

What's New at McNeill Audiology

Twenty-Fifth Edition / Winter 2009

Technology Update

written by Brent McNeill, M.A., Aud. (C)

During the past six months, there have been some exciting steps forward in the technology available for people with hearing loss. Some of these are:

Sennheiser 830 and 830S TV listeners

We have supplied Sennheiser systems since we opened 15 years ago and have found that they consistently produce quality sound and are built to last. The 830 models use infra-red signals (i.e. no wires) to transmit stereo sound from a television, stereo, radio, ipod, and other devices to a wireless headset. The new Sennheiser models allow you to listen up to a distance of twelve metres from the audio source. They further allow for individual volume adjustments for each ear, as well as tone controls. They have rechargeable batteries and are ergonomically designed with large volume controls. The on-off switches are built into the headphones so that whenever you place the headphones on your ears, the system automatically switches on. With the Sennheiser 830S the sound is transmitted wirelessly from the receiver to your hearing aid using the included induction loop. They are not inexpensive but the quality of sound, reliability and ease of use is excellent. A good Christmas gift for someone!

www.sennheiser.com/sennheiser/home_en.nsf/root/press_releases_250309-set830

Starkey Series S hearing aids

Starkey has been manufacturing hearing aids for decades and their latest series has a variety of features that are impressive.

The manufacturer reports:

- An improved feedback manager that cuts down the feedback to allow less "squealing" from the hearing aid, better hearing in background noise, and easier telephone use;
- Seamless transitions between different listening environments such as moving between quiet and noisy situations and in different types of noise;
- You can use your cell phone or touch tone phone to adjust the programs or volume on the hearing aids;
- Automatic telephone response -- when the telephone is picked up, the aid will move directly to the appropriate mode for better hearing;
- The open-fit miniature behind-the-ear aids have a high-tech look to them.

www.starkeycanada.ca/products/hearing-instruments/s-series/s-series-features.jsp

ClearSounds

This manufacturer designs devices such as telephones, listening systems and alarm clocks to assist those with hearing loss. We have tried some through the years and they worked well for our clients. The Canadian supplier for their products is well informed and has given us wonderful advice and service when we have ordered from them. I would encourage you to look at the ClearSounds website to get an idea of their product line. <http://www.clearsounds.com/>

Widex – Mind 440

Widex is a Danish hearing aid manufacturer that has been selling hearing aids since 1956. I have been dispensing these hearing aids since 1980 and they have always produced high quality aids. Their latest model, the *Mind 440* has some creative and innovative concepts:

- Introduction of **Dual Integrated Signal processing**, a system that gathers and assesses all information about you and your immediate listening situation before sound reaches your ears. According to your hearing needs and preferences, sound is then processed to ensure the best possible quality - even in challenging situations, such as at a party or in a public place.
- **SmartSpeak** will guide you through the programs by speaking the name of the program rather than having you listen and try to count the number of beeps, which has been the standard method of informing the listener. SmartSpeak will also tell you when the battery is running low and is available in a number of languages with male or female speakers.
- The **Zen program** is a relaxation program which can be initiated by the listener to provide a random series of harmonic tones to help relax individuals. I have been informed by the manufacturer that some research has been completed by a reputable researcher and will soon be published in a refereed journal. This article will discuss the effect of the Zen program on tinnitus (ringing in the ears).

This hearing aid is in the upper range of cost for hearing aids but does sound like it has some of the most advanced features.

Please give your audiologist a call if you have any questions about any of these exciting technological advances. □

Addressing High-Frequency Hearing Loss with Hearing Aids

written by Edward Storzer, M.Sc., Aud.(C)

High-Frequency hearing loss is defined as hearing loss that diminishes the ability to hear high pitched sounds while the ability to hear low pitched sounds is normal or near normal. A large number of individuals with hearing loss fall into the high-frequency hearing loss category. These people often notice that it is difficult to hear women and children's voices and also report that although the loudness of others' speech seems normal, it sounds unclear – as if the speaker is mumbling. Conversing in groups and background noise is particularly challenging with high-frequency hearing loss.

The underlying mechanisms of high-frequency hearing loss involve the deterioration of inner ear cells that are specifically tuned to high pitches. Typically permanent in nature, this hearing loss can be caused by aging, noise exposure, hereditary factors, or other sources of inner ear dysfunction. Functionally, the result is an inability to perceive many high pitched consonants, including /s/, /sh/, /th/, /f/, and /k/ while the ability to hear lower pitched vowels is normal. Hearing these consonant sounds is essential in order to fully comprehend speech. Sometimes, people with high-frequency hearing loss can unconsciously use the context of the conversation and their linguistic experience to fill in the acoustic gaps, but this is imperfect and requires considerable effort.

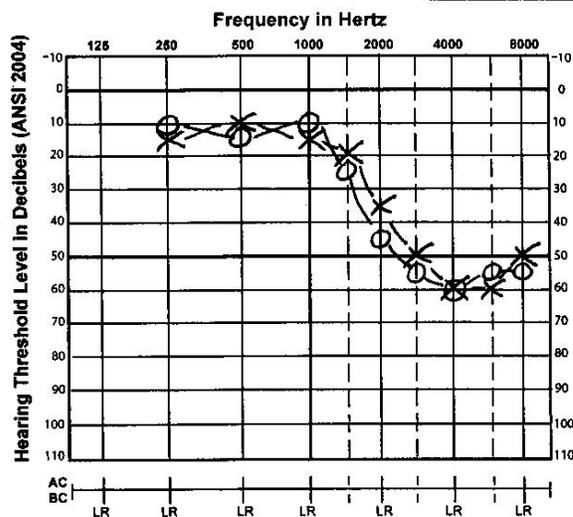
Fitting hearing aids on people with high-frequency hearing loss poses specific challenges for hearing aid manufacturers and hearing aid fitters. Obstacles have included:

- the requirement to selectively amplify high pitches without over-amplifying lower pitches;
- squealing feedback caused by over-amplifying high pitches;
- the unnatural quality caused by plugging the ears; and
- the lack of benefit amplifying high pitches when hearing loss is very severe at those pitches.

Thankfully, hearing aid manufacturers have made great strides in developing hearing aids that help meet these challenges and are effective in treating high-frequency hearing loss.

Today, hearing aids convert sound into a digital code that is analyzed and adjusted to match an individual's unique hearing loss. We have the capability to

Audiogram of a high frequency hearing loss



fine-tune the way your hearing aids amplify specific pitches more than others to best suit your hearing loss configuration and your listening needs. For high-frequency hearing loss, low pitches are often not altered, and amplification is only provided for high pitches. Older hearing aids would often squeal with feedback if the amplification was too great at high pitches, but this is largely controlled now by sophisticated feedback-cancellation technology that is present in almost all modern hearing aids.

Feedback cancellation technology has also allowed us to fit hearing aids without blocking the ear canal, something that previously resulted in an unnatural quality (especially of one's own voice) caused by blocking the ears. Hearing aids that do not block the ear canals are called open-fit, and they have become the standard for fitting most people with high-frequency hearing loss. Open-fit hearing aids are behind-the-ear and have a smaller tube and a vented tip that go into the ear canal. They allow low-frequency

sound to enter the ear canals, sound more natural than traditional hearing aids, and have been shown to provide excellent auditory benefit for high-frequency hearing losses. It is important to note that open-fit hearing aids are not usually recommended for people with significant low-frequency hearing loss or people with severe hearing loss.

A more challenging issue for a smaller group of individuals is the presence of severe high-frequency hearing loss. Researchers have even discovered that sometimes a high-frequency portion of the inner ear may consist of a "dead region", without any responsive cells. Amplifying sounds in these frequency ranges may result in distorted hearing, and can even be detrimental to speech understanding. Some manufacturers have designed hearing aids that will shift high frequency sounds to lower frequency regions that are more audible to the hearing impaired individual. These frequency-lowering technologies are designed to make high pitched speech sounds more audible, though the sound quality is significantly modified and somewhat unnatural at first to the listener. Hearing aids designed by Phonak and Widex utilise the frequency-lowering concept, by methods unique to each company. Initial research into these technologies indicate that they can result in improved detection of high-frequency speech sounds, however a period of adaptation is necessary for individuals to accept and improve in the processing of speech because of the significantly altered auditory sensation. Also, there is quite a bit of individual variation, and some people seem to benefit more than others.

In conclusion, we can gladly say that currently we are well equipped to address many of the specific challenges that individuals with high frequency hearing loss face. It is still very important that we look at each person's hearing loss as being unique, and each of the technologies outlined above may be better suited to some people more than others. Please feel free to contact us to further discuss your hearing loss and possible solutions that may suit you. □

Data-Logging

by Brent McNeill, M. A., Aud. (C)

One of the latest innovations with hearing aids is “data-logging”. These aids collect information regarding:

- The number of hours the user wears the hearing aids;
- The types of situations they are in (quiet, group noise, loud noise); and
- The percentage of time logged in each program.

They also collect information on the individual adjustments that the user makes to the hearing aids such as volume control, program changes and tone controls in various listening situations. More complex hearing aids (and that generally means more expensive), have more complex data collection. An important thing to remember is that this collection of data can be activated or deactivated by the audiologist.

Why is this data collected and what does the hearing aid do with it?

- When the hearing aid is connected to the computer for programming, the audiologist and user can see the collected data and subsequently the changes suggested by the computer program. They often make suggestions as to volume control changes and programs which are set up in the computer.
- The hearing aid can be programmed to “learn” from the adjustments the user makes to the hearing aids between appointments in the audiology clinic. For example, if the user is consistently lowering the volume, the hearing aid will change the default gain of the hearing aid by the average amount that the user has lowered the volume. If the user is only making changes in certain situations (such as in background noise), then the hearing aid will only adjust the volume in those situations. As with the collection of the data, the “learning” can be activated or deactivated by the audiologist. ➡

A Tour of the Ear

by Kristina Plewes, M. Sc., Aud. (C)

Our sense of hearing is a product of an amazingly complex system that converts sound from air pressure to mechanical vibration to neural impulses. This article is intended to outline the basic physiology and function of our hearing system from the outer ear to the inner ear.

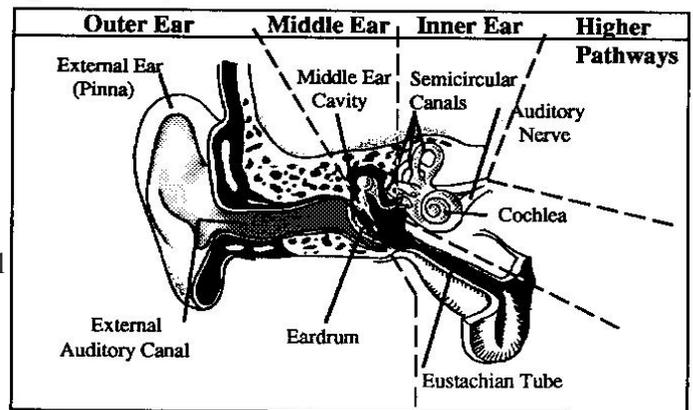
The **outer ear** consists of the pinna (the outside part of the ear that is visible) and the ear canal. The pinna helps to amplify sound by funneling it towards the ear canal and filters sound in a way that helps us localize sound in our listening environment. The first one-third of the canal is made of cartilage while the inner two-thirds is made up of bone. The earwax glands are located

along the walls of the canal, and serve to lubricate the canals and protect our eardrum from dirt, debris and insects. The ear canal also causes a resonance that amplifies higher pitch sounds travelling to the eardrum, helping us hear many softer speech sounds.

The **middle ear** begins at the tympanic membrane – more commonly known as the eardrum, which is about 8-10 mm in diameter and made up of a thin layer of skin. Sound vibrations are transferred from the eardrum to the three ossicles (bones) of the middle ear system – the malleus, incus

McNeill Audiology prefers to give our clients as much control over the hearing aid as they desire or what they feel they can handle. Some people prefer to have the hearing aid as automatic as possible, not having to worry about making adjustments, while others like to have control over as many aspects as possible. This hearing aid offers the best of both worlds. If you have questions about this, please do not hesitate to contact your audiologist! ☐

and stapes. These are the smallest bones in the human body. Sound is amplified through the middle ear system because of the size difference between the eardrum and the end of the stapes bone, and also from lever-type action of the ossicles. Air pressure in the middle ear is equalized by the Eustachian tube, which is connected to the throat and opens when we yawn and swallow.



From the bones of the middle ear, the mechanical back and forth movement of the stapes creates pressure waves that travel through the fluid of the hearing portion of the inner ear – a snail shaped, bone-incased organ called the cochlea. Here, waves travel along the surface of a rigid membrane called the basilar membrane. Higher pitch waves travel shorter distances, and lower pitch waves travel longer distances. This means the cochlea is arranged tonotopically – it is tuned at all points to specific pitches. It is here that receptor cells – called hair cells – transfer the sound waves into neural impulses. Some of these hair cells send impulses to our brain that we interpret as sound, while others work to change the way the basilar membrane moves to help fine tune our ability to hear subtle differences in speech sounds such as the difference between “sun” and “fun”.

From sensation to perception, sound is a complex yet fascinating journey, a journey that one should never take for granted. ☐

Research Assistance

Information about **hearing options, new technology, solutions for wax** and much more.
www.healthyhearing.com

Canadian Academy of Audiology
www.canadianaudiology.ca

Canadian Hard of Hearing Association
www.chha.ca

Consumer Corner of the Canadian Association of Speech-Language Pathologists and Audiologists
www.caslpa.ca/english/resources/consume_info_facts.asp

Widex
www.widex.ca

Phonak Corporation
www.phonak.com

Tinnitus Association of Canada
kadis.com/ta/tinnitus.htm

Unitron Hearing
www.unitron.com

Oticon /Phonic Ear
www.oticon.ca

Island Deaf & Hard of Hearing
www.idhhc.ca

Musicians' Clinics of Canada
www.musiciansclinics.com/home.asp

ClearSounds
www.clearsounds.com/

The Human Auditory Physiology Laboratory, U.B.C., Dr. David Stapells, Director
<http://www.audiospeech.ubc.ca/hap-lab/haplab.htm>

School of Audiology and Speech Sciences, U.B.C.
www.audiospeech.ubc.ca/

Sennheiser Set 830 TV Listeners
www.sennheiser.com/sennheiser/home_en.nsf/root/press_releases_250309-set830

Starkey S Series
www.starkeycanada.ca/products/hearing-instruments/s-series/s-series-features.jsp

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