

Bilateral Cochlear Implantation - Tips for Parents

BINAURAL HEARING SERIES



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Hearing with both ears, also known as binaural hearing, gives optimal access to sound. Hearing is normally accomplished with two ears, and the brain is organized to receive and then process sounds from two ears. Evidence shows that bilateral cochlear implantation improves binaural hearing, providing a range of benefits to recipients with severe-to-profound hearing loss: ^{1,2,3}

- Localization of sound. Localization refers to the ability to identify the direction that a sound, or speech comes from. For example, we can hear a person calling us on our right side, and we know which way we need to turn to respond.
- Better understanding of speech in both quiet and noisy situations. Hearing with two ears means that speech can be heard more clearly and easily in situations with loud background noise (e.g., classroom, cafeteria, playground).
- Improved ability to follow conversation.
- Reduced listening effort. Listening with two ears requires less effort to listen to a conversation compared to when listening with one ear.

Bilateral cochlear implantation refers to receiving sound to each ear using cochlear implants.

Bilateral cochlear implantation can be:

- *Simultaneous cochlear implantation* involves the implantation of a cochlear implant into each ear during the same surgery.
- *Sequential cochlear implantation* involves two surgeries with the second device being implanted weeks, months or years after the first surgery.

Rehabilitation

After implantation and fitting of the audio processors, it is important for parents/caregivers to support the development of their child's listening skills by ensuring that both audio processors are working appropriately and that the devices are worn all waking hours. Information on proper care and maintenance of the devices and accessories is provided to parents/caregivers during the cochlear implantation process. Additionally, information can be found at medel.com or on the [MED-EL Blog](#).

It is beneficial to establish a routine to maximize wear time. Put the audio processors on as soon as your child wakes up and do a Ling Six Sound Test to check hearing. Developing these daily habits is best practice to ensure that the devices are functioning well, and the child is hearing optimally.

Young children or beginning listeners will most likely not have enough listening or language experience to report a problem. If the listening check is performed with both devices at the same time, a problem with one of the audio processors may go unnoticed. If you do identify a problem, encourage your child to practise the language to explain it to develop the skill of independently reporting a problem (e.g., "The battery is flat").

The Ling Six Sound Test

Assessment and monitoring of auditory skills are important. The [Ling Six Sound Test](#) will tell you if your child is hearing the sounds necessary for speech and spoken language development. The Ling Six Sounds /m, ah, ee, oo, sh, s/ represent the speech range from low to high frequency. It is beneficial to assess each cochlear implant alone as well as together. Perform the Ling Six Sound Test every morning.

- Say the sounds slightly prolonged one at a time in a normal conversational tone within a close range of your child
- Use a random order with irregular pauses in between presentations. This will prevent your child from guessing what sound might be said and when
- Look for a detection response

Observe, monitor, and document how your child is responding to determine if the devices are providing appropriate access to the Ling sounds. The way a child responds to the Ling Six Sounds depends on age and ability.

- An infant, young child, or beginning listener may raise their eyebrows, blink, or stop activity to look around for the source of noise. These responses indicate that the child has heard the sounds.
- For toddlers or kindergarten children, you can use a container for the child to drop a small toy in whenever a sound is heard. To make it more fun, change roles and let your child produce the sounds and you drop the toys in the container. If you have more children, let the siblings "play" too! An older child may point to a picture with the specific sound or over time, learn to imitate the sounds.
- As your child develops auditory skills, you can complete the Ling Six Sound Test from close to further distances to check the range at which sounds are still heard clearly.

Creating good listening conditions at home

What is a "good listening condition" and why is it important for children with cochlear implants?

A *good listening condition* is the optimal acoustic environment where your child has the best access to sound in order to develop listening and language skills. Good listening conditions mean that background noise in the home is minimized. This will give your child the best opportunity to attend to and understand sounds and speech which will contribute significantly to the language learning process. Research has identified that children acquire up to 80% of language and general knowledge through listening in incidental learning situations.^{4,5} This means that your child is learning language and social behaviours not only when being spoken to directly, but also when hearing others (e.g., parents, siblings) talking around them. This *learning by overhearing* or *incidental learning* happens when children are not directly taught certain words, sentences or behaviours. They *catch information* by seeing or hearing people around them. Good listening conditions make it more likely that this happens.

For children with hearing loss, it is challenging to filter speech from the background noise. A noisy home environment makes it difficult for your child to understand language and follow conversation. A quiet environment in the home where you talk and play together will support the development of understanding and learning of language.



How can you improve listening conditions at home?

- *Reduce the background noise coming from inside the house.* Sometimes we are not aware of how loud it is in a room until we are not disturbed by the competing noise. Use a decibel metre application to measure the noise in the room and try to *shut down* the unnecessary noise (e.g., computer, TV, radio). An optimal listening environment for a child with cochlear implants has the background noise 15 to 25 dB softer than the voice your child is listening to. This means that if the background noise is 50 dB, your voice must be at least 65 dB for your child to have optimal access to listen and understand your speech.
- *Reduce the noise coming from outside.* Closing the doors and windows helps minimize the sound coming from outside the house. Examples of noise can be from playgrounds, cars or trucks, or groups of people talking as they pass by.
- *Distance.* Distance will impact understanding. The further away you are from your child, the less information they will hear from you. According to the "6 dB rule", speech sounds are heard 6 dB softer if the distance between listener and talker is doubled.⁶ Therefore, being aware of the distance and being close to your child's audio processor enables a good listening condition.
- *Reverberation.* This term describes how long sound stays in a space. Sound can echo around in a room that has many hard surfaces creating a poor acoustic environment for listening to speech. "Soft is good, hard is bad" is an easy way to remember how to look for problems related to reverberation. Reduce reverberation by using carpets or rugs, cushions, curtains, tablecloths, and rubber on the feet of tables and chairs on hard floors to suppress the noise.

Development of listening and spoken language skills

Once your child receives bilateral cochlear implants, rehabilitation can help facilitate best listening and spoken language development. Your child will need exposure to key strategies for developing listening skills to reach full potential as a verbal communicator. Family involvement is essential to this process. MED-EL has resources that may be helpful in empowering parents/caregivers. Informative booklets include *The First Steps: A Parent's Guide to Cochlear Implants*. It introduces you to the topic of cochlear implantation and rehabilitation. Discussion of early communication skills and how to facilitate your child's development of communication skills can be found in [Little Listeners](#). To learn about the benefits of music and how to introduce music into your child's life refer to [Music and Young Children With CIs](#). The MED-EL Blog has a [Tips & Tricks](#) section that provides numerous ideas for parents/caregivers on how to facilitate your child's listening, speech, and spoken language. Discussion about your child's daily listening abilities and challenges provides information for the rehabilitation professional to set realistic therapy goals collaboratively with you. The two key aims of rehabilitation are to maximize spoken language development and to enhance the benefits of binaural hearing.

Development of binaural benefit

Sound localization and improved listening in noise are significant benefits of binaural hearing.⁷ For children who have developed some auditory and language skills, activities which focus on development of these two skills can be included in the rehabilitation programme. Sound localization skills develop over time and require practice. *Sound Localisation* provides information and tips on how to develop these skills. Parents/Caregivers are encouraged to assist your child in becoming aware of sounds and in which direction the sound is coming from to help your child learn to use the cues provided by binaural hearing to develop localization skills. Practising already mastered activities in the presence of background noise will help your child listen and understand in situations of competing noise. Phonological development, global language skills, attention, and memory influence listening-in-noise performance. Start with low intensity background noise and progress to louder levels as confidence grows and performance improves. Target already well-established auditory skills and use language your child is already familiar with. Suggested background noise to add, from easiest to hardest are:

- Steady state noise (e.g., white noise), other noise unrelated to spoken language (e.g., orchestral music)
- Multi-speaker babble (individual speakers indistinguishable)
- Speaker babble with highlighted salient spoken phrases

Activities carried out in background noise are challenging for children. Keep activities brief (less than ten minutes).



MED-EL Resources to Support Rehabilitation

MED-EL Rehabilitation Online Resources

We provide information about cochlear implants and hearing solutions from [MED-EL](#) for children and adults.

MED-EL Blog [Tips & Tricks](#) provides further information on auditory training, language development, and communication strategies. [Technology](#) provides information on technology related to MED-EL, hearing loss, and hearing implants.

The MED-EL video series [Rehab at Home](#) provides examples of strategies to be used in communication with a child while practising listening and learning language at home.

[MED-EL Lesson Kits](#) are free paper-based CI rehabilitation resources. The Lesson Kits are a series of themed kits to support rehabilitation sessions with young children. Each kit has multiple activities with goals at different levels so that activities may be tailored to the abilities of individual children.

[Little Listeners](#) discusses early communication skills and how to facilitate a child's development of communication.

[Music and Young Children With CIs](#) provides information about the benefits of music and how to introduce music into a child's life.

[Sound Localisation](#) provides information and tips on how to develop these skills.

[LittleEARS® Diary Activities](#) provides ideas to practise listening and language in the home environment. It can be used in conjunction with LittleEARS® My Diary.

[All in a Day](#) is a booklet that tells the story of a boy, who has a cochlear implant, and his day. It provides suggestion for facilitating a child's listening and communication skills.

The [Murat Reader Series](#) is a series of books about a boy who has a cochlear implant. It contains parent's/therapist's pages to provide the user with ideas for listening activities and games to support conversations with a child.

[Why You Hear Better With Bilateral Cochlear Implants](#) is a blog post that explains hearing with bilateral cochlear implants.

[The Ling Six Sound Test Explained](#) describes what the Ling Six Sounds are and why they are important.

Additional MED-EL Rehabilitation Resources

Contact your [MED-EL representative](#) or the MED-EL Rehabilitation Department at rehabilitation@medel.com to obtain copies of any of the mentioned resources.

Listen and Play is designed for parents/caregivers to support the early interactions with their babies and toddlers with hearing loss.

LittleEARS® My Diary is designed for professionals and parents/caregivers to gather information about a child's early auditory, speech, and language development.

LittleEARS® Auditory Questionnaire is a parent questionnaire for assessing age-appropriate auditory behaviours up to 24 months of hearing age.

The First Steps: A Parent's Guide to Cochlear Implants introduces parents/caregivers to the topic of cochlear implantation and rehabilitation.

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