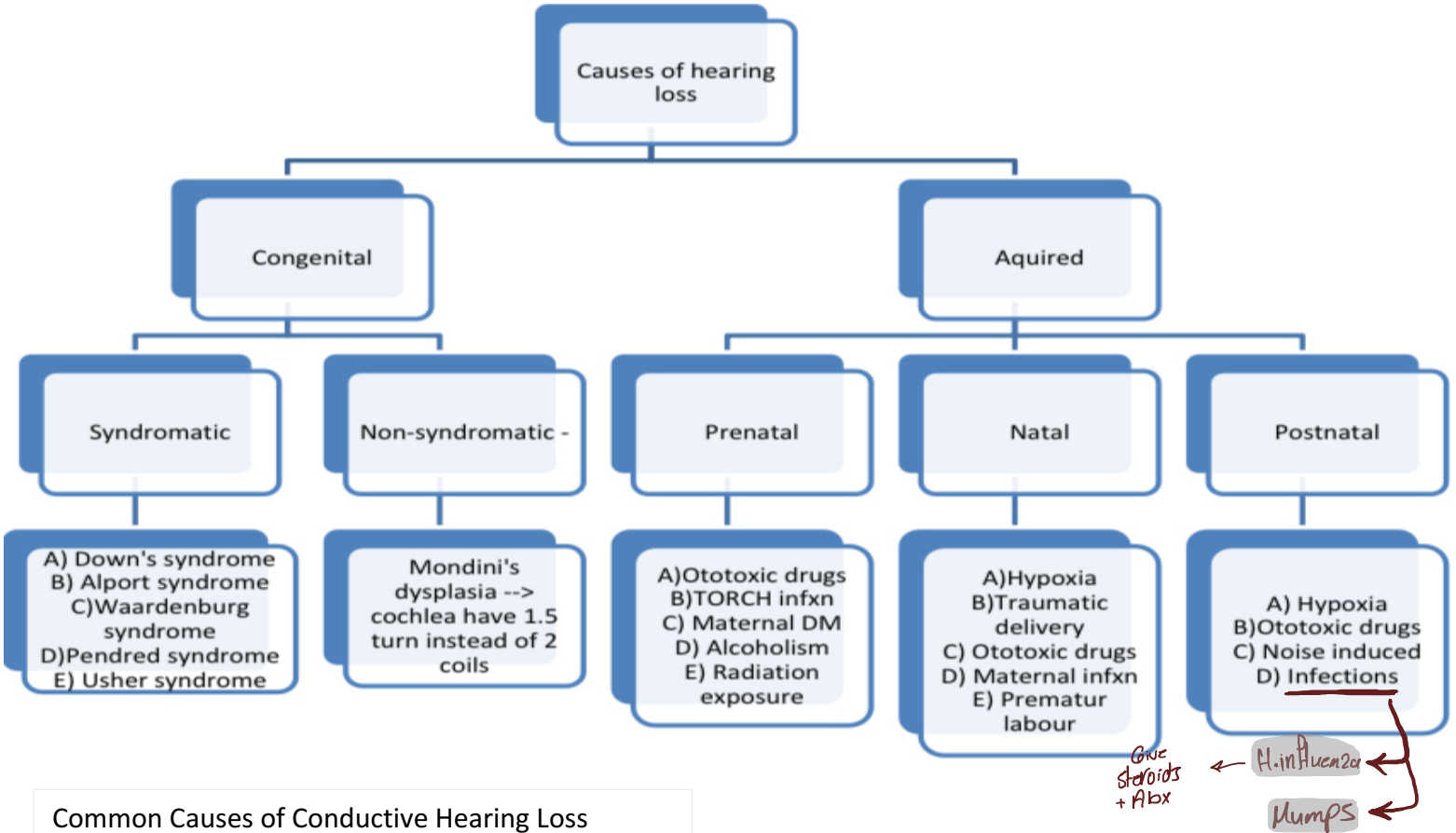


Assesment of Hearing Children

- **Sensorineural hearing loss (SNHL)** → the root cause lies in the inner ear or sensory organ (cochlea and associated structures) or the vestibulocochlear nerve (CN VIII)... about 90% of reported hearing loss.
- **Conductive hearing loss occurs** → through the outer ear, tympanic membrane (eardrum), or middle ear (ossicles).
→ more common and is treatable but it is difficult to detect.
- Hearing loss is more common in patients with mental retardation (→ language developmental delay) → is more common in patients with down's syndrome, turner syndrome , cleft palate (velopharyngeal insufficiency → secretory otitis media)
- The earlier it is detected, the less is the language and speech developmental delay.



Common Causes of Conductive Hearing Loss

1. Middle and outer ear anomalies
2. Otitis externa
3. Acute and chronic otitis media
4. Secretory otitis media
 - ✓ Low voice
 - ✓ Hearing better in noisy background
 - ✓ Hearing aids help better than in SNHL
 - ✓ Easier for surgeon to correct it

Common Causes of Sensory-neural Hearing Loss

As in graph !!

- ✓ Inappropriately loud voice
- ✓ Tinnitus
- ✓ Speech sounds distorted
- ✓ Background noise makes listening more difficult
- ✓ Hearing aids may help

	Sensorineural Loss	Conductive Loss
Anatomical Site	Inner Ear , CN 8, or CNS	Middle Ear , Tympanic Membrane, External Ear
Weber Test	Localizes to normal ear	Localizes to abnormal ear
Rinne Test	AC > BC Positive Rinne	BC > AC Negative Rinne

Testing of hearing :

1) Behavioral tests :

A. Behavioural observation audiometry:

→ For < 7 months, older children with no response to sound.

→ Normal responses:

- <4 months → auro-palpebral reflex which include eye widening, blinking, and tightening of the eye lid during sleep.
- 4-7 months → to side only
- 7-9 months → to side and indirectly below
- 9-13 months → to side and below
- 13-16 months → to side, below and indirectly above
- 16-24 months → to all directions

4, 7, 9, 13, 16, 24

B. Visual re-enforcement orientation audiometry :

→ For > 7 months

→ child response to sounds with different intensity and frequency is observed.

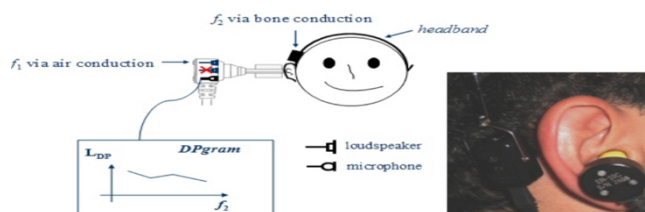
C. Play audiometry (PA):

- A pure tone audiometer usually relies on a user feedback button and, so, isn't practical for younger kids.
- PA makes it a game ... replacing the feedback device with activity-related toys such as blocks or pegs.

2) Electro-physiological tests : to detect the affected part

A. Otto-acoustic emission :

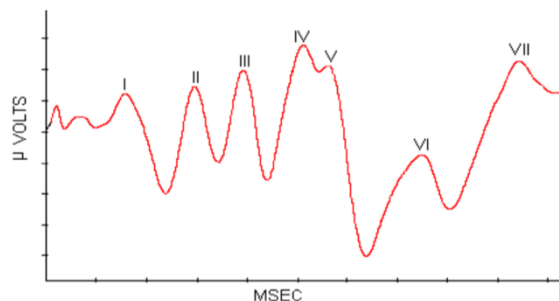
- to determine the **cochlear status**.
- sound is generated by a speaker and then a sensor will detect a soft sound which is generated by the cochlea in response to the auditory stimulus



B. Auditory brainstem response ABR :

- To test **auditory brainstem function**, More specific, under GA
- Waves of the ABR:

- I. Wave 1 peripheral part of cochlear nerve/ spiral ganglion
- II. Wave 2 central part of the cochlear nerve
- III. Wave 3 cochlear nucleus to superior olivary complex
- IV. Wave 4 Superior olivary complex to lateral lemniscus
- V. Wave 5 lateral lemniscus to inferior colliculus
- VI. Wave 6 Inferior colliculus to medial geniculate nucleus
- VII. Wave 7 Medial geniculate nucleus to Auditory cortex



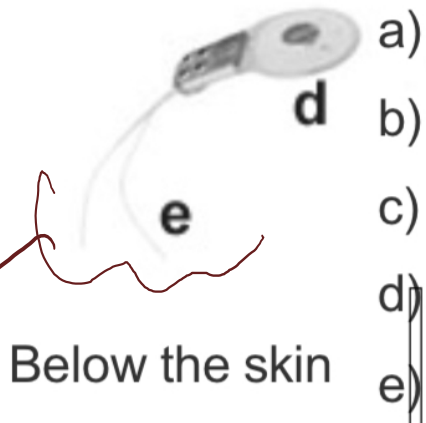
A typical ABR from an adult with normal auditory function.

C. Electro-cochleography:

→ under anaesthesia, picks electrical signal from different part of cochlea.

→ Treatment

- Hearing Aids
- Cochlear implants
- Hearing rehabilitation → sign language, school for deaf people, lip reading.



Below the skin

- a) Headset - microphone
- b) Speech processor
- c) Transmitter
- d) Receiver
- e) 22-Channel electrode

Cochlear implant device

