



Children's hearing

A guide for parents



PHONAK
life is on

Creating the future

Children are our future. By giving them access to a world full of sounds, we can help them to develop the hearing skills they need to build their future.

At Phonak, we understand the listening needs of children and the importance of providing them with the optimal access to a world full of sound. Based on more than 40 years of expertise and working cohesively with leading pediatric specialists, hearing care professionals and teachers, Phonak remains committed to creating innovative solutions for our future generations.

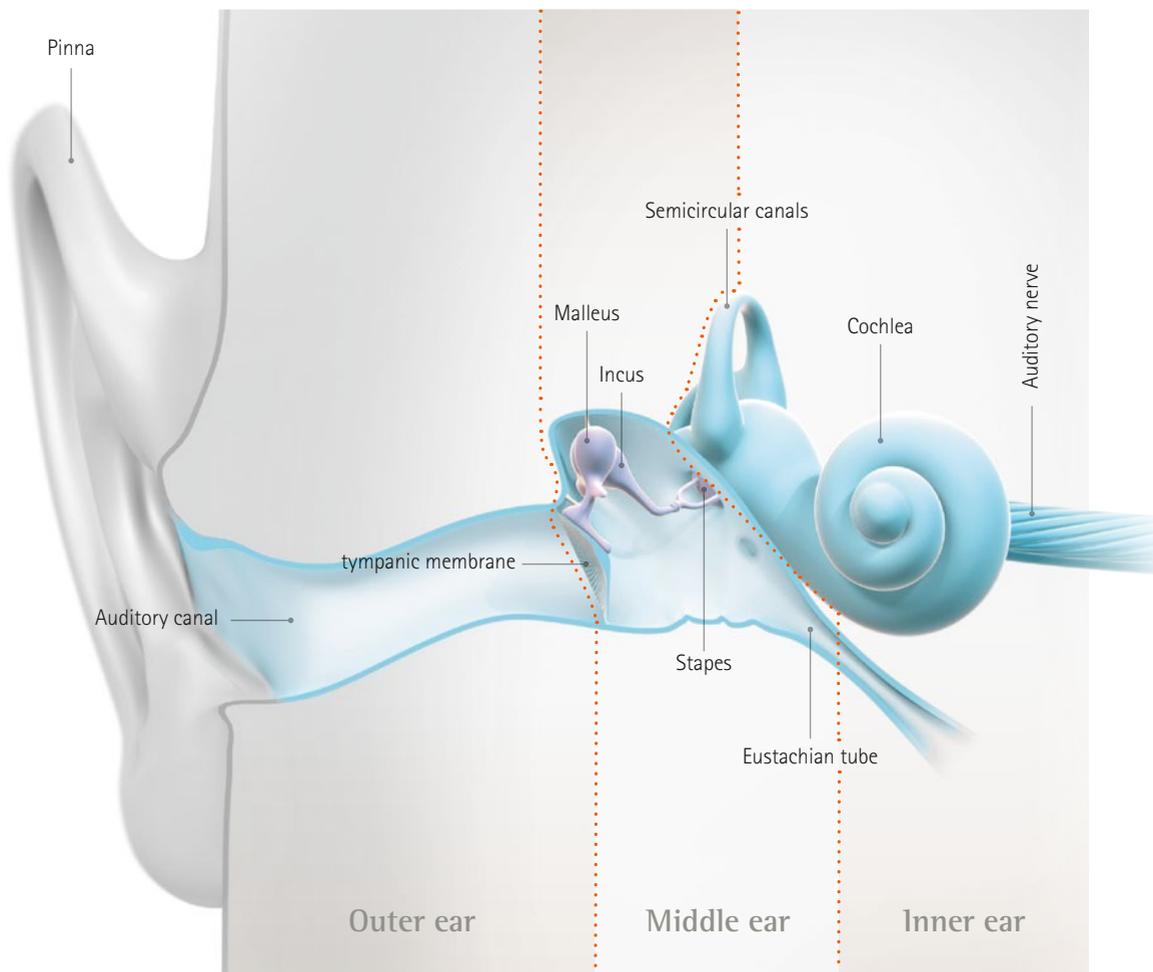
Providing children with the necessary solutions from an early age is essential for speech, language, communication and social development skills. The information in this booklet is designed to help you, as a parent, better understand the following:

- Children's hearing
- Speech and language development
- Types of hearing loss
- How to protect your child's hearing and prevent hearing loss

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How hearing works



The human ear has three main sections: the outer ear, the middle ear and the inner ear.

The outer ear

This is the part of the ear that we see on each side of our heads and is called the auricle, or the pinna. Made from cartilage, the pinna is flexible and collects and channels sound into the auditory canal (ear canal). The ear canal amplifies the sound waves and further funnels them toward the tympanic membrane (eardrum).

The middle ear

This is the space behind the eardrum made up of three small bones called ossicles. These bones, the malleus (hammer), the incus (anvil) and the stapes (stirrup), vibrate, magnifying the movements of the eardrum and transmitting the motions to the inner ear.

The inner ear

This is made up of the cochlea, the actual sensory organ of hearing. The chambers of the cochlea are filled with fluid which causes changes in tiny structures called hair cells. This movement of the hair cells sends electric signals from the inner ear along the auditory nerve to the brain where they are processed as the "sounds" we hear.

Learning to hear and listen

After birth, a newborn child's cochlear sensitivity is similar to that of adults, but babies must learn how to use their hearing to form the foundations of communication.

Localization

One of the earliest and easiest auditory skills to observe in your baby is localization – the ability to pinpoint the source of a sound. Because we hear through two ears (binaurally), we can localize sounds with extreme accuracy.

Observing your child's localization ability

In general, newborns will move or widen their eyes when they hear a loud sound. This is known as the "startle reflex" and many loud sounds should prompt this reaction. When your child gets to about five or six months, you can better observe a true localization response by making soft sounds behind or beside he or she while they are looking straight ahead. A soft rattle shake or a whisper should prompt your baby to turn his or her head toward the sound. It is very important to see how well your baby responds to soft sounds (such as the speech sound "s").

Your child's speech and language development milestones

9 months

Demonstrates an understanding of simple words such as "mommy," "daddy," "no," "bye-bye."

10 months

Babbling should sound "speech like," with single syllables strung together ("da-da-dada"). The first recognizable words emerge around this time.

1 year

Speaks one or more real words.

18 months

Understands simple phrases, retrieves familiar objects on command (without gestures) and points to body parts. Has a spoken vocabulary of 20 to 50 words and uses short phrases ("no more," "go out," "mommy up").

24 months

Has a spoken vocabulary of at least 150 words, coupled with the emergence of simple two-word sentences. Most speech should be understandable to adults who are not with the child daily.

3 to 5 years

Uses spoken language constantly to express wants, reflect emotions, convey information and ask questions. A preschooler should understand nearly all that is said. Spoken vocabulary grows from 1,000 to 2,000 words, which are linked in complex and meaningful sentences. All speech sounds should be clear and understandable by the end of this developmental stage.

If you notice your child is delayed by 3 months compared to the above-mentioned developmental milestones, we recommend you have your child's hearing tested by a hearing healthcare professional.

Signs of hearing difficulties

Sometimes a child will not respond because they are not paying attention. However, it is important to note if inconsistent responses are due to an inability to hear.

The single most important sign of possible hearing loss is delayed development of speech and language. These are common signs that a child may not be hearing normally:

- Not aware that someone who is out of view is talking, especially when there are few distractions
- Startled or surprised look when they realize their name has been called regardless of noise level
- Sitting close to the television set when the volume is sufficient for other family members
- Increasing the volume of the TV or stereo to unreasonably loud levels
- Not responding to voices over the telephone and/or switching ears continually
- Not reacting to intense, loud sounds



The following factors indicate that a child is at risk of hearing loss

Newborns – birth to 28 days

- Failure of newborn hearing screening
- Family history of hereditary childhood sensorineural hearing loss
- In utero infection, such as cytomegalovirus, rubella, syphilis, herpes or toxoplasmosis
- Craniofacial deformities including those affecting the skull and face
- Birth weight less than 1,500 grams (approx. 3.5 pounds)
- High levels of jaundice that require transfusion
- Some medications containing aminoglycosides (such as antibiotics like entamicin) used in multiple courses or in combination with loop diuretics can damage the auditory system through toxins (ototoxic medications)
- Bacterial meningitis

- General health score (Apgar) of 0–4 at 1 minute or 0–6 at 5 minutes after birth
- Mechanical ventilation lasting 5 days or longer
- Findings associated with syndromes known to include sensorineural hearing loss

Infants – 29 days to 2 years

- Concern regarding communication or developmental delay
- Bacterial meningitis or other infections known to cause sensorineural hearing loss
- Head trauma associated with loss of consciousness or skull fracture
- Otitis media with effusion (fluid) for 3 months or longer



Children's hearing loss

Hearing loss in children can be caused by any number of conditions or illnesses during pregnancy, shortly after birth or throughout their childhood. In some cases, the hearing loss could be genetic, and often the cause may be unknown.

Conductive hearing loss

With a conductive hearing loss, the inner ear functions normally, but something affects the outer or middle ear, hindering sound from reaching the inner ear. Conductive hearing losses are mild to moderate in degree and are hearing loss in children temporary and treatable. Sounds from the outside are softer while your own voice actually sounds louder than normal. The following are some common causes of conductive hearing loss:

Earwax (cerumen)

When wax becomes impacted in the ear canal, it acts as an ear plug, blocking sound waves from striking the eardrum. Excessive wax may be softened with wax-softening drops and flushed out or removed by a physician or other trained personnel. Cotton buds should never

be used to remove impacted wax because they may push the wax deeper into the canal or puncture the eardrum if inserted too deeply.



Otitis media (middle ear infection)

This is the most common cause of hearing loss in children. Otitis media is a general term used to describe a variety of conditions affecting the middle ear. More than 85% of all children will have at least one ear infection in childhood.

There are various forms and causes of otitis media. The single most frequent cause is infected adenoids, which harbor bacteria or obstruct the Eustachian tube that connects the middle ear with the back of the nose (nasopharynx).

Ear infections also may result from upper respiratory infections or exposure to cigarette smoke. The two most common types of otitis media are acute otitis media and otitis media with effusion.

Swimmer's ear

This painful bacterial infection occurs when the ear canal remains wet after bathing or swimming. It can cause the ear canal to swell shut, resulting in a temporary hearing loss.

Sensorineural hearing loss

Sensorineural hearing loss is caused by dysfunction of the cochlea (sensory) or auditory pathways to the brain and often is present from birth. It can also develop as a result of constant exposure to loud music or noise or exposure to medication that can damage hearing. These losses can range from mild to profound and may affect all or only certain frequency ranges.

Sensorineural hearing loss is permanent and cannot be treated with medicines or surgery. In most cases people with this type of hearing loss can be helped with hearing aids or in some cases by cochlear implants.

Mixed hearing loss

Sometimes a combination of factors occur that affect both the outer or middle ear and the inner ear (cochlea), resulting in a mixed hearing loss.



What to do if you think your child may have a hearing loss?

Hearing is not an all-or-nothing phenomenon. Even a mild hearing loss during those crucial first years of language and speech development can cause a child to misperceive speech sounds and may result in a delay of normal communication development. This is why after you have received a clear diagnosis, technology should be chosen and fitted as soon as possible to ensure that your child can benefit as early from auditory experience. In many countries, federal and state laws exist that mandate services for children who have hearing impairments.

Give your child's hearing the attention it deserves and seek professional help immediately if you are concerned. For further information about children's hearing visit our website at www.phonak.com/kids.





We support your family

In addition to our dedicated portfolio of hearing solutions for kids, Phonak also offers a range of online support resources.

www.phonak.com/leos-world

Meet Leo – your child's friend in hearing. On Leo's page you will find the following resources:

- Leo storybooks: "Leo gets hearing aids" and "Leo gets a Roger system" help your child feel less anxious about their hearing loss and more comfortable with their hearing systems. Available in print and electronic versions for the iPad.
- Leo coloring pages: two engaging Leo coloring pages to print and color. Then turn them into interactive 3-D worlds with the free app Quiver available for tablets and smartphones.

www.phonak.com/teens

Web pages especially for teens to connect with friends and family, experience music like never before, excel in sports and live a life without compromise.

www.thelisteningroom.com

A host of free fun activities and resources to support the development of speech, language, and listening skills in children of all ages with a hearing loss.

www.hearinglikeme.com

Online community for those whose lives are affected by hearing loss. People from all around the world share stories that inspire hope in almost any hearing loss situation.

Life is on

At Phonak, we believe that hearing well is essential to living life to the fullest. For more than 70 years, we remain true to our mission by developing pioneering hearing solutions that change people's lives to thrive socially and emotionally. Life is on.

www.phonak.com/kids

