

What's New at McNeill Audiology

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Technology Updates

New Phonak CROS / BICROS System

written by Brent McNeill, M.A., Registered Audiologist

The Problem

Individuals with severely damaged hearing in just one ear have struggled to hear for many years. These hearing losses are known as Unilateral Hearing Losses (UHL). People with this type of loss have particular problems hearing speakers close to their poor ear and hearing in background noise.

Old Technology for UHL

CROS or BiCROS systems have been available for longer than I have been practicing (30 years). If a person's good ear is normal we can dispense a CROS system and if the person's good ear has a loss that would benefit from a hearing aid it becomes a BiCROS system. In the past, the technology consisted of a large regular hearing aid for the good ear and either a cord to a microphone over to the poor ear or a radio receiver that would attach to the bottom of the hearing aid and a microphone connected to a radio transmitter on the poor ear. This technology was cumbersome with limited sound quality.

In addition, in the past 15 years, Bone Conduction Hearing Aids (BAHA) have been available. These systems have a surgically implanted metal piece with a stub that sticks out of the head on the side of the head with little hearing. A bone vibrator is attached to this metal piece that vibrates the skull so that the inner ear of the good ear picks up the sound. This helps people hear speech presented in the poor ear.

The New Technology for UHL

This new system is much more compact and uses the most modern technology available in hearing aids. The microphone section can either be a small hearing aid over the poor ear or a small custom made hearing aid that fits into the poor ear. The receiver on the good ear is a high-tech,

small, behind-the-ear hearing aid or a small, custom hearing aid that fits into the ear.

BiCROS



CROS



These hearing aids have a small digital chip which is programmable to the individual's hearing loss. In addition to higher quality sound they also have the ability to connect to Bluetooth cell phones and other devices which use Bluetooth technology such as televisions, computers, and audio systems.

The hearing aids in the good ear are the new standard hearing aids that Phonak offers and thus come in a wide range of costs. The price of a system like this will be similar to the cost of two hearing aids.

This system is extremely flexible and works with a wide range of Phonak instrument types, models and styles. The quality of sound is excellent, as is the cosmetic appearance. For individuals with a hearing loss in one ear, it is my impression that this system is a large step forward. □

For further information please call either of our offices or you can look on the Phonak webpage: http://www.phonak.com/ca/b2c/en/products/hearing_instruments/cros/overview.html

News in Hearing Research

written by Edward Storzer, M. Sc., Registered Audiologist

Hearing research is at the heart of understanding our auditory system, and treating impairments related to hearing. We find that our clients are often curious about the latest findings in hearing science, and enjoy discussing the latest articles or news stories related to hearing and hearing loss. In this feature, we will summarize some of the latest research that we find interesting. We hope you find it interesting too!

Tinnitus

Brain Processes are Responsible, and a New Idea for Treatment

Tinnitus is the perception of sound, such as ringing in the ears, when there is no actual sound present. It is most common in people that have hearing loss. For some people, tinnitus can cause significant problems such as anxiety, insomnia and depression. Recently, researchers at Georgetown University (Rauschecker, J., et al., Neuron, 2011) used brain imaging to show that the auditory cortex displays increased activity in people that have tinnitus. The researchers feel that hearing loss can lead to a reorganization of the neurons in the hearing part of the brain. This reorganization results in the production of sounds that replace the frequencies that are “missing” because of hearing loss.

Further imaging showed increased activity in the limbic system of the brain for tinnitus sufferers. The limbic system, involved in processing emotion, is important in suppressing unwanted sensory signals. The researchers feel that tinnitus becomes noticeable when the limbic system does not properly stop the sounds produced in the auditory cortex from reaching conscious perception. They conclude that understanding and treating tinnitus will require comprehension of how the auditory and limbic systems interact. Therapies could involve restoring the limbic system’s ability to eliminate the perceived sound.

In another tinnitus study, researchers at The University of Texas at Dallas

(Navzer, E., et al., Nature, 2011) have shown that, in rats, nerve stimulation can “retrain” the brain to eliminate tinnitus. They did this by creating noise-induced tinnitus in rats, and then using a technique of presenting tones with brief pulses of stimulation to the vagus cranial nerve. The nerve stimulation releases chemicals which can encourage changes in the brain. The researchers theorize that pairing the nerve stimulation with tones reorganizes brain circuits involved in tinnitus. Vagus nerve stimulation is currently used in humans for treating epilepsy and depression, and this research team is proceeding with clinical trials to determine if vagus nerve stimulation can be used to treat tinnitus in humans.

It’s a Noisy World Impact of Workplace Noise on Sleep and High-Volume Music Players on Hearing

Researchers at Ben-Gurion University of the Negev, in Israel (Test, T., et al., in press) have shown that sustained exposure to loud workplace noise can affect sleep quality. In this study, workers who experienced significant exposure to harmful noise and had a resultant hearing impairment were more likely to have difficulty falling asleep, wake too early, wake during the night, have excessive daytime sleepiness, fall asleep during the daytime, snore, and have excessive sleep movement. Tinnitus was reported to be the main sleep disrupting factor.

Turning up the volume on portable music players, such as iPods and MP3

players, can have detrimental effects on the brain’s auditory system. This is what Dr. Okamoto of Japan’s National Institute for Physiological Sciences has discovered in his research (Okamoto, H., et al., PLoS ONE, 2011). Users of portable music players tend to turn up the volume in noisy surroundings. Although these individuals may show normal hearing ability on a standard hearing test, this research has demonstrated that their ability to discriminate sounds clearly can be compromised. For example, individuals who regularly listen to music at full blast through headphones were less likely to be able to pick out a specific frequency in the presence of background noise. The researchers argue that the high volumes burden the nerves of the brain and auditory system, resulting in a decline in ability to

discriminate sounds. They recommend using “noise-cancelling” headphones to suppress background noise instead of turn-



ing the volume up when listening to portable music players in a noisy environment.

It should be noted here that listening to loud headphones or using noise cancelling headphones can disconnect people from their auditory surroundings in an unsafe manner, especially in traffic or other situations where an individual needs to be aware of sounds in their environment. □

Are Two Ears Better Than One?

written by Kristina Plewes, M. Sc., Registered Audiologist

When clients come in for an audiological evaluation, a typical question asked is “Do I need two hearing aids or just one”? This is a common and legitimate question that deserves further attention.

When clients ask this question I like to make the analogy with vision. The eyes use certain cues when they work together for processes such as depth perception for example. Ears work the same way. When ears are operating at the same strength they work together to use certain timing and loudness cues in the environment for processes such as sound localization (knowing where sound is coming from) and for helping us to separate speech from background noise in order to hear the best we can in such challenging listening situations.

Sound Localization

When you hear an emergency siren, a child crying or someone calling your name from across the room how do you know where to look? Well your brain does the work by interpreting the timing of sound arrival to your two ears and therefore analyzing which side was louder. When only one ear has a hearing aid the ears and subsequently the brain are no longer able to make use of these cues and our ability to localize where sounds are coming from disappears. Just like with vision, if both eyes are having trouble seeing you wouldn't get glasses with only one lens.

Balanced Hearing

Hearing loss typically occurs in both ears. With only one hearing aid people tend to feel slightly off balance as sound will be amplified on one side but not the other. Additionally with a hearing aid on only one side, you will be able to hear people on the aided side more clearly and easily, however speech on the non-aided side will cause difficulties such as having to repeat yourself, not hearing them at all or constantly having to turn your head so that your "better ear" is directed towards the speaker. With two hearing aids these issues are significantly reduced.

Loudness

With hearing aids in both ears, overall loudness perception is improved as opposed to wearing only one hearing aid. With only one aid, sound needs to be programmed at a louder level in order to compensate for the unaided ear. This can lead to distortion of speech, sensitivity to loud sounds and increased chance of feedback (squealing). With two hearing aids the volume level can be decreased as the brain is receiving equal input from both ears.

Hearing in Background Noise

With hearing aids in both ears the ability to hear the best you can in background noise increases. When both ears are hearing sound equally, the ears (and therefore the brain) work to subtract noise we **don't** want to hear from the speech that we **do** want to hear. With only one hearing aid we are no

longer able to take advantage of this process.

Although there are many good arguments as to why two hearing aids are better than one, there are some reasons why only one hearing aid may be appropriate:

- The hearing loss is only in one ear with normal hearing in the other ear;
- People with poor speech discrimination on one side would not benefit from a hearing aid on this side as the aid would be amplifying a muffled or distorted speech signal;
- If someone is prone to ear infections in one ear it may not be medically suitable to block the ear with a hearing aid;
- Malformation of the ear or canal on one side;
- Dexterity issues may preclude someone from having to insert two aids instead of just one;
- Financial reasons.

In general, the improvement in hearing and related processes with two hearing aids versus just one has been well documented throughout the years. However, there may be individual reasons why someone would be fit monaurally (one aid) rather than binaurally (two aids). All things being equal, a good rule of thumb is **'two hearing aids are better than one but one hearing aid is better than none'** with the ultimate goal of optimizing your hearing to enhance and improve your quality of life. □

Research Assistance

Canadian Association of Speech-Language Pathologists and Audiologists

www.speechandhearing.ca

Canadian Academy of Audiology

www.canadianaudiology.ca

Canadian Hard of Hearing Association

www.chha.ca

General info re: hearing options, new technology, solutions for wax and much more

www.healthyhearing.com

The Western Institute for the Deaf and Hard of Hearing

www.widhh.com

Phonak Corporation

www.phonak.com

Tinnitus Association of Canada

kadis.com/ta/tinnitus.htm

Unitron Hearing

www.unitron.com

Oticon

www.oticon.ca

Island Deaf & Hard of Hearing

www.idhhc.ca

Musicians' Clinics of Canada

www.musiciansclinics.com/home.asp

ClearSounds

www.clearsounds.com/

Siemens

www.siemens.ca/hearing

School of Audiology and Speech Sciences, U.B.C.

www.audiospeech.ubc.ca/

British Columbia Association of Speech Language Pathologists and Audiologists

www.bcaslpa.ca

Widex

www.widex.ca

Etymotic Research - Musicians' Earplugs

www.etymotic.com

GN ReSound

www.gnresound.com

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