



Cochlear implant: electrical stimulation of the auditory nerve

P a t i e n t i n f o r m a t i o n

INTRODUCTION	3
HOW DOES A COCHLEAR IMPLANT WORK?	4
WHO QUALIFIES FOR REIMBURSEMENT OF A COCHLEAR IMPLANT?	5
PRELIMINARY EXAMINATIONS	6
THE SURGERY	7
YOUR STAY IN HOSPITAL	7
Day of the surgery	
The day after the surgery	
REHABILITATION AND AFTERCARE	12
Fitting: technical adjustment	
Auditory training and speech therapy	
INTRODUCTION OF THE TEAM	15
MORE INFORMATION	17
CONTACT DATA	17
PATIENTS AND THEIR FAMILIES AS HANDS ON EXPERTS	18

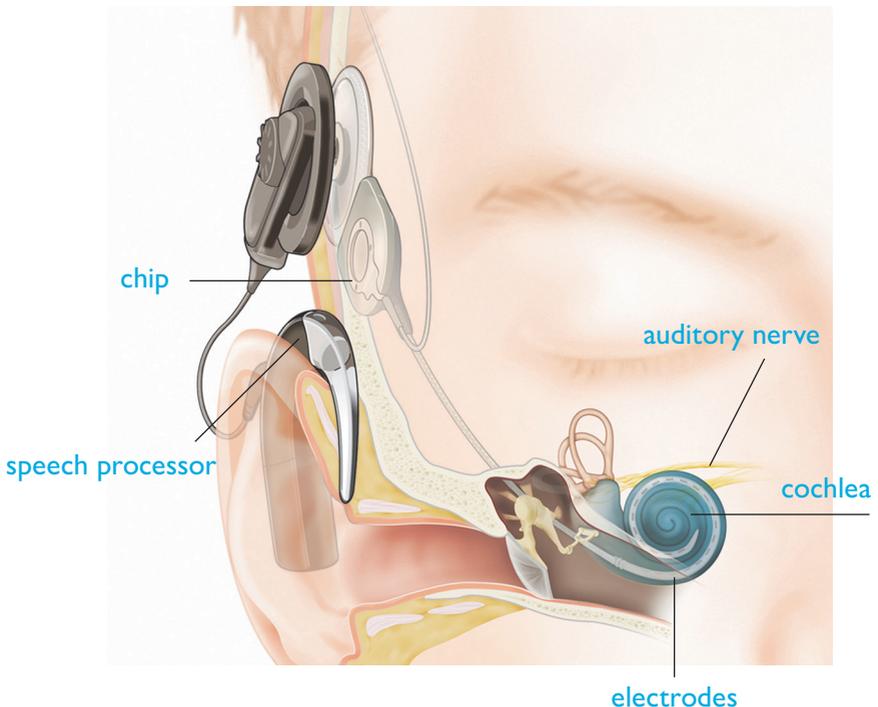
This brochure provides more detailed information on treatment involving a cochlear implant (CI) at UZ Leuven. You can take your time to read the information about examinations, the actual treatment and aftercare involved in this procedure. Prior to the intervention, we will also arrange consultations with the surgeon, audiologist, speech therapist, social worker and psychologist, who will provide you with further information.

At the end of this brochure we have included a list of the members of the multidisciplinary team that will be in charge of your treatment and rehabilitation. Please do not hesitate to contact them should you have further questions.

HOW DOES A COCHLEAR IMPLANT WORK?

In people with normal hearing sound travels via the ear canal and middle ear to the cochlea, where sensory cells (hair cells) transmit electrical signals to the auditory nerve and brain.

When the hair cells in the cochlea are not functional well or damaged, a cochlear implant (CI) can be used to stimulate the auditory nerve directly via electrical stimulation. The term 'cochlear implant' is derived from the name 'cochlea'. Unlike hearing aids, which amplify sound, a cochlear implant bypasses not-working portions of the ear to deliver sound signals to the hearing (auditory) nerve.



A cochlear implant is made up of an internal and an external component. The two are linked by magnets. The microphone in the external element captures sound from the environment and transmits it to the speech processor, where the sound is analysed and processed into a code, which is sent from the external to the internal component. The internal chip determines which electrodes in the cochlea should be stimulated. These electrical impulses stimulate the auditory nerve, which transmits the signal to the brain where it is recognised as sound.

WHO QUALIFIES FOR REIMBURSEMENT OF A COCHLEAR IMPLANT?

- ✓ Children and adults with severe hearing loss in both ears, who do not gain satisfactory benefits from the use of a traditional hearing aid.
- ✓ Hearing loss must be at least 70 dBHL (decibels hearing level).
- ✓ Because the electrical signals are transmitted directly to the auditory nerve, the latter must be intact and receptive to stimulation.
- ✓ Children below the age of 18 may qualify for a cochlear implant in both ears.
- ✓ Children below the age of 18 with asymmetric hearing loss (best ear minimum 60 dBHL and worst affected ear minimum 70 dBHL) may qualify for a cochlear implant in the worst affected ear.
- ✓ In selected cases a CI for unilateral hearing loss can be reimbursed also in adults and in children.

PRELIMINARY EXAMINATIONS

Prior to the operation we will schedule one or two half days for consultations with the surgeon, audiologist, speech therapist, social worker and psychologist.

You will receive extensive information about the functioning of a cochlear implant, the actual surgery and subsequent rehabilitation. The results of hearing tests with and without hearing aids will be discussed and you and your companions will have the opportunity to ask questions.

The consultations with the social worker and psychologist are intended to outline the expectations, general learning ability, social and school situation and current support. This will make it easier to assess the rehabilitation process following the operation. Information will also be provided about potential rights and obligations, e.g. with respect to VAPH (Vlaams Agentschap voor Personen met een Handicap - Flemish Agency for the Disabled), FOD (Federal Public Service), Social Security, care subsidies, homecare, employment situation support, etc.

The examinations will also include a scan of the cochlea, a MRI and if needed a CT scan of the temporal bone, a balance test and a consultation with the anaesthetist. The examination of the vestibular organ is important because it is connected to the cochlea. In exceptional cases an electrical stimulation test will have to be performed to establish whether the auditory nerve is functioning properly. In young children who are profoundly deaf, we try to implant as early as possible, from an age of 7 months onwards.

All details will be discussed in the multidisciplinary CI team. Together with you a surgical date is planned subsequently. If you or your child comply with the reimbursement criteria, no prior approval by the Riziv (National Institute for Health and Disability Insurance) is mandatory.

THE SURGERY

During the procedure, the surgeon will insert the internal component of the implant under general anaesthesia and will then test it to ensure that it is working properly. The insertion of the electrode array is performed according to the latest technological advances. Our surgeons are trained in high precision medicine with gentle care for structure preservation.

In most cases, the surgery takes about two to three hours, in some cases up to four hours, depending on the anatomy. Most patients will be admitted on the day of surgery and leave the day after. Some patients may require hospitalisation the day before surgery. They will be discharged the day after surgery as well. Up till now, young children are hospitalized the evening before as well.

YOUR STAY IN HOSPITAL

THE DAY OF THE SURGERY

Preparations

- You will be contacted about the time of admission at the latest one day before surgery. You will be contacted on Friday should your surgery be scheduled for Monday.
- If you are admitted on the day of surgery you may present yourself at Dagziekenhuis 4, which is located on the Oranje straat (Orange street), poort 7 (gate 7), level -1 (OR 7.-1.c). You are advised to park at "Parking Oost". After the necessary registrations you will receive an identification wristband showing your surname, first name and date of birth. You will be asked for this data repeatedly during your stay in hospital.

- If you come on the day of the surgery, you need to fast. Check the preoperative orders regarding medication. There is no need to fast if you come the day **before**.
- Empty stomach

You must have an empty stomach for a procedure under general or partial anaesthesia.

- For adults, this means:
 - No eating or drinking from midnight (00:00) before the procedure.
 - No smoking from midnight (00:00) before the procedure.
- For children, specific guidelines apply:
 - No eating from midnight (00:00) before the procedure.
 - Drinking milk is allowed up to 6 hours before admission.
 - Breastfeeding is allowed up to 4 hours before admission.
 - Drinking water, sugar water and clear apple juice is allowed up to 2 hours before admission.
- You will be called up for preparation. Once installed the nurse will:
 - check your temperature and run through the operation checklist with you.
 - check that you are not wearing any jewelry, piercings, nail polish or dentures.
 - ask you to remove your contact lenses should you have any. You may keep wearing your glasses. These will be stored in a cardboard box later.
 - allow you to keep wearing your hearing aid or cochlear implant until you get to the operating theatre to ensure that communications run smoothly. They will also be stored in the same cardboard box that will be fixed to your bed.
- You will be given a hospital gown with back closure.
- You will need to wear an identification armband showing your surname, first name and date of birth. You will be asked for this data repeatedly during your stay in hospital.
- You will be brought to the operating theatre once it is time for the final preparations.

- You will notice that it will be slightly cooler in the corridor and the operating theatre preparation area.
- The surgeon or trainee will confirm the side of surgery by drawing an arrow in the neck.
- The nurse will check a few more details in the preparation area for security reasons:
 - Your name and date of birth
 - Address
 - The type of operation you are about to undergo
 - Whether you have fasted (not eaten or drunk anything or smoked)
 - Allergies (to medication or other substances)
 - Correct location of the arrow on your skin for the planned procedure
 - To ensure that dentures, contact lenses and jewellery have been removed.
 - A drip will then be inserted into your arm.
In some cases this will be done in the operating theatre.
- The nurse in the operating theatre will also ask a few questions (similar to those in the preparation area). You will then be taken into the operating theatre, where everyone will be wearing green surgical clothing, a green cap and a face mask for hygiene reasons.

For children



- You can find more information for children and their parents online: www.uzleuven.be/kinderziekenhuis/operaties-het-kinderziekenhuis (in Dutch).
- Verification that the 'General anaesthetic' consent form signed by the parent(s) is present.
- One companion can accompany the child to the operating theatre (they will need to wear an apron and hairnet, which will be provided in the preparation area).
- If agreed during the anaesthesia consultation, a Rapydan[®] plaster may be applied to the child's hand to administer a local anaesthetic.

In the operating theatre

Preparations/making you comfortable

- You will be taken into the operating theatre and your bed will be put alongside the operating table. Your identification armband will be scanned and you will be transferred to the operating table. Your bed will then be removed from the operating theatre.
- You will be asked to place your head on the pillow and your arms alongside your body. You will be covered with a blanket.
- Any necessary monitoring devices will then be attached to your body:
 - Five ECG electrodes to monitor your heart during the operation.
 - A blood pressure gauge around your arm.
 - A saturation monitor on your finger (to measure your blood oxygen level).
- If you have not yet been fitted with a drip, the anaesthetist will insert one now (they will monitor the anaesthesia during the procedure).
- If you have any questions for the anaesthetist, you can ask them any time.
- You can wear the hearing aid or cochlear implant until you go to sleep. The nurse will then store it safely in a box attached to your bed to ensure that you can wear it again in the recovery room after the operation.

For children



- Once you've climbed onto the operating table, your mummy or daddy will come and stand, or sit, alongside you. You can bring your favourite soft toy with you.
- A few stickers will be applied to your body and a clip with a little light will be attached to your finger, but you won't feel anything. (The extent of any monitoring will be decided by the anaesthetist in each individual case and will be tailored to the age of the child.)

Initiating the anaesthesia

- The anaesthetist will initiate the anaesthesia process. An oxygen mask will be placed over your mouth but you can continue to quietly breathe in and out.
- You will also be given a painkiller via the drip. This might make you feel a little dizzy.
- The anaesthesia will then be administered to put you to sleep. This might generate a warm feeling where the drip is inserted.
- The anaesthetist will look after you throughout the operation. At the end of the procedure you will be woken up and taken back to the waiting area.

For children



- Young children are put to sleep using a mask with sleeping gas following which the anaesthetic will be administered via a drip. Older children (sometimes from the age of eight) can also be put to sleep with medication via a drip.
- Mummy or daddy can stay with the child until they are 'asleep'.
- The companion will then be accompanied back to the operating theatre preparation area by a member of the team.

Recovery room

After the operation you will have to stay in the recovery room for a few hours. Once your condition is stable and you have properly woken up, you can return to your room.

For children



- One companion can stay with the child in the recovery room. The nurse in the recovery room will contact the unit or, if you are in the waiting area, will contact you there.

THE DAY AFTER THE SURGERY

You will often stay for one more night in the hospital, unless otherwise communicated in advance. The day after the surgery, the medical trainee or the surgeon will check the ear bandage and might renew this. Often the bandage is kept for 48-72h. Often, the day of the surgery or the next day, a high resolution CT scan is performed for verification purposes. After this, the doctors will discharge you from the hospital (in adults, often at around 11h).

In adults, some imbalance, some tinnitus, pain or headache has been reported and is regarded as normal postoperative. A limited amount of swelling of the eye or neck (at the side of the surgery) might occur, somewhat looking like a mild bruise.

If the swelling would increase, you should contact the ear-nose-throat (ENT) emergency department. Also if fever or general sickness and vomiting occurs, you should contact us.

REHABILITATION AND AFTERCARE

One week after the surgery, the stichtes will be removed at the consultation of ENT. After the surgery, it takes two weeks for the wound to heal properly. Thereafter, the external component will be adjusted for the first time and rehabilitation can then commence at the Multidisciplinair Universitair Centrum voor Logopedie en Audiologie (MUCLA - Multidisciplinary University Centre for Speech Therapy and Audiology) at UZ Leuven.

Rehabilitation will consist of:

- ✓ Technical adjustment (fitting) of the speech processor using a computer
- ✓ Auditory training and speech therapy

FITTING: TECHNICAL ADJUSTMENT

Two to three weeks after the operation we will start the fitting or technical adjustment of the speech processor. There will be two fittings during the first week and one fitting per week during the following two weeks.



Fitting takes into account any results and progress made from auditory training and speech therapy.

Thereafter, and depending on what is required, fittings will initially be held fortnightly but then monthly, every two months, every 6 months and annually. A fitting takes approximately 45 minutes. All children and adults are monitored for life. Control fittings will be performed at least once every two years.

AUDITORY TRAINING AND SPEECH THERAPY

Auditory training and speech therapy are required because sound perception is quite different with a cochlear implant. Although the implant bridges the functioning of the damaged hair cells, it can never match normal hearing.



Thanks to the brain's flexibility and enormous learning potential many children can learn to speak with a cochlear implant, and many adults and children can learn to understand speech.

However, the results of a cochlear implant vary significantly from person to person. Factors that play a part in this process include the duration of the hearing aid adjustment prior to the cochlear implant, the extent of residual hearing, the number of still functioning auditory nerve fibres, learning ability, possible limitations in addition to hearing loss, the time, duration and cause of the deafness.

Initially most children and adults can hardly understand anything with a cochlear implant. However, auditory training, speech therapy, fitting and frequent use of the cochlear implant can gradually improve the understanding of speech and speech itself. This usually requires a lot of patience. The duration of deafness plays a role in the speed of rehabilitation. Listening to music, understanding from a distance and in a noisy environment might remain more difficult or even problematic.

For unilateral hearing loss CI cases a dedicated rehabilitation scheme is provided. A lot of training is done directly with streaming on the implant. Auditory training and speech therapy for children and for adults living some distance away usually takes place at another specialist centre. Fittings always take place at UZ Leuven, in the Multidisciplinair Universitair Centrum van Logopedie en Audiologie (MUCLA - Multidisciplinary University Centre for Speech Therapy and Audiology).

INTRODUCTION OF THE TEAM

At UZ Leuven you will be supported by a multidisciplinary team during the operation and rehabilitation.

- [prof. dr. Nicolas Verhaert](#), surgery and medical follow-up consultant ear, nose and throat diseases, facial and neck surgery
- [dr. Elke Loos](#), surgery and medical follow-up consultant ear, nose and throat diseases, facial and neck surgery
- [dr. Steven Mes](#), surgery and medical follow-up consultant ear, nose and throat diseases, facial and neck surgery

- [prof. emeritus dr. Christian Desloovere \(consultant\)](#),
surgery and medical follow-up
consultant ear, nose and throat diseases, facial and neck surgery
- [prof. dr. Jan Wouters](#), physicist
head of ExpORL research laboratory,
KU Leuven neurosciences department
- [prof. dr. ir. Tom Francart](#), chartered engineer
ExpORL research laboratory,
KU Leuven neurosciences department
- [Ann Dierckx](#), speech therapist and audiologist
coordination, fitting and auditory training
- [Ellen Boon](#), speech therapist and audiologist
fitting and auditory training
- [dr. Lieselot Van Deun](#), speech therapist and audiologist
fitting and auditory training
- [Ellen Vermaete](#), speech therapist and audiologist
fitting and auditory training
- [Yasmine Antonis](#), psychologist
psychological follow-up
- [Liesbeth Vansantvoet](#), social worker
social follow-up
- [Ines Vanderhoeven](#), secretary
administrative support
- [An Didden](#), secretary
administrative support
- [dr. Sam Denys](#), clinical support manager

MORE INFORMATION

You can find more information on our website www.uzleuven.be/ci. Here, we also announce our information moments. At least once a year we organise an information moment to explain the procedure and answer all your questions live.

The information event of 2022, which was recorded with subtitles and sign language interpreting, can be watched on the website. If you have any questions, you can already contact the CI team via e-mail: CI@uzleuven.be.

CONTACT DATA

UZ Leuven Gasthuisberg campus
Otorhinolaryngology, head and neck surgery Unit
F.a.o. Ines Vanderhoeven
Herestraat 49, 3000 Leuven

The CI consultation unit can be accessed via Oranje straat, poort (gate) 2, 2nd floor.

tel. 016 33 23 34
e-mail CI@uzleuven.be
www.uzleuven.be/CI

PATIENTS AND THEIR FAMILIES AS 'HANDS ON EXPERTS'

Would you like to meet someone who went through a similar experience and would understand your situation? Are you looking for practical tips? Or would you like to talk about what is affecting you? If so, why not consult our hands on experts!

WHAT CAN A HANDS ON EXPERT DO FOR YOU?

Benefits of talking to a fellow patient

Talking to someone who had a similar experience, to find recognition and understanding, and exchange experiences can help. This kind of contact will provide you with a unique experience.

Support

Hands on experts can tell you how they manage hearing problems as a patient or as a family member. They can give you tips, suggestions and practical information and you can learn from their experiences.

How do they manage it in their everyday lives? Which tools do they use at school or at work?

A positive conversation in private

You can talk openly to a hands on expert, possibly even discuss topics you would rather not talk about with your care providers. The meeting will be confidential. Similar to care providers, hands on experts are obliged to maintain discretion and professional confidentiality.

How does hands on expertise complement professional knowledge?

Hands on experts complement the professional knowledge of care providers by sharing their personal experiences with a cochlear implant. Their contacts with patients and their family members can provide ideas for potential care improvements. Hands on experts can report any issues and suggest potential improvements to care providers.

How can you contact a hands on expert?

You can contact them by email in two ways:

- either by contacting a hands on expert directly via the general email address ervaringsdeskundigenCI@outlook.be.
- or by asking your care provider to put you in touch with a hands on expert.

In both cases you can indicate whom you would like to talk to. You can then mutually decide when and how to organise a meeting.

© december 2024 UZ Leuven

Duplication of this text and these illustrations shall always be subject to prior approval from the UZ Leuven Communications Department.

Design and Production

This text was composed by the CI team of the otorhinolaryngology, head and neck surgery unit, in conjunction with the Communications Department.

This brochure is also available at www.uzleuven.be/en/brochure/700419.

Comments or suggestions pertaining to this brochure can be submitted via communicatie@uzleuven.be.

Editor-in-chief
UZ Leuven
Herestraat 49
3000 Leuven
tel. 016 33 22 11
www.uzleuven.be

 mynexuzhealth



Consult your medical dossier
via nexuzhealth.com
or download the app

