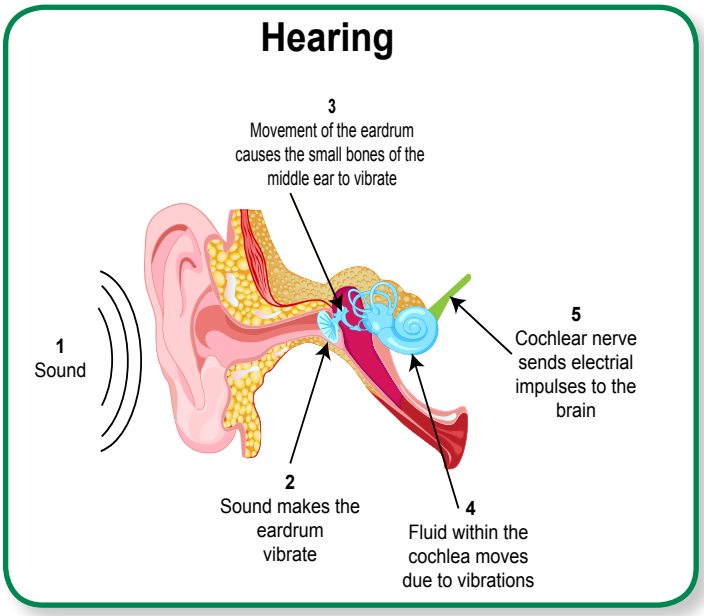
Children's Health Ireland
at Temple Street

Your Child's Hearing Test
Information for Parents and Carers

Tympanometry

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.

The Middle Ear

The middle ear consists of

- The eardrum.
- An air-filled cavity that includes three middle ear bones.
- The oval and round window membranes.
- The eustachian tube.

The cone-shaped eardrum is stretched across the ear canal. Behind the eardrum 3 bones are connected to form the ossicular chain. The three bones are:

- The Hammer (Malleus)
- The Anvil (Incus)
- The Stirrup (Stapes)

The hammer is connected to the eardrum on one end. It is connected through the anvil to the stirrup at the other end. The stirrup is the smallest bone in the body, smaller than a grain of rice. It rests against the oval window membrane leading into the inner ear.

The middle-ear cavity, filled with air, is connected to the back of the nose and throat by the eustachian tube.This tube adjusts the air pressure in the middle-ear space to match the air pressure on the outside of the eardrum and is normally closed. In a plane when you take off or land, it helps to yawn or swallow because these actions usually open the eustachian tube to adjust the air pressure in the middle ear space.

Tympanometry

This is a test which shows how well the ear drum moves. It is painless – most children would feel no more than a tickle in their ear canal and it only takes a couple of seconds, as long as your child is sitting quite still.

How the test works: to check how well the ear drum is moving, a small probe is placed at the entrance to the ear canal. Once we have an airtight seal around this probe, a small amount of air pressure, along with a soft humming sound, can be puffed into the ear canal reaching and normally stopping at the ear drum.

The movement from your child's ear drum would usually produce 1 of 3 different graphs:

1. Normal tympanogram: we would described the graph drawn on the computer as looking like a mountain or hill; this means that your child's ear drum is moving or vibrating properly.

This graph suggests that it is unlikely that your child has any fluid behind their ear drum and that the middle ear cavity is filled with air (this is normal). It also suggests that the tube from the ear to the nose, the Eustachian tube, is opening and closing properly.

2. Flat tympanogram: the graph on the computer would show a flattish line; this usually would indicate the presence of fluid behind the ear drum, which makes the ear drum very stiff and unable to move. This result may need treatment by your GP or an Ear, Nose and Throat Consultant (ENT). We may have recommended some form of action for you to take today.

Sometimes a flat line can also indicate a hole (perforation) in the ear drum or the presence of a grommet (drainage tube) that is open and working. As part of the test we check the ear canal volume or size of the ear canal as this shows if there is a perforation or grommet – it would be much larger than normal if there is any kind of a hole in the ear drum.

If an air tight seal was not obtained today this may also suggest the presence of a grommet that is open and working.

3. Tympanogram showing negative middle ear pressure: again a drawing of a hill would appear on the computer but it would be moved across to the left of the graph. This type of response usually means that the tube which runs from the ear to the nose, called the Eustachian tube, is not opening and closing properly. Usually the Eustachian tube opens and closes freely to allow your ears to "pop". You have probably experienced this feeling whenever you have driven up and down a mountain or flown on a plane.

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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Review date January 2021