

SPAU 332

Hearing Aids I

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Treatment Options for Hearing Loss

Aim of today's lecture:

Describe the various treatment options for persons with hearing loss, including hearing instruments, implantable devices, and assistive listening devices.

Listening devices

- Primary objectives:
 - Make speech audible and intelligible, while avoiding distortion or discomfort
 - Restore a range of loudness experience

Listening devices – a brief history

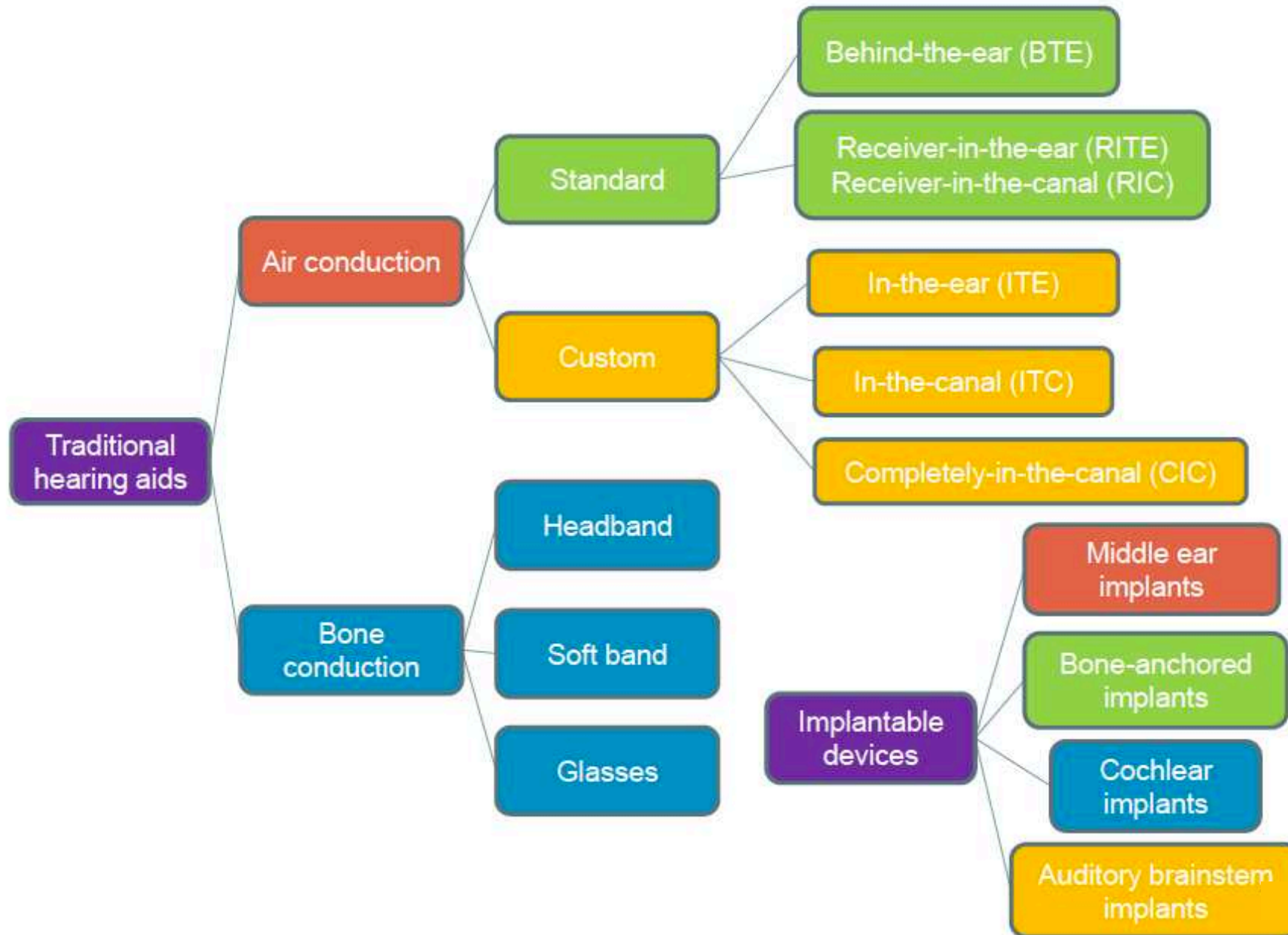


FIG. 2040.—Currier's Duplex Conversation Tube, for Educating Deaf Mutes.



Listening devices – a brief history





Behind-the-ear (BTE) hearing aids

- Can be fitted to a wide range of hearing losses from mild to severe or profound
- Can be coupled with a variety of earmoulds and thin-tube coupling systems to provide more or less occlusion
- Space in the housing/casing provide options for batteries (power), controls (programmes, microphones), telecoil, direct audio input etc.
- Fewer repair problems than other HA styles
- More reliable than ITE devices
- Easy to clean
- Cosmetics may be a concern
- Susceptible to wind noise



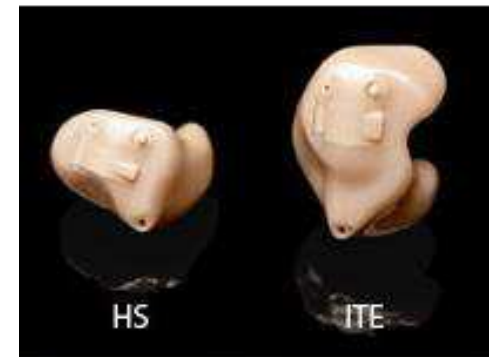
Receiver-in-the-ear (RITE) hearing aids (also called receiver-in-the-canal (RIC))

- Casing houses all components apart from receiver
- Less prone to feedback
- Occlusion generally less of a problem
- More natural sound due to open ear canal
- Small and lightweight
- For those with mild to moderate hearing loss
- Receiver end vulnerable to moisture in ear canal therefore frequent repairs to receiver required.



In-the-ear (ITE) hearing aids

- Very easy to use with telephone
- Very easy to insert in the ear
- Less visible than BTEs
- Less sensitive to wind noise than bigger/BTE devices
- Higher cost compared to BTEs
- Expensive to remake e.g. if lost or damaged
- Custom made so cannot swap to other ear if one of a pair is faulty or patient has fluctuating loss in other ear
- Size limitation sometimes makes direct audio input and telecoil options unavailable
- Manipulating user controls may be difficult for patients with diminished manual dexterity



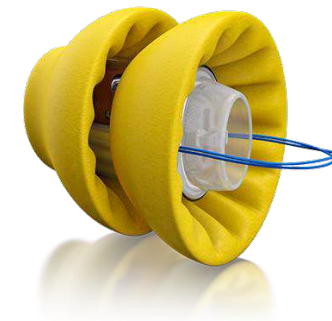
In-the-canal (ITC) hearing aids

- Reduction of feedback (if no vent)
- Improved sound localisation
- Less gain required
- Elimination of wind noise
- Enhanced telephone use
- Virtually invisible
- Greater high frequency gain achievable
- High maintenance devices
- Cerumen/wax build-up –frequent cleaning necessary
- Due to size, cannot house some features e.g. direct audio input, telecoil, directional mics
- Occlusion
- Less overall gain



Completely invisible hearing aids

- Fitted by Lyric trained audiologist or ENT
- Fits mild to moderately-severe hearing loss
- Worn for 24 hours per day
- Battery lasts for up to 120 days
- Expensive, subscription required
- <https://www.youtube.com/watch?v=gid1>

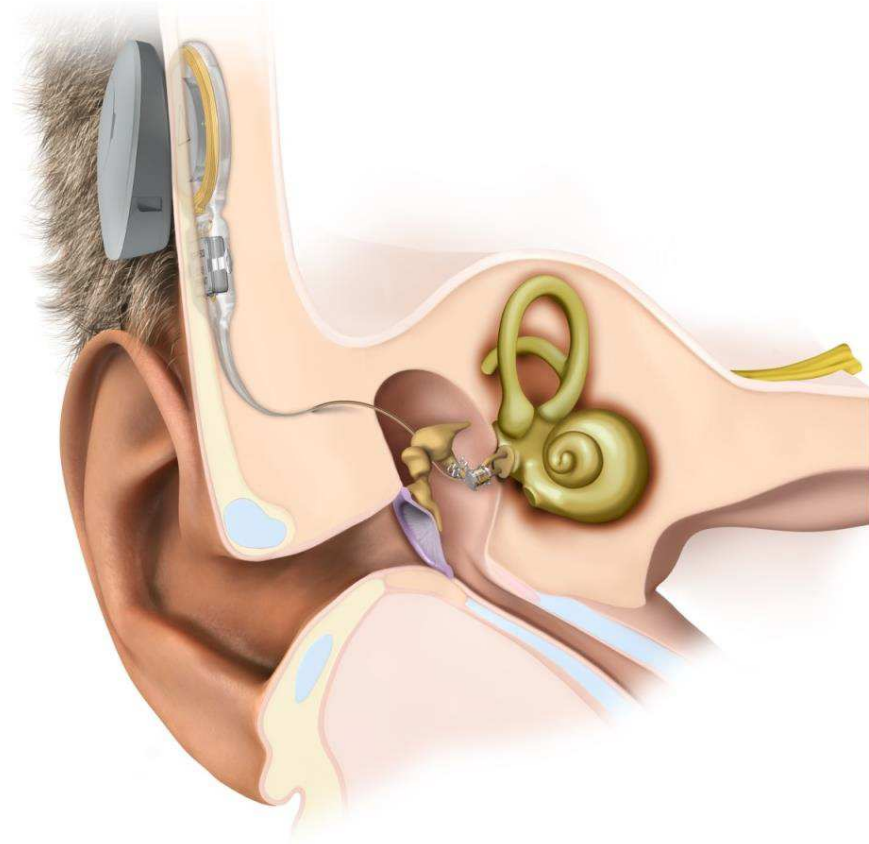


Implanted devices

- Middle ear implants
- Bone conduction implants
- Cochlear implants
- Auditory brainstem implants

Middle ear implants

- Option for patients who cannot wear an external hearing aid
- Converts sound to micromechanical vibration –transmitted directly to the ossicular chain
- Surgically implanted



Bone conduction devices/implants

- Screw surgically implanted into skull
- Sound transmitted directly to cochlea via bone conduction
- Suitable for patients with conductive or mixed hearing loss

Baha Attract System

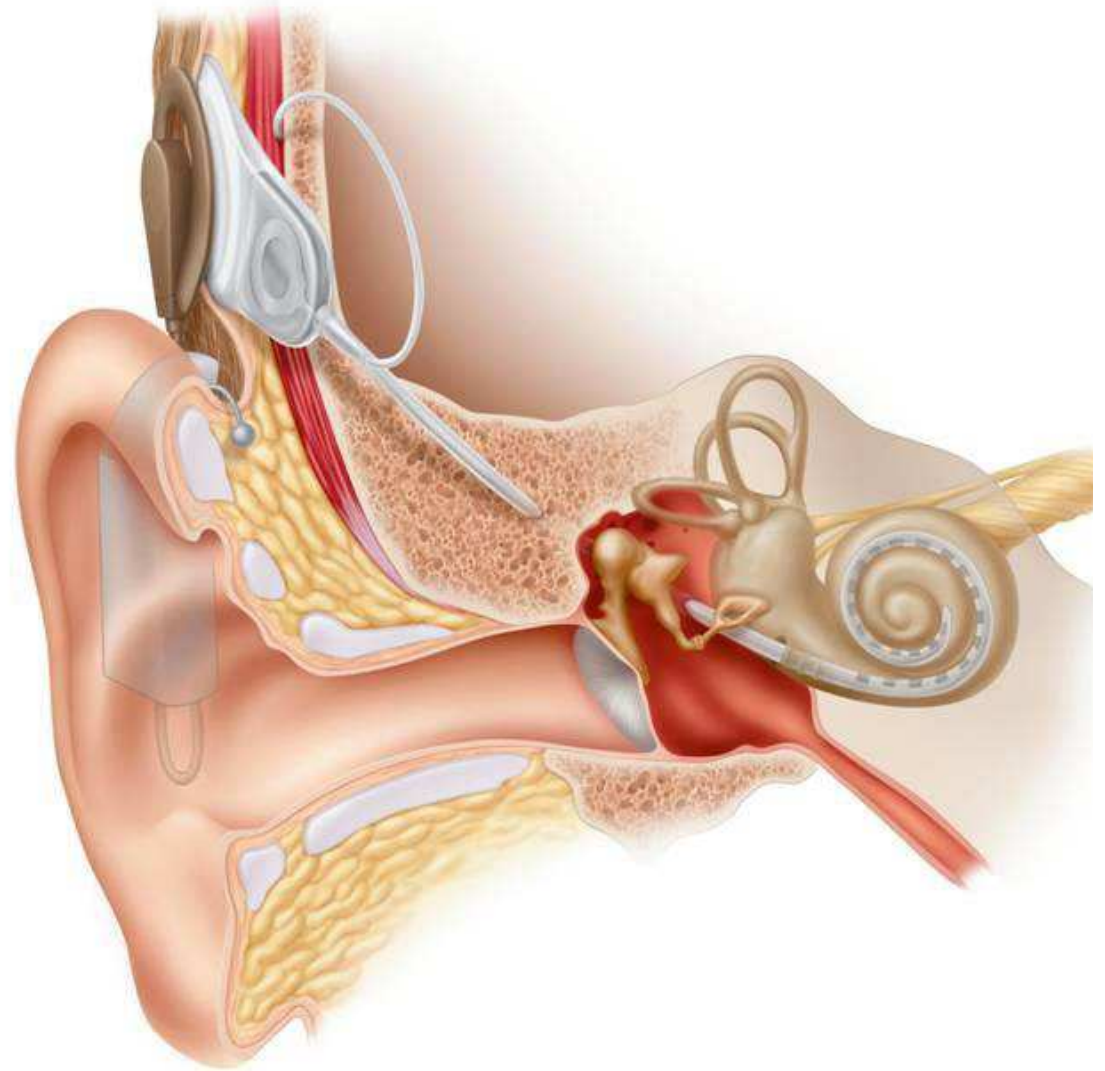


Baha Connect System



Cochlear implants

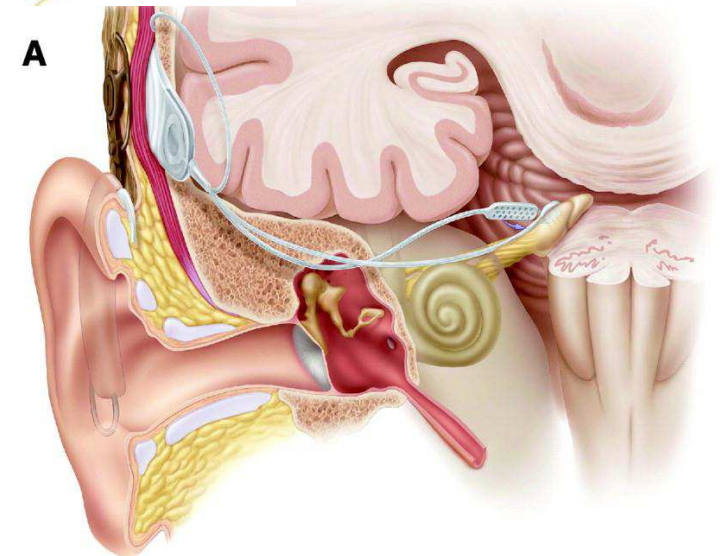
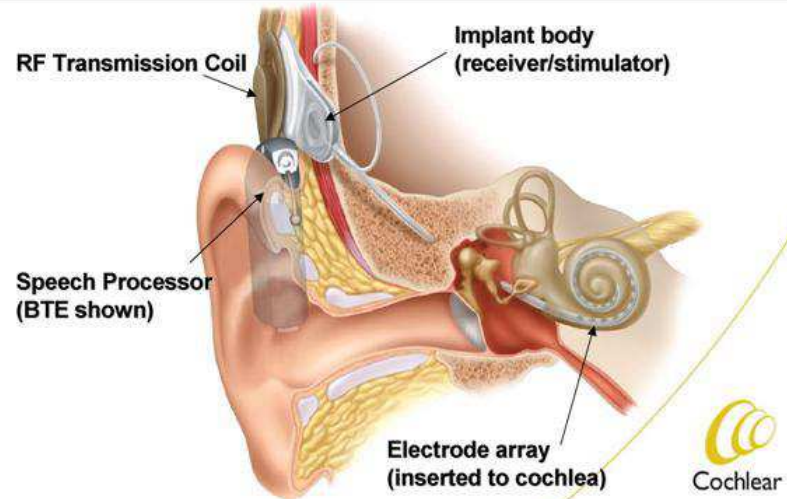
- Internal components surgically implanted
- External components typically worn behind the ear
- Suitable for patients with severe to profound hearing



Auditory brainstem implant

- May be helpful for those with absent or damaged auditory nerves

Components of the Nucleus®
Cochlear Implant System



Assistive listening devices

- Radio aid systems, infrared systems, induction loop systems
- Telephone amplifiers
- Vibrating alarm clocks –placed under the user’s pillow
- Flashing alarm clocks –light flashing signals the alarm
- Doorbell coupled to a lamp –flashes when doorbell is rung
- Smoke detector –light flashes to signal presence of smoke
- Text messaging on mobile phones and other text message display systems
- Baby cry alert system