

Your Guide To

# BETTER HEARING



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## What Do These Famous People Have in Common?

They all have hearing loss and they have all successfully overcome their hearing loss, the majority with hearing aids. These famous people have been so delighted with their improved hearing, that by serving as positive role models, they hope to inspire other people to seek treatment early in their life. Many people delay treatment unnecessarily and as a result miss out on so much of life.



Visit our website at [www.betterhearing.org](http://www.betterhearing.org) to read the personal success stories of the dozens of Better Hearing Institute celebrities who have overcome their own hearing loss and...



**Discover a World of Better Hearing!**





## Introduction

### The Consequences of Untreated Hearing Loss

Many people are aware that their hearing has deteriorated but are reluctant to seek help. Perhaps they don't want to acknowledge the problem, are embarrassed by what they see as a weakness, or believe that they can "get by" without using a hearing aid. And, unfortunately, too many wait years, even decades, before getting treatment.

But time and again, research demonstrates the considerable negative social, psychological, cognitive and health effects of untreated hearing loss ... with far-reaching implications that go well beyond hearing alone. In fact, those who have difficulty hearing can experience such distorted and incomplete communication that it seriously impacts their professional and personal lives, at times leading to isolation and withdrawal.

Studies have linked untreated hearing loss to:

- irritability, negativism and anger
- fatigue, tension, stress and depression
- avoidance or withdrawal from social situations
- social rejection and loneliness
- reduced alertness and increased risk to personal safety
- impaired memory and ability to learn new tasks
- reduced job performance and earning power
- diminished psychological and overall health



Hearing loss is not just an ailment of old age. It can strike at any time and any age, even childhood. For the young, even a mild or moderate case of hearing loss could bring difficulty learning, developing speech and building the important interpersonal skills necessary to foster self-esteem and succeed in school and life.

At the Better Hearing Institute, our mission is to help educate the public about hearing loss and promote the importance of prevention and treatment. In this guide, you will find basic information about hearing loss, including advances in diagnosis and treatment, a review of different hearing aids, and resources for medical care and financial assistance.

If you think you or a loved one suffers from hearing loss, don't delay another day. Visit a hearing healthcare professional and take the first step toward a world of better hearing.

Sergei Kochkin, Ph.D.

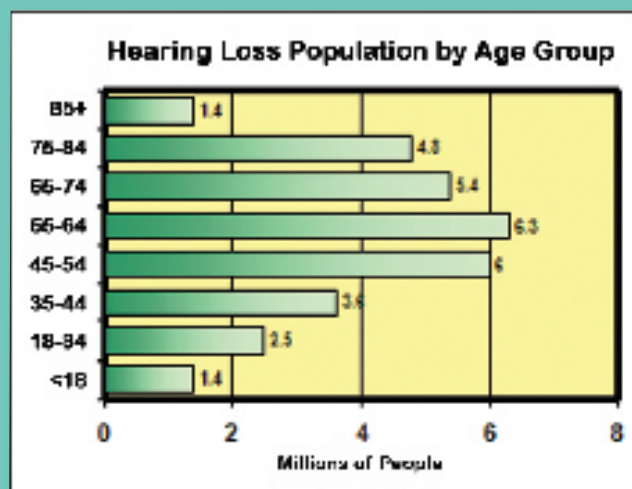
Executive Director, Better Hearing Institute

## The Prevalence of Hearing Loss in the U.S.

Sergei Kochkin, Ph.D. — Better Hearing Institute, Alexandria, VA

In order to gauge the number of people with hearing loss in the United States, 80,000 members of the National Family Opinion (NFO) panel were surveyed. This survey, which has been funded by a sponsor of BHI since 1989, is published under the name “MarkeTrak”. The NFO panel is representative of U.S. households.

People with hearing loss are often embarrassed because they think that they are different or that they have a rare condition. The last MarkeTrak survey (2004) estimated that 31.5 million people report a hearing difficulty; that is around 10% of the U.S. population. So if you have a hearing loss, understand that you are not alone. The number of people with hearing loss by age is provided in the graph above.



Here are some general guidelines regarding the incidence of hearing loss:

- 3 in 10 people over age 60 have hearing loss;
- 1 in 6 baby boomers (ages 41-59), or 14.6%, have a hearing problem;
- 1 in 14 Generation Xers (ages 29-40), or 7.4%, already have hearing loss;
- At least 1.4 million children (18 or younger) have hearing problems;
- It is estimated that 3 in 1,000 infants are born with serious to profound hearing loss.

## Common Myths

### “Hearing loss affects only “old people” and is merely a sign of aging.”

Actually it is the reverse of what most people think. The majority (65%) of people with hearing loss are younger than age 65. There are more than six million people in the U.S. between the ages of 18 and 44 with hearing loss, and nearly one and a half million are school age. Hearing loss affects all age groups.

### “If I had a hearing loss, my family doctor would have told me.”

Not true! Only 13% of physicians routinely screen for hearing loss during a physical. Since most people with hearing impairments hear well in a quiet environment like a doctor’s office, it can be virtually impossible for your physician to recognize the extent of your problem. Without special training, and an understanding of the nature of hearing loss, it may be difficult for your doctor to even realize that you have a hearing problem.

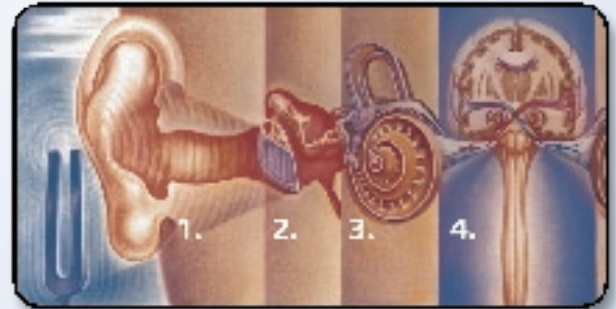
# Hearing Loss

Patricia E. Connelly, Ph.D. CCC-A, FAAA — New Jersey Medical School, Newark, NJ

## THE HEARING SYSTEM

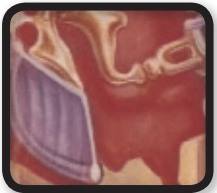
The anatomy of the hearing system can be divided into four components. These divisions are the:

- 1) outer ear
- 2) middle ear
- 3) inner ear
- 4) central auditory pathways



### 1) THE OUTER EAR

The outer ear is made up of the pinna or auricle and the external auditory canal. The pinna collects and funnels sound down the ear canal. The ear canal is curved, “S” shaped, and about 1 inch long in adults. It has hairs and glands that produce wax called cerumen. Cerumen helps to lubricate the skin and keep it moist.



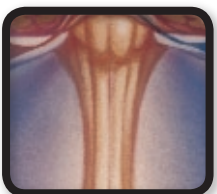
### 2) THE MIDDLE EAR

The eardrum (tympanic membrane) is a membrane at the inner end of the ear canal. On that inner side of the tympanic membrane is an air-filled space called the middle ear cavity. The vibrations of the tympanic membrane are transmitted through the malleus (hammer) incus (anvil) and stapes (stirrup), also called the ossicles. The stapes footplate transmits the vibrations into the inner ear.



### 3) THE INNER EAR

The inner ear has two divisions: one for hearing, the other for balance. The hearing division consists of the cochlea and the nerve of hearing. The cochlea is snail-shaped, bony structure that contains the sensory organ for hearing called the organ of Corti. The organ of Corti releases chemical messengers when the vibrations from the stapes activate its tiny hair cells. These then excite the nerves of hearing which carry sound to the brain.



### 4) CENTRAL AUDITORY PATHWAYS

The central auditory system is a complex network of neural pathways in the brain that is responsible for sound localization, speech understanding in noisy listening situations and other complex sounds, including music perception.

## THE PROCESS OF “HEARING”

Sound is transformed into mechanical energy by the tympanic membrane. It is then transmitted through the ossicles to the inner ear where it is changed again into hydraulic energy for transmission through the fluid-filled cochlea. The cochlea's hair cells are stimulated by the fluid waves and a neurochemical event takes place that excites the nerves of hearing. The physical characteristics of the original sound are preserved at every energy change along the way until this code becomes one the brain can recognize and process.

Hearing loss misleads our brain with a loss of audibility and introduces distortion into the message that reaches the brain. Changes in the effectiveness of the brain to process stimuli, from head trauma, disease, or from aging, can result in symptoms that mimic hearing loss. The ears and the brain combine in a remarkable way to process neural events into the sense of hearing. Perhaps it's fair to say that we “hear” with our brain, not with our ears!

## SIGNS OF HEARING LOSS

**The signs of hearing loss can be subtle and emerge slowly, or they can be significant and come on suddenly. Either way, there are common indications. You should suspect hearing loss if you experience any of the signs below.**

You might have hearing loss if you . . .

### SOCIALLY

- require frequent repetition.
- have difficulty following conversations involving more than 2 people.
- think that other people sound muffled or like they're mumbling.
- have difficulty hearing in noisy situations, like conferences, restaurants, malls, or crowded meeting rooms.
- have trouble hearing children and women.
- have your TV or radio turned up to a high volume.
- answer or respond inappropriately in conversations.
- have ringing in your ears.
- read lips or more intently watch people's faces when they speak with you.

### EMOTIONALLY

- feel stressed out from straining to hear what others are saying.
- feel annoyed at other people because you can't hear or understand them.
- feel embarrassed to meet new people or from misunderstanding what others are saying.
- feel nervous about trying to hear and understand.
- withdraw from social situations that you once enjoyed because of difficulty hearing.

### MEDICALLY

- have a family history of hearing loss.
- take medications that can harm the hearing system (ototoxic drugs).
- have diabetes, heart, circulation or thyroid problems.
- have been exposed to very loud sounds over a long period or single exposure to explosive noise.



# Hearing Loss

Patricia E. Connelly, Ph.D. CCC-A, FAAA — New Jersey Medical School, Newark, NJ

## TYPES OF HEARING LOSS

In general terms, there are two types of hearing loss, conductive and sensorineural. A combination of both is also seen as a mixed hearing loss.

### CONDUCTIVE HEARING LOSS

Conductive hearing loss is caused by any condition or disease that blocks or impedes the conveyance of sound through the outer or middle ear. The result is a reduction in the sound intensity (loudness) that reaches the cochlea. Generally, the cause of conductive hearing loss can be treated with a complete or partial improvement in hearing.

### SENSORINEURAL HEARING LOSS

Sensorineural hearing loss results from inner ear or auditory nerve dysfunction. Often, the cause cannot be determined. It is typically irreversible and permanent. It, too, reduces the intensity of sound, but it might also result in a lack of clarity even when sounds, particularly speech, are loud enough. The treatment for sensorineural hearing loss is amplification through hearing aids.

### MIXED HEARING LOSS

A mixed hearing loss is a combination of a conductive and a sensorineural hearing loss. Hearing aids can be beneficial for persons with a mixed hearing loss, but caution should be exercised.

## CAUSES OF HEARING LOSS

The main causes of hearing loss are as follows:

- Aging (presbycusis)
- Excessive noise (i.e. construction, rock music, gun shot, etc.)
- Sudden onset
- Infections (otitis media)
- Injury to the head or ear
- Birth defects or genetics (i.e. otosclerosis)
- Ototoxic reaction to drugs or cancer treatment (i.e. antibiotics, chemotherapy, radiation)





# Tinnitus, or Head Noises

Richard Carmen, Au.D. — Auricle Ink Publishers, Sedona, AZ

**Tinnitus** – often simply referred to as ringing-in-the-ears or head noises is a sound heard by one or both ears that is described by different people in various ways. To some it is a high-pitched ringing, whining, or hissing sound, like listening to a conch shell. To others it may be a low roaring noise. Tinnitus can be very mild, noticeable only in a quiet room, or it can become so loud and annoying the victim hears nothing else. It can be persistent, intermittent, or throbbing, depending on the cause. Some 50 million adults suffer from Tinnitus. For 12 million, the problem is so severe they are incapacitated. While Tinnitus does not cause hearing disorders, it may accompany decreased hearing and other ear symptoms such as pressure, unsteadiness, or dizziness. Often, it occurs alone.

Some of the main causes are:

- wax buildup or obstructions in the outer ear canal
- perforation in the eardrum or fluid accumulation behind
- Otosclerosis - the stirrup bone (stapes) becomes fixed
- Otitis media (ear infections)
- exposure to a sudden loud noise or repeated exposure to noise without adequate protection
- trauma to the head or neck as in a concussion or whiplash injury
- some medications induce head noises
- high or low blood pressure or anemia

## Treatment of Tinnitus

Correcting treatable causes of Tinnitus (i.e. ear wax build-up, allergy, infection, syphilis) often will improve the condition. However, when the cause is unknown, or when head noises arise from within the cochlea, auditory nerve, or brain, treatment becomes more difficult. Most medications and surgical procedures have not been successful in relieving Tinnitus. Because of the direct association between the hearing mechanism and the nervous system, Tinnitus sufferers have been advised to avoid nervous tension, fatigue, and stimulants. Sedatives, biofeedback, and other relaxation techniques may offer some people temporary relief. The only other approach that so far has achieved any success has been Tinnitus Maskers to mask the ringing sound with other sounds as a means of distracting the individual's concentration on Tinnitus. Other worthwhile treatments to explore are cognitive therapy and Tinnitus Retraining Therapy (TRT).

## Conclusion

Because Tinnitus may be symptomatic of a more serious disorder, it is important to try and find the cause before treating the head noises by any of these means.

If you or someone you know suffers from Tinnitus, we urge you to contact an ear doctor (otologist or otolaryngologist) or audiologist as soon as possible.

## BHI Quick Hearing Check

### Introduction

The following hearing loss check is based on the Revised American Academy of Otolaryngology-Head & Neck Surgery (AAO-HNS) five-minute hearing test\*. It is a means of quickly assessing if you possibly have a hearing loss requiring referral for an objective hearing test and possible hearing solution. This screener is related to objective

### INSTRUCTIONS – STEP #1

With respect to your hearing, please think about your experiences with each of the following WITHOUT the use of hearing aids or other devices designed to help you hear better. For each item, indicate the degree to which you agree or disagree (circle one number for each item).

	Strongly Disagree	<----->			Strongly Agree
I have a problem hearing over the telephone	0	1	2	3	4
I have trouble following the conversation when two or more people are talking at the same time	0	1	2	3	4
I have trouble understanding things on TV	0	1	2	3	4
I have to strain to understand conversations	0	1	2	3	4
I have to worry about missing a telephone ring or doorbell	0	1	2	3	4
I have trouble hearing conversations in a noisy background such as a crowded room or restaurant	0	1	2	3	4
I get confused about where sounds come from	0	1	2	3	4
I misunderstand some words in a sentence and need to ask people to repeat themselves	0	1	2	3	4
I especially have trouble understanding the speech of women and children	0	1	2	3	4
I have trouble understanding the speaker in a large room such as at a meeting or place of worship	0	1	2	3	4
Many people I talk to seem to mumble (or don't speak clearly)	0	1	2	3	4
People get annoyed because I misunderstand what they say	0	1	2	3	4
I misunderstand what others are saying and make inappropriate responses	0	1	2	3	4
I avoid social activities because I cannot hear well and fear I will reply improperly	0	1	2	3	4
Family members and friends have told me they think I may have a hearing loss	0	1	2	3	4

**STEP # 2** Add up scores in each column scored 1-4----->

\_\_\_ + \_\_\_ + \_\_\_ + \_\_\_ = \_\_\_

measures of hearing loss using audiological equipment. In step #1 you are asked to respond to 15 items related to your hearing. In step #2 you will score your hearing and in step #3 you will be able to compare yourself to 2,304 adults with hearing loss.

### STEP # 3

#### How Does Your Hearing Loss Score Compare to Adults with Hearing loss?

In adding up your responses to the 15 items you are now able to compare your scores to adults who have a hearing loss. The National Council on the Aging (NCOA) collected this information based on the responses from a representative sample of 2,304 people with hearing loss, ages 50 and above, using the National Family Opinion Panel in 1999.

First, locate your total score in column 1; Column 2 tells you how your hearing loss compares to adults with hearing loss; Column 3 tells how your significant other views the hearing loss; Column 4 tells you what hearing solution action is needed.

1 – What is your hearing loss score?	2 – How does your hearing loss compare to others?	3 – How does your significant other describe your hearing loss?	4 – Hearing Solution Action Needed
0-4	Lower 5%	Very Mild	None
5-9	Lower 10%	V	V
10-13	Lower 15%	Majority mild with some moderate	Hearing test may be necessary to monitor your hearing.
14-17	Lower 20%		
18-19	Lower 25%	V	V
20-21	Lower 30%	Majority moderate with about a third mild	Hearing test recommended; hearing solution based on lifestyle
22-23	Lower 35%		V
24-25	Lower 40%	   V	Hearing test recommended; hearing solution probably needed in many situations.
26-27	Lower 45%	Majority moderate with some mild	 
28-29	Middle- 50%		
30-31	Upper 45%	V	V
32-33	Upper 40%	Majority moderate to severe	Extensive communication difficulty requiring testing and hearing solution
34-35	Upper 35%		
36-37	Upper 30%		
38-39	Upper 25%		
40-42	Upper 20%	V	
43-45	Upper 15%	Majority severe to profound	
46-50	Upper 10%		
51-55	Upper 5%		
56-60	Upper 1%	V	V

\*Source: Koike, J.; Hurst, M.K.; and Wetmore, S. J. Correlation between the American Academy of Otolaryngology—Head and Neck Surgery five-minute hearing test and standard audiological data, Otolaryngology—Head and Neck Surgery, Volume 111 (5), pp. 625-632.



# The Impact of Treated Hearing Loss on Quality of Life

Sergei Kochkin, Ph.D. — Better Hearing Institute, Alexandria, VA

It would seem that hearing is a second-rate sense when compared to vision in our visually oriented modern society. People with hearing loss delay a decision to get hearing help because they are unaware of the fact that receiving early treatment for hearing loss has the potential to literally transform their lives. Research by the National Council on the Aging on more than 2,000 people with hearing loss, as well as their significant others, demonstrated that hearing aids clearly are associated with impressive improvements in the social, emotional, psychological, and physical well-being of people with hearing loss in all hearing loss categories from mild to severe. Specifically, hearing aid usage is positively related to the following quality of life issues.

Hearing loss treatment was shown to improve:

- Earning power
- Communication in relationships
- Intimacy and warmth in family relationships
- Ease in communication
- Emotional stability
- Sense of control over life events
- Perception of mental functioning
- Physical health
- Group social participation

And, just as importantly, hearing loss treatment was shown to reduce:

- Discrimination toward the person with the hearing loss
- Hearing loss compensation behaviors (i.e. pretending you hear)
- Anger and frustration in relationships
- Depression and depressive symptoms
- Feelings of paranoia
- Anxiety
- Social phobias
- Self-criticism

If you are one of those people with a mild, moderate or severe hearing loss, who is sitting on the fence, consider all the benefits of hearing aids described above. Hearing aids hold such great potential to positively change so many lives.



**You Should Hear What You Are Missing!**

# Advances in the Diagnosis and Treatment of Hearing Loss

Ross J. Roeser, Ph.D. — University of Texas-Dallas/Callier Center for Communication Disorders

New information about how we hear, as well as the explosion of new technology has made help available for almost everyone with hearing loss.

## Improved Identification of Hearing Loss

With recent advancements, it is now possible to perform comprehensive testing to determine:

- If hearing loss exists, even for the youngest populations
- The amount and nature of the hearing loss
- The benefits that are possible through available treatments

Breakthroughs in identification techniques include:

- **Universal neonatal hearing screening** – to test the hearing of babies within the first 48 hours of life. Such tests identify hearing loss in infants so that treatments can begin as soon as possible.
- **Auditory brainstem response (ABR) testing** – for use with difficult-to-test populations and for medical diagnosis of auditory disorders. The ABR test can be performed on individuals of any age, even the youngest infant. There is no longer any reason to delay referral of infants for hearing evaluation because they are “too young to test.”
- **Immittance testing** – for objective and complete evaluation of middle ear function and assessments of the nerve function of the ear.
- **Otoacoustic emissions testing** – that provide information regarding the hearing nerve in the inner ear and help identify the cause of hearing loss.
- **Special auditory tests** – for identification of the exact location of the auditory impairment.

## Improved Rehabilitation

Auditory rehabilitation is now available for individuals of all ages who have hearing loss. New and modernized techniques include:

- specialized educational programs for children with hearing loss
- individually tailored and computerized training in speech reading (lip reading), auditory training, and counseling
- assistance in everyday listening through custom-designed personal hearing aids
- assistance in specific listening situations (telephone, television, and group listening devices) through the use of assistive listening devices

## Advances in the Diagnosis and Treatment of Hearing Loss

Ross J. Roeser, Ph.D. — University of Texas-Dallas/Callier Center for Communication Disorders

- Help for those with profound deafness through the use of cochlear implants, tactile hearing aids, and alerting devices.
- Benefit to those who suffer from tinnitus (ringing in the ears) through counseling and the use of specially designed tinnitus maskers.

Help is now available for almost everyone with a hearing loss.

- If you THINK you have a hearing loss, diagnostic testing is available.
- If you KNOW you have a hearing loss, rehabilitation is available.

### Hearing Healthcare Professionals

To find the most comprehensive list of hearing healthcare professionals near you, consult the yellow pages under “audiologist”, “audiology”, “hearing aids” or “Physicians – Ear Nose Throat (Otolaryngology)”. Here is a brief description of each hearing healthcare profession:

**Audiologists** identify and assess disorders of the hearing and balance systems of children and adults. Audiologists select, fit, and dispense amplification systems such as hearing aids and related devices; program cochlear implants; and provide instruction, rehabilitation, and counseling services to enhance human communication. A graduate (doctorate or master) degree is required for practice.

**Hearing instrument specialists** assess hearing and select, fit, and dispense hearing aids and related devices. They provide instruction, rehabilitation, and counseling in the use and care of hearing aids and related devices to enhance human communication. The nationally accepted credential for hearing instrument specialists is certification by the National Board for Certification in Hearing Aid Sciences.

**Otolaryngologists** (ear, nose, and throat physicians) perform a complete medical history and physical examination of the head and neck. They also perform and supervise hearing and balance testing, which leads to the medical diagnosis, treatment, and rehabilitation of diseases of the hearing and balance systems in children and adults. This may include prescribing medications; performing surgery including implanting cochlear implants; and selecting, fitting, and dispensing hearing aids and related devices. The nationally accepted credential for otolaryngologists is board certification by the American Board of Otolaryngology. A medical degree (MD or DO) is required.





## When a Loved One Resists Help

Richard Carmen, Au.D. — Auricle Ink Publishers, Sedona, AZ

When we think of helping a loved one with hearing loss who declines use of hearing aids, we often think of how important it is to repeat ourselves, speak clearly, speak louder or interpret what others say if they cannot hear the message. But when we do these good deeds for loved ones with a hearing loss, what we don't realize is that we're assisting in their failure to seek help. Such well-intended efforts are counterproductive to the ultimate goal of them receiving hearing aids. Here's why.

If a loved one with a hearing loss has come to rely on your good hearing, what is the great need for them to wear hearing aids? Your co-dependent efforts must stop in order for them to grasp the magnitude of their problem. Many people with a hearing loss never realize how much communication they actually fail to understand or miss completely because you have become their ears. However, it takes only a short time for them to realize that without your help, they're in trouble. It is through this realization that one becomes inspired to take positive action to solve their problem. Therefore, as a loving spouse or family member you must create the need for your loved one to seek treatment by no longer repeating messages and being their ears. Your ultimate goal is for them to hear independent of you.

### Here are some practical tips for you:

- **Stop repeating yourself!** Explain that you are on a "Hearing Help Quest"—one that involves your loved one by allowing him or her the opportunity to realize the significance of their hearing loss. Do not stop helping though. All you do is preface what you repeat by saying each time, "Hearing Help!" or some other identifier. In a short amount of time, your loved ones will realize how often you say this. In turn, they will come to realize how often they depend on you. (This suggestion is only for a loved one who resists the idea of getting any help.)
- **Stop raising your voice** (then complaining you're hoarse). That results in stressing your throat and vocal chords.
- **Stop being the messenger by carrying the communication load for the family.** Do not tell your loved one "He said" and "She said" when he or she needs to be responsible for getting this information directly from the source.
- **Do not engage in conversation from another room as tempting as this is and as convenient as it appears.** This sets up your communication process for failure.
- **Create a telephone need.** This means for you to stop being the interpreter on the telephone. Allow your loved one to struggle in order to recognize how much help he or she needs. We're looking for motivation (to hear) from your loved one—not you.

## Hearing Aids

Gus Mueller, Ph.D. — Vanderbilt University, Nashville, TN  
Ruth Bentler, Ph.D. — University of Iowa, Iowa City, IA



### HOW HEARING AIDS WORK

While the processing of modern hearing aids is complex, and computer programming is required to make some of the adjustments, the basic components that make them work has not changed. The basic function of a hearing aid is as follows:

- Sound waves enter through the microphone, which converts acoustic signals into electrical signals.
- The amplifier increases the strength of the electrical signal.
- From the amplifier, the signal is then transformed back to an acoustic signal by the receiver (a miniature loud speaker).
- From the receiver the signal is channeled into the ear canal, either through a small tube or through an ear mold.
- A battery is required to power the hearing aid and enable the amplification process.

Many hearing aids also have user controls (e.g. toggle switch, volume control wheel, push button, or remote control) that enable the wearer to adjust a variety of hearing aid parameters, including:

- Turning the hearing aid “on” or “off”
- Changing the volume
- Switching to the telecoil
- Switching between omni- and directional-microphone settings
- Switching to a different pre-programmed memory

### Styles of Hearing Aids

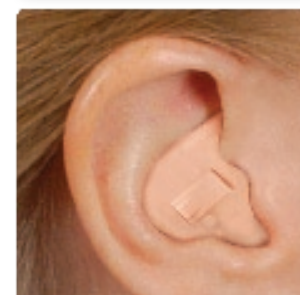
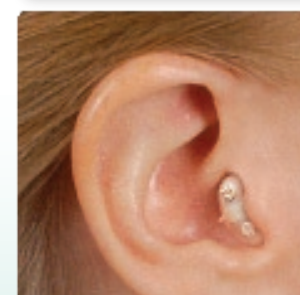
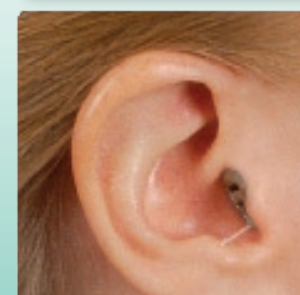
Hearing aids have been available in four styles: body, eyeglass, behind-the-ear (BTE), and in-the-ear (ITE). Included in the category of ITE hearing aids are in-the-canal (ITC) and completely-in-the-canal (CIC) styles (all shown in the figures below). While body and eyeglass style hearing aids were regularly used 40-50 years ago, they comprise only about 1% of all hearing aids marketed today. Instead, most individuals choose ITE (approximately 80%) or BTE (approximately 20%) style hearing aids. This transition in style, use, and preference is occurring for a number of reasons, including the reduction in the size of the components, durability, and cosmetic concerns on the part of the consumer.

The **ITE** style hearing aid fits directly into the external ear. The circuitry is housed primarily in the concha (external) portion of the ear. Due to the miniaturization of the component parts (including the microphone, receiver and battery), it is possible to make hearing aids small enough to fill only a portion of the concha (ITC) or fit deeply into the ear canal (CIC). All three of these styles have typically been considered to be more modern and cosmetically appealing. However, modern BTE hearing aids have become smaller and at times are less noticeable than some ITC hearing aids. Other features of in-the-ear aids are as follows:

- More secure fit, and easier insertion and removal than with BTEs.
- Improved cosmetic benefits with smaller styles (CIC, ITC).
- Less wind noise in the smaller styles than with BTEs.
- Directional microphone technology available for most styles, excluding CICs.
- Deep microphone and receiver placement with CICs may result in increased battery life and high frequency amplification compared with other styles.
- All components are integrated into a one-piece shell, which may be easier to handle and operate than for BTE styles.

The **BTE** style hearing aid is housed in a small curved case which fits behind the ear and is attached to a custom earpiece molded to the shape of your outer ear. Some BTE models do not use a custom earpiece; instead the rubber tubing is inserted directly into the ear. The case is typically flesh colored, but can be obtained in many colors and/or patterns. Other features include:

- BTEs may be the most appropriate choice for young children, as only the earmold needs to be replaced periodically as the child grows and the ear changes in dimension.
- Typically, BTEs are the most powerful hearing aid style available, and may be the best option for persons with severe-to-profound hearing loss.
- FM and direct auditory input is routinely available as an optional or standard feature.
- Telecoil circuitry is often more powerful than with ITEs.
- Non-occluding earmolds may be used with BTE hearing aids, if a medical condition exists or if the patient reports a “plugged” sensation when wearing other hearing aid styles.
- Directional microphone technology available with most BTE styles and models.
- Larger battery sizes used in BTEs may be easier to handle than smaller styles for those with limited manual dexterity or vision deficits.

**BTE w/ earmold****BTE w/ small tubing****ITE****ITC****CIC**



## Hearing Aids

Gus Mueller, Ph.D. — Vanderbilt University, Nashville, TN  
Ruth Bentler, Ph.D. — University of Iowa, Iowa City, IA

### BRIEF GUIDE TO MODERN HEARING AID TECHNOLOGY

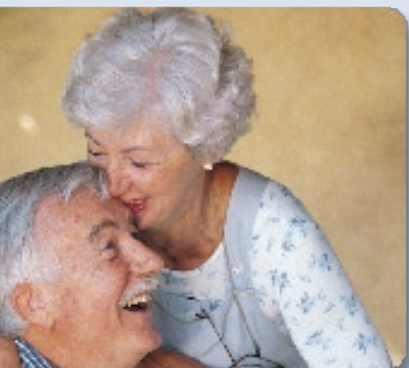
In addition to the basic features of hearing aids discussed earlier, there are many other features available in modern hearing aids—some of them are for convenience and ease of use, others are designed to improve speech understanding or listening comfort.

**Adaptive Feedback Cancellation:** Acoustic feedback (whistling from the hearing aid) can be annoying, embarrassing, and in some cases, prevent the hearing aid wearer from using the correct amount of gain. Many of today's hearing aids have an automatic feature that quickly detects acoustic feedback and cancels it. This feature is designed to manage transitory feedback (e.g. caused by placing one's hand or a telephone next to the ear), and is not a solution to a poorly fitted ear mold or hearing aid.

**Automatic Gain Control—Output (AGCo):** AGCo or output compression is used to put a “ceiling” on loud sounds. It handles the output after the amplifier, and can be adjusted to correspond to the patient's threshold of discomfort (maintaining sounds below this level).

**Automatic Gain Control—Input (AGCi):** AGCi, or input compression, often referred to wide dynamic range compression (WDRC) is used to “repackage” the speech signal (and other incoming sounds) to correspond to the reduced dynamic range of the hearing aid user. That is, if the incoming sounds have a 60 dB range, and the patient only has a 30 dB range of useful hearing, the sounds might be “compressed” by 2:1 to fit into the useful auditory region. The notion is that most people with a hearing loss need more gain for soft sounds than for average, and more gain for average sounds than for loud. WDRC accomplishes this automatically—in fact, if the WDRC is programmed correctly across frequencies, many hearing aid users have little need for a volume control.

**Digital Noise Reduction:** With digital hearing aids, it is possible for the hearing aid to analyze an incoming signal and differentiate speech from a broad-band noise signal. This can be accomplished simultaneously in several channels. If the dominant signal is believed to be noise in a given channel, there is a reduction in gain. Note, however, that what a typical hearing aid user might consider to be “noise,” (background talkers at a party) might not be considered “noise” by the hearing aid. While this feature has the potential to improve speech understanding in typical difficult listening situations, this has yet to be verified by research.





**Digital Signal Processing:** Until recently, the majority of hearing aids utilized analog signal processing. This has changed rapidly over the past few years, and today, nearly all hearing aids sold in the U.S. utilize digital signal processing. The advantage of digital processing is that less space is required, allowing manufacturers to include many more “programmable features” in a small package. Through the use of digital signal processing, the hearing aid can conduct an analysis of an incoming signal, and make a reasonable classification of the content—speech versus broad-band noise versus acoustic feedback (whistling) versus music, for example. This classification can then be used to trigger automatic activation of other special features.

**Directional Microphone Technology:** Using special microphones or phase cancellation signal processing, it is possible to configure a hearing aid so that sounds from the side, and especially the back of the hearing aid user are amplified less than sounds originating from the front. It can serve as a type of “spatial” noise reduction if the user is correctly positioned. Directional technology is available on all hearing aid styles except CICs (because of size constraints). Importantly, directional technology does not improve localization of sounds. Research has shown that many hearing aid users prefer directional technology for listening in noise, usually when:

- the noise originates from behind the listener,
- the talker is in front of the listener,
- the listener is close to the talker,
- the room has low reverberation.

Some hearing aids automatically switch to a directional mode when the signal type and/or input intensity are matched to the characteristics of the algorithm. Adaptive directional hearing aids automatically track a dominant single noise source (e.g. a car passing by someone on a sidewalk), attempting to provide maximum reduction in gain toward the location of the source.

**Multiple Channels:** The majority of today’s hearing aids have multiple channels. Each channel represents a portion of the frequency range important for understanding speech. One advantage of multiple channels is that features such as gain and compression can be programmed differently to reflect changes in the patient’s hearing across frequencies. Multiple channels also are useful for implementing other features such as digital noise reduction and feedback cancellation. There is no consensus regarding how many channels are enough (or how many are too many)—to some extent, this depends on the feature utilized within the channels.

## Hearing Aids

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**Multiple Memories:** A memory is a location to store hearing aid settings that are designed for a particular listening situation. It is common for hearing aids to have two or three memories. For example, in a hearing aid with three memories, it is common that memory one will be for listening in quiet, memory two will be for listening in noise, and memory three will be for telephone. On the other hand, many hearing aid users find that a single memory works in a variety of listening situations, and may only use one memory. Changing memories is accomplished by using a button (or toggle switch) on the hearing aid, with a remote control device. In some digital hearing aids, it happens automatically.

**Telecoils:** With this special circuit, electromagnetic signals can be picked up from the handset of the telephone and amplified in a manner similar to the amplifying function of the hearing aid. Although many hearing aid wearers report benefit with this circuit, there is substantial variability across hearing aids. Telecoils are not available in some smaller custom-made models due to space limitations. Often, hearing aids with multiple memories will devote one memory to the telecoil. In these aids, the telecoil can be accessed through a push button on the hearing aid or by the use of a remote control device.

## The Binaural Advantage (Two are better than one)

Sergei Kochkin, Ph.D. — Better Hearing Institute, Alexandria, VA

If you have hearing loss in both ears (bilateral hearing loss), then most likely you are a candidate for two hearing aids. While a hearing healthcare professional can determine best if you are a candidate for two hearing aids, the ultimate decision-maker concerning binaural aids is the person who will wear them. It is important that the person with the hearing loss be given the chance to experience binaural (two hearing aids) amplification, before a decision on one or two hearing aids is made. Similar to the way refractory problems in both eyes are treated with a pair of glasses, it makes sense that bilateral hearing loss should be treated with binaural hearing aids.

Let me share with you why two hearing aids are better than one (visit [www.betterhearing.org](http://www.betterhearing.org) for more detailed explanations of the binaural advantage):

- better understanding of speech
- better understanding in group and noisy situations
- better ability to tell the direction of sound
- better sound quality
- smoother tone quality
- wider hearing range
- better sound identification
- keeps both ears active resulting in potentially less hearing loss deterioration
- hearing is less tiring and listening more pleasant





- feeling of balanced hearing
- greater comfort when loud noises occur
- reduced feedback and whistling
- tinnitus (ringing in the ears) masking
- consumers prefer two over one
- customer satisfaction is higher with two

Logically, just as you use both eyes to see clearly, you need two healthy ears to hear clearly. Before you decide on one hearing aid, try two. Your hearing healthcare professional can demonstrate to you the binaural advantage experience either through headphones (during testing), probe microphones, master hearing aids, or during your trial fitting. Decide for yourself.



## Medical Advances

Patricia E. Connelly, PhD, CCC-A, FAAA — New Jersey Medical School, Newark, NJ

Between 5% and 10% of people with hearing loss are not candidates for hearing aids. When conventional amplification does not help, there may be alternative approaches to the treatment of hearing loss as illustrated by the following examples. A medical consultation is necessary, preferably by a physician who is Board Certified in Otolaryngology – Head and Neck Surgery.

- **Severe hearing loss or deafness.** When hearing aids cannot effectively amplify conversational speech a cochlear implant evaluation should be considered.
- **Otosclerosis.** Fixation of the hearing bones or Otosclerosis and the hearing loss it causes may respond favorably to a surgical procedure called a stapedectomy.
- **Impacted cerumen.** Removal of ear wax may result in reversal of the hearing loss. Some audiologists are trained in the procedure.
- **Ear infections.** The treatment of ear infections is important for the restoration of good health to the ears and may restore hearing. Treatment usually is with antibiotics or by draining fluid behind the eardrum.
- **Acoustic neuroma.** This is a tumor that grows on the nerve of hearing and balance. Surgery may be necessary.
- **Atresia and Microtia.** A bone-conduction hearing aid or a surgically implanted bone-anchored hearing aid may improve hearing.
- **Unilateral deafness.** Several options may be helpful including: trans-cranial fitting, bone-anchored hearing aid, CROS hearing system, or assistive listening devices. A comprehensive audiological evaluation is essential.

## Assistive Technology

Cynthia Compton-Conley, Ph.D. — Gallaudet University, Washington, DC

Due to technological advancements in recent years, today's hearing aids do an excellent job of helping people meet many of their communication needs. However, sometimes there are situations where additional technologies may be needed. For example, some hearing aid users may continue to experience difficulty understanding speech in noisy environments, from a distance, as when watching TV or attending a movie or play, or while listening on the telephone. At bedtime, a person with even a mild to moderate hearing loss may not hear the smoke alarm located down the hall. This same person might miss a doorbell chime while listening to the TV a room away. Further, a child with normal hearing, who suffers from recurrent middle ear infections or who has a central auditory processing disorder, is at a definite educational disadvantage when seated in a typical classroom with poor room acoustics and excessive noise.

### How Assistive Technology Can Help

Many auditory and non-auditory devices—collectively known as Assistive Technology, Assistive Listening Devices (ALDs), or Hearing Assistance Technology (HAT) – are available to help people with all degrees of hearing loss. These devices can help facilitate improved face-to-face communication, reception of electronic media, telephone reception, and reception of important warning sounds and situations.

### Devices to Facilitate Face-to-Face Communication and the Reception of Electronic Media

Auditory assistive listening devices can be thought of (roughly) as “binoculars for the ears.” By placing a remote microphone next to the talker (or loudspeaker) or by connecting directly into the sound source (TV, VCR, MP3 player, etc.), these devices bring the desired sound closer to one's ear(s) before it has a chance of being mixed with noise and reverberation. The “captured” sound is then sent to the listener via a “hardwired” or “wireless” link. Three wireless systems can be used: FM (see below), infrared or inductive (audio loop). In order to use these systems, the hearing aid must be equipped with either a “telecoil” or a feature called “direct audio input (DAI).” DAI allows very tiny FM receivers to be plugged into the bottom of the hearing aid. DAI or a telecoil also allow body worn FM and infrared receivers to be used with more styles of hearing aids. Finally, a telecoil allows the hearing aid itself to function as the receiver when listening to a room-sized inductor (room loop) installed in a building (e.g. church, movie house). For greatest listening flexibility ask for hearing aids with telecoils built into them. And, if you want to have the opportunity to use the latest tiny FM receivers, think about purchasing behind-the-ear (BTE) hearing aids equipped with DAI.

Two types of visual systems are available to help people understand speech at a meeting or other live event: Computer-Assisted Note taking (CAN) and Communication Access Real Time Translation (CART), also known as Real Time Captioning.



## Devices to Facilitate Telephone Reception

Special telephone amplifiers are available that replace the telephone handset, attach to the phone between the handset and the phone (in-line amplifiers) or attach to the handset and are powered by a battery (portable amplifiers). Each of these amplifiers can be used with or without a hearing aid. These standard telephone amplifiers can be coupled to a hearing aid either acoustically or inductively. With acoustic coupling, the amplifier is held up to the hearing aid's microphone. While this tends to work well with a CIC hearing aid, it usually results in an annoying whistling sound (feedback) with the larger hearing aid models. However, if the larger models are equipped with a telecoil, then the hearing aid can be set to "T" and held next to the amplifier, with no feedback.

Special telephones with built-in amplification are also available in both standard and wireless handset models. Also available are devices that enable you to use your hearing aid(s) with a digital cell phone for distortion- and noise-free reception.



For those who cannot understand over the voice telephone, even with amplification, there are other options such as the Voice Carry Over (VCO) or "read and talk" telephone. Used with the telephone relay service, VCO allows you to talk directly to the other party while an operator translates what the other party says to you into print that is displayed on a small LCD screen.

## Alerting Devices

Alerting devices allow hard of hearing and deaf people to be aware of many environmental sounds and situations in the home, in school or in the workplace, as well as for travel and recreation. Such systems use either microphones or electrical connections to pick up the desired signal and hardwired or wireless transmission to send the signal to you in a form to which you can respond. For example, when someone presses the doorbell button, when the phone rings or the fire alarm is activated, these events can trigger a flashing incandescent or fluorescent light, a loud horn, a vibrational device (pager, bed shaker), or a fan.

## WHICH SYSTEM IS BEST?

A broad assortment of auditory and non-auditory technology is available to assist in removing the communication barriers of everyday life. Your hearing healthcare professional should be able to help you select the best system, or combination of systems, based on your own unique communication needs and lifestyle.



## Childhood Hearing Loss

Judith Gravel, Ph.D. — Children's Hospital of Philadelphia, Philadelphia, PA

Children's quality of life and development vitally depend on hearing. Children learn to speak because they hear others and themselves communicate. Hearing helps your child learn to read, appreciate music, and receive warnings of approaching harm. Your child will have difficulty coping with many of life's challenges and opportunities at home and in school without good hearing.

Age	Communication Behavior
5 months	Turn to source of moderate and soft sounds
6 months	Recognize familiar voices and engage in vocal play with parents
9 months	Demonstrate understanding of simple words
10 months	Babbles by stringing multiple, single-syllable speech sounds together
12 months	One or more real, recognizable spoken words emerge
18 months	Understands simple phrases, retrieves, places or manipulates familiar objects on spoken request; points to body parts on request; spoken vocabulary of 20-50 words and short phrases
24 months	Spoken vocabulary 200-300 words; speaks in simple sentences; most speech is understandable to adults not with the toddler on a daily basis; sits and listens to read-aloud story books
3 – 5 years	Uses spoken language constantly to express wants, reflect emotions, convey information and ask questions. Understands nearly all that is said. Vocabulary grows rapidly: 1000-2000 words; produces complex and meaningful sentences. All speech sounds are clear and understandable by 5 years.

### Signs of Hearing Problems

The single most important sign of hearing loss in children is the failure to develop, or the delayed development of spoken language.

If children have severe or profound hearing loss, it is usually obvious that they do not respond to sound. Sometimes it is difficult to detect mild forms of hearing loss, including hearing loss in only one ear. Even the more common forms of mild hearing loss, however, can negatively impact communication development and school performance.





Common warning signs for hearing loss include:

- Family member or teacher concern regarding:
  - hearing acuity
  - delays or differences in speech and language development
  - attention or behavioral difficulties
  - academic performance
- Inappropriate, delayed, or lack of response to soft and moderate-level sounds: speech or environmental when distractions are minimal
- Use of “what?” or “huh?” frequently
- Intently watching the faces of speakers
- Difficulty understanding speech in background noise
- Sitting close to the TV set when the volume is adequate for others; increasing the TV or stereo/tape/CD player volume to unreasonably loud levels
- Not responding to voices over the telephone or switching ears continually when the phone is utilized
- Not startled by intense sounds
- Unable to locate the source of a sound accurately

### Newborn Hearing Screening

Today, the vast majority of newborns receive a hearing screening before discharge from the hospital. Two types of objective test technologies are used to screen for hearing loss in newborns: otoacoustic emissions and the auditory brainstem response (sometimes called ABR test or BAER test). These screening tests can detect 80-90% of infants with moderate degrees of hearing loss and greater. However, no screening test is perfect. Children with mild hearing loss may pass newborn hearing screening. Newborn hearing screening cannot identify children with late onset or progressive types of hearing loss.

Even when an infant passes a hearing screening test in the hospital, it is important to monitor developmental milestones for hearing, language and speech. If your child was born with visual, cognitive or motor disabilities, a comprehensive audiological evaluation would be important to ensure your child's hearing is completely normal.

### HEARING CAN BE EVALUATED AT ANY AGE

Hearing assessment can be completed in children of any age using objective and subjective audiologic test technologies. Therefore, hearing testing should not be delayed. Confirmation of hearing loss is made following audiologic and medical assessment.

## Childhood Hearing Loss

Judith Gravel, Ph.D. — Children's Hospital of Philadelphia, Philadelphia, PA

### EARLY INTERVENTION FOR CHILDREN WITH HEARING LOSS

*All newborns should be screened for hearing loss before 1 month, hearing loss should be confirmed by 3 months, and children with diagnosed hearing loss should receive intervention, which means enrollment in early intervention programs by 6 months of age.* (Maternal and Child Health Bureau, Centers for Disease Control and Prevention, Joint Committee on Infant Hearing (JCIH, 2000))

It is important to remember that infants may be fit with amplification soon after the confirmation of the hearing loss. As such infants may begin to use hearing aids and assistive devices before 6 months of age.

Infants age 12 months with profound hearing loss, who have not made sufficient progress with conventional hearing aids are considered candidates for cochlear implants. In some cases (as when meningitis is the cause of deafness), younger infants may be candidates for a cochlear implant.

### Risk Conditions for Childhood Hearing Loss

(Joint Committee on Infant Hearing, 2000)

#### Neonates from Birth Through 28 Days

- An illness or condition requiring admission of 48 hours or greater to an infant care unit
- Stigmata or other findings associated with a syndrome known to include a sensorineural and or conductive hearing loss
- Family history of permanent hereditary childhood sensorineural hearing loss
- Craniofacial anomalies, including those with morphological abnormalities of the pinna and ear canal
- In-utero infection such as cytomegalovirus, herpes, toxoplasmosis, or rubella

#### Infants 29 Days Through 2 Years

- Parental or caregiver concern regarding hearing, speech, language, and or developmental delay
- Family history of permanent hereditary childhood hearing loss
- Stigmata or other findings associated with a syndrome known to include a sensorineural or conductive hearing loss or Eustachian tube dysfunction
- Post-natal infections associated with sensorineural hearing loss including bacterial meningitis
- In-utero infections such as cytomegalovirus, herpes, rubella, syphilis, and toxoplasmosis
- Neonatal indicators, specifically hyperbilirubinemia at a serum level requiring exchange transfusion, persistent pulmonary hypertension of the newborn associated with mechanical ventilation, and conditions requiring the use of extracorporeal membrane oxygenation (ECMO).
- Syndromes associated with progressive hearing loss such as neurofibromatosis, osteopetrosis, and Usher's syndrome
- Neurodegenerative disorders, such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich's Ataxia and Charcot-Marie-Tooth syndrome
- Head trauma
- Recurrent or persistent otitis media with effusion for at least three 3 months

## NOISE EXPOSURE AND CHILDREN

If speech must be raised (shouted) to communicate, it is very likely that the noise is excessive and possibly damaging. Ringing in the ears (tinnitus) after noise exposure also indicates excessive sound levels. Children should be told about the dangers of noise exposure and the use of ear protection (ear plugs, ear muffs, etc.). When ear protection is unavailable, simply block the ear canal opening with your fingers. This serves as to reduce the level of sound going to the eardrum. Obviously children should be protected from excessive noise exposure whenever possible.

## FEDERAL LEGISLATION AND CHILDREN WITH HEARING LOSS

Through the Individuals with Disabilities Education Act (IDEA, 1997), the Federal Department of Education provides funds to states for children birth to 21 years who have disabilities. A child with a hearing loss is covered by the provisions of IDEA if, by reason of the child's hearing loss the child is deemed to require special education and related services. Related services includes transportation, speech-language pathology, audiology and other such services as may be required to assist the child in benefiting from special education. Services provided can however, vary by state and even school district.

### Preparing Your Child for Better Hearing

You are your child's role model for attitudes on hearing loss and hearing conservation. If hearing and the use of hearing protection are important to you, it will be important to your child as well. With your understanding, encouragement, and support, your child will enjoy a world of better hearing.

#### Remember:

- You child's hearing is the means through which communication will develop and flourish.
- Guard your child's hearing carefully and seek professional help if you are concerned at any time.





## Hearing Loss Prevention

**Richard W. Danielson, Ph.D. — National Space Biomedical Research Institute  
and Baylor College of Medicine, Houston, TX**

Noise is one of the most common causes of hearing loss, and one of the most common occupational illnesses in the United States. A single shot from a shotgun, experienced at close range, may permanently damage your hearing in an instant. Repeated exposures to loud machinery may, over an extended period of time, present serious risks to human hearing.

- 10 million Americans have already suffered irreversible hearing damage from noise.
- 30 million are exposed to dangerous noise levels each day.
- The effects of noise on hearing are often underestimated because the damage takes place so gradually.

Excessive noise damages the delicate hair cells in the inner ear. This damage results in sensorineural hearing loss and often tinnitus (ringing of the ears). Dangerous levels of noise can come from working in noisy occupations or in engaging in dangerous recreational activities:

- Beware of dangerous recreational activities: video arcades, fire crackers, discos, music concerts, shooting a gun, movie theatres, sporting events, motor boards, motorcycles, snowmobiles, “boom cars”.
- Occupations particularly under risk for hearing loss due to exposure to noise are as follows: firefighters, police officers, factory workers, farmers, construction workers, military personnel, heavy industry workers, musicians, entertainment industry professionals.

If you have to raise your voice to shout over the noise to be heard by someone within an arm’s length away, the noise is probably in the dangerous range.

Some of the warning signs of the presence of or exposure to hazardous noise are as follows:

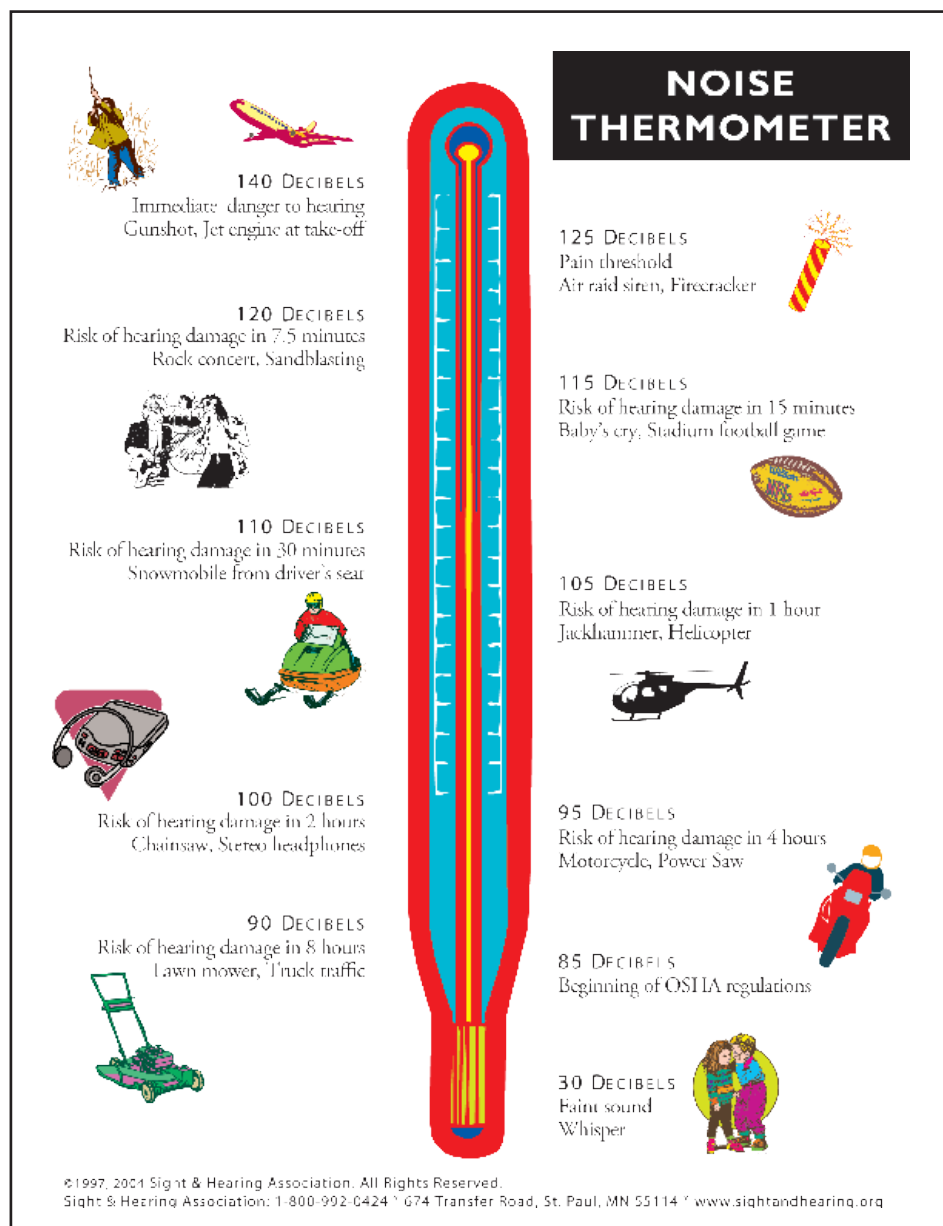
- You can’t hear someone three feet away.
- You have pain in your ears after leaving a noisy area.
- You hear ringing or buzzing (tinnitus) in your ears immediately after exposure to noise.
- You suddenly have difficulty understanding speech after exposure to noise.
- You can hear people talking but you cannot understand them.





## WHAT YOU CAN DO TO PROTECT YOUR HEARING

- If you work in an at-risk occupation, check with your employer to make sure you have adequately protected your hearing according to OSHA regulations.
- Limit exposure time to noisy activities.
- Wear hearing protection, such as foam or silicone plugs or muffs. Foam plugs are available at your pharmacy while muffs and specialized ear protection can be purchased at sporting good stores or safety equipment stores.
- At home, turn down the volume on the television, radio, stereos and walkmans.
- Wear ear plugs or muffs when using loud equipment (i.e. lawn mowers, power saw, leaf blower).
- Buy quieter products (compare dB ratings – the smaller the better).
- Reduce the number of noisy appliances running at the same time in your personal environment.
- Avoid medications that can be dangerous to your hearing. Be sure to ask your physician about possible effects on your hearing.



### An Ounce of Prevention

Be alert to hazardous noise. Since prevention is so critical, make sure that your family (especially children), friends, and colleagues are aware of the hazards of noise.

**Remember: One-third of hearing loss is preventable with proper hearing protection.**

**PROTECT THE HEARING THAT YOU HAVE NOW!**

## Financial Resources

Financial assistance for hearing help is often available to beneficiaries of public assistance programs and to others on a limited budget. First ask your local hearing center, ear doctor, or hearing healthcare professional. He or she may be aware of local assistance programs. Possible sources of financial help are as follows:

### LOCAL

- Department of Social Services, Human Services (listed in the telephone directory under city and state government). In many states, Medicaid offers assistance to those with speech, hearing and language disorders who qualify. Medicare may provide funds for testing and medical treatment, but does not fund hearing aids at this time.
- Mayor's office (Community services – listed under city governments).
- Chamber of Commerce (listed in the white pages).

### SOCIAL SERVICE AND CHARITABLE ORGANIZATIONS

Local chapters of many social service organizations have special programs for people with hearing loss. Contact local social service organizations in your area, or local chapters of the following service organizations:

Lions' Clubs International  
National Easter Seals Society  
United Way  
Rotary Club

Kiwanis  
Sertoma International  
March of Dimes  
Optimist Club

There are also a number of charitable organizations specializing in hearing healthcare which at times will provide grants for hearing aids. Visit the BHI website for up-to-date information.

### STATE

- Contact your State Department of Rehabilitation Services (or Department of Vocational Rehabilitation).
- For aid to children, try the Maternal and Child Health Service and the Youth Projects divisions of your State Department of Human Services.

### FEDERAL

- The Veterans Administration provides hearing aids to eligible veterans. Veterans should contact their nearest VA office or hospital for information.

### CORPORATE

- Your health insurance provider, union or employer may offer financial assistance for hearing aids or audio-logical services either through reimbursement or as part of a hearing healthcare agreement entitling you to a discount on hearing aids.
- Many employers have flexible spending accounts in effect enabling you to purchase hearing aids on a pre-income tax basis.
- Under the American with Disabilities Act (ADA) you may be eligible for hearing aids or other assistive technology if it is needed to perform your job.

**For more specific information on sources for financial assistance please visit us on the web at [www.betterhearing.org](http://www.betterhearing.org).**

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