

TESTS

*“Our children may learn
about heroes of the past.
Our task is to make ourselves
architects of the future.”*



Introduction

As your infant/child grows, many hearing tests will be done by a hearing loss specialist called an audiologist. Currently, the Auditory Brainstem Response (ABR) test, also called Brainstem Auditory Evoked Response (BAER), and Evoked OtoAcoustic Emissions (OAE), are available to examine hearing in newborns and infants up to six months of age. Once your infant/child reaches six months of age, there are several other tests that audiologists can do to check and measure his/her hearing loss. Some of the tests include the Behavioral Observation Audiometry (BOA), Visual Reinforcement Audiometry (VRA), and Play Audiometry. (See the Terminology section.)

Each test will give the audiologist information about your infant/child's hearing loss. Most likely, many tests will need to be performed over a long period of time, to figure out the exact kind and amount of hearing loss your infant/child has.



Frequently Asked Questions

What is a decibel?

A decibel (shortened dB) is the unit used to measure the intensity of a sound, or how loud a sound is. On the decibel scale, the smallest sound a person is able to hear (near total silence) is 0 dB, and a sound 10 times more powerful is 10 dB. Any sound over 85 dB can cause hearing loss. This hearing loss (caused by too much noise, or noise-induced) is the result of both the loudness of the sound and how long a person hears the sound.

Near total silence _____	0 dB
A whisper _____	15 dB
Normal conversation _____	60 dB
Lawnmower _____	90 dB
A car horn _____	110 dB
A rock concert or a jet engine ____	120 dB
Gunshot, firecracker _____	140 dB

What is an audiologist?

An audiologist is a highly trained and licensed professional who specializes in the testing, evaluation, and management of hearing loss. The audiologist does tests to figure out the amount of hearing loss your child has, what type of hearing loss it is, and what type of help is needed.

How do I choose an audiologist?

Be sure that your audiologist is experienced in the testing and management of infants and young children. This is important because testing methods for infants and young children are different than those used for older children and adults who can talk and answer questions.

How can an infant/child's hearing be tested?

There are different ways to test an infant or young child's hearing. Some do not need any direct participation or effort from your child. Other tests rely on trained observation of your child's behavior when sound is present. Not all tests can be done on every child and every type of test gives different information. More than one type of test should always be performed to provide the most information possible.

What is an ABR?

An Auditory Brainstem Response test (may be referred to as ABR, AABR/BAER, and BSER) records the brain's response to sound through sensors that are placed on your infant/child's head. Small earphone inserts that look like earplugs, are placed into his/her ear(s) to send the sound. The test requires no direct reply or response from your infant/child. For best results, your infant/child must be asleep since movement can interfere with the test. A diagnostic ABR gives the audiologist information about the amount and type of hearing loss that your infant/child may have.

What is an OAE?

An Otoacoustic Emissions (OAE) test is a simple test to gather general information about your infant/child's hearing. A small probe is placed into your child's ear canal, after which sounds are carried inside the ear. A normal cochlea (hearing part of the ear) will send a signal back in reply/response. If no signal from the cochlea is picked up by the probe, then there may be a hearing loss. This test cannot measure how much hearing loss is present. It can only tell if the cochlea is working correctly or not.

What are BOA, VRA and Play Audiometry?

Behavioral Observation Audiometry (BOA), Visual Reinforcement Audiometry (VRA), and Play Audiometry are other methods used to review your child's hearing. These tests are all done in a soundproof booth and should include testing for both tones and speech.

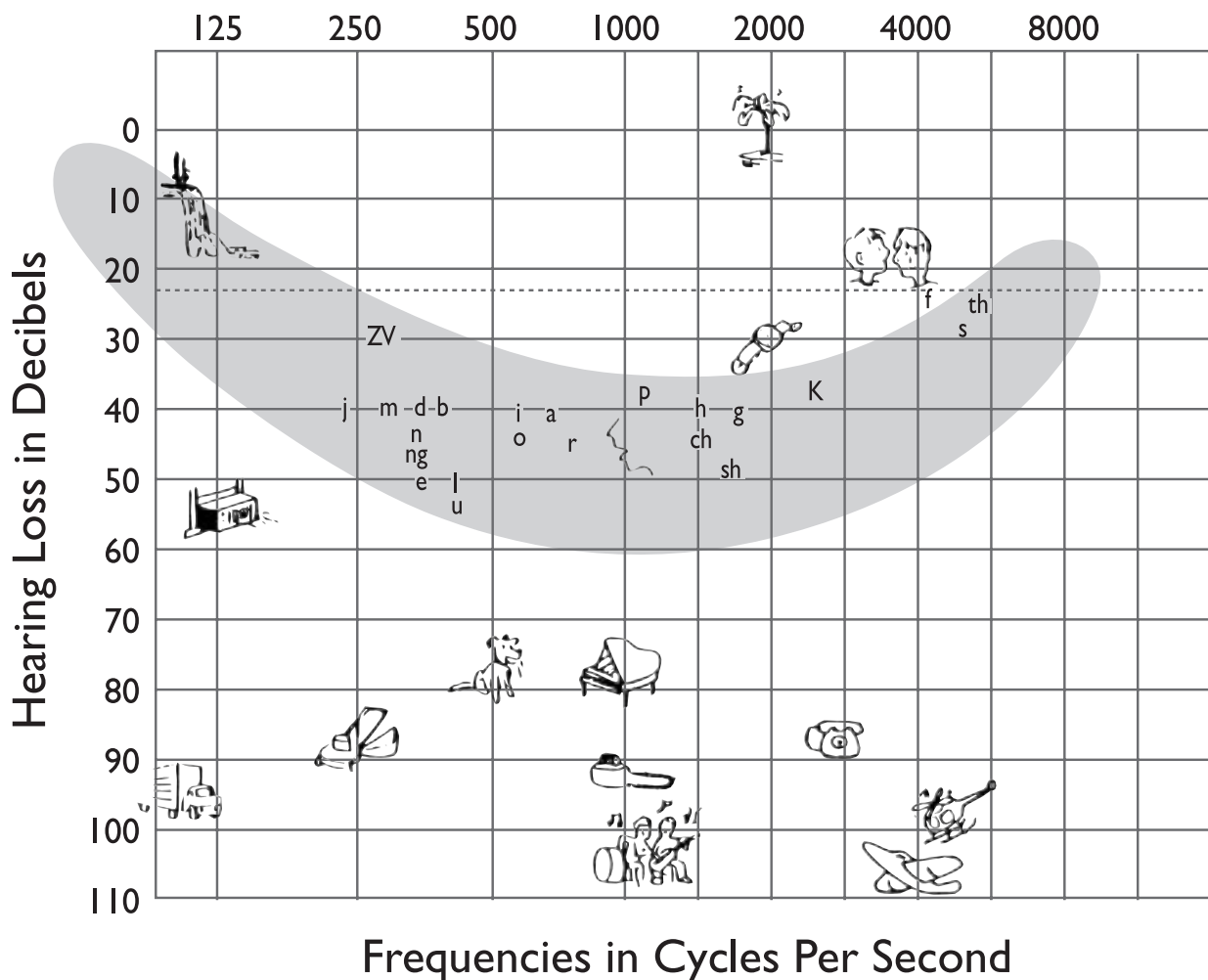
- Behavioral Observation Audiometry (BOA): This is used for infants up to approximately six to nine months of age. In this test, the audiologist closely watches your infant/child's face and body for changes in actions when he/she hears different sounds. Such actions include eye blinking and widening, changes in sucking, trying to find sound/s, and/or body tensing. Although this test gives important information, it should never be used alone to figure out whether or not your infant/child has a hearing loss.

- Visual Reinforcement Audiometry (VRA): This test is generally used for infants and young children from six months to two or three years of age. In this test, the audiologist trains your infant/child to look at a toy that lights up and/or moves whenever he/she hears the sound. Like the BOA, the VRA should not be the only test used to diagnose, or decide whether or not your infant/child has a hearing loss.
- Play Audiometry: This test is generally used for children three to six years of age. In this test, the audiologist trains your child to drop a block in a bucket (or do something like it) whenever a sound is heard. Your child may also be asked to point to simple pictures when told or shown to do so.

What is an audiogram?

An audiogram is a graph, or picture, on which the audiologist draws the findings of your infant/child's responses to different sounds, and the loudness (decibel) level at which your infant/child can hear that sound. An ABR audiogram can give a good idea of your infant/child's hearing level, usually within ten decibels of the actual hearing loss. The audiogram that you get through behavioral (your infant/child's actions) tests may give you more exact information. However, the findings depend on if, and how, your infant/child helps, or takes part in, these tests. As your infant/child gets older, you can get a more detailed audiogram done. A complete audiogram will show the loudness level at which your infant/child can hear different levels of sound in each ear with and without hearing aids.

The "Speech Banana"



What is tympanometry?

Tympanometry is not a hearing test. It measures the movement of your infant/child's eardrum (tympanic membrane) and the ability of the middle ear system to move sound to the inner ear. During the test a small probe is placed into your child's ear canal, and there is a slight change in air pressure. The feeling is very much like the feeling of air pressure change when riding in an elevator. Tympanometry can determine if there is middle ear fluid that is changing the hearing test results.

What does the ABR/BAER look at?

Just like how an electroencephalogram (EEG) looks at the way brain waves work, the ABR/BAER looks at how brain waves change when different sounds are heard by the auditory (hearing) part of the body. As the sound travels into the ear, it is changed into nerve signals by the tiny, hair-like nerve fibers of the cochlea (hearing part of the ear). These tiny nerve fibers come together at the auditory (hearing) nerve, which conducts the signals through to the brain. Research has shown that the lower parts of the brain, called the brainstem, are very important in the working of a healthy auditory (hearing) system. During the ABR/BAER test, by putting sounds at several volume (loudness) levels into the ear, we can see if the brainstem is working well. This information can give us a good idea of how well someone can hear.

How is the ABR/BAER test done?

Typically, the ABR/BAER test is done by an audiologist. Your health care provider or current audiologist will most likely refer you to a professional who can do the test, if the test cannot be done at their office.

The audiologist uses a special computer to get and analyze, or study, the ABR/BAER. A soft, foam earplug is placed in your infant/child's ear. This earplug will send sounds at different volume (loudness) levels into the auditory (hearing) part of the body in the ear. Electrodes are placed on your infant/child's

forehead and ear lobes. These electrodes carry tiny, nerve-like signals to the computer. The computer reads these signals and creates a special wave form on paper. By looking at the shape and size of these wave forms, the audiologist can tell if your infant/child has a hearing loss or not, as well as, what type of hearing loss they may or may not have.

Why might an ABR/BAER test not be normal?

There are many reasons why an ABR/BAER test might not be normal.

1. Most importantly, if your child has a hearing loss, that will cause the ABR/BAER test not to be normal. The audiologist can tell if the hearing loss is caused by something not working in the outer or middle ear, or if it is because of a problem with the inner ear.
2. Some neurological (brain) conditions, or illnesses, can also cause ABR/BAER tests not to be normal, or abnormal. An abnormal ABR/BAER can also be caused if your infant/child moves during the test, so it is very important for him/her to stay still while the test is being done. Usually, infants/young children need to be sleeping during this procedure.

How do I know if my child needs to have an ABR/BAER test?

Your infant/child's health care provider may suggest that you see an audiologist for other, earlier tests before an ABR/BAER is done. Usually, the audiologist will try to get responses/replies to sounds through behavioral (action) testing. If the findings of these earlier tests do not give what is needed, the audiologist will likely suggest that an ABR/BAER test be done to rule out hearing loss. Currently in Alaska, two hospitals can do ABR/BAER tests for newborn infants; 1) Providence Alaska Medical Center and 2) Alaska Native Medical Center, both in Anchorage. In addition to diagnostic testing, follow-up with your infant/child's health care provider or an otolaryngologist (a ear, nose, throat doctor) may be also be suggested.

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Questions for parents to begin asking about their infant/child's hearing tests?

- What does this test measure? What will this test tell me about my infant/child's hearing loss?
- How does this test work?
- Why do we do this test at this time?
- What are you looking for with this test? What do you expect to find with this test?
- How do we read the results or findings of this test?

The audiologist (hearing loss specialist) is an important part of your infant/child's team of caregivers. Make sure that he/she is willing to listen to you and take time to answer your questions. Following are some questions that you may want to ask your audiologist:

- How much experience do you have testing infants and young children? How about fitting infants and young children with hearing aids?
- How much of your time do you spend working with young children (practicing pediatric audiology)?
- Do you know what FM systems are? Do you recommend them for infant/young children?
- How soon do you suggest fitting hearing aids for a deaf or a hard-of-hearing infant/child? (The audiologist should be ready to fit your infant/child with hearing aids as soon as the loss is confirmed.)
- Will you be able to direct me to the speech and language pathologists? How about early intervention programs? (If not, the audiologist probably does not have many pediatric (infant/children) patients.)
- What do you know about cochlear implants? Where can I get more information about them?

“I’ve learned that it’s not what happens to people that’s important. It’s what they do about it.”

— 10 year old