TUNING FORK TESTS
A **tuning fork** is an Acoustic resonator in the form of a two-sided fork with the prongs (tines) formed from a U-shaped bar of elastic metal (usually steel).

It resonates at a specific constant pitch when set to vibrate by striking it against a surface or with an object, and emits a pure musical tone after waiting a moment to allow some high overtones to die out.
The pitch that a particular tuning fork generates depends on the length and mass of the two prongs. It is frequently used as a standard of pitch to tune musical instruments.

The most useful tuning fork tests in audiological evaluation are Rinne and Weber test.
AIR CONDUCTION VS BONE CONDUCTION PATHWAY
The Basic Idea of Bone conduction is, Bone Vibration makes us hearable.
This test is based on the concept that patients with CHL hear better via bone conduction than air conduction. However, patients with SNHL hear better by the air conduction than by bone conduction.

Test could be administered by either bone vibrator or a tuning fork.
Procedure:

- A 500 Hz tone (bone vibrator) or a vibrated tuning fork with 512 Hz is placed alternatively between on the mastoid and at the entrance to the ear canal.

- The patient should indicate whether the tone is louder on the mastoid or at the ear canal entrance.
ILLUSTRATION FIGURE FOR
RINNE TEST

http://www.clinicaljunior.com/enttuningforktests.html
Accessed August 23, 2013 at 2 pm

Rinne’s Test

With a 512 Hz tuning fork press against the mastoid bone and then hold it 1 cm away from the ear.

‘Which is louder, behind the ear or in front?’
Results:

- **Rinne positive**
  - If the tone heard louder at the ear canal entrance.
  - It indicates normal hearing or SNHL, sound transmitted more efficiently via air conduction than bone conduction.
Rinne negative

- Tone heard louder on the mastoid than at the ear canal entrance.

- It indicates CHL, sound transmitted more efficiently by bone conduction than air conduction.
Rinne False negative

- It may occur when the non-tested ear responding instead of tested ear.
- It may occur when the bone conduction threshold of the non-tested ear is better than that of the tested ear.

Rinne false positive

- It may seem in cases with mild CHL.
2-WEBER TEST

Procedure:

- The vibrated tuning fork or the bone vibrator placed on the midline of the skull, centre of the forehead, or midline of the nasal bones, chin, or upper teeth.

- The subject should indicate in which ear the tone heard.
ILLUSTRATION FIGURE FOR WEBER TEST

Weber’s Test

512 Hz Tuning Fork placed in midline.

‘Where can you hear the buzzing noise?’

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Results:

- If the tone heard in the middle of the head, the tone equally loud or the patient can’t determine in which ear the tone heard >>

- This indicates bilateral normal hearing or symmetrical hearing loss either CHL or SNHL.
If the tone lateralized to the better ear (as indicated by the air conduction threshold or patient’s indication) >>

- This indicates SNHL in the poorer ear or the poorer ear has CHL and it’s bone conduction threshold worse than that of the better ear.
If the tone *Laterализed to the poorer ear* (by air conduction thresholds patient’s indication) >>

- This indicates that poorer ear has CHL.
3- BING TEST

- It’s a modified Weber test.

- It’s based on **Occlusion effect (OE) concept**
  - The tone presented by bone conduction heard louder when the ear canal entrance is closed off
  - This is evident in normal hearing persons or patients with SNHL
  - It is absent in patients with CHL, Why?
Procedure:

- The vibrated tuning fork stem placed on the mastoid.

- The subject should indicate as soon as the tone no longer heard.

- At this stage the ear canal entrance should be occluded by the patient finger.

- The patient should indicate if the tone become audible again.
ILLUSTRATION FIGURE FOR BING TEST
Results:

- The tone become audible after occlusion >> normal hearing person, ear canal occlusion prevent sound escaping from the ear.

- The tone still inaudible after occlusion >> CHL.
It is based on the comparison done between the bone conduction of the patient and the examiner.

Procedure:

- The vibrated tuning fork stem placed alternatively on the examiner and the patient mastoid.
- The patient should indicate whenever the tone becomes no longer audible.
When the patient indicates that the tone no longer heard, the examiner should place the TF immediately on his mastoid and notes the number of seconds that the tone is audible after the patient stop hearing it.
Results:

✓ If both patient and examiner stop responding in the same time >> patient has normal hearing

   Normal schwabach

✓ If the patient stop responding before, time in seconds should be calculated>> patient has SNHL

   Diminished schwabach
If the patient continues to hear the tone after the examiner >> patient has CHL

Prolonged schwabach
Negatives against Schwabach test

- It assumes that examiner always has normal hearing

- Difficult to interpret mixed hearing loss if one of the cochleae is normal and **false normal schwabach will be resulted**