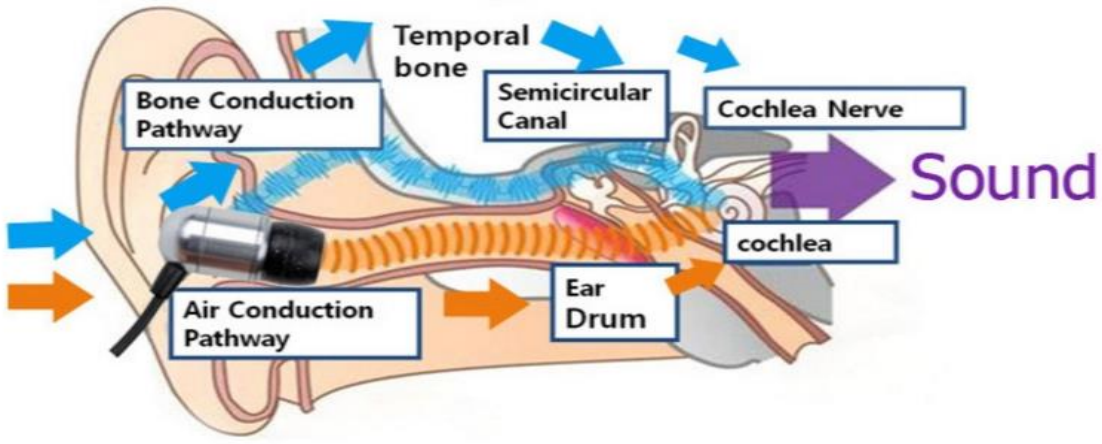
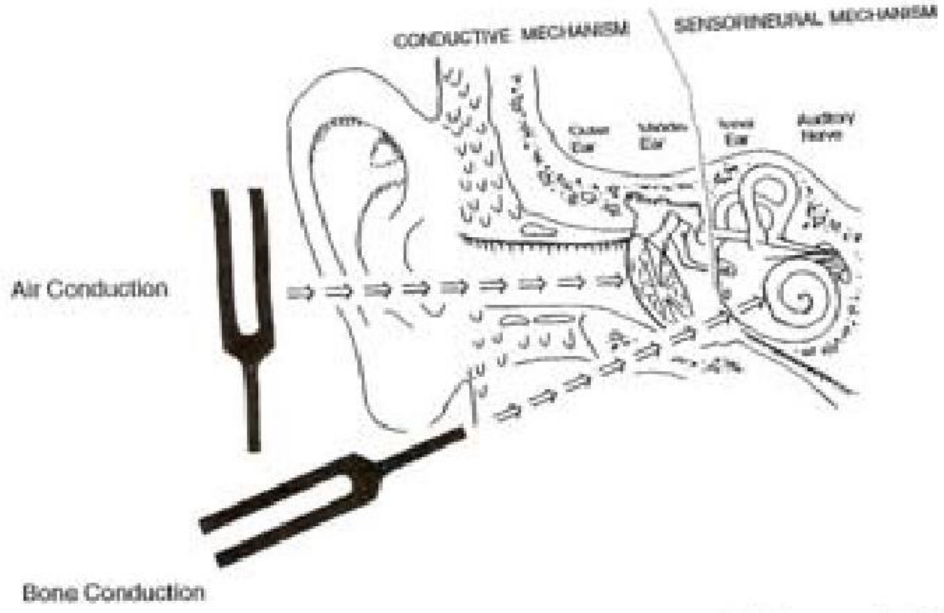
Simple tests of hearing

Topics

- Pathways of Sound
- Types of Hearing loss
- Definition and Development of Tuning forks
- Principle of Tuning Fork Tests
- Tuning Fork Tests

AC & BC Pathway





Types of Hearing Loss

- **Conductive** :pathology in the outer or middle ear
- **Sensory/neural** :pathology in the inner ear or the 8th nerve
- **Mixed** :pathology located in the outer/middle ear and inner ear/8th nerve

Tuning Fork Tests

- Used before the development of audiometers with BC and the other sophisticated electronic devices
- Over a century ago, they were used as an instrument for testing hearing
- They are rarely used by audiologists
- They illustrate the principles involved in certain modern tests

Principle of Tuning Fork Tests

- **CHL** (OE or ME Disorder) : Sounds delivered to the ear via AC will be attenuated and the sound will be heard normally via BC
- **SNHL** (OE & ME Are Free From Disorders) Sounds delivered to the ear via BC and AC will be attenuated

Tuning Forks

- Made of steel, magnesium or aluminium.
- Emits a tone at a particular pitch and has a clear musical quality.
- Vibrates sinusoidally to generate a pure tone

Tuning Forks

FIGURE 2.3 Several tuning forks. The larger forks vibrate at lower frequencies (produce lower-pitched tones) than the smaller forks.

FIGURE 2.4 Vibration pattern of tuning forks.

Standard Tuning Fork Tests

- Purpose: to diagnose the type of HL
  Results from these tests are determined by the presence or absence of an occlusion effect

- Tuning fork test:
- **Schwabach**
- **Bing**
- **Rinne**
- **Weber**

SchwabachTest

- compares pt's BC
  hearing sensitivity with that of an examiner.
- The fork is set into vibration, stem is placed alternately

  against the mastoid process of the pt. and later of the examiner
- Pt. should indicate whether the tone is heard or not

SchwabachTest

- Vibratory energy of the tines of fork decreases overtime, making the tone softer
- When the pt. no longer hears the tone, examiner immedi ately places the stem behind his ear and using a watch, notes the number of seconds the tone is audible after the pt. stops hearing it

SchwabachTest

- Can be quantified by recording the number of seconds an examiner continues to hear the tone after a pt. has stopped hearing it
- Examiner hears the tone 10 sec longer than a pt.: pt. hearing is "Diminished 10 seconds"
- If pt. has CHL, BC is normal and they are expected to hear the tone for at least as long as the examiner
- In some CHL, the pt's hearing in the low-pitch range m ay appear better than normal, called "Prolonged Schwa bach"

SchwabachTest

- Normal Schwabach:
  Both pt. & examiner stop hearing the tone at approximately the sam e time
  - Pt. has normal BC (normal hearing or CHL)
- Diminished Schwabach:
  Pt. stop hearing the sound much sooner than the examiner
  - Pt. BC is impaired (SNHL)
- **Disadvantages:**
  Difficulties in the administration and interpretation of test in cases of MHL plus it requires normal hearing by the examiner

Bing Test

- Principle:
  Persons with Normal hearing and SNHL when they close off the opening of the ear canal, loudness of a tone pr esented by BC increases "Occlusion Effect"
- Observed primarily for low-pitched sounds
- Absent in pts. with CHL

Bing Test

- Assesses the presence of CHL

Tuning fork is placed on the pt.'s mastoid, while the ear canal is alterna tively opened and closed by the examiner by depressing tragus and the pt. is asked to state which position is louder

- Positive Bing: (normal hearing and SNHL)

  the result is a pulsating sound that seems to get louder and softer.

- Negative Bing

  Pts. will not experience this sensation and the tone will be the same when the ear canal is opened and closed because the ear already has a conductive impairment.

RinneTest

- Compares pts' hearing sensitivity by BC to their sensitiv ity by AC

-The tuning fork is set into vibration

_Examiner alternates the placement of the tuning fork ei ther next
to the pt's ear or by placing the stem of the tuning fork o n the pt's mastoid as in the Schwabachtest

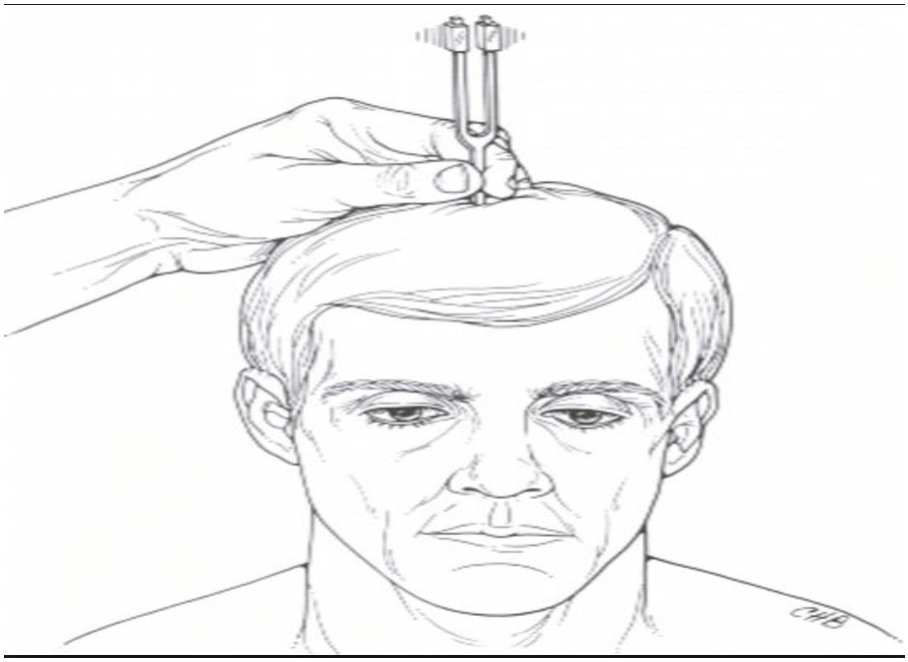
	Result
Normal or sensorinueral hearing loss(+)	**AC** >BC (positive)
Unilateral conductive hearing loss (-)	BC>**AC** (negative)

RinneTest

- Interpretation:
- Positive Rinne Pts. with NH and SNHL
  will hear the tone louder at the ear (Because AC is a more efficient m eans of sound transmission to the inner ear than BC) than when the tuning fork is placed on the mastoid.
- Negative Rinne
  Pts. with CHL (more than mild) will hear the tone louder with the ste m of the fork behind the ear because their BC hearing is better than t heir AC hearing
- **False negative Rinne** can occur due to nontested ear response

Weber Test

- **A test of lateralization**
- **Used for pts. reporting unilateral HL**
- **The examiner places the stem of the tuning fork on the midline against t he pt's forehead**
  Pt should state where they heard the tone (L, R, both or at the midline)
- **Individuals with NormalHearing or those with the same type and degree of hearing loss in both ears will report hearing the tone at the midline.**
- **Pts with SNHL in one ear will report hearing the tone at the better ear**
- **and those with CHL will report hearing the tone at the poorer ear.**



Weber Test

- If the sound is detected in the midline position:

-Normal hearing
or equal amounts of the same type of HL in both ears (CHL, SNHL or M HL)

- If the tone lateralizes to the better/good ear:
- SNHL in the poor earThe cochlea with the best hearing sensitivity will detect the signal
- If the tone lateralizes to the poorer ear: CHL in the poor ear

REVIEW TABLE 2.2 Tuning-Fork Tests

Test	*Purpose*	*Placement Fork*	*Normal Hearing*	*Conductive Loss*	*Sensorineural Loss*
Schwabach	Compare patient's BC to normal	Mastoid process	*Normal Schwabach:* Patient hears tone as long as examiner	*Normal or prolonged Schwabach:* Patient hears tone as long as, or longer than, examiner	*Diminished Schwabach:* Patient hears tone for shorter time than examiner
Rinne	Compare patient's AC to BC	Alternately mastoid process and at ear opening	*Positive Rinne:* Louder at ear	*Negative Rinne:* Louder behind ear	*Positive Rinne:* Louder at ear
Bing	Determine presence or absence of occlusion effect	Mastoid process	*Positive Bing:* Tone sounds louder with ear opening occluded	*Negative Bing:* Tone does not sound louder with ear opening occluded	*Positive Bing:* Tone sounds louder with ear opening occluded
Weber	Determine conductive vs. sensorineural loss (in unilateral	Midline of head	Tone equally loud in both ears	Tone louder in poorer ear	Tone louder in better ear

Tuning Fork Tests

- Should never replace BC audiometry

- Advantages:

-Provides preliminary diagnosis of the type of HL

- - Requires no special equipment

-Provide a quick way to validate PT audiometric data

- Easy to administer

- Can be used by physicians