



# Single and Multiple Microphone Noise Reduction Strategies in Cochlear Implants

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# What is CI

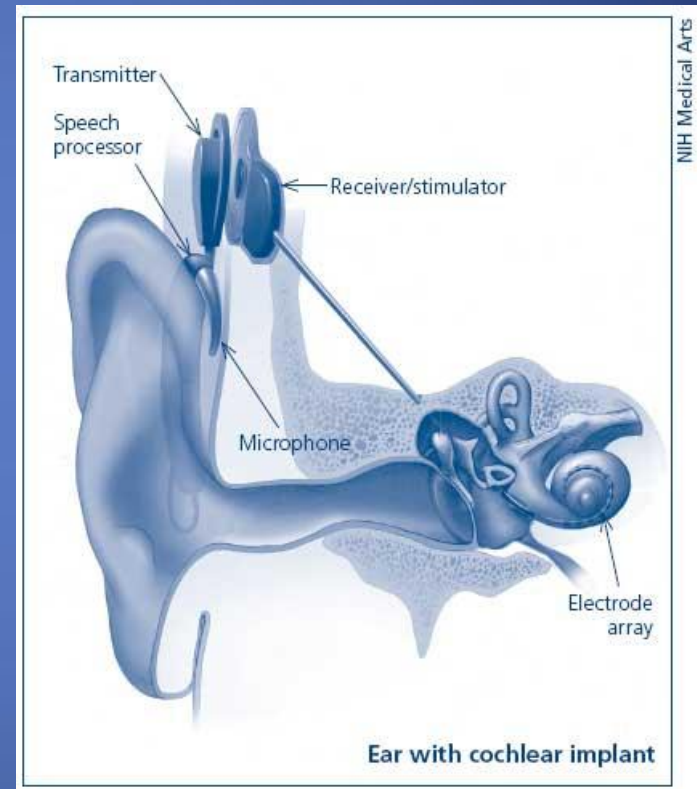
- ❏ A cochlear implant (CI) is a surgically implanted electronic device that provides a sense of sound to a person who is profoundly deaf or severely hard of hearing.
- ❏ Cochlear implants deliver electrical pulses to the auditory nerve by relying on sophisticated signal processing algorithms that convert acoustic inputs to electrical stimuli.



# Components of CI

## Signal Pre-processing

- 👂 A mic./mic.s
- 👂 A speech processor
- 👂 A transmitter
- 👂 A receiver/stimulator
- 👂 An electrode array





# Why is Pre-Processing necessary

- 👂 Almost all CI processors perform well in **quiet environments**.
- 👂 In the presence of background noise, the speech intelligibility of cochlear implant listeners is **more susceptible** to background noise than that of normal hearing listeners.
- 👂 SRTs(Speech Reception Thresholds)
  - 👂 steady-state noise :CI **10-15dB** higher than NH
  - 👂 competing-talker background:**25 dB or higher**



# Noise Reduction Strategies

## 👂 Single-microphone:

- 👂 Rely mostly on **statistical models** of speech and noise, and therefore can only differentiate between signals that have different temporal and spectral characteristics

## 👂 Multi-microphone:

- 👂 Can better exploit the **spatial diversity** of speech and noise, in addition to their spectral and temporal differences.