

Bionic Ear

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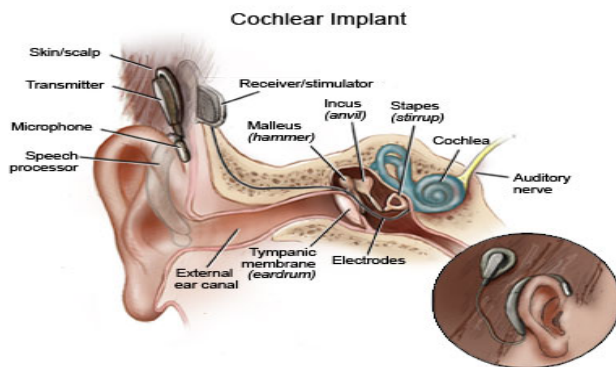
Abstract— A Bionic Ear, which is known as a cochlear implant, is an artificial hearing device, designed to produce useful hearing sensations by electrically stimulating nerves inside the inner ear.

I. INTRODUCTION

The Bionic Ear was invented by Professor Graeme Clark and a team of scientists in the 1970's in Melbourne, Australia. The Bionic Ear provides sound to a person who is profoundly deaf or severely hard of hearing. The Bionic ear consists of a receiver and stimulator as well as a speech processor and headset. The bionic ear was created to help people who are deaf or near deaf be able to hear things using this electronic earpiece which fits on one's ear and is compact.

II. METHODS

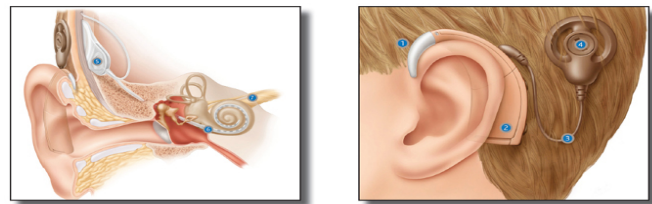
The Bionic ear is an electronic device implanted on the ear to help restore hearing in one's ear. The transmitter is held in position by a magnet placed behind the external ear. Electrical sound signals are sent through a thin cable to the transmitter, and the processed sound signals to the receiver and stimulator. Where as the receiver and stimulator, are secured in the bone beneath the skin. This converts the signals into electric impulses and sends them through an internal cable to the electrodes inside the cochlea, which send the impulses through the auditory nerve system to the brain.



III. RESULTS

Hearing can become impaired if the hair cells in the cochlea become damaged. This in turn causes the vibrations in the inner ear to be incapable to be altered into neural impulses and therefore does not get send to the brain which results in loss of hearing. People who are considered deaf can use this earpiece to hear. Hearing loss is categorized into two categories Conductive and Sensorineural. Hearing Loss can be rated by using a scale based on the threshold of hearing.

The Scale can be defined as mild hearing loss where hearing is manageable and is rated using the scale 25-40 dB, moderate hearing loss 41-55dB can not hear conversations if there is noise in the background, moderately severe hearing loss 56-70dB, severe hearing loss of 70-90dB(decibel, where sound intensities are measured), where as profound hearing is defined as a hearing of 90dB or above where speech is difficult to understand. The normal hearing level for adult's range from 0-25 decibels on the hearing scale. Conductive hearing loss is when the sound is not conducted efficiently through the outer eardrum and tiny bones of the middle part of the ear. Conductive hearing loss results in a reduction in sound level or the ability to hear small things. Sensorineural hearing loss is when there is damage to the inner ear (cochlea) or to the nerve pathway from the inner ear to the brain. Sensorineural hearing loss cannot be medically repaired and is one of the most common types of permanent hearing loss. People who have some type of hearing loss can use this bionic ear or cochlear implant to assist them in hearing partial noises.



IV. DISCUSSION

Bionic Ear helps patients be able to speak more clearly and understandable, they can understand verbal speech without relying on someone who is a lip reader to guide them the words. The Bionic Ear is worn by over 20, 000 deaf people in over 55 countries. The recent polls show that approximately 175,000+ people who are considered deaf have received a cochlear implant in the world. This means that 175,000+ people considered permanently deaf have been given the ability to hear sound using this device. In the United States, the Bionic Ear roughly costs anywhere from 45,000 to the most experienced and expensive ones ranging from 100000-125,000 dollars which includes the device, installation, and surgery. Insurance companies usually take care of the costs by making the patient pay little money to ensure their safety and protection.

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