

What is a Cochlear Implant ?



What is a cochlear implant compared to a hearing aid ?

A cochlear implant is an electronic device designed to provide sound perception and the potential for greater speech understanding to children and adults with severe to profound hearing loss who receive little or no benefit from conventional hearing aids. For people with severe or profound hearing losses, hearing aids are often very limited in their ability to improve speech understanding. This is not because the hearing aids can't make sounds loud enough. It is because some very tiny hair cells in the inner ear (cochlea) have become too damaged or are completely missing and therefore the amplified sound cannot be properly delivered to the brain.



Why do people get a cochlear implant?

People get a cochlear implant because they want to hear better or they want their child to hear better. Adults want to be independent and to feel included instead of isolated: to take part in conversation, to hear their children or grandchildren talk, to listen to music or simply to listen to the sounds of nature. They want to be confident that they can hear in all listening situations even in background noise. Parents want their child to hear the sounds of life. They want to provide their child with the opportunity to learn to listen, talk and communicate freely and independently. They want their child to participate fully in the world of sounds that surrounds them.

What are the benefits of cochlear implants?

The progress made over the last decade in cochlear implants has been truly phenomenal. Cochlear implants have now demonstrated their ability to significantly and positively improve the quality of life of adults and children. While all cochlear implant users benefit from an increased access to environmental sounds, many enjoy the ability to hear and understand words and sentences without lip-reading particularly in quiet listening environments.

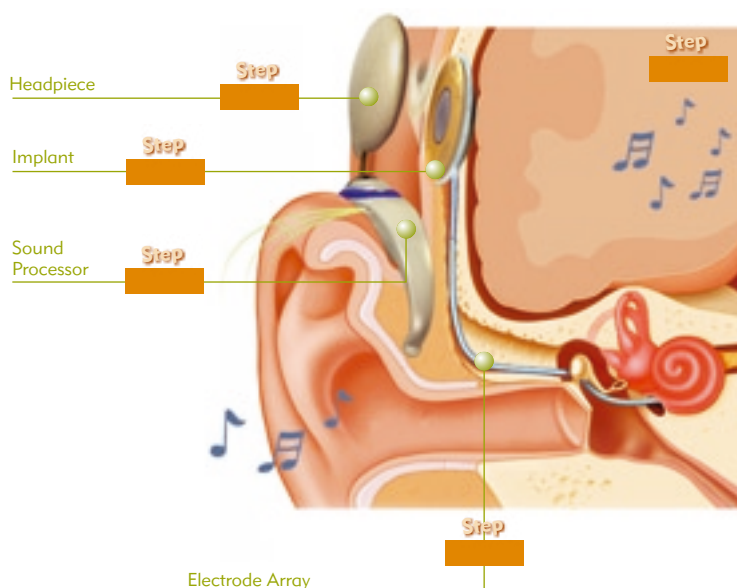
How does a cochlear implant work ?

A cochlear implant works by bypassing damaged or missing hair cells and stimulating the hearing nerve directly.

A cochlear implant has external components – a **Sound Processor** and a **Headpiece** - that can be taken on and off easily. It also has internal parts that are implanted during surgery and which are not visible - the **Implant** and the **Electrode Array**.

- Step 1** The external components capture environmental sounds as well as speech and music...
- Step 2** ... and process these sounds so that they can be transmitted across the skin to the implant.
- Step 3** The implant then passes the signals along to the electrode array, ...
- Step 4** ... where individual electrodes deliver them to the hearing nerve.
- Step 5** The signals travel up the hearing nerve to the brain where they are perceived as sounds.

The entire process – from incoming sound to processing in the brain – occurs so rapidly that the user hears sound as it happens.



What can cochlear implant users or parents expect?

As each cochlear implant user is unique, no one can predict exactly how much benefit a user will receive from his/her cochlear implant because many factors contribute to the outcomes.

- Some of the variables are beyond anyone's control, like age, amount of previous hearing, duration of deafness or remaining number of healthy sensory cells.
- Other variables are technology limitations in providing sound through a cochlear implant. However, the research always continues to remove barriers with advances in sound processing and system capabilities.
- A cochlear implant user's brain is trained as he or she practices listening. As such post-operative rehabilitation, educational support as well as personal and family commitments are key success factors.

Very recent advances in implant technology are allowing more implant users to cope effectively with the challenges that they face in their every day life: noisy backgrounds, soft speech, appreciation of music, use of telephone, business or school environments. Today's evaluation methods are beginning to show differences among implant designs in their ability to address real-life listening challenges.



An overview of the Advanced Bionics' HiResolution® cochlear implant system

Advanced Bionics has made a major breakthrough in the science of delivering sound through a cochlear implant. For the first time, with the HiResolution® Bionic Ear System, most of the key parameters that are known to play a role in helping listeners cope with difficult listening situations have been addressed.

HiRes® 90K the internal component

The primary component of Advanced Bionics' HiResolution System is the HiRes 90K implant. Implant capability is the most important consideration in a cochlear implant system. This will determine how much detailed sound information is ultimately delivered to the hearing nerve.



Advanced Bionics developed an implant with speed, power and flexibility offering future expandability and the confidence that when a superior new sound processing strategy comes out existing users can simply upgrade to it without the need for additional surgery to replace the implant.

The HiRes 90K implant uses state-of-the-art computer technology to deliver electrical signals to the electrode array. The implant's small surgical size makes it ideal for very young children as well as adults. The HiRes 90K also includes Neural Response Imaging (NRI), an important diagnostic tool that audiologists can use to confirm proper function of the auditory nerve and to assist in the programming of very young children.

HiResolution® Sound the sound processing technique

HiRes Sound is the newest generation of sound processing techniques which delivers measurable improvement in sound clarity, music quality appreciation⁽¹⁾ as well as speech understanding in the presence of background noise⁽²⁾.



With this advanced processing technique, detailed sound information is delivered to the hearing nerve extremely fast, mimicking how normal hearing works, thus allowing for a more natural sound. This ability to stimulate at very fast rates is unique among cochlear implants.

Sound Processors

To support HiResolution Sound, the HiResolution Bionic Ear System comes with a choice of two processors offering equivalent sound processing capabilities. Programs can be easily downloaded from one to the other with equal sound quality and both benefit from full compatibility with FM amplification systems.

HiRes Auria™



This Ear Level Processor has been designed to offer users uncompromising sound. It can be customized to fit the needs of all including infants and toddlers with the HiRes PowerPak configuration.

The HiRes Auria features environmentally friendly custom rechargeable battery PowerCel™ technology. A

line of user-friendly accessories has been developed to meet the needs of both paediatric and adult users such as the Auria T-Mic™, a unique in-the-ear microphone technology for easy access to cellular telephones or the Auria Firefly™, a fun-to-wear visual indicator that assists parents and teachers in monitoring good function.

To learn more about the HiRes Auria, please refer to the card "Getting the best from the Auria Sound Processor".

Platinum Series™

Advanced Bionics' pager style processor is a small body-worn processor. It is robust, has easily manipulated controls and can be tucked discreetly under the clothes, and is therefore preferred by some adults and by some parents of young babies or toddlers. It too has environmentally friendly, custom built rechargeable batteries.



To learn more about the Platinum Sound Processor, please refer to the card "Getting the most from the Platinum Sound Processor".

With the development of the HiResolution Bionic Ear System, Advanced Bionics is demonstrating its ability to address simultaneously the needs for **Reliability, Technology and Performance, Quality, Design and Commitment**, which are all essentials if a user is to realise his/her full hearing potential.

To learn more about Advanced Bionics and the HiResolution Bionic Ear System we invite you to visit our website www.bionicear-europe.com, or to contact your local Advanced Bionics office. A dedicated team, including audiologists, engineers and counsellors will be there to answer your questions.

(1) Vickers D, Filipo R, Ballantyne D, Lenarz T, Frohne-Buchner C, Amstutz-Montadert I, Besse E, Le Her F, Frijns J, Briaire J, Gault A, Arnold L, Boyle (2003). Assessing Sound Quality with the quality Assessment questionnaires battery: Results from the pilot phase. British Cochlear Implant Group Meeting Abstract Book.

(2) A comparison of performance among patients fit with the CII HI-Resolution, 3G and TEMPO+ Processors – Anthony J. Spahr and Michael F. Dorman, Arizona State University – Presented at the Conference on Implantable Auditory Prostheses (2003).

Advanced Bionics is ISO9001 certified and QSR certified by the FDA. Advanced Bionics products are CE marked and FDA approved.