



the Trumpeteer

An Ear- Responsible Publication of Central Carolina ENT, PA

Sound Recover - A New Processing Strategy for Hearing Loss

The main mechanism of hearing in the inner ear is the cochlea. It is a small snail shaped structure that contains three rows of outer hair cells and one row of inner hair cells. As sound waves enter the ear, these small hair like fibers are deflected by the fluid in the inner ear which in turn cause a neural firing of information to the hearing centers in the brain.

What is most interesting about the cochlea is that the hair fibers are frequency specific as to their layout in the structure. Like a piano keyboard, the high frequency regions (like the S and SH sounds) are more exposed to the environmental sounds over time and thus are more susceptible to damage by loud sounds. The lower frequency regions (like vowel sounds) lie deep within the cochlea and thus are more shielded from exposure to sounds that can cause hearing loss.

An audiological examination can determine your hearing thresholds at frequencies from 250Hz to 8KHz. A threshold is defined as the point where you detect a frequency specific tone 50% of the time. It is widely believed now that thresholds of 80dB or greater at different frequencies may indicate "dead zones" within the cochlea. Attempting to provide amplification to these regions may prove pointless



Reviewed by:
J.P. Miller, M.S. CCC-A
Editor, The Trumpeteer

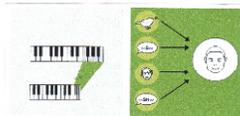


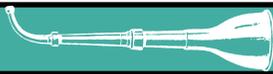
Figure #1. Selected high frequencies are compressed into a lower frequency range.

as very little of the information at these regions actually reach the brain. In other words, attempting to make sounds louder at these damaged frequency regions may result in added distortion of speech to the patient. Perceptual problems are often a consequence of irreversible damage to the hair-cell receptors in the inner ear. Therefore the challenge is how to help hearing impaired persons hear specific high frequency information important to the discrimination of speech when certain segments of their cochlea are dead zones?

The answer may come in new processing strategies like **SoundRecover** by Phonak. Phonak is a major world wide hearing instrument manufacturer based in Switzerland. They, in collaboration with the University of Mel-

bourne, developed SoundRecover which is an innovative non-linear frequency compression algorithm. It essentially compresses selected high frequency sounds into a lower frequency range where both hearing sensitivity and discrimination ability are better (See figure #1). The proprietary algorithm effectively extends the audible range without creating annoying artifacts. Frequencies below the compression sensitivity point are amplified conventionally while only the high frequencies are compressed.

The overall benefits of SoundRecover algorithm should be increased detection, distinction and recognition of sounds. Patients should also experience a significant improvement in intonation, overall voice quality, improved hearing of high pitched sounds, and better speech understanding. For children, SoundRecover is designed to ensure that a greater number of high frequency cues are available thus aiding in the development of speech and language skills and continued audibility of important speech sounds in the classroom setting. Extensive field studies will continue to evaluate adults and children fitted with the Naida hearing instruments which includes the SoundRecover fitting strategy.



William C. LeLiever MD, FFCS, FRCS©

Severe Vertigo

Broadly defined, vertigo (the symptom) is a hallucination of movement of self or surroundings. When it comes on – its effects are usually immediate and often severe. Patients report disabling feelings of rotation, nausea, double vision, imbalance to the point of losing control of balance and falling, and other complaints depending on the system involved. Vertigo, by itself, is not a disease.

Vertigo can be from one or multiple systems. Many of the conditions are well-known. These can be grouped into middle or inner ear conditions. Meniere's Disease is the one of the most common. Stroke, heart disease, endocrine disease, muscular and joint disease, degenerative brain disorders, other brain disorders (narrowing of key blood vessels and resultant blood flow problems are common), medications, psychiatric disorders, cerebellar system disease, and ocular (eye) abnormalities. All may produce vertiginous symptoms.

Severe vertigo is a state of symptoms that prevents normal activities and is disabling. Severe vertigo prevents working in hazardous areas, often associated with nausea and frequently vomiting and imbalance. Severe vertigo literally prevents normal life activities as we know it. Some cases can be ongoing for months and even years. For each case, a correct diagnosis of the actual cause is the key to doing something about the condition.

For example, benign positional paroxysmal vertigo (BPPV) is commonly seen to result in severe vertigo. This condition is due to the free bits of debris in the semicircular canals of the inner ear called otoconia. These particles are extremely small and can

be dislodged from their membrane by injury or degenerate over time. The patient complains of severe vertigo whenever he or she rolls over in bed or sits up. Occasionally, other head positions can bring on the symptom. The debris floats in the inner ear fluids and comes to rest against one of the inner ear receptors and triggers a full blown dizzy spell. For these cases, a simple head maneuver and physical therapy can alleviate the symptoms. For other patients, physical therapy is unsuccessful and surgery is required to stop the flow of inner ear fluids and prevent the particle from settling of the receptors. The recurrence rate of BPPV is often high.

Early articles in the newsletter have addressed Meniere's disease diagnosis and management. Many ear conditions are chronic and often become life time problems.

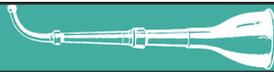
Acute severe vertigo needs to be seen by a physician or emergency room facility as soon as possible to rule out the various life threatening disorders. Chronic severe vertigo will require a methodical approach to the problem, comprehensive history, physical examination, appropriate testing to help arrive at the correct diagnosis and a treatment plan tailored to each individual patient.



What is a Videonystagmography Study? (VNG)

- This test may be ordered by your doctor to test the inner ear that is part of the balance system.
- The test measures eye muscle movements, and your doctor can learn a lot about how your inner ear is working from this.
- This test may be ordered for any of the following symptoms:
 - Dizziness
 - Off balance
 - Hearing loss
 - Ringing in the ears ('tinnitus')
 - Pressure or fullness in the ears or head





FM Systems



Comfort Contego @ \$900



Phonak's Smartlink Transmitter/
microphone @ \$1176



Phonak iSense receiver @ \$840

Phonak MLxi Receiver @ \$1038



Interfaces with most BTE instruments through a boot connector

"I have normal hearing, but I can't hear in noise. What are my options?"

By: J.P. Miller, M.S. CCC-A, CCENT Audiologist

You may be one of those patients who has a normal audiogram but has a great deal of difficulty hearing in noise. How can this be? We often encounter patients in our clinic that report this complaint in light of a perfectly normal comprehensive audiological evaluation.

When I counsel people about their test results, I am always careful to mention that a basic hearing test does not evaluate the ability to process sound, especially in the presence of background noise. It basically shows if there is any peripheral hearing loss due to the middle ear, inner ear, or a combination of both.

Some patients are often surprised to learn they have a normal audiogram, because they often report communication issues with certain voices, particularly in noisy environments. Often the communication issues are the result of an auditory processing problem. It is very common to witness central auditory processing disorders (CAPD) in school children with slight hearing loss, unilateral hearing loss, autism, attention deficit disorder (ADHD), and second language learners.

There are now a wide variety of wireless FM communication systems that may help you with your communication problems. Basically a wireless microphone picks up the sound and transmits the signal to a receiver unit. The Federal Communications Commission has reserved certain frequency bandwidths for the transmission of information. Basically the sounds you want to hear are brought closer to your ears which helps minimize the effects of background noise and reverberation. These different systems can vary in price as well as size and complexity. One basic system offered by Westone Labs is called the **Comfort Contego** which features a receiver unit with ear bud earphones. This system sells for \$900.00 plus postage. On the other hand, Phonak sells very sophisticated FM systems that can work with your existing behind the ear (BTE) hearing instruments or as standalone units. Phonak also offers a variety of microphones that are Bluetooth® compatible. This allows the microphone to be paired with a cell phone, Ipad, or some other bluetooth® device. The price range for these high end units (not including hearing aids) can be in the \$1700 to \$3300 range.

If you are experiencing communication difficulties in noisy environments and have normal or near normal hearing, an FM system may be just what you need. Call one of our offices to setup a demonstration of how an FM system works. You'll be glad you did.



Bluetooth™ Technology and Hearing Aids

By: J.P. Miller, Trumpeteer Editor

Bluetooth™ is an open wireless protocol for exchanging data over short distances from fixed and mobile devices, creating personal area networks (PANs). It is a short-range communication system intended to replace the cables connecting portable and/or fixed electronic devices.

The actual name, Bluetooth™, comes from Harald I of Denmark, a medieval king who united dissonant Danish tribes into a single kingdom. The implication is that Bluetooth™ does the same by electronically pairing portable devices. A common example today is Bluetooth™ ear pieces (see figure #1) that allow people to answer and talk on their cell phones wirelessly (and also hands-free). It has always seemed a bit paradoxical that people will wear these large devices in their ears, but many won't think of wearing hearing aids. Oh well, another topic for discussion.

Bluetooth™ technology is now available to help hearing impaired persons hear more easily and conveniently on their cell phones. The Beetle device which sells for \$250, allows a MP3 player, iPod, or any Bluetooth™ enabled device to communicate with a hearing aid through the telecoil program (or direct connection if possible).

How does the Beetle device work? This small device, which looks like a small keychain light, comes with an earhook and neckloop transducer for mono or stereo listening (See figure #2). You may also be able to buy a cable compatible with your cell phone that plugs directly into the Beetle unit. When your cell phone rings, you just turn on the Beetle unit, activate the telecoil program in your hearing instrument, and begin talking and listening hands-free. If you don't have a direct connection to your device, then you'll have to use the neckloop or earhook to send the signal to your hearing instrument(s).

Bluetooth™ technology will continue to expand in the years to come. Soon all hearing aids will be manufactured with a Bluetooth™ chip as a standard feature. This will allow for the direct pairing of a hearing instrument to any Bluetooth™ enabled device. Until that is a reality, we will need to use supplementary devices like the Beetle to make communication for the hearing impaired more effective, user-friendly, and hands-free.



Figure #1 Bluetooth™ earpiece for cell phone



Beetle Device for \$250



Figure #2 Components of Beetle Unit