Healthy Ears

Catherine Rees Lintzenich, MD
Riverside ENT Physicians & Surgeons
Healthy Ears

- Basic ear anatomy
- Outer Ear Problems
- Middle Ear Problems
- Inner Ear Problems
External Ear

- The EAC (external auditory canal) is about 2.5 cm long
  - Lateral 1/3 is made of cartilage and has hair follicles and cerumen (wax) producing glands
  - The medial 2/3 is made of bone
- The external ear and EAC provide a 10-15 dB gain in the 3-5 kHz region
Middle Ear

• Transmits acoustic energy from the air filled external ear to the fluid filled inner ear (cochlea).

• Through the movement of the energy from the tympanic membrane through the malleus, incus, and stapes, there is a 17-20 x gain
Inner Ear

• Cochlea 35 mm long coiled bony tube
• Transduction of mechanical (acoustic energy initiated from the stapes footplate) to electrical (neural energy to cranial nerve VIII)
  • Outer and Inner hair cells
Outer ear problems

- Cerumen impactions
- Otitis externa (aka Swimmer’s Ear)
Cerumen/Ear Wax

- Generated from the lateral 1/3 of the ear canal
  - Combination of sebaceous and sweat gland production
- Prevents infections of the ear canal and lubricates the ear canal skin
- Q-tips often just push the cerumen in deeper
- If the ear drum is intact, it is acceptable to use over-the-counter ear wax removal kits or have your ears flushed in your primary care office
- If going to an MD office for cerumen removal, use the OTC kit one week prior
Otitis Externa

- Hallmark is pain
- Treated with antibiotic ear drops
- Often the ear needs to be debrided for the treatment to be effective
Middle ear problems

• Otitis Media ("ear infection")
  • Acute bacterial
  • Chronic serous

• Tympanic Membrane Perforation

• Otosclerosis
  • Fixation of the ossicles, usually causes unilateral hearing loss; usually familial

• Cholesteatoma
  • Congenital versus acquired
  • Destructive skin cyst in the middle ear
  • Associated with chronic otitis media
Otitis Media
Conductive Hearing Loss
Pressure equalization tube
Tympanic Membrane Perforation
Eustachian Tube Dysfunction

• Your ear is supposed to “pop” when you swallow, yawn, blow your nose, etc.
• Anything that affects your nose/sinuses can affect the Eustachian tubes
• If you are having trouble with your ears feeling full intermittently, popping your ears several times per day (every hour) will help!
• There are devices manufactured to help with this
• TMJ typically mimics Eustachian tube dysfunction
  • So can hearing loss
Inner Ear Problems

• Sensorineural Hearing Loss
• Balance problems
What is a decibel?

- Unit used to measure the intensity of sound or the power level of an electrical signal by comparing it with a given level on a logarithmic scale
  - Zero dB = near total silence/smallest audible sound
  - 10dB = 10 times more powerful than 0 dB
  - 20dB = 100 times more powerful than 0 dB
  - 30 dB = 1000 times louder than 0 dB
- Any sound above 85 dB can cause hearing loss
### Common Sounds and Sound Levels (dBA)

- **Air raid siren at 50 ft (threshold of pain)**: 130 dBA
- **Maximum levels in audience at rock concerts**: 120 dBA
- **On platform by passing train**: 110 dBA
- **Typical airliner (B737), 3 miles from take-off (directly under flight path)**: 90 dBA
- **On sidewalk by passing bus**: 80 dBA
- **On sidewalk by passing typical automobile**: 70 dBA
- **Busy office**: 60 dBA
- **Typical suburban area background**: 50 dBA
- **Library, Bedroom at night, Isolated broadcast study**: 40 dBA
- **Leaves rustling**: 20 dBA
- **Just Audible**: 10 dBA
- **Threshold of Hearing**: 0 dBA

### Loudness Compared to 70 dBA

- **32 x as loud**
- **16 x as loud**
- **4 x as loud**
- **1/4 x as loud**
- **1/16 x as loud**

*Source: Handbook of Environmental Acoustics, James P. Cowan, 1994*
Ears and shooting

• If you shoot guns and are right-handed:
  • Greater hearing loss is in the LEFT ear
  • The greatest acoustic energy is at the muzzle of the gun, which is closest to the left ear
  • The right ear is protected by the head-shadow effect (which is attenuation of sound by the head, 5-15 dB)
Sensorineural Hearing Loss

- Normal part of aging process
- Accelerated by genetics, autoimmune disease, viruses, NOISE
- Irreversible in most cases

- SUDDEN hearing loss in one ear should always be evaluated promptly!
Tinnitus

- The perception of noise or ringing in the ears
  - “phantom noise”
- Usually a symptom of hearing loss
- Sometimes associated with infection, wax impaction
- Aspirin, diuretics, other meds can make it worse
- Worse with anemia, high blood pressure
- Pulsatile tinnitus can be caused by a blood vessel disorder
Balance problems

• Complex relationship between inner ears, spine, brain, proprioception, eyes
• Medication sides effects, cardiovascular problems, anemia, stroke, eye problems, spine problems
• Ear causes of dizziness:
  • Acute labyrinthitis
  • Meniere’s disease
  • BPPV
Acute Labyrinthitis

- Sudden debilitating vertigo lasting hours to days, typically incapacitating and associated with nausea/vomiting
- With or without hearing loss
- Will have milder recurrences over the next several weeks, eventually will improve
- “Inner ear infection”
Meniere’s Disease

• Spinning dizzy attacks (vertigo) lasting for hours to days continuously
  • Typically preceded by: ear ringing/roaring, ear fullness, sudden loss of hearing
• Hearing fluctuates
• Probably a buildup of fluid within the inner ear
BPPV (benign positional paroxysmal vertigo)

- Spinning vertigo that lasts 10-60 seconds, occurs a few seconds after turning head AGAINST gravity
- Not typically associated with nausea/vomiting
- Not associated with hearing loss/tinnitus
- Can usually be fixed with exercises
Thank you!

• Catherine Rees Lintzenich, MD
• 737-345-2600

• Great resource: www.entnet.org