

# Diagnosing and Treating Adults with Hearing Loss

**Diana Callesano, Au.D. , CCC-A**

**Eric Nelson, Au.D. , CCC-A**

**Clinical Audiologists**

**Department of Otolaryngology**

**Head and Neck Surgery**

**Hearing and Speech Services**



# DISCLAIMER

The information contained in this presentation is not intended as a substitute for professional medical advice, diagnosis or treatment.

It is provided for educational purposes only.

You assume full responsibility for how you choose to use this information.

# Contact Information

**Weill Cornell Medicine**  
**1305 York Ave, 5<sup>th</sup> Floor**  
**New York, NY 10021**  
**646-962-2231**



# Objectives

- **Demographics**
- **What is hearing loss?**
- **How to diagnose hearing loss?**
- **What are the types and causes of hearing loss?**
- **What can be done for hearing loss?**
- **What can be done for tinnitus?**
- **Hearing assistive technology systems**
- **Communication strategies**

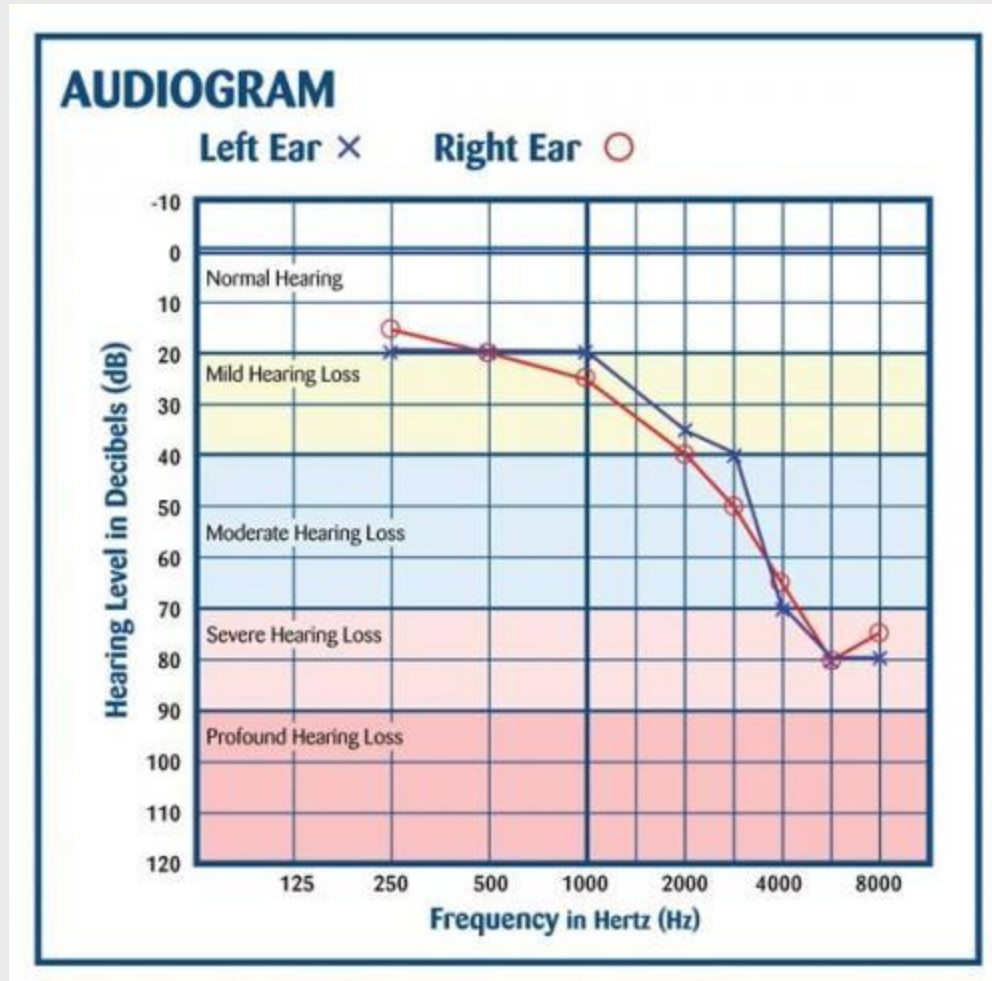


# Prevalence of Hearing Loss in the US

(National Center for Health Statistics, 1999)

Age Group	Prevalence	Rate per 1000
All Ages	22,044,000	91.2
<18	897,000	12.6
18-44 years	4,522,000	41.9
45-64 years	6,987,000	131.5
65-74 years	4,697,000	255.2
75+ years	4,941,000	369.8

# Audiogram



# Impact of Hearing Loss

- **Children – speech/language development, education, social development**
- **Adults- vocational issues, family and social**
- **Psycho-social impact, isolation**



# Hearing Health Care Professionals

- **Audiologist**
- **Otolaryngologist (ENT)**



# Audiologist

- **A professional, by virtue of academic & clinical training, certification and licensure, is uniquely qualified to provide professional services related to the prevention, evaluation and rehabilitation of hearing loss**
- **American Speech and Hearing Association (ASHA)**
- **American Academy of Audiology (AAA)**

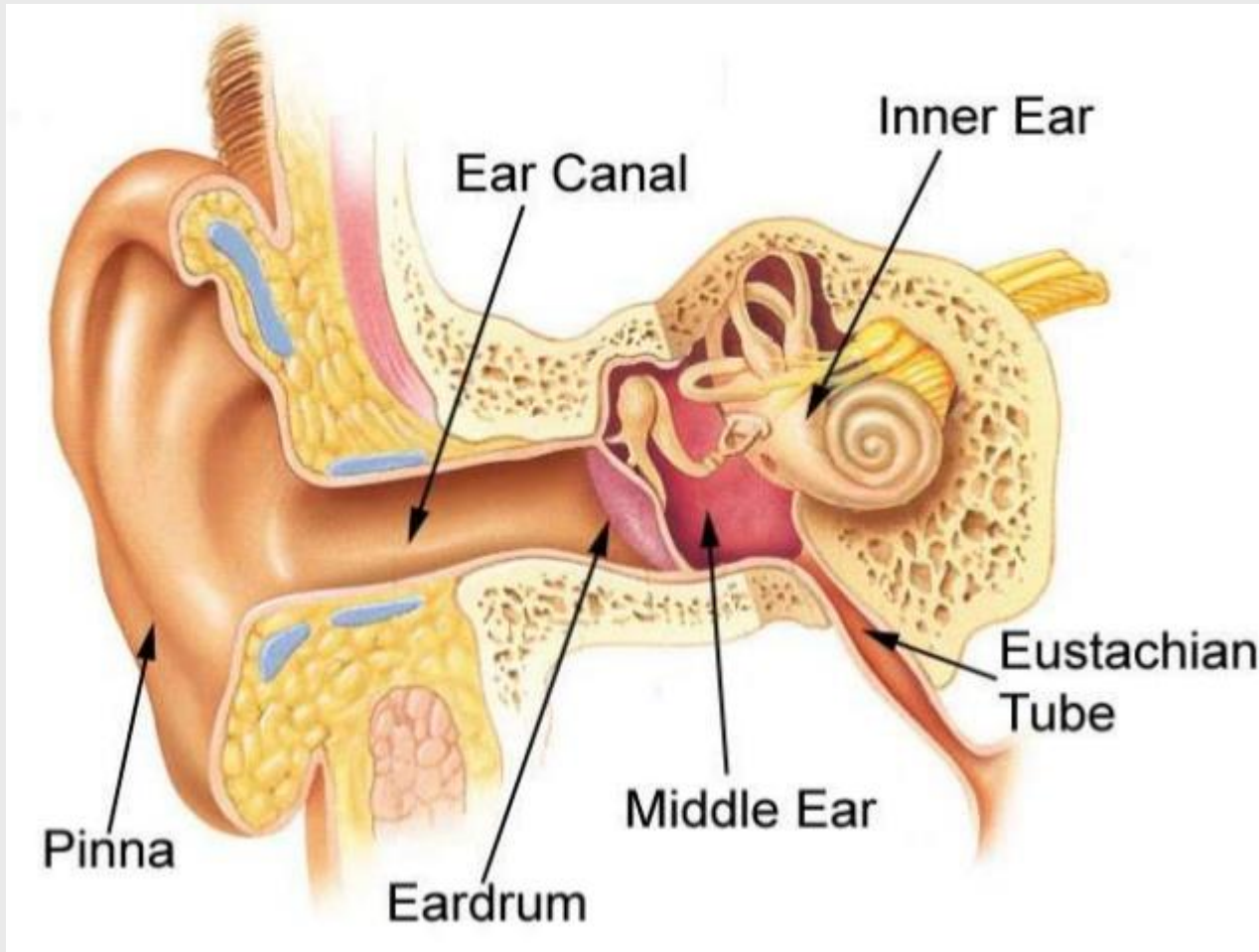
# Otolaryngologist

- **Medical professional involved in the diagnosis and treatment of disorders of the ear, nose, and throat.**
- **Otologist – ENT physician specializing in issues related to hearing and balance**

# What is Hearing Loss?

- **Hearing loss is a result of problems that occur in the transmission and receiving of auditory information**

# Anatomy of the Ear



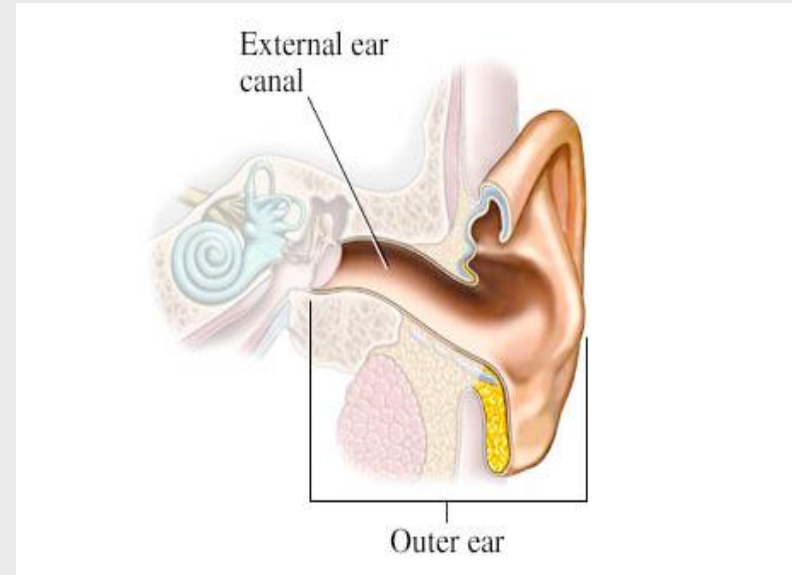
# Outer Ear

## Components:

- Auricle (Pinna)
- External Acoustic Meatus
- Tympanic Membrane

## Responsibilities:

- Localization
- Funnel
- Protection
- Amplification
- Transmission of sound to middle ear



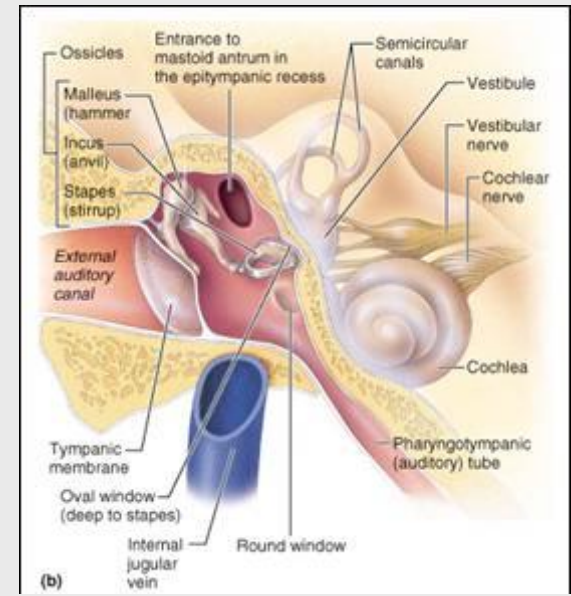
# Middle Ear

## Components:

- Ossicles (Malleus, Incus, Stapes)
- Eustachian Tube

## Responsibilities:

- Ossicles- transfer sound to inner ear
- Eustachian Tube- drainage, pressure equalization





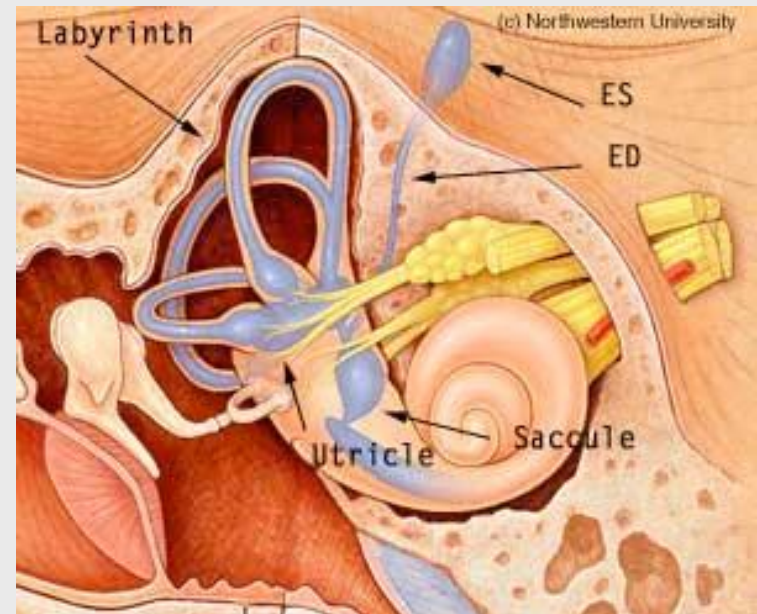
# Inner Ear

## Components:

- Vestibular apparatus
- Cochlea

## Responsibilities:

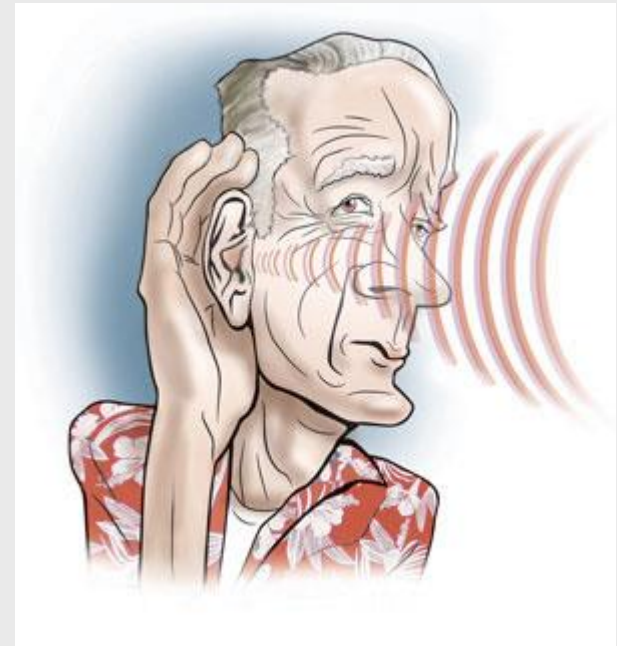
- Balance and equilibrium
- Transmission of sound from mechanical to electrical signal





# Types of Hearing Loss

- **Conductive**
- **Sensorineural**
- **Mixed**



# Conductive Hearing Loss

Hearing loss due to dysfunction of  
**OUTER or MIDDLE ear**

## Common causes:

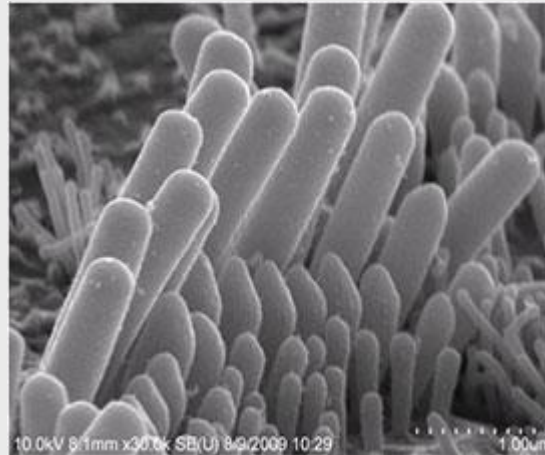
- Cerumen
- Otosclerosis
- Ear infections
- Eardrum perforation
- Foreign bodies

## Treatment:

- Generally is treated with surgical and/or medical intervention

# Sensorineural Hearing Loss

- **Most often occurs when the tiny hair cells (nerve endings) that transmit sound through the ear are injured, diseased, do not function properly, or have prematurely died**



# Sensori-Neural Hearing Loss

Hearing loss due to dysfunction in the cochlea or auditory nerve

## Common causes:

- Aging
- Genetics
- Noise exposure
- Viral infections
- Ototoxic medication



# Noise Induced Hearing Loss

- **Occupational noise exposure**
- **Recreational noise exposure**
- **Military noise exposure**
- **100% preventable**

# Why is type of hearing loss important?

- **Determines the success of medical/surgical intervention**
- **Determines best management option**
- **Set realistic expectations**

# Treatment of Hearing Loss

- **Medication**
- **Surgery**
- **Hearing Aids**
- **Cochlear Implants**
- **BAHA**
- **Audiological (aural) Rehabilitation**

# Medical/Surgical

- **Myringotomy/PE tubes**
- **Tympanoplasty**
- **Ossicular chain reconstruction**
- **Stapedectomy**
- **Antibiotics**
- **Diuretics**





# When Hearing Should be Tested?

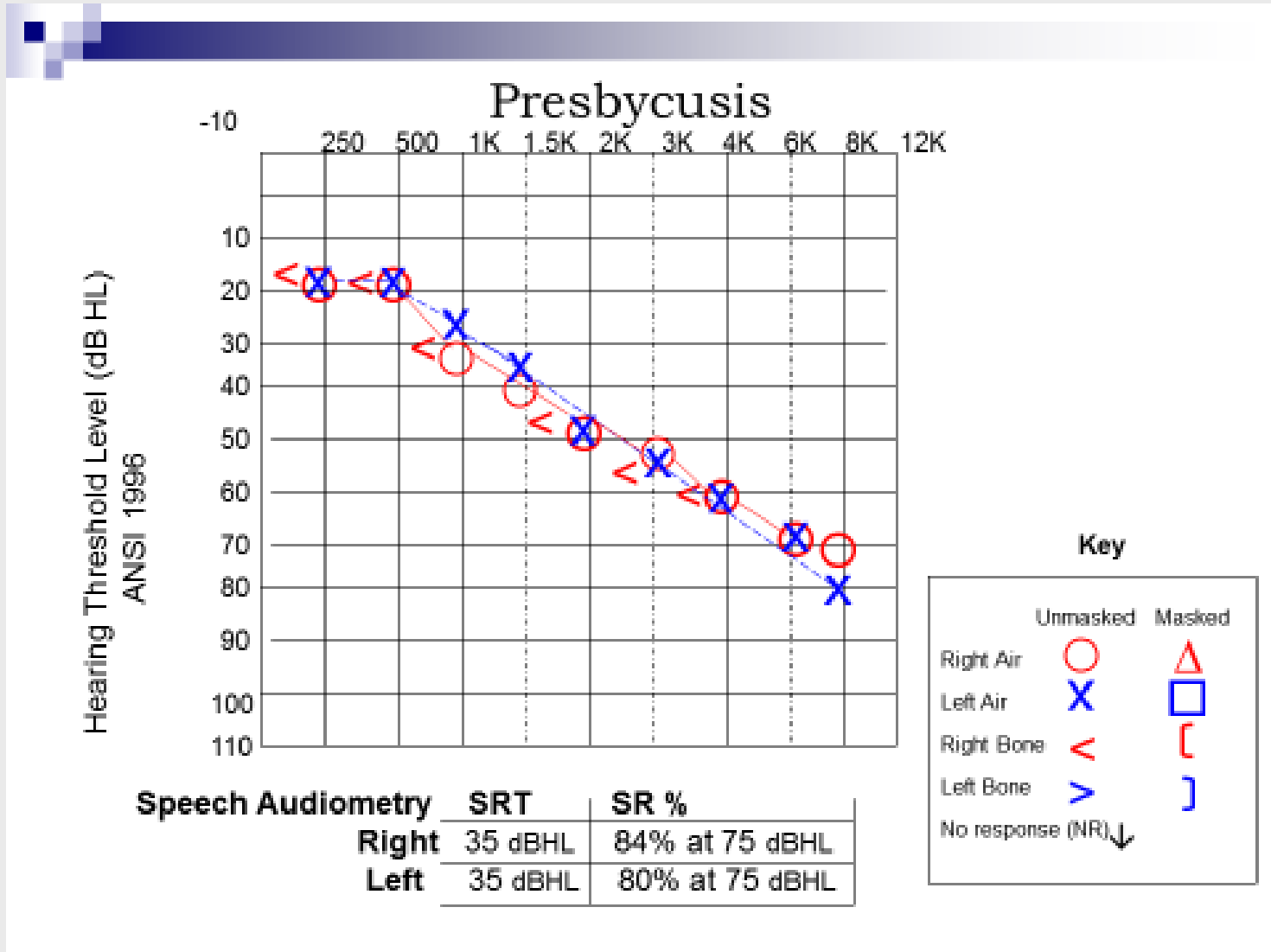
- **Misunderstanding speech**
- **Often asking speakers to repeat themselves**
- **Difficulty understanding speech in noisy environments (restaurants, parties, etc.)**
- **Difficulty hearing the TV/Telephone**

# Complete Audiological Evaluation

- **Cursory otoscopy**
- **Tympanometry**
- **Acoustic Reflexes**
- **Pure tone air and bone conduction**
- **Otoacoustic emissions**



# Presbycusis- Sensorineural Hearing Loss





# Tinnitus

**Tinnitus is defined as the perception of noise in the absence of external sound.**



(American Tinnitus Association, 2016)

# Tinnitus

- Usually a common symptom of hearing loss
- May be described as a ringing, buzzing, hissing or roaring sound
- Can be caused by noise exposure or ototoxic medications

# Tinnitus Management Options offered at WCM

- **Hearing aids/combination devices**
- **Cochlear implant**
- **Ear-level sound generators**
- **Tinnitus Retraining Therapy (TRT)**

# Hearing Aids/Implants

- **In-The-Ear (ITE)**
- **Behind-The-Ear (BTE)**
- **Bone Anchored Hearing Aids (BAHA)**
- **Cochlear Implants (CI)**





# Hearing Aid Style: In-The-Ear (ITE)



# Behind-The-Ear (BTE)



# Receiver-in-Canal (RIC)



# Assistive Listening Devices

- **Hardwire Systems**
- **Infrared Systems**
- **FM Systems**
- **Telephone Devices**
- **Alerting Devices**
- **TV Ears**

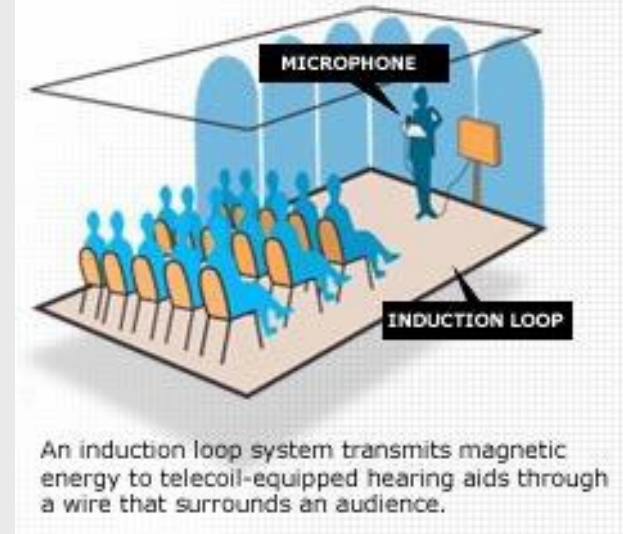
# Hardwire



# Induction Loop System

## *Advantages:*

- **Wireless**
- **Inexpensive to use**
- **Anyone with a T-coil can use it**

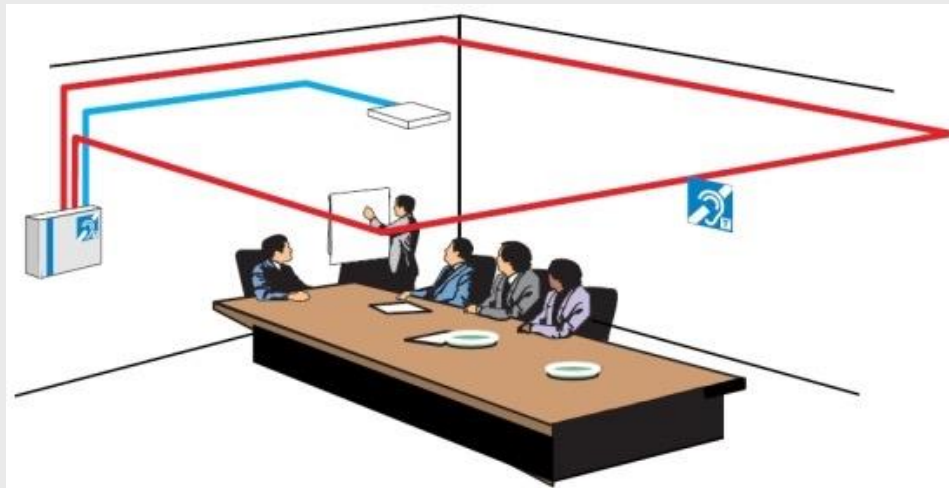


The system sends an electromagnetic signal from the person speaking to the listener's hearing aid telecoil

# Induction Loop System

## *Disadvantages:*

- **Sound quality is only as good as the T-coil in the hearing aid**
- **Vulnerable to electromagnetic interference**
- **Signal may vary depending on head position and distance from the loop**



# Get in the Loop

## Common places with induction loops:

- Places of worship
- Subway systems, train stations, airports
- Classrooms, offices
- Theaters, auditoriums
- Court rooms
- Home living room
- Drive-thru & ticket windows



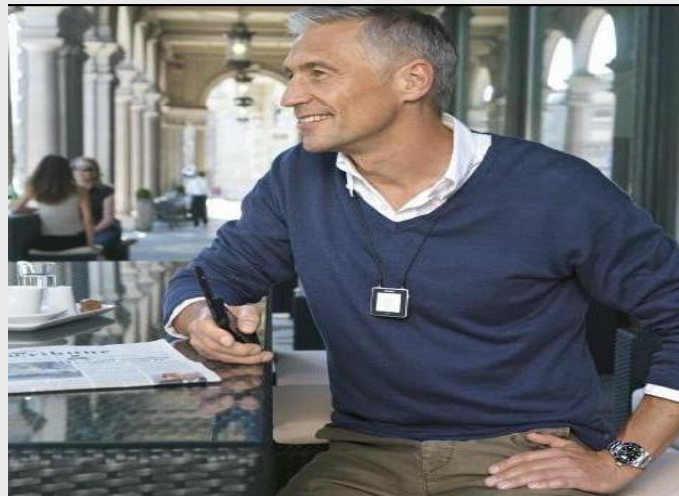


# Infrared System



# Bluetooth

- **Wireless exchange of data over short distances**
- **Sound transferred between “paired” devices**
- **Commonly seen with hands-free cell phone use**
- **Can be used with TVs, Music Players, Hearing Aids, and Computers**



# FM Systems



# Telephones



# Caption Call Telephone

Relies on voice recognition and an operator to interpret the signal and display the conversation on the screen



# ALDs and Cell Phones

The combination of hearing aids and cell phones creates digital interference

Interference Ratings for phones and hearing aids:

- Microphone Rating (M1-4)
- Telecoil Rating (T1-4)



# Telephone Alerting Device

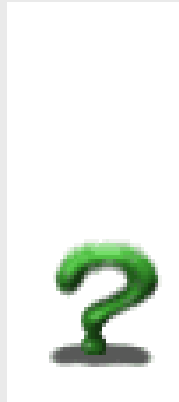
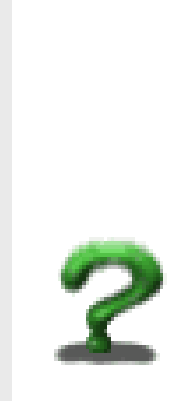
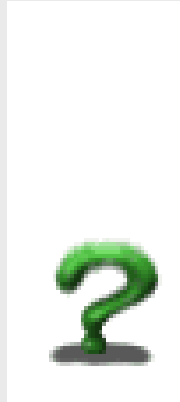
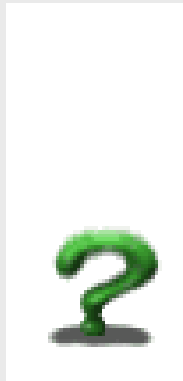


# Communication Strategies

- **Maintain eye contact**
- **Control the listening environment**
- **Let people know you have a hearing loss**
- **Avoid noisy locations**
- **Consider speechreading**
- **Hearing Loss Association of America**



# Questions ?



# Contact Information

**Weill Cornell Medicine**  
**1305 York Ave, 5<sup>th</sup> Floor**  
**New York, NY 10021**  
**646-962-2231**





**Weill Cornell Medicine**

 **NewYork-Presbyterian**