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Revue canadienne d'audition

Update: Linear Frequency Transposition

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Welcome to the 2007 Conference Edition of the *Canadian Hearing Report (CHR)*, CAA's official publication. Inside, you will find some thought-provoking articles and the highest of quality research papers, for which the *CHR* is becoming known. As well, you will find a "ton" of information about our upcoming conference and exhibition, and our 10th Anniversary celebration in Niagara Falls, Ontario – the honeymoon capital of Canada! Read on – you won't want to miss a thing!

The *Oxford Pocket Dictionary of Current English* (2007) defines conference the following way:

> conference: *n.* 1. a formal meeting for discussion. 2. a formal meeting that typically takes place over a number of days and involves people with a shared interest, esp. one held regularly by an association or organization', **such as the Annual Canadian Academy of Audiology (CAA) conference.** Okay, I added that last part but, it is an appropriate example of what a conference should be.

A formal meeting, a discussion among people of shared interests held by the CAA – sounds like something in which every Canadian audiologist should be involved. And, if this year is anything like years past, the majority of Canadian audiologists will be at this year's conference.

Again, the *Oxford Pocket Dictionary*:

> com·mit·ment: *n.*. 1. A pledge to do. 2. Something pledged, especially an engagement by contract involving financial obligation. 3. The state of being bound emotionally or intellectually to a course of action, like attending one's annual conference (my example to fit my purposes) or to another person or persons: **a deep commitment to one's professional association (a slight but fitting modification of example); a profound commitment to the family.**

I realize that when you decide to attend a professional conference you are making quite a personal commitment. Whether you attend for one day only or spend several days, it involves an investment of your time, energy and money. However, I can assure you, that particularly in this, our 10th anniversary year, it is worth the investment.

Again, this year, the CAA conference has all the elements of a world-class event. When you come to Niagara Falls, you will enjoy presentations by national and international speakers, and you will have the opportunity to rub shoulders with some "legends in our field."

It's great to attend workshops given by presenters whose material we often read and whose research influences our practice, but who we have never had the opportunity to meet before. Seeing one of our leaders in person provides a very helpful new perspective on how they view our profession and its issues. You can also arrange for an opportunity to talk directly with your mentors or even share some social time so you get to see the person in a whole new light!

Again with the definitions (from the *Oxford Concise*):

Bienvenue à l'édition de conférence 2007 de la revue canadienne d'audition, la publication officielle de l'ACA. Ci-joint, vous trouverez des articles de pensée-provocation en plus des articles de recherche de très haute qualité pour lesquels la revue canadienne d'audition est renommée. De plus, vous trouverez une quantité considérable d'information à propos de nos conférences et expositions à venir en plus de la célébration de notre 10e anniversaire à Niagara Falls en Ontario, la capitale des lunes de miel au Canada. Lisez bien, vous ne voudrez rien manquer !

Le dictionnaire de poche *Oxford de l'anglais courant* (2007) définit le mot 'conférence' de la façon suivante :

> Conférence : *n.* 1. une réunion formelle ayant pour but la discussion. E2. une réunion formelle qui s'étend habituellement sur plusieurs jours et qui implique des gens qui ont un intérêt commun, spécifiquement tenu régulièrement par une organisation, **comme la conférence annuelle de l'Académie Canadienne d'Audiologie (ACA).** Bon, d'accord, j'ai ajouté la dernière partie de la définition, mais il s'agit d'un exemple approprié de ce qu'une conférence devrait être.

Une réunion formelle, une discussion entre personnes partageant un intérêt commun tenu par l'ACA – ceci ressemble à quelque chose pour lequel chaque audiologiste devrait être impliqué. De plus, si cette année ressemble aux années passées, la majorité des audiologistes canadiens devraient assister à la conférence de cette année.

Une fois de plus, le dictionnaire de poche Oxford:

> Engagement: *n.* 1. Une promesse à tenir. 2. Quelque chose de promis, plus spécifiquement une promesse par l'entremise d'un contrat impliquant des obligations financières. 3. État d'être lié émotionnellement ou intellectuellement par une ligne de conduite, comme assister à une conférence annuelle (mon exemple pour atteindre mon but) ou à toute autre personne ou groupe de personnes : **un engagement profond à une association professionnelle (une légère modification de l'exemple, mais tout aussi appropriée) ; un engagement profond envers la famille.**

Je réalise que lorsque vient le temps pour vous de joindre une conférence professionnelle vous réalisez par le fait même un engagement personnel. Même si vous assistez à une ou plusieurs journées, cela implique un investissement de votre temps, de votre énergie et de votre argent. De plus, je peux vous assurer que tout particulièrement dans ce 10e anniversaire il s'agit d'un investissement qui vaut la peine.

De plus, cette année, la conférence a tous les éléments d'un événement de renommée mondiale. Lorsque vous viendrez à Niagara Falls, vous profiterez de présentations des conférenciers nationaux et internationaux en plus d'avoir l'opportunité de côtoyer quelques-unes des 'légendes de notre domaine'.

Il est agréable d'assister à des ateliers présentés par des conférenciers dont nous avons souvent la chance de lire les articles et dont les recherches influencent notre pratique, mais dont nous avons rarement la chance de rencontrer. Rencontrer un de nos leaders en personne permet de voir une nouvelle perspective fort intéressante sur leur position

friend: *n.* 1 a person with whom one has a bond of mutual affection, typically one exclusive of sexual or family relations.
2 a familiar or helpful thing. 3 a person who supports a particular cause or organization.

For me, one of the greatest things about conferences is the time and opportunity that one has to spend with one's colleagues. Conferences are an opportunity to form new relationships or connect with old friends. You can meet face-to-face, those people you only know by email! Let's face it, whether you are a "seasoned" professional or you are a "newbie" to our profession, we're all in the business of hearing health care and that alone means we have something in common, right off the bat. The fun part is finding out what else we have in common!

For over 30 years I have been attending professional conferences and I can say that I get something new and refreshing, and sometimes even inspiring, every year. The CAA conference in particular gives me the opportunity to find out all sorts of new things that are happening in our field, at lectures and meetings as well as in the exhibit hall, which I must say, is one of my favourite spots. I believe you can learn equally intriguing information in the exhibit hall as at any other place at a conference.

One last word from the the *Oxford Pocket Dictionary of Current English* (2007):

Party: *n.* (pl. parties) 1. a social gathering of invited guests. 2. a group of people taking part in an activity or trip.

v. 1. (parties, partied) 1. informal enjoy oneself at a party or other lively gathering.

And, don't forget, there is always lots of opportunity to party! Between CAA lunches, special events organized by various manufacturers, and celebratory parties such as this year's 10th Anniversary Celebration and Gala, there is ample time to enjoy your colleagues in a more fun, relaxed way!

Enjoy this edition of the *Canadian Hearing Report* as a precursor to your visit to Niagara Falls. It will be great to see you there at this year's special CAA conference.

Cheers!

Glen Sutherland, Associate Editor

face à notre profession et ses problématiques. Il est aussi possible pour vous de parler directement avec vos mentors ou même prendre part avec eux à des événements sociaux pour les découvrir sous un autre œil !

Encore une fois avec les définitions (tiré du dictionnaire *Oxford concis*):

Ami: *n.* 1 personne avec qui nous avons un lien d'affection mutuel, généralement en exclusivité des relations sexuelles ou de famille. 2 quelque chose de familier ou d'utile. 3 une personne qui supporte une cause ou une organisation particulière.

Pour ma part, une des choses que je trouve les plus importantes à propos des conférences est qu'il s'agit d'une opportunité de passer du temps avec ses collègues. Les conférences sont une opportunité de former de nouvelles relations ou de renouer avec de vieux amis. Vous pouvez rencontrer en personne les gens que vous ne connaissez que par courriel ! Voyons les choses comme elles sont, même si vous êtes un professionnel chevronné ou un nouvel arrivant dans la profession, nous sommes tous dans le monde des soins de santé auditive et avec seulement cela, nous avons quelque chose en commun, alors allons de l'avant.

Cela fait plus de trente ans que j'assiste à des conférences professionnelles et je peux dire que je retire quelque chose de nouveau et de rafraîchissant, même parfois inspirant, à chaque année. La conférence de l'ACA tout particulièrement me donne l'opportunité de trouver un vaste éventail de tout ce qui se fait de nouveau dans notre domaine, autant par l'entremise des conférences, des réunions et même dans la salle d'exposition, qui, je dois l'avouer, est mon endroit préféré. Je crois que l'on peut apprendre autant des informations intrigantes de la salle d'exposition qu'à tout autre endroit de la conférence.

Un dernier mot à propos du dictionnaire de poche *Oxford de l'anglais courant* (2007):

Fête: *n.* (pl. fêtes) 1. un rassemblement social pour les invités. 2. un groupe de personnes qui prennent part à une activité ou à un voyage.

v. 1. (faire la fête) 1. s'amuser lors d'une fête informelle ou tout autre rassemblement animé.

De plus, n'oubliez pas qu'il y a toujours beaucoup d'opportunité de faire la fête! Entre les dîners de l'ACA, les événements spéciaux organisés par de nombreux manufacturiers et les fêtes de célébrations, comme la célébration et le gala du 10e anniversaire de cette année, il y a beaucoup de moments pour s'amuser entre collègues dans une atmosphère amusante et décontractée!

Appréciez cette édition de la revue canadienne d'audition comme un précurseur à votre visite à Niagara Falls. Il sera bon de vous voir à cette conférence spéciale annuelle de l'ACA.

Santé!

Glen Sutherland, Éditeur associé

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EDITOR-IN-CHIEF / ÉDITEUR EN CHEF
André Marcoux, Ph.D.
University of Ottawa

ASSOCIATE EDITORS / ÉDITEURS ADJOINTS
Richard Seewald, Ph.D.
National Centre for Audiology
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Glen Sutherland
Central West Infant Hearing Program–Erinoak

EDITORIAL COORDINATOR / COORDONATEUR DE L'ÉDITION
Scott Bryant

CONTRIBUTORS
Bill Campbell | Ronald Choquette
Denise Keenan | Francis Kuk
Andre Marcoux | Glen Sutherland

ART DIRECTOR/DESIGN / DIRECTEUR ARTISTIQUE/DESIGN
Binda Fraser
binda.mac@cogeco.ca

SALES AND CIRCULATION COORDINATOR. /
COORDONATRICE DES VENTES ET DE LA DIFFUSION
Brenda Robinson
brobinson@andrewjohnpublishing.com

ACCOUNTING / COMPTABILITÉ
Susan McClung

GROUP PUBLISHER / CHEF DE LA DIRECTION
John D. Birkby
jbirkby@andrewjohnpublishing.com

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ANDREW JOHN PUBLISHING INC.
AJPI 115 King Street West, Suite 220
Dundas Ontario L9H 1V1

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CANADIAN ACADEMY OF AUDIOLOGY
350-210 Consumers Road, Toronto, Ontario M5J 4V6
Tel.: 416.494.6672, 800.264.5106, Fax: 416.495.8723
Web: www.canadianaudiology.ca, Email: caa@canadianaudiology.ca

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PRESIDENT'S MESSAGE

Our 10th annual conference! Amazing! In the early 90s, it would have been difficult to imagine that attendance at a Canadian audiology conference would ever surpass a couple of hundred people. However, for those who first envisioned an autonomous national organization in audiology, current attendance numbers would not come as a surprise. The early boards of directors carefully examined the state of audiology in Canada and were determined to improve the situation for all. One obvious deficiency at the time was the lack of continuing education opportunities for audiologists, whose only options in Canada were joint Audiology-Speech Language Pathology conferences, where audiology content was often limited. Realizing the risk but embracing the potential benefit, the CAA adopted the "Build it and they will come" philosophy and was the first organization to offer a three-day conference with competing sessions focused solely on audiology-related issues. Success was immediate and attendance has steadily increased over the 10 year history of the CAA conference. On behalf of the current and past boards of directors, I would like to take this opportunity to thank every single audiologist who has attended our conference over the years and in doing so, permitted the CAA to become the strong organization it is today.

Over the years, as the conference became a great success, there was still much work to be done. I had once stated that those who chose audiology as a profession certainly did not make the choice because of its political stability. With its inability to govern itself, with disputes over billing for our services, and the threats to the ownership of our scope of practice, the profession of audiology was in need of attention. To meet that need, the CAA revamped its mission statement to focus on the promotion of audiology and developed a firm stance on standards for employment, education, and practice. By so doing, the CAA has started to raise awareness among professionals and stakeholders that audiologists own their profession and have their own voice. While this might be completely natural for an association of audiologists, the professional autonomy from which benefits the CAA has allowed our academy to communicate its stance with passion and conviction. Who else should speak for audiology with so much conviction but an audiologist, right? As a result, people are listening, attitudes are changing and common sense is prevailing.

Close to 10 years later we are still dealing with many of the same issues identified in those early days. Having been on the board of directors of the CAA in some fashion over the span of these past 10 years, I have come to observe one of the most important barriers to solving these issues: apathy. It is easy to hope that in the face of important issues, things will magically take care of themselves. This allows us to avoid the inconvenience of working toward a solution. Is it possible that we sometimes feel inconvenienced by our profession and that the obstacles which lie in the way of our autonomy and stability are too complex and therefore not worth the trouble? Rest assured that the CAA believes it does possess the mechanisms to address these issues but has to rely on all of our concerted efforts to get the job done. This is the

MESSAGE DU PRÉSIDENT

Notre 10e conférence annuelle! Incroyable! Au début des années 90, il aurait été difficile d'imaginer que le taux de participation à une conférence canadienne d'audiologie aurait dépassé les centaines de personnes. Toutefois, pour ceux qui voyaient dès les débuts une organisation autonome nationale en audiologie, la forte participation actuelle n'est pas une surprise. Les premiers comités de direction avaient examiné avec soin l'état de l'audiologie au Canada et étaient déterminés à améliorer la situation pour tous. Une des lacunes évidentes à cette époque était le manque d'opportunité pour les audiologistes en matière d'éducation continue. En ces temps, la seule façon d'avoir accès à de l'éducation continue était de se joindre à des conférences en audiologie et orthophonie, cependant le contenu en audiologie y était limité. Réalisant les risques mais aussi les bénéfices potentiels, l'ACA adopta la philosophie 'Bâti-le et ils viendront' et devint la première organisation à offrir une conférence de trois jours avec des sessions portant exclusivement sur les sujets reliés à l'audiologie. Le succès fut immédiat et le taux de participation croît constamment depuis les 10 ans d'existence des conférences de l'ACA. Comme représentant du présent comité de direction et de ceux du passé, je voudrais profiter de l'occasion pour remercier tous les audiologistes qui ont participé aux conférences au cours des dernières années et en permettant ainsi à l'ACA de devenir la solide organisation qu'elle est aujourd'hui.

Au cours des ans, alors que les conférences devenaient un grand succès, il resta toujours beaucoup de travail à faire. J'ai déjà cité que ceux qui ont choisi l'audiologie comme profession ne l'on sûrement pas fait en raison de sa stabilité politique. Avec son inhabileté de s'auto-régir, avec des disputes au sujet de la tarification de nos services et des menaces au niveau de notre champ de pratique, la profession d'audiologiste avait besoin qu'on y prête attention. Afin de répondre à ce besoin, l'ACA a rehaussé son énoncé de mission afin de mettre l'accent sur la promotion de l'audiologie et de développer une position ferme sur les standards d'embauche, d'éducation et de pratique. En agissant de la sorte, l'ACA commença à faire prendre conscience aux professionnels et aux parties prenantes que les audiologistes ont leur propre profession et ont leur propre voix. Tandis que cela pourrait paraître tout à fait naturel pour une association d'audiologistes, l'autonomie professionnelle dont bénéficie l'ACA a permis à l'académie de communiquer sa position avec passion et conviction. Qui d'autre pourrait parler au nom de l'audiologie avec autant de conviction qu'un audiologiste ? Comme résultat, les gens nous entendent, les attitudes changent et le bon sens domine

Il y a près de 10 ans maintenant et nous sommes toujours en présence des mêmes problèmes identifiés au tout début. Faisant partie du comité de direction de l'ACA depuis une bonne partie des 10 dernières années, j'ai observé une des plus importantes barrières pour résoudre ces problèmes ; l'apathie. Il est facile d'espérer face à des problèmes importants que les choses se résoudront par elles-mêmes comme par magie. Ceci nous évite d'avoir à chercher une solution. Est-il possible que nous nous sentions inconfortable devant les obstacles de notre profession et que les obstacles qui enfreignent notre autonomie et notre stabilité sont trop complexes et ne vaillent pas tous les ennuis encourus ? Soyez assuré que l'ACA croit qu'elle possède les opérations

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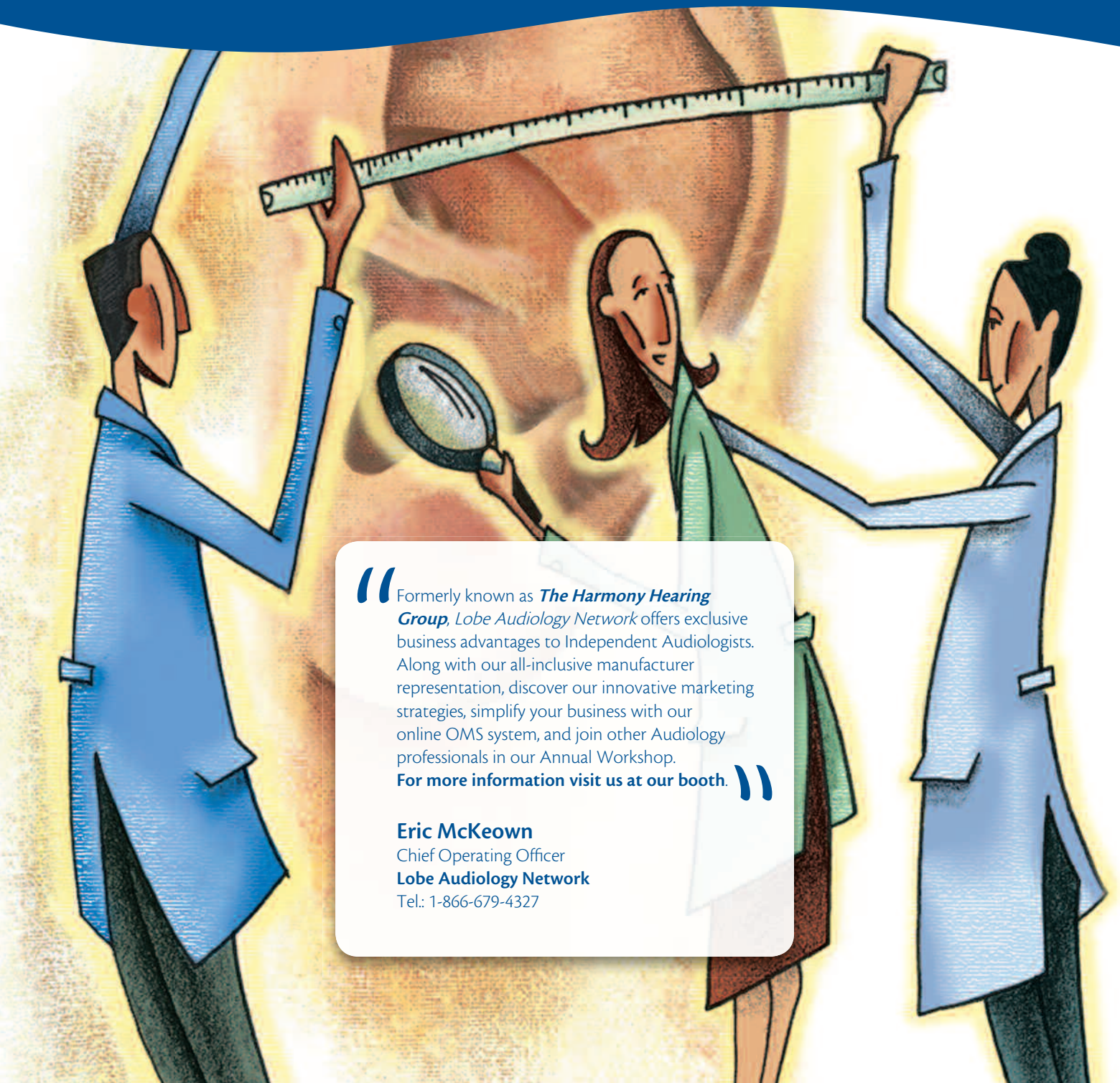

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PRESIDENT'S MESSAGE

important part of the equation!

The anniversary of our 10th conference should be a celebration of autonomy and prosperity in an environment of respect and collaboration with the other professionals who influence our profession. At our gala evening, I will be raising my glass to your support of CAA and for permitting each successive board of directors to be a voice of conviction for our profession. I hope that you will join me in toasting this memorable event in the company of our esteemed colleagues.

Sincerely,
André Marcoux, Ph.D
President

MESSAGE DU PRÉSIDENT

pour résoudre ses dilemmes, mais à besoin de se fier sur tous nos efforts pour pouvoir accomplir ce travail. Ceci est la partie importante de l'équation !

L'anniversaire de notre 10e conférence devrait être une célébration de l'autonomie et de la prospérité dans un environnement de respect et de collaboration avec les autres professionnels qui influencent notre profession. À notre soirée gala, je lèverai mon verre à votre support envers l'ACA en plus d'avoir permis à chacun des comités de direction d'être la voix de la conviction de notre profession. J'espère que vous vous joindrez à moi pour porter un toast à cet événement mémorable en compagnie de nos très estimés collègues.

Sincèrement,
André Marcoux, Ph.D
Président

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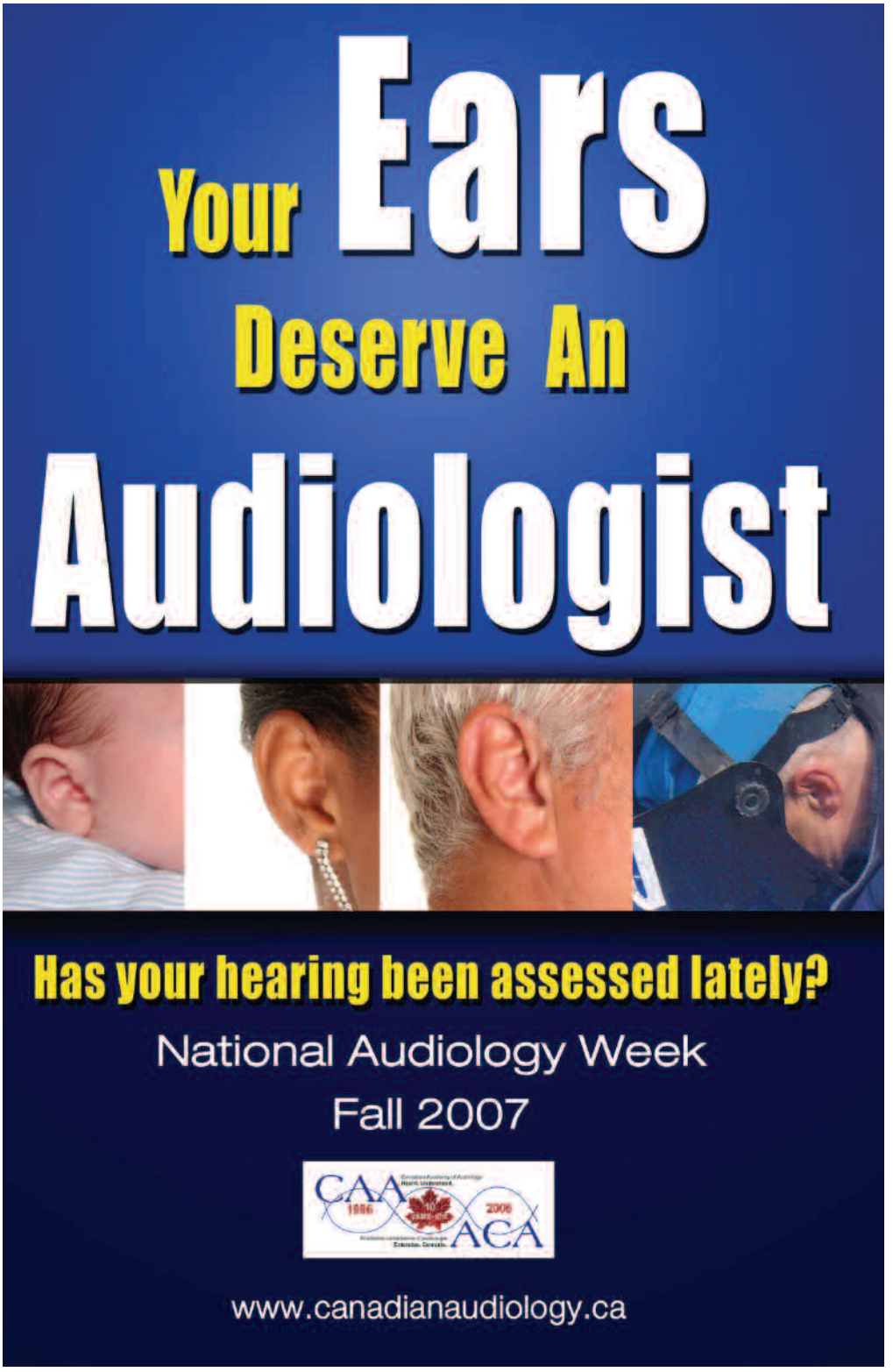


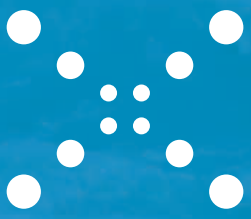
The Public Relations and Visibility Committee of the Canadian Academy of Audiology (CAA) is pleased to announce the first National Audiology Week, October 22 to 28, 2007. In the future, National Audiology Week will be held annually during the 3rd week of October.

The goal of National Audiology Week is to have audiologists from across the country promote the profession of audiology by organizing activities (radio/TV interviews, articles in newspaper, school presentations, etc.) that will inform the public about who we are and what we do. The Public Relations and Visibility Committee will be putting materials and suggestions online to help you organize your National Audiology Week campaign. Look for the materials at the CAA website, www.canadianaudiology.ca.

On behalf of my committee members, I hope you will take advantage of National Audiology Week to help increase the visibility and profile of audiologists and our profession!

If you want more information or you want to get involved on the Public Relations and Visibility Committee, please contact me at 1-800-264-5106 or by e-mail at caa@canadianaudiology.ca.

Ronald Choquette
Public Relations and Visibility Committee
CAA Board Member



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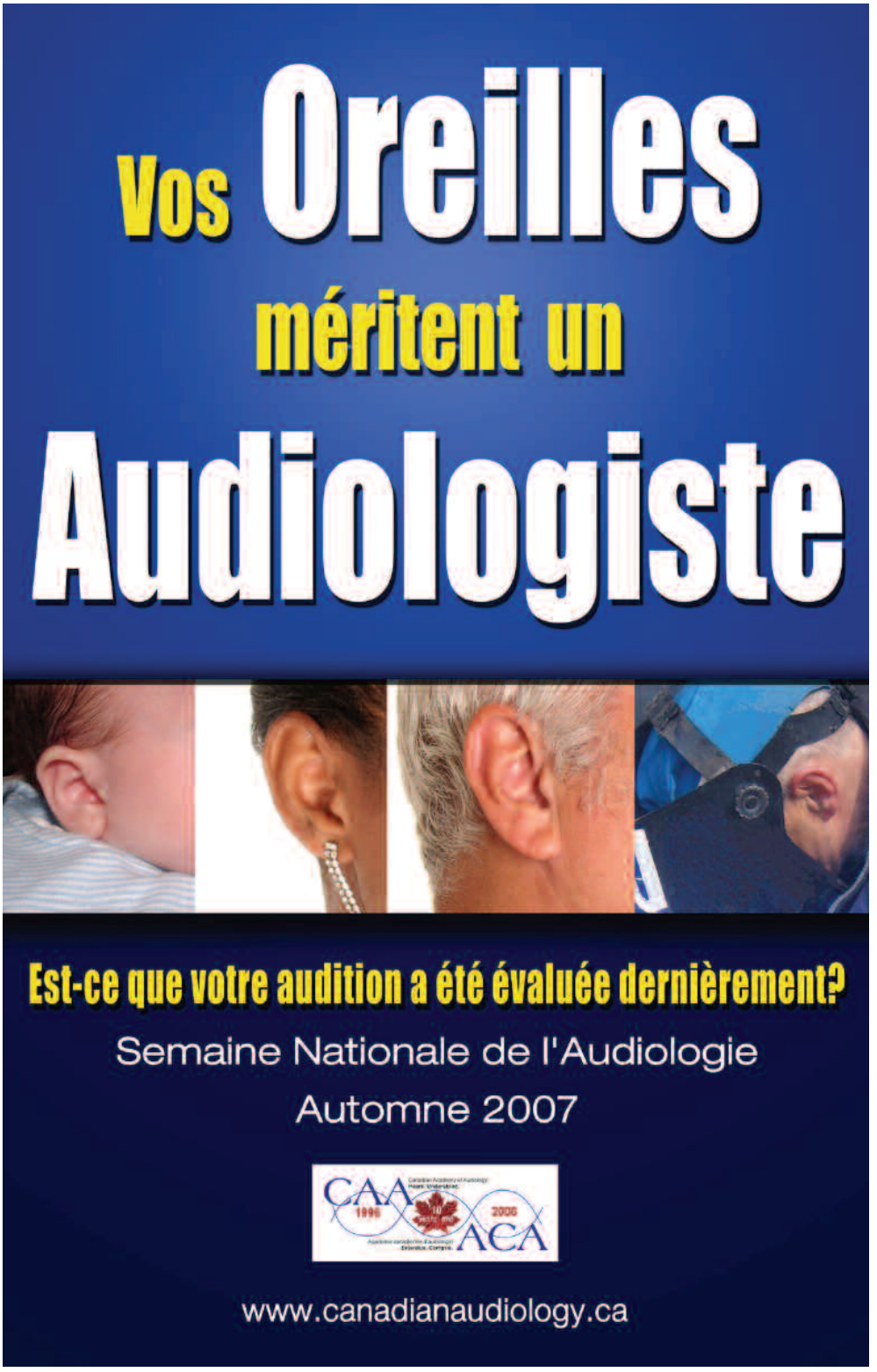

Le comité des relations publiques et de la visibilité de l'Académie Canadienne d'Audiologie a le plaisir de vous informer de la tenue du 22 au 28 octobre 2007 de la première Semaine Nationale de l'Audiologie. Cette semaine sera répétée à chaque année durant la 3ième semaine du mois d'octobre.

Le but de cette semaine sera d'offrir aux audiologistes une occasion spéciale pour faire la promotion de la profession d'audiologiste et de l'audiologie.

L'Académie Canadienne d'Audiologie ayant maintenant créée l'occasion, il sera de la responsabilité de chaque audiologiste d'organiser des activités (entrevue à la radio/télévision, articles dans les journaux, présentation dans les écoles, etc.) lors de cette semaine pour informer le public sur notre profession.

Le comité des relations publiques et de la visibilité mettra en ligne sur le site Internet de l'Académie Canadienne d'Audiologie (www.canadianaudiology.ca) du matériel qui vous permettra d'organiser plus facilement cette semaine.

En espérant que vous profiterez de cette nouvelle occasion pour augmenter la visibilité des audiologistes et de l'audiologie.

Si vous désirez de plus amples informations concernant cette semaine ou vous impliquez dans notre comité, n'hésitez pas à communiquer avec moi au 1-800-264-5106 ou par courriel au caa@canadianaudiology.ca

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For many years the Canadian International Hearing Services (CIHS) has been thanking you for collecting hearing aids and equipment for us to pass onto people in developing nations. For this we are grateful. However, what we have forgotten to recognize is the contribution many of you make to enhancing hearing health care in the developing nations. Over the years, CIHS has sponsored many people to come to Canada for three to four months to study as audiometric technicians. CIHS does not do the training but relies on the generosity of members of the Canadian Academy of Audiologists to do the training. The candidates observe and train in private practices, dispensing offices, and hospitals for periods of one to three weeks each.

In 2006, Kamalini Weeratna from Sri Lanka studied in Ottawa while Laura Charlemagne and Angela Antoine from St. Lucia studied in Toronto. Each of these ladies had successfully completed the International Hearing Society's correspondence course prior to coming to Canada. This course is a pre-requisite for studying to be an audiometric technician. Upon completion of the three to four months in Canada they are qualified to:

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The success of the audiometric technician course is credited to those of you who so generously share your time and talents to train candidates from developing nations. We have indications that more people will be doing the IHS course and will be expecting to do their practicum in Canada. If you would like to participate in this program please contact us at:admin@c-i-h-s.com.

Again, thank you for sharing our interest in hearing health care in developing nations.

PS. Please keep those hearing aids coming.

Gordon Kerr, Executive Director
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BEYOND THE AUDIOGRAM

In January of this year (2007), The Hearing Foundation of Canada (THFC), together with the National Centre for Audiology (NCA) held a workshop at the University of Western Ontario (UWO). The theme of discussions was "Beyond the Audiogram." The 30 core participants in the workshop were Canadian-based hearing researchers from a range of science and health care disciplines including, of course, audiology.

The workshop was organized by Bob Harrison (University of Toronto and Hospital for Sick Children) and Prudy Allen (NCA; UWO), and the general idea was to discuss where audiological sciences should or will be moving in the next decade or so. It was an attempt to get audiology into a larger academic framework and think about new avenues for hearing diagnosis, and intervention.

One of the fundamental questions that was posed and discussed was: What is normal hearing and how should hearing be measured? At a superficial level, these questions appear simple to answer. Clinically, audiologists and hearing specialists have measured hearing most often using the behavioural audiogram for well over 50 years. The audiogram is a measure of threshold sensitivity to pure tone stimuli at octave-spaced frequencies typically from 0.5 – 8 kHz. Thresholds are judged against normative data (ANSI, 1989), and if the subject is within 20 dB of that norm, he/she is judged to have "normal" hearing. The audiogram is an internationally agreed upon standard that is easy and relatively inexpensive to administer, and has become a standard tool in audiology and otology. The predominant goal of rehabilitation recommendations remains that of bringing auditory sensitivity into the "normal" audiometric range and/or improving the signal-to-noise ratio for listening.

However, advances in the auditory sciences over recent decades force us to reevaluate the usefulness of restricting audiometric assessment to such measures. A growing number of clinicians and researchers question our reliance on measures of auditory sensitivity and a definition of hearing that is based on what an individual cannot hear rather than what they can. They argue that the current widely accepted clinical tests do not adequately define hearing ability, and therefore limit assessment and treatment options. For example, significant auditory system damage may be present beyond that predicted by audiometric thresholds, a peripheral hearing problem will often be accompanied by impairment in the central auditory nervous system, and simple tone detection tasks do not adequately describe the complex processing that takes place in the auditory system.

The workshop "Beyond the Audiogram" was designed to bring together hearing science and audiology researchers from across Canada to begin to work jointly towards defining and developing a better set of diagnostic tools for audiology, and to look into the future directions for clinical audiology. Scientists from a range of disciplines contributed to the workshop, ranging from those in genetics and basic physiology and pharmacology, through psychologist and neuroscientists, up to clinicians including audiologists and otolaryngologists.

The workshop considered basic functional questions such as: What does the auditory system enable us to do? How can this ability and underlying requisite skills be evaluated? Topics included understanding speech-in-noise, listening to soft sounds, learning new sounds, understanding unfamiliar speech, etc.

The discussion asked about anatomical assessment, in other words: How would one best evaluate the integrity of various regions of the auditory system? Discussion included consideration of the assessment of the conductive mechanisms, the cochlea, auditory nerve, ascending and descending pathways of the brainstem, and the thalamic and cortical areas.

The workshop took a close look at diagnostic tools, and discussed what existing and new techniques could be applied to clinical assessment. There was debate on new advances and the potential for clinical application in the behavioural areas of psychophysics, speech perception in real and simulated environments. Much discussion was devoted to discussion on objective assessment methods including tympanometry and acoustic reflexes, otoacoustic emissions, auditory evoked responses (ECoG, ABR, ASSR, MLR, etc.), neuroimaging (PET, fMRI, etc.), and genetics. The workshop also considered how we might better evaluate the auditory system for the impact of genetic disorders, trauma (noise, drugs), disease and infectious processes?

At the end of the day the workshop did, indeed, take us "Beyond the Audiogram" and some of the seeds sown and new ideas launched will contribute to the future evolution of audiological science, and audiology practice. Perhaps one of the most important issues discussed at the workshop related to how bring new knowledge and ideas into clinical practice. Everybody talks about the importance of "knowledge transfer," but in reality it is one of the most difficult hurdles to cross. As part of the mechanism for bringing new ideas into audiology, the concepts, ideas and impacts of the workshop discussions will be presented to interested audiologists and hearing scientists at the upcoming CAA conference. If you are new into audiology and or feel the need to keep moving forward, do not miss the pre-conference sessions on "Beyond the Audiogram."

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An Update on the Use of Linear Frequency Transposition

By Denise Keenan, MA and Francis Kuk, PhD, Widex Office of Research in Clinical Amplification

In 2006, Widex introduced the Inteo, the first hearing aid using the Integrated Signal Processing (ISP) platform to achieve consistent audibility and natural sound quality.

One of the unique features of the Inteo is the Audibility Extender – an algorithm that uses linear frequency transposition to bring audibility of high-frequency sounds that would otherwise not be audible with conventional amplification. Since its introduction, we have conducted several studies that attempt to shed light on how this technology can be maximally utilized. While we are still conducting studies on this technology and our views on this technology may change over time, we feel that we have reached a level of understanding of how this technology can be best fitted to realize patient benefit. We would share this understanding with the readers in this article.

The concept of frequency transposition is not new. Braida et al. (1979), in their excellent review of some of the frequency lowering techniques used before that time, dated studies on the topic to as far back as the 1950s (Fairbanks et al. 1954). Despite the long history and repeated attempts to document its benefits, the efficacy of frequency lowering is mixed at best. Limitations of the technology at the time, the lack of individualized settings, the degree of hearing loss of the subjects, as well as training were only some of the reasons cited for the observed mixed results (Braida et al. 1979).

The Inteo Audibility Extender (AE)

Inteo uses linear frequency transposition to achieve frequency lowering. A detailed description of the steps involved in this algorithm can be found in Kuk et al. (2006). Briefly, a start frequency for transposition is first chosen. The start frequency is the frequency beyond which transposition begins. It is determined as the lowest frequency at which the patient's hearing loss first exceeds 70 dB HL and when the slope of the audiogram exceeds 10 dB/octave. Once this algorithm is activated, sounds that are one octave above the start frequency (source region) will be continuously measured to determine the frequency with the highest intensity. This sound (with the highest intensity) will be transposed down one octave. The surrounding frequencies will be moved down linearly. The transposed sounds will then be band-pass filtered and amplified automatically so they are above the hearing threshold of the wearer at the frequencies where the transposed sounds are targeted. Finally, they are mixed with the original sounds below the start frequency as the final output. To provide added flexibility, the gain of the transposed sounds may also be adjusted by the clinician to be 14 dB above or 16 dB below the default setting. The AE is an optional listening program (i.e., the wearer may choose to use it whenever s/he wants) and is active (i.e., transposing) all the time on sounds above the start frequency.

What Clinical Research Have We Done?

Several studies were conducted at the U.S. Widex Office of Research in Clinical Amplification (ORCA-USA). These studies sought to examine the usability of the transposed information, discover how to best fit and fine-tune the AE program, and investigate methods to facilitate acceptance and use of the transposition algorithm. The following are some of the lessons we have learned and a brief review of the studies that contributed to that conclusion.

The AE Provides Additional Information that Can be Utilized

The first study we conducted was to demonstrate that the AE algorithm resulted in speech cues that can be useful (i.e., used to improve speech identification scores). To demonstrate this, a group of nine normal hearing subjects were recruited. The use of normal hearing listeners minimized confounding factors among subjects (such as cognitive level, consequences of hearing loss on cortical organization, etc) and would allow a more direct answer to the stated question of usable cues. In the study, the nine subjects listened to voiceless consonant syllables with transposition and without transposition (all filtered above 1600 Hz to simulate a profound hearing loss) in a random order. They were tested four times; and between each trial, subjects went through a self-paced, 15-minutes of training. The results, as displayed in **Figure 1**, demonstrated that listeners were able to improve their identification scores with the use of transposition over no transposition. However, benefit was not immediately apparent before training was conducted (i.e., no training). With as little as 30 minutes of training, subjects' performance improved by almost 15% over the AE off (blue) condition. This also suggests that training may be an important factor to realize the benefit of the AE algorithm.

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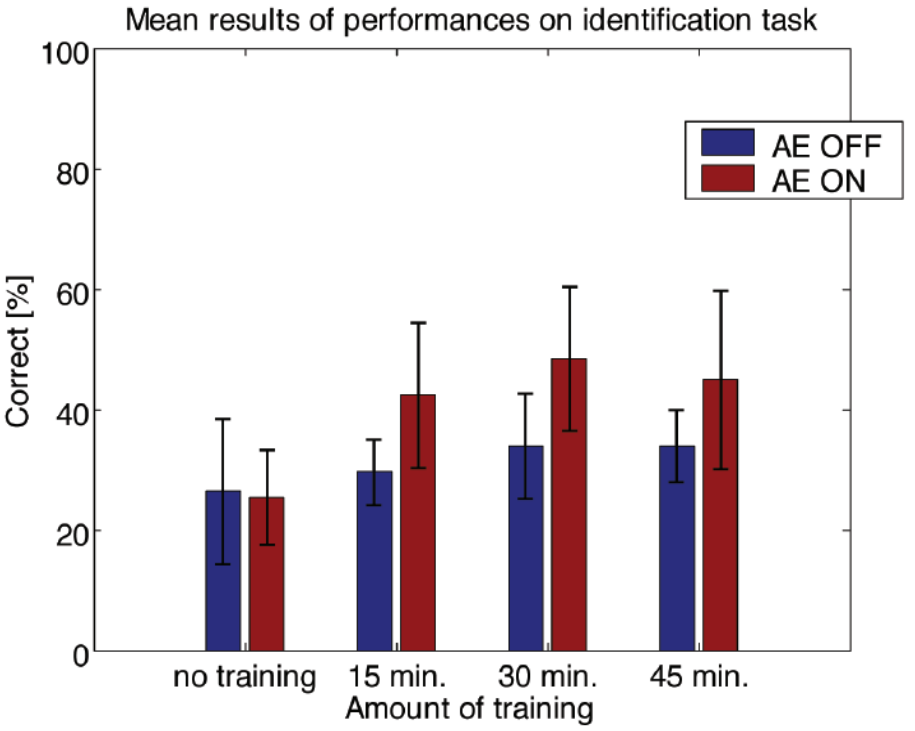

Figure 1. Identification scores of voiceless consonants for normal hearing subjects with a simulated hearing loss with AE on and AE off with training.

The Choice of the "Right" Start Frequency is Important

Because amplification is typically not provided during transposition, the choice of the optimal start frequency becomes important. If one knows for certain that a specific frequency region is "dead" (Moore 2004), the choice of the start frequency will be simple – it should be just below the dead region. On the other hand, since the determination of a "dead" region is typically not conducted in a clinical setting, the appropriateness of the chosen start frequency may become questionable. When the start frequency is too low, information that would be heard through traditional amplification will be transposed instead. The consequence could be that less information in the higher frequencies is transposed and the wearer continues to miss out on this information. Furthermore, information that may have been heard without transposition is transposed unnecessarily. This could "distort" the speech signal. When the start frequency is too high, information that should be transposed is not. This would result in less than optimal speech audibility. Case studies illustrating the usefulness of fine tuning the start frequency for some patients were discussed in Kuk et al. (2007a).

People with a Precipitous High-Frequency Hearing Loss May be a Better Candidate

Previous studies with frequency lowering were conducted on people with a severe-to-profound degree of hearing loss where the hearing sensitivity in the lower frequencies may be severe to begin with. Consequently, even with frequency lowering, the transposed frequencies had to be decoded in a frequency region where the psychophysical resolution is poor. This may partly explain why studies with these individuals yielded mixed results. On the other hand, it has been suggested that frequency discrimination along the slope of the audiogram of a precipitous high frequency hearing loss is more sensitive than other regions (Thai-Van et al. 2003). Because the hearing sensitivity in the lower frequencies of these individuals is typically intact, it is reasonable to expect that these patients will be able to use the transposed information because of their "assumed" intact psychophysical abilities. This, of course, does not exclude people with other hearing loss configurations to benefit from frequency transposition.

The Advantage of the AE Can Be Seen In People with a Hearing Impairment

Nonsense Syllable Identification

To test the hypothesis, we examined the potential benefit of the AE algorithm in a group of subjects who were candidates for open-ear hearing aids (Kuk 2007b). Fourteen subjects with normal or a mild hearing loss below 1000 Hz and a precipitous loss in the high frequencies were tested on the Nonsense Syllable Test at two input levels (30 dB HL and 50 dB HL) three times – during initial fit, two weeks after initial fit, and one month after the initial fitting. The results of the study showed an improvement in phoneme identification, particularly at the lower input level of 30 dB HL. **Figure 2** showed that the improvement in consonant identification increased from 5% at the time of the fitting to 12% at the two-week follow-up. Improvement, though slightly less, was also noted at the louder input level of 50 dB HL.

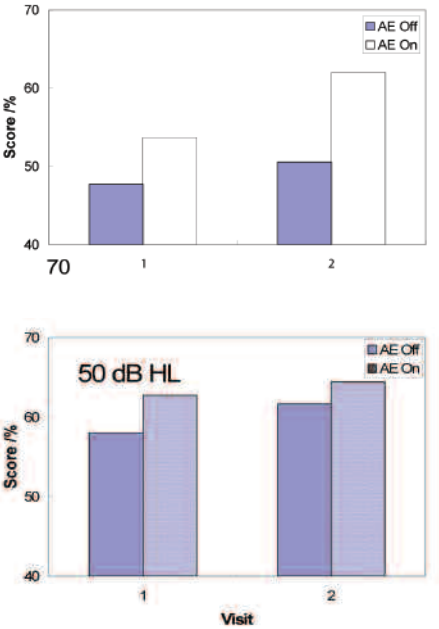

Figure 2. Average NST consonant scores for visit 1 and visit 2 at presentation levels of 30 dB HL and 50 dB HL. AE off is shown in blue and AE on is shown in stripes.

Other Sound Effects – Stronger Preference for Simpler Stimuli

In the same study, we also evaluated the subjects' preference for the AE (over the AE Off) using bird songs, music, and female dis-

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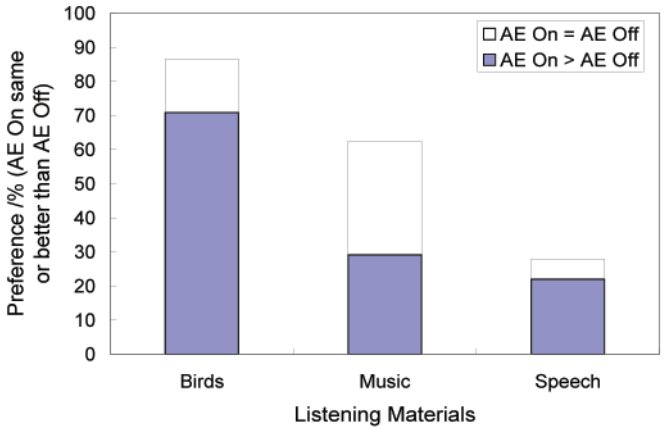

Figure 3. Preference for the [AE On] program over the [AE Off] program for three types of stimuli – birds, music, and female discourse.

course stimuli. Subjects listened to the same sound stimuli with the AE On and the AE Off and decided if the AE On is more preferred, equal to, or less preferred than the AE Off condition (subjects were blinded to the AE conditions). **Figure 3** shows that as much as 85% of the subjects found the AE On to be the same or better than the AE Off condition when bird songs were used as the stimuli. The percentage was around 65% when music was used and 30% when female discourse passages were used as the stimuli. These results showed that the preference for the AE algorithm was the strongest for simple stimuli. As the range of frequencies in the stimulus increased, the immediate subjective preference for the AE (over the no AE) decreased.

The Full Realization of the AE Benefit Needs to be Facilitated

Just because information in the "dead" region becomes audible does not mean it will be immediately usable. It is possible that with time, cortical reorganization may take place and the new information may become meaningful to the patient (Willott 1995). Consequently, we also studied the effect of the AE at different times after the initial fitting. To maximize the potential impact of the AE, we asked that subjects listen to everyday sounds with both the AE On and AE Off programs during the first two weeks of use of the Inteo. Afterwards, they were asked to just listen to the AE On program all the time in addition to undergoing a training exercise on voiceless consonant sounds identification (Kuk et al. 2007c). Expectedly, training improved the listeners' performance; with some showing more improvements than others. This suggests that some types of facilitation exercises may be necessary to fully realize the benefits of the AE program (as well as hearing aid use in general).

AE Fitting Protocol – Integrating What We Have Learned

Selecting the Right Candidate

Frequency transposition is an option that can be used for patients who are unable to benefit from traditional amplification. If a listener can be amplified using traditional approaches but one chooses transposition instead, it is very likely that the results may not be optimal. Thus, from the audiological standpoint, the ideal candidates for this technology are those with a severe to profound hearing loss in the high frequencies (greater than 70 dB HL) and no worse than a moderate-to-severe loss (less than 60–70 dB HL) in the lower frequencies. It appears that the greater disparity in hearing sensitivity between the high and the low frequencies (i.e., more sloping), the more likely the listener will benefit from the AE.

Verify Optimal Fit of the Master Program (No Transposition) in the Inteo Instrument

Even though the parameters of the AE program may be adjusted independently, its frequency characteristics are based on the Master program. Therefore, to help ensure an optimal fit of the AE program, the Master program should first be verified. Various screens in the Compass fitting software are helpful to check for audibility, such as the Frequency-Output curve and the SoundTracker. Other measures such as real-ear measurement or the clinician's own verification procedure may be completed at this time.

Audibility Check of the Default Start Frequency in the AE Program

One way to ensure audibility provided by the default start frequency is to use the SoundTracker (Kuk et al 2004). This visual demonstration can also be used to counsel the patient as to the purpose of frequency transposition. While the patient is in a quiet test room, present the /s/ sound at 30 dB HL. The /s/ sound is chosen because of its energy content above 4000 Hz. If the listener is able to detect and identify this sound, it is assumed that the other speech sounds in the English language should be audible as well.

In **Figure 4A**, the /s/ sound is presented to the AE Off (or Master) program at 30 dB HL in the sound field. The lighter coloured vertical bars denote the input to the hearing aid. The gain applied to the instrument is shown with the darker coloured bars. The height of the bars is the output of the hearing aid at the specific channel. In this example the in-situ thresholds (sensogram) is shown by the red line. A sound is audible when the bars are above the sensogram level (red line). Note that the amplified output of the /s/ was centered around 3000 Hz and is not audible to the patient in the Master program. When the AE program was activated as shown in **Figure 4B**, this peak energy was transposed to the slope of the audiogram and was audible to the patient.

Facilitate Adjustment

In order to facilitate the acceptance of the AE algorithm and the possible cortical reorganization, a three step procedure is recommended.

a. Counselling: As with any hearing aid fitting, counselling and discussing realistic expectations should be completed at the patient's hearing aid evaluation and at the time of the hearing aid fitting. The use of the SoundTracker can be used to compare audibility of high-frequency sounds with and without the AE program. Different high-frequency sounds such as birdsongs, music, or even conversational speech can be used to show what is inaudible to the patient using traditional amplification and what will be audible with transposition. It will also be beneficial to explain why the AE may sound "unnatural" at first.

b. Sound Awareness: After the fitting of the instruments, reorder the programs in the hearing aid so that the AE program will be first and the AE Off program will be second. Give the patient a list of sounds to listen for when they go home. Have them compare these sounds in each program (AE On and AE Off). This activity will give the patient practice listening for sounds that they may not have heard without amplification or were not able to hear with traditional amplification. It

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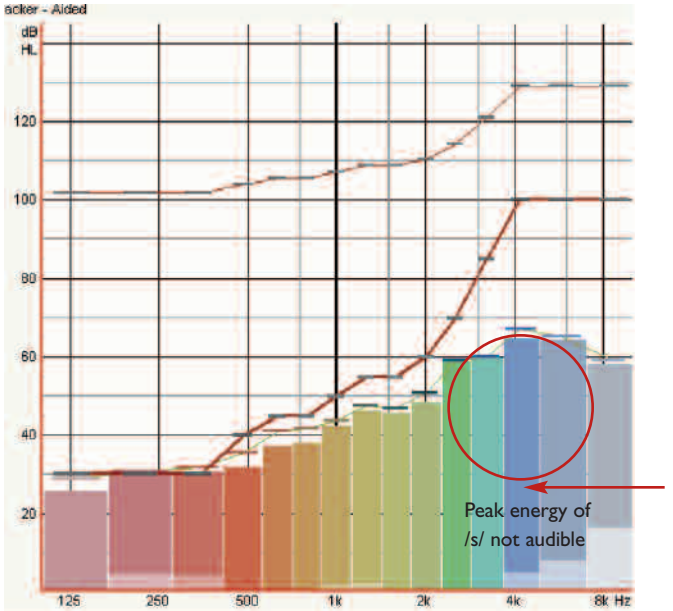

Figure 4A. SoundTracker view when /s/ is presented at 30 dB HL to Master program. Note that the peak of the /s/ is not audible.

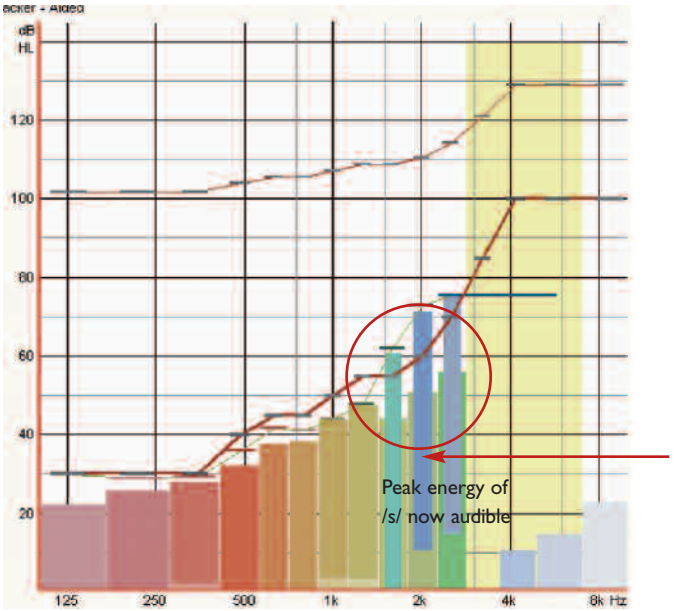

Figure 4B. SoundTracker view when /s/ is presented at 30 dB HL to AE program. Note that the peak of the /s/ is now audible.

heightens their understanding of the AE program. Encourage them to wear the AE program as often as possible. Turn on the Sound Diary (data logging) in order to monitor which program they utilize the most. This period should last about two weeks after the initial fitting.

c. Focused Listening: During the more recent studies with the AE program on those with a high frequency hearing loss, we developed a PC based home training program targeting at voiceless high-frequency consonant sounds – /p, t, k, s, f, θ, ʃ/. This program consisted of ten days of exercises where each day was focused on a particular phoneme with the remaining days a review of all sounds. This program was helpful after the "Sound Awareness" phase for individuals who are motivated to receive such training. The intent of the program was to give the patient focused listening practice for speech sounds which may have been inaudible to the patient prior to using the AE program. With repeated exposure, it is hoped that the patient will be able to make the audible information usable once again. Other commercial programs may achieve the same purpose as well.

Fine Tuning the Start Frequency If Necessary

After the patient has returned from the initial two-week trial, assess the patient's progress. If s/he indicates that s/he understands more speech even though it may still sound a little different, the default start frequency should remain and the acclimatization process should continue. Some patients may take as long as one month to acclimatize to the AE program. If the patient returns and s/he continues to struggle with the AE program, fine tuning of the start frequency may be indicated. We recommend a method for choosing the new start frequency based on the audibility of the /s/ sound, as previously described.

a. Choose a New Start Frequency: Begin testing a start frequency that is three steps higher than the default. The start frequencies available are: 630, 800, 1000, 1250, 1600, 2000, 2500, 3200, 4000, and 6000 Hz. If, for example, the default start frequency was 2000 Hz, begin the evaluation at 4000 Hz. Present the /s/ sound in a test booth at 30 dB HL in sound field. If the hearing loss is too severe for the patient to identify a /s/ sound, the /sh/ sound can be used instead.

b. Adjust AE Gain: If the patient was unable to hear the /s/, increase the AE gain until they are able to do so. Stop when they can hear and identify the /s/ sound.

c. Lower the Start Frequency: If the patient was still unable to identify the /s/ sound at the maximum AE gain (+14), move to the next lower start frequency. In the example, it would be 3200 Hz.

d. Repeat: Repeat the procedure until the patient is able to hear and identify the /s/ (or /sh/) sound at the highest start frequency and the lowest AE Gain. You may bracket around the AE gain until you get a consistent response at the lowest AE gain. Stop and use the new settings that you have determined.

Conclusions

Our clinical studies on the efficacy of the Audibility Extender (AE) so far have been promising. It is expected that others would reach similar conclusions if three important caveats are remembered. First, AE may not be appropriate for any listeners. So far, we have demonstrated its efficacy on people with a precipitously sloping hearing loss. People with other hearing loss configurations may receive less benefit from this algorithm. Caution is needed in selecting the right candidate. Secondly, the right start frequency is important in order to transpose just the right amount of sounds without distortion. Thirdly and perhaps most importantly, is the need to facilitate the patient's adjustment to the perception that results from the use of the AE. All three considerations are important before the full benefit provided by frequency transposition can be realized.

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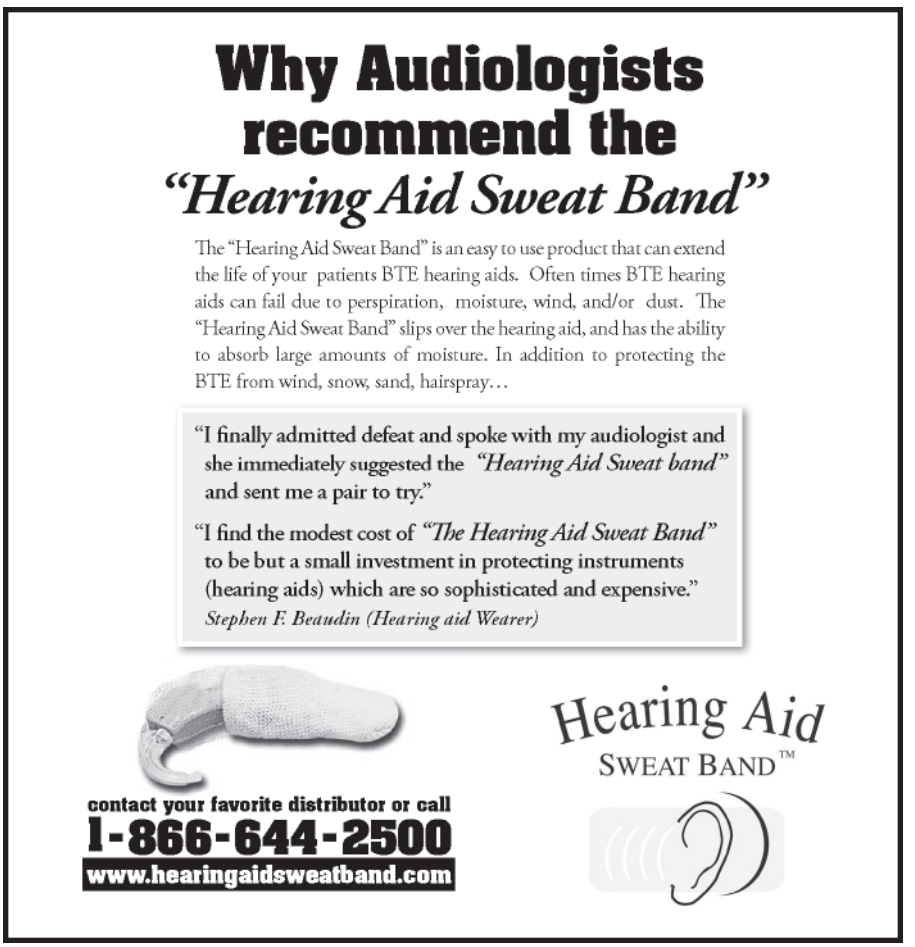
Francis Kuk, Ph.D., is director of audiology at Widex USA and director of Office of Research in Clinical Amplification (ORCA)ORCA-USA.

Denise Keenan, M.A., is a research audiologist at ORCA.



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The Au.D. Past, Present and Future: What Does It Hold For Canadian Audiologists?

By Bill Campbell, MClSc, Audiologist

The Audiology Doctorate or Au.D. degree was introduced to the profession in the United States in 1994 when Baylor University developed the first professional doctorate degree in audiology. The American Speech and Hearing Association (ASHA) has recommended that the Au.D. become the entry level degree for audiology by 2012. Currently, there are over 70 residential Au.D. programs in the United States according to ASHA, and at least two distance learning programs continue to exist today. ASHA also reports that in 2006, approximately 3,800 audiologists graduated with the Au.D. degree while all master's degree programs were closed. In addition to these changes, professional associations in the United States are changing membership requirements for audiologists. The American Academy of Audiology does not accept audiologists for membership who have earned a master's degree after 2006. ASHA has revised its standards for the Certificate of Clinical Competence for Audiologists as of January 1, 2007 to reflect the move to the Au.D. as an entry level degree.

Academic leaders are divided as to the direction that audiology education should take, but they generally agree that a change to the curriculum is needed. Universities in the United States have stated that students entering the profession need to know more than what is available through the traditional master's degree program in order to practice effectively. Audiology is recognized as a rapidly changing and evolving profession, requiring constant upgrading in order to keep pace with best practices. Specialties within the profession continually appear, as research refines our knowledge and audiologists move to narrow fields of practice such as cochlear implants, tinnitus management, balance assessment and rehabilitation, and specialized adult and pediatric practices, to name a few.

The Au.D. degree as a minimum standard is not without contention and controversy. While U.S. state legislators look to raise the minimum requirements to practice to the Au.D., public opinion questions the motives of the imposition of the doctorate degree by a "private professional association of audiologists" at a time when there is a severe shortage of practitioners and calls suggest it may be a "cash grab." Some editorials even question whether even a Master's degree is necessary to test hearing. Aside from illustrating the need for public education, this viewpoint highlights the controversy surrounding the Au.D.

In Canada, there are no universities currently offering the Au.D. degree. The Master's level degree is the minimum entry requirement to practice audiology and there are no current plans to change that from a legislative point of view. However, existing master's programs are graduating small numbers of audiologists each while there are dozens of

Au.D. graduates practicing in this country and many more currently enrolled in universities and colleges in the United States, chiefly through distance education, but some in residential programs. Canadian universities are now faced with some tough decisions. Although recognizing the need for improved education in some areas of the profession and realizing that professionals face increased pressure from other practitioners on their scope of practice and field of expertise, universities in Canada struggle politically to maintain the master's level degree in the face of suggestion that audiology practice does not require a postgraduate degree at all. Programs already find it difficult to find clinical practicums for the small number of existing students at the master's level because of a lack of mentoring resources. Finding placements in the country for doctorate level students would pose a significant challenge to administrators as it could be suggested that only audiologists with an Au.D could supervise the doctoral-level student. In addition, there are other multivariate challenges faced by universities, such as (1) the cost/benefit of creating an administrative distinction between currently coexisting speech language pathology and audiology programs, and (2), the question of where a doctoral program would fit. Currently, in Canada, medical and dental doctors graduate from an undergraduate program. In developing an Au.D. program, universities would have to consider whether it would fit as a graduate program or in the undergraduate arena. The reality that universities must also face is the fact that as the United States adopts the Au.D. degree as an entry level standard, potential Canadian students may well seek educational opportunities south of the border. This would create a significant shortage of potential students for existing Canadian master's level programs, having a further negative effect on their viability. Even now, there is a potential shortage of Ph.D. audiologists to allow for any expansion of current programs.

It is without doubt though, that the profession is undergoing transformation. In 2004, in changing the Medicaid definition of an audiologist, the United States eliminated the need for an audiologist to obtain or maintain the ASHA Certification of Clinical Competence (CCC) (1993 standards), which was required in order to practice and paved the way for state licensure of audiologists. Canadian health care regulators may well face the same challenges. Canada now has regulatory bodies in most provinces and the Canadian Alliance of Regulators was formed with membership from these bodies with the intent of evaluating and developing national standards for practice. The CAR also purports to ensure that accredited university programs meet mandatory registration requirements.Historical regulation of practitioners by self-governed association is undergoing change at the same time as regulators meet to discuss the future of professional standards. The issue of the Au.D. only serves to fuel these fires. Speaking for audiologists, both professional associations in Canada, the Canadian Academy of Audiology (CAA) and the Canadian Association of Speech Language Pathologists and Audiologists (CASLPA) have written, or are developing, position statements endorsing the Au.D. degree or its equivalent as a standard for practice.

The CAA recognizes that, in the face of the desire for increased independence of the profession and with significant changes to practice guidelines and the knowledge base of the profession, the educational model remains dramatically outdated In light of the current professional trends and taking into account the viewpoint of Canadian audiologists, the CAA recommends that the Au.D. or equivalent degree be established as the minimal entry level degree for the practice of audiology. The academy recognizes the challenges that this will create for regulating bodies, for those in the academic arena and for clinicians across the country and endeavours to consult with institutes of learning and with other professional associations to work towards a doctoral degree as the entry level to practice audiology. It is recognized that this will not be accomplished without challenges and the CAA, an association created by audiologist to act on behalf of audiologists in Canada, intends to facilitate the changes necessary to allow the doctoral degree standard to replace the current minimal standard of practice.

To create a change in the entry level requirements of audiology also raises the possibility of creating a two tiered system of service quality. The CAA does not support the "grandfathering" or granting of title to audiologists who are currently practicing with a master's degree and who do not elect to complete and Au.D. While contentious, there is good reason for this. The Au.D. degree purports to offer a different level of education, with a broader base of knowledge. It would be unfair to those who have earned the Au.D. to have the degree automatically conferred upon those who have not. However, it is not in the interest of the profession to create different levels within itself. There is already public confusion as to what is an audiologist in comparison to other hearing health care professionals and the creation of another apparent level of service would be damaging to the profession as a whole. While endorsing the Au.D. as the entry level standard, the CAA also is strongly committed to a level playing field within the profession. There are ways to allow those with a master's level degree to earn a doctoral degree by allowing credits for experience and education earned since graduation, in combination with further educational opportunities. This would be similar to the recommended "earned equivalents" proposed in the United States.

In addition to the threat of a two tier profession, there is the concern over the use of the Au.D. as a marketing tool, to perceptively

raise some professionals above others to gain competitive advantage. Several Au.D. graduates and students cite the marketing aspect of the degree as a primary reason for entering the program. There are those professionals in private practice who have elected to obtain their Au.D. degree solely out of fear that they will be forced out of the market, or in the hope that it will gain them a competitive edge. In addition, there are many professionals who see the Au.D. as a means to increase public awareness as to the level of expertise that audiologists possess in comparison to hearing health care practitioners with a college degree. They feel that the broad scope of practice of the doctoral level Au.D. should be recognizable and distinct. The effect of such practices and viewpoints on the profession is yet to be seen; however, all variables are sure result in changes from a legislative and practice point of view.

Although there are differences in approach, both professional associations, reflective of their member's viewpoints, endorse change in the training regimen and the entry level qualifications for audiologists. A change of such magnitude is not an easy one. There are issues to address and obstacles to overcome that will affect the entire profession, from regulatory bodies to the professionals themselves, as well as the public seeking hearing health care. This can only happen with cooperation between agencies, regulatory bodies and professionals. It can only happen if audiologists have a strong voice in the process.

There are many audiologists in Canada who either hold the Au.D. degree, or are currently enrolled in studies toward that end. These are practitioners who are dedicated to their profession and who can see the advantages of a broader education to both their practice and their clients. As the Au.D. degree in Canada seems to be inevitable in some form, these practitioners are quite likely to set the stage for others Currently, Au.D. practitioners and those enrolled in studies are chiefly from the private sector. There seem to be a very few from public or academic settings. It is likely that many in public practice are already in a setting where educational opportunities are readily provided by the employer. As well, those in the public sector may not face the market pressure to seek an updated degree. So, why are Canadian audiologists seeking an Au.D. degree if it is not yet a required standard? There is additional time and significant expense involved, so entering such studies is not taken lightly. Is it a desire merely for more knowledge, the need to be able to deliver a better service to the client?Perhaps a clinician's job is becoming so specialized that they feel the need to upgrade in one area, or is it the pressures of the marketplace? Audiologists report that it is a combination of these and other factors.

Carri Johnson of Near North Hearing Services in North Bay, Ontario, is in her first year of study in a distance education program at the Pennsylvania College of Optometry. Carri entered the program with the intention of furthering her knowledge in specific areas beyond what her master's degree had provided, particularly in auditory processing and tinnitus research. She notes that while a few courses were redundant, as she had expected (such as business courses when she has already established a practice), but finds that the majority of coursework is providing a level of education far beyond her previous experience. Carri is among those audiologists who feel that the Au.D. degree is an appropriate entry level standard for Canada to adopt. While recognizing the need for a transitional period, she feels that if audiologists are to be taken seriously as health professionals, the doctoral level degree is essential. Carri also notes that while she does not see the need for a competitive edge in her community, there would appear to be a marketing advantage in having the Au.D. degree in larger centers.

Betty DeKraker is an audiologist practicing at Expert Hearing Solutions in Thunder Bay, Ontario. She will be beginning a distance education program at Arizona State University in the fall of 2007. Betty states that the decision to pursue an Au.D. degree was largely a marketing decision. She feels that the degree lends credibility to the profession and that she expects to be able to improve her clinical skills while also giving her a competitive edge. Betty hopes to gain knowledge particularly in the areas of pharmacology and in tinnitus assessment and

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management; areas where she feels her master's degree was lacking. Raising an interesting point, Betty fears that the adoption of the Au.D. degree may have a negative impact on the profession, as there are potential audiology students who may elect to pursue careers in other areas, such as otolaryngology, if the Au.D. degree requires a similar investment of time and finances as other more prestigious and financially rewarding areas of medical practice. While she feels a need to reserve judgment on the need for the Au.D. in Canada until she has been in the program for a while, Betty does express concern for the profession if it does not distinguish itself from other areas in the field, such as hearing instrument practitioners and dispensers. Betty feels there is the need for a Canadian distance education program for the Au.D. degree and worries that students will seek education in the United States if the degree is not offered here, thereby reducing programs available in Canada. And, while she is not sure yet that it will make a significant difference in her clinical activities, she is sure that the Au.D. will act as an effective marketing tool in a competitive private practice environment.

Rodney Taylor, an Au.D. graduate from the Pennsylvania College of Optometry, practices at the Advanced Hearing Aid Clinic in Ottawa, Ontario. Rodney extols the benefits of the doctoral distance education program, noting that this type of program allows the student to receive instruction from a diverse pool of academic and clinical leaders in the profession. This diversity is not possible in residential programs, as institutions cannot draw from as many areas as with a distance program. Rodney expresses a strong opinion that the distance program offers the best opportunities, especially for current audiologists who cannot take the time away from practice to attend residential programs. He notes that his program allowed him to study various aspects of practice from formidable leaders in those areas. While he notes that the Au.D. is a strong marketing tool and feels that his practice has benefited since he obtained the degree, he also notes that the education has affected every aspect of his clinical practice. His clinic is able to offer a

wide range of services that fall within the scope of practice of audiology, including in-depth vestibular assessment and rehabilitation, and tinnitus management, which would have been difficult to offer without the knowledge provided through the doctoral degree. When addressing the issue of a national standard, Rodney feels that the Au.D. degree is an appropriate entry level degree for audiology. And although he

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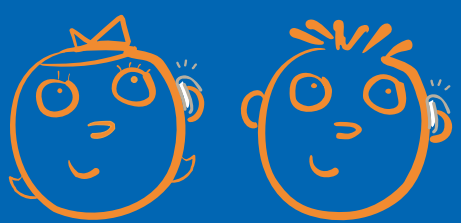

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believes that audiology can exist with two distinct levels of practitioner, it would be detrimental from the perspective of public perception. He feels that audiology needs to present itself as one profession, distinct and on the same level as other medical professionals using the title of "doctor." On the topic of current programs, Rodney feels that Canadian universities will have to meet the challenge of offering the Au.D. degree. He feels that current programs are lacking in

providing much more than basic training, particularly in the areas of tinnitus and balance. This results in professionals acting as little more than technicians in ENT offices, when their scope of practice and potential for public benefit could be so much greater. Rodney acts as a clinical supervisor for students from many universities and is disappointed by the lack of movement and direction from current programs. He hopes that time and strong voices will change the academic viewpoint in Canada.

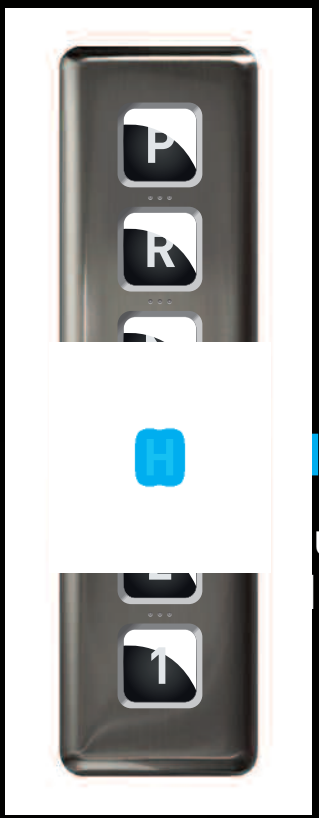
Marlene Bagatto is one of the few Au.D. audiologists working in a sector other than private practice. Marlene is a research audiologist employed at the National Center for Audiology at the University of Western Ontario and received her Au.D. through the Central Michigan University/Vanderbilt Distance Education program. She feels the experience was especially beneficial to her having worked in the field for 4 to 5 years prior to beginning the program. She, like Rodney, notes that the distance program allowed her to receive a tailored program delivered by professionals from combined institutions and academic leaders. Marlene's experience with the program was good overall and she reports that certain areas, particularly microbiology and pharmacology were far more in-depth than the education received in her master's program. Courses relating to the business of audiology were beneficial in areas such as management, budget development, and human resources. Marlene found this to be applicable to her situation in the public sector and believes it would be even more beneficial to audiologists in private practice. Overall, Marlene was interested in the Au.D. program for the

additional education that it provided. The Au.D. designation itself was an additional benefit, but she did not consider it important to her current employment situation. Marlene has not ruled out the pursuit of a Ph.D., agreeing that the profession is desperately short of researchers and professors. This is one of her fears for the possible inception of Au.D. programs in Canada; the very real possibility that students will opt for the Au.D. rather than pursuing a Ph.D. and working in an academic setting. Being in a university setting herself, Marlene adds a unique perspective to the issue. She sees the need for improved education, to reflect the changes in the profession. Changes to the audiology curriculum across all universities in the country seem to be inevitable as programs progress and react to outside pressures. This may, in turn, lead to the inception of Au.D. programs in Canada by default. Through working with students, Marlene sees some of the changing opinion. Students are concerned about the changes in the entry level standards and are apprehensive about current programs and the degree that they will eventually attain. This pressure is likely to increase as the deadline in the United States approaches, and may affect student enrolment in Canadian universities. Students are facing real competition for jobs from students who hold an Au.D. and this is of concern to current and potential audiology students.

There is no doubt that the profession of audiology in Canada will have to react to the changes seen in the United States. From where those changes will stem remains to be seen. Universities would react quickly should regulatory bodies dictate that a doctoral degree is the entry level standard for the profession in Canada. On the other hand, regulatory bodies could react to pressures from university programs, employers and audiologists. It would be wise to avoid a situation that sees the decline of programs in Canada, with audiologists receiving their education solely from U.S. programs. Although a doctoral degree may better prepare a new graduate for practice, U.S.-prepared students would not be familiar with health care and business practices in Canada. This could have a negative impact on both graduates and on the delivery of hearing health care in this country. It is important for audiologists to have a voice in this critical decision, as it affects the future of all of us. All audiologists in Canada currently practicing with a Master's level degree have a vested interest in this issue. The Au.D. is not going to "go away." It is going to affect the way that we all practice in ways that most of us have not yet considered. The Canadian Academy of Audiology is committed to working with regulators and educators to ensure that the professional opinions of audiologists are key in shaping the future of the profession. The Au.D. is going to continue affecting all audiologists in Canada and you, as a professional, need to have your own voice heard.

Resources

1. Sacremento Bee, Editorial,
2. `California Speech Language Pathology and Audiology Board, Licensing and Education Practice Committee Meeting Minutes, Jan. 26, 2007.
3. Academy of Doctors of Audiology website: ADA Accomplishments, http://www.audiologist.org/about/accomplishments.cfm
4. Hearing Loss Association of America, Position statement on the Au.D.
5. Canadian Alliance of Regulators of Audiology and Speech-Language Pathology Mission Statement, March 2006.



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