Undergraduate & Master's degree

NEWSTAR EAR CENTRE GH. LTD

Ghana's first accredited private ear centre!!!

Audiologist

Northwestern University

3rd year Ph.D student

Early Ears, Bright Futures: Building Future Success Through Early Hearing Screenings

Northwestern University
Hearing Aid
Laboratory

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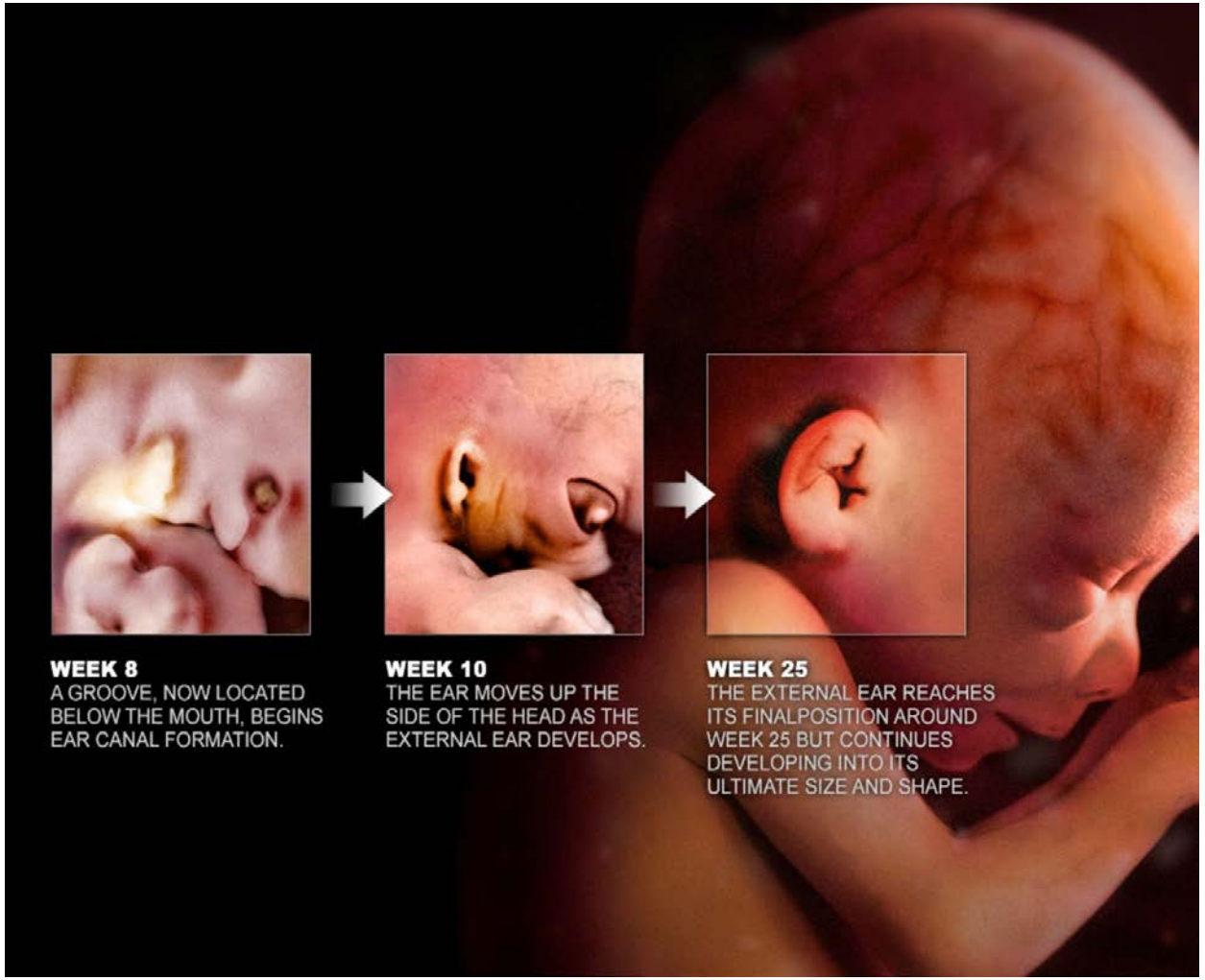
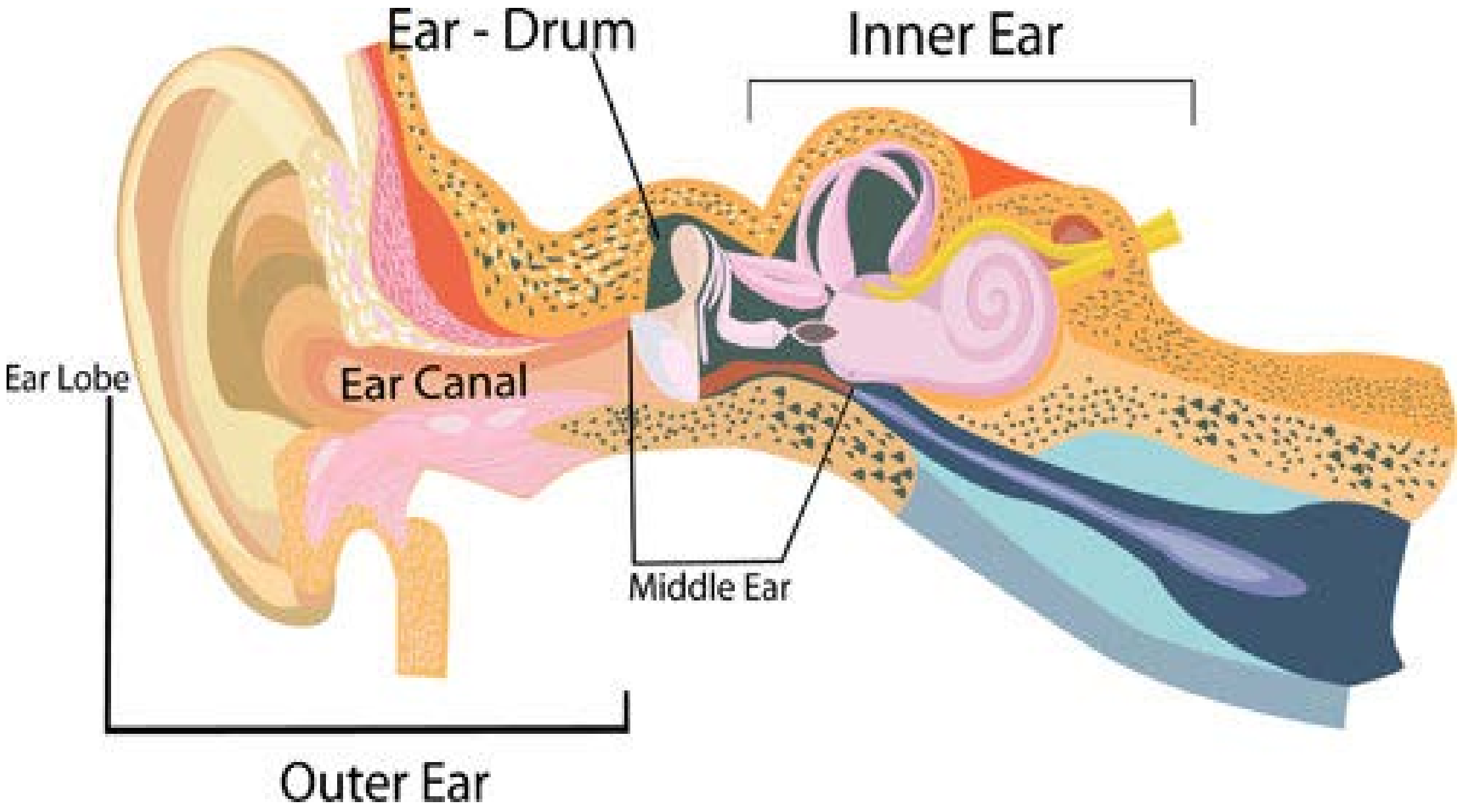
KEY STAGES OF THE DEVELOPMENT OF THE HUMAN EAR

- Development of the auditory system begins in the third week of gestation.
- From 20 weeks, the fetus starts to hear sounds.
- Adequate intrauterine auditory stimulation is necessary for the development of the inner ear and auditory centers in the brain.
- Both intrauterine and postnatal sound exposures are critical for the proper development of the auditory system.




Ear - Drum
Inner Ear
Ear Lobe
Ear Canal
Middle Ear
Outer Ear

Hearing Milestones in Early Childhood

Hearing and Understanding

0–3 Months

- Startles to loud sounds
- Quiets or smiles when spoken to
- Seems to recognize caregiver voice and quiets if crying
- Increases or decreases sucking behavior in response to sound

4–6 Months

- Moves eyes in direction of sounds
- Responds to changes in tone of your voice
- Notices toys that make sounds
- Pays attention to music

Hearing and Understanding

7 Months–1 Year

- Enjoys games like peek-o-boo and pat-a-cake
- Turns and looks in direction of sounds
- Listens when spoken to
- Recognizes words for common items like "cup", "shoe," "juice"
- Begins to respond to requests ("Come here," "Want more?")

1–2 Years

- Points to a few body parts when asked
- Follows simple commands and understands simple questions ("Roll the ball," "Kiss the baby," "Where's your shoe?")
- Listens to simple stories, songs, and rhymes
- Points to pictures in a book when named

- Intact auditory system is necessary for a child's speech and language acquisition as well as cognitive development.

- Hearing impairment may interfere with a child's speech and language acquisition as well as cognitive development.

CAUSES OF HEARING IMPAIRMENT IN CHILDREN

- **Genetic factors** - about 50% of PCHI (Gene mutation -120 known genes (80 associated with syndromes and 40, non-syndromic HI; Inheritance patterns)

  - **Syndromic HI** - 30% of genetic HL (Has HL as one of the clinical symptoms)

    Over 400 syndromes include HL as a feature.

    e.g. Down syndrome, Turner syndrome, Usher syndrome, Waardenburg syndrome

  - **Non-syndromic HI**- Independent of any syndrome
    80% of genetic deafness

    Mutations in the GJB2, which produces the protein Connexin 26 is responsible for 50% of non-syndromic HL e.g. Adamorobe in Ghana

Prenatal- Infections during pregnancy (rubella, toxoplasmosis, cytomegalovirus)

Maternal therapy (certain medications taken during pregnancy- Alcohol, ototoxic drugs)

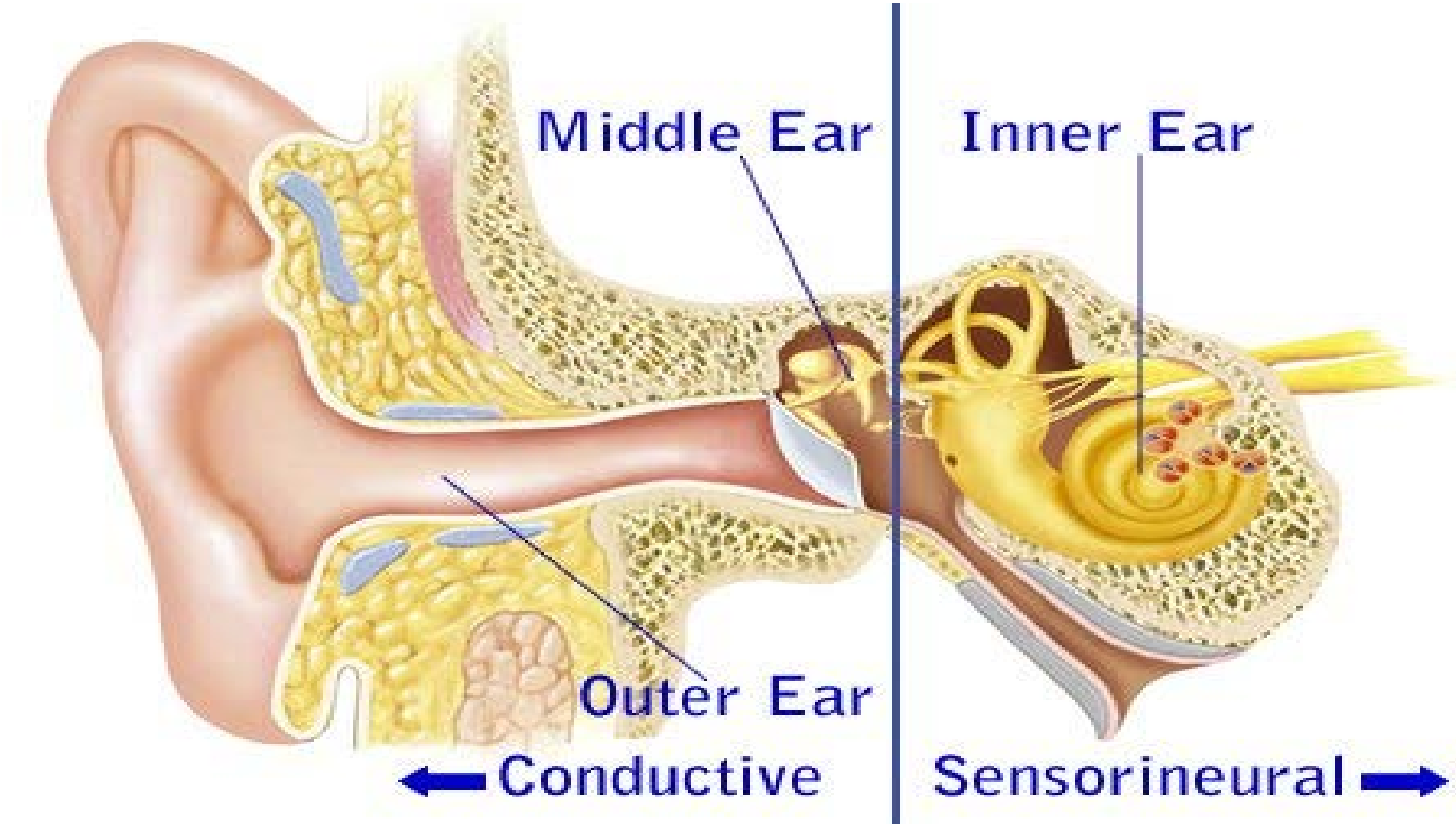
Perinatal- conditions and complications around the time of birth

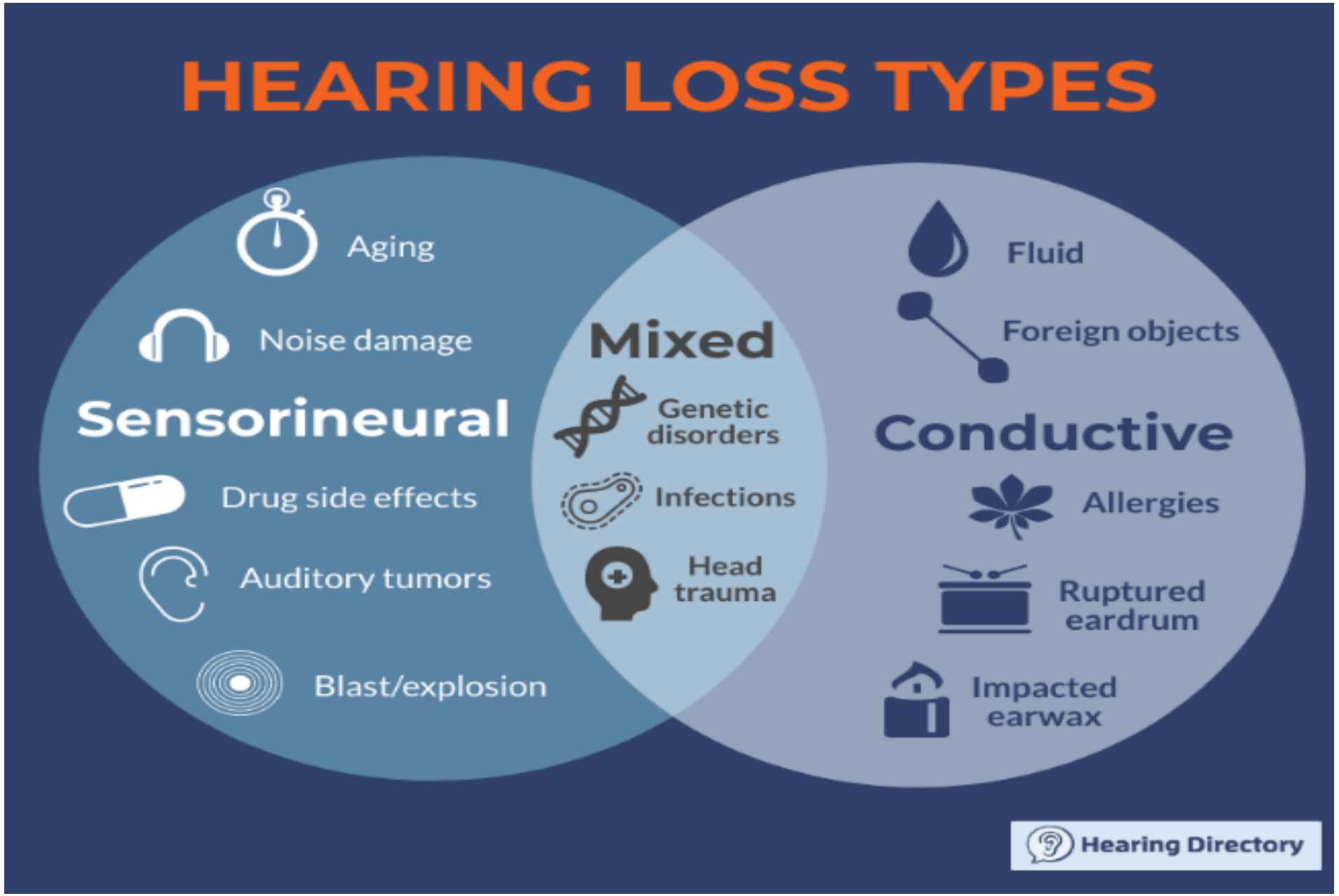
- Prematurity (NICU)
- Anoxia
- Severe jaundice,
- Low birth weight
- Ototoxic drug treatments
- Neonatal sepsis
- Birth trauma

Postnatal- Factors that could cause HI after birth

- Bacterial meningitis,
- measles,
- mumps
- ototoxic treatments
- chemotherapy

TYPES OF HEARING LOSS




HEARING LOSS TYPES
Aging
Noise damage
Sensorineural
Drug side effects
Auditory tumors
Blast/explosion
Mixed
Genetic disorders
Infections
Head trauma
Fluid
Foreign objects
Conductive
Allergies
Ruptured eardrum
Impacted earwax
Hearing Directory

Difference Between Hearing and Listening

Hearing → **Listening**

- Hearing involves detecting sound waves and making them accessible to the brain- Audiologist
  - Acoustic access
  - Improving sound quality
- Listening is the active process of focusing on and making sense of the sounds that are heard- Parents, teachers, Speech Therapists.
  - Focus and attention
  - Making sense of sound

Implications of Hearing Disruptions

- ❏ Hearing impairment impacts language exposure and access in children

- ❏ Children without appropriate language exposure and access fall behind their hearing peers in multiple areas:

    - ➔ Delays in speech and language development
    - ➔ Cognition (memory, attention, and problem-solving skills)
    - ➔ Reading
    - ➔ Social-emotional development
    - ➔ Lower academic achievement
    - ➔ Difficulties in social integration and forming meaningful relationships.

These delays can persist into adulthood.

- ❏ Hearing impairment affects about 34 children globally.

Joint Committee on Infant Hearing (JCIH)

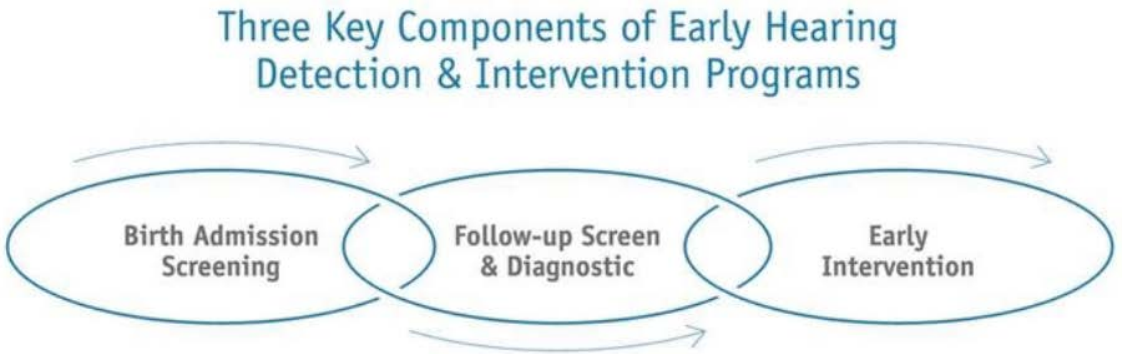
Key recommendations

- Universal Newborn Hearing Screening (UNHS)
- Follow-Up and Diagnosis
- Early Intervention
- Ongoing Monitoring/regular surveillance/risk factor monitoring
- Comprehensive Support

Early Hearing Detection and Intervention

Goal of EHDI (Early Hearing Detection and Intervention) :

- **Primary Objective:**
  - ➔ Ensure that all infants with hearing impairment are identified as early as possible.
  - ➔ Initiate appropriate intervention by 3–6 months of age.



Benchmark

- ➔ 1-3-6 benchmark (screening completed by 1 month, audiologic diagnosis by 3 months, enrollment in early intervention by 6 months)
- ➔ 1-2-3 benchmark is better
- ➔ 6 weeks- 4 months- 8 months (South Africa)
- ➔ Ghana??

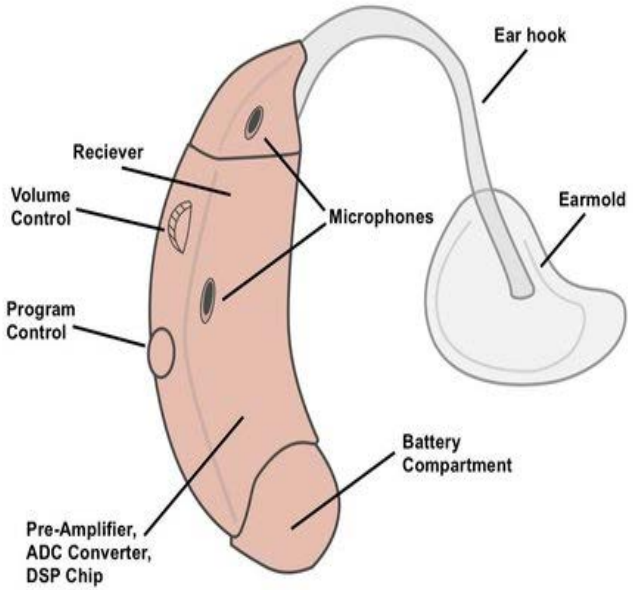
When timelines are met, the linguistic competence and literacy development are maximized

Hearing Screening

- OAE testing is fast and cheap but is easily influenced by ear canal obstruction or middle ear effusion and is not able to detect retrocochlear hearing impairment.

- AABR is slower, more expensive and requires patient immobility (natural sleep in newborns), but is able to detect retrocochlear losses.

INTERVENTION: HEARING AIDS

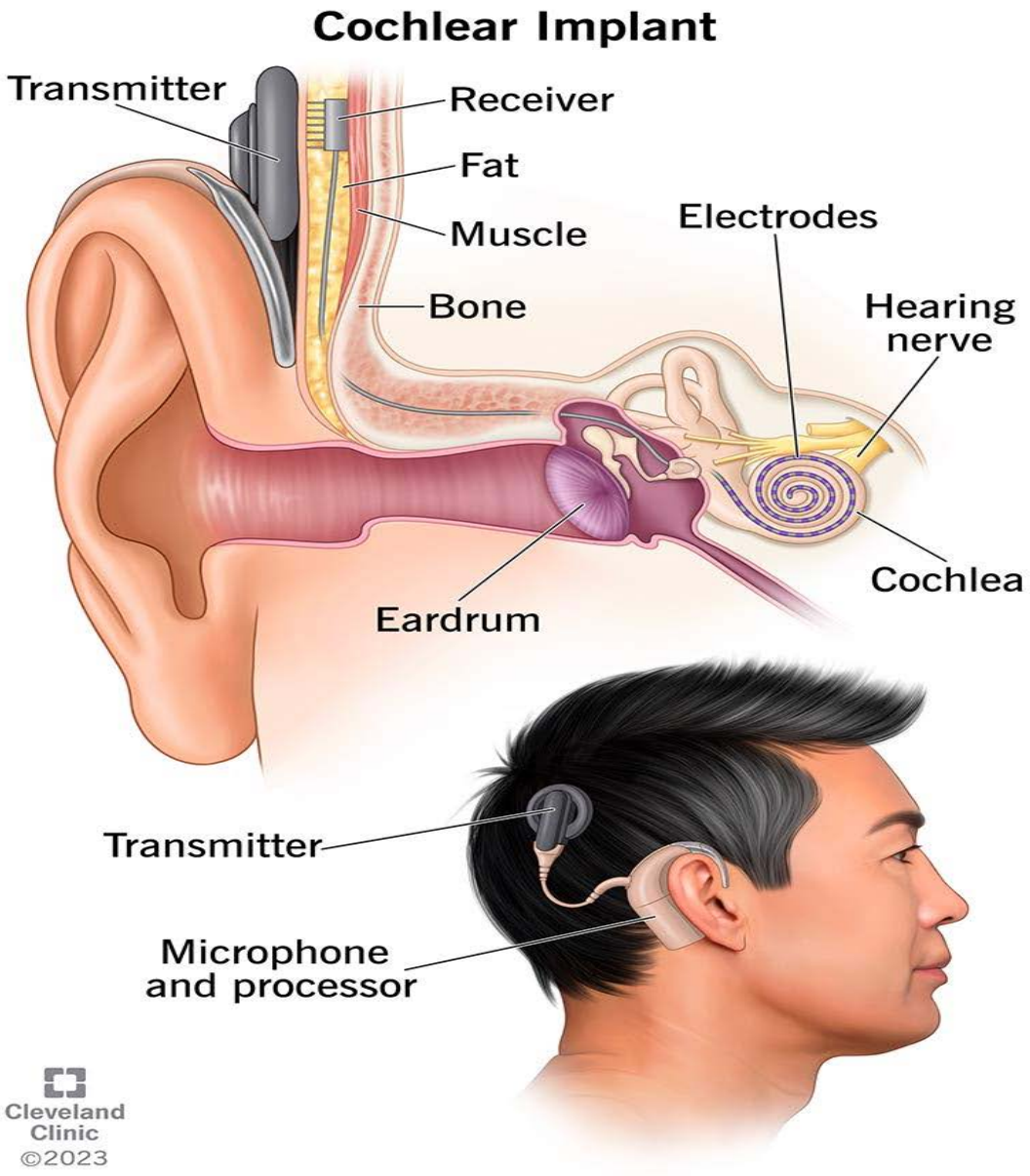


A) Behind-the-ear (BTE) Hearing Aid

B) In-the-ear (ITE) Hearing Aid

C) Completely-in-the-canal (CTC) Hearing Aid

INTERVENTION: COCHLEAR IMPLANTS



What should you do?

- ❑ Monitor typical developmental milestones for hearing
- ❑ Be vigilant and observe how the child responds to sounds and speech
- ❑ Create a language-rich environment (consistent communication, reading aloud)
- ❑ Seeking specialized services from Audiologists, Speech therapists, Pediatricians

Conclusion

- Hearing is essential for the acquisition of speech, language, and learning development
- Hearing loss is the most common sensory deficit and one of the most common congenital abnormalities.
- Hearing loss harms the development of newborns and results in them living with a significant handicap if not detected and treated early.
- Early detection of hearing loss and prompt intervention are of utmost importance to minimize the negative impact of hearing loss.


Questions
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Answers
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