Optimizing Patient Care: The Medical Investigation of Hearing and Balance Disorders with a Multi-Specialty Focus

Alan Freint, MD

The Basic Premise
- Identifying the etiology of a health problem is essential for proper treatment of any medical condition
- Consider the fact that a hearing loss may be a manifestation of a systemic illness
- Therefore, identifying the etiology of the hearing loss is analogous to identifying the etiology of any other medical condition
- Applying the concept of the “medical model” to the work-up of a hearing or balance disorder is essential for maximizing patient care

The Empowerment of the Audiologist
- The changing medical delivery systems demand that the audiologist be more:
  - global in patient care
  - Being familiar with radiographic studies
  - Understanding of the need for, and implications of, various types of medications
  - Maximizing otoscopic evaluation
  - collegial with partnering physicians (chart documentation and face-to-face)

Knowledge breeds confidence!

Where to Start?
- Pretend you’re Sherlock Holmes
- Begin with the patient’s account of the problem (the history)
- Listen carefully to what is, and is not, being said
- Review the physical exam and perform relevant diagnostic testing
- Compile all the clues and consider the possibilities of what could account for the patient’s problem (differential diagnosis). What else do you need?

What Comprises the Work-Up?
- Advanced audiologic studies
- Radiologic studies
- Laboratory testing
- Other diagnostic testing
- Consultations with other healthcare professionals

CT Scan

- CT (Computerized Axial Tomography)
  - Preferentially “looks” at bone
  - Ideal for examining the ossicles, mastoid cavity, and surrounding bones
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MRI Scan
- MRI (Magnetic Resonance Imaging)
  - Preferentially "looks" at soft tissues such as brain, spinal cord, nerves, muscle, etc.
  - Better contrast between different tissues

MRA Scan
- MRA (Magnetic Resonance Angiogram)
  - Specialized MRI to evaluate blood vessels
  - Indications:
    - Aneurysms
    - Stenosis or occlusion
    - Dissection of an arterial wall
    - Arteriovenous Malformations (AVMs)
  - Utilizes gadolinium (not iodine contrast)

The Scanners
- "Anything" metallic, if it's magnetic
- Cardiac pacemakers and stimulators
- Surgical clips in the head (particularly aneurysm clips)
- Some artificial heart valves
- Most ear implants
- Metal fragments in the eyes
- Implanted pumps

Contraindications to MRI
- Complete Blood Count (CBC) with Differential
  - Red Blood Count (RBC)
    - Anemia
  - White Blood Count (WBC)
    - Infection
    - Bacterial vs. viral etiology
- Erythrocyte Sedimentation Rate (Sed rate)
  - A basic measure of the degree of inflammation

Lab Studies
Lab Studies (cont’d)

• Anti-nuclear Antibodies (ANA)
  • Antibodies (proteins) directed against one’s own tissues (auto-antibodies)
  • Propensity for the body to work against itself is called autoimmunity
  • The ANA evaluates for the possible presence of autoimmunity, and therefore, the presence of an autoimmune disease

Lab Studies (cont’d)

• Rheumatoid Factor (RF)
  • An antibody suggestive of rheumatoid arthritis
  • Another test for autoimmune disease
  • May be present along with findings of other autoimmune disorders
  • Positive RF results may be seen in healthy patients and in those with endocarditis, TB, syphilis, kidney, liver, or lung disease, and many other conditions

Lab Studies (cont’d)

• Autoimmune Diseases
  (Connective Tissue Disorders)
  • Sjögren’s syndrome
  • Systemic lupus erythematosus (SLE)
  • Scleroderma
  • Raynaud’s disease
  • Rheumatoid arthritis
  • Autoimmune thyroid disorders

Lab Studies (cont’d)

• Fluorescent Treponemal Antibody-- Absorbed Test (FTA-Abs)
  • A screening test for syphilis
  • A negative result is consistent with a person not having syphilis, but it is most reliable in the middle stages of the disease
  • A negative result may be seen in early (primary) or late (tertiary) syphilis

Lab Studies (cont’d)

• Free Thyroxine (T₄)
• Thyroid Stimulating Hormone (TSH)
  • Measures the function of the thyroid gland for hypo or hyperthyroidism
  • Evaluates the body’s metabolic rate
• Anti-thyroid Antibodies (Follow-up tests)
  • Anti-thyroglobulin and antimicrosomal antibodies are examples
  • May be present in Hashimoto’s thyroiditis, SLE, RA, thyroid ca, and autoimmune hemolytic anemia

Lab Studies (cont’d)

• Fasting Glucose
  • Abnormal glucose levels may affect the metabolic function of the body
  • Long-term disease (Diabetes) causes narrowing or occlusion of the small blood vessels by decreasing blood flow and oxygenation which, if in the ears, may lead to hearing loss
• Hemoglobin A1c (Follow-up test)
  • An index of mean blood glucose over the past 2-3 months, weighted to recent levels
Lab Studies (cont'd)

- **Blood Lipids** - Fats that circulate in the blood stream; the two main lipids are:
  - **Cholesterol** - Essential to the structure and function of the body's cells as well as a building-block of certain hormones
  - **Triglycerides** - Important in the transfer of energy derived from food into cells
  - High levels may accumulate and clog the blood vessels (atherosclerosis), causing narrowing and decreased blood flow

- **Lyme Antibody Screen**
  - A test that looks for antibodies to *Borrelia Burgdorferi* to indicate infection by the deer tick
  - Infection may affect the cochlea and inner ear structures, possibly causing a unilateral SNHL

Lab Studies (cont'd)

- **Kidney Function Tests** - Measure how well toxins are excreted from the body
  - **Blood Urea Nitrogen (BUN)** - A breakdown product of protein, produced in the liver and excreted in the urine
  - **Creatinine** - A breakdown product of muscle, excreted in the urine
  - **BUN/Creatinine Ratio** - Helps to identify the type of problem affecting the kidney

Other Diagnostic Testing

- **Electrocardiogram (ECG or EKG)**
  - Measures the electrical activity of the heart
  - Includes the rate and regularity of the beats

Jervell and Lange-Nielsen Syndrome

- Delayed recharging of the heart between beats—'T'd QT interval
- May cause fainting and/or sudden death
- Associated with varying degrees of hearing loss, usually b/l

Is Your Patient Drugged?

Common Meds Used In ENT

“Drug”: Not Another Four-Letter Word
It is necessary to...

- become familiar with the most commonly encountered medications prescribed for a hearing and balance problem. Not being licensed to prescribe medications doesn’t excuse the audiologist from being acquainted with these drugs.
- understand the effects and possible side-effects of medications; proper patient management is predicated on knowing this information.

Overview

- Antihistamines
- Anti-infectives
  - Antibiotics
  - Antivirals
- Anti-inflammatories
  - Salicylates
  - NSAIDS
- Steroids
- Vasodilators
- Chemotherapy

Antihistamines

- Drugs that reduce or eliminate the effects mediated by histamine, a chemical released during allergic reactions.
- Antihistamines block the histamine H-1 receptor effect on smooth muscles of the respiratory and gastrointestinal tracts and reduce vascular permeability.

Histamine Effects

- Histamine causes:
  - Congestion
  - Itching
  - Vasodilation / flushing
  - Headache
  - Bronchoconstriction
  - Hypotension / tachycardia

Antihistamines: Indications

- Treatment of allergic symptoms
- Suppress motion sickness

Available as oral or topical products
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**Antihistamines: Types**

**First-generation: “sedating”**
- Benadryl, Dramamine, Meclizine, Bonine, Zyrtec, Xyzal, etc.

**Second-generation: “non-sedating”**
- Claritin, Clarinex, Allegra, Alavert, etc.

**Antihistamines: When Taken Orally…**
- Onset of action is rapid (about 15-30 minutes)
- First-generation meds are generally effective for 6-8 hours, but some benefit may be seen for 24 hours
- Second-generation meds for adults are generally effective for 24 hours
- Metabolized mainly in the liver

**Antihistamine-like: Anticholinergic - Scopolamine**
- Prevention of motion sickness
  - Rapid onset of action (1 hour)
  - Available as a patch (Transderm Scop)
  - Commonly used for cruises
  - One patch lasts for three days

*(Will discuss in more detail with other vestibular medications)*

**Antihistamines: Decongestant Combinations**
- Purpose: Address complaints of allergy, congestion, and rhinorrhea
- Examples:
  - Dimetapp
  - Claritin D
  - Coricidin D
  - Tylenol Sinus

Preparations contain stimulants such as, or similar to, Sudafed or caffeine to counteract potential sedative effects and “dry” the nose

**Antibiotics**
- Destroy or inhibit the growth of micro-organisms
- Widely used to treat infectious bacterial diseases
- Three major indications:
  - Treatment of infection
  - Treatment of suspected infection
  - Treatment to prevent infection (prophylaxis)
**Antibiotics: Methods of Action**

- **Bactericidal** – an agent that *kills* bacteria
- **Bacteriostatic** – an agent that *inhibits* the growth of bacteria by interfering with
  - Bacteriostatic agents must work with the immune system to eradicate the infection

**Antibiotics: Types**

- **Bactericidal**
  - Penicillins
  - Cephalosporins
  - Fluoroquinolones
  - Vancomycin
  - Aminoglycosides (most)
- **Bacteriostatic**
  - Tetracyclines
  - Sulfonamides
  - Trimethoprim
  - Macrolides
  - Chloramphenicol
  - Aminoglycosides (a few)

**Beta-Lactamase**

- An enzyme produced by certain bacteria that inactivates penicillin and certain other antibiotics and results in resistance to those medicines
- **Beta-lactamase antibiotics** act by inhibiting cell wall synthesis, thereby interrupting replication of the bacteria; they are *bactericidal*

**Antibiotics: Traditional Oral Antibiotics**

- **Penicillin “G”**:  
  - Spectrum – *Group A beta-hemolytic Streptococcus* (GABHS), penicillin- susceptible *Pneumococcus, Meningococcus*  
  - Advantages – inexpensive, few adverse effects  
  - Disadvantages – low bio-availability, bitter taste, QID, not stable to beta-lactamase

**Traditional Oral Antibiotics** (cont’d)

- **Ampicillin**:  
  - Spectrum – same as penicillin but with Gram-negative organisms (e.g. Haemophilus influenzae)  
  - Advantages – inexpensive therapy for respiratory infections  
  - Disadvantages – diarrhea (10–25%), poor absorption in GI tract, TID dosing, increasing penicillin resistance among pneumococcus, not stable to beta-lactamase

**Traditional Oral Antibiotics** (cont’d)

- **Amoxicillin**:  
  - Spectrum – same as ampicillin  
  - Advantages – TID dosing, great bubble-gum taste, less diarrhea (9%)  
  - Disadvantages – unstable to beta-lactamase
“Bringing It Up a Notch”

- Augmentin (amoxicillin / clavulanate):
  - Spectrum – very broad, including:
    - Beta-lactamase producing H Influenza (H flu)
    - Moraxella catarrhalis (M cat)
    - Pathogens previously susceptible to amoxicillin
  - Advantages – high potency
  - Disadvantages – higher incidence of diarrhea & cramps

Traditional Oral Antibiotics

- Sulfonamides (Sulfa Drugs):
  - Spectrum – mostly Gram-negative, some activity against penicillin-resistant Pneumococcus
  - Advantages – penetrates well into sinuses and middle ear space
  - Disadvantages – frequent allergic skin reactions, not effective for H. flu
  - Examples: Bactrim, TMP-SMX

- Macrolides:
  - Spectrum – Strep and Moraxella Cat, etc.
  - Advantages – inexpensive, alternative for penicillin-allergic patients
  - Disadvantages – no activity against H influenza; rarely may be ototoxic
  - Examples: Zithromax, Biaxin, Clarithromycin, Azithromycin

- Tetracycline / Doxycycline:
  - Advantages – increased spectrum, use in penicillin or sulfa-allergic patient
  - Disadvantages – stains developing teeth, photosensitivity, milk and other foods interfere with absorption, GI upset, esophageal ulceration
  - Example: Minocin

Aminoglycosides

- Aminoglycosides:
  - Spectrum – Gram-negative bacteria like Pseudomonas and Enterobacter
  - Advantages – Good control of sepsis
  - Disadvantages – High risk of hearing loss or vestibular injury. Must be given intravenously, possible kidney damage
  - Examples: Gentamicin, streptomycin, tobramycin, amikacin, neomycin, etc.
Aminoglycosides (cont’d)

- 5-10% of all patients experience a side effect
- Young children and the elderly are at the greatest risk
- Excessive dosage or poor excretion of the drug may be injurious at any age

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Fluoroquinolones

- **Bactericidal action**
  - **Spectrum** – Very wide range of gram-negative and gram-positive bacteria
  - **Advantages** – Once daily dosing for newer generations, resistance is rare
  - **Disadvantages** – Photosensitivity, risk of tendon rupture (worse with steroids), joint pain, peripheral neuropathy, elevated glucose

Examples: Cipro, Floxin, Levaquin, Avelox

Antibiotics: Cautions!

**Resistance –**
- In some cases, bacteria are resistant to, or become resistant to, antibiotics that would normally kill them
- Arises from a mutation that alters the bacteria’s susceptibility to the drug

Non-Steroidal Anti-Inflammatory Drugs (NSAIDS)

- Drugs with analgesic, antipyretic, and anti-inflammatory effects
  - They reduce pain and fever at low doses, and reduce inflammation at high doses
  - They are non-narcotic, NOT STEROIDS
  - Most prominent types:
    - Ibuprofen (Advil, Motrin)
    - Aspirin (ASA)
  - Tylenol (acetaminophen) is not an NSAID
Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) (cont'd)
- 70 million prescriptions annually and 30 billion OTC doses sold
- **Advantages** – Relatively safe; no sedation, respiratory depression, or addiction potential
- **Disadvantages** – Often cause heart burn, perforated ulcer, gastrointestinal bleeding, and possibly death (rare, but influenced by poly-pharmacy and health status)
- **Dose-dependent**: higher doses for longer periods increase the risk of GI ulceration

NSAIDs: Potential Side-Effects
- May cause tinnitus, possibly irreversible
- Relatively high incidence of renal impairment
- Represent 43% of drug-related ER visits
- 16,500 deaths annually!
- NSAIDs are not “innocent” drugs even though available over-the-counter

Salicylates
- Collectively, a group of analgesics (pain-killing drugs) derived from salicylic acid, an NSAID
- Most common is aspirin (acetylsalicylic acid or ASA)
  - The greater the dose, the greater the symptoms
  - May cause reversible hearing loss and tinnitus
  - 6-8 g/day can lead to toxicity
  - Upon discontinuation, salicylate levels fall rapidly as the drug is excreted
  - Hearing may return within 24-72 hours

Salicylates (cont’d)
- **Aspirin** is found in the following medications (among others):
  - Bufferin
  - Alka Seltzer
  - Fiorinal
  - Anacin
  - Norgesic
  - Equagesic
  - Empirin Compound
  - Bayer Aspirin
  - Empirin Compound

Steroids
- **Corticosteroids**
  - Glucocorticoids – regulate many aspects of metabolism and immune function via cortisol (hydrocortisone)
  - Mineralocorticoids – maintain blood volume and regulate kidney excretion of electrolytes
- **Anabolic steroids**
  - Interact with androgen, the “body-building” steroid, to increase muscle and bone

Glucocorticoids
- **Possess potent anti-inflammatory and immunosuppressive properties**
- **Used to treat**:
  - Arthritis
  - Allergic reactions
  - Dermatitis
  - Autoimmune diseases, etc.
  - Excellent absorption through intestines or skin
Glucocorticoids: Common Types
- Hydrocortisone (Cortisol)
- Prednisone
- Prednisolone
- Methylprednisolone
- Dexamethasone
- Betamethasone
- Triamcinolone
- Beclomethasone

Glucocorticoids Need to Know
- Increase blood glucose levels
- Increase blood pressure levels
- Cause an excitatory effect on the central nervous system (for example: insomnia, euphoria, mania)
- Cause immunosuppression
- May cause appetite stimulation and weight gain
- Affect ovulation and menstrual periods
- Cause muscle breakdown and weakness

Autoimmune: Prednisone
- A synthetic corticosteroid drug that is usually taken orally but can be delivered by intramuscular or intra-tympanic injection

Autoimmune: Prednisone
- Contraindications/Precautions:
  - If patient has a fungal infection
  - Can weaken the immune system
  - Don’t take if exposed to chicken pox or measles
  - Don’t take a live vaccine!

In general, long-term prednisone therapy is not discontinued suddenly. Short-term therapy may be discontinued rapidly.

Autoimmune: Prednisone
- Cautious use if the following medical conditions exist:
  - Liver, kidney, or thyroid disease
  - Diabetes
  - Osteoporosis
  - Muscular disease (such as myasthenia gravis)
  - Stomach ulcers, ulcerative colitis, or diverticulitis
  - Elevated blood pressure, congestive heart failure
  - Long-term use may slow growth and development in children

Steroids: What is at the Root of the Controversy?
Steroids: “Believers” Say:

- Prompt use of steroids can often reverse SSNHL
- Treatment protocol for Auto-Immune Inner Ear Disease (AIED) and/or idiopathic SSNHL
- May eradicate sudden onset of tinnitus or even vertigo

Steroids: Therapeutic Options

Controversial management choices:

- Oral only
- Intra-tympanic only
- Combination of oral and intra-tympanic therapy concurrently
- Oral only, first; if no response, then intra-tympanic treatment as “salvage” therapy

Antivirals

- Used specifically for treating viral infections
- Like antibiotics, specific antivirals are used for specific viruses
- Viruses cannot reproduce on their own, so they propagate by “hijacking” cells to do the job for them
- Antiviral drugs de-activate viral proteins, parts of proteins, or enzymes to disable DNA or RNA replication

**Antivirals**

- **Target:** herpesviruses, HIV, acute hepatitis B and C
- **Examples:**
  - Acyclovir (Zovirax) – Herpesviruses, including Shingles and cold sores
  - Zidovudine (AZT) – HIV
  - Zanamivir (Relenza) – Influenza
  - Oseltamivir (Tamiflu) – Influenza
  - Valacyclovir (Valtrex) – Genital herpes, shingles, and cold sores
  - Famciclovir (Famvir) – Genital herpes

**Antivirals (cont’d)**

- **Warnings:**
  - May cause kidney failure
  - May cause unusual bruising or bleeding under the skin signaling a dangerous blood disorder
  - Seems relatively safe during pregnancy, but consideration needs to be given to make sure the benefits outweigh the potential risk to the baby
  - May affect a nursing infant (may appear in breast milk)
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Vestibular

• Over 90 million Americans, age 17 and older, experience a “dizziness” or balance problem
• Affects 30% of people over the age of 65
• Most experts regard BPPV as the most commonly diagnosed vestibular disorder
• Nearly 40,000 requests per month are made to the Vestibular Disorders Association for information regarding labyrinthitis, Ménière’s Disease, and BPPV

Vestibular: Drugs of Choice

• Diuretics
• Steroids
• Meclizine/Antivert/Bonine
• Transderm Scop
• Lipoflavonoids

Vestibular: Diuretics

• Elevates the rate of bodily urine excretion (diuresis). There are several categories of diuretics. All increase the excretion of water from the body, although each class of diuretic does so in a distinct way
• Loop diuretics, such as Lasix (furosemide) or HCTZ are the most common and carry an increased risk of side effects (including hearing loss and vestibular issues)

Vestibular: Lasix

• Commonly used to treat high blood pressure, but also used for treating Ménière’s Disease and other vestibular disorders
• Lasix acts quickly, usually within 1 hour
• Treats the symptoms, not the “disease”
• Can cause the body to lose too much potassium; may need to take supplements
• Taking Sulfa drugs with Lasix may decrease platelets

Vestibular: Meclizine (Antivert/Bonine)

Is an anti-histamine; may be associated with sedative side effects
• Polypharmacy: Caution if taken with:
  – OTC sleeping pills
  – Sedatives
  – Narcotics
  – Pain meds, tranquilizers, barbiturates
  – Anti-depressants

Cannot consume alcohol
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**Meclizine/Antivert/Bonine**
- **Warnings:** Side effects include:
  - Fast or irregular heartbeat
  - Wheezing or trouble breathing
  - Rash or hives
  - Severe concussion
  - Drowsiness
  - Dry mouth
  - Blurred vision

**Vestibular: Transderm Scōp**
- **Generic name:** Scopolamine
- Scopolamine reduces the activity of the nerve fibers in the inner ear
- Adhesive patch placed behind the ear over the mastoid
  - One patch is kept in place for up to days
  - Should not be used in children and should be used cautiously in the elderly

**Transderm Scōp**
**Precautions:** Prescribing physician must know if a patient:
- Is pregnant or planning a pregnancy
- Has glaucoma
- Has any metabolic, heart, liver, or kidney issues
- Has prostate enlargement or bladder obstruction

**May cause:**
- Drowsiness, widening of the pupils, blurred vision, reddened whites of the eyes, dryness of the mouth, disorientation, memory issues, restlessness, hallucinations, confusion, and/or heart palpitations

**Vestibular: Lipoflavinoids**
- Copyrighted name for a vitamin/mineral supplement made from lemon extract
  - Affects microcirculation
  - Speculated that the increased blood circulation will increase blood flow to the cochlea and the vestibular system
  - Used to treat Menière’s Disease and tinnitus
  - Paralytic dilatation of the blood vessels of the stria vascularis and distension of the endolymphatic system
  - Available as an OTC supplement
  - Variable success

**Vasodilators**
- Relax the smooth muscle in blood vessels which cause them to dilate
  - Dilation of arterial blood vessels leads to a decrease in blood pressure and better blood flow within the vessels
  - The opposite physiological process is vasoconstriction
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Vasodilator: Niacin

- **Indications:** Lowers cholesterol and triglyceride levels in the blood and treats niacin deficiency (pellagra). It is vitamin B3.
- May be indicated for treating Sudden Sensorineural Hearing Loss (SSNHL)
- **Recommendations:**
  - Take at bedtime with a low-fat meal or snack
  - Swallow whole
  - If taking other medicines to lower cholesterol, take them 4 hours before or after taking niacin

Vasodilator: Niacin

- **Possible Side Effects:**
  - Fast, irregular, or pounding heartbeat
  - Nausea, vomiting, loss of appetite, stomach pain
  - Unusual bleeding, bruising, or weakness
  - Unusual tiredness, fever, nausea
  - Dark-colored urine or pale stools

Always check with patient’s physician

Chemotherapy

- **How It Works**
  - Attempts to halt cell division by “damaging” the RNA or DNA that tells the cell how to copy itself in division
  - Cells that are unable to divide, die
  - The faster the cells divide, the more likely the chemotherapy will kill the cells causing the tumor to shrink
  - Unfortunately, chemotherapy doesn’t know the difference between cancerous cells and normal cells

Chemotherapy: How It Works

- “Normal” cells grow back, but in the meantime, side effects occur
- The most commonly affected “normal” cells are the blood cells, cells in the mouth, stomach and bowel, and the hair follicles.
  - Thus, low blood counts, mouth sores, nausea, diarrhea, and/or hair loss may occur

Ototoxicity

- **Cisplatin**
  - Primarily affects the outer hair cells
  - May cause tinnitus
  - Associated with a high frequency hearing loss
- **Carboplatin**
  - Preferentially destroys the inner hair cells
  - OAEs remain normal
### Cisplatin

- **Commonly used to treat** testicular, bladder, lung esophagus, stomach and ovarian cancers
- **Given as a drip (infusion) through a fine tube inserted into the vein**
  - Can be given through a central line

### Possible Side Effects:
- Nausea and vomiting typically beginning a few hours after the treatment is given and may last up to a few days
  - May need anti-sickness drugs (or medicinal marijuana)
- Slight chance for kidney damage
- Numbness or tingling in hands or feet

### Possible Additional Side Effects:
- Temporary taste alteration
- Lowered resistance to infection
  - Reduces production of white blood cells by the bone marrow
  - May begin 3-7 days post-treatment and susceptibility to infection usually reaches its peak 10-14 days after the infusion
  - Blood cells usually return to normal within 21-28 days
- Bruising due to reduction of platelets
- Anemia due to reduction of red blood cells
- Loss of appetite
- Diarrhea
- Hair loss
- Malformations: Not advisable to become pregnant or father a child

### Carboplatin

- Primarily used to treat ovarian cancer, but may be used for lung, head and neck, esophageal, bladder, breast, and cervical cancers
- Used as preparation for a stem cell or bone marrow transplant
- Usually administered by IV infusion

### Possible Side Effects: Similar to Cisplatin
- Hearing loss – affects the high frequencies
  - Abnormal blood electrolytes (sodium, potassium, calcium)
  - Kidney problems

*These symptoms are reported around 21 days after treatment*
Otitis Externa

- Also known as:
  - External ear canal infection
  - External otitis
  - Swimmer’s ear
  - Ear ache (when pulling the ear elicits tenderness)
  - Diffuse otitis externa

Otitis Externa (cont’d)

- Pathophysiology:
  - Most common cause is local trauma (Q-tips, etc.) allowing bacteria to compromise the natural skin barrier
  - Also may be caused by excessive cerumen and moisture changing the natural environment of the ear canal leading to maceration and inflammation
  - Presence of hearing aids may exacerbate the infection

Otitis Externa

- Background:
  - Infection of the external ear canal
  - Common emergency room problem; usually simple to treat
  - Can be harder to manage for people who are diabetic or immunocompromised
  - Considered chronic when the duration of the infection exceeds 4 weeks or when more than 4 episodes occur in 1 year
  - Chronic infection seen in 3-5% of the population
  - Acute otitis externa occurs in 4 of every 1,000 people each year

Otitis Externa (cont’d)

- History:
  - 1-2 days of progressive ear pain, including “tightness” or swelling, especially when inserting a hearing aid
  - Frequently, history of exposure to water or manipulation
  - Itching
  - Purulent discharge
  - Possible conductive hearing loss
  - Feeling of pressure or fullness, pain, or numbness of the ear and/or face
Otitis Externa (cont’d)

- Predisposed in patients with smaller ear canals and/or with atypical cerumen composition/build-up, e.g., eczema
- **Sex:** Occurrence equal in males and females

Otitis Externa (cont’d)

- **Prognosis:**
  - Most patients with OE treatment improve greatly within 24-48 hours and are well in 7-10 days
- **Patient Education:**
  - Avoidance of cotton-tipped swabs!
  - For hearing aid users, proper cleaning of the instrument(s)

Otitis Externa (cont’d)

- **Causes:**
  - **Bacterial infection**
    - Pseudomonas species (38-50% of all cases)
    - Staphylococcus species
    - Gram-negative rods
  - **Fungal infection** (10% or less)
    - Aspergillus species
    - Yeast (rare)
    - Candida species

Otitis Externa (cont’d)

- **Treatment typically performed by an ENT:**
  - Gentle cleaning of ear canal to eliminate all cerumen and debris by curette and/or suction
  - Important to visualize the tympanic membrane
  - In the presence of severe swelling, wick placement may be necessary to facilitate delivery of the medication into the swollen canal
  - Typically apply acidifying drops
  - Analgesics for pain relief
  - Oral antibiotics are rarely needed

Otitis Externa: Ear Drops

- **Safe:**
  - Fluoroquinolones (Ciprodex susp. or Floxin)
  - Tobramycin (Tobradex Ophthalmic suspension)
  - Clotrimazole or Miconazole

- **Ototoxic:** (If a perforation or tube is present and medication gets into the middle ear)
  - Neomycin-polymyxin-hydrocortisone, Gentamicin
  - Yeast (acetic acid)
  - Gentian Violet

Otitis Externa: Anti-fungal

- **Drug name:**
  - Clotrimazole Solution/Miconazole Solution

- **Description:**
  - Topical preparation easily placed into the ear canal
  - Continue use for a few days after symptoms clear

- **Contraindications:**
  - Caution with perforation; drops may sting
Lacerations of the EAC

- The best way to manage a laceration of the EAC is to avoid it in the first place!
- Treat all patients as if they are on blood thinners
- Be gentle, slow, and deliberate
- Never work blindly; visualize the area fully
- Know if a perforation is present
- Be familiar with different techniques for different situations

Lacerations of the EAC

- If bleeding occurs, initially rotate the ear downward so blood will flow towards the meatus
- Next, turn the ear upwards again and instill *Adrin* (oxymetazoline), neosynephrine, or other liquid decongestant medication into the canal and allow to remain for 15 minutes
- Then, rotate the ear downwards to drain the medication out; check for continued bleeding

Lacerations of the EAC

- If bleeding still persists, gently insert some cotton soaked with the decongestant and allow to remain for another 15 minutes
- Be patient, and *know your limits*
- Remove the cotton and check for hemostasis
- Clean and dry the canal as completely as possible

Being Collegial

- With the changing delivery protocols of patient care comes the expectation that audiologists must be familiar with medications and how they influence patient care
- Audiologists don’t prescribe medications, but that doesn’t excuse them from understanding the expectations/limitation/side-effects of both prescribed and over-the-counter drugs
- Keeping a patient on a drug with potential side-effects may out-weigh the possible risks for not prescribing the medication. Collegial discussions with the prescribing physician are essential

"Seeing the Diagnosis"

Otoscopy Made Easy
Alan Freint, MD

Optimizing Patient Care: The Medical Investigation of Hearing and Balance Disorders with a Multi-Specialty Focus

Otoscopes

- Optimally, visualization occurs when the acoustic meatus is in line with the canal
- For adults, pull the auricle upward and backward
- In children, the auricle should be pulled downward and backward
- Hold the otoscope like a pen/pencil and use the little finger area as a fulcrum. This prevents injury should the patient turn suddenly

Suggestions

- Select an otoscope with a good light source
- Use largest speculum that can be tolerated
- External auditory canal can be sensitive, so “explore” with a gentle touch
- Evaluation under a microscope is optimal

Before Otoscopy

- Many patients have had increased sun exposure. The audiologist must be able to recognize abnormal skin conditions
- Some may be benign and some may be malignant
- You play a critical role in recognizing and referring for treatment

Pre-Cancerous Lesions

**Actinic Keratoses**

- Most common type
- A flat, greasy plaque with well-defined borders
- Usually seen in the elderly with sun-damaged skin

Pre-Cancerous Lesions

- Cutaneous Horns
  - Overgrowth of keratinous material on the helical rim

Cancerous Lesions
Early Warning Signs: ABCD's

- **A** – Asymmetry - common moles are round and symmetrical
- **B** – Border - skin cancers may have uneven borders
- **C** - Color - watch for varied shades of brown, tan, black, and also red, white, and blue
- **D** - Diameter - if a spot is larger than a pencil eraser (¼” diameter), it could be an issue

Normal Otoscopy

- **Auditory Canal**: hair, often with yellow-to-brown cerumen (ear "haircut"??)
- **Tympanic Membrane**:
  - Pinkish gray in color, translucent and not retracted
  - Malleus lies in oblique position behind the upper part of tympanic membrane

A normal tympanic membrane (TM) as seen through the otoscope. The TM is in normal position, gray, and translucent.

A: Pars flaccida  
B: Short process of malleus  
C: Pars tensa (AS)  
D: Manubrium of malleus  
E: Umbil
F: Light reflex  
G: Pars tensa (A)  
H: Promontory of ossicles  
I: Grains of sand  
K: Round window niche  
L: Pars tensa (P)  
M: Incus: lenticular process  
N: Incus: long process  
O: Incudostapedial joint  
P: Incus: long process  
Q: Pars tensa (PS)

Note the light reflex. The absence of a light reflex doesn’t necessarily indicate middle ear effusion.

Normal Eardrums: Notice the different shades of color. The eardrum still remains an opaque translucent appearance in all the pictures.
Questions to ask:
Is…
• the skin of the PINNA normal or suspicious for skin lesions?
• the EXTERNAL AUDITORY CANAL
  – tender
  – swollen
  – moist
  – odor
  – filled with cerumen either partially blocking the canal or impairing visualization of the tympanic membrane
  – housing a foreign body (waxguard?)

Abnormal Exam
• The EARDRUM:
  normal clarity?
  retracted?
  bulging?
  increased vascularity?
  intact?

In Short…
• Inspect the pinna (too often this is ignored)
• Inspect the external auditory canal
• Evaluate tympanic membrane
  – Note the color (red, white, yellow) and translucency (transparent, opaque) and position (retracted, neutral or bulging) of the eardrum
  – Identify the pars tensa, the handle and short process of malleus, the anterior and posterior areas of the pars flaccida, and position of the malleus handle

Document your examination; be thorough!

The Ear Canal
• Hair
• Cerumen
• Foreign Body
• Exostoses
• Osteoma
• External otitis

Cerumen

External Otitis

Fungal infection of the ear canal
Stages of Otitis Media

In this patient with OME, the TM is seen as retracted, faintly amber and white, and semi-opaque. A small air-fluid interface is seen anterosuperiorly.

In this patient with AOM, the TM is seen as bulging, white, and opaque.

Serous Otitis - fluid build up is seen behind the eardrum. Common in children with chronic allergies and/or inflammation of the Eustachian tube.

Acute Otitis with bulging of the tympanic membrane due to pressure from pus behind it. The last picture reveals an ear tube that has gotten prematurely blocked and the ear is once again infected.

Myringotomy
Ear Drum Perforations

And the Diagnosis is?

Diagnosis?

Diagnosis?

Diagnosis? What Kind?

Diagnosis?

Acute Otitis Media
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**Diagnosis?**
Attic Cholesteatoma

**Diagnosis?**
Cerumen

**Diagnosis?**

Advice: When you hear the sounds of hooves, think horses…not zebras!

**It’s All About Documentation**

**Medical Record**

- Requisite for avoiding and/or surviving an audit
- Having an organized chart is part of best business practices
- The practice “owns” the chart
The Medical Record

- Enables clear communication between treating medical professionals
- Is required for determining reimbursement and supporting medical necessity
  - Health care services or supplies needed to prevent, diagnose, or treat an illness, injury, condition, disease, or its symptoms and that meet accepted standards of medicine

Medical Record

- Serves as a legal document
- Is utilized when performing quality assessment reviews
- Research purposes

SOAP:
Organized Comprehensive Documentation

- Subjective – Patient’s description of the problem
- Objective – Physical findings on exam
- Assessment – Evaluation/findings
- Plan – Recommendation(s)

...and So It Is Said

- If it is not written, it didn’t happen!

Change is what keeps a profession viable…
Embrace change – recognize it as a key for being successful!
Alan Freint