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Tinnitus: A Primer

Audism

Founders of Our Profession: William A. Cole

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This is my first editorial as the new editor-in-chief of the Canadian Hearing Report and I must begin with a thank you to the previous editor-in-chief, Dr. André Marcoux. André had set a standard that I pledge to maintain for the magazine and I thank him for his efforts. He has (thankfully) agreed to stay on as a member of the editorial board. I don't want to resort to hyperbole but Glen Sutherland who has been involved in the editorial board for over 1,000 years has decided to step down. Thank you Glen …well, not thank you for stepping down … Thank you for your years of hard work. And to replace him, the newest member of the editorial board is Joanne Deluzio. Joanne has been an audiologist for 25 years and who is just compleing her PhD in the Department of Speech-Language Pathology at the University of Toronto – welcome aboard.

Canadian Hearing Report is the official organ of the Canadian Academy of Audiology and as such is intended to be a mirror of the professional and academic interests of our members. It is intended to be stimulating and informative, publishing perspectives and research reports that are both, at times, controversial and enriching the knowledge of our members. And like any publication that seeks to take the high road, articles may occasionally appear whose content may not be widely shared by the CAA membership – that's what the Letter to the Editor section if for! This is your publication and without you, it cannot exist. Articles, brief reports, and letters are always welcome from our readers.

Beginning with this issue, *CHR* will host a series of regular columns from the various sectors relevant to Canadian audiologists. In this issue there are two new columns: "From the Labs" – a glimpse into the research (both current and proposed) of various laboratories around Canada; and "The E in ENT" – perspectives from members of the otolaryngological community that highlight various views and clinical approaches. This will be in addition to our regular segments such as the Spotlight on Science and the Founders of our Profession sections.

This issue has three main articles – the use of hearing aid practitioners as an adjunct to an audiological practice by Dr. Ted Venema; "Audism" by Gary Malkowski, an article about the sometimes subtle discrimination that Deaf people may be subject to;"Tinnitus: A Primer" by Dr. Phillip Wade: and for the next year or so, in each issue, an article with a humanitarian bent where Canadians or Canadian manufacturers that have been instrumental in making the world a better place, will appear. In this issue we read about the efforts of Starkey Canada. If any of our members are involved in humanitarian efforts and want to write about it, please contact me. This same "call for contributions" is aimed at any of our readers who has developed, or is involved in, any unique or exciting new audiological program.

Marshall Chasin, AuD, MSc, Reg. CASLPO
Editor-in-Chief

C'est mon premier éditorial et en tant que nouveau éditeur en chef de la Revue Canadienne d'Audition, je dois commencer par remercier le dernier éditeur en chef, le Dr André Marcoux. André a établit des normes pour notre revue que je m'engage à assurer et je le remercie pour ses efforts. Il a été aussi convenu qu'il va demeurer membre du comité éditorial. Je ne veux pas exagérer mais Glen Sutherland qui a été impliqué avec le comité éditorial pour plus de 1000 ans…a décidé de partir. Merci Glen...bon, pas pour ta décision de te retirer du comité…merci pour tes années de travail acharné. Et pour le remplacer, la toute nouvelle membre du comité éditorial, Joanne Deluzio. Joanne est audiologiste avec 25 ans de pratique derrière elle et elle est actuellement en voie de compléter son doctorat au département d'orthophonie de l'université de Toronto, bienvenue.

La Revue Canadienne d'Audition est l'organe officiel de l'Académie Canadienne d'Audiologie, et comme tel est sensée être le miroir des intérêts professionnels et académiques de ses membres. Elle se veut une perspective de publication et une revue de recherche à la fois stimulante et informative qui, tout en étant à certains moments controversée, enrichit le savoir de nos membres. Et comme toute publication, certains articles dont le contenu ne sera pas endossé par la majorité des membres de l'ACA, vont être publiés. Et c'est la raison d'être de la section: Lettre à l'éditeur ! Ceci est votre publication, et ne peut exister sans vous. Nous serons heureux de publier vos articles, rapports, et lettres.

Ce numéro de *La Revue Canadienne d'Audition* est le premier d'une série qui auront une colonne pour des secteurs variés et pertinents aux audiologistes canadiens. Dans ce numéro, nous avons deux nouvelles colonnes: "Des laboratoires" – un aperçu de la recherche (autant actuelle que proposée) de plusieurs laboratoires canadiens; et "Le O dans L'ORL " – perspectives des membres de la communauté Oto-Rhino-Laryngologique qui soulignent des points de vue et des approches diverses. Ceci en plus de nos segments réguliers comme la section, le spotlight on sciences et la section, les fondateurs de notre profession.

Ce numéro contient 3 articles principaux : – L'utilisation des praticiens d'appareils auditifs en complément d'une pratique audiologique par le Dr Ted Venema; "Audisme" par Gary Malkowski, un article au sujet de la discrimination parfois subtile à laquelle les personnes culturellement sourdes sont confrontées ; "Tinnitus: Une amorce " par le Dr. Philip Wade : et pour l'année prochaine, dans chaque numéro, une approche humanitaire apparaitra avec des canadiens ou des fabricants canadiens qui ont eu un rôle essentiel dans l'amélioration de notre monde. Dans ce numéro, nous allons en savoir plus sur les efforts de Starkey Canada. Si des membres sont impliqués dans des efforts humanitaires et veulent les relater, je vous prie de me contacter. Ce même appel à la contribution est dirigé à tout lecteur qui aurait développé, ou est impliqué dans tout nouveau programme audiologique unique et passionnant.

Marshall Chasin, AuD, MSc, Reg. CASLPO
L'éditeur en chef

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Revue canadienne d'audition

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PHONAK life is on

As I start my term, I would like to thank you for the privilege and opportunity to serve as your president. The next year will be a time of change and growth. This is something that CAA is familiar with. In my 12 years as a CAA member, I have watched the academy grow from a small but very devoted group to an organization that represents over 40% of Canadian audiologist. The journey has been one of hard work, dedication, and joy and it continues today.

The Canadian Academy of Audiology is an organization by audiologists for audiologists. It is the board's mission over the next year to raise the profile of CAA and be THE voice of audiology in Canada.

- We will raise awareness within the audiology community of what CAA can do for audiologists.
- We will increase the public's knowledge of why audiologists are THE most qualified providers of hearing health care.
- We will advocate for the rights audiologists and the rights of the public to proper audiology services across Canada.

And how are we going to do all of this?

The first steps have already been taken. Over the past few years CAA has established itself among health care providers, government agencies, educators, and regulators as the group who has its finger on the pulse of audiology and the needs of audiologists in Canada. Our presence is needed, necessary, and requested. We have formed strategic alliances with many partners and these relationships have helped us bring our message, your message, to the people who need to hear it.

The next step that we have taken is to undergo a change in the organizational structure of CAA.

"The best houses are built on the strongest foundations."

In order for us to continue to grow and expand we need to have a solid foundation in place. An essential component of this foundation is a permanent and dedicated executive director position. The role of this individual will not only be organizational and administrative, but they will also be a consistent face at the table for advocacy. The executive director will help us communicate our message and be our voice with the policy makers across Canada.

CAA will undertake an aggressive marketing campaign in conjunction with our strategic partners to raise the visibility of audiology in Canada with the public, with other health care professionals, and within our own community. Audiologists should be the professionals who first come to mind whenever there are questions or concerns about hearing or balance. We want little girls and little boys to grow up dreaming of being an audiologist just as much as they dream of being a doctor, a nurse, or a teacher.

And of course none of this is possible without your input and hard work. So please use our new website to let us know what you want, what concerns you have, and how we can help you.

Committees are the life blood of any organization. If you are interested in promoting of the profession or the promoting

Je voudrais, pour commencer, vous remercier pour le privilège et l'opportunité que vous m'octroyez à assumer la fonction de présidente. L'année prochaine sera une année de changement et de croissance. Ceci est un terrain familier pour l'ACA. Au cours de mes 12 années en tant que membre de l'ACA, j'ai vu l'académie évoluer d'un petit groupe de personnes dévouées en une organisation qui représente plus de 40% des audiologistes canadiens. Ce parcours a été celui de travail ardu qui continue à ce jour.

L'Académie Canadienne d'Audiologie est une organisation d'audiologistes pour les audiologistes. C'est la mission du conseil d'élever le profil de l'ACA et faire en sorte que l'ACA soit LA voix de l'audiologie au Canada.

- Nous allons sensibiliser la communauté d'audiologie aux bienfaits que l'ACA apporte aux audiologistes.
- Nous allons accroitre la notoriété des audiologistes auprès du publique et stresser leur rôle de fournisseurs de services les plus compétents en matière de soins de santé auditifs.
- Nous allons défendre les droits des audiologistes et le droit du publique à des services d'audiologie appropriés au Canada.

Et comment allons nous faire tout ceci ?

Les premiers pas ont été déjà faits. A travers les années, l'ACA a réussi son établissement parmi les fournisseurs de soins de santé, les agences gouvernementales , les éducateurs, et les organismes de réglementation, en tant que le groupe qui a son doigt sur le pouls de l'audiologie et des besoins des audiologistes au Canada. Notre présence est requise, nécessaire et demandée. Nous avons formé des alliances stratégiques avec plusieurs partenaires et ces relations nous ont permis de porter notre message, votre message, aux personnes qui ont besoin de l'entendre.

Le pas suivant a été de faire un changement à la structure organisationnelle de l'ACA.

Les meilleures maisons sont construites sur des fondations solides.

Pour que nous puissions continuer à croître et à nous développer, nous devons avoir en place une assise solide. Un poste de directeur exécutif, ou directrice exécutive, permanent est une composante essentielle de cette assise. Le rôle de cette personne ne se limitera pas aux tâches organisationnelles et administratives, mais elle sera aussi une réalité constante à la table de défense. Le directeur exécutif ou la directrice exécutive va nous aider à communiquer notre message et sera notre voix auprès des décideurs au Canada.

LÁCA va lancer, en parallèle avec nos partenaires stratégiques, une campagne de marketing agressive pour rehausser la visibilité de l'audiologie au Canada auprès du publique, auprès d'autres professionnels des soins de santé, et au sein de notre communauté. Les audiologistes devraient être ceux auxquels on pense en premier quand il est question d'ouïe ou d'équilibre. Nous voulons que des petites filles et des petits garçons grandissent en rêvant de devenir audiologistes tout autant que quand ils rêvent de devenir médecins, infirmières ou enseignants.

Et bien entendu, rien de tout ceci n'est possible sans votre apport et votre travail ardu. Veuillez utiliser notre nouveau site web pour nous faire part de vos demandes, vos préoccupations si vous en avez, et vos commentaires et suggestions en ce qui concerne la meilleure manière de vous aider.

Les comités sont la source de vie de toute organisation. Si vous êtes intéressés à la promotion de la profession ou la promotion de L'ACA,

PRESIDENT'S MESSAGE

CAA, join the PR and Visibility Committee. Our annual conference is a shining example of what we can do to promote continued education in audiology, but without volunteers it is nothing. The *Canadian Hearing Report* is another medium though which to communicate and educate. Input and articles are always welcome.

Alan Cohen said "It takes a lot of courage to release the familiar and seemingly secure, to embrace the new. But there is no real security in what is no longer meaningful. There is more security in the adventurous and exciting, for in movement there is life, and in change there is power."

I personally am looking forward to this adventure.

Carri Johnson
President
Canadian Academy of Audiology

MESSAGE DE LA PRÉSIDENTE

participez aux RP et au comité de visibilité. Notre conférence annuelle est un exemple éclatant du savoir-faire en matière de promotion de la formation continue en audiologie, mais rien n'est faisable sans bénévoles.

La Revue Canadienne d'Audition est un autre moyen pour communiquer et former. Vos apports et articles sont toujours les bienvenus. Alain Cohen a dit « Il faut beaucoup de courage pour laisser tomber le familier et le semblant de sécurité, et adopter la nouveauté, mais il n'y a vraiment pas de sécurité réelle dans ce qui n'est plus significatif. Il y'a plus de sécurité dans l'aventure et dans le passionnant, du fait que la vie est dans le mouvement et le pouvoir est dans le changement. »

Personnellement, j'attends avec impatience cette aventure .

Carri Johnson
Présidente
Académie Canadienne d'Audiologie

LETTER TO THE EDITOR

Open Letter and Call to Action on Excessive Product Packaging to All Hearing Aid Manufacturers

In an era of corporate social responsibility (CSR) I find it difficult to understand why manufactures consistently go to great lengths with regards to the packaging of new products, new software releases, and hearing aid orders.

Hearing health care providers are bombarded with lavish packaging that I can only imagine is to enhance the appeal of a certain product. Personally, I find this a little insulting to think that the more elaborate the packaging is, the more appeal this will have to the hearing health care professional. No matter how elaborate or how large the packaging is, it in no way shape or form adds value or appeal to the hearing instrument itself.

It is time hearing aid manufactures aligned themselves with a socially responsible method of marketing and distributing their products. In essence, the hearing aid should sell itself through its own value-added benefits and advanced technological components.

I call on hearing aid manufactures to reduce the amount of packaging used not only to ship products but also for the marketing of new products. It's inconceivable to think that as hearing aid technology advances and products become more lavish manufacturers cannot conjure up ways to market their products in a manner that is consistent with other large global corporations who are now acting in a socially responsible manner.

I will be following up with a call to action of all professional hearing health care groups both regulated and non-regulated. ListenUP! Canada at their annual 2008 Winter Conference will be circulating a petition to all ListenUP! staff to garner support for this initiative. However, this is an open invitation for each of the manufacturers to be socially and environmentally responsible, and to change the manner in which they market products moving forward.

Sincerely,
Neil Treadway, BA, HIS, MBA
DIRECTOR OF OPERATIONS
ListenUP! Canada

Dedication of the Mark Ross Collection

Dr. Mark Ross, professor emeritus at the University of Connecticut, attended the dedication of the Mark Ross Collection at the National Centre for Audiology (NCA), University of Western Ontario, on June 4, 2008. This addition to the NCA Library resulted from the generous donation, by Dr. Ross, of his extensive personal collection of books and journals to the NCA. The development of the Mark Ross Collection was generously supported by Phonak Canada and Dr. Marshall Chasin.

Dr. Ross has been known for decades as a pioneer in the area of aural rehabilitation and has been a strong advocate for children and adults who have hearing loss and their families. Many "firsts" can be attributed to Dr. Ross. For example, in the early 1970s Dr. Ross published the first research report to describe the benefits of FM system use by children within the classroom environment. Dr. Ross also published the first paper that defined and advocated for "Communication Access" for persons with hearing loss in all environments. He also published the first textbook on educational audiology.

At the dedication ceremony, Dr. Ross talked about the importance of his books and journals over his professional career and stated how pleased and honoured he was that "his treasures" would now be available to researchers and students for decades to come.

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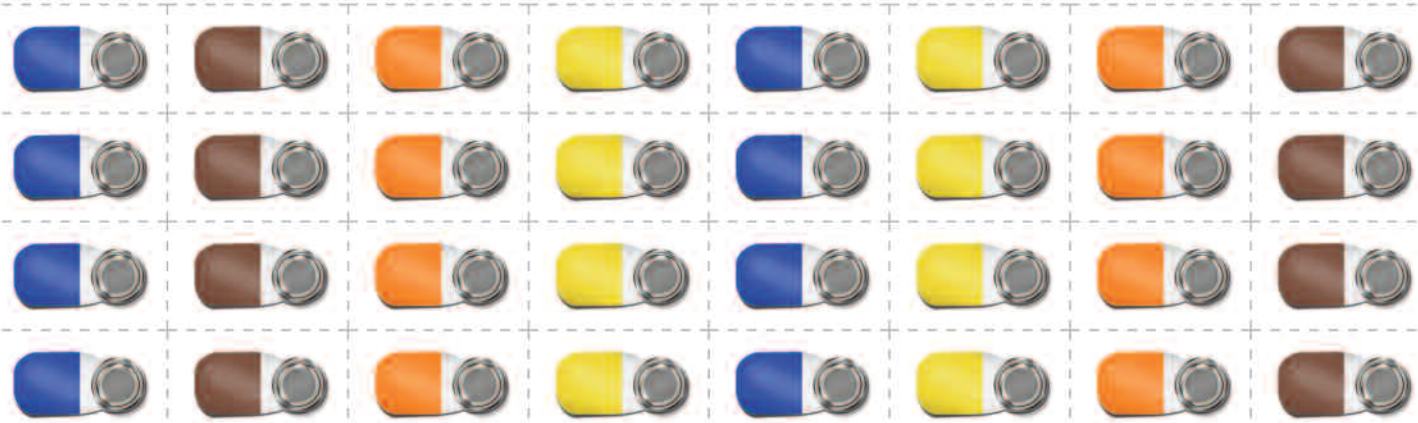

The Relationship between Central Auditory System Responses and Speech Understanding

Cochlear implants (CIs) help individuals with profound hearing loss to hear and understand speech by direct stimulation of afferent auditory nerve fibres. Over 150,000 individuals worldwide have been fit with a cochlear implant and this number is rapidly increasing. Most adults can cooperate easily when the implant is adjusted to provide optimal stimulation. However, young children and some adults have difficulty responding behaviourally to sounds, and this makes fitting the implant very difficult. Therefore, an objective, physiologic measurement of the brain's ability to distinguish sounds through the implant would be of tremendous use in programming the implant and in monitoring speech perception.

My research explores the relationship between responses of the central auditory system and speech understanding. The central auditory system consists of many structures that process both the temporal and spectral characteristics of speech. Some of the responses of these central structures have been shown to vary with important speech parameters such as fundamental frequency, voice-onset-time, place of articulation and duration of formant transition. Therefore, it follows that altered or impaired neural spectral or timing patterns could have perceptual consequences.


Lendra M. Friesen, PhD

Some reasons for altered neural spectral and timing patterns in individuals with CIs are the combined effects of auditory deprivation and electrical stimulation. With a CI, sound is being reintroduced to a previously deprived auditory system, resulting in altered neural representation of spectral and temporal speech cues. Also, the cochlea is stimulated electrically which results in neural responses that are very different from those obtained with acoustic stimulation. Beginning at the level of the auditory nerve and traveling all the way to auditory cortex, these differences likely generate patterns of information unlike any of those experienced by individuals with normal hearing.

Electroencephalography (EEG) is a physiological tool that has been used to examine these patterns of information. More specifically, auditory evoked potentials (AEPs) can be recorded by averaging together the EEG patterns that follow a repeating sound. AEPs are the tool I am using to explore the relationship between evoked physiological patterns and speech understanding in both individuals with CIs and in individuals with normal hearing.

Typically, very simple stimuli such as such as clicks, tones, and synthetic speech are used to evoke AEPs; however, these stimuli are not necessarily representative of everyday speech sounds. Naturally produced speech sounds are highly complex time-varying signals and therefore might be more effective than clicks, tones, and synthetic speech sounds for examining the relationship between the detection/discrimination of speech sounds and evoked neural responses. Therefore, in the research I'm conducting, I'm particularly interested in using natural speech stimuli such as consonants, vowels, CV syllables, and CVC words.

Currently, one of the AEPs I'm examining in individuals with normal hearing and in individuals having CIs is the P1-N1-P2 response. This response consists of a series of positive and negative peaks and is classified as a long or late latency response. Most of you are familiar with the auditory brainstem response (ABR) which occurs within 10 ms

after the stimulus is presented and is generated in the lower brainstem region. The P1-N1-P2 response occurs much later than the ABR, around 100 ms after stimulus onset, and is generated in the area of the auditory cortex. This response reflects the neural response to detection at the level of the auditory cortex, indirectly indicating that an adequate stimulus is reaching the cortex.

The P1-N1-P2 response has several inherent characteristics that render it a unique research tool. One of these is that it reflects the neural response to acoustic change at the level of the auditory cortex. For example, a change from silence to sound, from sound to silence, or frequency changes within an ongoing signal will evoke this response. Perhaps most importantly, these neurophysiologic detections of acoustic change have been shown to correspond well with perceptual thresholds of acoustic change in individuals with normal hearing. If this is true for individuals with CIs, then this response might be useful in identifying which acoustic change cues are and are not being neurally detected.

Some of the findings with this response in both individuals with normal hearing and in listeners with CIs are that this response is stable from test-to-retest when evoked by various naturally produced CV syllables. This is an important finding if this response is to be used to measure speech perception performance because if any response changes are observed, it is important to know that these changes are performance-related rather than just changes that are within the normal limits of variability. Also, in both normal and CI subjects, we've observed that different naturally produced speech syllables evoke unique response patterns, indicating that the P1-N1-P2 response reflects at least some of the acoustic cues in naturally produced speech.

We've just begun to explore the relationship between speech understanding and evoked physiological patterns. In the future, we will examine the relationships of the auditory EP to the acoustic properties of the evoking signal, the implant processor variables, and the perception of the subject.

Lendra Friesen is an associate scientist in the Cochlear Implant Program in the Department of Otolaryngology at Sunnybrook Health Sciences Centre and has been there since March, 2007. She also has an appointment as an assistant professor at the University of Toronto in the Faculty of Medicine in the Department of Otolaryngology. She received her BSc degree in Zoology and Chemistry from Brandon University in Brandon, Manitoba, her MS degree in Audiology at Utah State University in Logan, Utah, and her PhD degree in Hearing Science from the University of Washington in Seattle, Washington. Prior to completing her PhD, she worked as a research audiologist at the House Ear Institute in Los Angeles for several years.

Tubes and Swimming: To Plug or Not To Plug

Dr. David Goldfarb, BSc, MD, FRCSC


Dr. David Goldfarb

To plug or not to plug … this is the question. Well, the actual question is "do kids with ventilation tubes require earplugs to keep the water out when bathing and swimming." It turns out that the answer to this is more in the domain of physics than otology.

A study was conducted by physicists at the University of Colorado in 1984 and they examined the capillary action of ventilation tubes using a theoretical model. That is, how much water pressure is necessary for it to enter a ventilation tube. For those of us that remember our high school physics, the fluid pressure (*P*) entering any tube (such as a ventilation tube) is proportional to the surface tension of the fluid divided by the inner radius of the tube. The greater the surface tension and the smaller the radius of the tube, the greater is the pressure needed for fluid to enter the tube.

For those of us that like physics, $P = 2T/r$ where T is the surface tension and r is the radius of the tube. And for those of us that really like physics the factor 2/r comes from dividing the inner circumference of the tube by the area of the hole in the tube ($2\Pi r / \Pi r^2$).

All this means is that with ventilation tubes with very narrow radii (on the order of 0.45 mm to 0.8 mm, depending on the type and the manufacturer), it takes a lot of pressure to push fluid through the tube. Having said this, there are some factors that can affect surface tension (*T*) in the top of the equation. The less the surface tension the easier it is for fluid to get through the tube. It turns out that the surface tension of the fluid is affected by temperature, fluid type, and particulate in the fluid. And particles in the fluid do reduce surface tension.

A common case where particles may be mixed with potentially contaminating water is when one is swimming in a muddy lake or river. Because of the reduction of the water surface tension this may be more problematic than swimming in a pool. Dunking one's head in bath water can also be problematic since the soap decreases surface tension of the water such that bath water may enter the tube. As far as overall fluid pressure, although it takes a very large fluid pressure to enter a ventilation tube, this could occur when diving deeply under the water. This should be avoided.

One study by Goldstein and his colleagues in 2005 demonstrated a small but significant increase in otorrhea. They concluded that the "clinical impact of using ear plugs is small, (and) their routine use may be unnecessary." Since 1977 there have been many studies and serveral larger meta-studies. Virtually all show no increase in acute otitis media with tube (AOMT) with ventilation tubes in place. These studies are the same whether the person is unprotected, wearing earplugs, or using eardrops.

My clinical rule is thumb is "if the child is willing to wear earplugs then that is fine. Otherwise 'throw them in the water without earplugs.'"

Dr. David Goldfarb, BSc, MD, FRCSC, is an Otolaryngologist, in Toronto, Ontario

Acceptable Noise Level

This issue's "Spotlight on Science" column has been written by Marshall Chasin, and provides us with a timely overview of a quick but powerful measure, the "Acceptable Noise Level." Chasin's article gives us a very clear summary of the measure. Watch for further literature on this topic to help explain the origins of the measure and how we can best use it in management of hearing loss. *(Lorienne Jenstad, PhD, Associate Editor).*

Acceptable Noise Level (ANL): What this Means and How We Can Use It In Hearing Aid Fittings

By Marshall Chasin, AuD, MSc, Reg. CASLPO

This 15-year-old concept was first introduced by Anna Nabelek at the University of Tennessee – the only state with three different pairs of double letters. In 1991, it was called "tolerated speech-to-noise ratio," but since 2002 has been called "Acceptable Noise Level" or ANL. This measure is an estimate of an individual's willingness to accept background noise levels. Nabelek and her colleagues reasoned that it was not so much one's *ability* to hear in noise, but one's *willingness* to listen to speech in noise. As it turns out, a three minute test that assesses ANL can be used to predict a person's success with a hearing aid with 85% accuracy.

ANL is measured in decibels and is the difference between a person's most comfortable listening level (MCL) and the background noise level (BNL) that a person will accept. If the difference is very low (i.e., a person will accept a background noise level that is close to their MCL, then these people will generally be very good hearing aid users – i.e., will use their hearing aids most of the time and even wear them, with some limitation, in noisier environments. If the ANL is higher, then these hearing aid users will typically only be part time users and will not be successful with hearing aids in noise.

ANL is not related to the degree of hearing loss, the configuration of hearing loss, wearing a binaural or monaural fitting, differing background noises, different languages, or age. ANL appears to be inherent in all people and cannot be trained.

Neurophysiological studies indicate that differences that correspond to good ANLs are cortical in origin and have an inverse correlation with the amplitude of wave V in an ABR – the greater the amplitude of wave V, the poorer success that a person would have with a hearing aid. Because it is such a cortically high-functioning parameter, training will likely not significantly improve it.

ANL can be used as a predictor of hearing aid success. A "predictor" is based on measures PRIOR to being fit with a hearing aid. An "outcome" measure such as the APHAB or COSI is based on measures AFTER being fit with a hearing aid. As it turns out, there is a poor correlation between ANL and outcome measures such as the APHAB or COSI.

ANL can be used to predict a person's success with a hearing aid with 85% accuracy.

ANL may account for why some people are better communicators in noisy locations than others. Two people with the same audiogram (normal or abnormal) may function differently and this may be related to their specific ANL.

This has ramifications for hearing-aid counselling and recommendation. If a person has a poor (high dB value) ANL then these people should be counselled regarding the use of assistive listening devices such as an FM system and should be enrolled in an aural rehabilitation program. People with a lower value ANL could still derive benefit from these measures but it is predictable that the benefit that they derive would be less than those who unfortunately possess inherently poor ANL.

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The Starkey Hearing Foundation

By Julie K. Purdy, PhD, Starkey Canada

In 1973, The Starkey Hearing Foundation started with a simple premise: "Alone we can't do much. But, together we can change the world." With "So the World May Hear" as his goal, Starkey Hearing Foundation founder William F. Austin built an organization upon this vision.

Today the foundation is sustained by the efforts of thousands of volunteers and donors around the world. The foundation delivers more than 20,000 hearing aids annually through more than 100 hearing missions a year in countries stretching from the United States to Vietnam. Since 2000, Starkey has provided more than 305,420 hearing aids to hearing-impaired children all over the world.

Starkey has collaborated with partners such as the Grammy Foundation/MusiCares, the Minnesota Timberwolves Fastbreak Foundation, Fedex, NBA Cares, Northwestern Health Sciences University, and the Delta Zeta Sorority. Partners actively participate in providing care to hearing-impaired children and in fundraising activities. Awareness regarding hearing loss and hearing loss prevention are promoted via activities surrounding the Grammy's, the Superbowl, etc. In addition to such collaborations, each year the foundation hosts a fundraising gala, joined by notable performers such as Elton John, Garth Brooks, Trisha Yearwood, Pat Benatar, and Marlee Matlin. Funds generated from the gala are used to fund missions all over the world and participants can bid on the right to attend a mission to fit hearing impaired children. In addition, Starkey employees often donate a portion of their salaries to the foundation.

Each year, audiologists, hearing instrument specialists and staff members from Starkey Canada participate in a mission. Recent past missions have included El Salvador, Panama, Turkey, Egypt, and Jamaica. While the hearing impaired patients benefit greatly from the hearing aids that they receive, Bill Austin summed up the feeling of those who participate when he said: The greatest gift of all

from this effort, is perhaps, not the gift of hearing but rather, the gift of respect shown each individual by traveling long distances and doing the very best to help them be all they can be. This respect for life is a lesson that can only be taught by giving respect."

Prior to the participants traveling to their

"It's important for us to help the children because they're the future of the world – and if we neglect the children, we diminish our future. This is a very special thing we do for the children. It is something from which they'll always remember us. Our reward is in the faces and smiles of each person as we help them hear again. This is the best work we could ever do because it's helping people … and that's what life is all about. We truly live through what we give – we live on into the future through our gifts back into our community and to humanity."

– William F. Austin

mission country, individuals are selected by local agencies, receive a hearing assessment, and impressions are taken so that the team who travels to the country have earmolds and the appropriate hearing aids available. Typically, the preliminary work is done by existing agencies but if there are not sufficient resources available, Starkey may be called upon to provide the preliminary piece as well. Prior the mission to Jamaica, audiologists from Starkey Canada traveled to the island nation and tested young children in their local communities as well as took earmold impressions. After the individuals are fit with their hearing aids, they receive information on care and use along with batteries to last one year.

The most recent mission for Canada occurred in October 2008 and took place in Cairo, Egypt. Under the hot sun without the benefit of shade, Canadians fit 3,000 hearing aids in a few short days. While the pictures convey the appreciation and hope that the children have at the time of being fit, they cannot begin to convey the feelings of the mission participants. I have spoken to many mission participants who have lived active, varied lives and we all agree on one thing: bringing hearing to someone who would otherwise never have the chance without you being there to provide assistance is the single most significant thing we have ever done in our lives. For more information about the Starkey Foundation or to make a donation, view www.sotheworldmayhear.org.

Industry Insider

New Managing Editors for AudiologyOnline and Healthy Hearing

AudiologyOnline (audiologyonline.com), the leader in online education and information for the hearing health care profession, and Healthy Hearing (healthyhearing.com) the leading website for consumer information on hearing loss and hearing aids, have announced the appointment of new Managing Editors for each site.

Kristi Albers, MA, previously an associate editor for AudiologyOnline, is responsible for the day-to-day editorial content management of Healthy Hearing. She manages a group of staff writers who produce fresh news and article content based on the latest innovations in hearing aid technology and research on hearing disorders. Kristi is an audiologist with experience working in a clinical setting and as a product trainer for a hearing instrument manufacturer.

Carolyn Smaka, AuD, brings years of experience working in the product development department of a major hearing instrument manufacturer and also in practice development for a large group of hearing clinics. Her excellent skills in technical writing will be key in managing the ongoing editorial responsibilities of AudiologyOnline including producing interviews with industry experts and facilitating CEU quality articles from the leading names in research and technology.

Paul Dybala, PhD, president and editor-in-chief of AudiologyOnline and Healthy Hearing stated, "I am excited about having Kristi and Carolyn in these new roles. They will be key in keeping us at the forefront of providing the best in article topics, news coverage and expert presenters."

Unitron Hearing Introduces 360

A SUPER POWER HEARING INSTRUMENT WITH ADVANCED FEATURES TAILORED FOR SEVERE TO PROFOUND HEARING LOSS

Kitchener, Ontario, Canada – Unitron Hearing announced today the introduction of 360, an advanced digital hearing solution specially tailored for people with severe to profound hearing loss. 360 is the first super power hearing solution purposely built to allow clients to achieve all the power they need without compromising on advanced features, sound quality or everyday reliability.

360 will address the advanced through essential categories with two distinct offerings, 360+ and 360e. 360+ offers a full complement of advanced innovations designed to deliver high performance even in the most challenging listening environments, while 360e provides solid, reliable performance.

More Usable Power without Feedback

360 delivers enough power to fit hearing losses up to 120 dB, offering an impressive peak output of 141 dB SPL and peak gain of 82 dB SPL (2cc). The feedback management system rapidly detects and suppresses multiple feedback peaks, providing clients with optimal amplification and pure, comfortable listening.

"Individuals with severe to profound hearing loss demand the highest quality, durability and performance from their hearing instruments," explains Cameron Hay, president & CEO, Unitron Hearing. "360 is purpose-built to deliver on what is most important to these wearers, such as the world's first speech enhancement system designed specifically for severe to profound hearing loss and a feedback management system engineered to deliver the most usable power. Advanced features combined with engineered toughness ensure users can be confident their 360 hearing instruments are up to the challenge of constant, everyday use – even in the most demanding environments."

www.unitronhearing.ca

Redesigned Baby's Communication Checklist Distributed to Birthing Professionals

Redesigned Checklist Distributed Nationally

Did you know that three babies in every 1,000 are born with some degree of hearing loss, and that until recently the problem was not typically detected until the ages of two to three? Now, with the advent of newborn hearing screening in many areas of Canada, hearing loss is identified at birth or shortly after, and the child receives timely intervention to help ensure the development of good communication skills.

But hearing loss can also occur after birth for many reasons. The first three years of life are crucial for language development, so it's important that parents and caregivers be aware of their children's speech and hearing progression.

The Hearing Foundation of Canada is pleased to be distributing our updated *Baby's Communication Checklist* to doctors, midwives, parent groups, and hearing health professionals across the country. The Checklist is a colourful, bilingual guide that's packed with information and tips to help parents monitor and nurture their baby's language skills.

Additionally, the Checklist is being distributed to families across Canada through prenatal classes and hospital bedside distribution program.

If you would like a copy of the Checklist please contact us at **baby@hearingfoundation.ca** to order it; alternatively, you may download it from our website, **www.hearingfoundation.ca**.

Bernafon Unveils Avanti BTE and Brite 50X at EUHA 2008

At the EUHA convention in Leipzig from the 15th – 17th October 2008, the Swiss hearing system manufacturer Bernafon proudly presents a new visual identity and a new brand promise. The new Avanti BTE family in the entry-level category and the new lifestyle and design hearing system Brite 50X complete the Bernafon product portfolio in an ideal way.

Bernafon is a company with a long tradition. For over 60 years Bernafon has developed hearing systems thanks to Swiss Engineering and precision technology in Bern, Switzerland. The company is changing, evolving and wants to take another strategic step with a new vision, mission and brand promise: "Your hearing Our passion". A new, fresh visualization with beautiful images of the natural world of Switzerland characterizes the new Bernafon look.

Advanced hearing system technology does no longer need to be high priced. Avanti makes fully adaptive technology available in the entry-level category too. The Avanti product range includes a small, powerful and attractive micro BTE and a compact BTE with a 13-size battery for greater hearing losses. Both instruments can be fitted either with a standard ear hook or a thin tube.

Avanti features an automatic program with signal processing in 7 channels, adaptive directionality and adaptive noise reduction as well as the proven data logging.

The award-winning Brite receiver-in-the-ear hearing system is now available at three price points. Brite 50X in the mid-range category completes the very successful Brite product family featuring a highly flexible automatic program with a choice of nine different signal processing strategies.

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Interview with Bill Cole, Hearing Aid Pioneer

In conversation with Marshall Chasin

Topic: Early development of compression and directional microphones in hearing aids, real-ear measurement and digital hearing aids.

Marshall Chasin: **William A. Cole** – also known as Bill Cole, is one of the most accessible people in the field of audiology. He is always willing to answer questions and provide insight that only comes with intelligence and years of experience. As president of Audioscan, Bill Cole, has dedicated his career to excellence and innovation in the field of audiology. Mr. Cole has left his mark of distinction on the hearing aid standards, audiology technology and has provided enriched experiences for future audiologists through his teaching. To this day Mr. Cole continues to freely provide assistance in engineering knowledge to all those who ask.

To honor Bill and all that he has contributed to the field it was recently announced that a new award would be given in his name through the University of Western Ontario, in London, Ontario, Canada. "The William A. Cole Award for Excellence in Audiology is dedicated to excellence and innovation in the field of audiology. It will be awarded to a student in the final year of the master's in clinical audiology program who has shown excellence in applying their knowledge to an area that has direct clinical applicability."

I wanted to chronicle the many accomplishments that have lead to this award, and so today I am sitting down with Bill to have a conversation about all of this. Congratulations, Bill. You have certainly earned this.

William A. Cole

Bill Cole: Thank you Marshall.

MC: I know that you are an electrical engineer. How did you end up in the hearing aid field?

BC: It was largely serendipity I suppose. As a teenager, I was interested in both electronics and audio. I designed and built my own vacuum tube amplifier and speaker enclosures and had one of the earliest stereo tape recorders. There were no audio or acoustics courses at Canadian universities and I had a scholarship at the University of Waterloo so I became one of the early students in their co-op electrical engineering program. One of my co-op job placements was in a research lab working on the development of high speed transistors which led me into microchip manufacturing at Northern Telecom upon graduation. That eventually led me to Westinghouse Canada which had acquired the manufacturing rights to an integrated circuit originally developed for use in Zenith hearing aids. In 1970, I was given the job of designing a new generation of integrated circuits for hearing aids and that got me back to audio in a way that I could never have imagined.

MC: I know that you hold six US patents related to hearing aids. Was this Westinghouse IC a linear hearing aid circuit?

BC: No, my first integrated circuit design was a compression IC, the WC501. It was the first compression IC developed for a hearing aid and it made it practical for many hearing aid manufacturers to offer compression hearing aids to their customers. That design was awarded a Canadian patent and several linear circuts for both low and high power hearing aids followed. Over the years, the Westinghouse Canada semiconductor group eventually became Linear Technology Inc. which eventually became Gennum while the WC501 and its descendants continued to be used in millions of hearing aids

and other low voltage devices.

MC: I understand that you didn't join the spin off to Linear Technology right off, but decided to join Unitron Industries.

BC: Yes, when Westinghouse Canada decided to divest itself of the semiconductor group, the future looked pretty uncertain and the opportunity came along to move to Unitron. I was their first engineer, although I hasten to point out that they already had some fine technicians working there.

MC: I understand that you designed a directional hearing aid while at Unitron in the early 1970s.

BC: Yes, but my first design job was to develop what turned out to be the first BTE hearing aid with input compression – the Unitron 205 which eventually became the 295 and the 905. The only other input compression hearing aids around were body worn types. I learned a lot about hearing aid design during that project. I still have a Unitron 205 and it still sounds better than a lot of modern hearing aids.

Over the next few years, we built a new development lab where we had an anechoic chamber and one of the first KEMAR manikins. In 1975, I published an article on the difference between coupler gain and "functional" gain measured on KEMAR (which later became known as simulated insertion gain). One of my conclusions was that you could not properly fit a hearing aid without some way to measure this gain on an individual ear and I could not see how this would ever be clinically feasible.

At that time, we were also working on directional hearing aids. We found that if you made them highly directional, people were at risk when out of doors. Because of cost and size, it was not possible to contemplate putting two microphones in a hearing aid so switching between directional and omni meant closing off the rear microphone port which dramatically altered the frequency response. I came up with a scheme, which we patented, for adjusting the effective port spacing allowing the polar pattern to be changed by moving a slider. That was the Unitron B500 and I have to say that it was a great idea, but also a great failure. It was physically large and had sharp corners and flat planes – very ergonomic but not very appealing.

MC: And then you left Unitron in 1977 and joined your previous colleagues who were now at Linear Technology?

BC: Yes. My youngest son was born that year and I wanted to spend more time at home than I had been able to when my other children were growing up. I was looking for part-time work and Linear Technology was flexible enough to offer me a part time position so that I could commute and work for them, three days a week. I was there until 1984.

MC: I understand that you were awarded four patents while you were there and also had designed the first noise reduction circuit for hearing aids.

BC: During that time, I received four patents on low-voltage circuits that could be used in hearing aids. The noise reduction patent was a case of serendipity. There were BILL and TILL circuits out at that time and I was working on a two-channel system with compression in the high frequency channel. I was listening to the circuit in my basement office when I suddenly realized that I could no longer hear the furnace running, yet nearby speech was very normal. It sparked a lot of interest in the consumer electronics area as well as in the hearing aid field.

MC: I do recall seeing that breadboard in a back-room someplace at an ASHA convention. I understand that you left Linear Technology in 1983, along with your business partner Jim Jonkman to start up a company called Etymonic Design, Inc. – a product development firm. What are some of your accomplishments there?

BC: Let me begin by saying that there is no connection between Etymotic Research Inc. and Etymonic Design Inc. Mead Killion and I started our companies within a couple of months of each other and, quite independently, picked similar names. We agreed to co-exist and put up with the occassional mixup in phone calls and orders.

Regarding the accomplishments, they were not mine but rather they were joint efforts with Jim and, as we grew, with other members of our team. Our first project in the hearing aid area was the mechanical, acoustic and electronic design of a power BTE for Miracle Ear. They then asked us to propose an application of new technology to hearing aids and we proposed an analog, digitally programmable hearing aid. We developed the world's first digitally programmable ITE hearing aid in 1985, along with a hand-held programmer, and ran early pilot studies with them. Before that was finished, we were asked to develop a programmable BTE for Audiotone which Miracle Ear had just acquired and this turned out to be a lot more difficult. I believe it was called the "Dolphin." After that we got involved in Project Pheonix, which was the world's first digital hearing aid. We designed the analog input and output sections of the system. At that time, the digital part had limited dynamic range and one had to compress the input to avoid overloading the A/D converter. We also developed an IC version of the trademarked Adaptive Compression circuit for Telex.

MC: The two time constant circuit?

BC: Yes, with Harry Teder. Another major project was the first headworn cochlear implant stimulator for the House Ear Institute which involved all mechanical and electronic design and prototyping for a replacement for the body-worn processing pack. This was a dual channel processor driving a single electrode and was overtaken by multi-electrode implants before it got past the prototype stage. I also had some minor involvement with the K-AMP.

MC: Surely more than "minor." Your initials are on the K-AMP chip.

BC: Yes, my initials are on the chip, but that is more a testament to Mead Killion's generosity than my contribution. My role was to share with the team some of the things I had learned about low-voltage, low-current design and help eat chinese food and pizza late at night. I developed the output stage but about that time, the class D receiver became available, and my output stage was therefore never needed.

MC: The K-AMP still remains my favorite hearing aid of all time.

BC: Well, there's no question about it. It still sounds better than many of the hearing aids out there today.

MC: In 1989 you had to eat your words, because in the mid 1970s you had written off real-ear measurement as never being clinically feasible.

BC: We actually started development in 1987. This was really the result of seeing a lot of our creative energies failing to result in viable products because of forces beyond our control. After examining options, with the

help of a business consultant, we decided there was a need for a portable HAT/REM system at a price people could afford and we decided we could design, manufacture and market it. Recognizing that the confusion between Etymonic Design and Etymotic Research could become an issue, we trademarked Audioscan and introduced the Audioscan RM500 in 1989. It was a reliable, durable system that people found easy to use and it kept going and going. As hearing aids evolved, we continued to find innovative ways to test them to give people the information they needed to successfully apply them. However, as digital technology became more sophisitcated, we could see that there was a need for a new generation of testing technology.

In 2001, we introduced the Audioscan Verifit as our first desktop HAT/REM system. It was the first system to replace the conventional tone and noise signals with digitized real speech samples that were accurately controlled in the sound field for repeatable measurements and analyzed in such a way that results could be directly compared to behavioral measures of hearing. It was also the first hearing aid analyzer with dual speakers and a patented test signal which allows the directional response of hearing aids to be tested and displayed in real time without the need to disable compression or adaptive features.

MC: I know that in addition to all of your accomplishments- input compression ICs, low-voltage, low-current drain ICs, directionality, real-ear measurement test equipment – you are also very active with ANSI and IEC technical committees.

BC: I have been involved since the mid-1970s. I am involved in the IEC hearing aid standards committee, the audiometer standards committee, and the joint IEC/ISO committee on real-ear measurement. I also chair the ANSI committee on real-ear measurement, and I am on the ANSI hearing aid committee as well.

MC: Is there anything that you are not involved in! My first question was to have been "how does an engineer end up having an audiology award named in his honor?" but listening to all of the various aspects and innovations that you have been involved in, the answer is pretty obvious. I know that you are an honorary professor at the University of Western Ontario and it's well known in the field that if someone wants to know something, we just have to ask Bill.

BC: I must say that I have basically done things that were fun and although I have always worked long and hard, I have done things that I have enjoyed. Getting into the field of audiology has been great because it has allowed me to combine my early interests to do something that improves peoples' lives. That is really the most rewarding thing.

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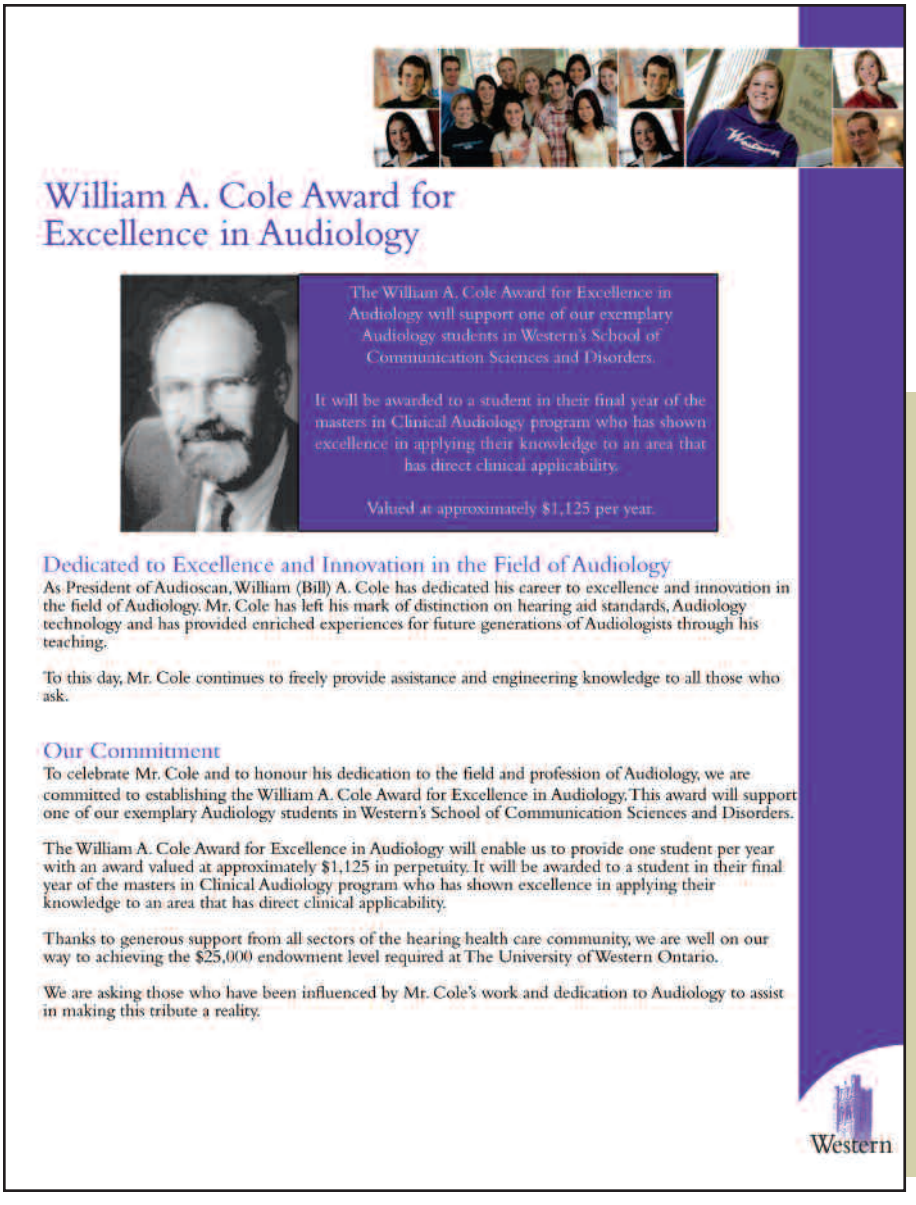

Editor's Note: *A scholarship was recently created by the University of Western Ontario to honor Mr. Bill Cole, a pioneer in the development in some of the first integrated circuits for hearing aids and who could be considered one of the fathers of compression in hearing aids. On behalf of* Audiology Online, *one of our Contributing Editors, Dr. Marshall Chasin from the Musicians' Clinics of Canada (www.musiciansclinics.com), interviewed Mr. Cole to cover his many contributions and talk about the award.*

For more information about, or to make a donation in support of the "William A. Cole for Excellence in Audiology" please contact:

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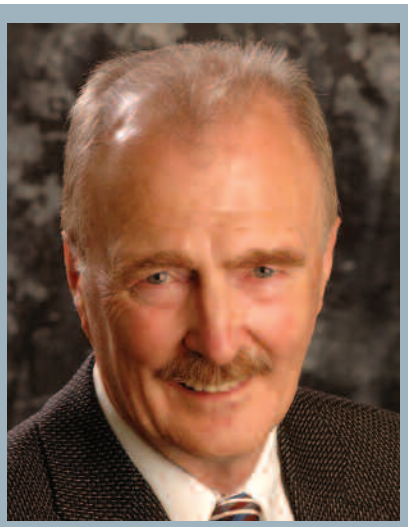
Tinnitus: A Primer

Dr. Phillip Wade, DDS, MD, FRCS(C)



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About the Author
Dr. Phillip Wade. DDS, MD, FRCS(C) is Medical Director at the Canadian Hearing Society

Despite much recent interest in tinnitus, its mechansims and treatments still remain an enigma. What is known to us is that in the majority of cases, tinnitus is related to peripheral hearing loss with the auditory nerve as the common pathway of sound. Although reduced auditory input may produce tinnitus, the question is why are there tinnitus patients with normal auditory function (this occurs about 8% of the time). What other factors predispose these individuals to experience tinnitus?

Tinnitus is a symptom and not a disease and is associated with various risk factors such as advancing age, noise exposure, head injury, and certain drugs and medications. It has been described as a phantom auditory perception (i.e., perceived sound in the absence of acoustic stimulation) and it has been classified as subjective ? heard by the patient only; or objective ? heard by the examiner. The latter may be pulsatile as noted with a vascular tumor in the middle ear, or non-pulsatile heard as repetitive clicking caused by intermittent contraction of the soft palate or the muscles attached to the ossicles in the middle ear (i.e., tensor tympani or stapedius muscles). Approximately 10% of the population experience it. And children are not exempt but do appear to cope better with it. They often assume the noises they hear are completely normal and don't complain.

What causes tinnitus? Tinnitus is often a result of injury to the peripheral auditory system with many central systems involved. One theory that has some merit postulates that the dorsal cochlear nucleus in the brainstem is the generator of tinnitus as a result of peripheral injury to the outer hair cells (Jastreboff 1995). This may be as a result of the aging process, noise exposure, head injury, or certain ototoxic medications (i.e., the same risk factors associated with tinnitus). The dorsal cochlear nucleus is activated to produce tinnitus when there is a discrepancy between the damaged outer hair cells that play a key role in the motions of the basilar membrane and normal inner hair cells.

Wherever tinnitus is generated, in order to be heard it must be represented in the auditory centre of the brain in the temporal lobe. The region of the brain that is engaged in emotional reactions to any sendory input, is the sympathetic part of the auditory system and the limbic system. Once the patient becomes emotionally involved, annoyed, or angry at the tinnitus, the autonomic system and/or their limbic system in involved. The more annoyed they get, the more they suffer ? neuroplasticity at work. Unfortunately once imprinted in the brain the more difficult it is to habituate to it. Once imprinted, even cutting the auditory nerve will not alleviate it.

A thorough evaluation of the tinnitus patient may indicated whether they are amenable to medical or surgical management. This would include a detailed history to note the nature of the tinnitus which might offer a clue as to the etiology ? is the tinnitus intermittent or continuous; unilateral or bilateral; high or low pitched; or if it is pulsatile or non-pulsatile? A low pitched tinnitus may indicate Ménière's disease whereas pulsatile tinnitus in syncrony with the pulse rate, suggests a possible vascular cause. A complete functional enquiry is necessary to enquire as to whether there is a past history of hearing loss, noise exposure, head injury, ototoxic medication, etc. Also, it would be important to note a history of ear infections, eustachian tube dysfunction, previous surgical intervention, or any associated vestibular disturbances.

Following the history, a full head and neck examination is mandatory. Microscopic examnation of the external auditory canal might reveal wax or hair resting against the tympanic membrane producing a repetitive clicking sound. A red hue behind an intact tympanic membrane may be seen in some otosclerotic patients or an inferior mass on the floor of the middle ear in keeping with dehiscent jugular bulb. It is important to auscultate the head and neck to reveal any vascular abnormalities. Finally, if warranted, a complete otoneurological examination might be indicated to include examination of the cranial nerves and vestibular system.

A full audiological assessment follows along with radiographic imaging, as required. A high resolution CT or MRI or possible angiography may be needed as a diagnostic adjunct for tumors of the internal auditory canal or vascular tumors at the base of the skull. In patients with pulsatile tinnitus, carotid doppler (ultrasonography of the carotid arteries) might confirm an obstruction. Blood tests to include testing for Vitamin B12 deficiency, lipid abnormalities or thyroid abnormalities are rarely helpful.

What options do we have in treating tinnitus? First of all, almost everybody experiences brief periods of tinnitus at times, especially younger people following loud concerts but fortunately most people are not too concerned about it and often, reassurance will allay apprehension.

Loud tinnitus is less than 10 dB sensation level and even though patients may be experiencing loud chronic tinnitus, many can be easily distracted by everyday noise at work and at play, and complain only about it when in quiet. (Dobie 2004). Sleep disturbance is not uncommon. They may have difficulty in initiating sleep with tinnitus or waking up with it, and unable to get back to sleep after. For most patients, it is only a nuisance factor which requires explanation and reassurance to help alleviate the symptom over time.

Unfortunately 20% of patients are suffering from chronic tinnitus. Many, if not most have some predisposing psychological problem (e.g., anxiety or depression). In some, it may start gradually and in others there may be an immediate onset. In the latter group of patients, the onset often occurs at the time of a severe grief reaction (e.g., the loss of a loved one, a failed marriage, loss of a job, etc.). They usually do not make the connection. In the case of the lost oved one, especially if it was due to medical condition, they may become anxious that their tinnitus is possibly associated with the same condition. The more anxious they become, the louder the tinnitus ? further increasing their anxiety.

Presently curing tinnitus is an elusive goal. The most successful treatements to date are directed not as much at treating the tinnitus sensation itself, but at the suffering caused by the tinnitus. Counselling, possibly in conjunction with a psychologist and/or support groups, may be extremely helpful. There are several approaches that combine the elements of counselling and gradual habituation to the sound with the use of sound generators. (see Tyler, 2006; for a review). The sound generators, by partially masking the tinnitus, allow the brain not only to gradually habituate to the white noise but to the tinnitus itself. The drawback is that this is a prolonged process over a 12- to 24-month period wearing the device continually during the waking hours. The patients therefore have to be very motivated. Success rates of 80% have been reported in the literature for numerous international centres.

Medical treatment when held up to high levels of accountability by randomized clinical trials (RCTs) has been found wanting. Xanax, a benzodiazapine, has been shown on one RCT to reduce tinnitus sensations but drug dependance can be problematic. (Johnson et al. 1993). Anticonvulants, antiarrythmics, and various miscellaneous drugs such as melatonin (Roseberg et al. 1998), betahistine (Kay, 1981), eperisove (Kitano et al. 1987), etc. have failed on RCTs to demonstrate benefit. In one RCT in Turkey (Paaske et al. 1991), zinc showed some benefit (a number of these patients were zinc deficient) but no benefit was found on another RCT. Homeopathic medications such as Ginko biloba which has been widely used has failed to show improvement on most RCTs (Drew and

Davies 2001). In other homeopathic remedies there is concern about the consistency of the drug and possible side effects or significant drug interactions. The most successful drug treatment presently is directed towards treating depression and minimizing sleep disturbance. Nortriptylene (an antidepressant) at bedtime has been widely recommended in such patients (Dobie et al. 1993).

Do non drug treatments work? Electrical stimulation if the inner ear, biofeedback, and acupuncture have all been tried with varying degrees of success. Electrical stimulation of the inner ear to suppress tinnitus is not new and various forms of wearable devices have been tried since the nineteenth century but it is the result of coclear implant technology that has been the most interesting. Many patients who have received such implants have noted as a welcome side effect that their tinnitus is reduced. This suppression is likely on the basis of restoring spontaneous activity in the auditory nerve, if indeed it is believed that tinnitus is a result of reduced activity due to some pathological process. Further research is required in this direction.

Biofeedback may have a role to play. It is known that in some patients, their tinnitus may fluctuate on contraction of the jaw muscles. This would suggest some connection between the trigeminal nerve which activates these muscles and the auditory nerve. Reducing muscle tension by the means of biofeedback techniques therefore might reduce tinnitus. Unfortunately, it has been difficult to evaluate it since it is difficult to address the placebo effect and, up to date, there is little evidence to support this therapy.

Many patients have tried acupuncture and often report initial success but for this form of therapy, the initial success is most likely a placebo effect.

Is surgery an option? This is certainly an option for some patients. Those who have lost hearing due to otosclerosis often complain of associated tinnitus. Surgery for otosclerosis will improve hearing dramatically in 90% of patients but it is a 50/50 proposition for the improvement of the tinnitus. Unfortunately there is a slight chance of making the tinnitus worse. For patients with Ménière's disease who have failed medical treatment, acoustic nerve section, endolymphatic sac surgery, labrynthectomy, and ablation with ototoxic antibiotics through a myringotomy tube, may reduce tinnitus but potentially could make it worse. Approximately 50% of patients who have acoustic neuroma surgery to remove a tumor in the internal auditory meatus pressing on the auditory nerve have also noted a decrease in their tinnitus. Similarly reduction of tinnitus has been noted after a removal of a vascular tumor in the middle ear. Unfortunately in all of the above surgical procedures, hearing loss is a possibility and in some cases, it is guaranteed.

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HEARING INSTRUMENT PRACTITIONER TRAINING:

PROSPECTS AND PURPOSES

By Ted Venema PhD

About the Author
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Today in all health professions the buzz word is "accessibility." The hearing health care profession is no exception.

Smaller centres and rural settings are having a difficult time finding hearing health care providers. Also, the baby boomer generation is entering middle age, and this increased demand on resources may become a problem of access based solely on manpower issues. Audiologists are relatively few in number. Without the non-audiologist hearing instrument practitioner (HIP, and in some jurisdictions hearing instrument specialist or HIS), we as a hearing health care profession cannot meet the hearing health care needs of the bulging baby boomer population, especially in smaller cities and towns. There has been a lot of misunderstandings and apprehension between audiologists and hearing instrument practitioners, regarding scope of practice and also education. The purpose of this article is to look at an education program of the HIP. It is hoped that this will help readers to see what the HIP is capable of doing in the hearing health care field. The ideal situation is for the audiologist and the HIP to work together.

The HIP is trained to test hearing and to recommend and fit hearing aids for the adult population. The HIP scope of practice is generally limited to the mainstream adult population; the HIP is trained to refer to an audiologist or a physician when clients present with conductive HL, asymmetrical SNHL, etc. The mainstream adult population, however, is quite large, and it accounts for the vast majority of persons with hearing loss. What's more, this population is one that is particularly accessible to the potentially lucrative area of private practice. Remember not too long ago when most audiologists worked as salaried employees in hospitals? Today, the private sector has become the main business for the audiologist. In private practice settings, audiologists mostly perform hearing testing, hearing aids selection, hearing aid fitting, and hearing aid dispensing. After all, this is where the money is. Few of us could make a living in private practice doing ABRs. The simple fact is that the HIS and audiologist are both professionals whose scopes of practice overlap considerably.

There is a community college route and a university route for entrance to the hearing health field. The HIP is community college-trained. Unlike the university-trained student who obtains a degree in a discipline, community college trained students obtain a diploma in an "applied" field of study. Parallels abound in health care – BScN nurses versus registered practical nurses, and optometrists versus opticians, and podiatrist versus chiropodist, are several examples. For mainstream adult hearing health care concerns, there is simply more than one venue from which the public can choose.

Much has been made of the fact that audiologists spend 6–7 years studying for their profession, while the HIS does not. There are two things, however, to note here. First, while this is true, it is not true that all 6-7 years are spent studying audiology. The first 3 or 4 years are spent taking courses that are not necessarily audiology related. Second, most audiology students first heard about the field of audiology while earning the bachelor's degree. Most audiologists did not come out of high school thinking, "I want to become an audiologist, and so I am going to school for 6–7 years to do this."

The HIP, on the other hand, comes from completely different origins. One might be a mother of three with a BA in English. Another might be an administration assistant at a hearing health care clinic. Another might be a son or daughter of an HIP in private practice. Another might begin HIS studies at a community college just having finished high school. Yet another might be a sales manager at a hearing aid manufacturer. Very often, the applicant for HIS studies is a mature student. Some may have medical degrees from other countries; they may have applied to get into an audiology training program at a university, but due to the often lengthy, complex application process to these programs, were denied entry. Many of them would not be accepted at a typical university audiology program. The community college route can provide readily-accessible HIP training for these students.

There are presently four HIP training programs in Canada. Rosemont College in Montreal is a 3 year CEGEP (Collège d'en-

seignement général et professionnel) program that trains students to become audio prosthetists. Grant MacEwan College in Edmonton has a distance learning HIP program. George Brown College in Toronto has a 3 year hearing instrument specialist (HIP) program; further training will allow an HIP to be trained as a hearing aid specialist (HIS).

Conestoga College in Kitchener is Canada's fourth and newest HIP program (At Conestoga, the curriculum is more densely packed into a 2 year length of time). Conestoga's HIS program began as a part-time program 4 years ago, in September of 2005. In September, 2007, Conestoga added a full-time program. The pre-requisite for entry into the full-time program is Grade 12. Students must take core community college courses as well as HIS-specific courses to earn their 2 year diploma. For the part-time program, a minimum of a 2 year college diploma is required for admission. Most part-time students tend to be older than full-time students, and they often have families and employment. Since core-college courses are assumed from the applicants' previous diplomas, the part-time program consists of only HIS-specific courses. The full-time and part-time programs are fused or integrated, so that they run in parallel. For the most part, full-time and part-time students sit in the same classes. This arrangement saves on teachers that would otherwise be required to run the separate programs.

The full-time program at Conestoga consists of four semesters. The curriculum is laid out below:

Semester 1

HEAR 1160	Acoustics & Psychoacoustics	45 Hours, 3 Credits
HEAR 1170	Anatomy/Physiology of the Ear	45 Hours, 3 Credits
HEAR 1100	Professional Ethics for the HIS	45 Hours, 3 Credits
COMM 1590	Basic Writing	45 Hours, 3 Credits
PSYC 1110	Lifespan Development	45 Hours, 3 Credits

Semester 2

HEAR 1130	Introduction to Audiometry	60 Hours, 4 Credits
HEAR 1110	Hearing Aid Components, ANSI Testing, and ALDs	60 Hours, 4 Credits
HEAR 1140	Counselling Techniques for the HI	45 Hours, 3 Credits
HEAR 1150	HIS Field Orientation	60 Hours, 4 Credits
General Elective		Minimum 36 Hours

Semester 3

HEAR 2110	Advanced Audiometry	60 Hours, 4 Credits
HEAR 2100	Hearing Aid Compression and Digital Features	45 Hours, 3 Credits
HEAR 2170	Fitting Methods	45 Hours, 3 Credits
HEAR 2180	Probe Tube Measures & Manufacturer Software	45 Hours, 3 Credits
General Elective		Minimum 36 Hours

Semester 4

HEAR 2160	Pre-Graduate Clinical Consolidation	495 Hours, 17 Credits

In the part-time program, the Fitting Methods course and Probe Tube Measures course are combined together into one course called HEAR 2120 Fitting Methods and Manufacturer Software. Similarly, the Professional Ethics and Counselling courses are also combined together into a course called HEAR 8100 Professional Ethics and Counselling. The particular arrangement of fused full- and part-time students allows Part-time students to take all their classes and labs on 2 days per week.

Part-time students take two Clinical Practicum courses; one begins in the summer after their first two semesters of study. The second placement begins in the summer after their fourth semester of study. These clinical placements must be completed at different sites. Part-time clinical placements are only 3 weeks each. This time span, however, accommodates the typical vacation times allotted to most employees.

The audiologist and the HIP can work well together in so many ways. The HIP can work on his or her own, and many already do this. In addition, however, the HIP can really be an asset to a busy office. A cursory look at the list courses the HIP has taken (at Conestoga) shows that as supportive personnel, the HIP is far more than the most capable administrative assistant. They are well trained in all elements of general adult hearing health, from taking earmold impressions to counselling, from audiometric testing to hearing aid recommending and fitting. Many audiologists find themselves in the position of having to constantly recruit new help. Expansion of offices and growth of business always require more employees. Even the steady stable business that is not necessarily in a growth mode will require new help as anyone retires. For an even more glaring picture of the need for more hearing health care professionals, look outside the more urban and densely populated areas of Canada, such as the Maritime Provinces and the Prairies. The need for more personnel in our field is so obvious it needs not to be said any further. If audiologists are looking for audiology assistants, look no further than the HIP.

Meeting hearing health care needs today requires both professions. Rosemont College in Montreal graduates about 15 students per year. Grant MacEwan, due to its distance education model graduates far more. George Brown College produces some 20?30 graduates per year. Conestoga has graduated 44 students over the past 2 years. This past September (07) Conestoga accepted 35 students (25 full time and 10 part time). At this time, they are half way through their programs of study, and will graduate in June of 09. As of this September (08) Conestoga has accepted another total of 35 students. Together with the audiology programs at UBC, University of Montreal, University of Ottawa, University of Western Ontario, and Dalhousie University, we graduate a good number of hearing health care professionals. Hearing health care accessibility in smaller centres and in rural settings can be met by the combined presence of both the HIS and the audiologist. The audiologist and the HIP should work together as a united front. Our numbers would more than double if we did. Our efforts to show the public and the government who we are, would net more results too.

Audism

By Gary Malkowski, MA
Special Advisor to President, Public Affairs
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About the Author
Gary Malkowski, MA, was the world's first Deaf MPP, who served in the Ontario provincial legislature during the 1990s. He is currently the Special Advisor to the President- Public Affairs at the Canadian Hearing Society.
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One of my earliest memories was from my days in a pre-school program for deaf and hard of hearing children. My teacher, a woman who later went on to win a number of awards for excellence in teaching, was focused on oral instruction and sign language was banned in the classroom. On one occasion I asked to go to the bathroom and was denied permission because I wasn't able to ask clearly in spoken English. When I peed on the floor out of desperation, I was forced to clean up my urine, wash my clothes, and was sent to my dormitory without an evening meal. What is at the heart of a teacher's insistence that a child use a language that is neither natural nor accessible?

With my lack of speech intelligibility and residual hearing skills coupled with poor lip reading skills, I experienced low expectations and noticeably different treatment from teachers, counsellors, and even peers compared to deaf children who had mastered these skills. In my classrooms, I noticed that these classmates were given more attention, encouragements, supports, privileges, positive reinforcements and obtained more formal education while children like me did not. Discouraging me from using sign language in my early years, the lack of support and encouragement, and the deferential treatment of my more "accomplished" classmates are all examples of audism.

Audism

Unlike racism, sexism, and ageism, "audism" is an unfamiliar concept to many. Tom Humphries, an associate professor at the University of California, San Diego, originated the term in 1975 while working on his dissertation on a bilingual approach to Deaf education.

Humphries defined audism as "the notion that one is superior based on one's ability to hear or behave in the manner of one who hears." Although there is currently no unanimously accepted definition of audism, the Canadian Hearing Society (CHS) has adopted a definition in our official position paper on discrimination and audism using Humphries definition and expanding it to include two additional definitions: "A system of advantage based on hearing ability" and "A metaphysical orientation that links human identity with speech." Discrimination rooted in audism is systemic, subtly woven into every facet of our society – housing, education, employment, government services, and health care. The attitudinal barriers it engenders, the direct and indirect discrimination it fosters, and the impact on those who are Deaf or have a hearing loss can be devastating.

During my childhood, adolescence, and some of my adult years, I grew accustomed to the attitudes of those in authority who surrounded me. Among just some of the attitudes I encountered were:

- "Sign language is bad for deaf children to learn"
- "Sign language ruins a person's chances at careers, friends, family, and being a responsible citizen."
- "You can't play sports in regular house leagues because you are deaf."
- "You can't get a summer job because you are deaf."
- "You will not have a successful career because you are deaf and cannot speak."
- "You can't drive because you can't hear."
- "You can't be served in the restaurant because you are deaf."

Sadly, these types of attitudes persist today in one variation or another. It is still common practice, for example, for audiologists, speech-language pathologists, early intervention and early childhood education providers, educators of deaf children, boards and government ministries to discourage deaf children from learning and using their natural and accessible language – sign language. In fact, many parents of deaf children who are making decisions around their child's education are still not given balanced information about the benefits of sign language.

This restriction of the use of sign language

The spelling of Deaf with a capital "D" refers to someone who identifies with Deaf culture and who uses ASL as their primary mode of communication. It is not a definition based on audiometric hearing loss (Marshall Chasin, editor-in-chief).

coupled with a fundamental belief that a deaf child should learn to use residual hearing or the hearing that is a result of a cochlear implant and learn to speak is the most blatant form of audism. Sadly, when spoken language, both expressive and receptive, is not accessible, precious time is wasted. The child is labelled a spoken language "failure" and the window of opportunity to acquire language quickly closes.

Unfortunately, these spoken language deficiencies can be identified as a learning disability. In some cases there is no cognitive disability; in others, learning disabilities are compounded by language deficiencies. In both instances, it is too late for the language deficit to be repaired and this can have enormous associated costs in terms of special education requirements, and long-term mental health issues, among others.

A great number of professionals – audiologists, interpreters, educators, speech-language pathologists, and medical practitioners – have enormous amounts of power and influence. How that influence is exercised over the lives of people who are Deaf, and Deaf children and their parents is important and the information they disseminate needs to comprise the facts fully and be in the best interests of the individual.

The Saskatchewan Ruling

In a landmark Saskatchewan provincial court decision in August 2005, the presiding judge wrote in his ruling that "…physicians and medical personnel, audiologists, educators, children protection workers and others are undoubtedly caring and capable professionals... It was clear that, throughout, as they should, these people acted in strict accordance with the policies, directives and mandates of the governmental or other bodies for which they work. Unfortunately, the best efforts of these fine people have failed to avert a terrible disaster in the life of this little deaf boy."

At issue in the court was the guiding philosophy of the Saskatchewan Pediatrics Auditory Rehabilitation Centre (SPARC), the publicly funded pre-school program offered to deaf children in the province. SPARC adhered to a restrictive "auditory-verbal" approach to education for deaf children which focuses only on restoration and remediation of hearing and speech. The judge ruled that this approach fell-short in the case of one deaf boy and American Sign Language (ASL) must be offered to Deaf children as a communication option in the early years. It was a powerful message about the importance of sign language and a challenge to what was essentially an audist assumption: deaf children will only succeed the more they resemble someone who hears.

The results of denying children language in the years when language development is most critical is that deaf and hard of hearing children routinely fall behind educationally, socially, and psychologically. As adults, they often do not live up to their employment potential and become unnecessary burdens on the health and social welfare systems where they encounter serious attitudinal barriers.

Legal Citations Supporting Sign Language Rights

- United Nations Convention on Rights of Persons with Disabilities, 2007
- Canadian Charter of Rights and Freedoms, 1982
- Supreme Court of Canada Eldridge Decision, 1997
- Federal Court of Canada's Canadian Association of the Deaf Decision, 2006
- Ontario Human Rights Code, 1990
- Ontario Human Rights Commission's Policy and Guidelines on Disability & the Duty to Accommodate, 2000 & Policy and Guidelines on Accessible Education, 2004
- Ontario's Accessibility for Ontarians with Disabilities Act, 2005
- Education Act: ASL and LSQ Regulations, July 2007

Some of the solutions to these problems are neither complicated nor expensive. The solutions represent best practices and have demonstrated and positive outcomes. The solutions also represent the enactment of the Canadian Charter of Rights and Freedoms.

One of the sectors in which the effects of audism are most acutely felt is employment. The un- and underemployment of persons with disabilities is an undisputed truth with the unemployment rate for persons with disabilities estimated to be five times that of people without disabilities. The 2001 Statistics Canada Participation and Activity Limitation Survey (PALS) reported that almost 50% of people with disabilities were unemployed and that percentage is now estimated to be over 55%. For women with disabilities the rate is almost 75%.

In Ontario alone, up to 85% of deaf, deafened, and hard of hearing Ontarians are un- or under-employed. Only 20.6% of Deaf Canadians are fully employed (compared with 61% of all Canadians) and 37.5% are unemployed (compared to 8% of all Canadians).

Statistics from the United States are instructive as well. When it was introduced into law, the Americans with Disabilities Act (ADA) was touted as a groundbreaking piece of legislation in the area of employment. The ADA seeks to create unbiased hiring practices by making the hiring process transparent to job seekers and requiring employers to clearly outline duties of the offered position. The ADA also clearly defines a qualified candidate with disabilities as one that meets all the skills and experience requirements of the position and is able to perform the essential duties of the position, even if the job seeker requires accommodation. The ADA goes further to include the final qualifier: "Requiring the ability to perform 'essential functions' assures that an individual with a disability will not be considered unqualified simply because of inability to perform marginal or incidental job functions."

Despite the restrictions and requirements of the act, 3.7% of all meritorious ADA employment cases heard by the Equal Employment Opportunity Commission (EEOC) between July 26, 1992 and September 30, 2005 were related to a "hearing impairment" making it one of the top 10 conditions cited.

In more extreme forms, "like racism or sexism, audism judges, labels, and limits individuals on the basis of whether a person hears and speaks." (Humphries and Alcorn 1995; 85). Discriminatory practices rooted in audism that create unfair limits and barriers to employment for people who are culturally Deaf or have a hearing loss are often presented as concerns for safety (It isn't a safe environment for someone with hearing loss), being unaware of accommodations (I can't promote you to supervisor because of your hearing loss; how will you communicate with your team?" or perceived undue financial hardship in providing accommodations. In reality, employees with a hearing loss have an above average safety record. Few jobs require "hearing" to function safely: driving is a visual skill; many noisy environments require hearing protection that limits all employees' hearing and emphasis is placed on being visually aware. In terms of accommodation, information about available

technology including TTYs, telephone visual signalling or amplifiers, as well as other accessibility services including interpreting, captioning, and relay services, are readily available and the employees themselves are the best resources as to what they will need in order to effectively and successfully meet the requirements of their position.

Audism is also exemplified in a situation where one deaf or hard of hearing individual is offered a position or promotion, over an otherwise more qualified deaf or hard of hearing individual, on the basis how "hearing-like" the individual looks, acts and/or functions. Selecting a hearing person over an otherwise more qualified deaf or hard of hearing person, or denying a deaf person their rights solely because of a hearing loss are more explicit and discernible examples of discrimination. However, audism, as in the first example, often appears in more subtle forms, though the results are equally devastating for the individual and society as a whole.

Audism can also find expression in surprising and unexpected ways. Incidences of discriminatory, audist, and paternalistic missteps are not uncommon, for instances, in communications facilitated by a sign language interpreter. Interpreters are the human engines in the language and communication process and bridge the language gap between Deaf people who use American Sign Language (ASL), and people who use spoken English. Professional ASL/English interpreters are knowledgeable in the language and culture of both Deaf and hearing people and are bound by their professional Code of Ethics and Guidelines for Professional Conduct as set out by the Association of Visual Language Interpreters of Canada (AVLIC). Despite these guidelines most interpreters have played a part in, or have witnessed audist incidents before, during, or after interpreting.

Some interpreters privy to audists' behaviours do not convey the information or interpret it appropriately or accurately and the Deaf consumers are left unaware of the audism that was present in the discourse. Only a very small number of interpreters interpret clearly and accurately in these often times difficult and uncomfortable situations.

Dr. Genie Gertz's article, "Dysconscious Audism: A Theoretical Proposition" published in *Open Your Eyes: Deaf Studies Talking* (Dirksen and Bauman, 2008) described the marked difference between "unconscious" and "dysconscious" with regard to audism. "Unconscious" implies that the person is completely unaware of his or her audist beliefs and actions; whereas dysconscious implies that the person does have an inkling of his or her consciousness but does not yet realize it is impaired.

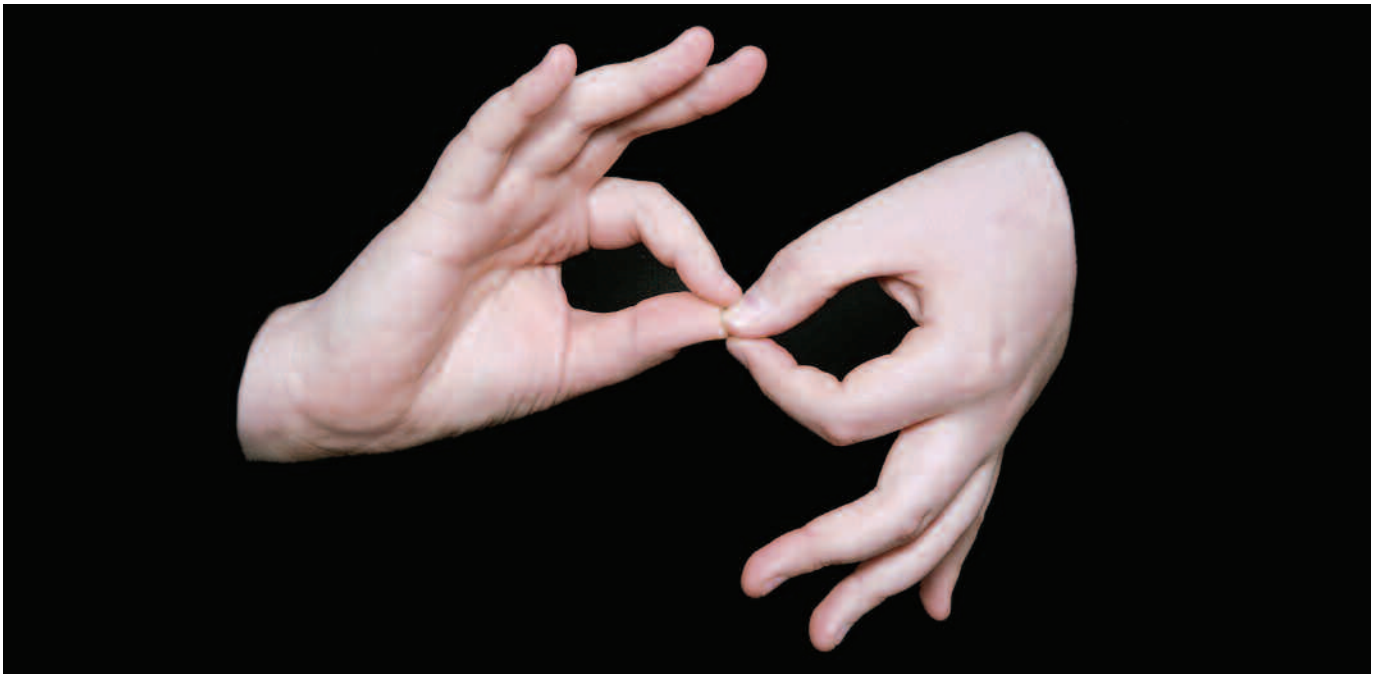
Working together we can continue to develop public education to challenge the unconscious and the dysconscious forms of Audism.. Audism and ableism both, although new terminologies, are old attitudes and ones that can begin to be pulled from the fabric of our society – pulled in the same way as we have racism and sexism. It was not long ago when it was hard to imagine a time when women like Kim Campbell, Marilyn Churley, and Francis Lankin would be crashing through the glass ceiling of the male-dominated Canadian political machine. Here is our opportunity, working together as professionals, human rights organizations, ombudsperson organizations, and in partnership with groups like CHS, the Canadian Association of the Deaf, and the Canadian Cultural Society of the Deaf, to better understand, indentify, and, ultimately, eradicate incidences of ableism and audism.

I am a true believer when it comes to the vision articulated by CHS and unveiled last year. The vision reads:

> ***A society where all people are respected; have full access to communication; and are able to participate without social, economic, or emotional barriers.***

I along with hundreds of dedicated partners both in Canada and abroad are working to realize that society. I am confident that as public awareness broadens, as education increases, and as understanding deepens, we will achieve that vision.

You have the opportunity to join us.



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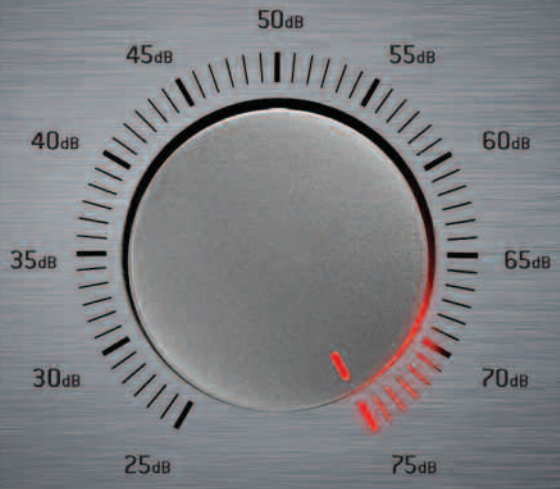

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