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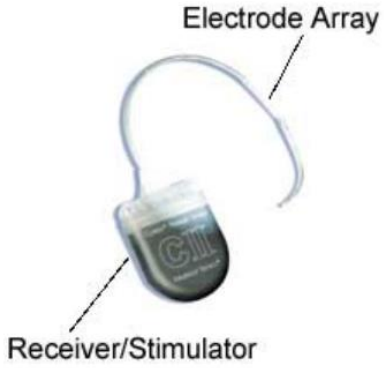
What Is A Cochlear Implant And How Does It Work?

Cochlear implants are implantable devices designed with the goal of providing sound detection and speech recognition for people who receive little or no benefit from hearing aids. The cochlear implant—regardless of the manufacturer—is comprised of both internal and external components.

Internal Portion: Receiver

The internal device is implanted surgically and has a receiver and tiny electrodes. Three examples of internal devices are shown below. The receiver is imbedded under the skin behind the ear. The electrode array is inserted into the cochlea.





External Portion: Speech Processor

The external portion – called the speech processor – can come in a variety of sizes and wearing options.

Standard features include:

- Powered by a battery
- Connected to a headpiece via a cable.
- Transmitting coil sends the signal to the internal device
- Magnetically attaches to the surface of the head behind the ear where the internal portion of the implant is located

Speech processors come in many styles including behind the ear, body-worn, and single unit processors.

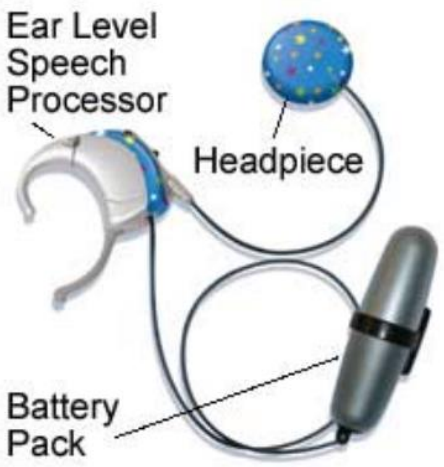
- Styles available in an array of colors
- Some processors, such as Advanced Bionics' Neptune, are waterproof and can be worn in the pool or the bathtub
- Processors can utilize rechargeable and/or disposable batteries
- Microphones can be found directly on the processor (behind the ear models) or on the headpiece (body worn and single processor units)

- Program and volume changes can be made via controls directly on the unit and/or using a remote control accessory

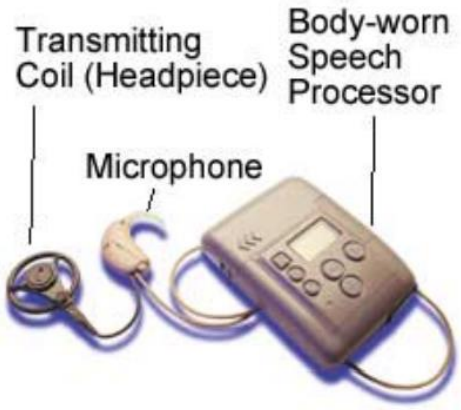
The external portion, shown in the picture below includes a speech processor that is connected to a headpiece by a cord. The headpiece has a transmitting coil that sends the signal from the speech processor to the internal part of the device. It magnetically attaches to the surface of the head behind the ear at the spot where the internal portion of the implant is located.



Platinum Series



Auria Processor



Sprint Processor



Esprit Processor

**There are additional speech processors and configuration options available other than those shown above.*

The internal and external portions work together to change sound into electrical signals that are sent to the hearing nerve.

- First, the microphone(s) located on the external device, picks up the sound energy. The speech processor then filters, analyzes, and converts the sound energy into a digital code.
- That signal is sent through the cable to the headpiece where it is transmitted across the skin to the internal receiver, via radio frequencies.
- The internal receiver distributes the signal to the electrodes along the array which has been placed inside the cochlea.
- The electrodes send tiny electrical charges that stimulate the auditory nerve which is connected to the cochlea. By stimulating the auditory nerve directly, the cochlear implant bypasses the damaged parts of the cochlea that cause hearing loss.
- The auditory nerve then carries the electrical signals to the brain where they are interpreted as sound. This process occurs so rapidly that the listener will hear speech and other sounds without any noticeable delay.

For more information about specific manufacturers please visit the following websites:

- Advanced Bionics Corporation - www.cochlearimplant.com
- Cochlear Americas - www.cochlear.com
- Med-El - www.cochlearimplants.com

babyhearing.org — Supported by the National Institute on Deafness and Other Communication Disorders. Boys Town National Research Hospital.