

MAKING CONNECTIONS

**COCHLEAR IMPLANTS:
PATIENT FAQs**



This booklet aims to answer some of your questions about cochlear implants. Write down any additional questions you have as you think of them, and we can answer them when you come to the clinic.

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1 THE EAR

Q How does the ear normally work?

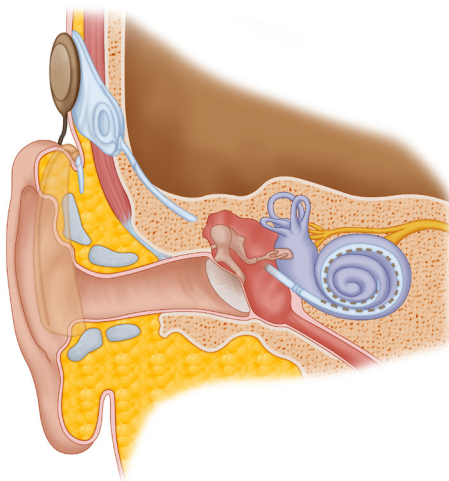
A In a healthy ear sound travels along the ear canal and causes the eardrum and the chain of tiny bones (ossicles) to vibrate. These vibrations move through to the fluid in the cochlea, which is the part of the inner ear shaped like a snail shell. The movement of the fluid stimulates thousands of tiny hair cells in the cochlea which generates an electrical current in the nerve of hearing. The nerve sends the

electrical signal to the brain, and the sound is heard. The cochlea is vitally important to hearing; when people have a severe or profound hearing loss, the hair cells are usually damaged or missing and so the sound signal cannot reach the nerve of hearing.

2 COCHLEAR IMPLANTS

Q What are cochlear implants?

A A cochlear implant is an electronic device that can help both adults and children who have a severe to profound hearing loss. It has two parts: an internal receiver/stimulator package and electrode array, and the external speech processor that usually looks like a hearing aid. The cochlear implant uses small electrical currents to directly stimulate the nerve of hearing, which then sends signals to the brain where they are interpreted as sound.



Cochlear implant in place

Q How does the cochlear implant work?

- A**
1. Sound from the environment enters the microphone(s), which is usually situated on the speech processor. The speech processor is worn behind the ear like a hearing aid
 2. The speech processor selects and codes useful sounds
 3. This information is sent along the lead to the transmitter coil, which attaches to the head using a magnet
 4. The coil sends the information across the skin to the receiver/stimulator
 5. The receiver/stimulator converts the information into an electrical signal
 6. Pulses of electricity at the electrodes stimulate the hearing nerve
 7. The nerve sends a signal to the brain, which interprets the signal as a sound

Q Who could a cochlear implant help?

A A cochlear implant can give a person with severe or profound hearing loss a sensation of sound. It works best for people who don't get much help from hearing aids.

Q What is the best age to have a cochlear implant?

A A cochlear implant usually works best for adults who have become deaf after acquiring some speech, or young children who were born deaf or acquired a hearing loss. An adult who has always been deaf and never learned to speak may get limited benefit from a cochlear implant.

Q How do you decide which ear to implant?

A All children, and adults who have a Certificate of Visual Impairment (CVI), are eligible for two implants. For all other adults the ear implanted depends on audiology assessments, scans and the person's hearing history and preference. Outcomes can be better in the ear which has most recently had useful hearing as there may be more nerve survival. The decision is very individual and the team can advise you.

Q Is the cause of deafness an important factor?

A The cause of deafness is usually not important as long as the auditory nerve is able to respond to electrical stimulation provided by the cochlear implant.

Q What about people with other disabilities?

A Other disabilities are no barrier to cochlear implantation as long as the person is fit for surgery.

Q Can elderly people have cochlear implants?

A If a patient is fit enough for a general anaesthetic, old age alone is not a reason not to have a cochlear implant.

Q What kinds of sounds are heard with an implant?

A Patients can usually hear and identify many environmental sounds and find that the implant helps lip-reading. Many individuals can understand speech without lip-reading and some can even use the telephone.

Q Do people with a cochlear implant hear normally?

A No. Patients who have lost their hearing say that sound through an implant is very different from normal hearing. At first it is reported to be "mechanical" or "electronic" sound or "like a radio that's out of tune"; but gradually over a period of weeks or months the sound becomes clearer and more natural.

Q How large is the speech processor?

A The speech processor is usually worn behind the ear; it is the size of a large hearing aid. Some processors work with a remote control.

Q Where does the transmitter coil go?

A The coil fits behind the ear and can be hidden beneath the hair. It is held in place by a small magnet and is slightly larger than a 2 pence piece.

Q How visible is the cochlear implant system to other people?

A The cochlear implant is generally only visible on patients with very short hair.

Q Does the speech processor use batteries?

A Yes. Some of the speech processors use rechargeable batteries and some use zinc air button batteries. The Auditory Implant Service encourages the use of rechargeable batteries.

Q How long do the batteries last?

A This depends on the individual. Most need to be changed daily but some can last for shorter or longer time periods. Some batteries will last a few days others will need to be changed more frequently.

Q Can the processor be taken off?

A Yes. The external parts of the implant can be taken off at any time, for example when going to bed.

Q Do the external parts ever break?

A Yes. As with anything that is used regularly, the processor, transmitter coil and leads can break. They are easily replaced.

Q Do the internal parts ever break?

A There have been many years of research in order to make the implant as reliable as possible, but failures can occur, as with any electronic item. If an implant user were to experience a failure, they would usually be offered a replacement, which would require another operation. The re-implantation operation is usually quicker and more straightforward than the initial surgery.

Q Is it dangerous to have electricity so close to the brain?

A The level of electricity from a cochlear implant is similar to the natural electricity required to stimulate hearing.

Q Does the implant user need to pay for repairs?

A No. NHS patients are covered for the cost of replacing essential equipment.

Q Why are some members of the Deaf community against cochlear implants?

A Some Deaf people do not agree with cochlear implantation, especially in children. They worry that Deaf culture and sign language might disappear if all deaf children receive implants.

Q When did cochlear implantation begin?

A Experimentation with electrical stimulation of the ear was first performed by French researchers in the late 1950s. Since then, investigators around the world have been developing this treatment. USAIS began implanting adults in 1990 and then children in 1992.

“Since the Cochlear Implant Programme was established here in 1990 our surgeons have implanted over 2000 devices.”

Emily Arbuthnott, Director, USAIS



The Auditory Implant Service is based at the University of Southampton

3 THE COCHLEAR IMPLANT CARE PATHWAY

Q What does the Cochlear Implant Care Pathway involve?

A The programme has four main parts:

1. Assessment
2. Surgery
3. Tuning
4. Rehabilitation

Assessment

Q What happens in assessment?

A Assessment is carried out by a multidisciplinary team.

An Audiologist finds out what the adult or child can hear with and without hearing aids.

An ENT Consultant sees the patient to assess if there are any medical reasons not to have a cochlear implant. In addition, an MRI and CT scan of the inner ear is performed in order to check that an electrode can be inserted into the cochlea. Other medical, radiological and psychological assessments may be required in some cases.

Rehabilitationists also assess whether a candidate would benefit from a cochlear implant.

In the case of children, a Speech and Language Therapist and a Teacher of the Deaf will assess the child's listening behaviour, learning style and communication abilities. A Clinical Psychologist will also meet with the family during the assessment period.

Members of the cochlear implant team ensure that patients and their families have realistic expectations about what the implant can do. Motivation and commitment is needed to get the most from rehabilitation after the operation. A clear understanding of the advantages and disadvantages of a cochlear implant is essential before making the final decision.



Surgery

Q What happens during surgery?

A The cochlear implant operation takes about three hours. The receiver/stimulator package is placed on the bone behind the ear, and the electrodes are inserted into the cochlea. The stay in hospital is usually only two days.

Q Are there any risks?

A The surgical procedure involves entering the mastoid bone to reach the inner ear. The mastoid is part of the skull directly behind the ear. The operation has the same risks as other inner ear surgery: infection, facial muscle weakness or paralysis and the risks of anaesthetic. These are all very small risks. Other risks of cochlear implantation include a possible increase in symptoms such as tinnitus or dizziness. Although temporary changes in these symptoms often occur following ear surgery, a permanent increase is rare.

Q Can the patient hear immediately after surgery?

A No. The external parts of the cochlear implant system must be used in order to hear sound. Patients do not receive these until four weeks after surgery, when the skin is healed and the swelling has gone.

Tuning

Q What is tuning?

A The tuning process is the adjustment of the speech processor to suit the individual. An Audiologist tests what the patient can hear using a computer. Several tuning sessions are required to reach the optimal settings. Tuning sessions usually last one to two hours. For children the tuning will be incorporated into play or an age appropriate listening activity; the aim is to make the sessions as enjoyable as possible.

Rehabilitation

Q Once the cochlear implant is switched on, why are further appointments needed?

A The sound from the cochlear implant is very different from normal hearing, and takes a while to get used to. Counselling and rehabilitation sessions are provided to help the patient adjust to the sound heard through the implant and to make communication easier. The clinic staff also teach the patient and their family how to handle and care for the external parts of the device.

During the first year, several visits to the implant centre are required for tuning, hearing testing and rehabilitation. After this, patients attend less often. You can always contact us if you need further support.

Children will receive visits from the outreach support team in order to provide support for parents and others who work with the child. Local staff are then able to monitor the child's progress and encourage the development of listening skills.

Adults are encouraged to attend group sessions and workshops.



4 EXPERIENCES OF COCHLEAR IMPLANT USERS

In this section the answers are based on the experiences of patients who have had cochlear implants – the answers give you an idea of what to expect if you have a cochlear implant.

Q What kinds of sounds can be heard with the implant?

A Most medium and loud sounds and some soft sounds can be heard with the implant. Patients can learn to recognise many environmental sounds including footsteps, doorbells, telephones ringing, dogs barking, wind in the trees, the clicking of light switches etc.

Q When implant users hear these sounds, do they know what they are?

A Initially all the sounds may seem very similar. With experience and training users learn to tell differences between sounds and most adults are able to recognise environmental sounds after six months of implant use.

Q Can implant users tell the direction that sound is coming from?

A People with one implant will usually have difficulty in locating sound. Wearing a cochlear implant with a hearing aid on the other ear may help the listener know where sound is coming from. Children with two cochlear implants can develop the ability to localise sound.

Q Does the implant help lip-reading?

A Yes. Implant users can hear the rhythm, pattern and intensity of speech. They say that the sound from the implant makes lip-reading easier. The amount of help the cochlear implant provides with lip-reading depends upon prior experience with sound and speech. The ability improves over time, with experience and training.

Q Can implant users hear their own voices?

A Yes. Many patients say the sound of their own voice is very strange at first. Many adults say that their voices sound like Donald Duck or a Dalek! After several weeks, however, patients report that the sound becomes more natural.

Q Can the implant help people to control the loudness of their voices?

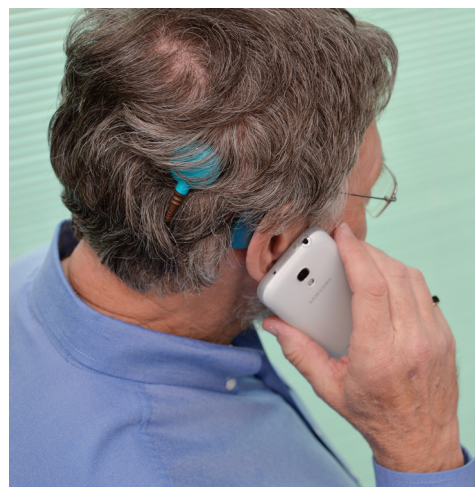
A Yes. The implant allows the user to hear their own voice and background noise, and by monitoring the background noise the implant user can control the volume of their voice.

Q Do cochlear implant users enjoy music?

A Cochlear implants are primarily designed to help people hear speech. Music often includes a combination of different sounds played at the same time, making it more difficult to process through a cochlear implant. How much cochlear implant users enjoy music varies. Most people can pick up the beat and some people can learn or re-learn to enjoy music, especially music that they already know. Others report that the sound quality of music is disappointing and they choose not to listen to it.

Q Can people with an implant use the telephone?

A Some patients can use the telephone for a normal conversation, but many more can use it in a limited way. Telephone training is part of the rehabilitation given where appropriate.





A cochlear implant can help patients hear environmental sounds better.

Q Are very soft sounds heard through the implant?

A The implant is designed to hear normal speech sounds. Very soft sounds such as a whisper, a car in the distance, or footsteps on the carpet may not be heard.

Q Are any sounds uncomfortably loud with the implant?

A Members of the cochlear implant team make careful tests to check that the sound does not become uncomfortable. The processor is programmed so that it will not produce sounds above the level of discomfort. Much like normal hearing, some sounds can be startling or very loud, for example sirens from police cars, ambulances and fire engines. The implant system has been designed so these sounds should not be uncomfortable.

Q Does the implant affect sounds in the head or tinnitus?

A Most implant users have found that they have less tinnitus while wearing the processor. Usually the reduction occurs only on the side with the implant. Some users have found that tinnitus is also reduced for several hours after using the processor. A small number of implant users have no change in tinnitus, in very few it has increased.

Q How long is it before getting maximum benefit from the cochlear implant?

A Learning the best ways to use this type of sound is a continuous process. For most adults big improvements are made in the first year, but they often report that their performance continues to improve even after several years of implant use. Young children continue to develop their listening over many years.

Q Can I get an upgrade for new technology?

A Yes. Improvements in the speech processing strategies usually involve changing just the external components. The University of Southampton Auditory Implant Service offer new models of processor every 5 years.

Q Should I be implanted now or wait for improvements in the technology?

A Improvements have and will continue to occur in implant technology. The evidence indicates however, that shorter periods of time between onset of deafness and use of implant produce better results. In general you should have your implant as soon as the Team feels it is appropriate for you.

5 COCHLEAR IMPLANTS IN CHILDREN

Q At what age do children receive a cochlear implant?

A When a child has gone through the assessment process and the decision has been made that they would benefit from an implant, it is a good idea for the operation to be performed as soon as possible. The most usual age at implant for this centre is between 12 and 18 months for those referred very young.

Q Do some children get more benefit than others?

A There are many factors which will influence a child's progress with a cochlear implant. These include the age when the child became deaf, the length of deafness before surgery, communication methods, experience with hearing aids, condition of the cochlea and auditory nerve and the motivation of the child and family. Generally those children who have been deaf for a shorter period of time have a better outcome than those who have been deaf longer.

Q Can children who are born deaf have a cochlear implant?

A Yes. Many children who receive cochlear implants were born deaf or lost their hearing at a very early age. However, if a child has no memory of sound it is important that the implant operation is performed in the first few years of life, as this is when the pathways in the brain relating to sound are formed. As a child who is born deaf grows older, the benefit they will receive from the implant decreases.

Q Does the cochlear implant affect a child's behaviour?

A Parents and teachers often report a decrease in behavioural problems as the cochlear implant eases communication difficulties. Some children may be more attentive and interact better with their peers.

Q Will intensive therapy be needed?

A Having a cochlear implant can be a strange experience for a young child; they will need a lot of support to learn to make use of the new auditory information. All newly implanted children receive regular visits and support including visits from the implant centre staff who will work with local professionals.

Q Should my child learn sign language?

A It is very important that a child has some method of communication during the early years of life, so some parents do use sign language or gesture to interact with their child. If a child receives a cochlear implant, they usually have the potential to learn to understand speech and even speak themselves, so it is important that they are given full access to spoken language. However many children will continue to use sign language to support their communication.

Q What type of school should a child with an implant attend?

A Children with cochlear implants can be found in a wide variety of educational settings: mainstream, hearing impaired units and schools for the deaf. The implanted child needs to have access to speech in order to get the maximum benefit from their implant.

Q Can a cochlear implant be used with a radio aid?

A The Auditory Implant Service recommends using assistive listening devices such as personal FM or soundfield systems particularly in classroom environments. Advice can be given to local services about using these devices with cochlear implant sound processors.

“I have been very pleased with the attention and care I have received both before and after the implant.”

“It is really good for a parent to see staff visit and liaise with the school. Everyone has been very understanding and supportive.”

“All staff are really friendly and helpful and I never feel rushed. There is always ample time to ask questions. I always enjoy coming and am delighted with the care I receive.”

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