# Assessments for Hearing & Functioning of the Ear

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Hearing assessments attempt to determine the degree of earing loss (mild, moderate, profound), type of hearing loss (see below), and configuration of hearing loss (e.g., bilateral or loss in both ears, unilateral or loss in one ear, etc.). Other tests determine how parts of the ear are functioning and are not actual tests of hearing.

**Definitions**

*Image of Tympanometry*

**Physiological Testing**: Objective tests or measures that rely on recorded responses from the body; the individual being tested does not have to respond as is required for behavioral testing

**Behavioral Testing:** Tests that require a response from the individual (e.g., raising one's hand in response to a tone, repeating a word presented through earphones)

| *Category* | *Test name* | *What it tests* | *How the test is conducted* | *Age testing can be conducted* |
|---|---|---|---|---|
| Physiological Testing  | Tympanometry | Purpose is to evaluate the function of the middle ear and tympanic membrane [4]<br>Does not tell if child is hearing or not [3]<br>Results reveal how well the middle ear is functioning [4]<br>When combined with Acoustic Reflex Test (below), the results reveal how well the middle ear is functioning [4] | Non-invasive test<br>Takes approximately two minutes to perform [4]<br>A probe is inserted into each of the patient's ears.<br>Results are not dependent on a response from the patient; however, the patient should not move [4] | Can be performed on infants from 7 months of age through adults [6] |
| | Acoustic Reflex Test | Purpose is to measure middle ear muscle in response to sounds [6]<br>The muscle in the middle ear contracts as a reflex in response to sounds<br>When combined with tympanometry (above), the results reveal how well the middle ear is functioning [4]. | A probe is inserted into each of the patient's ears.<br>The results are not dependent on a response from the patient; however, the patient should not move [4] | Can be performed on infants from 7 months of age through adults [6] |
|  | Otoacoustic Emissions Testing (OAEs) | Test to determine how well the inner ear functions, specifically, the cochlea [7].<br>Otoacoustic emissions are sounds from vibrations produced by the outer hair cells of the cochlea (in the inner ear); these hair cells vibrate when the cochlea is stimulated by sound<br>Test can, "partially estimate hearing sensitivity within a limited range …" [7]<br>Individuals with a hearing loss greater than 25-30 dB will not produce these otoacoustic emissions | A small plug is inserted into the patient's ear and a microphone in the plug records responses of the ear [7].<br>This test can be conducted while the patient is asleep, takes a few minutes [7] | Can be performed on newborns through adults [7] |

| *Category* | *Test name* | *What it tests* | *How the test is conducted* | *Age testing can be conducted* |
|---|---|---|---|---|
| Physiological Tests | Auditory Brainstem Response (ABR) | Gives information about inner ear and brain pathways for hearing<br>The purpose of this test is to measure the function of the brainstem in response to sounds [5] | Earphones are placed into the patient's ears and electrodes are placed onto the patient's head [3]<br>Clicking noises are sent through the earphones and the electrodes measure the brain's activity [3]<br>No response is needed from the person<br>Takes a few minutes and can be conducted while the patient is sleeping [3] | Can be preformed on newborns through adults [5] |

*Images of ABR testing*

| *Category* | *Test name* | *What it tests* | *How the test is conducted* | *Age testing can be conducted* |
|---|---|---|---|---|
| Behavioral Tests | Behavioral Audiometry | This test is used for screening purposes [3] | Observing infant's behavior in response to certain sounds is observed [3] | Can be performed on infants through adults [3] |
| | Pure-Tone Audiometry Or Pure-Tone Air Conduction Testing | Test measures hearing sensitivity, specifically, the softest sound an individual can hear at specific frequencies 50% of the time [9]<br>"This test assesses sensitivity when the signal is transmitted through the outer, middle, and inner ear, through the brain to the cortex" [10] | The patient may wear earphones or headphones or test may be conducted using speakers [10]<br>When earphones are worn, results for each ear are obtained<br>If test is done using speakers, it is not possible to obtain ear-specific results<br>The person is asked to make a response (e.g., raise hand) when he/she hears a sound [3] | Can be performed to assess children older than 4 years old [3] |
| | Pure-Tone Bone Conduction Testing | The purpose of this test is to test hearing in the inner ear without utilizing the outer or middle ear [10, 1]<br>Used if there is blockage in outer or middle ear | A small vibrator is placed behind the ear or on the forehead of the patient [1].<br>The signal gently vibrates the bones of the skull, and directly stimulates the inner ear [1] | Can be performed on infants through adults [9] |

*Image of Bone Conduction Testing*

*Image of Behavioral Audiometry Testing*

| *Category* | *Test name* | *What it tests* | *How the test is conducted* | *Age testing can be conducted* |
|---|---|---|---|---|
| Behavioral Tests | Visual Reinforcement Audiometry (VRA) | Variation on the Pure-Tone Audiometry test (above) [1] "This test assesses sensitivity when the signal is transmitted through the outer, middle, and inner ear, through the brain to the cortex" [10]. | Patients are tested wearing earphones or headphones or in a sound booth with speakers [1] The patient is taught to look at a visual object (e.g., flashing light, moving toy) when a sound is heard [1] | Can be performed to assess children from 6 months to adult [3]. Typical ages: 6 months to 2 years old [1] |
| |  Conditioned Play Audiometry *(image above)* | Variation of the Pure-Tone Audiometry test (above) [1] "This test assesses sensitivity when the signal is transmitted through the outer, middle, and inner ear, through the brain to the cortex" [10] | Patients are tested wearing earphones or headphones or in a sound booth with speakers [1] The patient is taught to perform a task (e.g., drop a block into a box, stack a ring) each time a sound is heard [1] | Can be performed to assess children from 2 years to adult [1]. Typical ages: 2 to 5 years old [1] |
| | Speech Awareness Threshold (SAT) Or Speech Detection Threshold (SDT) | Indicates the lowest level at which speech can be detected at least 50% of the time [8] | Patient listens to a voice say words via earphones or loud speakers [8] and indicates when speech is present [8] | Can be performed to assess children who are too young to repeat [8] |
| | Speech Reception Threshold or Speech Recognition Threshold (SRT) | Indicates the lowest level at which speech can be identified at least 50% of the time [8] | Patient listens to a voice say words via earphones or loud speakers [2] and repeats word he/she heard or indicates word recognition [2] | Can be performed to assess older children and adults [2] |

## References


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