

# **A Brief Discussion About the Mankind Hearing Mechanism and the Hearing Device Nowadays-- Cochlear**



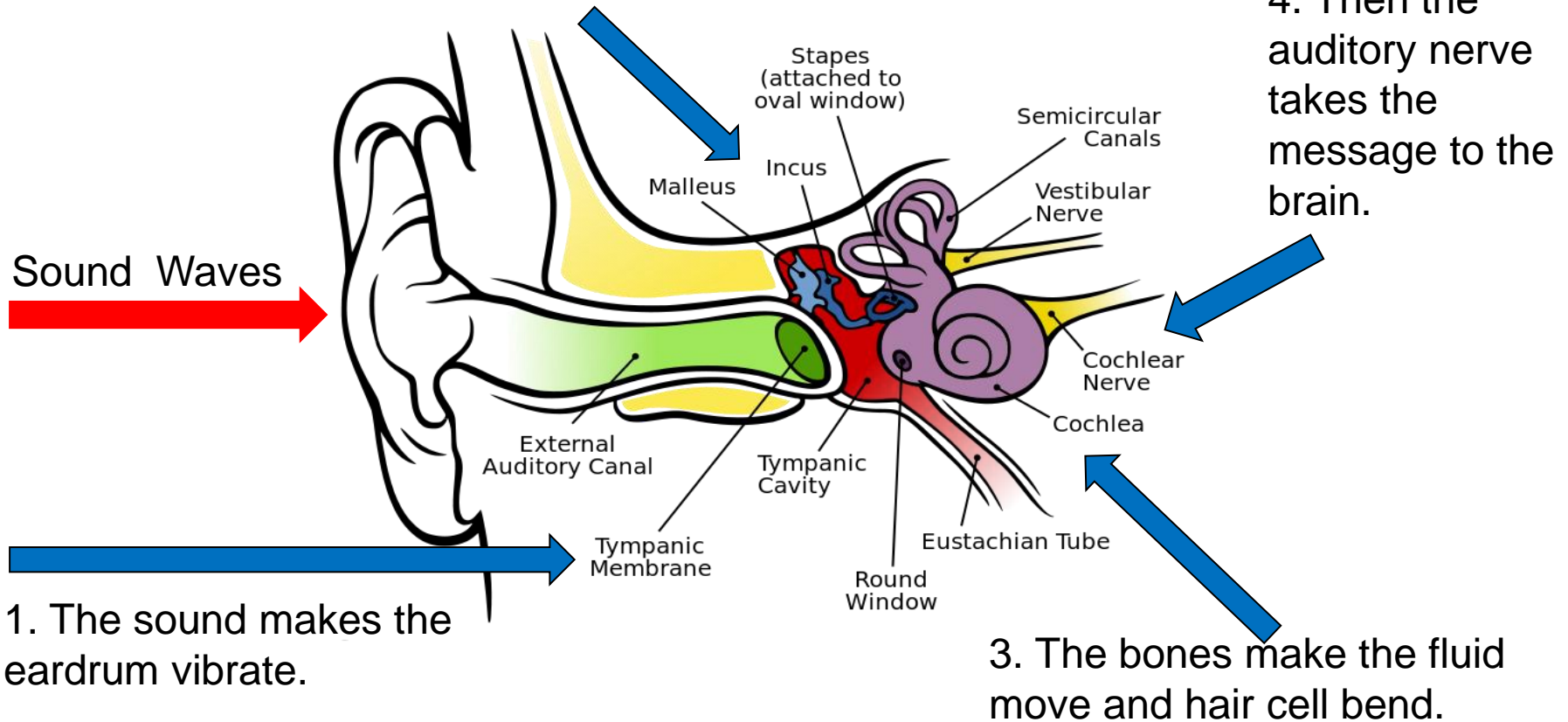
Student : Jia-Heng Chang 張家恒

Advisor : Chung-Chih Hung

Analog Integrated Circuit Lab  
National Chiao Tung University  
Hsinchu, Taiwan

# How do we hear ?

2. The eardrum makes the bones vibrate.



Sound Waves

1. The sound makes the eardrum vibrate.

3. The bones make the fluid move and hair cell bend.

4. Then the auditory nerve takes the message to the brain.

Photo reserved by Chittka L, Brockmann, from Wikipedia



# Cochlear Implant System

- External:

- Microphone
- Battery
- Speech processor



RF frequency  
transmission

- Internal:

- Received coil
- Electrodes array

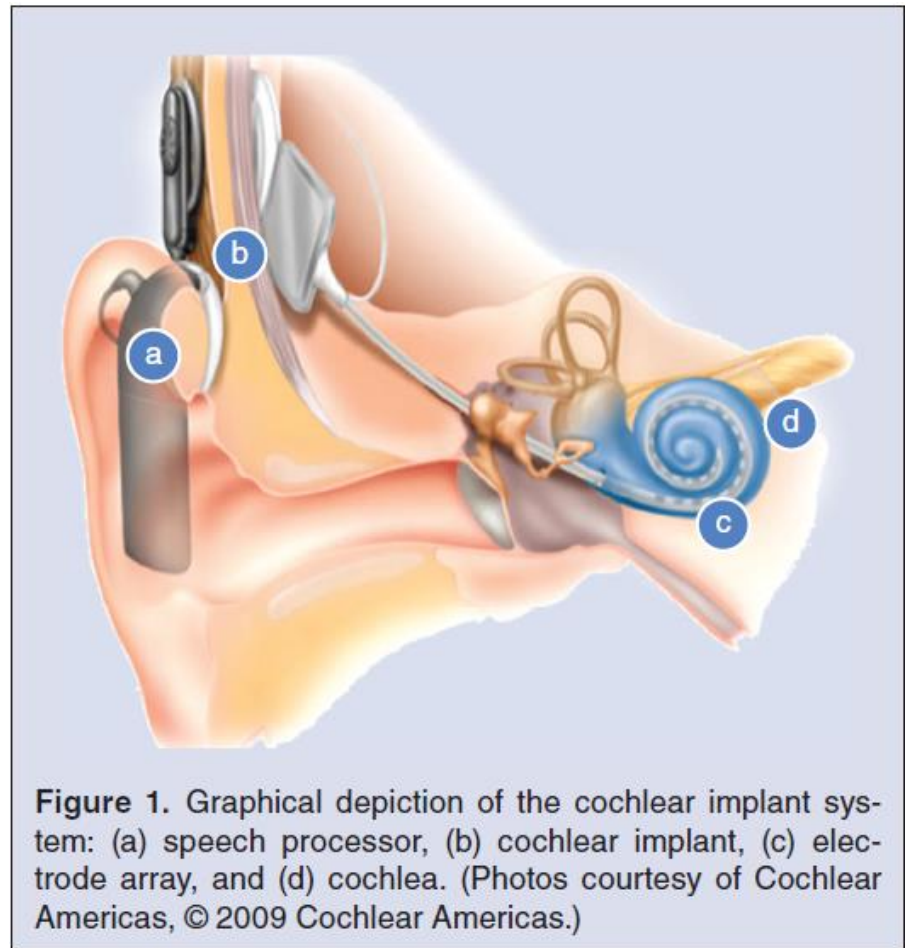
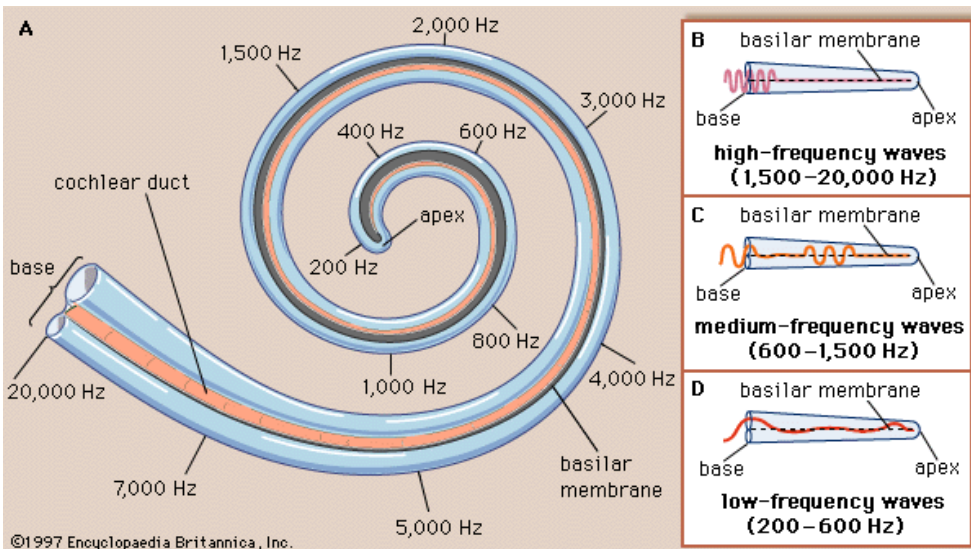
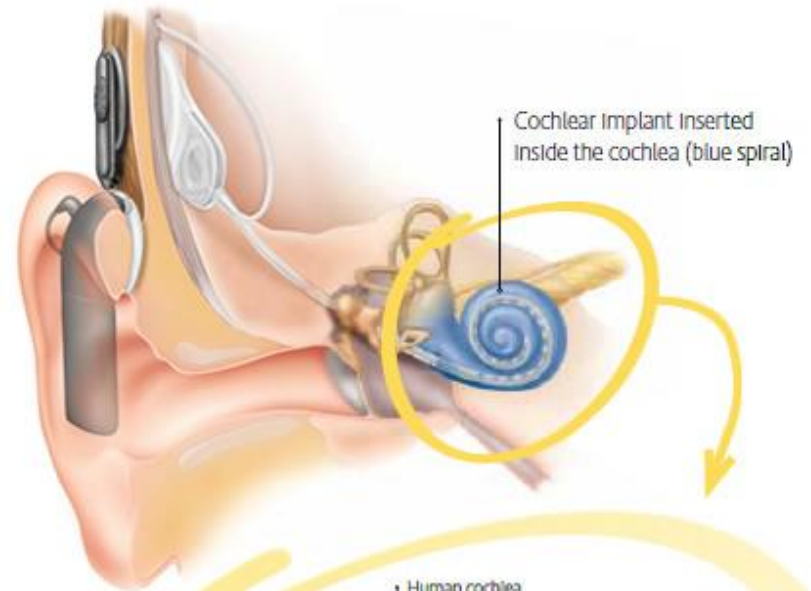


Figure 1. Graphical depiction of the cochlear implant system: (a) speech processor, (b) cochlear implant, (c) electrode array, and (d) cochlea. (Photos courtesy of Cochlear Americas, © 2009 Cochlear Americas.)

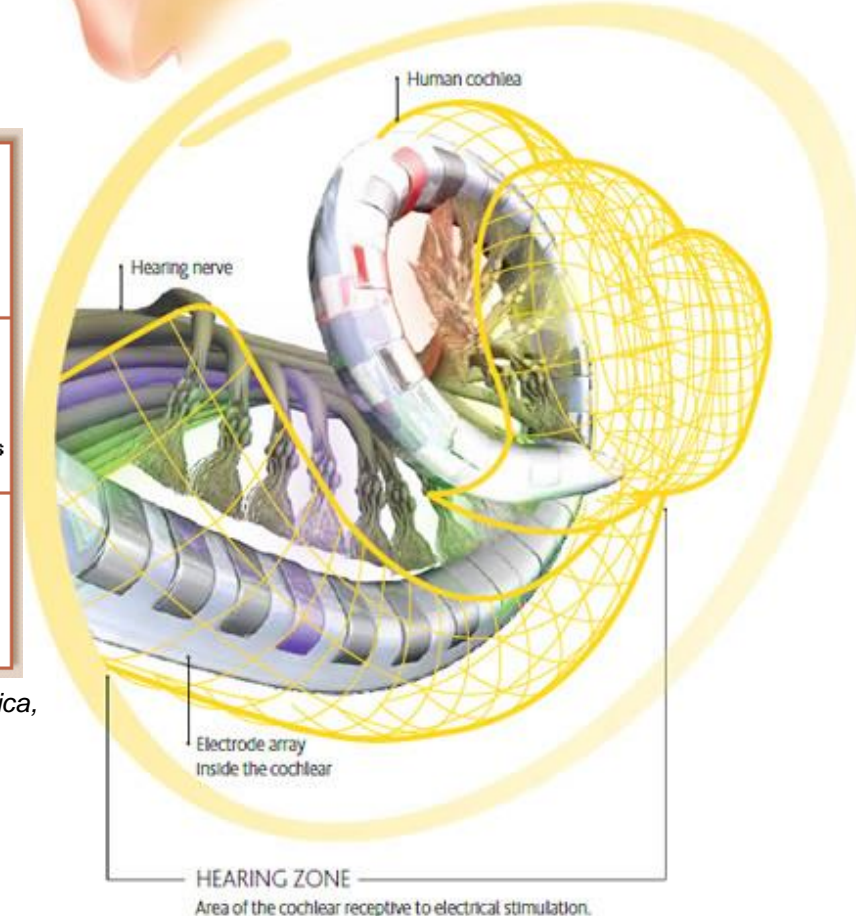


# Cochlear Implant

Direct stimulation of the auditory nerve is accomplished by an array of electrodes, and is inserted along the length of the cochlea.



Basilar membrane motions at different frequencies (from Encyclopaedia Britannica, Inc.)



# Block diagrams of the cochlear implant system

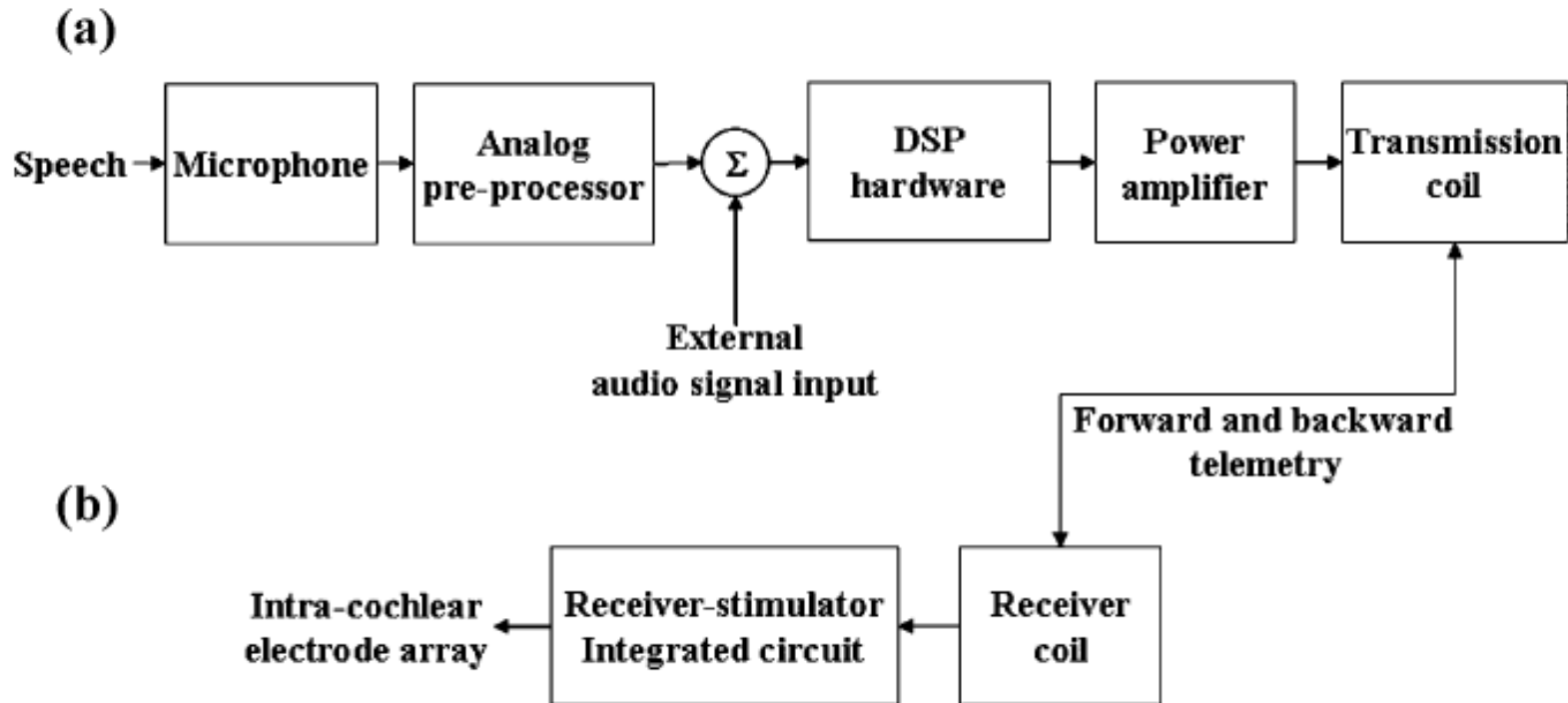


Fig. 1. Block diagram of the CI system. (a) External speech processor, (b) implantable unit.