Children's Health Ireland
at Temple Street

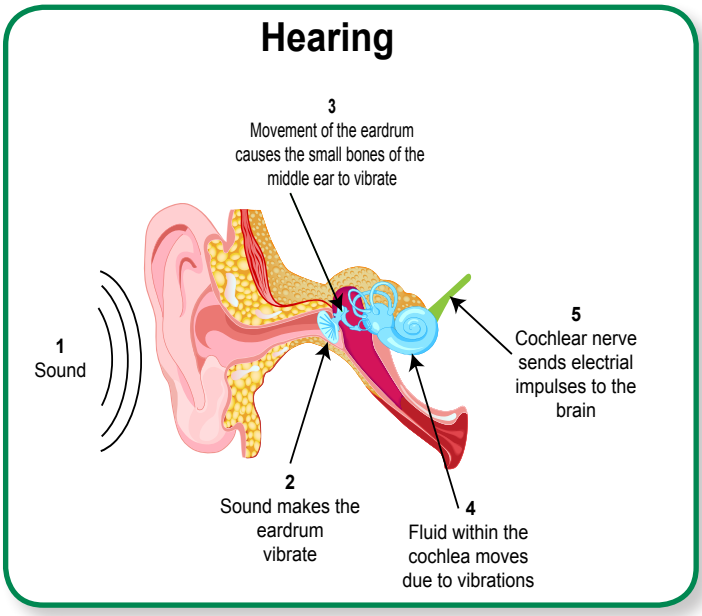
Your Child's Hearing Test
Information for Parents and Carers

Auditory Brainstem evoked Response Testing Under General Anaesthetic

How Does Your Ear Work?

Sound occurs when a moving or vibrating object causes the air around it to move. Sound travels in invisible waves through the air. When sound waves travel down the ear canal and hit the eardrum, the eardrum vibrates. Three bones in the middle ear link the vibrating eardrum to the cochlea in the inner ear.

The cochlea contains thousands of tiny hair cells. Movement of the hair cells causes them to fire off electrical signals. The electrical signals travel up the cochlear nerve to the brain that processes them. All this happens in a fraction of a second.



What is ABR testing?

ABR tests the function of the auditory (hearing) system up to the brainstem, in response to sound. As ABR testing does not require a child to indicate when they hear a sound, it is useful for testing children that do not give reliable responses when sounds are made around them.

How is the ABR Test performed?

Three sticky sensors are placed on the head- one on the forehead and one behind each ear. Sounds are made by a headphone held over the ear or through an insert earphone placed in the ear canal. A normally functioning auditory system will respond to sound and it is usually possible for the sticky sensors to pick up changes in electrical activity that occur when the auditory system is working. A computer records electrical activity from each of the sticky sensors and the information that is recorded is interpreted by the Audiologist who will try to establish whether the auditory system has responded. Responses will be in the form of repeatable waveforms on the computer screen. The length of time for the ABR test depends on a number of factors. The test will take longer when:

1) Fluid has to be removed from behind the ear-drum prior to testing
2) Recording conditions are poor due to high levels of electrical interference
3) Child has a hearing loss or abnormally functioning auditory system

Most children will be under general anaesthetic (GA) for a period of between 45 minutes and and hour and a half, however occasionally the time under GA will be longer than an hour and a half. Any GA involves a risk to the patient. The ENT/Anaesthetics team will discuss this with you.

Results of the ABR Test

Testing is usually carried out using a high-frequency or high-pitched sound, similar to the “ss” sound in “hiss”. When clear responses are obtained using this sound at a low intensity (“quiet” level), it is likely that your child will be able to hear the sounds of speech. Under these circumstances, The Audiologist will report that estimated hearing thresholds are less than or equal to 30dBeHL for 4000Hz tone pips and that a satisfactory result has been obtained. 4000Hz is the most sensitive test frequency for detecting sensorineural hearing loss, and also, practically, it is usually the easiest tone pip ABR response to record. If clear responses are not obtained at a satisfactory level, testing will take place at levels that are louder than low intensity.

After the assessment the Audiologist will explain the results of your child’s ABR test. If clear responses were present, the quietest level at which they occurred will have been determined. The louder that the sounds have to be made before clear responses occur, the greater the likelihood that your child has a hearing loss.

Limitations of the ABR test.

Sometimes responses may be recorded at a satisfactory level of low intensity tone pips, even though a permanent hearing loss is present at the time of the ABR assessment.
Reasons for this include:

1. Presence of a mild hearing loss
2. Presence of a hearing loss for some frequencies/pitches and normal hearing for other frequencies/pitches. For example, if a child has a low frequency hearing loss and normal hear ing for high frequencies, it is possible that a satisfactory ABR will be obtained because the 4kHz tone pip stimulus contains high frequency energy only. Under these circumstances the part of the ear that is functioning normally is stimulated and a response is generated, even though there is abnormal low frequency hearing.
3. When the hearing system above the level of the brainstem does not function normally. An ABR assessment tests the auditory system from the outer ear up to the inferior colliculus in the mid brain. Any abnormality beyond that point **will not be detected.**

Sometimes responses are not recorded at a satisfactory level, even though a permanent hearing loss is not present at the time of the ABR assessment.
Reasons for this include:

1. temporary hearing loss due to removal of middle ear fluid or wax in the ear canal
2. collapse of the ear canal during testing, which sometimes occurs when the headphone is placed over the outer ear
3. blockage of the insert earphone or ear canal with blood or fluid
4. immature neural function
5. electrical interference/poor recording condition

If you have any further questions about your appointment please contact us on 01 878 4577

To arrange any further appointments, please contact our secretaries on 01 8784533

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