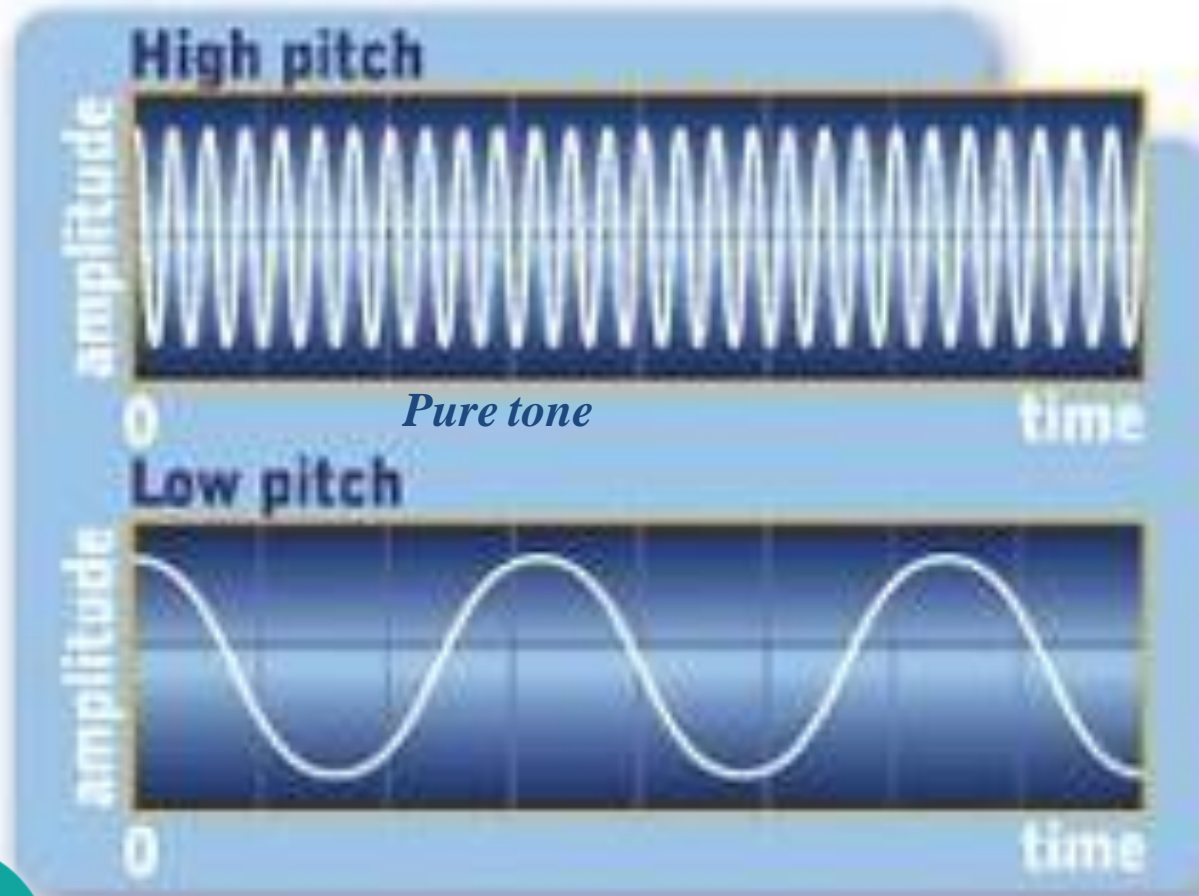
Pure tone



- A **pure tone** is a single frequency tone with no harmonic content (no overtones). This corresponds to a sine wave.



Pure tone



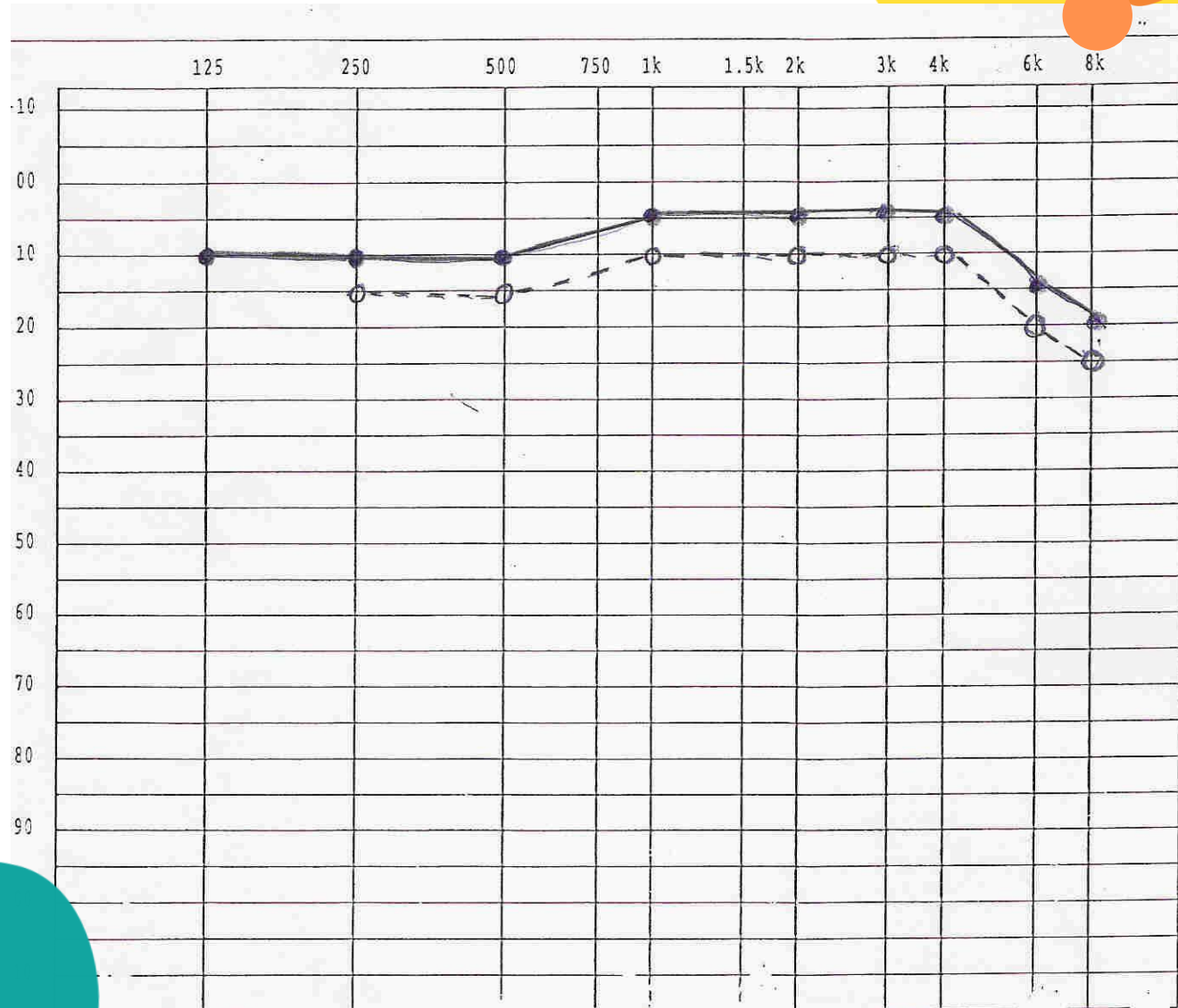


Audiogram

- The audiogram is a chart of hearing sensitivity with frequency charted on the X- axis and intensity on the Y-axis. Intensity is the level of sound power measured in decibels; loudness is the perceptual correlate of intensity.



Audiogram





Pure tone Audiometry

- In a sound proof room person is seated comfortably.
- Ear phones are applied which are color coded. (Red for right ear, Blue for left ear.)
- Masking sound is delivered to the non-test ear.
- Start with a frequency of 125Hz. & 0 dB.
- Gradually increase the dB. till person hears the sound & respond.
- Mark the threshold intensity on the audiogram paper.



Contd...

- Find the threshold of hearing from 125 Hz. to 8000Hz. & mark on the audiogram paper.
- Join the points to make air conduction audiogram.
- Place the bone vibrator over the mastoid process.
- Deliver the sound through the vibrator & find out the threshold of hearing for different frequencies of sound.



Contd...

- Use different sign to mark the bone conduction audiogram.
- Select the other ear and repeat the whole procedure.



TYPES OF HEARING LOSS

- Conductive hearing loss
- Sensorineural hearing loss
- Mixed hearing loss

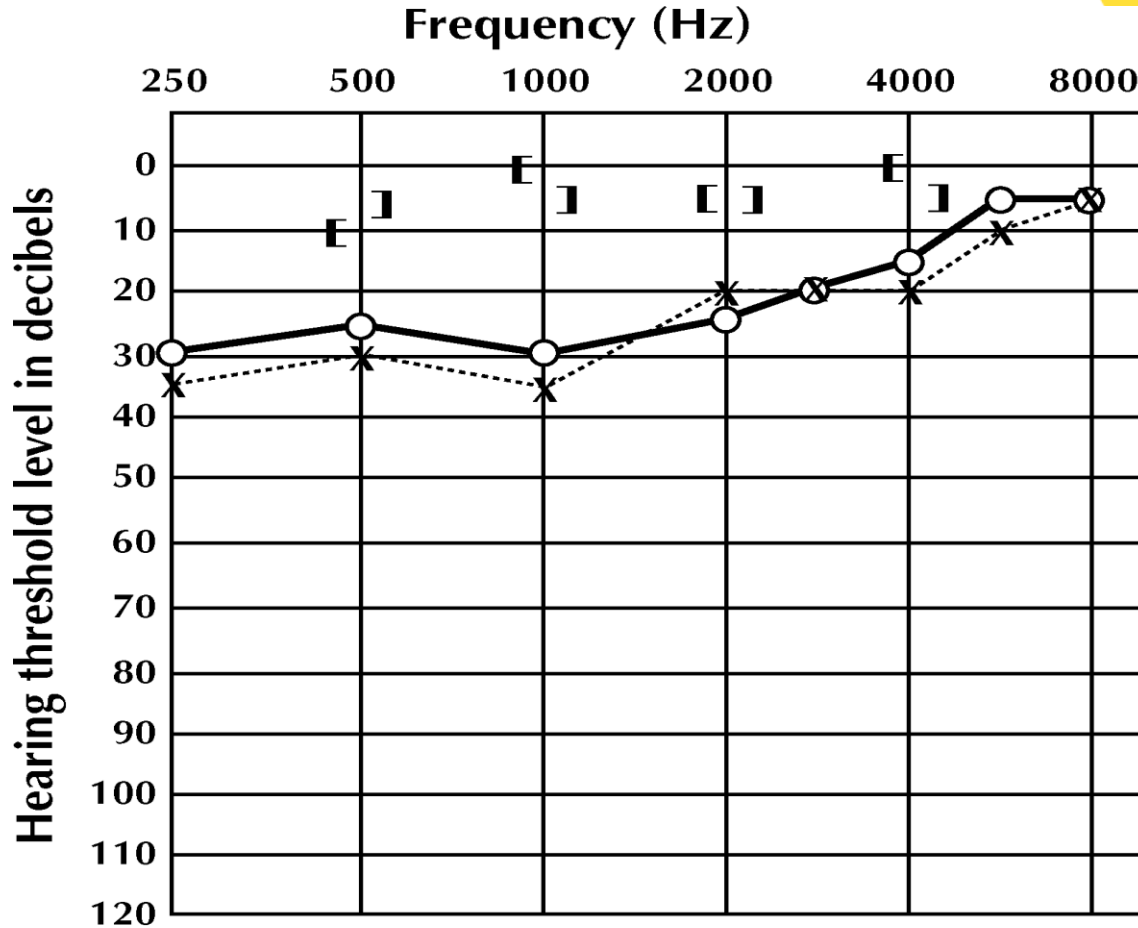


Conductive Hearing loss (deafness)

- The abnormality reduces the effective intensity of the air-conducted signal reaching the cochlea, but it does not affect the bone-conducted signal that does not pass through the outer or middle ear.
- Examples of abnormalities include perforated tympanic membranes, fluid in the middle ear system, or scarring of the tympanic membrane. Pure-tone air-conduction thresholds are poorer than bone-conduction thresholds by more than 10



Conductive deafness



Audiogram Key		
	Right	Left
A/C Unmasked	○	×
A/C Masked	△	□
B/C Unmasked	<	>
B/C Masked	⌈	⌋
B/C Forehead Masked	⌊	⌉

SPEECH TESTS

TESTS		R	L
Sp. Reception Threshold (SRT)		30 dB	30 dB
Sp. Discrim. Scores	35 dB SL	98%	98%

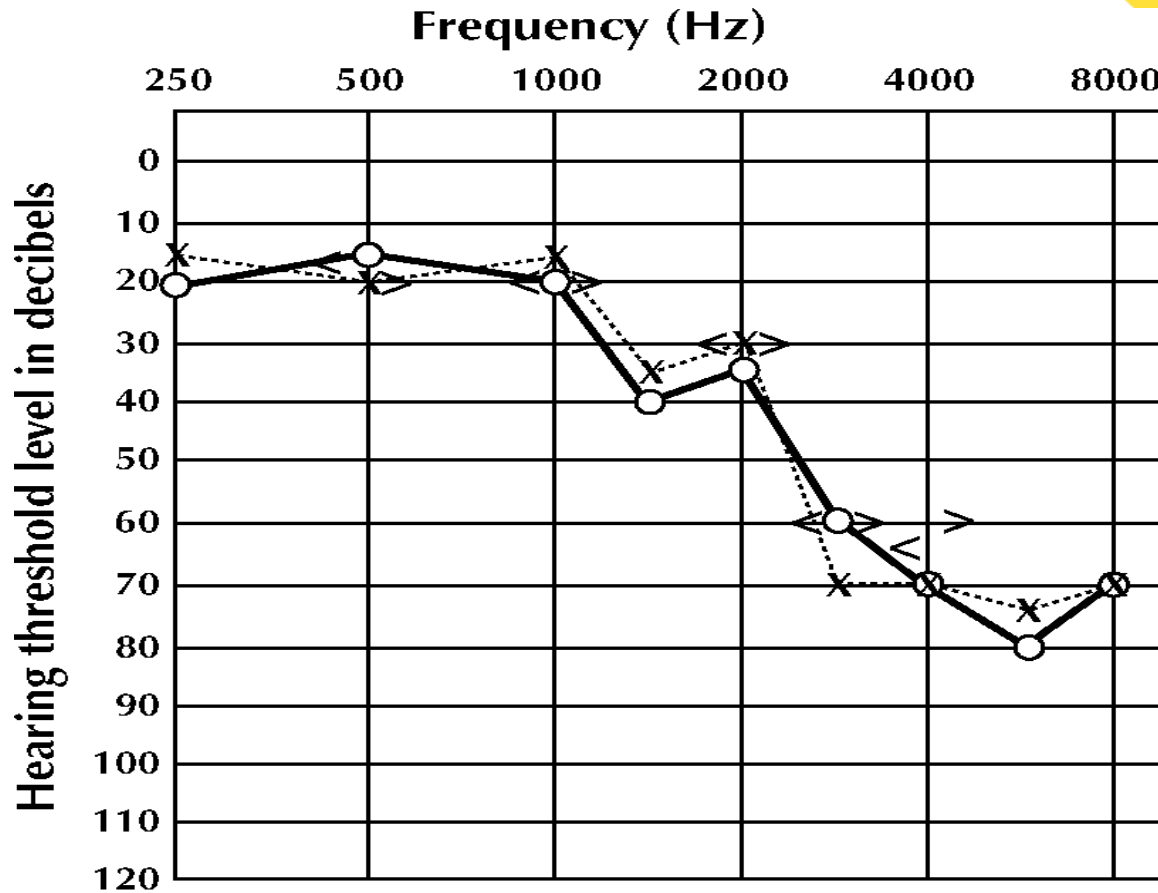


Sensorineural Hearing loss (deafness)

- This type of hearing loss is secondary to cochlear abnormality and/or abnormality of the auditory nerve or central auditory pathways. Because the outer ear and middle ear do not reduce the signal intensity of the air-conducted signal, both air- and bone-conducted signals are effective in stimulating the cochlea. Pure-tone air- and bone-conduction thresholds are within 10 dB



Sensorineural



Audiogram Key		Right	Left
A/C Unmasked	○	○	×
A/C Masked	△	△	□
B/C Unmasked	<	<	>
B/C Masked	┌	┌	┐
B/C Forehead Masked	└	└	┘

SPEECH TESTS

TESTS	R	L
o. Reception Threshold (SRT)	25 dB	25 dB
o. Discrim. Scores	72%	76%



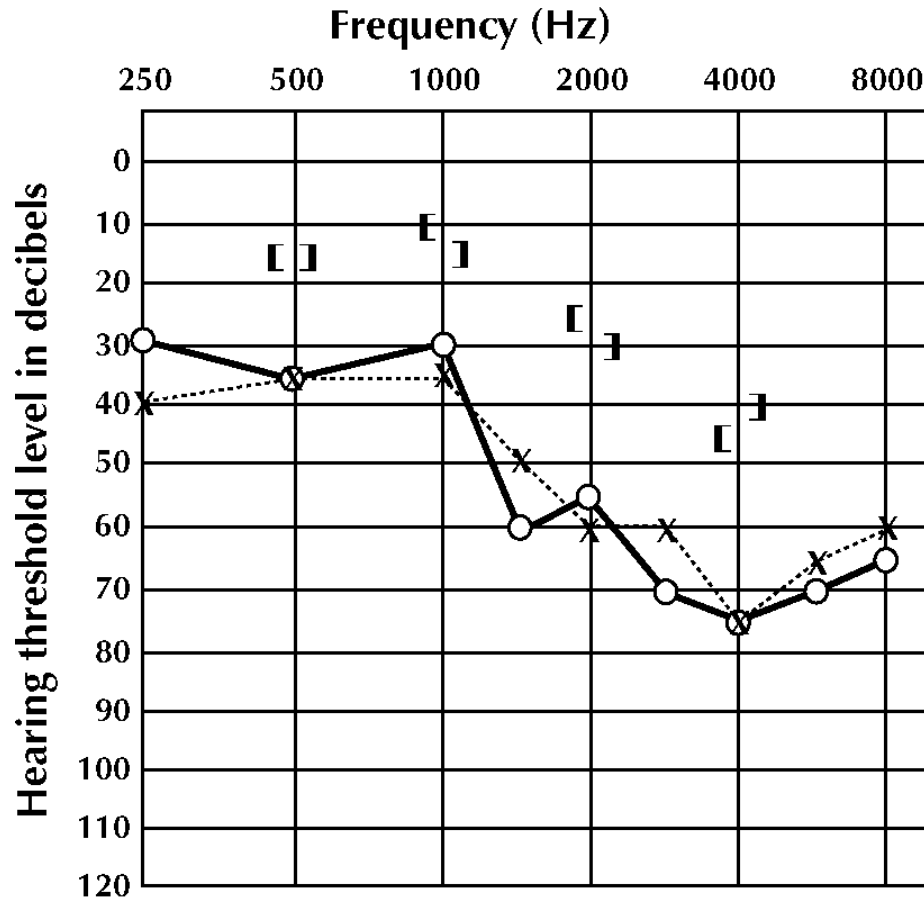
Mixed Hearing loss

- This type of hearing loss has sensorineural and conductive components. Pure-tone air-conduction thresholds are poorer than bone-conduction thresholds by more than 10 dB, and bone-conduction thresholds are less than

25 dB



Mixed Hearing Loss



Audiogram Key		
	Right	Left
A/C Unmasked	○	×
A/C Masked	△	□
B/C Unmasked	<	>
B/C Masked	⌈	⌋
B/C Forehead Masked	⌊	⌉

SPEECH TESTS

TESTS	R	L
<i>Sp. Reception Threshold (SRT)</i>	40 dB	40 dB
<i>Sp. Discrim. Scores</i>	35 dB SL	84%



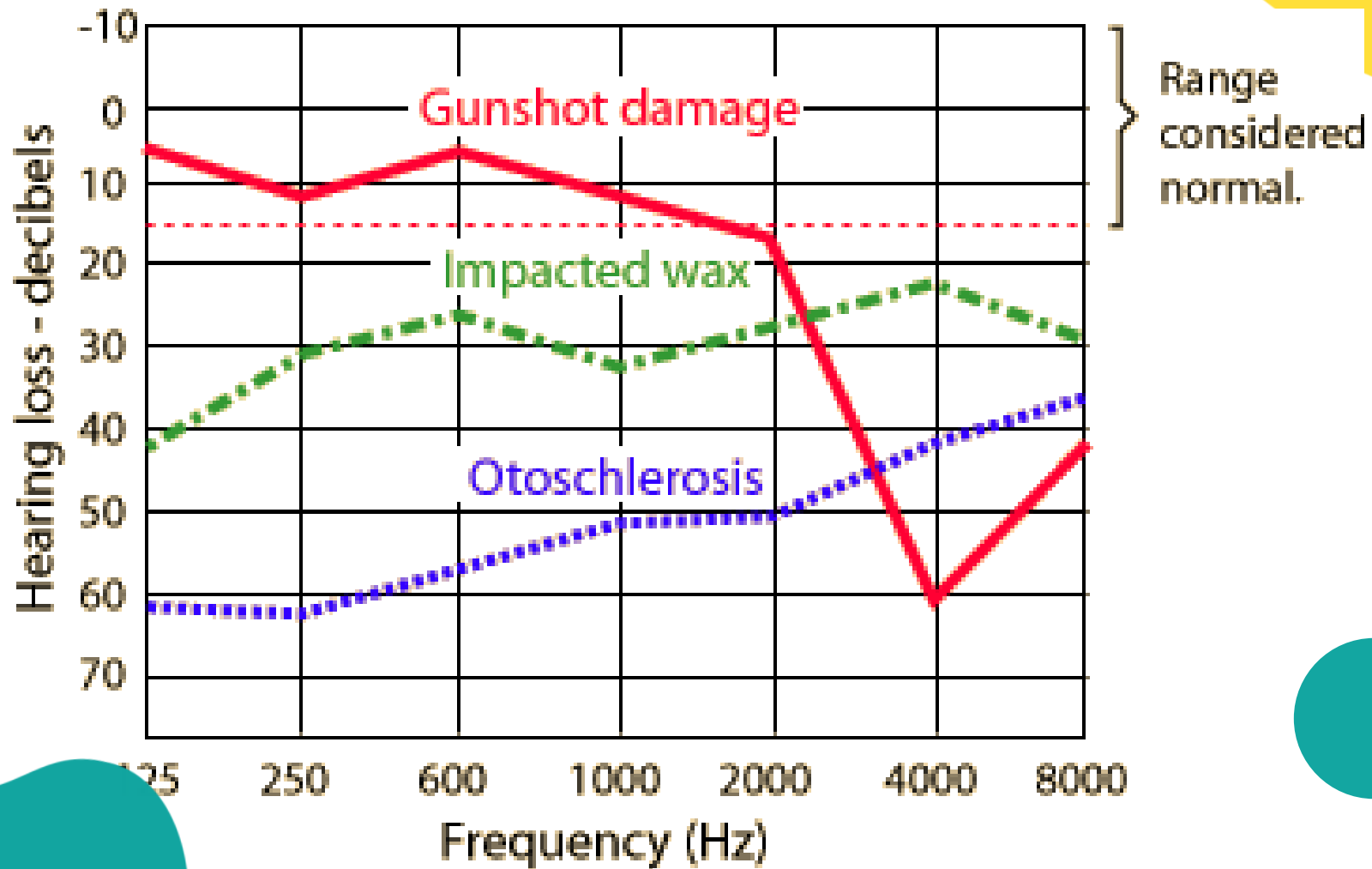
DEGREES OF HEARING LOSS

- Normal hearing (0-25 dB)
- Mild hearing loss (26-40 dB)
- Moderate hearing loss (41-55 dB)
- Moderate-severe hearing loss (56-70 dB)
- Severe hearing loss (71-90 dB)
- Profound hearing loss (>90 dB)



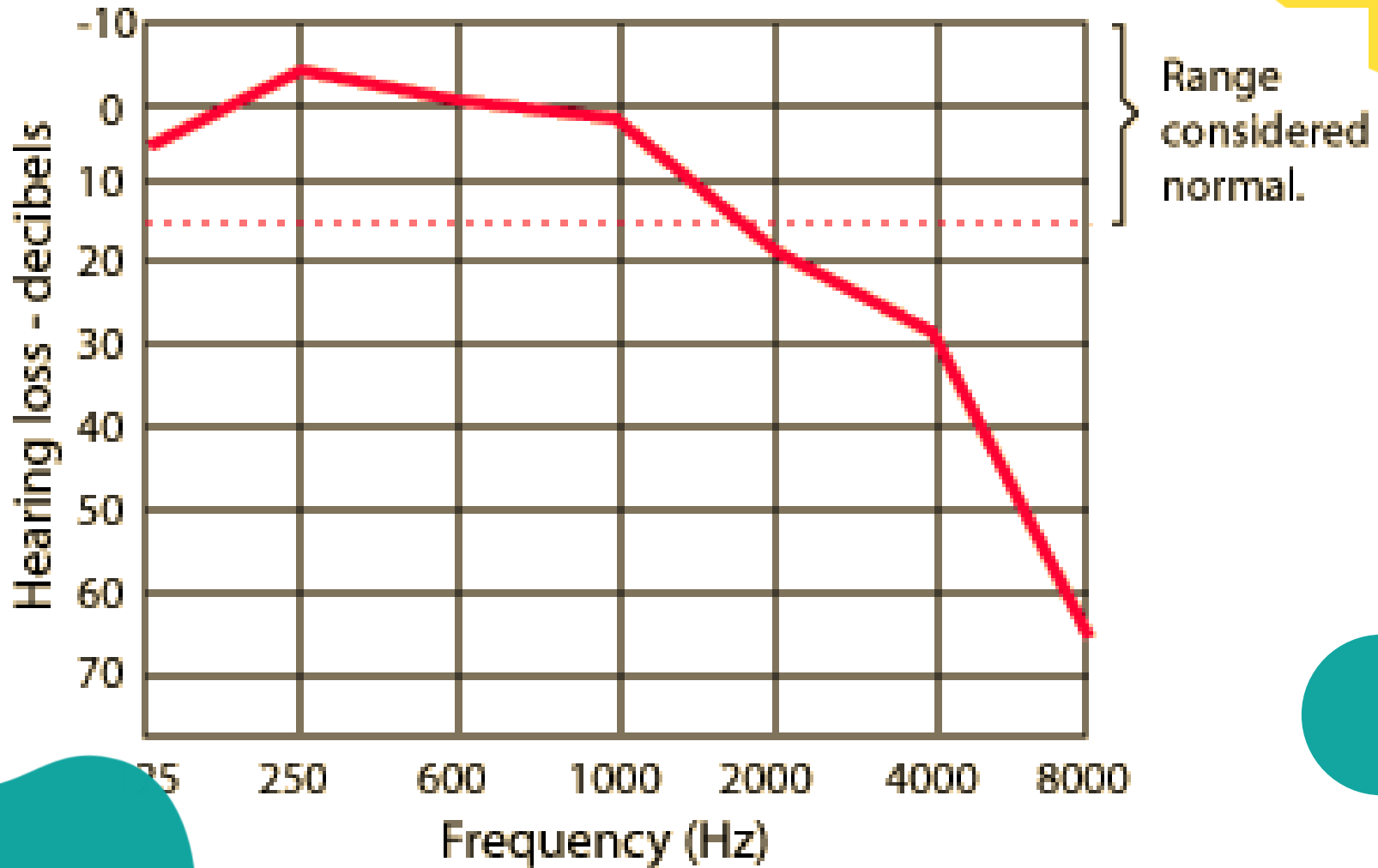
- # COMMON AUDITORY DISORDERS
- **Presbycusis** (age related hearing loss)
 - **Otitis media:** This condition is marked by fluid in the middle ear space usually secondary to an infection.
 - **Noise-induced hearing loss.**
 - **Otosclerosis:** The condition is caused by stapedial fixation in the oval window, stiffening the middle ear system.

ore disease



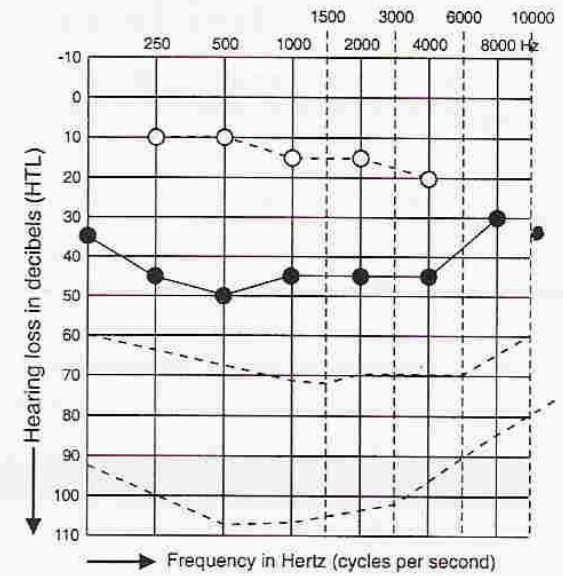


Presbycusis





ABNORMAL AUDIOGRAM



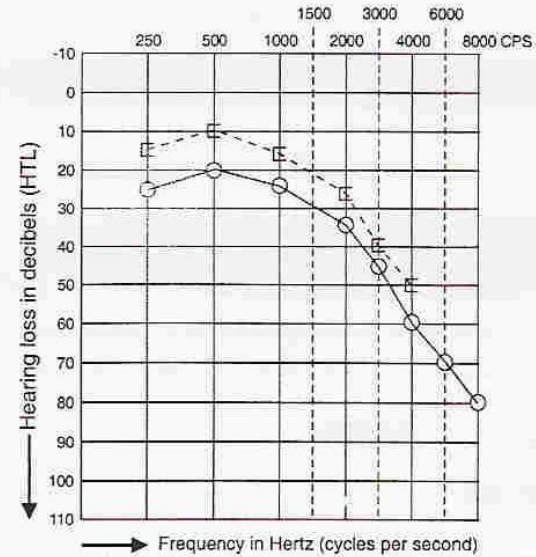
- BONE CONDUCTION
- AIR CONDUCTION
- INTERPRETATION

*Conductive deafness
otosclerosis*



ON

BONE CONDUCTION
AIR CONDUCTION
INTERPRETATION



*Presbycusis
old age hearing loss*



Glossary

- Pure tone
- Deafness
- Conductive
- Contralateral
- Frequency



THANK YOU