Canadian Hearing Report Revue canadienne d'audition



2016 CHR PRODUCT REVIEW

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The days are getting longer. We're over half way through winter now and compared to last year, it's been relatively kind to us. Then again, it's not over until it's over, right?

Here in Victoria the weather is...well, we won't bring up the obvious and to that end, I'll say no more[®] Welcome to the 1st issue of 2016! As with *CHR* tradition, our 1st issue of the year is always a product-focussed issue with fewer than the normal amount of articles. We have two for you however, and they are as different from each other as night and day. Here goes:

As clinicians and private practitioners, we are always looking for new and novel ways whereby to get clients to cross our doorsteps. Sometimes the approach is getting family practice physicians interested in our cause, thus gaining referrals from them. Another approach is highlighting the research linking hearing loss in the elderly to early onset of Dementia. The ads today seem flooded with this latest focus. Then again, websites from many franchises offer self-assessment of one's own hearing sensitivity, by means of informal screening tests done with one's computer speakers. The unity behind most of today's efforts whereby to garner better business is: public, consumerfocused education of hearing, hearing loss, and hearing aids.

Yet another example of this kind of focus is one where consumers can use the internet to locate and access hearing health care centres nearest to where they live. Once on such a site, they can see pictures of the clinicians, the offices, the services and the products, ranging from hearing aids to other available assistive listening devices. A rapidly growing and increasingly popular such instance would be "Hearing Tracker." If you're not familiar with this one, Google it up and "Czech" it out.

We begin with an interview with Abram Bailey, the founder of Hearing Tracker. He's led an interesting path through the field of Audiology, having moved to New Zealand where he practiced for a few years before returning back to the US. Let's let him tell his story though. I think you will find it interesting. Hopefully many more of you will use Hearing Tracker as a tool whereby to make yourselves even better known to potential clients.

Monty Python once said, "And now for something completely different." The title "How Well Can Centenarians Hear?" immediately caught my eye. The article concerns hearing in those who have past the ripe age of 100 years. It lately seems this population is growing by leaps and bounds. We increasingly hear on television the news of people who have passed the age of 110! In our field of hearing health care it is quite common to address Presbycusis, and we know that increasingly large and growing population to consist of those 65 years and older in age. Well now let's just add another 35 years to that, and take another look! To the best of my knowledge, I am not aware of any previous study that specifically examined hearing in the 100+ year old population.

The article addresses not only pure-tone hearing threshold results, but it also looks at results from non-behavioural procedures such as tympanometry and oto-acoustic emissions (OAEs). Oddly enough, the section discussing Distortion Product Oto-Acoustic Emissions is titled "Transient Evoked Oto-Acoustic Emissions." As anyone who is clinically aware of OAEs will know that these are two completely different procedures. While that remains a small mystery, the content is still quite interesting. As clinicians, among our senior citizen clients, we sometimes see very elderly clients. This study is really about them. It offers a concise - yet detailed - report on their audiometric characteristics.

It's been my pleasure and privilege to edit *CHR* over the past year and a half. May the weather hold steady and the seas remain calm (and may spring come quickly to TROC (the rest of Canada).

Ted Venema, PhD, Editor-in-Chief

Canadian Hearing Report Contents

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DEPARTMENTS

3 Message from the Editor-in-Chief

FEATURES

- 5 Hearing Tracker: An Interview With Abram Bailey INTERVIEWED BY TED VENEMA, PHD, EDITOR-IN-CHIEF
- 8 How Well Can Centenarians Hear BY ZHONGPING MAO, LIJUN ZHAO1, LICHUN PU, MINGXIAO WANG, QIAN ZHANG, DAVID Z. Z. HE

PRODUCT REVIEW 2016

- 8 Assistive Devices
- 20 ALDS
- 25 All Star Sales
- 25 Bernafon
- 25 ClearSounds
- 25 DiaTec
- 30 GN ReSound
- 3 Oticon
- 32 Phonak
- 35 Sound Listening Environments Inc. 56 Widex
- 35 Unitron
- 35 Widex

37 **Batteries and Earmolds**

- 39 All Star Sales
- 39 Bernafon
- 40 DiaTec
- 40 Emsee
- 42 Oticon
- 42 Phonak
- 43 Siemens
- 44 Widex

45 Hearing Instruments

- 47 Bernafon
- 47 GN ReSound
- 48 Oticon
- 49 Phonak
- 50 Siemens
- 54 Sonic Innovations
- 55 Starkey
- 55 Unitron

58 Testing, Outfitting and Misc.

- 60 All Star Sales
- 60 Blueprint Solutions
- 60 DiaTec
- 64 Ear Gear
- 65 EMI
- 67 Phonak
- 68 Siemens
- 68 Starkey
- 69 Sycle
- 69 Widex

Corporate Profiles

70 Starkey



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Hearing Tracker: An Interview With Abram Bailey

Interviewed by Ted Venema, PhD, Editor-in-Chief



Dr. Bailey is a leading expert on consumer technology in the audiology industry. He is a staunch advocate for patient-centered hearing care and audiological best practices, and welcomes any technological innovation that improves access to quality hearing outcomes. Dr. Bailey holds an AuD from Vanderbilt University Medical Center.

Abram, I've recently been hearing bits and pieces about Hearing Tracker. Having looked it up on the Internet, I find you to be at their vortex central. Caughtcha! Now tell me all about it. What is Hearing Tracker, and how, when did it all get started? Our website, HearingTracker.com, hosts an online directory of over 20,000 hearing health providers throughout the United States – the largest directory of its kind – and provides intuitive tools for locating providers based on their location, services, qualifications, and even which hearing aid brands they work with. We also host a large collection of hearing aid reviews, but we strongly urge consumers to defer to the advice of their hearing health care professional when selecting a device.

One important side note: Our company is completely independent; we are free from any of the manufacturer biases that affect competing directories.



CLINIC FINDER



BLOG RESOURCES ABOUT FAO

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The future of hearing care

Hearing Tracker was founded by a Doctor of Audiology to help consumers find better hearing aids and better hearing aid providers. Hearing aids and hearing aid providers are rated by real patients. This helps ensure more meaningful information for consumers and providers. We're sure we have the best platform available, and we hope you enjoy using it as much as we do.



Hearing Tracker looks like a consumer-clinician meeting place. Tell us a bit more about how clinicians in private practice can get their names etc., listed on Hearing Tracker. What things should they be sure to include?

When we started HearingTracker. com 2 years ago, our website had zero consumer traffic. Since then the traffic has ballooned to over 30,000 monthly visits, with the vast majority of visitors coming from North America. Our approach to connecting consumers with providers has proven extremely successful, with many US-based providers responding positively to having a new organic source of patient leads.

Claiming a listing on Hearing Tracker is free and takes less than five minutes. Just visit HearingTracker.com and click on the "List Your Clinic" link on the upper-right hand corner. At minimum, be sure to include your services, hearing aid brands, a profile photo, and a practice location. We've also found that including a descriptive bio (*tell your* *story*) greatly increases your chances of generating interest among Hearing Tracker users.

I see on your website: "Hearing Tracker is the leading online review system for hearing aids and providers. We believe that information is empowerment." I couldn't agree more with that last sentence. In fact, I used to tell my students, if you want to launder the word "sell," just say "teach." In my opinion, good explanations are the foundation of good business. So, what got you going in this directions? I mean, who lit the fire in your belly about that, and how did it all get started?

When I was practicing clinical audiology in New Zealand, I was astounded by the number of patients who came into my office with completely inappropriate (or poorly fitting) hearing aids. By following a simple set of best practices, I was able to improve the hearing outcomes for many of these patients, which often had a positive impact on their overall quality of life. When I returned to the US, I realized clinical standards weren't a great deal better here. I personally selected a doctor of audiology to treat my grandfather in Lafayette (Louisiana), using the American Academy of Audiology's own provider directory. The provider performed a simple diagnostic exam, without the use of a sound-treated booth, did not perform Real Ear Measures, and failed to set goals or do any type of subjective income or outcome measurements. At that moment, it became a personal mission to help people like my grandfather find reliable hearing care.

How did you end up in New Zealand? Tell us a bit about that, and then why did you decide to return back to the US?

As an amateur landscape photographer, I was very interested in New Zealand. The scenery is out-of-this-world, and the Maori culture has always intrigued me. An opportunity came up for a paid clinical externship in the final year of my AuD program, and I jumped on it. I met my wife after my first year in New Zealand, and ended up staying for another four years.

I was worried that my wife wouldn't like the US, seeing that there are so many cultural differences, but after a trip to Austin and New Orleans, she was up for the the adventure of moving here. My grandfather, who has since passed, was ill at the time, and I wanted to return to the US to be closer to him. I also wanted to be closer to my parents and sister, who live in Houston. Helen and I welcomed our first child, Alice, earlier this year. Helen was not impressed with our health care system (or parental leave policies)!

I can see you are a real consumerfocused group. Sergei Kochkin has long said one of the main barriers to hearing aid usage is cost-finances. What do you make of that?

There are a number of barriers to hearing aid adoption, including the looming threat of ageism, but cost is always cited as a significant concern. Some look to penetration rates in the UK and Australia, where hearing aids can be obtained at no cost, as proof that cost is not the primary barrier to hearing aid usage. I'm not sure who is right.

How do you think Personal Sound Amplification Products (also known as PSAPs) and over-the-counter hearing aids will affect the demand for traditionally fitted hearing aids?

I do believe that PSAPs have created a new parallel market for low-budget shoppers, which should act as a funnel for generating new hearing aid candidates. Of course, we need to get our act together and improve our standard of care if we're going to impress those upgrading from PSAPs to hearing aids. If we just hit the "first-fit" button in the hearing aid manufacturer's software, we might not deliver the added value that consumers will expect (given the difference in cost).

You have a lot of interesting information on the Blog section of your website. One issue you tackle is that of assistive listening devices. What do you make of the recent renaissance in North America of loop systems for churches and other public places?

I'm really happy about the renaissance, but I'm also thinking it might be too little too late. I expect hearing aids to comply with rigorous wireless streaming protocols sometime in the near future. As wireless radios become smaller and smaller, and less power hungry, there will be a movement toward favouring this mode of sound delivery over the antiquated T-Coil technology, which is highly susceptible to interference.

I looked under your menu item "Resources." One item listed is called "Communication Needs Assessment Tool." Tell us a bit about that.

The Communication Needs Assessment Tool was developed by Cynthia Compton-Conley, PhD in order to help consumers develop a "listening-needs profile," which covers face-to-face, media, telecommunications, and alerting needs. Dr. Compton-Conley is a frequent contributor to Hearing Tracker, and helped to spearhead the partnership between Hearing Tracker and the Hearing Loss Association of America. The tool is available to consumers online at *soundstrategy.com*.

How the heck did you manage to get all this material together? I mean, is this a full time occupation for you?

Ted, this truly has been a labour of love for me. Hearing Tracker was born afterwork and on weekends during a very busy time for me, and gradually became my full-time job. I am a collaborator on a number of other businesses, but Hearing Tracker will always be my primary focus.

How has this venture been going? Where do you see it going into the future?

Between advertising revenue and premium subscriptions, we have managed to turn Hearing Tracker into a profitable business. It will never be the next Google or Facebook, but the goal was never to make a lot of money. If we can solidify Hearing Tracker's role as the #1 online resource for consumers seeking audiological care, and help improve hearing aid outcomes across the board, I will feel positive about the project's success.

How Well Can Centenarians Hear?

By Zhongping Mao^{1*}, Lijun Zhao¹, Lichun Pu¹, Mingxiao Wang¹, Qian Zhang², David Z. Z. He^{2,3*}

ABSTRACT

With advancements in modern medicine and significant improvements in life conditions in the past four decades, the elderly population is rapidly expanding. There is a growing number of those aged 100 years and older. While many changes in the human body occur with physiological aging, as many as 35% to 50% of the population aged 65 to 75 years have presbycusis. Presbycusis is a progressive sensorineural hearing loss that occurs as people get older. There are many studies of the prevalence of age-related hearing loss in the United States, Europe, and Asia. However, no audiological assessment of the population aged 100 years and older has been done. Therefore, it is not clear how well centenarians can hear. We measured middle ear impedance, pure-tone behavioral thresholds, and distortion-product otoacoustic emission from 74 centenarians living in the city of Shaoxing, China, to evaluate their middle and inner ear functions. We show that most centenarian listeners had an "As" type tympanogram, suggesting reduced static compliance of the tympanic membrane. Hearing threshold tests using pure-tone audiometry show that all centenarian subjects had varying degrees of hearing loss. More than 90% suffered from moderate to severe (41 to 80 dB) hearing loss below 2,000 Hz, and profound (.81 dB) hearing loss at 4,000 and 8,000 Hz. Otoacoustic emission, which is generated by the active process of cochlear outer hair cells, was undetectable in the majority of listeners. Our study shows the extent and severity of hearing loss in the centenarian population and represents the first audiological assessment of their middle and inner ear functions.

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INTRODUCTION

While many changes in the human body occur with physiological aging, agerelated hearing loss ranks among the top three chronic conditions affecting adults over 65 years of age, according to the National Center for Health Statistics [1]. It has been reported that hearing loss affects approximately one-third of adults 61 to 70 years of age and more than 80% of those older than 85 years [1]. Age-related hearing loss, or presbycusis, refers to the physiological age-related changes of the peripheral and central auditory system that lead to hearing impairment and difficulty understanding spoken language. Presbycusis is characterized by decreased hearing sensitivity, reduced speech recognition in a noisy environment, and decreased central processing of acoustic information [2]. The early sign is a loss of hearing sensitivity primarily at high frequencies. Over time, the hearing threshold elevation progresses to lower frequencies. Presbycusis is bilateral, symmetrical, and often sensorineural in origin [2]. Hearing impairment hinders the exchange of information, thus significantly impacting daily life. Loss of hearing in the elderly can also contribute to social isolation and loss of autonomy, and is associated with anxiety, depression, and cognitive decline [2,3]. There is no known single cause for age-related hearing loss. Most commonly, it is caused by loss of mechanosensitive hair cells in the inner ear as one grows older. However, genetic deficits and repeated exposure to loud noises may play a major role [4]. Smoking and certain medical conditions and medications can aggravate presbycusis [5-7]. With advancements in modern medicine

and significant improvement of living conditions in the past four decades, the elderly population is rapidly expanding. There are a growing number of populations aged 100 years and older. Although there are many studies documenting the prevalence and degree of hearing loss with advanced age in the United States, Europe, and Asia [8-22], auditory function in the population aged 100 years and older has never been evaluated. Therefore, it is not clear how well centenarian listeners can hear. We measured middle ear impedance, hearing threshold, and distortion-product otoacoustic emission (DPOAE) from

74 centenarians living in the city of Shaoxing, China, to evaluate their middle and inner ear functions. This study represents the first audiological assessment of the middle and inner ear functions of the centenarian population.

MATERIALS AND METHODS

PARTICIPANTS

A total of 74 subjects born before 1911 participated in this study. Hearing tests were part of the physical examinations (i n c l u d i n g electrocardiogram and laboratory tests of blood and liver function) and mental health evaluation for the centenarians. Their ages varied between

100 and 106 years, with a mean age of 102 years. A questionnaire about ear- and hearing-related medical history, noise exposure (during leisure and work), and selfperceived hearing function was administered as an interview. All participants were farmers with no history of leisure- and/or workrelated high intensity noise exposure. Ouestionnaire data on socioeconomic status, medical history, lifestyle factors, and medication use were obtained as part of the examination. Subjects with a family history of hearing loss and/ or a history of ototoxic drug usage were excluded from the study. After excluding subjects with apparent



Figure 1. Lifestyle factors and health condition of the centenarian participants. A: Percentage of centenarian subjects who had some of the risk factors for age-related hearing loss. Smoking was defined as consumption of at least half a pack of cigarettes a day for more than a year within the past 10 years. Drinking was defined as consumption of more than 50 ml wine or alcohol on the daily basis for more than a year within the past 10 years. COPD: Chronic obstructive airways disease (diagnosed by a physician). B: Distribution of centenarian subjects (presented as percentage) with different blood pressure and glucose levels. Glucose level presented was based on blood collected 2 to 3 hours after meal. The numbers indicated inside the plots are the percentage.

middle ear diseases after otoscopic examination, 68 subjects (21 male and 47 female) were included in the report. The mean age of this group was 102 years. Figure 1 summarizes their lifestyle factors and medical conditions that are known risk factors for aggravating age-related hearing loss. For comparison, we also recruited normal subjects aged between 20 and 25 years and 60 and 65 years. Twenty subjects (equal number of males and females) for each of these two age groups were examined in the same condition as centenarian listeners. The same questionnaire that was used for centenarian subjects was used to obtain medical history and noise exposure history from the younger subjects before hearing tests. Subjects with a family history of hearing loss, history of otologic diseases, and treatment with ototoxic drugs were excluded. Written informed consent was obtained from all participants or their guardians. The procedures described in the present study have been approved by the Institutional Review Board of the Shaoxing Second Hospital.

HEARING TEST PROCEDURES

Pure-tone air-conduction thresholds were obtained in both ears of participants at the frequencies of 250, 500, 1,000, 2,000, 4,000, and 8,000 Hz using a diagnostic audiometer (MADSEN Midimate 622). Bone-conduction thresholds were also obtained at the frequencies of 500, 1,000, 2,000, and 4,000 Hz. No masking was used during test. The audiometer was calibrated in accordance with international (ISO) standards. Testing was completed in a room that met standard requirements. To measure evoked DPOAEs, a MADSEN Capella Cochlear Emissions Analyzer was used. Test frequencies were 500, 1,000, 2,000, 4,000, 6,000, and 8,000 Hz with an f2/f1 ratio of 1.2. The level of f1 was set at 70 dB (maximum output), while the level of f2 was set at 65 dB. DPOAE response was regarded as detectable if the "cubic" distortion tone (DP1) and the "quadratic" distortion tone (DP2) were 6 dB above noise floor. For the assessment of middle ear function. tympanometry was used with a 226 Hz probe tone. An otoscopic examination was performed before all the tests to ensure that the ear canal was clear and that there were no obvious signs of middle ear infection or perforation in the tympanic membrane.

STATISTICAL ANALYSES

Middle ear impedance, pure tone thresholds, and DPOAEs were obtained from both ears of each participant. When a participant was unable to hear a tone, 5 dB above the highest audiometer output level was recorded as the threshold. Data were presented as mean and standard deviation (SD) and evaluated with student's t-tests. Statistical significance was assigned to P values of less than 0.01. A p value larger than 0.5 was considered as statistically insignificant. Data presented in this study reflected a sample size of 136, 40, and 40 ears for the centenarian group and the two groups aged 60-65 and 20–25, respectively.

RESULTS

I. MIDDLE EAR FUNCTION

We used tympanometry to evaluate middle ear function of the centenarian subjects. Tympanometry examines the relationship of air pressure in the external ear canal to impedance of

the tympanic membrane and middle ear system. For comparison, middle ear function was also examined from subjects in the age groups of 20-25 and 60-65. The majority of the subjects in the 20- to 25-yearold and 60- to 65-year-old age groups had an "A" type of tympanogram, with compliance peaked near zero decaPascals (Fig. 2A, B). In contrast, most centenarian subjects exhibited an "As" type, with significantly reduced peak compliance (Fig. 2C). We examined the ratio of various types of tympanograms in different age groups and present it in Figure 3A. As shown, only 30% of ears from the centenarian group had the normal "A" type, while the "As" type accounted for .60% of the centenarian subjects tested. This is in contrast to more than 80% of ears with "A" type in the group aged 20-25 years and approximately 50% in the group aged 60-65 years. Figure 3B presents the mean and SD values of peak compliance obtained from tympanometry. It is apparent that the peak compliance of centenarian subjects was significantly reduced when compared to those of the younger age groups (p,0.01). The peak compliance between 20-25 and 60–65 year old groups was not statistical different (p =0.68). Figure 3C shows the mean value of middle ear pressure of the subjects from the three age groups. The middle ear pressure of the centenarian subjects was significantly more negative than the younger subjects (p,0.01). However, the pressure between the two younger age groups was not significantly different (p = 0.51).

2. PURE-TONE BEHAVIORAL THRESHOLDS

To determine how well centenarians

can hear, we measured airconduction behavioral thresholds using pure-tone audiometry. For comparison, hearing thresholds of subjects from the two younger groups were also measured. Figure 4 shows the mean and SD values of thresholds of the right and left ears from subjects from the three groups. The mean thresholds of 20- to 25-year-old subjects were all within the normal range (less than 20 dB HL) for the frequency range tested (between 250 and 8,000 Hz). While the mean thresholds of 60- to 65-yearold subjects were within the normal range at low and mid frequencies, their mean thresholds at 4,000 and 8,000 Hz were elevated to 30 and 40 dB HL, respectively. The mean thresholds of centenarian subjects were significantly elevated across all frequencies, with mid and high frequency (4,000 and 8,000 Hz) thresholds exceeding 95 dB HL. Comparison between the audiograms of left and right ears indicated that hearing loss of the centenarian subjects was bilateral and symmetric. We also measured bone-conduction thresholds at the frequencies of 500, 1,000, 2,000 and 4,000 Hz from the centenarian group. As shown in Figure 4, the bone-conduction thresholds were also significantly elevated. However, there was an appropriately 10 to 20 dB difference between the air- and boneconduction thresholds, with air-conduction thresholds being significantly worse.

To determine the distribution of different degrees of hearing loss at different frequencies in the elderly population, we graded hearing loss based on the World Health Organization (WHO) criterion [23]. Hearing loss was ranked as mild (26– 40 dB HL), moderate (41–60 dB HL), severe (61–80 dB HL), and profound (\$81 dB HL). Figure 5A presents the distribution of ears (as percentage) that had different degrees of hearing loss at various frequencies for centenarians and those aged 60–65 years. As shown, most centenarian subjects had moderate to severe hearing loss at low frequencies. The number of ears that had profound hearing loss

increased as frequency increased. At 8,000 Hz, 95% of the centenarian subjects suffered from profound hearing loss. As for the subjects in the 60- to 65-year-old group, the number of ears that had mild to moderate hearing loss also increased at high frequencies. However, only a fraction of subjects in this age group had severe to profound hearing loss (Fig. 5A). The WHO standards use audiometric threshold values to grade hearing impairment (ranked as mild, moderate, severe, and profound) based on the averages of hearing threshold values at 500, 1,000, 2,000, and 4,000 Hz. Figure 5B presents the percentage of different grades of hearing loss of centenarian subjects, as well as subjects from the 60- to 65-yearold group. As shown, more than 95% of

centenarian subjects had severe to profound hearing loss. This is in contrast to 75% of the subjects from the 60- to 65-year old group who showed no sign of hearing loss. 25% of the subjects from the 60- to 65 year old group showed mild to moderate hearing loss. We also analyzed hearing thresholds of male and female subjects in the centenarian group. Figure 6 presents threshold comparison between



Figure 2. Representative tympanogram obtained from subjects from three different age groups. A: 20–25 years old. B: 60–65 years old. C: \$100 years old. doi:10.1371/journal.pone.0065565.g002



Figure 3. Parameters obtained from tympanometry. A: Ratio (presented in percentage) of 5 different types (A, As, Ad, B, C) of tympanogram at different age groups. B: Peak compliance (mean 6 SD) for the three groups are: 0.3160.30 (\$100 years old), 0.5860.44 (60–65 years old), and 0.6760.41 (20–25 years old) mmho, respectively. Peak compliance of the centenarian group is significantly less than the other two groups. C: Middle ear pressure (mean 6 SD) for the three groups are: 233.2654 (\$100 years old), 28.2624 (60–65 years old), and 25.5615 (20–25 years old) daPa, respectively. doi:10.1371/journal.pone.0065565.g003



Figure 4. Mean and SD values of pure-tone behavioral thresholds of left and right ears obtained from listeners from different age groups. Bone-conduction thresholds of centenarian subjects are also included. Sixty-eight subjects were included in the centenarians' group, while 20 subjects each participated in the 20- to 25-year-old and 60- to 65-year-old groups. doi:10.1371/journal. pone.0065565.g004

male and female subjects at different frequencies. Student's t-test showed that the mean thresholds of male and female subjects at each frequencies were not statistically significant (p.0.5).

3. TRANSIENT EVOKED DISTORTION PRODUCT OTOACOUSTIC EMISSION

A routine non-invasive technique used to evaluate hearing is the otoacoustic emissions test [24-27]. We measured DPOAEs from centenarian listeners and two other age groups with test frequencies varying from 500 to 8,000 Hz. Figure 7 shows some examples of DPOAE responses obtained from subjects from different age groups. As shown in the left panels of Figure 7A and B, subjects from younger age groups had robust DPOAEs in response to test tones near 6,000 Hz. DPOAEs are reflected by the presence of DP1 and DP2 in the spectrum analysis. In subjects presented in Figure 7A and B, DPOAEs were present in all frequencies tested (two panels on the right). However, when the same test tones (near 6,000 Hz) were presented to the centenarian subjects, neither DP1 nor DP2 were detected (left panel of Fig. 7C) in majority of the subjects. As shown in the right panel, DPOAEs were not observed in any of the frequencies tested. To determine how many ears had positive DPOAE responses at different frequencies, Figure 8 exhibits the percentage of ears that had detectable DPOAEs in different age groups. It is apparent that while all subjects from the 20- to 25-year-old group and the majority of participants in the 60- to 65-year-old group had positive DPAOEs at all test frequencies, only a small fraction of centenarian subjects had detectable DPAOEs at low to mid frequencies. None of the



Figure 5. Degree of hearing loss at different frequencies and age groups. A: Number of ears (presented in percentage) that had hearing loss at different frequencies from two different age groups. B: Percentage of different grades of hearing loss in two different age groups. Hearing loss grade was based on the WHO criterions. doi:10.1371/journal.pone.0065565.g005



Figure 6. Comparison of hearing thresholds between men and women at different frequencies. Means 6 SD are presented. Comparison was made between two genders at each frequencies and no statistical significance in threshold was found at any frequencies (p.0.5). doi:10.1371/journal. pone.0065565.g006

centenarian subjects showed positive DPOAEs at frequencies above 6,000 Hz.

DISCUSSION

The current study is the first audiological assessment of the middle and inner ear functions of centenarian subjects. We show that all centenarian subjects have hearing loss with severity varying from moderate to severe in the low and mid frequencies and from severe to profound in the mid to high frequencies (Figs. 4 and 5). Otoacoustic emissions, which reflect the status of outer hair cells, were undetectable in the majority of the subjects. The elevation of hearing threshold and absence of otoacoustic emissions suggest that sensorineural cause is largely responsible for agerelated hearing loss seen in centenarian subjects.

Several large-scale epidemiologic studies were carried out in the United States and Europe to examine the prevalence and degree of hearing loss in the elderly population [9,11,12,15–17]. The prevalence of hearing loss shown in these studies varies significantly from study to study. Comparisons of prevalence and degree of hearing loss among different studies are difficult because of the lack of agreement on a standard definition of hearing loss for use in epidemiologic studies, as well as differences in age and sex in the populations tested [16]. Although there are many studies of the prevalence of age-related hearing loss in the United States and Europe, auditory function in the centenarian population has never been examined. The only study that examined hearing from more advanced age was done in an urban



Figure 7. Representative DPOAE responses obtained from listeners from different age groups. A: An example of DPOAE response obtained from a subject from the 20- to 25-year-old group. The two probe tones were set at frequencies close to 6,000 Hz. Distortion product one (DPI) and DP2 were clearly visible (,10 dB above the noise level). The right panel shows the DPOAEs were detected in all test frequencies (500, 1,000, 2,000, 4,000, 6,000, and 8,000 Hz). B:An example of DPOAE obtained from a participant from the 60- to 65-year-old group. DPOAEs were also detected in all test frequencies. C: Otoacoustic emission from a centenarian subject using the same probe frequencies used in younger groups. DPI and DP2 were absent (arrows indicate where DP1 and DP2 were expected in the frequency spectrum). The right panel shows that DPOAEs were not detected in all frequencies tested. doi:10.1371/journal.pone.0065565.g007



Figure 8. Number of ears (presented in percentage) that had detectable DPOAEs at different frequencies from different age groups. From the centenarian group, 136 ears were measured. The numbers above the red bars indicate the number of ears that had detectable DPOAEs. doi:10.1371/journal.pone.0065565.g008

Swedish population aged between 85 and 90 [14]. The participants in that longitudinal study were followed audiometrically over a 20-year period from 70 to 90 years of age. The study focused on hearing and its decline during the later time span in which the participants were tested at the age of 85, 88 and 90 years. The results reveal that hearing loss in advanced age progresses only slightly in both men and women. The annual hearing threshold decline is about twice as large in the eighth decade of life as compared with the ninth [14]. Although we did not follow the progression of agerelated hearing loss of centenarian subjects in our study, the hearing loss appeared to be much worse than the population aged 85 and 90. We would like to point out that the current study is not an epidemiological study whose goal is to examine prevalence of hearing loss in the general population. Neither was our goal to compare and monitor hearing loss progression over time among different age groups. Our goal is to determine how well centenarian listeners can hear. It is likely that the extent and severity of hearing loss in the general centenarian population are slightly greater than what we reported here. This is because the current study excluded those who already had hearing loss due to genetic deficits (family history), histories of ototoxic drug usage and exposure to impulsive noise, and middle ear diseases. In addition, most subjects in this study were generally in reasonably good health (Fig. 1). It has been reported that changes in the blood supply to the ear because of heart disease, high blood pressure, and other circulatory problems can cause and/or aggravate presbycusis [5,6].

It has been demonstrated in several well-controlled studies that agerelated hearing loss is more prevalent and severe in men than in women, especially at high frequencies [9,12,16]. Cruickshanks et al. reported that the mean threshold difference was as large as 20 dB at 4,000 and 8,000 Hz between men and women aged between 60 and 64 years [16]. Such difference is likely due to the fact that men have a greater risk of noise exposure in occupational settings. Interestingly, we did not observe a significant difference of hearing thresholds between men and women at any tested frequencies. The result is not entirely surprising since both men and women in this group already had severe to profound hearing loss. It is conceivable that the difference was minimized when the majority of the subjects already suffered from a profound loss of hearing (Fig. 5).

Age-related hearing loss is a natural part of the aging process. Although it is generally accepted that morphological and physiological changes in the middle ear, cochlea, and central auditory system contribute to hearing loss, degeneration of the cochlear hair cells and/or atrophy of stria vascularis play the most important role [5]. A recent study suggests that microRNAs, a class of short non-coding RNAs that regulate the expression of mRNA targets, are important regulators of age-related hearing loss [28]. Animal studies have shown that outer hair cell loss, particularly in the basal turn of the cochlea, is associated with agerelated hearing loss [29]. Otoacoustic emissions decrease with age, likely signifying outer hair cell damage [30]. A number of previous studies in humans have shown that as

audiometric thresholds become poorer, the magnitude of the DPOAE response decreases and is ultimately eliminated [31-39]. Some studies indicate that there is spiral ganglion cell loss during aging [40]. Studies of the human temporal bone from patients with agerelated hearing loss have shown a loss of capillaries within the spiral ligament and degeneration of the stria vascularis [2]. It is important to point out that morphological and mechanical changes in the middle ear can also contribute to presbycusis. Such changes can result in reduced function of the tympanic membrane and the acicular chain. We show that the peak compliance of the middle ear was significantly reduced in centenarian subjects (Fig. 3). Furthermore, the boneconduction thresholds are 10 to 20 dB better than the airconduction thresholds (Fig. 4), suggesting that conductive hearing loss is partially responsible for age-related hearing loss in centenarian subjects. A number of previous studies have demonstrated the impact of reduced conductive hearing loss on otoacoustic emissions [41–46]. Therefore, reduced middle ear function can partially be responsible for the absence/reduction of otoacoustic emissions seen in the centenarian listeners.

Finally, it is worth noting that the audiogram is not a particularly good measure of how one hears in real life. Hearing pure tones under headphones is quite different from listening to complex and dynamically changing sounds coming from different directions. Listening to pure tones in a quiet environment is also different from listening to conversation in background noise. Presbycusis is characterized by decreased hearing sensitivity

and reduced speech recognition in a noisy environment. Although we did not perform speech audiometry, many studies have shown that speech discrimination is significantly reduced in the elderly [47- 49]. The reduced speech recognition is generally believed to be caused by degeneration of the central auditory pathway. Loss of function of the cochlear nerve has been shown in aged animals with reduced synchronous neural activity [50,51]. This asynchrony may contribute to the decline in temporal resolution during aging. Other animal studies have shown decreased function in the cochlear nucleus [50,51]. Thus, it is conceivable that morphological and physiological changes in the periphery (middle ear and cochlea) and central auditory system contribute to agerelated hearing loss and difficulty understanding spoken language.

In conclusion, we show that although centenarian subjects still retain some residual hearing, more than 95% of them have server to profound hearing loss. It appears that both conductive and sensorineural causes contribute to the age-related hearing loss seen in the centenarian listeners.

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REFERENCES

- National Center for Health Statistics (1994) Prevalence and characteristics of persons with hearing trouble, vol 88. Department of Health Human Services, Public Health Service.
- Gates GA, Mills JH (2005) Presbycusis. Lancet 366: 1111–1120.
- Pacala JT, Yueh B (2012) Hearing deficits in the elder patient: "I didn't notice anything." JAMA 307: 1185–1194.
- Fransen E, Lemkens N, Van Laer L, Van Camp G (2003) Age-related hearing impairment (ARHI): environmental risk factors and genetic prospects. Exp Gerontol 38: 353–359.
- Gates GA, Cobb JL, D'Agostino RB, Wolf PA (1993) The relation of hearing in the elderly to the presence of cardiovascular disease and cardiovascular risk factors. Arch Otolaryngol Head Neck Surg 119: 156–161.
- Agrawal Y, Platz EA, Niparko JK (2009) Risk factors for hearing loss in US adults: data from the National Health and Nutrition Examination Survey, 1999 to 2002. Otol Neurotol 30: 139– 145.
- Sha SH, Kanicki A, Dootz G, Talaska AE, Halsey K, et al. (2008) Age-related auditory pathology in the CBA/J mouse. Hear Res 243: 87–94.
- 8. Møller MB (1981) Hearing in 70 and 75 year old people: results from a cross sectional and longitudinal population study. Am J Otolaryngol 2: 22–29.
- Mooecicki EK, Elkins EF, Baum HM, McNamara PM (1985) Hearing loss in the elderly: an epidemiologic study of the Framingham Heart Study Cohort. Ear Hear 6: 184–190.
- Keay DG, Murray JA (1988) Hearing loss in the elderly: a 17-year longitudinal study. Clin Otolaryngol Allied Sci 13: 31–35.
- 11. Pedersen KE, Rosenhall U, Møller MB (1989) Changes in pure-tone thresholds in individuals aged 70–81: results from a longitudinal study. Audiology 28: 194–204.
- Gates GA, Cooper JC Jr, Kannel WB, Miller NJ (1990) Hearing in the elderly: the Framingham cohort, 1983–1985. Part I. Basic audiometric test results. Ear Hear 11: 247–256.
- Brant LJ, Fozard JL (1990) Age changes in puretone hearing thresholds in a longitudinal study of normal human aging. J Acoust Soc Am 88: 813–820.
- 14. Jo⁻nsson R, Rosenhall U (1998) Hearing in advanced age. A study of presbyacusis in 85-, 88and 90-year-old people. Audiology 37: 207–218.

- 15. Jo`nsson R, Rosenhall U, Gause-Nilsson I, Steen B (1998) Auditory function in 70- and 75-year-olds of four age cohorts. A cross-sectional and time-lag study of presbyacusis. Scand Audiol 27: 81–93.
- 16. Cruickshanks KJ, Wiley TL, Tweed TS, Klein R, Mares-Perlman JA, et al. (1998) Prevalence of hearing loss in older adults in Beaver Dam, Wisconsin. The Epidemiology of Hearing Loss Study. Am J Epidemiol 148: 879–886.
- 17. Blanchet C, Pommie C, Mondain M, Berr C, Hillaire D, et al. (2008) Pure-tone threshold description of an elderly French screened population. Otol Neurotol 29: 432–440.
- Hoffman HJ, Dobie RA, Ko CW, Themann CL, Murphy WJ (2012) Hearing threshold levels at age 70 years (65–74 years) in the unscreened older adult population of the United States, 1959–1962 and 1999–2006. Ear Hear 33: 437– 440.
- 19. Lee FS, Matthews LJ, Dubno JR, Mills JH (2005) Longitudinal study of puretone thresholds in older persons. Ear Hear 26: 1–11.
- 20. Roth TN, Hanebuth D, Probst R (2011) Prevalence of age-related hearing loss in Europe: a review. Eur Arch Otorhinolaryngol 268: 1101– 1107.
- 21. Lin CY, Yang YC, Guo YL, Wu CH, Chang CJ, et al. (2007) Prevalence of hearing impairment in an adult population in southern Taiwan. Int J Audiol 46: 732–737.
- 22. Samuelsson SM, Alfredson BB, Hagberg B, Samuelsson G, Nordbeck B, et al. (1997) The Swedish Centenarian Study: a multidisciplinary study of five consecutive cohorts at the age of 100. Int J Aging Hum Dev: 223–253.
- 23. Mathers C, Smith A, Concha M (2000) Global burden of hearing loss in the year 2000. In: Global Burden of Disease. Geneva: World Health Organization, 2000: 1–30.
- 24. Kemp DT (1978) Stimulated acoustic emissions from within the human auditory system. J Acoust Soc Am 64:1386–1391.
- 25. Cilento BW, Norton SJ, Gates GA (2003) The effects of aging and hearing loss on distortion product otoacoustic emissions. Otolaryngol Head Neck Surg 129: 382–389.
- 26 Uchida Y, Ando F, Shimokata H, Sugiura S, Ueda H, et al. (2008) The effects of aging on distortionproduct otoacoustic emissions in adults with normal hearing. Ear Hear 29: 176–84.
- 27. Helleman HW, Jansen EJ, Dreschler WA (2010) Otoacoustic emissions in a hearing conservation program: general applicability in longitudinal monitoring and the relation to changes in puretone thresholds. Int J Audiol 49: 410–419.
- 28. Zhang Q, Liu HZ, McGee J, Walsh EJ, Soukup GA, et al. (2013) Identifying microRNAs involved in degeneration of the organ of Corti during age-related hearing loss. PLoS One 8(4): e62786. Doi:10.1371/journal.pone.0062786.
- 29. Spongr VP, Flood DG, Frisina RD, Salvi RJ

(1997) Quantitative measures of hair cell loss in CBA and C57BL/6 mice throughout their life spans. J Acoust Soc Am 101: 3546–3553.

- 30. Jimenez AM, Stagner BB, Martin GK, Lonsbury-Martin BL (1999) Age-related loss of distortion product otoacoustic emissions in four mouse strains. Hear Res 138: 91–105.
- 31.Bonfils P, Bertrand Y, Uziel A (1988) Evoked otoacoustic emissions: normative data and presbycusis. Audiology 27: 27–35.
- Collet L, Moulin A, Gartner M, Morgon A (1990) Age-related changes in evoked otoacoustic emissions. Ann Otol Rhinol Laryngol 99: 993– 997.
- 33. Martin GK, Ohlms LA, Franklin DJ, Harris FP, Lonsbury-Martin BL (1990) Distortion product emissions in humans. III. Influence of sensorineural hearing loss. Ann Otol Rhinol Laryngol Suppl 147: 30–42.
- 34. Lonsbury-Martin BL, Cutler WM, Martin GK (1991) Evidence for the influence of aging on distortion-product otoacoustic emissions in humans. J Acoust Soc Am 89: 1749–1759.
- 35. Gorga MP, Neely ST, Bergman B, Beauchaine KL, Kaminski JR, et al. (1993)
- Otoacoustic emissions from normal-hearing and hearing-impaired subjects: distortion product responses. J Acoust Soc Am 93: 2050–2060.
- Stover L, Norton SJ (1993) The effects of aging on otoacoustic emissions. J Acoust Soc Am 94: 2670–2681.
- 38. Kimberley BP, Hernadi I, Lee AM, Brown DK (1994) Predicting pure tone thresholds in normal and hearing-impaired ears with distortion product emission and age. Ear Hear 15: 199–209.
- 39. Dorn PA, Piskorski P, Keefe DH, Neely ST, Gorga MP (1998) On the existence of an age/threshold/ frequency interaction in distortion product otoacoustic emissions. J Acoust Soc Am 104: 964–971. \
- Dazert S, Feldman ML, Keithley EM (1996) Cochlear spiral ganglion cell degeneration in wild-caught mice as a function of age. Hear Res 100: 101–106.
- 41. Deppe C, Kummer P, Gu⁻rkov R, Olzowy B (2013) Influence of the individual DPOAE growth behavior on DPOAE level variations caused by conductive hearing loss and elevated intracranial pressure. Ear Hear 34: 122–131.
- Qin Z, Wood M, Rosowski JJ (2010) Measurement of conductive hearing loss in mice. Hear Res 263: 93–103.
- 43. Sanford CA, Keefe DH, Liu YW, Fitzpatrick D, McCreery RW, et al. (2009) Sound-conduction effects on distortion-product otoacoustic emission screening outcomes in newborn infants: test performance of wideband acoustic transfer functions and 1-kHz tympanometry. Ear Hear 30: 635–652.
- 44. Gehr DD, Janssen T, Michaelis CE, Deingruber

K, Lamm K (2004) Middle ear and cochlear disorders result in different DPOAE growth behaviour: implications for the differentiation of sound conductive and cochlear hearing loss. Hear Res 193: 9–19.

- 45. Herzog M, Shehata-Dieler WE, Dieler R (2001) Transient evoked and distortion product otoacoustic emissions following successful stapes surgery. Eur Arch Otorhinolaryngol 258: 61–66.
- 46. Olzowy, B Deppe C, Arpornchayanon W, Canis M, Strieth S, et al. (2010) Quantitative estimation of minor conductive hearing loss with distortion product otoacoustic emissions in the guinea pig. J Acoust Soc Am 128: 1845–1852.
- 47. Pichora-Fuller MK, Souza PE (2003) Effects of aging on auditory processing of speech. Int J Audiol 42: 2S11–S16.
- Mazelova J, Popelar J, Syka J (2003) Auditory function in presbycusis: peripheral vs. central changes. Exp Gerontol 38: 87–94.
- 49. Tremblay KL, Piskosz M, Souza P (2003) Effects of age and age-related hearing loss on the neural representation of speech cues. Clin Neurophys 114: 1332–1343.

- Willott JF (1986) Effects of aging, hearing loss, and anatomical location on thresholds of inferior colliculus neurons in C57BL/6 and CBA mice. J Neurophysiol 56: 391–408.
- Frisina RD, Walton JP (2006) Age-related structural and functional changes in the cochlear nucleus. Hear Res 216–217: 216–223.

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• Easy-to-read Caller ID display

- Includes belt clip and headset jack • Loud and clear handset
 - Hearing aid and TIA-1083 compatible

handset and base

1 year warranty

866 326 8830 diateccanada.com

















32 CANADIAN HEARING REPORT | REVUE CANADIENNE D'AUDITION



PHNAK

life is on

Phonak EasyCall II

roger

For more information visit www.phonakpro.ca

Phonak DECT Phone

This advanced cordless phone is easy to use and includes essential features designed specifically for people with hearing loss. The main benefit of the Phonak DECT Phone is the simultaneous sound transmission to both hearing instruments, maximizing speech intelligibility.



Phonak RemoteMic

The Phonak RemoteMic is a Bluetooth-based microphone which is clipped onto the conversation partners' clothing. It then streams the speaker's voice to Phonak wireless hearing instruments via ComPilot. This improves the intelligibility and listening experience when listening to a speaker or sound source in a noisy environment, or over a distance



Roger Clip-On Mic

This compact microphone uses adaptive wireless transmission to help people with a hearing loss understand more speech in noise and over distance. It is ideal for use by a partner or friend, plus it includes an audio input for listening to multimedia and TV connectivity. It can also be used alongside other Roger Clip-On Mics and Roger Pens in a



REVUE CANADIENNE D'AUDITION | CANADIAN HEARING REPORT

Roger design-integrated receivers

Roger design-integrated receivers (02) bring industry-leading speechin-noise performance to Phonak hearing instrument users who have a hearing loss. These discrete devices slightly extend the sleek contours of a Phonak hearing instrument.



Roger DynaMic

The Roger DynaMic passaround microphone for Roger inspiro places Phonak's Roger technology within arm's reach of every student, ensuring no child is left out of the discussion.



Roger inspiro SoundField

Roger inspiro SoundField can only be used for the SoundField application with the Roger DigiMaster 5000 Loudspeaker, Roger DigiMaster 7000 and Roger DigiMaster X Loudspeaker. This system transmits in Digital Modulation (DM) only and is available at a significantly lower price than the Roger inspiro.



Roger Dynamic SoundField

Roger Dynamic SoundField by Phonak ushers in a new era in classroom amplification, solving today's soundfield issues by offering industry-leading performance, fully automated settings, and hassle-free integration with Phonak's personal FM systems.



Roger EasyPen

The Roger EasyPen is an exciting product for clients who desire ultimate simplicity with full Roger performance and don't need Bluetooth functionality or manual microphone control.

Designed with discretion in mind, the Roger EasyPen microphone features premium speech-in-noise and over distance performance, adaptive wireless transmission, fully automated settings, TV connectivity and an audio input for listening to multimedia. It can also be used alongside other Roger Clip-On Mics, Roger Pens and Roger EasyPens in a microphone network.



For more information visit www.phonakpro.ca

Roger inspiro

The new Roger inspiro transmitter is our full featured wireless microphone that works with all components of the Roger systems. Simple to use, Roger inspiro connects with other Roger microphones, Roger receivers and Roger Dynamic SoundField with a simple click of the connect button. There is no need for frequency management, complex software or time consuming equipment set up. Roger inspiro is also compatible with previous generation FM receivers.





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Batteries and Earmolds







bernafon[®]

DiaTec Diagnostic Solutions & Accessories

SIEMENS







Simply ingenious



Audibly big, visibly small.

There is no other hearing aid this small, capable of this much.

Phonak Virto V introduces an industry first directional wireless 10 size battery model. It includes the unique Floating Antenna[™] which can be placed individually for increased customization and space optimization. Based on sophisticated Venture technology, Virto V features the unrivalled AutoSense OS with Binaural VoiceStream Technology[™] for outstanding precision and performance. Virto V is just one of many ingenious solutions from Phonak.



www.phonakpro.com/virto-v

BATTERIES AND EARMOLDS

ALL STAR SALES | Aqua-Earbands

Aqua-Earbands are colourful 3mm thick neoprene headbands that are recommended by professionals to help keep ears warm and dry. The Aqua-Earbands hold earplugs in, and keep water out. They are available in 4 sizes and 14 reversible colours. An earband for each member of the family! Receive a free gift on your first order.



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www.allstarsales.ca

ALL STAR SALES | Physicians Choice Earplugs

AQUA-LARBA

Physician Choice Earplugs are 100% medical grade silicone. They are great for sleeping or swimming. They reduce noise and repel water and are doctor recommended. The earplugs are available in 1 pair or 3 pair in a protective case.



www.allstarsales.ca







NOISE BRAKER

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ALL STAR SALES | Doc's Proplugs

Doc's Proplugs are preformed earplugs that help prevent Otitis Media. They are soft and comfortable and are available in 8 sizes, in solid or vented. 75% of ENT doctors recommend Doc's Proplugs because they are easy to fit, require no impressions, float and form an excellent watertight seal. Doc's Proplugs are inexpensive for both audiologists and patients.

Now available in a new clamshell package.



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ALL STAR SALES | Insta-Mold Kit

For the hearing health professional, everything your need in one low cost starter kit so you can get started using Insta-Mold Featherweight instant silicones to make custom Swim plugs. Can make up to 50 pairs. Receive a free gift on your first order.



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COUNTE



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Oto Sil, Blue & White (2x660g) Multi-purpose putty Super-smooth consistency • Easy mixing and removal Best cost/performance ratio with the highest detail reproduction and tear strength · Retains it's shape and volume well Setting time: 3-5 minutes 866 326 8830 DiaTec diateccanada.com Materials Acrylic: Hard clear, tints, Medicryl, Mediflex, Softex, Ultraflex PVC: Protint: Light pink or brown tint Hydroclear: Clear frosted Dermatex: Flesh colour Neon: Hot Pink, Orange, Yellow, Blue, Purple Silicone: Flesh colour only, in frost or gloss finish

Frost or gloss finish. Hundreds of colours Silicone II: and patterns, glitter, or glow-in-the-dark Catamaran: Floatable opaque swim plugs.

Hundreds of colours and patterns available 905-886-3366 1-800-893-6733 Tel:

info@emsee.ca www.emsee.ca



Open Fit Molds

We have designed a series of Hollow Canal molds for use with Open-Fit hearing aids. Molds can use Slim Tubes, #13 tubes, or RIC devices (space permitting), in occluded or nonoccluded options. Molds are usually Canal Lock, but any style is possible. Soft Silicone molds for use with regular-power or high-power RIC devices are also available, in any style, as well as CROS and IROS molds to allow combination aided and unaided sound in high frequency losses.



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40 CANADIAN HEARING REPORT | REVUE CANADIENNE D'AUDITION



DiaTec

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Bite Blocks

For open-jaw impressioning. Package of 100

Non-elastic styrofoam holds

• Tapered shape can be positioned for best fit

 Drilled to accommodate strand of dental floss

desired angle with firmness



Conventional Molds

Every style of mold for BTE hearing aids is available: Full concha, Shell (Geriatric handle available), Half-Shell, Skeleton, Semi-Skeleton, Canal Lock, Canal Tip.



BATTERIES AND EARMOLDS

MSEE

Swim Plugs

Plugs may be manufactured in any of our soft materials. Our most popular Catamaran floating plugs are available in hundreds of colours and patterns, including rainbow, camo, dots, or stripes. Select Silicone II for plugs that are transparent, translucent-tint, with sparkles, or glow-in-thedark. We include a

handy carrying case with each order, and handles and cords are available by request at no extra charge.



Tel: 905-886-3366 1-800-893-6733 www.emsee.ca info@emsee.ca



Filtered and Vented Noise Plugs

In situations where a person needs to hear some sound while reducing unwanted noise, we offer two options.

Acoustic Filtered plugs provide minimal low-frequency attenuation, while reducing high frequencies up to 25dB,

preserving speech comprehension. Vented Tuned plugs come with a set of inserts to allow the user to change high-frequency attenuation as desired, leaving low frequencies unaltered. Both of these products are available with the same options as the solid plugs.





Tel: 905-886-3366 1-800-893-6 www.emsee.ca info@emsee.ca



Musicians' Earplugs™

Etymotic Research Musicians' Earplugs™ are designed to replicate the natural response of the open ear. Sound heard with these earplugs has the same quality as the original, but quieter. The occlusion effect common to other plugs is entirely absent. This is achieved by combining an

interchangable filter with a carefully calibrated, custom-tuned silicone earmold. Attenuation is available with 9, 15, or 25dB filters.



info@emsee.ca

Tel: 905-886-3366 www.emsee.ca

Solid Noise Plugs

For the maximum attenuation with an in-ear product, select the Solid Noise Plugs, which reduce sound by approximately 28dB of constant attenuation when properly fit. These are the best choice for persons who regularly find themselves in very loud environments.

Usually made of Silicone or Sil II with a marker to indicate one side, any soft material can be chosen, with optional handles, cords, clips, or metal detector balls.



Tel: 905-886-3366 1-800-893-6733 www.emsee.ca info@emsee.ca



Sleep-Eez

Similar to the solid noise plugs, but sculpted as a Shell to follow the contours of the ears. This is to enhance comfort while sleeping, permitting a person to lay on their side without pain. Silicone II is the standard material, but you can select any of our soft materials, in Shell, Half-

Shell, or Canal Tip styles. The same shape makes these plugs suitable for use under helmets for motorcyclists or on construction sites.



Tel: 905-886-3366 1-800-893-6733 www.emsee.ca info@emsee.ca



MP3 Headset Buds

For true-to-life sound, our headset buds can be adapted to almost any headset, including such high-fidelity monitors as Etymotic Research and Shure. The precision fit provided by a custom plug will be more comfortable for extended wear, and with lower ambient sound, music

can be enjoyed at lower, safer sound levels, helping to preserve hearing. All headsets must be sent along with the impressions to ensure proper fit.



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42 CANADIAN HEARING REPORT | REVUE CANADIENNE D'AUDITION

BATTERIES AND EARMOLDS

SIEMENS

Private label mercury-free batteries

Promote your business while being environmentally conscious

Promote your brand by labeling batteries with your own company logo. Siemens offers an all-new process in providing effective branding for your battery needs.



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SIEMENS

SkyComfort™

Ideal for those who travel frequently

Changes in cabin pressure on an airplane, especially during takeoff and landings, can cause ear discomfort and even pain. Loud noises from the engines during the flight can be disturbing. SkyComfort custom earmolds provide individualized ear protection. The specialized SANOHRA flyfilter reduces the air pressure at the eardrum during flight, making the effects of altitude changes on the ears less uncomfortable. Additionally, it reduces loud noises such as turbine or engine sounds without affecting communication with your travel partner.

bestsound-technology.ca

SIEMENS

Music listeners ear protection

Small and discreet with natural sound quality

Now you can protect your hearing while enjoying music as a spectator or a musician in a band.

Siemens ear protection for musicians and music lovers allows you to enjoy listening as well as making all varieties of music while protecting your hearing. A special filter, positioned within the custom ear protection, reduces the loudness of the music. Enjoy rock concerts, heavy metal music, and sports events at a reduced level without losing sound quality.





Protect ears while shooting at the range or hunting

A simple gunshot registers at 140 decibels which is significant enough to cause permanent hearing loss. Siemens custom ear protection for hunting and high-decibel noise is specifically designed for these transient types of sounds. They are custom-made to fit your ear so they offer maximum protection from loud, harmful sounds and the sudden "impulse noise" coming from a gun.

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43

SIEMENS

Custom Earmolds

One integrated hearing system

Siemens delivers an impressive hearing experience that makes users forget they are wearing hearing instruments. We bring that same drive for innovation to Siemens Earmolds so you can get BestSound Technology in one integrated hearing system – conveniently, accurately, and quickly.



WIDEX BATTERIES

Premium Rayovac Mercury-Free Widex Full Performance hearing aid batteries.

- Designed to **meet the demands** of modern digital hearing aids
- Reliable and long lasting even in extreme environmental conditions such as high humidity
- Available in #10, 13, 312 & 675 sizes



Hearing Instruments



















THE NATURAL CHOICE FOR POWER AND PERFORMANCE

The all-new Power BTE is a strong, robust and modern hearing instrument, suitable for users with moderate to severe hearing losses. The P BTE is now available in Bernafon's newest hearing aid families, Juna 9 | 7, Saphira 5 | 3, and Nevara 1. It comes with an earhook and is also compatible with the miniFit system for added convenience with a variety of custom molds and domes.

Unlock the full power and potential of Swiss Engineered technology with this new Bernafon hearing instrument.



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HEARING INSTRUMENTS



POWERFUL

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PERSPECTIVES

JUNA 9|7

For a first class hearing experience, Juna delivers new Audio Efficiency™ features such as Reverb Reduction, Speech Cue Priority™, i-VC, and Comfort in Airplane. Explore the possibilities in Bernafon's premium hearing aid family today.

MAKE MORE OUT OF EVERY SINGLE SOUND. WITH JUNA. YOUR FIRST CHOICE.

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SUPREMIA 7|3

Reach out to even more clients with Bernafon's most powerful channel free hearing aid. With the Supremia Super Power BTE, we strive to offer people with severe to profound hearing losses a new perspective in hearing. Supremia's contemporary design and sophisticated feature set have the potential to inspire and support your super power users every day.

BE PART OF A POWERFUL CHANGE IN PERSPECTIVE WITH SUPREMIA.

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SUPREMIA 7|3

FOR PRECIOUS MOMENTS IN LIFE



CUSTOM-MADE SOLUTIONS FOR ME AND YOU



SAPHIRA 5|3

There are moments in life that are very precious. An impressive range of styles, in combination with state-of-the-art hearing aid and wireless technology, makes Saphira 5 | 3 a valuable choice for you and many of your customers. Let Saphira shine for a large number of your clients in their lives' most precious moments.

CHOOSE SAPHIRA A GEM FOR YOUR BUSINESS.

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NEVARA 1

For convincing sound quality choose Nevara. Impressive feedback handling with AFC Plus and effective noise reduction with ANR Plus are now offered in the entry-level performance category. With many models and easy fittings, you will be well on your way to a sound solution for your clients.



A MORE-THAN-SUITABLE CHOICE FOR EVERYONE.

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canadian hearing products review 47



HEARING INSTRUMENTS



Phonak Bolero V

Phonak Bolero V is the comprehensive BTE portfolio for mild to profound hearing losses. Phonak Bolero V includes three designs and four performance levels, including a noise generator for tinnitus management. Powered by the innovative technology of the Phonak Venture platform, Phonak Bolero V hearing aids are the ideal solution for those clients that prefer best hearing performance in water resistant high-tech BTE housings.

ΡΗϿΝΑΚ For more information visit www.phonakpro.ca

Phonak Naída Q

Phonak Naída Q is the most complete, WaterResistant power portfolio covering mild to profound hearing losses. It includes three models, available in four performance levels. Naída Q introduces significant performance enhancements across all levels, offering a host of features, based on Binaural VoiceStream Technology™. The Naída Q portfolio is available in the highly attractive Phonak Quest colour range.



Phonak Virto V

Phonak Virto V is the comprehensive custom product offering for mild to severe to profound hearing losses, including six models in four performance levels.

Powered by the innovative technology of the Phonak Venture platform, Phonak Virto V hearing aids are the ideal solution for those clients that prefer best hearing performance and a cosmetically attractive custom made hearing solution.



Phonak CROS II

Phonak CROS II is a dedicated product for clients with an unaidable hearing loss in one ear. Featuring the unique Phonak Binaural VoiceStream Technology™, it wirelessly transmits the sound from the unaidable ear to a Venture hearing aid on the better hearing ear. The hearing aid receives the signal and plays it into the better ear. As a result a person with single-sided deafness (SSD) can hear speech from the side they have not heard from before.

CROS II is compatible to hearing aids in all performance classes using the Phonak Venture platform.



Phonak Sky Q

life is on

Phonak Sky Q is the most comprehensive portfolio exclusively designed for children of all ages with mild to profound hearing losses. All four models are water resistant and dust tight. Tamperproof solutions are available when necessary. Phonak Sky Q introduces significant enhancements across the three performance levels, offering the unique benefits of Binaural VoiceStream Technology[™] for children. Enhanced fitting capabilities in Junior mode provide increased customization to meet listening needs while unique housing and ear hook colours enable children to Mix & Match so they can fully express their personalities.



For more information visit www.phonakpro.ca

PHONAK life is on

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Ace[™] binax

A highlight of discretion and sound

- Powered by binax technology
- IP67-rated resistant to moisture, sweat, dust and dirt
- Remotely controllable via the new touchControl App
- Ultra small design the hearing aid is nearly imperceptible when worn
- · Push button also available as flat cover
- Tinnitus therapy feature

50 CANADIAN HEARING REPORT | REVUE CANADIENNE D'AUDITION

HEARING INSTRUMENTS

SIEMENS

Pure[™] binax

Sophisticated binaural technology in an elegant design

- Powered by binax technology
- e2e wireless 3.0[™] third generation wireless system enables the sophisticated binax binaural features
- IP67-rated resistant to moisture, sweat, dust and dirt
- The industry's most energy efficient hearing aid
- Directional microphone placement and orientation is optimized to ensure the best possible hearing performance
- Easily operable via the easyTek audio streamer/ remote control as well as the touchControl App • Rechargeable - no hassle with tiny batteries
- Tinnitus therapy feature
- bestsound-technology.ca



binax

Motion[™] SX binax Sleek and easy to manage with true binaural capabilities

Fully featured, Motion provides almost all options to cover any individual need. The rechargeable Motion SX binax aids come in an innovative, sleek design with improved directionality. This makes them not only very discreet and comfortable to wear but also provides the best possible listening performance.

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Motion[™] PX binax

Sleek and easy to manage with true binaural capabilities

Motion PX binax is a powerful partner in a proven design; with its high level of amplification, it can cover a broad range of hearing losses and is a reliable solution for almost any customer. Its user-friendly controls, rechargeability, and intelligent interfaces offer wearers hassle-free handling and usability.



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Individual, comfortable hearing

Thanks to high resolution, feedback cancellation, and directionality, all models provide good speech understanding and a comfortable listening experience according to the wearer's sound preferences and needs. Plus, Orion 2 offers wireless connectivity options: Via the easyTekTM, it can stream audio from most Bluetooth-enabled devices. And it is remotely controllable via the easyTek AppTM and the touchControl AppTM – offering a discreet hearing solution to almost all your customers.



SIEMENS

Orion[™] 2 RIC 10

Individual, comfortable hearing

The new Orion 2 family offers all types of hearing aid models, from RICs to BTEs to customs. All models provide good speech understanding and a comfortable listening experience according to the wearer's

sound preferences and needs. Orion 2 is remotely controllable via the touchControl App – thus offering a discreet hearing solution for many of your customers.



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SIEMENS

Orion[™] 2 S

Individual, comfortable hearing

Thanks to high resolution, feedback cancellation, and directionality, all models provide good speech understanding and a comfortable listening experience according to the wearer's sound preferences and needs. Plus, Orion 2 offers wireless connectivity options: Via the easyTek™, it can stream audio from most Bluetoothenabled devices. And it is remotely controllable via the easyTek App™ and the touchControl App™ – offering a discreet hearing solution to almost all your customers.



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SIEMENS

Orion[™] 2 P

Individual, comfortable hearing

Thanks to high resolution, feedback cancellation, and directionality, all models provide good speech understanding and a comfortable listening experience according to the wearer's sound preferences and needs. Plus, Orion 2 offers wireless connectivity options: Via the easyTek™, it can stream audio from most Bluetoothenabled devices. And it is remotely controllable via the easyTek App™ and the touchControl App™ – offering a discreet hearing solution to almost all your customers.



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52 CANADIAN HEARING REPORT | REVUE CANADIENNE D'AUDITION

HEARING INSTRUMENTS

SIEMENS

Sirion[™] 2 S

Sound hearing, smart control

Thanks to feedback cancellation and noise reduction technology, each model provides a comfortable hearing experience. And this solid, Essential-range family offers convenient handling: All Sirion 2 hearing aids are remotely controllable via the touchControl App[™] to provide a high level of discretion in every situation.

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SIEMENS

Sirion[™] 2 P Sound hearing, smart control

Thanks to feedback cancellation and noise reduction technology, each model provides a comfortable hearing experience. And this solid, Essential-range family offers convenient handling: All Sirion 2 hearing aids are remotely controllable via the touchControl App[™] to provide a high level of discretion in every situation.



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SIEMENS

Sirion[™] 2 Custom

Sound hearing, smart control

Thanks to feedback cancellation and noise reduction technology, each model provides a comfortable hearing experience. And this solid, Essential-range family offers convenient handling: All Sirion 2 hearing aids are remotely controllable via the touchControl App™ to provide a high level of discretion in every situation.



SIEMENS

Sirion[™] 2 M

Sound hearing, smart control

Thanks to feedback cancellation and noise reduction technology, each model provides a comfortable hearing experience. And this solid, Essential-range family offers convenient handling: All Sirion 2 hearing aids are remotely controllable via the touchControl App™ to provide a high level of discretion in every situation.



SIEMENS



- Wireless connectivity
- IP68-rated waterproof and dust proof
- Completely protected housing suitable for continuous immersion in water up to 1 metre
- Soft touch surface for better grip behind the ear
- Available with Sport Clip ensuring a secure fit in any situation

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54 CANADIAN HEARING REPORT 1 REVUE CANADIENNE D'AUDITION

HEARING INSTRUMENTS





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Canadian Hearing Report Revue canadienne d'audition

FOR SAINA

Submissions Open for 2016 *Canadian Hearing Report (CHR)* is a Canadian hearing health care print journal that is published by Andrew John Publishing Inc. *CHR* provides a platform for researchers and students, Audiologists and Hearing Instrument Practitioners to impart and share knowledge in the form of papers, case studies, literature reviews and book reviews. We invite submission and also, letters!

CHR is one of the most well recognized publications of its kind in Canada. For 10 years, it has provided the hearing health care profession with a voice and a resource of high-quality articles. Our goal is not only to serve the profession but also to improve the quality of care to our clients.

Canadian Hearing Report is seeking quality articles related to all aspects of hearing health care.

To submit an article or for further information please contact Editor-in-Chief Ted Venema, PhD at: tvenema@shaw.ca

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Testing, Outfitting, Hearing Instrument Accessories and Miscellaneous



Socrates once said, "To find yourself, think for yourself."

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ALL STAR SALES | Sound-Off Earplugs

Sound-Off Earplugs are super soft foam earplugs for hearing protection. These plugs are ideal for traveling, snoring problems while sleeping, studying or for protection in the industrial workplace. Sound-off Earplugs are available in packages of 2 pairs

or 4 pairs. They are tapered for easy insertion, comfortable, smooth and have a NRR of 29db.



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DiaTec Canada, the one stop solution for all your diagnostic and accessory needs.

- Distributor of several different manufacturers
- Sound booth sales & installation
- Equipment calibrated on site
- for all manufacturers
- In-house repair & loaner equipment available • Fully stocked accessories including foam tips, tymp tips, paper rolls, probe tubes, etc.
- Assistive listening devices
- Service across the country to clinics, hospitals, ENT or balance centres

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AA222 Audio Traveler

The AA222 is the most comprehensive combination of middle ear analyzer and clinical audiometer available. It combines all of the diagnostic middle ear analyzer tests found on AT235 and most of the features available on the AD229 diagnostic audiometer. The AA222 is ideal for travelling to alternate locations and for clinical situations where space is at a premium.

- Includes speech and free field testing.
- Diagnostic impedance and audiometry
- PC integration for printing, storage/sharing
- · Built-in power supply and test cavities





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DiaTec

Blueprint OMS

Blueprint OMS is a highly customizable, paperless office management system that is simple to learn and efficient to use. Blueprint OMS features excellent customer service, with the ability to provide robust solutions for unique needs rather than a one-size-fits-all type of solution. Blueprint OMS also offer easy third-party billing (including electronic billing for WSIB), real time integration with both Noah and QuickBooks, scheduling (with email appointment reminders), ordering and billing, medical report writing, extensive reporting, flexible marketing module and much more.

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Blueprint solutions

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TESTING, OUTFITTING, HEARING INSTRUMENT ACCESSORIES AND MISCELLANEOUS



() Interacoustics

Callisto[™] —Redefining Portability

Interacoustics is proud to announce the release of the new modular member of our Hearing Aid Analyzer family.

Audiometry and REM in one Box!

- Small footprint and light weight (565 g / 1.25 lbs)
- Built-in digitized speech lists
- High frequency up to 16 kHz (optional)
- Counselling features
- Customized reporting and printing
- True on-top mode for fast and easy hearing aid fitting
- Latest NAL-NL2 fitting prescription

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(D) Interacoustics

Titan Middle Ear Analyzer

Titan offers full clinical level middle ear analysis with multiple probe tones (226, 678, 800 and 1000 Hz), multiple Eustachian Tube tests, full reflex battery ipsi/ contra, decay and latency as well as automatic and manual pump control. It can be operated either as a handheld or PC-controlled instrument with the ability to print to a small thermal printer or to a connected PC printer.

- A fully diagnostic and clinical impedance solution
- Handheld or PC-controlled
- High speed and high
- precision measurements
- Flexible and customizable protocols and reports
- Memory for 250 patients

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VHIT - EyeSeeCam

The vHIT is a measure of the patient's vestibulo-ocular reflex (VOR) in response to head movement. A patient with a healthy vestibular system should be able to keep his eyes focused on a stationary target, even if the head is in motion. In patients with vestibular dysfunction, when the head moves, the eyes will move with the head, requiring a corrective movement back to the target (known as a "catch-up saccade").

EyeSeeCam vHIT captures this abnormal eye movement, displays the head and eye movements simultaneously in real time, analyzes the data and then provides a simple graphical presentation of the results.

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DiaTec

() Interacoustics

Titan—Evaluating the Entire Auditory Pathway

Imagine a handheld instrument that will evaluate the entire auditory pathway from middle ear to brainstem, a product that will reduce your screening ABR test time by up to 50% and yet is so intuitively designed it requires only four buttons to do tympanometry, OAE & ABR. The ergonomic, lightweight Titan platform can do exactly that and much more.

- IMP440 Impedance Screening, Diagnostic, Clinical
- DPOAE440/TEOAE440 Screening and Clinical Option
- ABRIS440

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(**)** Interacoustics

Wideband Tympanometry

The new dimension in differential diagnostics, WBT provides a 3D diagnostic insight of middle ear pathology, helping us to expand our understanding of the middle ear.

- Absorbance provides advanced diagnostic differentiation
- Comprehensive multi-frequency tympanometry fast and data rich
- 3D mountains of insightful diagnostic data
- Unprecedented research potential



DiaTec

DiaTec

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- Simultaneous display of patient
- movement and eye movement
 Comfortable and light tight goggle with disposable foam cushions
- Two versions: VF405 Basic for eye image display and VF405 Extended for additional video capture of eye images and examination procedures

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audioscan Best Science, Best Fit.

RM 500SL

The RM500SL portable hearing instrument fitting system delivers the ability to quickly, objectively and accurately fit and test today's complex digital aids. Objective verification has become even more important with the increased complexity of digital instruments. The RM500SL allows you to accurately fit digitals any time, anywhere. The ultimate portable solution



DiaTec

866 326 8830 diateccanada.com

PerfectDry Lux

For Hearing Aid Dehumidification and UV-C Disinfection

- Forced-air fan system • 360° UV-C lamp
- Quick cycle (30 minutes) • Intensive cycle (1.5 hours)
- High quality materials
- USB or main power supply
- Compact case design
- Dimensions: 94x74x40mm

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Ear Gear Cochlear

Ear Gear Cochlear is designed to fit most types of implants. Ear Gear Cochlear protects instruments from Moisture, Loss, Wind Noise, and Dirt. It is available in 8 fashionable colours.and is

produced in corded, cordless, mono, and eyeglasses models. Ear Gear will minimize returns, and repairs, improve customer satisfaction, and help you sell more hearing instruments.

Wholesale pricing available upon request.

For more information and to order, contact Mitch Stickney, V.P. Sales, email: mitch@gearforears.com phone 888-766-1838. Visit our website at www.gearforears.com to learn more.



DiaTec

audioscan® Best Science, Best Fit

AXIOM

Audioscan Axiom fitting system. Captivate your patients with Axiom's modern design and exclusive Speechmap display. Educate your patients by revealing their residual auditory area. Motivate your patients using our unique before-and-after amplication speech audibility measure. Axiom's simple process makes you and your patient a team with a common fitting goal — audibility that is comfortable.

The unique stand combines the onear speaker and probe microphone cable management. Stand adjusts to both floor, and table-top height.



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Ear Gear Baha

Ear Gear Baha is designed to fit bone conduction hearing instruments. Ear Gear BAHA protects instruments from Moisture, Loss, Wind Noise, and Dirt. It is available beige and black only, and is produced in corded, cordless, and mono models. Ear Gear will minimize returns, and repairs, improve customer satisfaction, and help you sell more hearing instruments. Wholesale pricing available upon request.



Ear Gear for Hearing Aids

Ear Gear for Hearing Aids is designed to fit BTE, and RIC hearing aids. Models are the micro, mini, original and FM, fitting the smallest to largest hearing aids. Ear Gear for hearing aids protects instruments from Moisture, Loss, Wind Noise, and Dirt. It is available in 8 fashionable colours, and is



produced in corded, cordless, mono, and eyeglasses models. Ear Gear will minimize returns, repairs, improve customer satisfaction. Wholesale pricing available upon request.

For more information and to order, contact Mitch Stickney, V.P. Sales. email: mitch@gearforears.com phone 888-766-1838. Visit our website at www.gearforears.com to learn more.



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Ear Gear ITE

Ear Gear ITE is designed to work with ITE hearing aids to prevent loss. It is available in 8 fashionable colours, and is produced in binaural and mono models. Ear Gear will minimize returns, and repairs, improve customer satisfaction, and help you sell more hearing instruments.

Wholesale pricing available upon request.

For more information and to order, contact Mitch Stickney, V.P. Sales, email: mitch@gearforears.com phone 888-766-1838. Visit our website at www.gearforears.com to learn more.



The Bionix Lighted Articulating Ear Curette







1-2359 Roval Windsor Dr. Mississauga, Ontario L5J 4S9 Phone: (905) 822-3188: 1-800-263-6430 Fax: (905) 822-9920

The Bionix Lighted Forceps



The Bionix Lighted Forceps for foreign body removal is an innovative tool that provides primary and acute care physicians with light and magnification in a small, single-use forceps for the ear and nose. The Lighted Forceps is an extension of the innovative, award winning









1-2359 Royal Windsor Dr. Mississauga, Ontario L5J 4S9 Phone: (905) 822-3188: 1-800-263-6430 Fax: (905) 822-9920

Ear Gear Rondo

Ear Gear Rondo, is our newest model and is specifically designed to work with Medel's Rondo Implant. Ear Gear Rondo protects instruments from Moisture, Loss, Wind Noise, and Dirt. It is available in beige and is produced in corded, cordless, and mono models.



Ear Gear will minimize returns, and repairs, improve customer satisfaction, and help you sell more hearing instruments. Wholesale pricing available upon request.

For more information and to order. contact Mitch Stickney, V.P. Sales, email: mitch@gearforears.com phone 888-766-1838. Visit our website at www.gearforears.com to learn more.



The Bionix Lighted Curette

Bionix has combined the safety of our single-use ear curettes with a powerful LED light source and a magnification lens creating visualization in what has typically been a blind procedure. This design gives you the ability to handle even the most difficult cerumen removal procedures with confidence and enhanced patient safety.







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Bionix Lighted Suction



Bionix has combined the innovation of the Lighted Ear Curette with the efficiency of a suction device. The combination provides the ability to quickly remove cerumen or foreign bodies with the utmost ease and safety.



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Bionix Otoclear Irrigator



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Sometimes, using a curette to remove ear wax is not the right approach for the patient. Sometimes you'll get an ear canal with hard, dry or impacted wax that needs to be irrigated. But traditional ear irrigation methods that shoot water directly into the ear canal can be both dangerous and messy.



H-2559 Royal Windsor Dr. Mississauga, Ontario L5J 459 Phone: (905) 822-3188: 1-800-263-6430 Fax: (905) 822-9920

DE550 Wireless Digital Video Otoscope

The DE550 Wireless Digital Video Otoscope is a special purpose digital video camera combined with a high magnification lens and multiple ultra-bright LEDs. Powered by 30x variable magnification, this innovative device streams high quality live video (at 30fps) to a computer or TV, enabling the user to view and record crystal clear images or videos.



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GSI 39 Auto Tymp Pure tone audiometry 226 Hz & 1K Hz Tympanometry screener

The GSI 39 Auto Tymp provides a flexible, screening product for tympanometry, acoustic reflex measurements and audiometry to meet your testing needs today and in the future. It is available in five different versions. Choose the features needed today and upgrade easily to the additional features as your needs grow in the future. These upgrades can be managed in your facility by your local GSI authorized distributor.



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iCube II

iCube II is a cable-free fitting device that wirelessly transfers fitting data from the PC to the client's hearing aids. It can be used with any wireless Phonak hearing aid in Phonak Target software.



SIEMENS

iScan™

Your customer's ear impressions - easily handled

This innovative 3D scanning process allows acousticians to generate a 3D image of an auditory canal cast and send it directly to the manufacturer via e-mail. In conjunction with e-ordering, the iScan™ process eliminates the need for shipment costs and occasionally associated damage (such as shrinkage) from lengthy transportation periods. The end result is a better quality, better fitting product.

bestsound-technology.ca



Clarinet

Clarinet is a clinical middle ear analyzer, featured with all the tests needed for a deep and accurate investigation of middle ear disorders.

Advanced Features:

Automatic and manual tympanometry • Acoustic reflex threshold
 Decay and latency examinations • ETF for intact and perforated eardrums
 High frequency and multi-component tympanometry

www.StarkeyCanada.ca



TESTING, OUTFITTING, HEARING INSTRUMENT ACCESSORIES AND MISCELLANEOUS

Sycle Practice Management Software

Sycle is the number one practice management software in audiology and hearing care. Over 7,000 practices use Sycle to manage and grow their business. Sycle simplifies all your business processes so you're able to spend more time with patients. We automate every repeatable task, help grow your patient base, and increase patient satisfaction.

Features include drag and drop appointment scheduling, double booking, a paperless office solution, real time reporting, secure access from anywhere, best in class NOAH and QuickBooks integration, Canadian insurance capabilities, and more.



WIDEX **DRY-GO UV**TM

The easy-to-use DRY-GO UV dries and sanitizes hearing aids and earmoulds in just 3 hours.



• Electronic drying system

- Protects hearing aids from moisture damage – no desiccant required
- Kills 99.9% of germs, bacteria and fungi with it's UV-C light
- Daily use improves acoustic performance
- Energy efficient, safe and easy-to-use
- Portable includes a hard travel case & powered by a standard outlet or USB





FOUR DECADES OF INNOVATION

From our humble beginnings as a hearing aid repair shop, Starkey has done things differently. Our focus is not just manufacturing hearing aids, it's improving the hearing lives of people around the world. To this end, we have created the most advanced Research and Development department in the industry and continue to make life-changing advances year after year. Starkey firsts include the first in-canal hearing aid, the first CIC hearing aid, the first hearing aid with nanotechnology and the first real-ear measurement integrated directly into a hearing device.

BREAKTHROUGHS COME IN ALL SHAPES & SIZES -ESPECIALLY SMALL

Our latest innovations in hearing aid design create an unparalleled listening experience while eliminating some of the most frustrating characteristics of older hearing aids. For the first time ever, hearing aids are virtually feedback-free. Our nanotechnology also allowed us to incorporate automatic telephone recognition across a full line of hearing aids.

RESEARCHING THE FUTURE

At the Starkey Hearing Research Center in Berkeley, CA, our researchers explore the medical and technological breakthroughs of the future. Research conducted at the Center is focused on two primary tracks: Auditory Perceptual Science (how the auditory system perceives sound) & Signal Processing Technology (how hearing aids can modify sound to enhance auditory perception). Working with leading researchers and universities around the world, Starkey continues to seek ways to better understand the science of hearing loss.

PATIENT PROVEN

At Starkey, our renowned evidence based philosophy ensures that product changes will always be based in solid research and patient needs. By incorporating both internal and peer-reviewed research into the development process we ensure that patient benefit drives every design. You won't see extraneous features or updates just for technology's sake. If it doesn't improve the hearing lives of your patients, or improve the fitting process for professionals, we don't do it.

ALWAYS WILLING TO BACK IT UP

We are committed to benchmarking all claims and product research. As the industry leader, we thoroughly test our products internally and then against other hearing aids. If we make a claim, we'll back it up and make our findings public.



GLOBAL IMPACT

Starkey is an international hearing technology company. We employ more than 3,500 people, operate 21 facilities and conduct business in more than 100 markets worldwide. This uniquely positions us to deliver hearing aids to countries around the globe.

FOUNDATION EXPANDS STARKEY'S MISSION

Bill Austin built Starkey Hearing Foundation on the mission, So the World May Hear. The Foundation uses hearing as a vehicle to reflect caring and help people reach their full potential. Starkey Hearing Foundation fits more than 100,000 hearing aids to children and adults annually in the U.S. and around the world, and has committed to giving more than one million hearing aids to people in need over the next decade.

MISSIONS ALL OVER THE WORLD, ALL YEAR LONG

There's nothing like the tears streaming down a mother's face as her son is finally able to hear her say, "I love you," or a young girl's laughter when the world of sound opens to her. Hearing loss affects more than 63 million children worldwide, yet many do not have access to the hearing care that can help them. That is why Bill Austin and the Starkey Hearing Foundation team work tirelessly to give the gift of hearing and develop sustainable systems of care globally, having worked in more than 100 countries. PHOTOS TAKEN FROM STARKEY HEARING FOUNDATION MISSION IN THE WEST BANK 2014



STARKEY HEARING ALLIANCE

YOUR SUCCESS IS OUR GOAL

Being a small business owner in today's world can be tough — unless you're a Starkey Hearing Alliance member. That's because Starkey Hearing Alliance members are part of an exclusive group. A group forged from the best in our business.

One future, One Goal, One Alliance Become a Starkey Hearing Alliance member, and you too can have access to the hearing industry's smartest people, programs and solutions:

- Get patients to your practice
- Grow your business
- Build wealth
- Become better every day





Its all about **POWER**

139 dB SPL/78 dB Highest output ever from a BTE 13

Speech Rescue™ Innovative access to the inaudible frequencies

Speech Rescue[™] and Speech Guard E More speech details than ever before

Inium Sense feedback shield^{sp} Effective feedback control

YouMatic for Super Power Personalization to meet individual preferences

> **Bimodal fitting protocol** Fitting flow for bimodal balance

> > = Oticon Dynamo

For more information on Dynamo or Oticon BrainHearing™, contact your Business Development Manager or visit www.oticon.ca

