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**HEARING AID TECHNOLOGY:** There are 3 major types of hearing aid technology.

1. [Conventional Analog](#)
2. [Programmable Analog](#)
3. [Programmable Digital](#)

### **ANALOG HEARING AIDS**

There are 2 types of analog hearing aids:

1. Conventional Analog
2. Programmable Analog

**Conventional Analog** Conventional analog technology is a technology that has been around for many decades. Analog hearing aid technology is very basic and offers limited adjustment capability because of the way each hearing aid circuit is built. It is the LEAST expensive. The audiologist can order and manipulate various potentiometers (tiny dials located on the hearing aid) to help achieve optimum sound quality and clarity, and reduce sound signal distortion. The sound produced by conventional analog hearing aids is less likely to specifically fit the patient's hearing loss due to the hearing aid's limited adjustment capabilities. Also, conventional analog technology can (at times) use more battery power. Therefore, hearing aid users may need to change their batteries more often with conventional analog hearing aids.

**Programmable Analog** Programmable analog technology is the "middle grade" technology. This type of analog hearing aid is "digitally programmable" (meaning it can be hooked up to a computer for very detailed sound changes), but the hearing aid itself still only uses an analog circuit. The audiologist is able to manipulate more specific details to keep distortion to a minimum and produce the cleanest and crispest sound available. Programmable analog hearing aids are good for trying to match different types/amounts of hearing loss, but they do not match different types of hearing loss as precisely as digital hearing aids. These hearing aids are also more expensive than conventional analog hearing aids.

In the past few years, hearing aid technology has exploded. Today, equipped with specially programmed computers, our experienced audiologists adjust many variables in the incoming sound to create the most natural and comfortable sound for each hearing aid patient. Because each hearing aid must be customized to match the individual's hearing loss and listening needs, a complete audiometric evaluation is the first step in the fitting process. Our audiologists will then provide recommendations to help guide each patient in selecting the most appropriate hearing aid.

### **DIGITAL HEARING AIDS**

Digital technology is the most sophisticated hearing aid technology. It gives the audiologist maximum control over sound quality and sound processing characteristics. There are qualitative indications that digital instruments do outperform analog hearing aids. They provide the crispest and cleanest sound by amplifying the signal via a computer chip instead of a conventional circuit and amplifiers. This also allows for minute detailing by the audiologist to produce the cleanest and crispest sound available using the conventional amplifiers. Digital hearing aids have been widely available since 1996.

The term DIGITAL is used so often today, it can be confusing. When the term "digital" is used while referring to hearing aids, it generally means the hearing aid is 100% digital. In other words, the hearing aid is indeed a "complete computer". 100% digital hearing aids have been commercially available since 1996. They can process sound using incredibly fast speeds such as 100 to 200 million calculations per second. Interestingly, most 100% digital hearing aids have analog components, such as the microphone and the receiver. 100% digital hearing aids transform analog information (sound) into a digital signal (numbers used by a computer). They process sound in a way that maximizes important speech information, while minimizing sounds you do not want to hear (ex: background noise).

Our mission is to provide each patient with the most "cost-effective" hearing aid; i.e., the best type of hearing aid customized to maximize hearing at the lowest cost. Though our experience audiologic staff specializes in state of the art digital/programmable hearing aids for complex hearing losses, often a less expensive analog hearing aid, properly adjusted, can improve hearing nearly as well. Many patients come to us discouraged, having prior negative experience with hearing aids. We particularly welcome these patients. Our staff specializes in state of the art technology to resolve the most challenging hearing loss problems. In most instances, we are able to reverse that prior negative experience.

**HEARING AID STYLES:** There are many styles of hearing aids. The degree of the hearing loss, power and options requirements, manual dexterity abilities, cost factors, and cosmetic concerns are some of the factors that will determine the style the patient will use. The most common styles are CIC, MC, ITC, ITE, and BTE. Please refer to the separate section on hearing aid styles to learn more about each one.

**EARMOLD IMPRESSIONS:** All custom-made hearing aids and ear molds are made from a "cast" of the ear. The cast is referred to as an ear impression. The audiologist or hearing aid dispenser makes the ear impression in the office. It takes about 10 to 15 minutes. The audiologist places a special cotton or foam dam in the ear canal to protect the eardrum, and then a waxy material is placed in the ear canal. When the material hardens (about 5 to 10 minutes later) the wax cast, along with the dam are removed from the ear canal. Often, the ear canal will be "oily" after the impression is removed. This is normal. The oil comes from the wax material and prevents the wax material from sticking to the skin. Tell the audiologist before the ear impression is obtained if you are allergic to plastic or dyes!

**ADJUSTING TO HEARING AIDS:** Hearing aids users encounter a variety of problems and questions while using their hearing aids. People learn at different rates. Some people need a day or two to learn about and adjust to their hearing aids, most need a few weeks and some may need a few months. There is no perfect way to learn about hearing aids. I usually recommend you wear the hearing aids for a few hours the first day, and add about an hour a day for each day that follows. Do not try to set an endurance record. Over a period of time you will lengthen the amount of time that you wear the aid. Eventually you will wear the hearing aids most of your waking hours. It is recommended that you interact with those people you are most familiar with during your first few days. Start off listening with your hearing aids in a favorable listening environment and work towards more difficult listening situations. Let your friends and family know that you are using your new hearing aids.

#### **Helpful Steps to Learning to Use a Hearing Aid:**

- Use the hearing aid at first in your own home environment.
- Wear the hearing aid only as long as you are comfortable with it.
- Accustom yourself to the use of the aid by listening to just one other person - husband or wife, neighbor or friend.
- Do not strain to catch every word.
- Do not be discouraged by the interference of background noises.
- Practice locating the source of the sound, with listening only.
- Increase your tolerance for loud sounds.

- Practice learning to discriminate different speech sounds.
- Listen to something read aloud.
- Gradually extend the number of persons with whom you talk, still within your own home environment.
- Gradually increase the number of situations in which you use your hearing aid.
- Take part in an organized course of aural rehabilitation; see your audiologist to learn about these courses.

Hearing aids work very well when fit and adjusted appropriately. They amplify sound! You might find that you like one hearing aid better than the other. The left and right hearing aids will probably not fit exactly the same and they probably won't sound exactly the same. Nonetheless, hearing aids should be comfortable with respect to the physical fit and sound quality. Hearing aids do not restore normal hearing and are not as good as normal hearing. You will be aware of the hearing aids in your ears. Until you get used to it, your voice will sound "funny" when you wear hearing aids. Hearing aids should not be worn in extremely noisy or loud environments. Some hearing aids have features that make noisy environments more tolerable; however, hearing aids cannot eliminate background noise.

**HEARING and VISION and COMMUNICATION:** To maximally communicate, you need to use hearing from both ears (binaural hearing) and you need to use your eyes and ears together. You will not communicate well using your hearing aids alone. To facilitate optimal communication, you will need to pay attention to the speaker's gestures and facial expressions! To maximize communication remember to watch the person speaking, reduce the distance between the speaker and the listener, reduce or eliminate background noises from the listening environment and use good lighting. If someone is speaking to you from across the room, while the TV is on, while doing the dishes, it will be very difficult to adequately communicate, despite fantastic hearing aids!

**HEARING AIDS and BACKGROUND NOISE:** One of the most common complaints of hearing aids users is difficulty understanding speech in noisy environments. Virtually all patients wearing hearing aids complain about background noise at one time or another. There is no way to completely eliminate background noise.

Remember, when you had normal hearing there were still times when background noise was a problem. It is no different now, even with properly fit hearing aids! The good news is there are circuits and features that help to reduce (or minimize) background noise and other unwanted sounds. In fact, there are research findings that demonstrate digital hearing aids with particular circuit and microphone options can effectively reduce background noises. Please speak with your audiologist about this.

Many early digitally programmable (and even some digital) circuits, which claimed to reduce or eliminate background noise, actually filtered out low frequency sounds. This indeed made the sounds appear quieter, however, not only was the background noise made quieter, but so too, was the signal (the speech sound).

Newer ways to reduce background noise are based on timing and amplitude cues and other noise processing strategies, which 100% digital hearing aids can incorporate. These methods work, but are not perfect. Directional microphones are available and are useful as they help to focus the amplification in front of you, or towards the origin of the sound source. Directional hearing aids can offer a better signal-to-noise ratio in difficult listening situations by reducing a little bit of the noise from the sides or behind you. In most 100% digital hearing aids, the noise control features help make noise more tolerable, but do not completely eliminate the noise.

The best and most efficient way to eliminate or reduce background noise is through the use of FM

technology. Please consult with one of our audiologists to find out more about this.

**DO I NEED ONE or TWO HEARING AIDS?** Many patients (with hearing loss in both ears) will ask, "Do I REALLY need a hearing aid in both ears?" Basically, if you have two ears with hearing loss that could benefit from hearing aids, you need two hearing aids. It is important to realize there are no "normal" animals born with only one ear. Simply stated, you have two ears because you need two ears. If we try to amplify sound in only one ear, you cannot expect to do very well. Even the best hearing aid will sound "flat" or "dull" when worn in only one ear.

Assuming you have two ears that hear about the same, you can do a little experiment at home to better understand how important binaural hearing is: \_First, gently close just one ear, by simply pressing the little fleshy part in the front of your ear canal (the tragus) into your ear canal -- a little. Do not apply pressure, do not hurt yourself. Just close the ear canal to eliminate sound from entering the ear. The idea is to close that ear for about ten minutes while you watch TV or listen to the radio, or speak with your spouse. Then, after a full ten minutes, remove your finger. What an amazing difference!

There are many advantages associated with binaural (two ear) listening and importantly, there are problems associated with wearing only one hearing aid -- if you are indeed a candidate for binaural amplification.

Localization (knowing where the sound came from) is only possible with two ears, and just about impossible with one ear. Localization is not just a sound quality issue; it may also be a safety issue. Think about how important it is to know where warning and safety sounds (sirens, screams, babies crying, etc) are coming from. Using both ears together also impacts how well you hear in noise because binaural hearing permits you to selectively attend to the desired signal, while "squenching" or paying less attention to undesired sounds such as background noise.

Binaural hearing allows a quality of "spaciousness" or "high fidelity" to sounds, which cannot occur with monaural (one ear) listening. Understanding speech clearly, particularly in challenging and noisy situations, is easier while using both ears. Additionally, using two hearing aids allows people to speak with you from either side of your head -- not just your "good" side!

People cannot hear well using only one ear. There are studies in the research literature that show that children with one normal ear and one "deaf" ear are ten times more likely to repeat a grade as compared to children with two normally hearing ears. Additionally, we know that if you have two ears with hearing impairment, and you wear only one hearing aid, the unaided ear is likely to lose word recognition ability more quickly than the ear wearing the hearing aid.

**HEARING AID MAINTENANCE and BATTERIES:** All hearing aids users need to know about proper maintenance & batteries for their hearing aids.

**Wax and Dirt:** More than 75 percent of all hearing aid repairs are due to moisture and earwax accumulating in the hearing aid. The vast majority of these repairs are 100 percent preventable. It is extremely important to clean the entire hearing aid every time it is removed from your ear by wiping it off with a lightly dampened cloth. There are special electronic cleaning solutions that your audiologist can recommend. It is better to use special electronic cleaning solutions than a water-dampened cloth. Your audiologist can also give you a special wax removal tool. This tool can be used to remove wax and dirt deep down in the small opening of the hearing aid where sound enters the ear. It is important to check this opening in the hearing aid EVERY day, and remove even the smallest amount of wax.

**Moisture:** To better protect your investment, use a **DRY-AID KIT** every night! Non-electric dry-aid kits

only cost \$10-15, and they are small enough to travel with. The only problem with non-electric dry-aid kits is that they rarely eliminate all the moisture that can damage the hearing aid circuit. Electronic dry-aid kits are the best, and the cost is typically \$75-100. They include a germicidal light that kills bacteria and other germs. They also have an extremely strong desiccant pack to absorb moisture, as well as fans to circulate air around the internal components of the hearing aid. It is a good idea to put your hearing aid in a dry-aid kit EVERY day at night while you are sleeping. The hearing aid's electronic components can easily malfunction when exposed to too much moisture. This is one of the number one problems of hearing aid users in the gulf coast states (ex: Texas, Louisiana, etc). Preventive maintenance is the key to obtaining a long life from your hearing aid. A well maintained hearing aid can easily last 5 to 7 years, maybe longer.

**Hearing Aid Batteries:** All batteries are toxic and dangerous if swallowed. Keep all batteries (and hearing aids) away from children and pets. If anyone swallows a battery it is a medical emergency and the individual needs to see a physician immediately. One question often asked is "How long does the battery last?" Typically they last 7-14 days based on a 16 hour per day use cycle. Batteries are very inexpensive, costing less than a dollar each. Generally, the smaller the battery size, the shorter the battery life. The sizes of hearing aid batteries are listed below along with their standard number and color codes.

- Size 5: RED
  
- Size 10: YELLOW
  
- Size 13: ORANGE
  
- Size 312: BROWN
  
- Size 675: BLUE

Today's hearing aid batteries are "zinc-air." Because the batteries are air-activated, a factory-sealed sticker keeps them "inactive" until you remove the sticker. Once the sticker is removed from the back of the battery, oxygen in the air contacts the zinc within the battery, and the battery is "turned-on". Placing the sticker back on the battery will not prolong its life. Since many of today's automatic hearing aids do not have "off" switches, removing the battery at night assures that the device is turned off. Zinc-air batteries have a "shelf life" of up to three years when stored in a cool, dry environment. Storing zinc-air hearing aids in the refrigerator has no beneficial effect on their shelf life, in fact, quite the opposite may happen. The cold air may actually form little water particles under the sticker. Water is made of oxygen and hydrogen. If the water vapor creeps under the sticker, the oxygen may contact the zinc, and the battery could be totally discharged by the time you peel off the sticker! Therefore, the best place to store batteries is in a cool dry place, like the back of your sock drawer - not the fridge!