

Inside the Ear: Follow the Sound, Check the Evidence

TWO-HOST STUDY SCRIPT. No recording is included. Optional reference for existing lessons. No extra assignment or submission. Follow the current Schoology lesson for required work and deadlines.

Opening | This is a study script

Host A: This is a two-host study script, not an audio recording. Use it with the illustrated guide. Our question is simple: where along the sound-to-signal pathway might a problem occur, and what evidence would help us investigate?

Host B: These resources support the existing October 12, 13 and 16 Genetics of Disease lessons. They add no assignment or submission. Open the current Schoology lesson for the required task and deadline. Our cases are newly constructed teaching inputs, not actual patient or student findings.

1 | A wave becomes a signal

Host A: Start at the pinna and ear canal. Airborne sound vibrates the eardrum. Three middle-ear bones, the malleus, incus and stapes, pass movement toward the oval window and cochlear fluid.

Host B: Within the cochlea, basilar-membrane movement bends hair-cell stereocilia and starts an electrical response. Auditory nerve fibers carry signals toward the brain. Higher frequencies favor the cochlear base; lower frequencies favor the apex. Sound transmission and nerve signaling are linked, but they are different steps. [1]

Host A: Air-conduction thresholds use that whole peripheral route. Bone-conduction vibration bypasses the outer and middle ear, but it still needs cochlear transduction and auditory neural function. Neither test proves every central auditory function is normal. [1, 2]

2 | Look without guessing

Host B: Otoscopy is a clinician's view of the canal and eardrum. A normal-looking membrane is intact, translucent or pearly gray, and neutral to slightly concave. In an otoscopic view facing the membrane, the classic light reflex is about five o'clock in the patient's right ear and seven in the left. A missing reflection alone is not a diagnosis. [3, 4, 22]

Host A: Fluid behind the membrane suggests effusion. Appropriate bulging-membrane findings plus effusion can support acute otitis media in clinical context. Redness alone is insufficient. In class we use models and images. We never insert instruments, remove wax, irrigate ears or diagnose a classmate. [3, 5, 6, 7]

3 | Two fork comparisons, several limits

Host B: A clinician can use a vibrating 512 hertz fork for Rinne and Weber. Rinne compares perceived sound through the mastoid bone with sound beside the canal. Positive Rinne means air is heard longer or better than bone. It can occur in normal hearing and sensorineural loss. It does not prove normal hearing. [8]

Host A: A negative Rinne may suggest a conductive component. But profound one-sided sensorineural loss can give a false negative if the other cochlea hears the skull vibration. That is why the result needs context and sometimes masked audiometry. [8]

Host B: Weber asks whether a midline fork seems louder on one side. For a simple unilateral loss, conductive loss tends toward the affected side and sensorineural loss toward the better side. Symmetric impairment may still sound midline. Mixed and complex asymmetric patterns need more evidence. There is no single diagnostic positive Weber. [9, 23]

4 | Read axes, shapes and missing values

Host A: Audiogram frequency increases logarithmically from left to right. Every octave is a doubling. Hearing level in dB HL increases downward, so a lower plotted threshold means poorer sensitivity. Zero dB HL is a reference, not silence. [10]

Host B: Check the legend. Unmasked air uses a right red O and left blue X. Masked air uses a right triangle and left square. Conventional unmasked mastoid bone symbols are right less-than and left greater-than; masked bone uses a right opening bracket and left closing bracket. Shapes must still make sense without color. [10, 21]

Host A: Unmasked bone can reflect the more sensitive cochlea rather than the side where the vibrator sits. Masking puts noise in the nontest ear to limit cross-hearing. Our constructed cases assume reliable air results and appropriately masked, ear-specific bone results. They supply no eight-thousand-hertz bone value; do not invent one. [10, 11]

Host B: A no-response arrow means no response at the equipment limit, not an exact threshold at that level. A laptop volume setting is not calibrated dB HL. Classroom comparisons are not clinical hearing tests. [10, 11]

5 | Separate type, degree and cause

Host A: Air-bone gap means air threshold minus bone threshold at the same frequency. Our practice flags fifteen decibels or more as a teaching convention with the supplied reliable ear-specific results. The ten-decibel ASHA bone-masking indication is a separate measurement rule. [2, 11]

Host B: Normal-range bone with poorer air and a meaningful gap supports a conductive pattern. Elevated air and bone without a significant gap supports a sensorineural pattern. Elevated bone plus an additional gap supports a mixed pattern. These describe patterns, not a single disease or its cause. [2, 12]

Host A: We use the named ASHA/Clark degree bands. The guide defines our three-frequency air average and rounding rule. A normal-range average can hide substantial high-frequency loss. Always describe important individual frequencies. Use an assigned lesson's own chart if it differs; never mix cutoffs, and this reference does not change quiz grading. [12]

Host B: A notch may fit noise exposure, and a gradual bilateral high-frequency slope may fit age-related change. Neither occupation, age nor shape proves the cause. A pattern alone cannot prove a genetic explanation. [13, 14]

6 | Choose support with the person

Host A: Hearing aids amplify acoustic signals for surviving cochlear and neural function. Bone-conduction devices route vibration around transmission obstacles. Cochlear implants bypass damaged hair cells and stimulate auditory nerve fibers; they do not bypass the nerve. None restores normal hearing or guarantees the same benefit for everyone. [2, 15, 16, 17]

Host B: Qualified teams consider anatomy, medical cause, aided speech performance, follow-up learning, access, communication goals and individual preference. Respect Deaf identity and signed, spoken, captioned or combined communication choices. Captions, remote microphones and visual or vibration alerts can support access with or without a device. [17, 18, 19]

Host A: A sudden hearing change needs immediate medical attention. Do not assume wax or wait for a classroom test. Involve a trusted adult and a qualified clinician. [20]

Host B: Return to the required lesson. Record the evidence, separate the pattern from its possible explanation, and name what you still need to know.

Return to the current required lesson

Today's Lesson · Mon 10/12 · Wk8 · 1.3.1 Days 1 and 2: Build a labeled ear model, then show a hearing loss case on it

Today's Lesson · Tue 10/13 · Wk8 · 1.3.2 Day 1: Run the Rinne test and a speech-in-noise test with a partner

Today's Lesson · Fri 10/16 · Wk8 · 1.3.2 Day 3 and Checkpoint Quiz: Choose the best hearing loss intervention

Sources for the study script

The source numbers match the illustrated guide. These are clickable primary and institutional reference links, not an indication that clinical testing should be performed in class.

- [1] NIDCD, How Do We Hear? | <https://www.nidcd.nih.gov/health/how-do-we-hear>
- [2] ASHA Practice Portal, Hearing Loss in Adults | <https://www.asha.org/practice-portal/clinical-topics/hearing-loss/>
- [3] MedlinePlus, Ear Examination | <https://medlineplus.gov/ency/article/003340.htm>
- [4] Queensland Health, Ears and Hearing, Child | <https://www.ccm.health.qld.gov.au/child-health-checks/ears-and-hearing-child>
- [5] Alaska, Hearing Screening Guidelines for Preschool/School Population (2016) | https://health.alaska.gov/dph/wcfh/Documents/school/Hearing%20Screening%20Guidelines%20for%20Pre-school_School%20Population.pdf
- [6] CDC, Pediatric Outpatient Clinical Care | <https://www.cdc.gov/antibiotic-use/hcp/clinical-care/pediatric-outpatient.html>
- [7] NIDCD, Ear Infections in Children | <https://www.nidcd.nih.gov/health/ear-infections-children>
- [8] StatPearls, Rinne Test | <https://www.ncbi.nlm.nih.gov/books/NBK431071/>
- [9] StatPearls, Weber Test | <https://www.ncbi.nlm.nih.gov/books/NBK526135/>
- [10] ASHA, Audiometric Symbols (1990 guidelines) | <https://www.asha.org/policy/gl1990-00006/>
- [11] ASHA, Manual Pure-Tone Threshold Audiometry (2005 guidelines) | <https://www.asha.org/policy/gl2005-00014/>
- [12] ASHA, Type, Degree, and Configuration of Hearing Loss (2023) | <https://www.asha.org/siteassets/ais/ais-type-degree-and-configuration-of-hearing-loss.pdf>
- [13] CDC/NIOSH, Understand Noise Exposure | <https://www.cdc.gov/niosh/noise/prevent/understand.html>
- [14] NIDCD, Age-Related Hearing Loss | <https://www.nidcd.nih.gov/health/age-related-hearing-loss>
- [15] NIDCD, Hearing Aids | <https://www.nidcd.nih.gov/health/hearing-aids>
- [16] NIDCD, Cochlear Implants | <https://www.nidcd.nih.gov/health/cochlear-implants>
- [17] ASHA Practice Portal, Cochlear Implants | <https://www.asha.org/practice-portal/professional-issues/cochlear-implants/>
- [18] ASHA Practice Portal, Hearing Aids for Adults | <https://www.asha.org/Practice-Portal/Professional-Issues/Hearing-Aids-For-Adults/>
- [19] NIDCD, Assistive Devices | <https://www.nidcd.nih.gov/health/assistive-devices-people-hearing-voice-speech-or-language-disorders>
- [20] NIDCD, Sudden Deafness | <https://www.nidcd.nih.gov/health/sudden-deafness>
- [21] Johns Hopkins Medicine, Understanding Your Audiogram | <https://www.hopkinsmedicine.org/health/conditions-and-diseases/hearing-loss/understanding-your-audiogram>
- [22] StatPearls, Tympanic Membrane Perforation | <https://www.ncbi.nlm.nih.gov/books/NBK557887/>
- [23] StatPearls, Conductive Hearing Loss | <https://www.ncbi.nlm.nih.gov/books/NBK563267/>