



MED⁹EL

FIRST STEPS

Your Guide to a Cochlear Implant System

Whether your hearing loss has been gradual or entirely unexpected, we understand that this is a challenging and emotional time for you. You may be entering unfamiliar territory with countless questions, but rest assured...there is a solution out there for you.

As your hearing declined, you may have started relying on family members to repeat things for you. And perhaps you began to isolate yourself, avoiding social situations because they made your hearing loss even more apparent. And then one day, you decided to do something about it.

It's not always easy to seek treatment beyond hearing aids. Many people put it off for a long time, continuing to use hearing aids even when they are no longer benefiting from them. The decision to receive a cochlear implant is a big one – and we know you will be wondering what to expect.

This guide has been designed to help answer your questions. First, we'll have a look at what hearing loss is and how cochlear implants work. We'll discuss the benefits of treating your hearing loss and the process of receiving an implant. Finally, we'll show you what lies ahead for you and your family – improved communication, better engagement at home and work, and a return to the experiences and sounds you've been missing.

LET'S GET STARTED.

HOW DOES HEARING WORK?

SOUND AND THE EAR

Knowing how hearing works will help you to better understand hearing loss and how cochlear implants can overcome it.

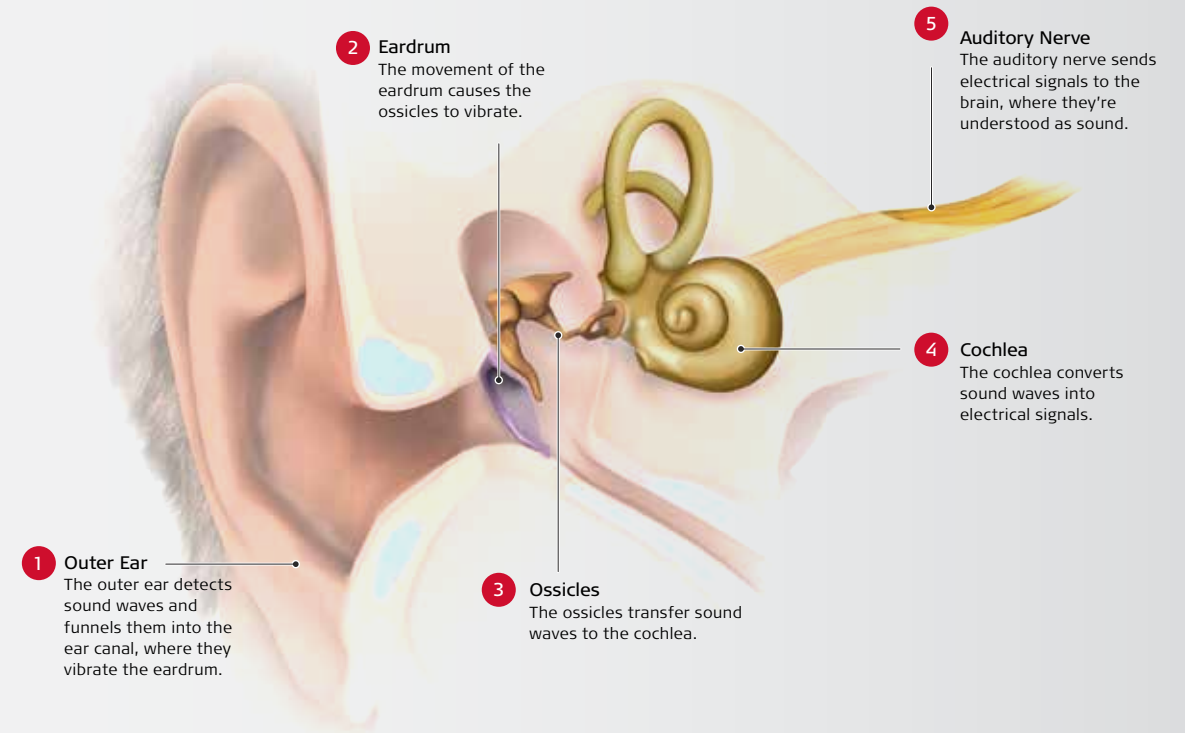
First, let's take a closer look at the ear:

The ear is made up of three parts—the outer ear, middle ear, and inner ear.

The outer ear is the part you can typically see, plus the ear canal.

The middle ear contains the smallest bones in the human body, the ossicles, which help carry sound from the outer ear to the inner ear.

The inner ear houses the cochlea, a snail-shaped, fluid-filled organ about the size of a pea. All of these parts work together to detect sound waves and change them into signals that the brain can understand as sound.



? How common is hearing loss?

Worldwide, approximately 360 million people have some type of hearing loss. Most of these people are adults, and as the world population ages, the incidence of hearing loss is rising. Among older adults, hearing loss is the most common sensory disorder and one of the most prevalent chronic conditions.^{1,2,3,4}



Want to learn more?
Check out our video
library at medel.com.

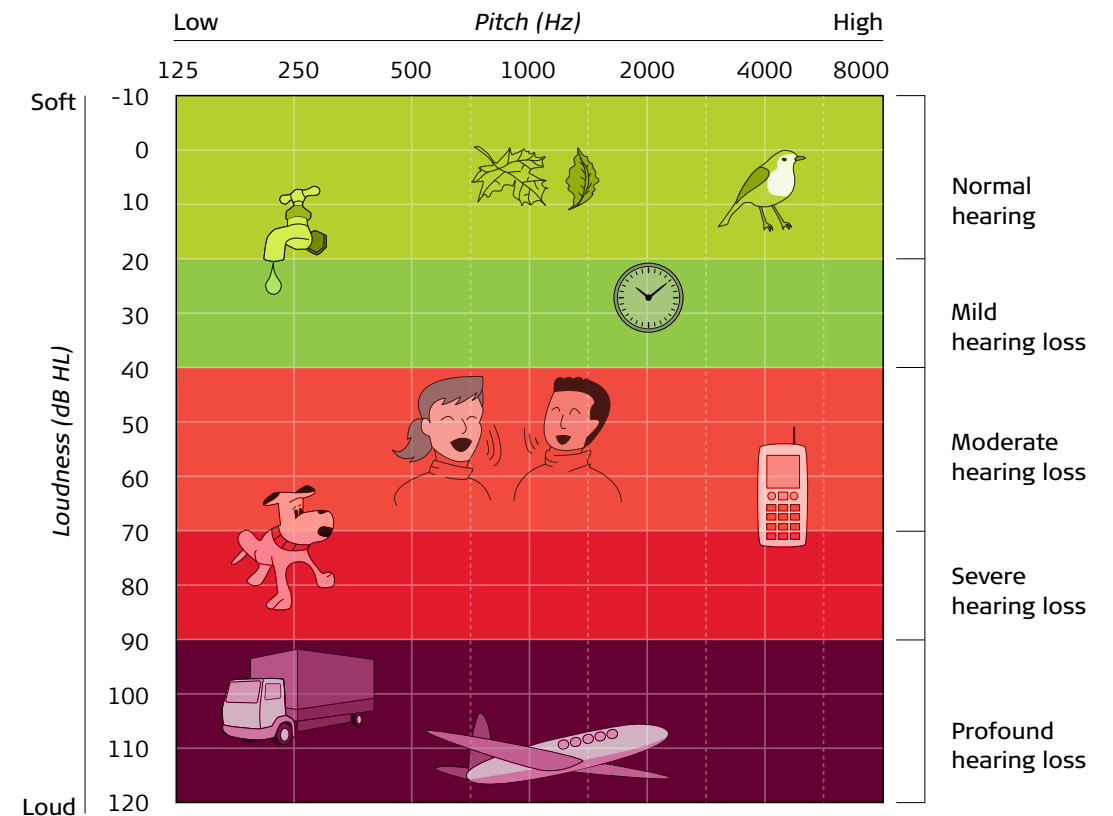
THE AUDIOGRAM

UNDERSTANDING WHAT IT MEANS

An audiogram is a graph that shows if you have a hearing loss, and if so, which type and degree of hearing loss it is. The audiologist measures the loudness level at which you can hear different sounds at different pitches. The softest sound you are able to hear is called the hearing threshold.

The loudness level of sounds, also shown as hearing level on the audiogram, is measured in decibels (dB). Frequency is measured in hertz (Hz).

Average normal hearing ranges between 0 and 20 dB HL (dB Hearing Level). If the hearing thresholds are outside this range, the result is considered to be a hearing loss. Someone with a hearing loss at 40 dB HL, for example, may not be able to hear certain speech sounds. The degree of loss is determined by the severity, e.g., mild hearing loss, moderate hearing loss, severe hearing loss, profound hearing loss. It is important to be familiar with the details of the audiogram so that you can detect any changes in hearing without delay. We recommend that you keep dated copies of these audiograms.



Average normal hearing range between 0 and 20 dB HL (dB Hearing Level).



What is SNHL and what causes it?

Sensorineural hearing loss (SNHL) is the result of damage in the inner ear. For those with SNHL, hair cells in the cochlea are either damaged or missing, or the auditory nerve is damaged. Individuals who have mild SNHL have difficulty hearing quiet sounds and find that even loud sounds seem muffled. Those with severe-to-profound SNHL aren't able to hear very loud sounds.

Causes

The most common cause of hearing loss among adults is the aging process. Other causes include genetics, exposure to loud noise, certain diseases, and medications that may be necessary and lifesaving—but harmful to the ear. Sudden hearing loss may be associated with certain infections and diseases, and it can also result from head injury. In most cases of sudden hearing loss, however, the exact cause can't be pinpointed.

Treatment

Regardless of the cause, severe-to-profound SNHL can usually be treated successfully with a **cochlear implant**. Cochlear implants have been routinely implanted since the 1980s, and they've made it possible for hundreds of thousands of people all over the world to strengthen connections to sounds, experiences, and loved ones. Over the next few pages, we'll have a look at what cochlear implants are and how they can be used to treat hearing loss.

WHAT IS A COCHLEAR IMPLANT SYSTEM?

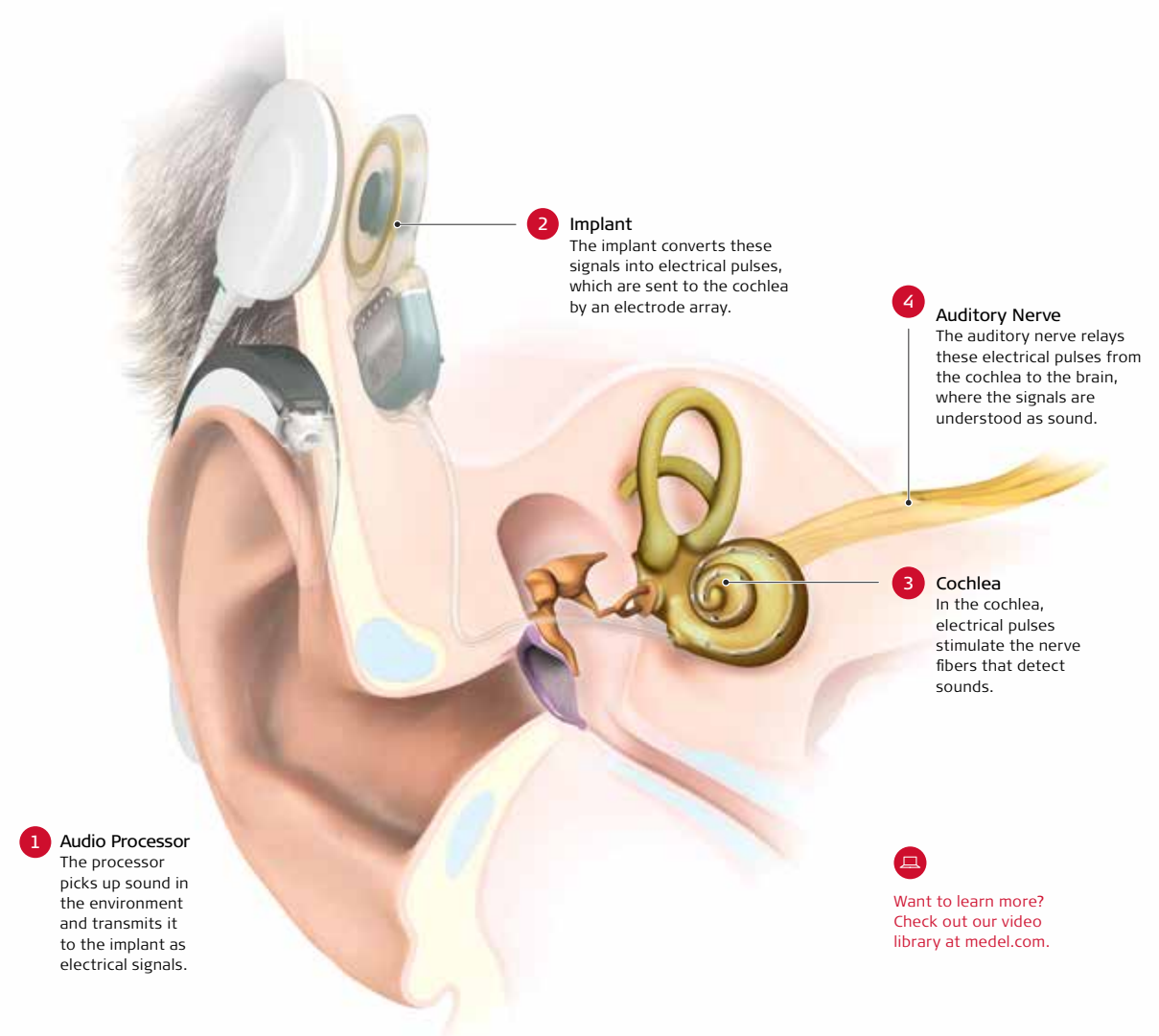
DESIGNED TO WORK JUST LIKE YOUR EARS

For some individuals with hearing loss, hearing aids don't provide enough—or any—benefit. This is often where cochlear implants come in. You might be somewhat familiar with hearing aids, but what is a cochlear implant and how does it work?

Your inner ear contains a tiny pea-sized structure called the cochlea. Delicate hair cells in the cochlea send signals to your brain, which then determines them as sound. If these hair cells are damaged, you can lose some or all of your hearing. Cochlear implants are designed to do the job of the damaged hair cells by sending electrical signals to your brain, helping to restore your ability to perceive sounds and understand speech. By bypassing the damaged part of the inner ear, a cochlear implant can help restore your ability to hear sounds and speech.

A cochlear implant system has two main components—an external audio processor and an internal cochlear implant. A MED-EL audio processor is worn either on or off the ear, depending on the model you choose. The audio processor is the part that you will handle every day and may come to think of as your “ear.”

The audio processor is connected to the implant by a magnet. The implant is placed just under the skin during a surgical procedure. After surgery, the implant won't be noticeable to you or others.



ONLY 5% OF THE PEOPLE WHO COULD BENEFIT FROM AN IMPLANT HAVE ONE⁵

Most people don't know how many options they have. They assume they haven't lost enough hearing to be a candidate for a hearing implant. They remain isolated in a world of half-missed conversations, feeling cut off from their friends and families.

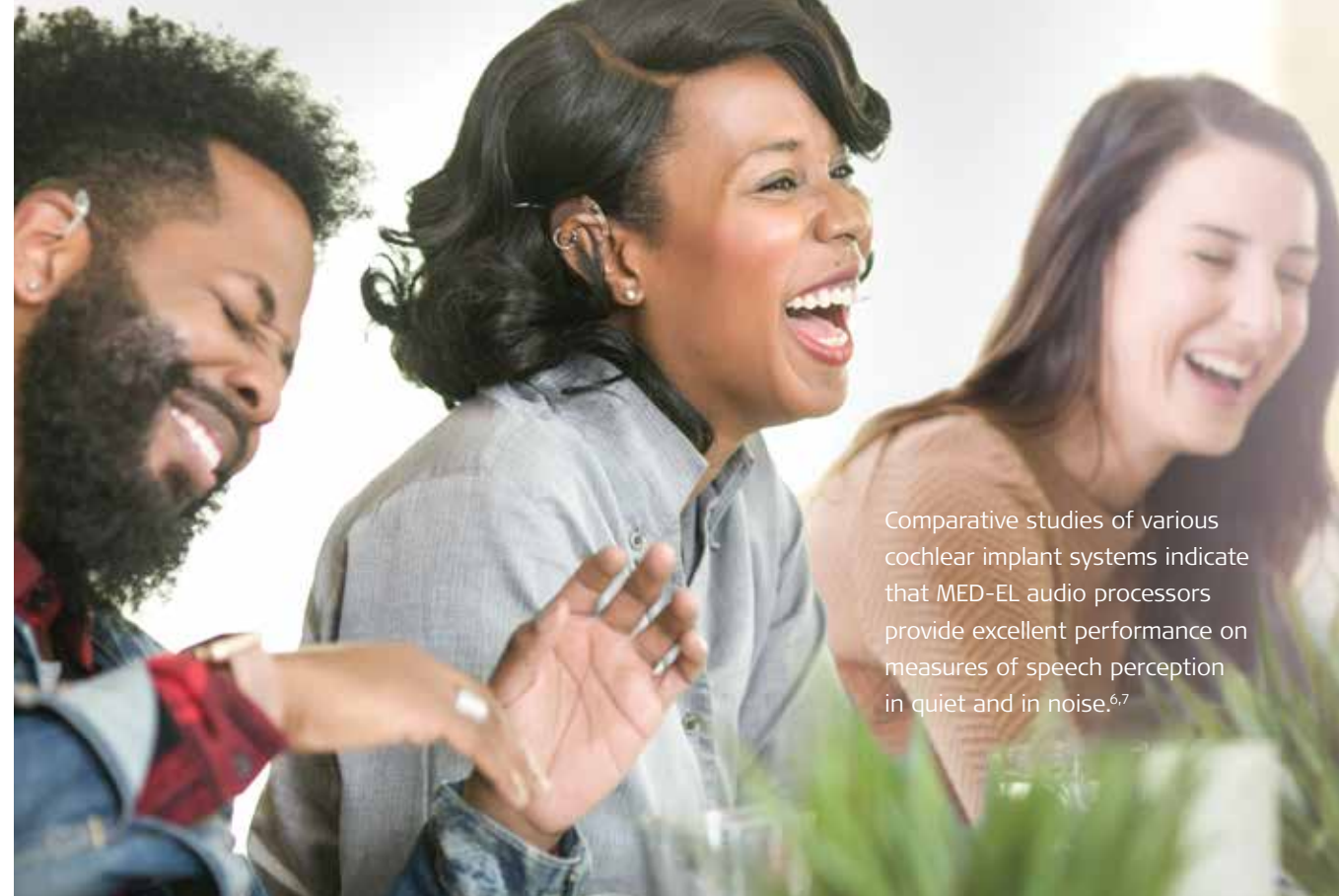
And maybe you know exactly what that's like.

MED-EL's mission is to eliminate the barrier to communication that so many people feel. We've spent the last 30 years bringing our recipients back into the world of sound, and will continue to do so in the future.

We're committed to helping you get back what you've been missing.

? What's the difference between a CI system and a hearing aid?

While a hearing aid amplifies sound, a cochlear implant directly stimulates the inner ear. Hearing aids are suitable for people with mild-to-profound hearing loss. Cochlear implants, however, can help individuals who have severe-to-profound hearing loss.



Comparative studies of various cochlear implant systems indicate that MED-EL audio processors provide excellent performance on measures of speech perception in quiet and in noise.^{6,7}



Cochlear Implants

A cochlear implant is a hearing solution that takes over the function of damaged nerve cells in the inner ear. Unlike hearing aids, cochlear implants do not amplify sounds. Instead, they process the sound signal electronically and use tiny electrical pulses to stimulate the hearing nerve in the inner ear.



Electric Acoustic Stimulation

Some individuals benefit from proper hearing aid amplification, but only in the low frequencies. This is usually referred to as partial deafness, or high-frequency hearing loss. EAS is the combination of two technologies: a cochlear implant for the high frequencies, and acoustic amplification for the low frequencies.

BENEFITS OF COCHLEAR IMPLANTS

Your cochlear implant will make it possible for you to hear your family's voices again, react to the ringing of the telephone, and hear a gust of wind as keenly as you feel it. You'll be able to take in these sounds and many more, but how else might a cochlear implant affect you?

Most noticeably, you'll gain a greater awareness of the sounds all around you. Tuning in to everyday sounds such as car horns and the voices of others can help alert you to any potential risks in your environment. Beyond these fundamental benefits, a cochlear implant will also expand your opportunities to communicate with your family, friends, and colleagues.

Adults who have received cochlear implants report that they can understand speech more easily, which usually leads to better communication.

After implantation, most recipients feel more confident and are able to get more involved in social activities. Many people experience an overall improvement in mental health.⁸



Cochlear implant use is also associated with improvements in cognition. Cognition is the process of gaining knowledge about the world through the senses and reasoning. We start developing cognitive skills from birth and practice them throughout our lives. Whether hearing loss occurs suddenly or worsens over time, it puts a strain on cognitive abilities. By doing something about your hearing loss, you can minimize this strain. If you're dedicating extra energy to deciphering what's being said around you, getting an implant may help improve your concentration, attention, and other aspects of cognition.⁹

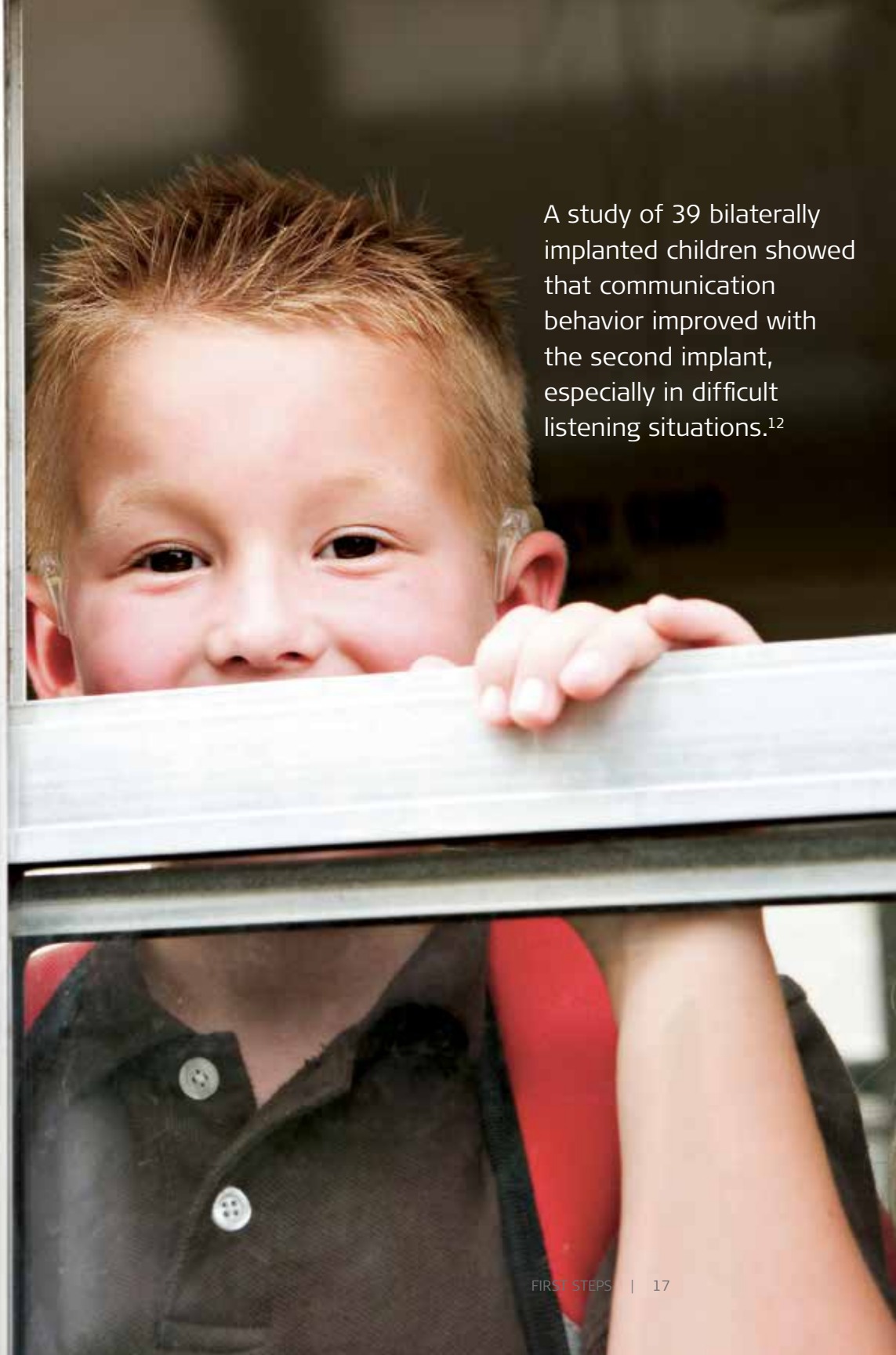
TWO EARS ARE BETTER THAN ONE

If you have hearing loss in both ears, you might be wondering how much difference a second cochlear implant would make. Research has shown that people with hearing loss on both sides who use two cochlear implants often fare better than people with only one CI.¹⁰

Bimodal hearing refers to having a hearing aid in one ear and a cochlear implant in the other. Those who use bimodal hearing receive the benefits of acoustic stimulation from the hearing aid and electric stimulation for the cochlear implant - potentially improving speech understanding and music enjoyment.¹¹

A second cochlear implant can make it possible for you to localize sound. Knowing which direction sounds are coming from, you are much more likely to develop better language skills, focus more easily on important sounds, and stay safe.¹²

Using two cochlear implants can help you concentrate on important sounds and tune out distracting background noise. For anyone, listening with two ears requires less effort than listening with one ear. Compared to adults with one cochlear implant, those with two CIs typically report that they're less tired at the end of the day. Using two CIs frees up some of your mental resources so you can focus more on conversations and less on trying to localize sounds.



A study of 39 bilaterally implanted children showed that communication behavior improved with the second implant, especially in difficult listening situations.¹²

WHAT TO EXPECT

Assessment

An assessment for a cochlear implant is usually done by an audiologist and/or ENT doctor, who checks the type and degree of your hearing loss. As soon as it's determined that you're a candidate for a CI, you'll be referred for implantation.

Implantation

Cochlear implant surgery typically lasts from 1–3 hours and is performed under general anaesthesia. You'll probably be able to return to your everyday routine a few days after surgery. Your hospital stay could last from one to several days, depending on local practice and your individual needs.

First Fitting

About four weeks after implantation, you will receive the audio processor during a session called an initial activation session. During this session, an audiologist will program and activate the audio processor. Activation day is often an emotional one for you and your family. Keep in mind that learning to hear with a CI is a process; sounds will become clearer and more understandable over time as you progress through rehabilitation.

? Is surgery safe?

Cochlear implant surgery is straightforward and safe. The risks are minimal, and no greater than those associated with other ear surgeries. Research has consistently shown that cochlear implantation is beneficial and safe for older adults. Your overall health is a much more important factor than your age for a successful surgery. Talk to your doctor about any considerations that might affect your candidacy for a CI.^{3,13}



Rehabilitation

During rehabilitation, you'll work with an audiologist and speech-language pathologist on improving your listening skills. Participating in rehabilitation is essential to your success with a CI. Over the next few pages, we'll take a look at rehabilitation and discuss how it can contribute to your progress.

LIFE WITH AN IMPLANT

STEPS TOWARD SUCCESS

How Important is Rehabilitation?

Rehabilitation is the process of training the brain to understand sound with a cochlear implant. Think of your cochlear implant as an instrument for accessing sound. As with any instrument, learning how to use it will take motivation and practice. While participating in rehabilitation, you'll learn effective strategies for practicing your listening, and you'll be given guidance on how to apply goals from therapy sessions to your daily life.

Your audiologist and speech-language pathologist will play important roles in guiding your auditory rehab. They'll design your rehabilitation program and help guide you through it. Once you become accustomed to your CI, you'll spend less time with your therapist and more time practicing at home. To gain the most benefit from your cochlear implant, start participating in rehabilitation as soon as your audio processor is activated.

Be Proactive

Don't underestimate the role you can play in your own rehabilitation. Make decisions about your therapy. Participate actively in sessions and ask questions. Practice whenever you can. Research has shown that if you do all of these things, you're more likely to be satisfied with your cochlear implant. And finally, get your family involved. If the people you're closest to are supportive, your chances of successful rehabilitation are even greater.¹³



You can expect therapy goals to fall into one or more of the following four skill areas:

- **Auditory:** From your first fitting, you'll practice improving your awareness, interpretation and understanding of specific sounds.
- **Speech:** Once you've trained your brain to understand sounds with a CI, the focus of these therapy sessions will shift towards the improvement of speech skills.
- **Communication management:** If your hearing loss has worsened over time, you've probably developed strategies for coping with hearing loss. As part of rehabilitation, you'll learn proven techniques for communicating effectively and overcoming lingering obstacles.
- **Practical and technical:** On activation day, you'll receive basic information about how to operate your audio processor. In later sessions, you'll learn how to access additional features for an improved listening experience.



Fine-Tuning Your Appreciation of Music

No matter how important music is in your life, there's no doubt listening to it is part of a greater social experience. People who have experienced substantial hearing loss often say they feel isolated in environments where everyone else is enjoying music. The good news for people with cochlear implants is that there are specific steps you can take to help you reconnect to the joys of music.

Advances in implant technology continue to help. Today, MED-EL makes the only cochlear implant with FineHearing¹ for better music appreciation and hearing in noisy environments. Our technology provides greater accuracy than ever before, so it allows listeners to detect smaller differences in pitch and perceive a wider range of tones.

Individual differences can cause one person's perception of music to differ greatly from what someone else experiences, even if they both have similar devices. Cochlear implant recipients find a number of factors contribute to their ability to enjoy music:

- **Anatomy:** Having healthier nerve cells and residual hearing may help some CI recipients distinguish the signals of music better than others. Another factor is whether your surgeon was able to achieve full insertion of the electrode, or if your unique anatomy dictated a shorter insertion. Your length of time being deaf, cause of hearing loss, and variations in your cochlear anatomy can also contribute.
- **Musical Characteristics:** The rhythm and beat of a piece of music also make a difference. Rock, hip hop and other music with a heavy beat may be a good starting point. You can practice your way to hearing more complex music like symphonies.
- **Environment and Expectations:** You already know that speech perception is easier in listening environments free from other sounds and complicating factors. The same is true when you're listening to music. Setting reasonable expectations for enhancing your music listening experience is also important for getting from where you are to where you want to be.

Get in the Game

You might be wondering how your CI will affect your ability to participate in sports or other physical activities. Whether you want to play tennis, run in a marathon, or climb a mountain, don't worry, having a CI should not stop you. Just take a few simple precautions and always protect your head, especially when doing activities that typically require a helmet.

Jump In, the Water's Fine

MED-EL offers accessories for our audio processors that can help you take part in sports and outdoor activities. Waterproof audio processor covers can be used in fresh, salt, and chlorinated water so you can hear friends, your family and even a lifeguard's whistle wherever you swim.

WaterWear for
MED-EL Audio Processors





Boost Your Listening

If you've been wearing hearing aids, you may already use assistive listening devices (ALDs) to hear better in certain situations. Assistive listening devices also work well with cochlear implant audio processors.

ALDs are devices that enable you to connect your audio processor, either wirelessly or with a cable, to nearly any external sound source. They help you tune out distracting background noise so you can focus more easily on the sounds you want to hear—music, a movie, or the voice of a telephone caller. ALDs provide clear sound input, even from across a room.

These devices are particularly useful in noisy or large spaces where anyone might strain to hear, such as bustling restaurants, crowded conference halls, and cinemas. Many ALD products are available for personal use, as well as in public places and venues, which often have hearing assistive technology in place. Look for the telecoil symbol, which is typically blue and depicts an ear with the letter 'T.' This symbol signifies that ALD technology is available. If you're not sure, just ask.

Connectivity. Simplified.

Use the phone you like, and connect it to the audio processor you love. **AudioLink** is an easy-to-use connectivity device that allows you to stream sound from phones, tablets, TVs and much more. In fact, AudioLink can be connected to anything that has Bluetooth or a headphone jack, including that old record player in the attic!

- EXPERIENCE hands-free phone calls
- STREAM wirelessly to your audio processors
- LISTEN with the remote mic in noisy environments

One-touch Bluetooth instantly connects you to your phone or tablet

Various mixing modes for listening in a variety of environments

Easy to access volume controls



Remote microphone for listening in large rooms, noisy situations or meetings

A variety of Phonak Roger™ transmitters and receivers are compatible with MED-EL audio processors.



Roger 21 sleeve for SONNET

Roger Pen

Roger Select

Roger MyLink telecoil neckloop



When Hearing Loss is Sudden

Unlike age-related hearing loss, sudden sensorineural hearing loss (SSHL) is not very common. Sudden hearing loss starts without any prior signs of trouble. It can occur at any age, but it often arises in late middle age.

Individuals with this type of hearing loss may have difficulty hearing high-frequency sounds only, low-frequency sounds only or all frequencies. SSHL almost always affects only one ear.

Aging and Hearing Loss

Changes in hearing are a natural part of getting older. Our hearing starts to decline as early as age 18, but for most of us, this shift is so gradual we don't notice it until a few decades later. Hearing loss that gets worse over time and occurs as part of the aging process is called presbycusis. This type of hearing loss usually affects both ears.

As we approach our 70s and 80s, it can become increasingly difficult for our ears to detect and make sense of the sound that's coming in. One of the most immediate effects is that understanding speech in noisy environments becomes more difficult. Even in relatively quiet places, you might find that you can hear speech—but not understand it. The source of sounds, from voices to footsteps, may be less easily identifiable. It's especially hard to make out speech that's fast or distorted by echoes in a room.

Age-related hearing loss can't be reversed, but it can be successfully treated with cochlear implants. Cochlear implants can help you manage the challenges associated with hearing loss.



QUESTIONS YOU MAY HAVE

How well will I do with a cochlear implant?

Many of our recipients do very well with implants. They're able to return to work, integrate more fully into their social circles, and enjoy music. Your success with a CI depends on several factors, such as the degree of your hearing loss and the amount of time that passes between the onset of hearing loss and your implantation. You'll be in control of other aspects, such as your expectations and motivation, your participation in rehabilitation, and the number of hours you spend using your audio processor each day.

Does a cochlear implant further damage the inner ear?

At MED-EL, we believe it is vitally important to preserve the delicate cochlear anatomy for the future, while still providing the best possible performance now. Our deep electrode design uses the entire cochlea to better represent hearing the way nature intended and is the softest and most flexible. We want to do everything we can to ensure your ability to take advantage of future technologies that haven't even been dreamed of yet.

Do CIs interfere with MRIs?

It is likely that most people will receive an MRI in their lifetime, so choosing a cochlear implant that enables high-resolution MRI scans gives you access to advanced medical technology. The SYNCHRONY cochlear implant is approved for high resolution MRI's without removing the magnet, allowing patients to receive emergency MRI's safely without the need for additional surgery.

Am I too old to get a cochlear implant?

As long as there are no medical contraindications, there is no age limit for cochlear implantation for adults. Older recipients have been shown to gain a substantial benefit from cochlear implants in terms of quality of life, as demonstrated by health status, success in the common activities of daily living and perceived satisfaction after cochlear implantation.¹⁴

How complicated is the cochlear implant sound processor to use?

With some cochlear implant systems, you can customize your listening to suit your environment or lifestyle. Most devices will enable you to quickly and easily change settings to suit your current needs. You will find MED-EL technology the easiest to use – from the simplest remote control, to wireless rechargeability, to automatic sound features. *Just put it on and go!*

Will I be able to listen to music?

With MED-EL's FineHearing technology, music and listening perception is closer than ever to natural hearing. In fact, 82% of MED-EL recipients reported listening to music every week if not every day. 91% of MED-EL users surveyed said that music was pleasant with cochlear implants. In addition, the majority of these users reported that the appreciation of music, both familiar and unfamiliar was improved, even after using their processor for only three months!¹⁵

Will I be able to hear on the phone?

Many people can hear on the phone with time and practice. Your therapist may be able to design a rehabilitation program that focuses on improving your ability to talk on the phone. A variety of wireless features are available that can optimize your hearing in challenging environments – digital wireless systems, Bluetooth accessories, and telecoil options.

Will insurance cover the cost?

Unlike traditional hearing aids, a cochlear implant is covered by most insurance companies and plans – including Medicare and Medicaid – and provincial health care programs in Canada. Our region-specific team of Reimbursement Specialists are trained to assist candidates, recipients and clinics to ensure they are getting the best possible coverage.

As a family-owned company, we're doing everything we can to improve quality of life for people with hearing loss, now and in the future. With an unwavering focus on research and development, we provide cochlear implant systems that are designed for reliability and lifelong hearing quality.

Since our founding more than 25 years ago by engineers Ingeborg and Erwin Hochmair, MED-EL has been pioneering innovation in the field of cochlear implants. We're dedicated to supporting you and your family as you make the transformative decision to get a cochlear implant.

We encourage you to contact us with any questions that arise during your hearing journey.



WE'RE HEAR FOR YOU.

Rehabilitation Products and Services

MED-EL's BRIDGE to Better Communication program was developed to help educators, rehabilitation professionals, implant users and parents BRIDGE the gap between implantation and the rapid development of improved listening and spoken communication skills. The program consists of a variety of products, resources and materials for adult and pediatric habilitation, assessment, and device management.



www.medel-bridge.com

A Network of Support

HearPeers is an online community of MED-EL hearing technology users, family members and professionals who actively support one another throughout the journey to optimal hearing.

www.hearpeers.com



GLOSSARY

Anatomy of the Ear

Auditory Nerve - The nerve that sends impulses from the inner ear to the brain.

Cochlea - The hearing organ in the inner ear.

Ear Canal - The passageway between the outer ear and the eardrum.

Eardrum - A thin layer of tissue between the outer and middle ear; also known as the tympanic membrane.

Hair Cells - Cells in the inner ear that change sound waves into nerve impulses.

Inner Ear - The part of the ear made up of the cochlea and the balance system.

Middle Ear - The part of the ear that includes the ossicles and the eardrum.

Ossicles - The three tiny bones in the middle ear—the malleus, incus, and stapes.

Outer Ear - The part of the ear that is normally visible; known as the pinna. It collects sound waves and directs them through the ear canal.

Audiology

Acquired Hearing Loss - Hearing loss that develops after birth.

Audiogram - A graph that represents the results of a hearing test.

Audiologist - A healthcare professional who treats people with a hearing loss or ear disorder.

Audiology - The science of hearing which is concerned with the diagnosis and rehabilitation of auditory and communication disorders.

Audiometry - A series of tests given by an audiologist that assesses hearing and middle ear function.

Auditory - Of or related to hearing.

Auditory Brainstem Response (ABR) - A test that checks the functioning of auditory pathways by measuring the brain's response to sounds.

Binaural Hearing - Hearing with both ears.

Bilateral Implantation - Having two hearing implants, one in each ear.

Congenital Hearing Loss - Hearing loss that's present from birth.

Decibel (dB) - A unit used to measure the intensity of a sound.

ENT - The branch of medicine that concerns the ear, nose, and throat.

Frequency - The pitch of a sound; measured in hertz (Hz).

Hearing Threshold - The softest sound that can be heard at any given frequency; indicates the degree of hearing loss.

Otology - The branch of medicine that concerns the ear and conditions of the ear.

Otologist - A physician who specialises in the treatment of ear conditions.

Prelingual Hearing Loss - Hearing loss that's present at birth or that occurs in early childhood before a child learns language.

Postlingual Hearing Loss - Hearing loss that occurs after a person learns language.

Rehabilitation - Specialized, post-implantation training for the development of listening, speaking, and other communication skills; sometimes referred to as habilitation.

Residual Hearing - Hearing that is measurable, usable, and present in varying degrees.

Sound Intensity - Relates to the intensity of a sound; measured in decibels (dB).

Sound Localization - The act of identifying where a sound is coming from.

Speech Frequencies - The range of frequencies most important for hearing and understanding speech, from 500 to 6000 Hz.

Vestibular System - A system in the inner ear that informs your sense of balance.

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