

Hearing Screenings for 0-5 yrs.

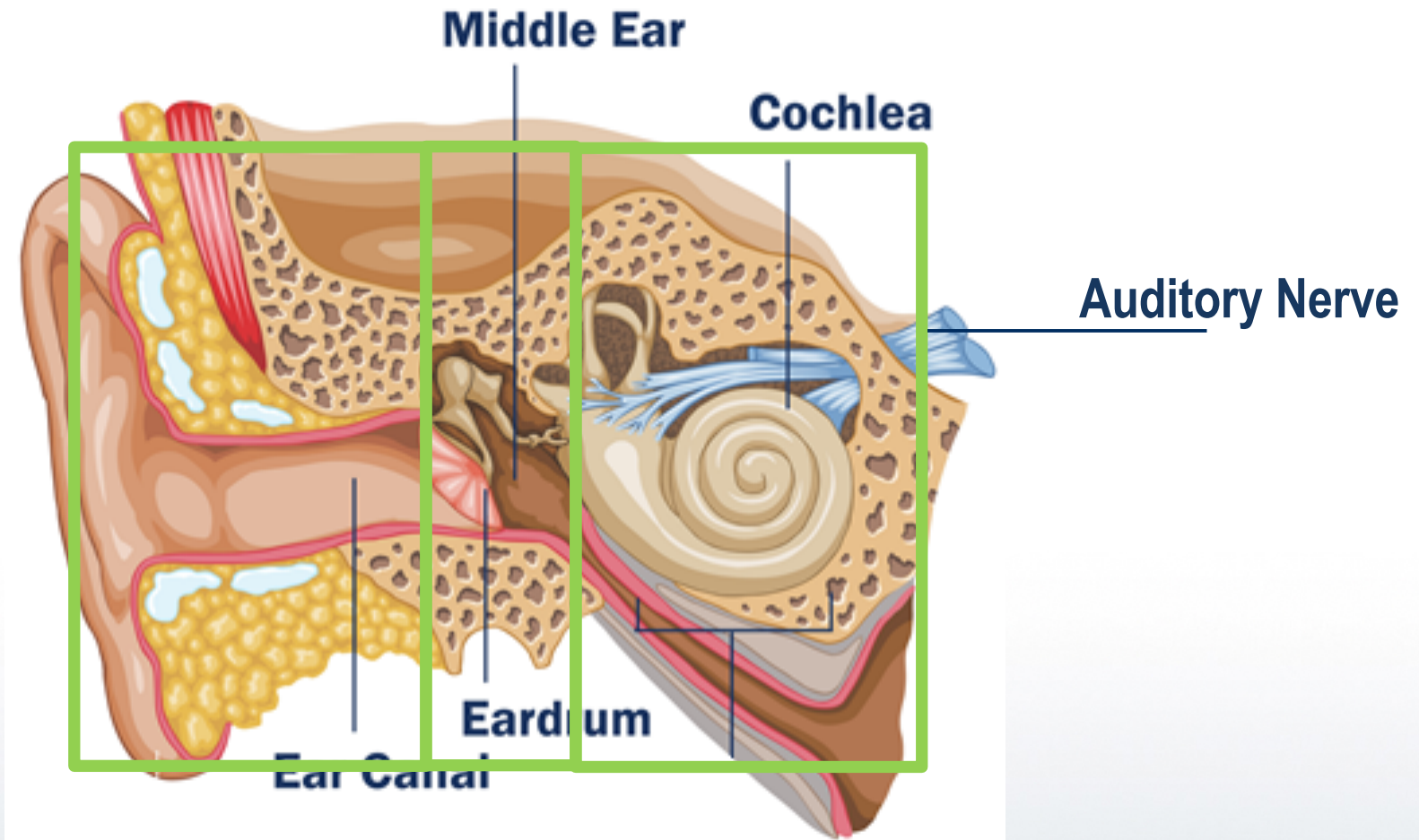
Get to know the how and why!

Agenda

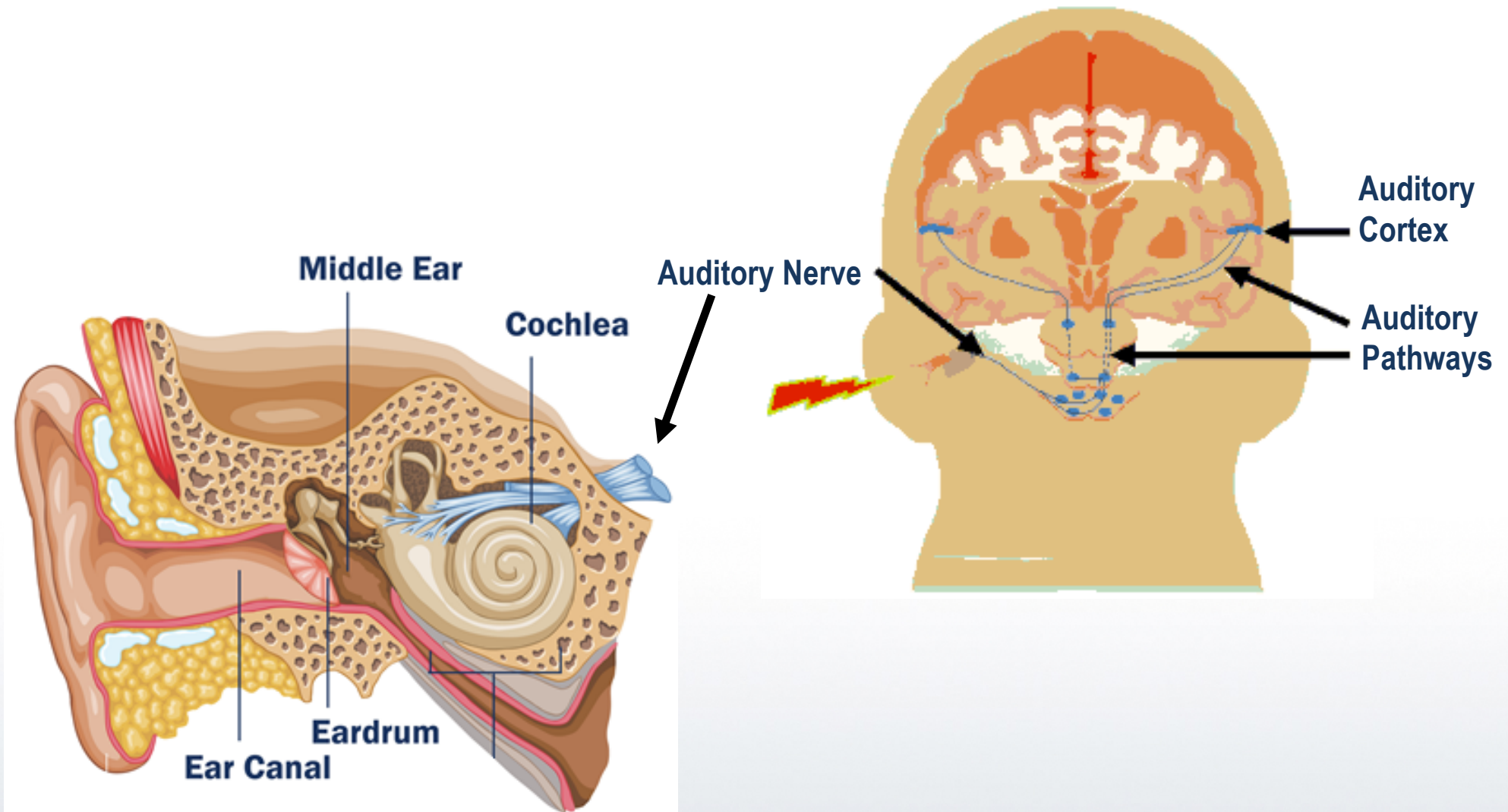
1. Basic anatomy
2. How we hear
3. Importance of hearing screenings
4. Hearing screening recommendation
5. Hearing screening process

Basic Anatomy

Hearing Pathway



Hearing Pathway



Hearing Pathway



4/7/20

Hearing Pathway



<https://youtu.be/dyenMluFaUw>

Important of Early Childhood Screenings

Importance of Preschool Screenings

- Hearing loss is the number 1 birth defect in the US.
 - 1-3 in 1000 at birth
- Increase to 6-10/1000 children in the school-age population
 - Estimated 20% of all cases of childhood hearing loss acquired after NHS

Importance of Preschool Screenings

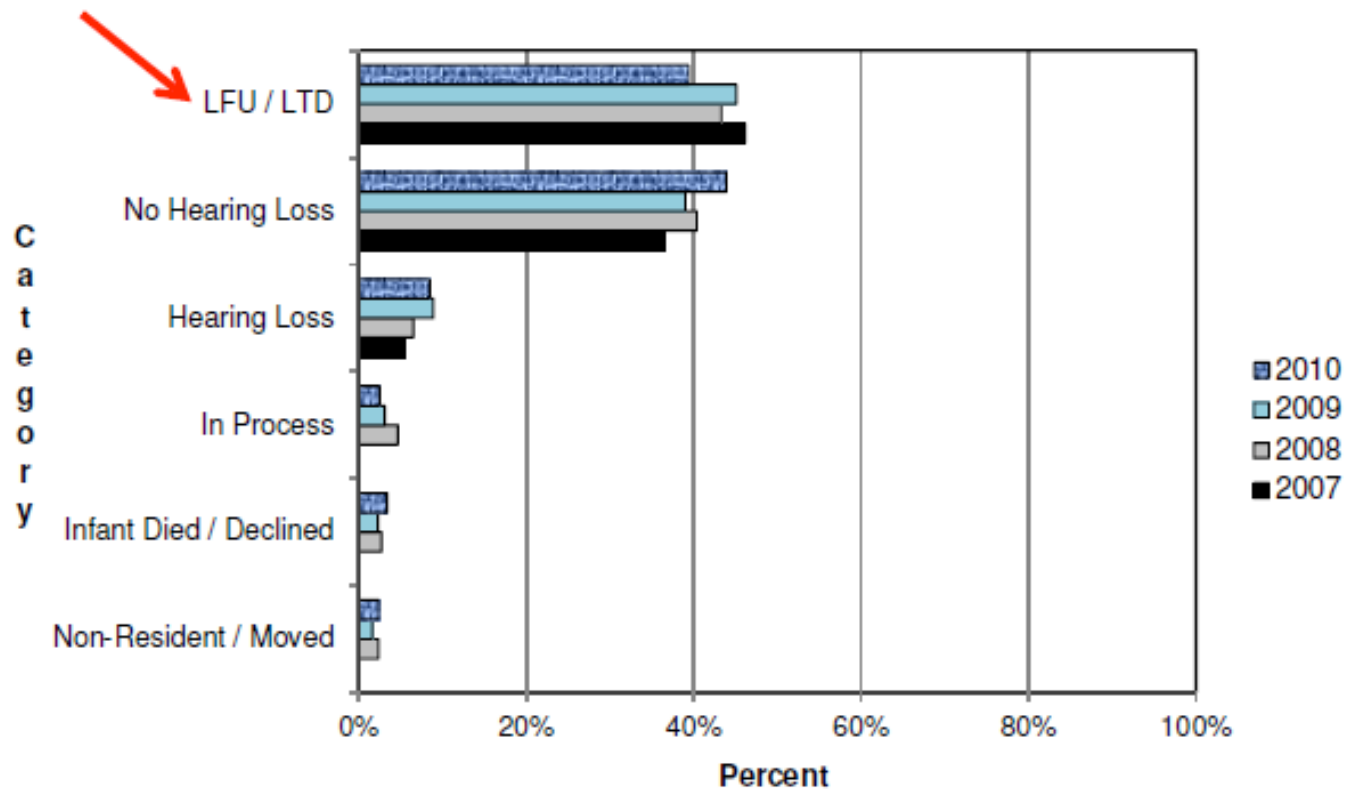
- Universal Newborn Hearing Screenings (UNHS) implemented 2000
 - ~3% nationwide are not screened at birth.
 - Centers of Disease Control and Prevention
 - In 2016 - 3,830,526
 - 74,742 (2%), were not screened at birth
 - 28,000+ Lost to follow up (LFU)
 - Parental refusal/infant death
 - Hospital discharge before screening completed
 - Transfer to another hospital before screening completed
 - The rescreening is not completed as scheduled in hospital
 - 65,000+ did not pass
 - 24,322 (37.3%) no documented diagnosis (LFU)
 - Parents declined services, infant death
 - Moved out of jurisdiction
 - Unable to contact/unresponsive/unknown

<https://www.cdc.gov/ncbddd/hearingloss/2016-data/01-data-summary.html>

Importance of Preschool Screenings

CDC EHDI (December 2012)

Documented Status of Infants Not Passing Hearing Screening
United States, 2007–2010*



Importance of Preschool Screenings

Natural extension of the NHS program:

- Have access to the kids
- Up to 50% of the kids that are part of NHS are lost to follow up
- Ear infections are high in this age group
- Hearing loss occurring after birth
- Early diagnosis and intervention is key to helping the kids

Consequences of Undiagnosed Hearing Loss

- Language and Cognitive Development
 - Vocabulary
 - Sentence Structure
 - Speaking
 - Academic Achievement
- Social Functioning
- \$1,000,000

Importance of Preschool Screenings

- Most important stage of language development occurs before age three.
- Earlier we detect and intervention provided, children can meet age appropriate language and concept development.
- Research indicates that children identified in the first 6 months of life, received intervention services, developed language within the normal range.
- Hearing screening in the 0-5 age range affects early intervention and minimize negative consequences.

Hearing Loss Simulation



<https://www.youtube.com/watch?v=1EJ4g3J6cJM>

Hearing Screening for Early Childhood

Screening Methods

- Pure tone screening been widely used since mid 1960s
- OAE came into play in mid 1990s
 - First in UNHS
 - Now recommended method for 0-3 year old in early care and education settings.

Hearing Screening Recommendations

Preschool hearing screening are recommended by a variety of organizations, which include, American Academy of Pediatrics, JCIH, American Academy of Audiology and American Speech and Hearing Association.

2011 American Academy of Audiology (AAA) Clinical practice Guidelines on Childhood Hearing Screening:

- Pure tone: 3 years (chronologically and developmentally) or older
 - 20 dB HL at 1000, 2000, 4000 Hz (each ear).
- OAE: 0-3 years or ability levels < 3 years old



Pure Tone Hearing Screening

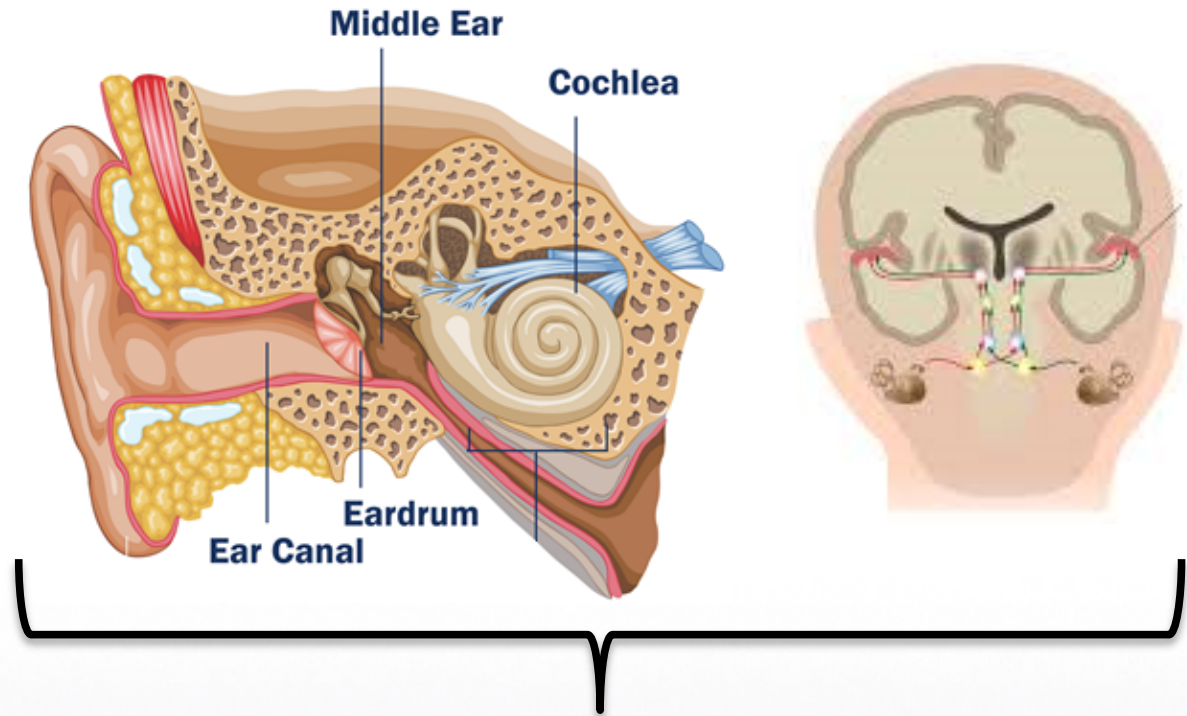
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Pure Tone Audiometry

- Audiometry



Nehoustonhearing.com



Pure Tone Audiometry

- Provides information about the entire auditory system
 - Information child's ability to both hear and respond
- Subjective test
- Recommended ages: 3 yrs +
- Equipment: Audiometer (air only)

Pure Tone Audiometry

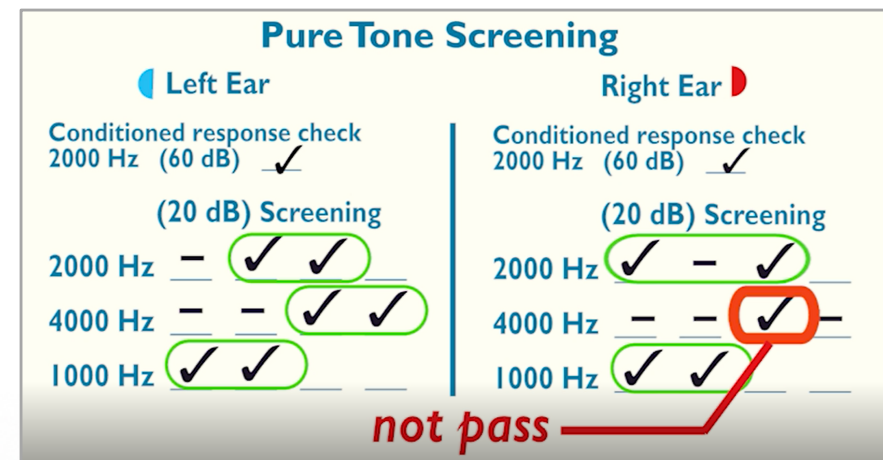


Tips and Tricks

- Make it a game (toys)
- First you want to “condition” the child to listen and make desired response
 - Place headphones on table, Set volume high and present tone.
 - Guide arm during presentation of tone
- Change signal type to pulse, warble or pulse/warble
- Reinstruct when get distracted
- Don't provide visual cues
- Set up screening in as least distracting location
- Require 2 responses at each frequency (no more than 4 presentations)
- Move quickly
- Give results to parents

Pure Tone Screening Results

- Pass:
 - All tones at screening levels in both ears
- Refer:
 - When even one frequency in one ear does not respond
- Could Not Screen:
 - Lack of cooperation
 - Inability to be conditioned to the response/task, etc.



<http://kidshearing.org>

Select Picture Audiometry



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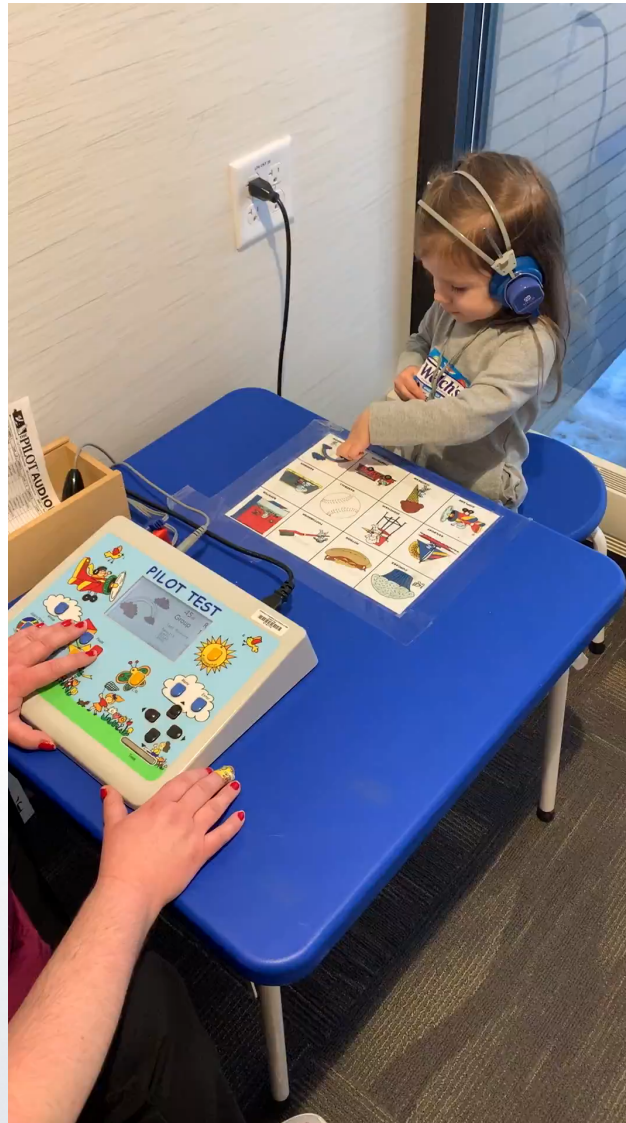
Select Picture Audiometry



Process:

- Must verify child knows pictures
- Tests automatically 50 to 15 dB HL
- Speech is offered with English and Spanish
- Tester can see image on screen and child's response

Select Picture Audiometry



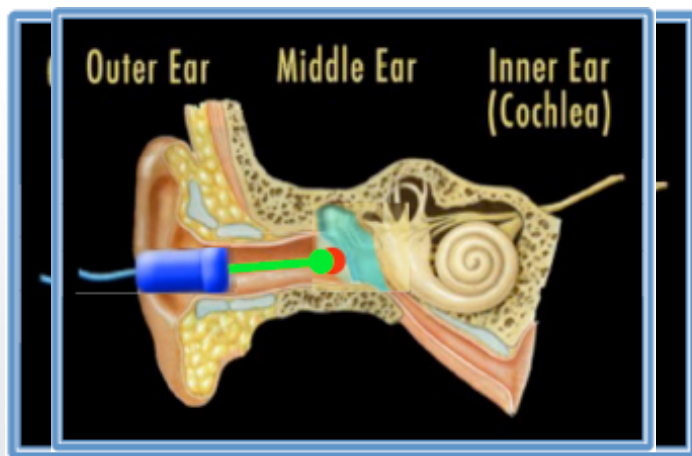


OAE Hearing Screening

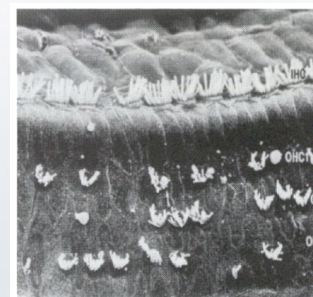
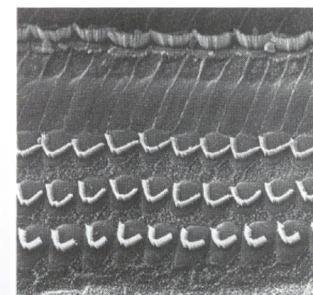
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OAE Review

- OAEs - Low-level sounds generated by the outer hair cells of the cochlea (inner ear) in response to auditory stimuli
- OAE stimuli types: Distortion product (DPOAE), Transient (TEOAE)
 - DPOAE most popular for schools
 - Probe presents 2 tones, microphone pick up DPOAE response
- Practical for screening programs but does not identify all hearing loss
 - Mild hearing loss
 - Auditory Neuropathy Spectrum Disorder (ANSD)
 - Impacted by middle ear pathologies

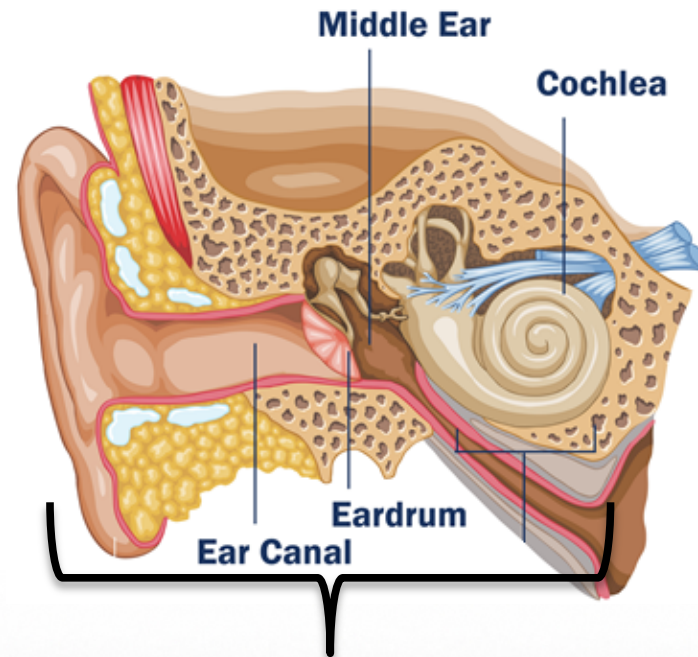


<http://kidshearing.org>



OAE Testing

- Otoacoustic Emissions



Otoacoustic Emissions (OAE) Testing

- Objective test
- Evaluates outer ear to cochlea
- Recommended age: 0-3 yrs or special needs, ESL, etc.
- Equipment: OAE

Visual Inspection

Visual inspection:

- Completed before start of test
- Inspect outer portion of ear and make note of any abnormalities
- Gently pull up and back to open the ear canal
 - OAE: take note for eartip size
- If there is a blockage or drainage with a foul smell do not proceed and refer to medical personnel



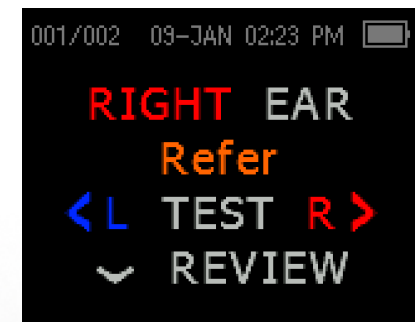
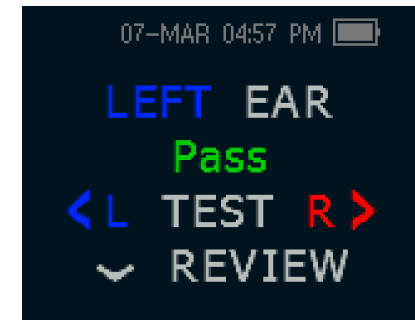
How to Conduct an OAE Test

1. Review probe tip to make sure nothing blocking probe
2. Visually inspect ear to determine correct eartip size
3. Insert probe:
 - Pull down/back on ear (infant)
 - Pull up/back on ear (child)
 - Insert by pointing towards nose and then push back into ear canal with slight twist
4. Press start, device completes an auto calibration check at start of test
5. Test will take 20 seconds
6. Complete one ear, then switch to next ear



OAE Screening Results

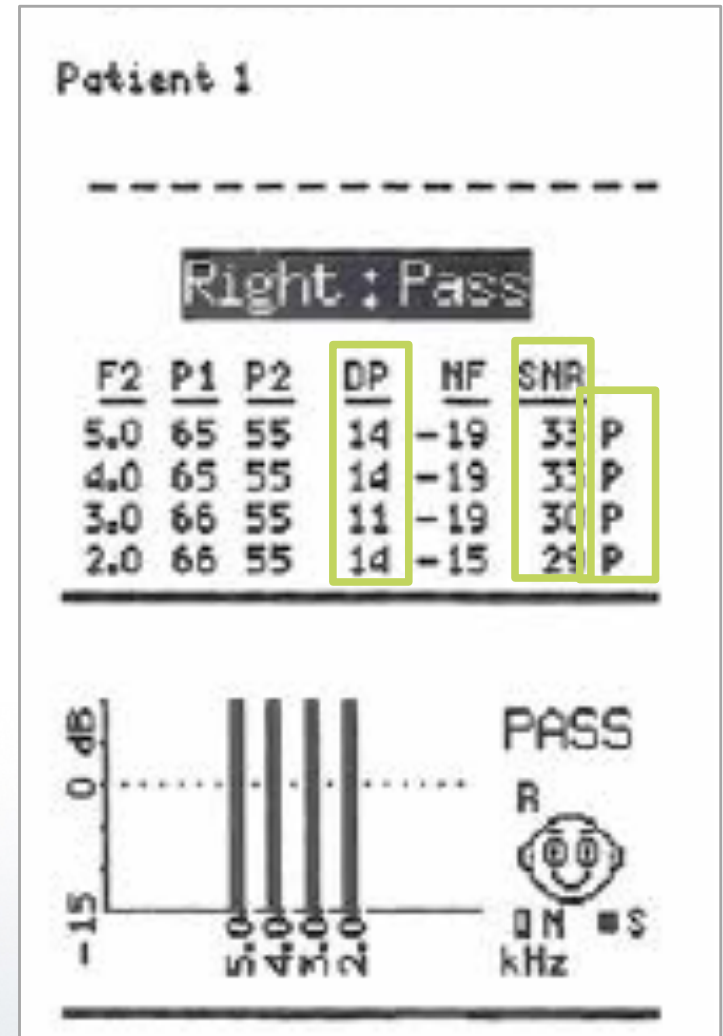
- Pass:
 - Meet equipment protocol criteria
- Refer:
 - Doesn't meet protocol criteria
- Could Not Screen:
 - Blocked, Noisy, No Seal
 - Test won't progress
 - Child would not allow test



OAE Screening Protocol

- Multiple protocols within your device
 - Based on Averaging Time
- Passing criteria:
 - DPOAE – noise floor => 6 dB (SNR)
 - DPOAE amplitude => 0 dB SPL*
 - Pass 3 out of 4 frequencies

*Minimum amplitude setting



OAE: Tips and Tricks

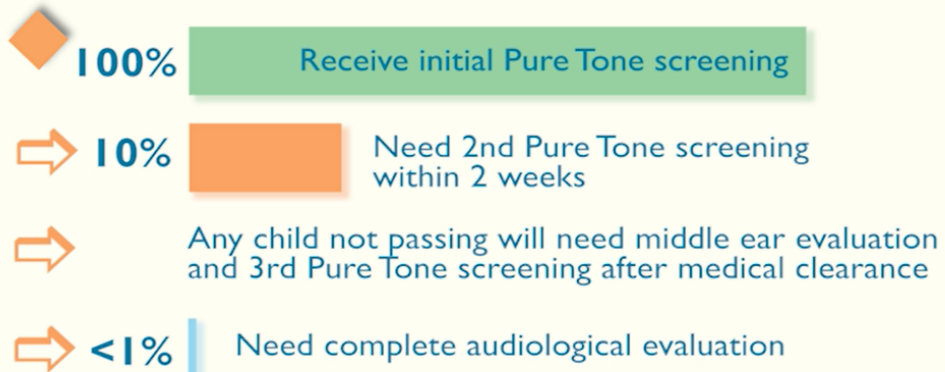
- Eartip selection:
 - Trial and error
 - Foam eartips
- Make sure completely on end of probe



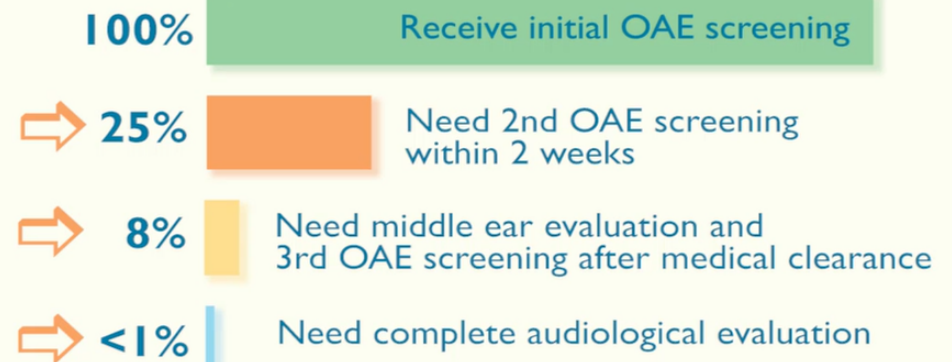
- Eartips are specific to device
- Have multiple probe tips on hand
- Hearing screening consist of no more than two attempts
 - Assuming no equipment problems or environmental interference
- What about PE-tubes??

Screening Outcomes

Pure Tone Screening Protocol Snapshot



OAE Protocol Snapshot



Retrieved from: kidshearing.org

Screening Outcomes

- Picture of a child's hearing at one moment in time.
- Ongoing observations by families, teachers, home visitors, and other staff
- When concerned, speak to child's health care provider immediately

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Questions?



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