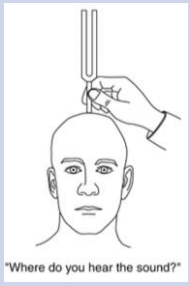
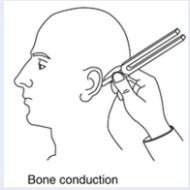
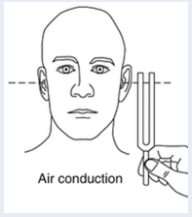
1. Summary of Tuning Fork Tests

Test	Procedure	Result	Interpretation
Weber Test: tests for differences in hearing between the two ears  	Place tuning fork firmly at the midline on top of the head. Ask subject where the sound is perceived (i.e. left, right or middle).	Sound is either lateralized to one of the ears (e.g. lateralized to the left means the subject perceived the sound on the left side) or not lateralized (sound is perceived at the centre of the head)	If a sound is lateralized to the left, there is either: 1. A conductive hearing loss in the left ear or 2. A sensorineural hearing loss in the right ear If a sound is lateralized to the right, there is either: 1. A conductive hearing loss in the right ear or 2. A sensorineural hearing loss in the left ear No lateralization means hearing is equal in the two ears (i.e. normal hearing or bilateral hearing loss)
Rinne's Test: tests for conductive hearing loss in each ear   	Test each ear separately. To test the left ear, firmly place the tuning fork base on the mastoid behind the left ear. When the sound is no longer heard by the subject, immediately place the tines of the tuning fork 1cm away from the entrance to the ear canal. Once you have done this, ask the subject whether they can still hear the sound.	When the tuning fork is moved beside the entrance to the ear canal, the subject will either: 1. Perceive the tone made by the tuning fork (positive Rinne; i.e. subject is more sensitive to air-conducted sound than bone-conducted sound) 2. Not perceive the tone (negative Rinne) Because you perform Rinne's test twice (once for each ear), you will get two test results.	If an ear shows a positive result for Rinne's test, it does not have a conductive hearing loss (it may be normal OR have a sensorineural hearing loss). If an ear shows a negative result for Rinne's test, it has a conductive hearing loss if Weber's test lateralizes to that same ear.

2. Using test results to diagnose patients

1. Can you diagnose the type of hearing loss (conductive or sensorineural) and configuration (left, right or bilateral) from the following test results?

	Weber Test Result	Rinne Test Results	Conductive or Sensorineural?	Left, Right, or Bilateral?
Patient 1	Lateralized to the Right	Positive Bilaterally		
Patient 2	Lateralized to the Right	Negative on the Right		
Patient 3	No Lateralization	Positive Bilaterally		
Patient 4	No Lateralization	Negative Bilaterally		

2. Which of these patients may have entirely normal hearing? And which patient has a sensorineural hearing loss in the left ear?

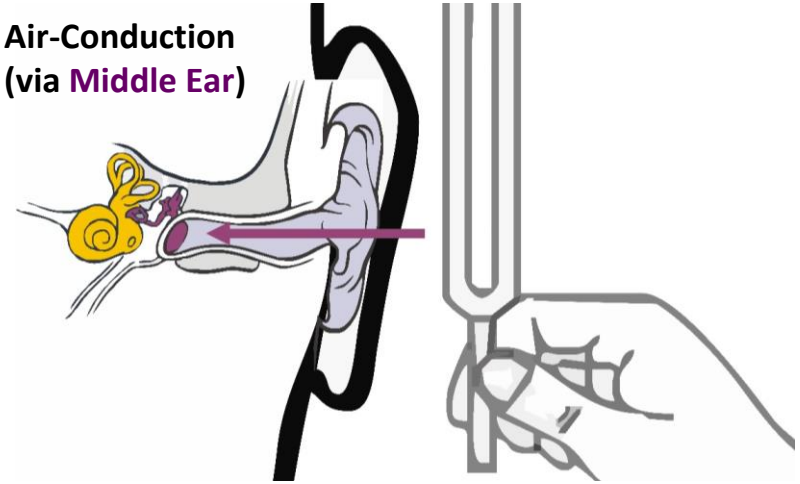
3. What are the similarities and differences between Weber's test and the hum test? Why is it better to use Weber's test (i.e. why is it better to use a tuning fork that generates sound at a single specified frequency)?

4. Why is it a problem that tuning fork tests only test a single frequency?

5. What kind of hearing loss would be missed by tuning fork tests?

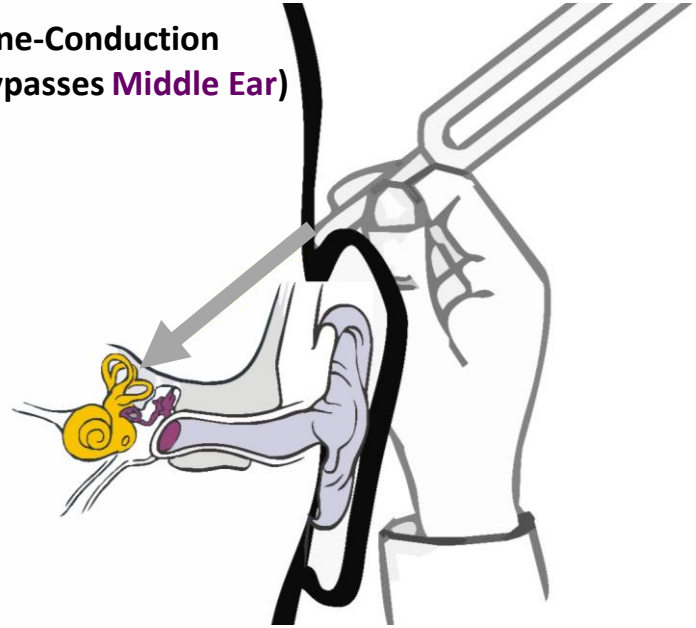
Testing for conductive hearing loss using bone-conducted sound

Air-Conduction
(via Middle Ear)



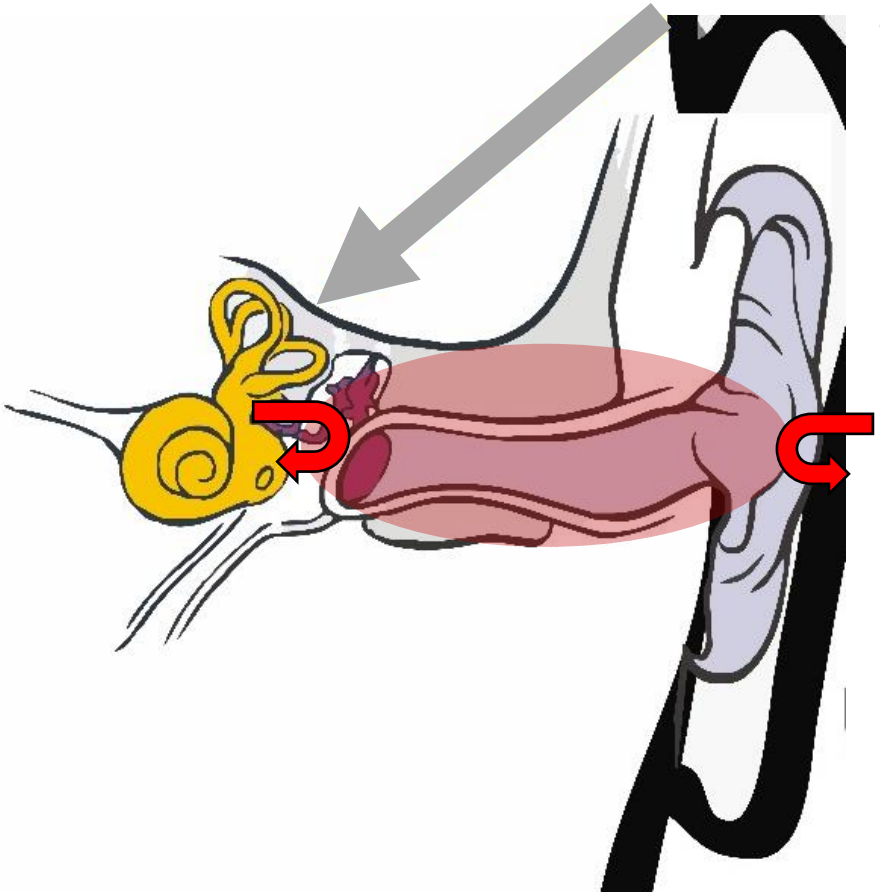
- Air-conducted sound is transmitted to the inner ear via the outer and middle ear
- Bone-conducted sound bypasses the outer and middle ear and is transmitted directly to the inner ear via the bone.

Bone-Conduction
(bypasses Middle Ear)



- If the outer and middle ear are normal, the ear is more sensitive to air-conducted sound than bone-conducted sound
- However, if the outer and middle ear are not working properly, the ear becomes:
    1. less sensitive to air-conduction (because the middle ear is unable to amplify the sound)
    2. more sensitive to bone-conduction.

Why does conductive hearing loss increase sensitivity to bone-conducted sound?



- If an ear has a conductive hearing loss, bone-conducted sound appears louder in that ear than normal because:
  - Bone-conducted sound will be unable to escape from the inner ear, which enhances its effect (the middle ear allows sound to both enter and exit the inner ear)
  - Ambient background noise will be much quieter because it is unable to enter the ear via air-conduction
  - Over time, the inner ear may upregulate its sensitivity to sound to compensate for the lack of air-conducted sound

Normal Outer/Middle Ear Function:

Air-conduction > Bone-conduction

Conductive Hearing Loss:

Air-conduction ≤ Bone-conduction