Tests of Hearing
And
Pure Tone Audiometry

Dr. Taj

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:

1. TUNNING FORK TESTS
2. AUDIOMETRY

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 or 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.

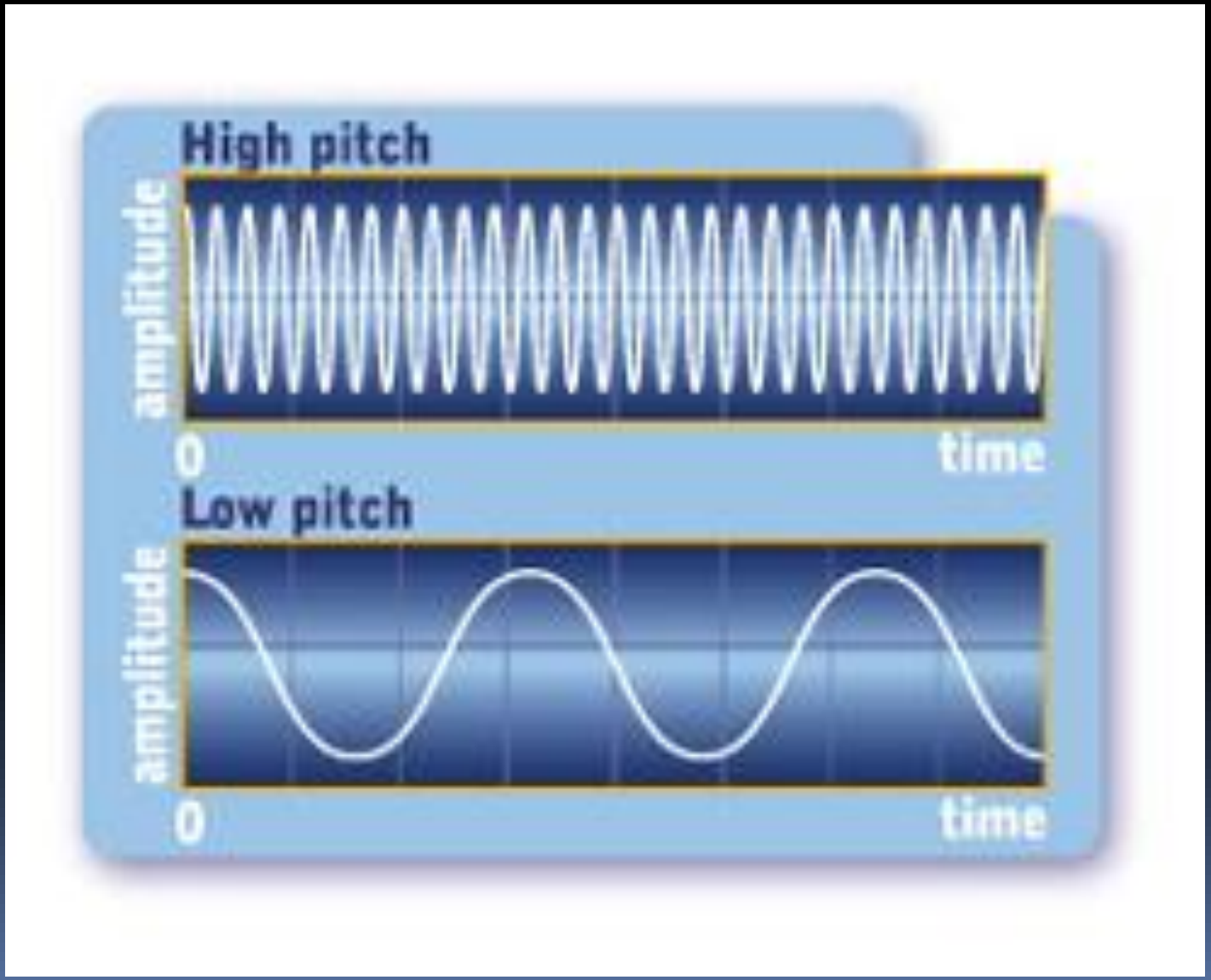
MASKING

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.

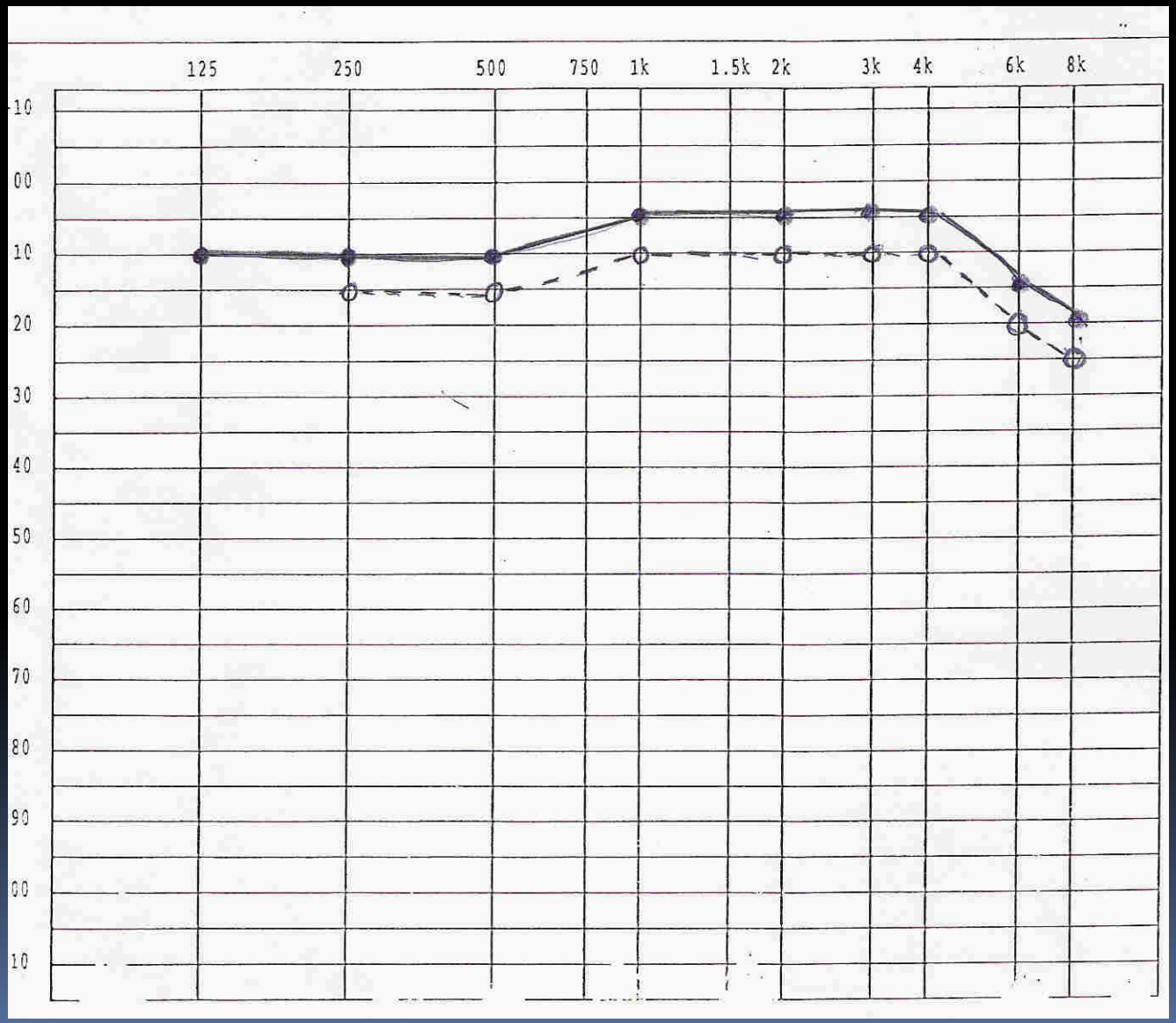
PURE TONE



AUDIOGRAM

The audiogram is a chart of hearing sensitivity with frequency charted on the X- axis and intensity on the Y-axis. Frequency is the pitch of the sound measured in Hertz (Hz) and intensity is the volume of sound measured in Decibels (db).

AUDIOGRAM


125
250
500
750
1k
1.5k
2k
3k
4k
6k
8k
10
00
10
20
30
40
50
60
70
80
90
00
10

TUNING FORK TESTS

RINNE'S TEST

TECHNIQUE

First: Bone Conduction

- Vibrating Tuning Fork held on Mastoid process
- Patient covers opposite ear with hand
- Patient signals when sound ceases
- Move the vibrating tuning fork over the ear canal
  - (Near, but not touching the ear)

Next: Air Conduction

- Patient indicates when the sound ceases

NORMAL: AIR CONDUCTION IS BETTER THAN BONE CONDUCTION

Air conduction usually persists twice as long as bone

Referred to as "positive test"

ABNORMAL: BONE CONDUCTION BETTER THAN AIR CONDUCTION

Suggests Conductive Hearing Loss.

Referred to as "negative test"


DEPARTMENT OF VETERANS AFFAIRS

WEBER TEST

TECHNIQUE:
TUNING FORK PLACED AT MIDLINE FOREHEAD

NORMAL: SOUND RADIATES TO BOTH EARS EQUALLY

ABNORMAL: SOUND LATERALIZES TO ONE EAR

Ipsilateral Conductive Hearing Loss OR
Contralateral Sensorineural Hearing Loss.

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.

Cont…

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 as used during the testing or air conduction ..

Cont…

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

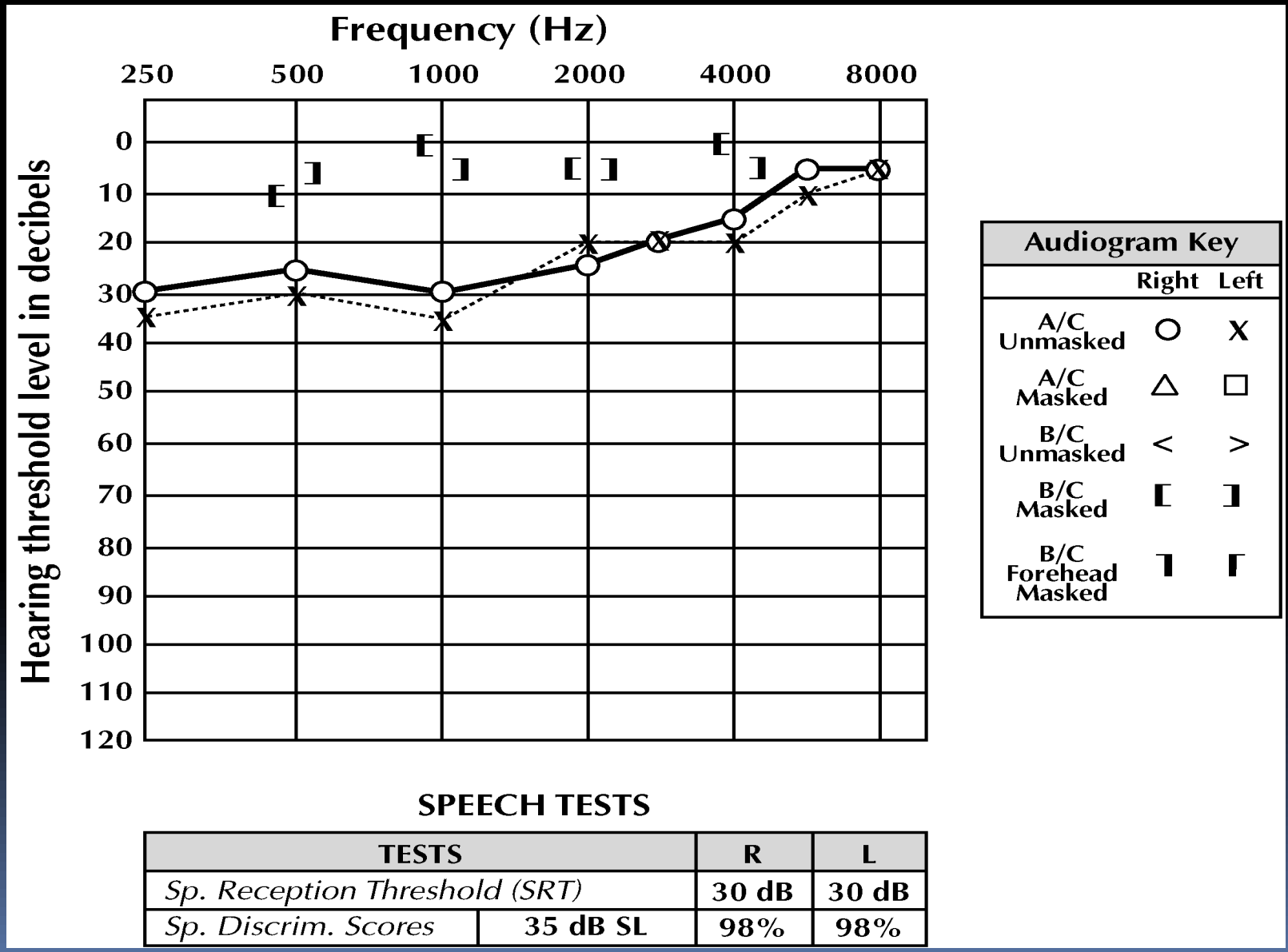
  Mixed hearing loss

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 db

Conductive deafness



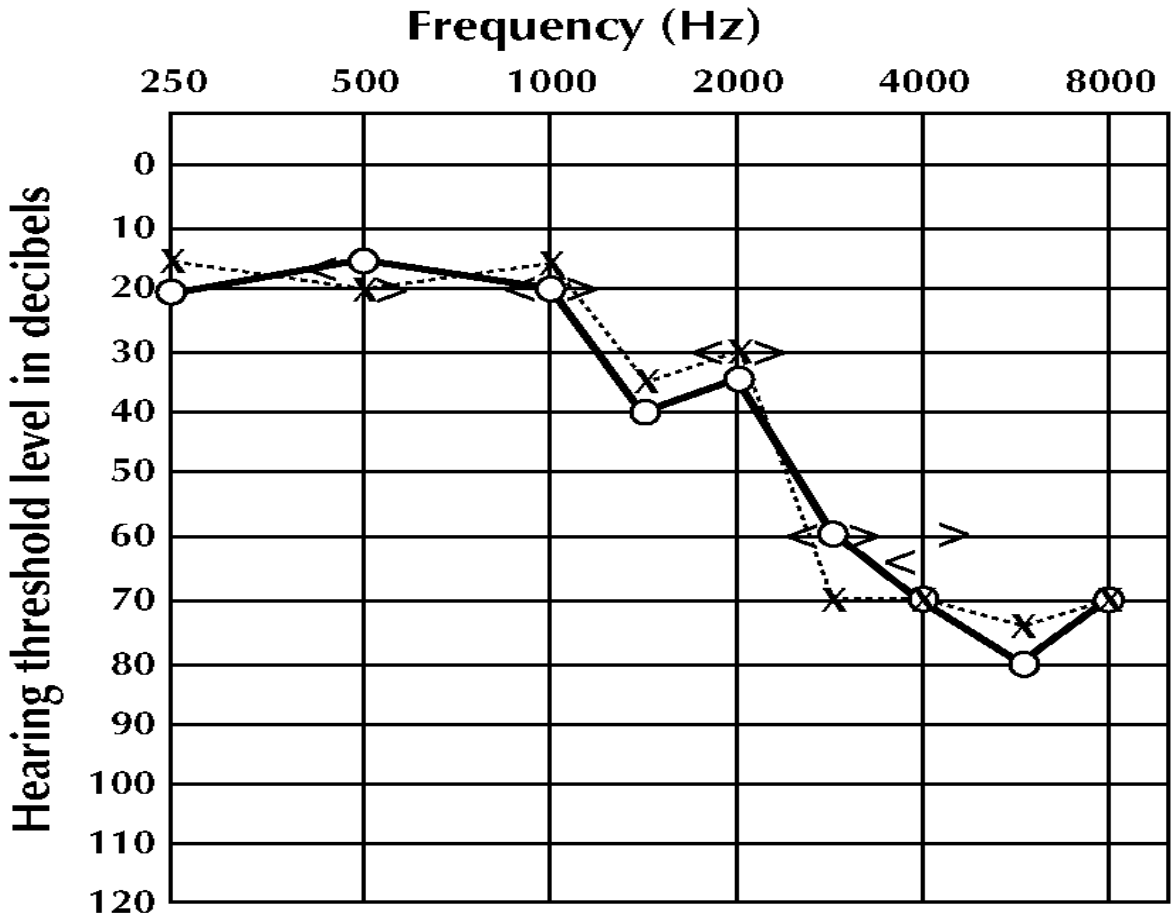
SPEECH TESTS

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	O	X
A/C Masked	△	□
B/C Unmasked	<	>
B/C Masked	[	]
B/C Forehead Masked	]	[

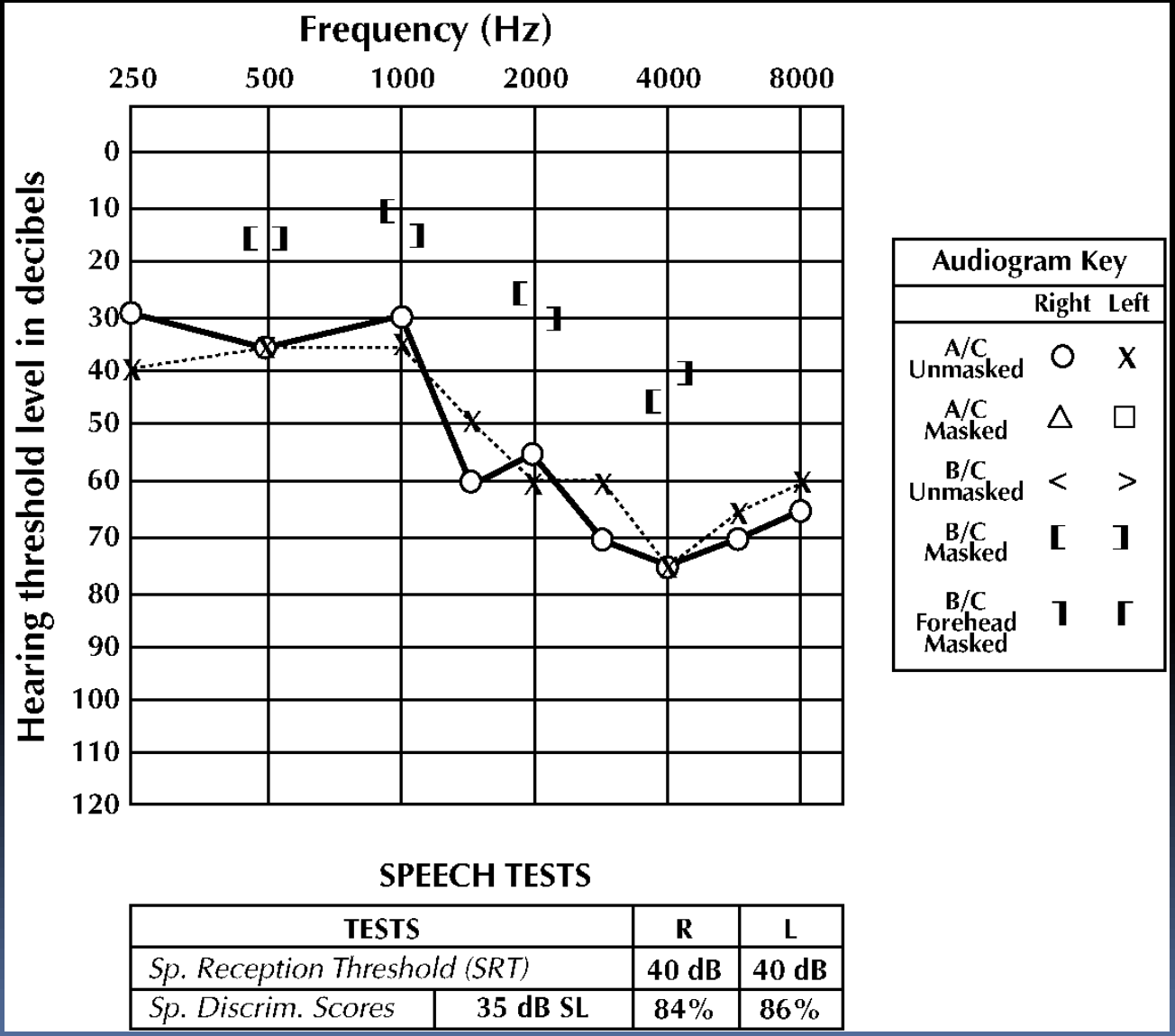
SPEECH TESTS

TESTS		R	L
Sp. Reception Threshold (SRT)		25 dB	25 dB
Sp. Discrim. Scores	35 dB SL	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



SPEECH TESTS

TESTS		R	L
Sp. Reception Threshold (SRT)		40 dB	40 dB
Sp. Discrim. Scores	35 dB SL	84%	86%

DEGREES OF HEARING LOSS

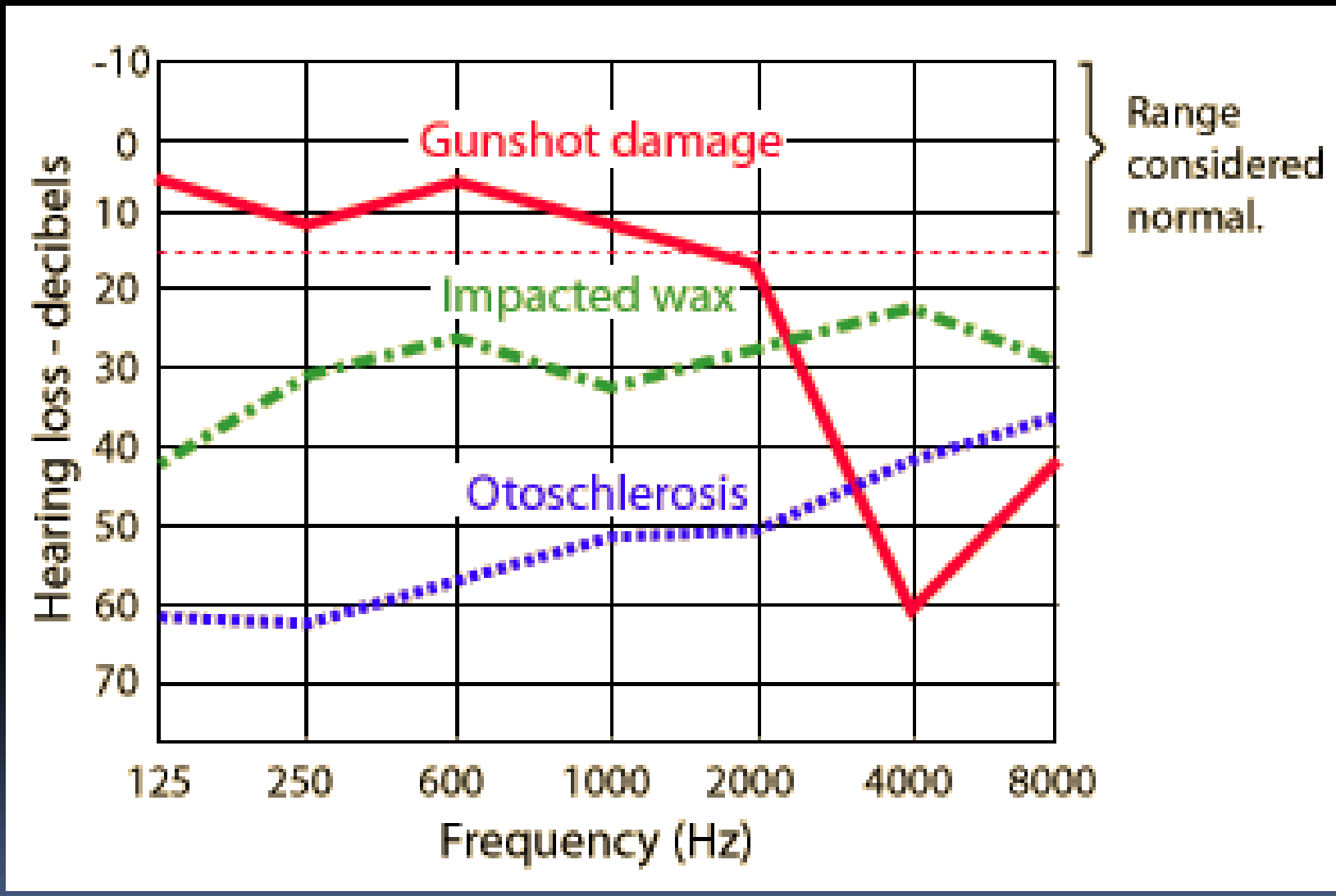
- Normal hearing (0-25 dB)
- Mild hearing loss (26-40 dB)
- Moderate hearing loss (41-55 dB)
- Moderate-severe hearing loss (56-70 dB)
- Severe hearing loss (71-90 dB)
- Profound hearing loss (>90 dB)

COMMON AUDITORY DISORDERS

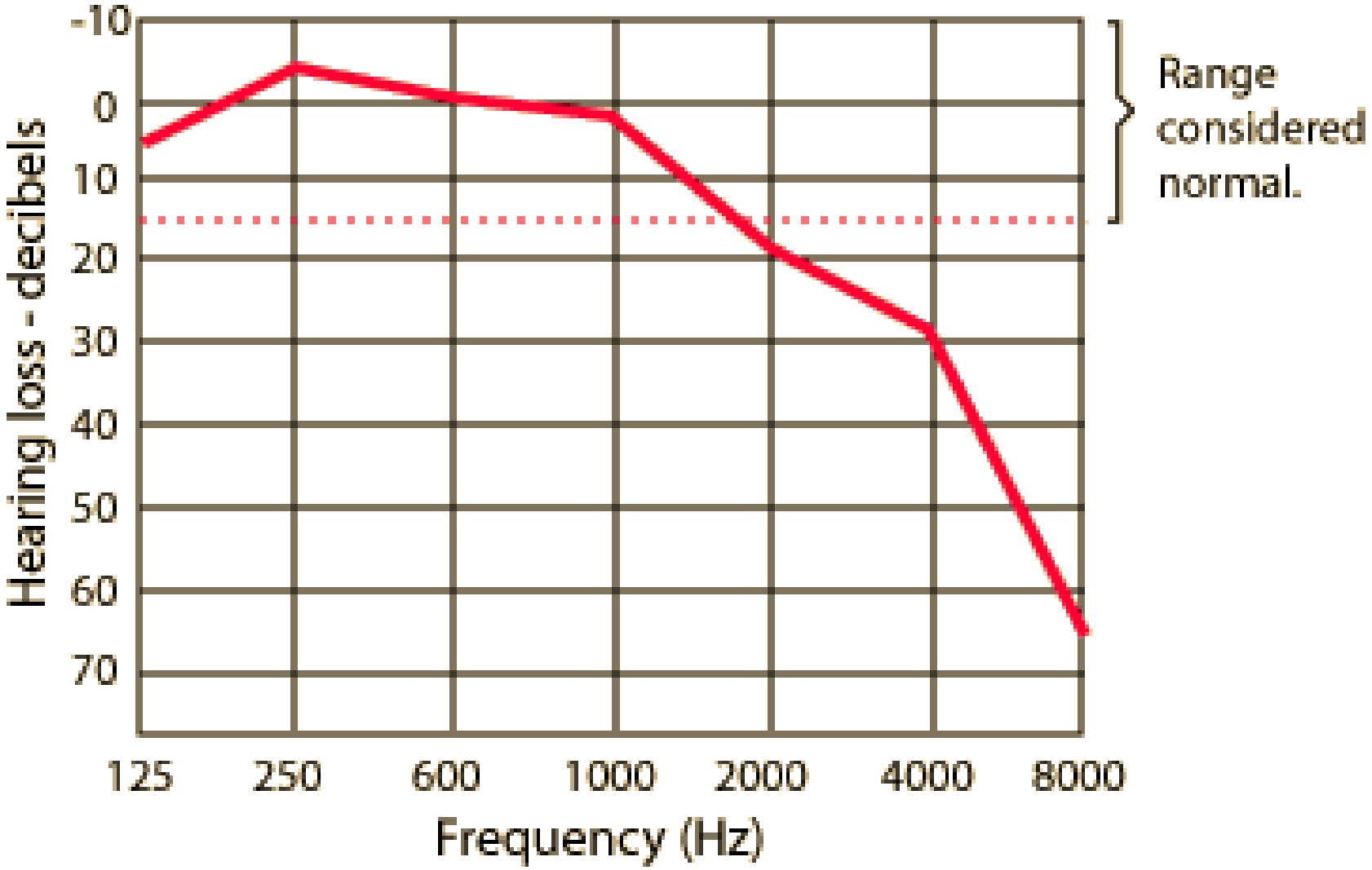
- Presbyacusis (age related hearing loss)
- Otitis media: This condition is marked by fluid in the middle ear space usually secondary to an infection.
- Noise-induced hearing loss.
- Otosclerosis: The condition is caused by stapedial fixation in the oval window, stiffening the middle ear system.
- Ménière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

COMMON EXAMPLES

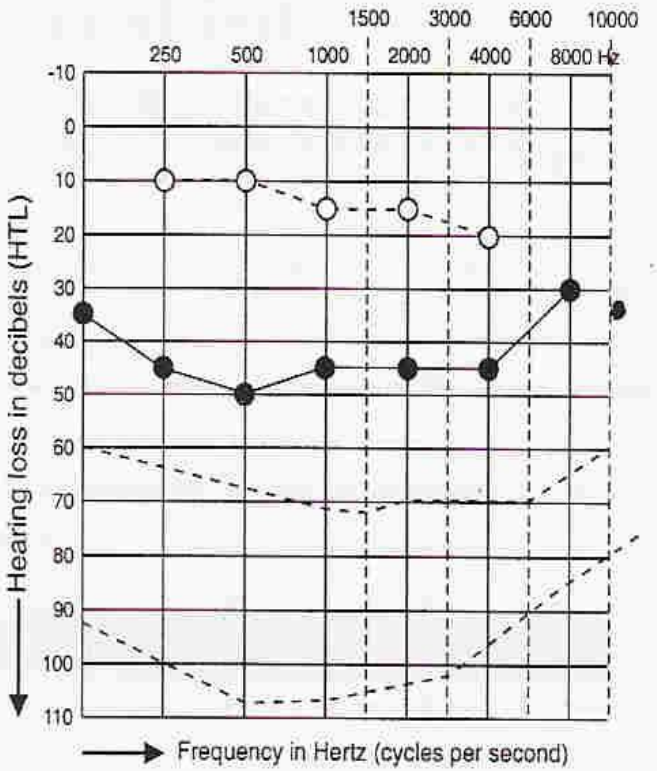
Conductive hearing loss	Sensorineural loss
Otitis media	Presbyacusis
Otosclerosis	Noise induced


-10
0
10
20
30
40
50
60
70
Hearing loss - decibels
Gunshot damage
Impacted wax
Otoschlerosis
Range considered normal.
125
250
600
1000
2000
4000
8000
Frequency (Hz)

Presbyacusis



ABNORMAL AUDIOGRAM



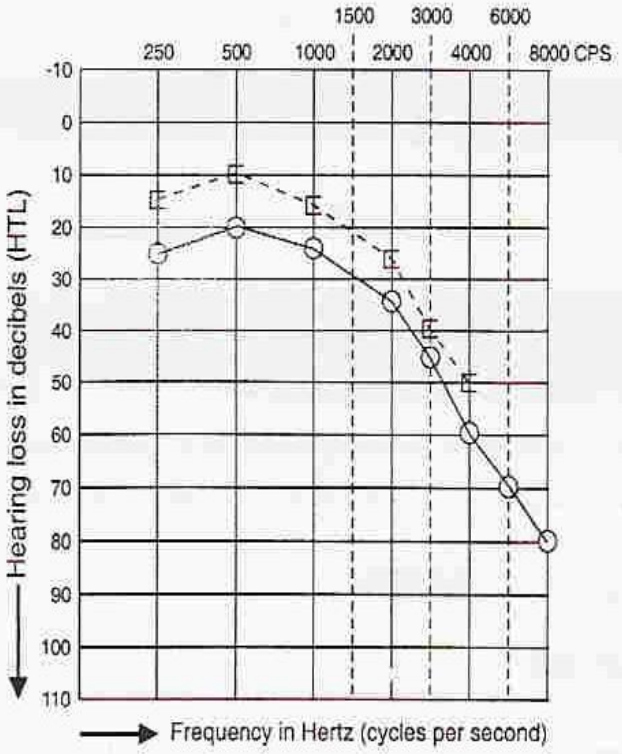
○ BONE CONDUCTION

● AIR CONDUCTION

INTERPRETATION

Conducline deafness

otosclerosis



BONE CONDUCTION

AIR CONDUCTION

INTERPRETATION

Presbyacusis
Old age hearing loss

Glossary

- Pure tone
- Deafness
- Conductive
- Contralateral
- Ipsilateral
- Frequency

THANK YOU