Audiometric Techniques

Program in Audiology and Communication Sciences
Pediatric Audiology Specialization

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Outline

• Ear Anatomy
• Types of Hearing Tests
• Types of Hearing Loss
• Reading an Audiogram
• Next Steps
Ear Anatomy

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Hearing Tests

Types of tests you may see at your child’s appointment:

- Otoscopy
- Tympanometry
- Otoacoustic Emissions (OAEs)
- Auditory Brainstem Response (ABR)
- Behavioral Audiometric Testing
Otoscopy

The audiologist uses an otoscope to examine the outer ear, including the ear canal and ear drum.
Tympanometry

Measures the movement of the eardrum

- Soft earbud is gently placed at opening of ear canal
- Child may hear a humming sound and feel a slight pressure change (similar to going up in an elevator)
- Child may hear a tone to measure muscle contraction within the middle ear
- Child simply sits during testing
Otoacoustic Emissions (OAEs)

A sound produced by the inner ear in response to a signal

- Soft earbud is placed at opening of ear canal
- A signal is presented to the child’s ear
- OAEs detect:
  - blockage in the ear canal
  - fluid or impairment in the middle ear
  - function of the inner ear
- Healthy ear responds to the signal by producing a sound
Auditory Brainstem Response (ABR)

Tests the hearing system from the ear to the brainstem

- Sounds are played through soft earbuds in the child’s ears
- Sticker electrodes are placed on the child’s head to measure responses
- Responses represent how sound travels from the outer, middle and inner ear to the brainstem
- Test is performed while the child is resting or sleeping
Behavioral Audiometry

Many different sounds are presented to find the softest sounds the child can hear

• Types of sounds used during testing:
  ○ Beeps or tones
  ○ Static or wind noises
  ○ Speech

• The child may listen through speakers, headphones, or a headband with a small vibrator that sits behind the child’s ear
Audiometric Techniques

- **Behavioral Observation Audiometry (BOA):** audiologist looks for behavioral responses to sound such as eye movements.

- **Visual Reinforcement Audiometry (VRA):** audiologist looks for responses to sound through the use of lights and moving toys.

- **Conditioned Play Audiometry (CPA):** child responds to a sound by completing a play-based task.

- **Conventional:** child raises hand or pushes a button when he or she hears a sound.
Reading an Audiogram

An audiogram is a graph of your child’s hearing.

- From left to right, the chart represents different pitches. Low pitches are on the left and high pitches on the right, similar to the keys on a piano.

- From top to bottom, the chart represents the loudness of a sound. Very soft sounds are toward the top of the chart, and very loud sounds are at the bottom.
The Audiogram

This audiogram graphs everyday sounds and speech by their pitch and loudness.
Types of Hearing Loss

Describes where hearing loss is in the hearing system

- **Conductive:** hearing loss in the outer and/or middle ear
- **Sensorineural:** hearing loss in the inner ear
- **Mixed:** hearing loss in the outer/middle and inner ear
Audiogram Symbols

Example audiograms of conductive and sensorineural hearing loss

**Conductive Hearing Loss**

**Sensorineural Hearing Loss**

- **O** - the softest sound heard at each pitch in the right ear
- **X** - the softest sound heard at each pitch in the left ear
Degrees of Hearing Loss

Hearing loss can be described in degree, ranging from slight to profound.

It is important to note that all hearing losses, regardless of degree, can affect your child’s ability to develop speech and language.
Next Steps

• Depending on your child’s hearing loss, he or she may not be able to hear certain sounds that are important for developing speech and language.

• There is much that can be done to help your child’s hearing loss and communication skills.

Contact a pediatric audiologist to learn more about treatment and communication options.

http://kidshearinghealth.wustl.edu