# Volume rendering based on HRCT temporal bone in cochlear implant patients

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Many people suffer hearing loss because they have damage to hair cells in the inner ear. A cochlear implant, often referred to as a bionic ear, is an electronic medical device that replaces the function of the damaged inner ear. Unlike hearing aids, which make sounds louder, cochlear implants do the work of damaged cochlea to provide sound signals to the brain. If some hearing nerves still work, a cochlear implant can allow you to hear.

The basic parts of the device include some internal and external components. The external ones are: a microphone; a speech processor which selectively filters sound and sends the electrical sound signals to the transmitter, which is a coil held in position by a magnet placed behind the external ear, and transmits the processed sound signals to the internal device by electromagnetic induction. The internal part of a cochlear implant are composed by a receiver/stimulator, secured in bone beneath the skin, which converts the signals into electric impulses and sends them to an electrode array that, inserted through the cochlea, send the impulses to the auditory nerve. During cochlear implant surgery the surgeon drills through the mastoid bone to the inner ear. The electrode array is then inserted into the cochlea (scala thympani). The receiver/stimulator is secured to the skull.

Various imaging modalities are performed in pre and post operative evaluation of cochlear implant candidates. HRCT is recommended in all patients for pre implant analysis of the temporal bone morphology due to its reliability and easy availability. MRI is recommended in all cases of post meningitic deafness and in others with doubtful CT findings.

Post operative plain radiography (an oblique anti Stenver's view) is done in all patients to determine optimum positioning of the electrode in the cochlea.

Volume rendering based on HRCT temporal bone, allow us to create a data set of images and animations visualizing the single structures of the human ear in three dimensions.

Post Operative volume rendering in cochlear implant can reveal normal or malpositioned implant (receiver/stimulator, array).

This method can be determinative in all cases with abnormal function of the cochlear implant system and in children to reveal eventually dislocations due to temporal bone growth. We think that the volume rendering can be the future in imaging in cochlear implants.