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HEARING HEALTH

Fall 2010

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Deafness Research Foundation

HEARING HEALTH

Volume 26 Number 4, Fall 2010

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A new face at Deafness Research Foundation? Well, yes and no. The face you see to the left is mine and it's hardly new – actually, it's been behind the scenes of these pages for the past nine years. I've just popped in to say "So long" and to introduce the real new face, Yishane Lee, who will be replacing me as editor beginning with the Winter 2011 issue. Congratulations, Yishane, and I hope you will enjoy interacting with our readers and writers as much as I have.

In my years with *Hearing Health*, five as editor, this job has never failed to meet my two criteria for satisfying employment: I'm learning and helping. Each issue has been an education for me, and I firmly believe that the information we've provided has been helpful to our readers – regardless of hearing status. In fact, I'm convinced that every family needs at least one person who is well read in *Hearing Health*. My own family is a great example of why this is so.

Just from what I've learned from *Hearing Health*, I was able to help my World War II veteran grandfather apply for hearing help from the Veteran's Administration; both he and my mother got hooked on an assistive listening device that makes watching television a joy again; I knew better than to rush my son to the doctor for antibiotics each time he contracted an ear infection; and when my sister began taking her granddaughter to stock car races, I was able to provide her with articles from *Hearing Health* to help her understand how detrimental that could be to the child's hearing.

Nine years of learning… and finally, with a recent achievement, I feel as though I have internalized DRF's mission of better hearing for all. My local church decided to construct a new sanctuary, and I strongly advocated that we include an induction loop so that our members with hearing loss could have better access to worship. In the old sanctuary, they were provided with written transcripts of the message. But now, thanks to a simple and inexpensive technology, sound is input directly into their hearing instruments and they can hear the preaching and music as well as anyone! I was so excited to see and hear the reactions of our members with hearing loss on September 5, our first service in the new sanctuary. But it didn't end there. A statewide newspaper thought this new offering newsworthy, and now many Arkansans are better educated about induction loops. I've had numerous requests for reprints of the article "so I can show my pastor." See? Good things happen when you read *Hearing Health*!

And so I hope you will continue to read – and support DRF's research which has provided the foundation for so much of the good information in these pages.

A fond farewell,
Donna Lee Schillinger
Donna Lee Schillinger
Editor-in-Chief

p.s. Keep in touch! donna@onmyownnow.com

Deafness Research Foundation

HEARING HEALTH

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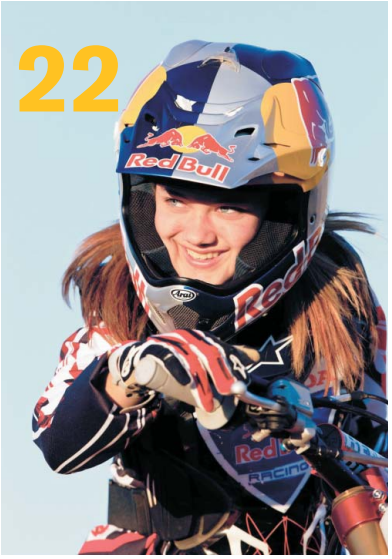
On the Cover

Cover Photo: Olympian Megan Jendrick
Photo by Nathan Jendrick

Below: Ashley Fiolek
Photo courtesy of American Honda



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USPS/Automatable Poly

Features

Second-grader Jeffrey Petty (with his service dog, Sero) needs a certified sign language interpreter at school.
Photo courtesy of Jeff Petty

Departments

Celebrating...

50 The Kresge Hearing Research Institute at the University of Michigan celebrates 50 years since its founding with an international symposium – "Pathology of the Inner Ear, Mechanics and Treatments" – on October 14-15 at the University of Michigan in Ann Arbor. Leading researchers will highlight the results of clinical trials on the prevention of drug- and noise-induced hearing loss; identify the most effective cochlear prostheses; and discuss alternate treatment paradigms involving molecular medicine, which are beginning to show promise in animal experiments.

40 The Division of Speech and Hearing Sciences at the University of North Carolina Medical School capped its 40-year history in May with a fundraiser to facilitate the education of the next generation of audiologists and speech-language pathologists. Offering an M.S. in speech-language pathology, an Au.D. in audiology and a Ph.D. in Speech and Hearing Sciences, the university boasts programs nationally ranked by *U.S. News & World Report*.

30 Thirty years ago this past July, the first child was implanted with a cochlear implant (CI) at the House Ear Institute (HEI) in Los Angeles. In the 1960s, William House, M.D., a founding member of Deafness Research Foundation Centurions, developed the single-channel CI and began successfully implanting adults. HEI received FDA approval for a clinical trial in 1980 to implant three patients under age 18 with the single-channel CI. The success of this trial led to the implantation of the same device in a preschool-age child the following year. Since then, HEI has implanted about 600 children with CIs, including the first-ever multichannel device, and has implanted CIs in children as young as 12 months.

20 On July 26, 1990, the Americans with Disabilities Act (ADA) became law, offering new and increased levels of access to public facilities and services for people with various disabilities, including hearing loss. Lex Frieden, M.A., professor of biomedical informatics and rehabilitation at the University of Texas Health Science Center at Houston, conducted a survey to gauge the ADA's impact on the disability community over the last two decades. "Overall, more than 90 percent of survey respondents believe that the quality of life for people with disabilities in communities across the United States has improved greatly since the passage of the ADA," Frieden said. "Two-thirds of the survey respondents with disabilities believe the ADA legislation has more influence on their lives than any other social, cultural or legislative change in the last 20 years."

10 The Starkey Hearing Foundation marked its 10th anniversary with the "So the World May Hear" Awards Gala in July in St. Paul, Minn. The event featured Muhammad Ali, Steve Martin, the Doobie Brothers and Frankie Valli and the Four Seasons. Since 2000 the foundation has distributed 447,432 free hearing aids to underprivileged children and adults in more than 86 countries, including the U.S. ■

Hot Tips & News Clips

Cochlear (www.cochlearamericas.com) now offers an FDA-approved rechargeable battery system for its fully submergible Nucleus 5® cochlear implant.

Williams Sound's new Web site, www.williamssound.com/rald, features the Military Assistive Listening Discount program which provides assistive listening devices at reduced cost to retired and active-duty military service members and their families.

Starkey Laboratories recently donated hearing aids to the Special Olympics Healthy Hearing Program. One hundred Special Olympics athletes who competed in the North America Regional Games in Lincoln, Neb., this past July received complimentary hearing aids.

Phonak is spearheading "A Sound Foundation Through Early Amplification" conference in Chicago, from November 8-10, 2010. Topics include pediatric audiology, including early identification, diagnosis and habilitation. Visit www.phonak.com and click on Events. ■

TubeRiders decorate BTE hearing instruments.
Photo courtesy of http://otocool.com

4th Annual Trends Holiday Gift Guide

BY NANNETTE NICHOLSON, PH.D., AND DAWN O'BRIEN TAYLOR, M.A., M.ED.

The holidays are around the corner, and even if the goose is a bit lean this year, most will be eager to give generously to family and friends – especially if a well-chosen present can help facilitate better communication and holiday closeness. And, since kids generally get most excited as fall turns to winter and the decorations begin to appear, let's have a look at their gift possibilities first.

Stuff stockings with Critter Clips! They attach to a hearing instrument on one end and can be fastened to the back of a toddler's collar on the other, securing the hearing instruments from loss (www.adcohearing.com/haa_hear_aid_acc.html). Similar to Westone's Color Otoclips, which are more suitable for teens and adults (www.westone.com/catalog/color-otoclips-and-color-otoclip-ii), Critter Clips are available for use with one device (monaural - $8.95) or two devices (binaural - $12.95). And kids can wear their favorite character: Croc O'Dile, Cool Cat, Hon E Bear, Dogzilla or Wabbit. Also choose from Dino, Farm or Sea Clips.

Critter Clips secure hearing instruments from loss.
Photo courtesy of www.adcohearing.com

EarGear covers protect hearing instruments.
Photo courtesy of http://gearforears.com

Kids will love to decorate their BTE hearing instruments with Tube Riders, billed as "styles for the ears." They can attach rockets, airplanes, baseballs, flowers, ladybugs, alligators, butterflies, basketballs and more to the instrument to make their own fashion statement (http://otocool.com/Product_Catalog_02.htm). Prices start at $6.95.

Practical gift-givers should stock up on Ear Gear (http://gearforears.com/index.asp), decorative covers that protect hearing aids, cochlear implants and bone anchored implants from moisture, dirt or accidental loss. Ear Gear can be purchased through distributors such as Adco, Harris Communications and Sound Clarity; prices start at $24.95. Ear Gear Safari comes complimentary with the purchase of an Oticon

Signing Time! helps parents communicate with children regardless of hearing ability.
Photo courtesy of www.signingtime.com

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Pediatric hearing instrument.

To encourage children with hearing loss to learn to appreciate music, you can use the same fun music appreciation program at home that therapists are using with good results. Advanced Bionics TuneUps, the 2009 *Therapy Times* MVP winner, weaves music and language together to help kids develop important interaction and communication skills. The 19-track CD features children with cochlear implants as background singers. The set also includes flashcards, a song book and instructions to maximize use as a hearing habilitation tool – reasonably priced at $19.99. To order, call Advanced Bionics at 877.829.0026. Learn more at www.advancedbionics.com/CMS/Rehab-Education/The-Listening-Room.aspx).

Signing Time! from PBS (www.signingtime.com) enables parents to communicate with any child before they can talk, regardless of their hearing ability. Learning signs can result in better reading and language abilities and scientific studies suggest that children who learn to sign have higher IQ scores, are better adjusted and learn to read at an earlier age. Many parents observe that by learning to communicate earlier, the "terrible twos" are not so terrible – a child can use a sign instead of throwing a tantrum to communicate. Individual DVDs cost $21.99; a two-DVD starter set is $39.99; or give the gift that keeps on giving with a Signing Time Club membership, with plans ranging from $19.99 to $59.99 a month.

For the kids in your family without hearing loss, consider a gift of Logitech Loud Enough Earbuds (www.loudenough.com), volume-limiting earbuds designed for use by children. Priced from $39.99, they're a perfect solution for parents wanting to limit the volume level their kids are exposed to when listening to iPods, DVD players, Xbox, Nintendo and more.

"All I want for the holidays is to talk on my cell phone and listen to my MP3." Alrighty, then! Put the Phonak iCom on your wish list (www.phonak.com/com/b2c/en/products/accessories/communication/icom/overview.html) so you can stream the audio signal from a variety of communication and entertainment electronic devices, including your TV, GPS systems and stereo equipment. The iCom can be connected to these devices either through Bluetooth™ or with a standard audio cable. Enjoy the stereo sound quality effortlessly and wirelessly. With Phonak TVLink, it is easy to connect the hearing system to the TV via Bluetooth ($125). Purchase the Phonak iCom and accessories through your hearing healthcare professional and get it programmed while you wait. Priced from $299, iCom works with most behind-the-ear models in the Phonak Exelia Art, Certena Art, Versata Art, Audeo, Naida and Neo product lines and, depending on the size of the model, may be available for half-shell or full-shell, in-the-ear Phonak hearing instruments.

The NoiZfree Beetle interfaces with cell phones and MP3 players.
Photo courtesy of www.harriscomm.com

Music can also be enjoyed by hearing aid and implant users through the use of the NoiZfree Beetle H-2ST. It is a lightweight Bluetooth receiver that interfaces with cell phones and MP3 players, transmitting music and speech directly to the hearing instrument or implant with your choice of a lightweight telecoil earhook or an induction neckloop. Simply switch your hearing instrument to T or MT to connect with the receiver. NoiZfree Beetle can be purchased through Harris Communications, with prices starting at $98.

Buying for the baby boomer who has everything? Check out the Domino, from Bellman Audio (www.bellman.se/web/news.php?newskey=423). Domino is a personal hearing system that uses wireless broadband technology to relay the audio signal from the transmitter unit to the receiver. It comes with earbuds, a travel case, charging cable, universal charger, tie clip microphone and a stereo cable. Earphones,

Domino from Bellman Audio uses wireless technology.
Photo courtesy of www.harriscomm.com

stereo headphones, a neckloop for use with hearing aid/implant T-coils, USB car charger and external microphone are optional accessories. The transmitter and receiver are small and lightweight, with a charge time of 2.5 hours for eight hours of use. Domino delivers crystal-clear stereo sound to assist those who suffer occasional hearing difficulty or who need an extra boost with their hearing aids or implants. This system transmits up to 25 meters and is available from Harris Communications (www.harriscomm.com/index.php/hc-domino.html) for $995.

Oticon's Connectline phone adapter enables hearing instrument users to hear phone conversations.
Photo courtesy of www.otioconusa.com

You'll think it is the holiday season all year round with Oticon's ConnectLine™ (http://oticon.com/Consumers/Products/ConnectLine/Overview/What%20is%20ConnectLine.aspx), a complete connectivity solution that

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enables hearing instrument users to listen to TV audio as well as phone conversations via landline or cell phone using Oticon's Streamer. Streamer employs Bluetooth technology to transmit audio to hearing aids and, with ConnectLine, enables any landline or cell phone to connect to a hearing aid. The ConnectLine kit ($650) is available through your hearing healthcare professional. The kit includes the Streamer ($325), the TV adapter ($300) and the telephone adapter ($200). Oticon Streamer works with most behind-the-ear models in the Oticon Agil, Epoq and Vigo product lines and, depending on the size of the model, may be available for half-shell or full-shell, in-the-ear Oticon hearing instruments.

The whole family will enjoy Clarity's new D613 cordless phone (http://shop.clarityproducts.com/products/listing/item3304.asp), which amplifies up to 30 dB to provide crisp, clear and interference-free communication. The ergonomic design has large, soft-touch buttons as well as bold numbers and text. It's available at RadioShack throughout the U.S. or can be ordered direct from Clarity, for $89.95.

Clarity's D613 cordless amplified phone
Photo courtesy of www.clarityproducts.com

For grandparents or elderly parents on the "nice" list, a Jitterbug phone (www.jitterbug.com) is the perfect gift. Easy to use and compatible with hearing aids and cochlear implants, Jitterbug phones feature a deep listening cup circled by a foam ear pad to reduce extraneous noise and the likelihood of feedback, along with large keypads for easy dialing. There are no complicated menus or confusing icons, no contracts or prepaid hassles and a helpful operator is available 24/7. Add-on services include daily check-in calls ($5 a month) and medication reminders ($10 a month). Free Live Nurse consultation comes with every rate plan priced at $29.99 and up. In honor of the American Heart Association, Jitterbug has introduced an eye-catching

The Jitterbug phone is handy for users who have hearing aids and cochlear implants.
Photo courtesy of www.jitterbug.com

The OjoVision Digital Video Phone is simple to use.
Photo courtesy of www.ojoservices.com

Go Red for Women cell phone to remind us all to eat healthy and exercise. Phones also come in gray or white and start at $99, with service plans starting at $14.99 per month.

When you call family at holiday time, wouldn't it be great if you could see them while you speak with them? The Ojo Vision Digital Video Phone (www.ojoservices.com/products/next-generation-digital-video-phone), which connects via high-speed Internet, does just this. With a seven-inch, high-resolution screen, large buttons and sleek design, the user-friendly graphics make it simple to dial, redial, add contacts and operate the speakerphone. There's a one-time activation and equipment fee of $138.98 and monthly service costs $29.99.

Even if a video call isn't possible, the ClearSounds Quattro Bluetooth Amplified Neckloop will make a cell phone call more enjoyable. It connects with telecoil-equipped hearing aids or implants and has 30 decibels of amplification boost. The Bluetooth neckloop streams the signal directly to the hearing aid, thereby removing the interference generated by mobile phones and hearing aids in close proximity. It's a wireless mobile phone hands-free device which allows hearing aid users to hear phone conversations and TV audio, and is compatible with any standard Bluetooth Version 2.0 + EDR devices. Use it with a computer, cordless phone, MP3 or other audio device. It is available from HARC Mercantile for $199 (www.harcmercantile.com).

This holiday season, nothing is more important that the safety of your family, and the dry winter air, combined with the

ClearSounds Quattro makes cell phone calls more enjoyable.
Photo courtesy of www.harcmercantile.com

holiday glow of candles and strings of lights, poses extra risks to your home and family's safety. Perhaps a great gift to give each other is a multisensory alerting system.

The Smart Alert™ System is the first alerting system designed to communicate with hearing aids and feature all the components you need to stay safe (www.unitronhearing.com/unitron/global/en/consumer/hearing_aids-c/accessories/alerting_safety/what_s_included.html). Enjoy the comfort of knowing you are connected wirelessly to the most important warning and communication devices in your home, such as a telephone detector, doorbell or smoke detector. Smart Alert can also be configured with a remote control device, a nightstand remote charger and a bed shaker. The advanced Smart Alert remote communicates alert signals directly to Unitron Passport™, Latitude™ and 360™+ hearing instruments. The Smart Alert Awareness system includes two detectors (telephone and doorbell), a remote, nightstand charger and bed shaker and can be purchased through a hearing healthcare professional for $745. The Smart Alert Safety Awareness system includes all these components plus a smoke detector for $995.

Bellman & Symfon's Visit offers a variety of devices that help people with hearing loss to respond to audio signals.
Photo courtesy of www.harriscomm.com

The Smart Alert™ System sends alerting signals directly to some Unitron hearing instruments.
Photo courtesy of www.unitronhearing.com

Another option is Bellman & Symfon's Visit wireless alerting system (www.bellman.se/web/page.php?catid=179), a sleekly designed array of devices that can also detect doorbells, smoke alarms and even a baby's cry, alerting those with hearing loss to respond. Depending on the option ordered, the Visit can transmit the alert via a vibrating pager or a flashing light. The Bellman Visit Value Pack 2 is available from Sound Clarity (www.soundclarity.com/productdetail.asp_Q_id_E_1026) for $275 and includes a pager receiver, a Visit door transmitter, a telephone/multipurpose transmitter and a Visit flash receiver. ■

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Dawn O'Brien Taylor, M.A., M.Ed., ECSE, is an Au.D. student at the University of Bloomsburg, Pa. The authors would like to express their appreciation to Ashley DeLaune, B.S., an Au.D. student at the University of Arkansas for Medical Sciences, Little Rock, Ark., for her assistance.

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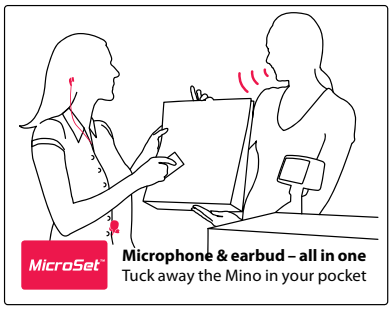

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Education: Just How Accommodating Does it Need to Be?

BY DEVORAH FOX, STAFF WRITER, AND KIMBERLY ROJAS

Jeffrey Petty is only seven years old, but his story began 16 years ago, in 1994. At that time, Katie Murch was a deaf student in Flour Bluff, a suburb of Corpus Christi, Texas. Katie sought to be mainstreamed into schools in the Flour Bluff Independent School District (FBISD), sparking a four-year court battle that ended with a Texas Supreme Court decision requiring the district to provide special programming for the incoming fourth-grader. Katie completed her education in the FBISD and went on to graduate with honors, while being involved with various student organizations and activities. She also became Miss Deaf Texas in 2007, first-runner up for Miss Deaf America in 2008, and a magna cum laude graduate of Texas A&M Corpus Christi, earning dual degrees in business management and marketing. She attributes her success to the support of her family and friends and the education she received at FBISD.

This year, history seems to be repeating itself at FBISD as Jeffrey Petty's parents seek a mainstreamed education for their son.

After a difficult birth and time in neonatal intensive care, Jeffrey underwent both an auditory brainstem response (ABR) and an otoacoustic emissions (OAE) newborn hearing screening. Both tests indicated that Jeffrey could hear. However, Cindy Petty noticed her son's response to auditory stimuli was not consistent. After repeated medical tests, Jeffrey was diagnosed with acoustic neuropathy, a term used to refer to symptoms that affect the auditory nerve, but which often result from other disorders. Jeffrey is diagnosed with moderate to severe hearing loss and he now wears hearing aids. At times when he is suffering from a cold or allergies, however, his parents say he cannot hear at all.

At age three, Jeffrey began special education at Calk Elementary School in the Corpus Christi Independent School District, about 18 miles from his home. There, Jeffrey's teacher was none other than Katie Murch's mother, Lesa Thomas. When it came time for Jeffrey to enter first grade, his teacher and parents felt that he needed to be mainstreamed at his home district (FBISD)to receive the quality of education that would enable him to reach his full potential. All he would need would be a certified sign language interpreter. As Jeffrey began the first grade, the Pettys were under the impression that he would be receiving that help. Instead, FBISD pressed into service a paraprofessional, an office worker who knew sign language because her husband was deaf.

Various federal laws, such as the Individuals with Disabilities Education Act (IDEA) and the Rehabilitation Act of 1973 apply to this situation, requiring public schools to provide a free appropriate public education. There are many options from which to choose with regard to meeting this obligation, but if interpreters are used, they must be certified. A certifying body, the Registry of Interpreters for the Deaf (RID), explains the assurances of certification: "Holders of this certificate have demonstrated the ability to expressively interpret classroom content and discourse and the ability to receptively interpret student or teen sign language. It is not limited to any one sign language or system." Interpreters have to do more than simply sign what the teacher is saying. They have to know where to stand so that the student can see both the teacher and the interpreter. They have to be able to communicate what the teacher's body language is conveying. They have to be able to help the student interact with other students and school personnel.

According to Cindy Petty, a certified interpreter was on hand to help another student in the school district. Even though this student was in a different grade than Jeffrey, the Pettys thought the two students could share the interpreter at least for core subjects like math, science and reading, through creative scheduling. But this did not happen. Jeffrey worked with the paraprofessional translator for six weeks and then the Pettys filed a complaint with the Texas Education Agency (TEA). TEA, which is under the State Board of Education, has as its mission: "to provide leadership, guidance and resources to help schools meet the educational needs of all students." One of its roles is to monitor compliance with federal guidelines.

Jeffrey is now in second grade in the FBISD. His father, Jeff, says the FBISD is reluctant to provide a certified interpreter because Jeffrey showed adequate progress without one. He uses a dated classroom FM system, which the Pettys feel needs to be updated to match the technology of Jeffrey's hearing aids. The Pettys have considered cochlear implantation as an option for the future, but for the present school year, if a certified interpreter isn't available for Jeffrey, he might have to go back to the special education program at the Regional Day School (RDS) in Corpus Christi, a placement Cindy Petty maintains is not appropriate for her son. In addition to the segregated environment, Cindy says RDS is rated lower academically than FBISD. Plus, Jeffrey's friends and siblings attend FBISD.

Jeff believes the school district isn't working hard enough to find a qualified person to fill the position of certified sign language interpreter, though he does acknowledge that it is difficult to find certified interpreters to work in school situations. Interpreters can earn significantly more money working in private enterprise, such as for a video relay service, than they can in a school.

The situation has made reluctant activists of the Pettys. Cindy says, "We don't want to herald the cause but if that's what God wants from us, that's what we'll do." Without help from the school district, the Pettys' choices are to try to supplement Jeffrey's education themselves, or to homeschool him. The latter would be difficult because the Pettys aren't certified interpreters. Cindy can sign, but only at a level appropriate for a four-year-old.

Attorneys have been drawn into the dispute. The Pettys are working with Advocacy, Inc., a federally funded and authorized

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protection and advocacy system for Texans with disabilities. The Flour Bluff School District is represented by an Austin attorney. Due to confidentiality laws, the school district is not in a position to discuss the matter specifically but did comment that "Flour Bluff ISD works diligently to meet the educational needs of all its students. The decisions that are made regarding a student with special needs are designed to address the unique needs of the child. All programs for children provided by Flour Bluff ISD reflect the district's fundamental philosophy of excellence in education."

As for Jeffrey, he is largely unaware that he is at the center of a controversy, not to mention between a rock and hard place. He just wants to go to school and do well, maybe even become a doctor.

Cindy Petty says, "It's been a very long road and it's not over yet." Another hearing is impending. Cindy adds, with hopeful optimism, "We're encouraged that Flour Bluff will continue to provide a quality education and that 'no child is left behind.'" ■

Devorah Fox is art director/senior designer and staff writer for *Hearing Health* magazine. She can be reached via e-mail at devorahfox@aol.com. **Kimberly Rojas** is an alumna of Flour Bluff High School, Class of 2010. She's currently enrolled at Del Mar College, and majoring in American Sign Language (ASL). She loves to explore different views and ideas about Deaf culture. Based in Corpus Christi, she can be reached at sportygirl142010@yahoo.com.

BY DEVORAH FOX, STAFF WRITER

The Individuals with Disabilities Education Act (IDEA) is a U.S. federal law that governs how states and public agencies provide early intervention, special education and related services to children with disabilities. It addresses the educational needs of children with disabilities from birth to age 21 in cases that involve 13 specified categories of disability. It applies to states and local educational agencies that accept federal funding under IDEA.

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The basic principle underlying IDEA is that denying free public education to disabled children deprives them of due process.

In 2004, regulatory changes to IDEA sought to accomplish two aims: clarify Congress' intended outcome for each child with a disability, and ensure that students must be provided a free, appropriate public education (FAPE) in the least restrictive environment that prepares them for further education, employment and independent living. FAPE is an educational right of children with disabilities in the U.S. that is guaranteed by the Rehabilitation Act of 1973. FAPE is intended to provide "regular or special education and related aids and services that are designed to meet individual needs of handicapped persons as well as the needs of non-handicapped persons."

This can be accomplished in residential schools, charter schools specializing in bilingual/bicultural education, day schools where sign language is used, day schools for deaf children that emphasize spoken language only, and neighborhood schools, some of which have programs for deaf and hard of hearing students.

The No Child Left Behind (NCLB) Act of 2001, otherwise known as the Elementary and Secondary Education Act of 2001, reiterates that all children, including those who are deaf and hard of hearing, must be included in district and statewide assessments designed to measure achievement. The act specifies mechanisms for holding schools and programs accountable to these aims. The goal of NCLB is to have all students in the U.S. score at "proficiency" level on these tests by 2012.

Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. § 794) requires programs which receive federal financial assistance to provide accommodations, such as qualified interpreters, real-time captioning (see "I See What You're Saying" p. 30), and assistive listening devices or other auxiliary aids, to people with disabilities when necessary to ensure effective communication. Public school systems receive substantial federal financial assistance, so this law applies to them. Title II of the Americans with Disabilities Act (42 U.S.C. §§ 12101-12213) requires comparable access by all state and local government programs, regardless of whether the programs receive federal financial assistance. Further, 28 C.F.R. § 35.104 defines "auxiliary aids and services" as including "qualified interpreters, note takers, transcription services, written materials, telephone handset amplifiers, assistive listening devices, assistive listening systems, telephones compatible with hearing aids, closed caption decoders, open and closed captioning, telecommunications devices for deaf persons [TTYs], videotext displays, or other effective methods of making aurally delivered materials available to individuals with hearing impairments; . . . and . . . other similar services and actions." ■

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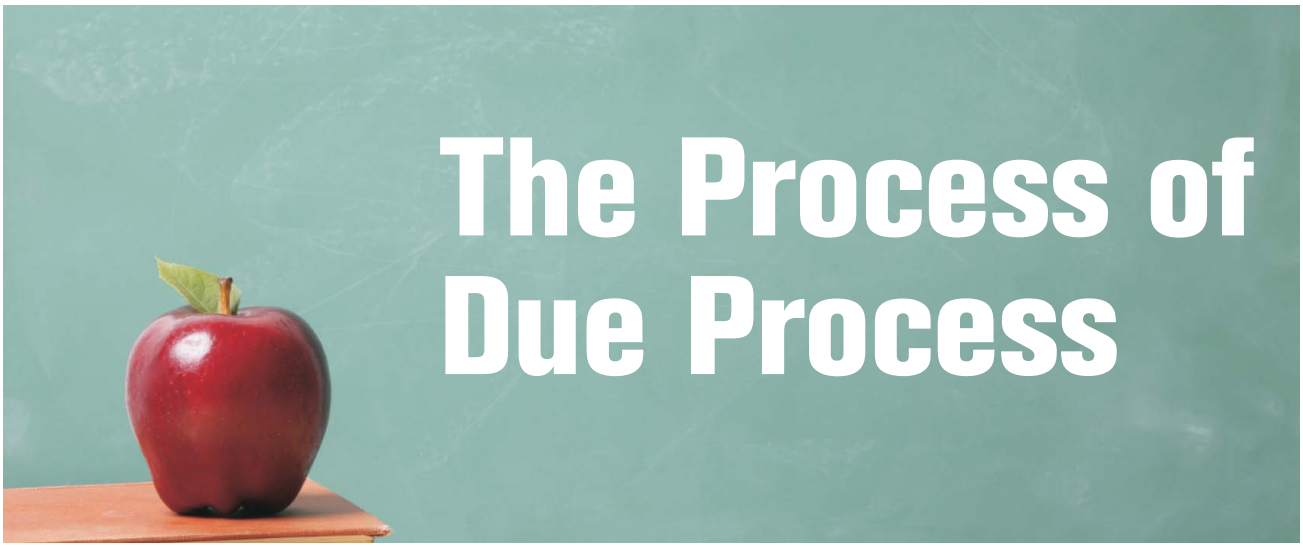

The Process of Due Process

Because the resources that children receiving special education services require are often either hard to find or involve significant cost, parents and other advocates can find themselves having to fight for what their child needs from his or her school, even when the law is clearly on their side.

While the federal government has established a free, appropriate public education (FAPE) as the right of every student (see "FAPE for All – It's the Law!" p. 14), it has been left to each of the 50 states to implement this mandate through their educational policies and administrators. While the process of ensuring that a child with special needs receives a FAPE varies, we can glean some insights by examining the options in the state of Texas, where Jeffrey Petty lives (see "Education: Just How Accommodating Does it Need to Be?" p. 12).

The Texas Education Agency (TEA), under the oversight of the State Board of Education, provides three options for parents or guardians who believe that their child is not receiving an adequate FAPE. These options seem to be typical of those offered in other states and include mediation, filing a complaint and a formal hearing.

According to the TEA, "Because the parties [i.e., parents and the school or school district] will need to work together in the future on matters relating to a student's educational program, TEA's policy is to encourage resolution of disputes at the local level if possible."

Mediation offers the best opportunity for an outcome that is both educationally beneficial and conducive to an ongoing cooperative relationship. "Nearly 80 percent of the parties that have used TEA's mediation services during the last several years have reached an agreement as a result of the mediation," according to TEA. Mediation is a voluntary, confidential process that is usually less costly and less time-consuming than the other options. The final agreement is usually a signed, legal contract, enforceable in court.

If an agreement cannot be reached via mediation, a parent or other concerned party may file a formal complaint alleging non-compliance with IDEA. In Texas, TEA staff members review and evaluate complaints. In this process, there is no formal testimony by witnesses and no formal record of the proceedings. If TEA finds that a school district is in violation of IDEA, it can direct that various remedies be applied, including monetary reimbursement for educational expenses incurred by parents because of a failure on the part of a school district, and that corrective action be taken, such as staff training or revision to policies and practices. TEA typically requires school districts to submit a plan and timeline for implementation of the corrective actions within 30 calendar days.

If parents do not receive satisfaction from the filing of a complaint, they can initiate a special education due process hearing – a formal, adversarial legal process similar to a bench trial. If a due process hearing does find that a school was guilty of a substantive violation, such as not providing a student with a FAPE, then the due process hearing can result in several kinds of relief, including: awards of compensation or reimbursement; disciplinary sanctions; or orders for a school district to implement an educational program, conduct an evaluation or change an educational placement.

Thus there are various avenues of petition for parents seeking to provide the best mainstream education for their special needs child. While the outline above applies directly to the state of Texas, the process in other states can be found via their respective state departments of education. A national directory of these state departments can be found by visiting: www2.ed.gov/about/contacts/state/index.html. ■

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HEARING HEALTH

Megan Jendrick contemplates an Olympic victory.
Photo courtesy of Megan Jendrick

2012: Another Golden Opportunity for Megan Jendrick?

BY AMY GROSS, STAFF WRITER

In 1996, swimmer Megan Jendrick, then Megan Quann, informed her parents that she was going to be on the next Olympic swim team. She was 12 years old.

To their credit, Tom and Erin Quann recovered quickly, and after exchanging bemused glances – there may have even been some laughter – responded in an appropriately parental fashion. Competing in the Olympics was a good goal, they told Megan. But to achieve it, she would have to work hard – *very hard*, they thought. For they knew that although their daughter loved swimming, she was by no means a standout athlete in her local club.

At the end of the summer, however, Megan had won her first blue ribbons in the 50-meter breaststroke and 50-meter freestyle. Something inside clicked and she immediately decided, "Yeah, I want to win a lot more of those!"

Four years later, she would hang two Olympic gold medals next to those blue ribbons. Four years after that, a silver. And if all goes as planned in the next couple of years, Megan would like to add to her collection during the 2012 Olympic Games in London.

So how exactly does an average swimmer go about achieving Olympic gold?

If you're Megan Jendrick, you set goals – lots of them. At the age of 12, she wrote down a list of 100 goals for herself, and reviewed them every day. "I came up with a four-year plan for making the next Olympic team," Megan recalls, "and I followed that plan exactly – to a tee." Year One: Compete in the Junior National Time Standards. Check. Year Two: Make the Junior National Time Standards. Check. Year Three: Win the Senior National Time Standards. Check. Year Four: Win at Olympic trials. Check.

At the ripe old age of 16, Megan found herself in Sydney, Australia, a member of the U.S. Olympic Swimming Team. A self-described "come-from-behind" swimmer, Megan says that prior to Sydney, her usual racing strategy was to "be in first at the halfway mark, then hang on for dear life in the second half!" However, the 100-meter breaststroke event in Australia would change the way Megan raced.

"In that race, I was in fourth place at the half, not first," she recalls. "I kept thinking, 'I need to go faster, faster!' and I was so focused on that. I actually remember every single stroke I took in that race. I pulled from fourth to first and won by a body length." After winning gold in an individual event, Megan also helped her team win gold in the 400-meter women's medley relay.

Back home in Puyallup, Wash., Megan, by then a high school junior, adjusted to post-Olympics life. There were the hundreds of requests to travel and make appearances around the country. She made the cover of *Sports Illustrated* and was recognized everywhere. Despite missing almost 90 days of school her junior year of high school, Megan graduated with honors and went on to earn a degree from Pacific Lutheran University. Then more changes ensued: She bought a house and was living on her own. Her coach suddenly and without warning took a job on the East Coast.

"I was sort of coasting and didn't really know what I wanted. I realized I had forgotten what had made me successful before," Megan says. So out came the notepad and soon she had compiled a whole new list of goals. At King Aquatic Club in Seattle, she began training again in earnest, with a new coach and an old goal: Make the Olympic team – this time in 2004.

Megan Jendrick, then Megan Quann, takes a practice run at the 2004 Olympic trials in Long Beach, Calif.
Photo courtesy of Megan Jendrick

But it was not to be. At the Olympic trials, Megan missed qualifying for the Olympic team by 11-hundredths of a second – outtouched by Tara Kirk by a distance of just two inches. It was a stunning and heartbreaking wakeup call, and Megan, the "come-from-behind" swimmer who somehow always came through in the clutch, found herself watching the 2004 Olympic Games from her living room.

Dispirited, she decided to retire from swimming at the age of 20, but stayed active by coaching young children just learning to swim. Seeing how much fun the four- and five-year-olds were having in the water made Megan realize how much she missed swimming, and how far she had come herself in her own journey. By this time, married to writer Nathan Jendrick, whom Megan describes as "my biggest supporter and motivator," she came out of retirement in 2005, drew up her list of goals once more and started training with a vengeance.

Two years later, Megan secured a berth on the U.S. team in Beijing. As fate would have it, she qualified for the team by outtouching her old rival Tara Kirk by an even narrower margin: one-one-hundredth of a second – less time than it takes to blink an eye. This was a victory Megan did not take lightly. There would be no personal medals this time around, but in Beijing in 2008, she helped her team bring home silver in the 400-meter medley relay.

Today, Megan Jendrick is coaching teenagers and running swim camps around the country. Oh, and there's that little business about training full-time for the 2012 Olympics.

Megan's coach, Tommy Hannan, calls Megan "a master of preparation" and credits her goal-setting abilities as a major factor in her winning nature. "Megan is focused, intense and very organized," says Hannan, himself a gold medalist from the 2000 games in Sydney. "She sets her own goals. I'll ask her to do things in practice that I think, as her coach, are part of the practice plan, and she'll say, 'Um, yeah – that's not part of my plan right now.'"

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It's that independent streak that sets Megan apart from other swimmers and hones her competitive edge.

If she makes the 2012 Olympic team, Megan will be 28 when she travels to London. According to her coach, Megan is still in her prime and takes very good care of herself. But more than that, says Hannan, "She's a gamer. She wants the race all the time, every day. As Megan gets closer to a big meet, everything she does gets tighter. There is no wasted motion, just absolute precision."

At a Master's Swimming Circuit meet outside of Seattle this past July, Megan competed in four races in 90 minutes. Of the four races, and with barely enough time between races to catch her breath, she broke world records in three events: the 50-meter, 100-meter and 200-meter breaststroke. Not a bad way to kill an hour and a half. Now she just has to kill two years until Olympic trials in Omaha, Neb.

In between her personal training schedule (which includes swimming some 8,000 meters a day), Megan indulges her passion for working with children and running swim clinics. "Doing the swim camps and getting to know each swimmer – I feel like I'm giving back to the sport that I fell in love with at 12 years old," she says. To help her students reach their potential, Megan encourages them to set goals – to literally write them down and then go back and re-evaluate them often.

Megan and her husband started a company, AcquaBody.com, which produces sustainable, organic fitness and life products such as lip balms, body lotion and a stainless steel water bottle. In addition to promoting her own products, Megan, like most professional athletes, is an accomplished promoter of swimming-related brands and products. Her current sponsors are TYR, a manufacturer of swimming caps, goggles and apparel, and Mutual of Omaha, which sponsors the week-long swim clinic Megan teaches. She also endorses two products from Health Enterprises that she has been using herself for years. One product, AfterSwim™, absorbs water from the ear post-swim. "It was really a perfect fit for me," Megan says. "I used to get ear infections all the time when I was young. Being in the pool, your ears get clogged a lot, which causes ear infections. And for me, using cotton swabs just aggravated the problem and I'd need drops. AfterSwim is like a little sponge that absorbs all the water in your ear in about 10 seconds. I just keep some in my gym bag and pop them in after every workout."

Megan also endorses Swim-Fit Plugs™, which keep water out of the ears. "I wear these more when I'm not feeling well or when I'm feeling run-down," she says. "They're great for preventing ear problems."

It is very apparent that Megan Jendrick is a positive, motivated individual – someone who is as enthusiastic about ear health for swimmers as she is about upcoming meets.

"Megan's a little different than most swimmers," says coach Tommy Hannan. "She's a little older, a little more mature. Swimming is what she does for a living, and it's easy to get caught up in the monotony of a sport that can get very boring. Megan's always finding something new in it. That's part of the reason she's had the success she's had." ■

Water-logged?

Swimmer's ear is a painful condition of inflammation, irritation, or infection of the outer ear. Commonly affecting children and teen swimmers, it's caused by bacteria growing and spreading in water trapped in the ear. It can also be caused by water from showering, bathing, hot tubs and high humidity, as well as polluted water, excessive cleaning with cotton swabs, certain chemicals (hair spray or hair dye), a cut in the ear canal or other abnormal skin conditions in the ear canal. Any of these factors can enable bacteria that is normally present in the ear to run amok.

The most common symptoms of swimmer's ear, according to ENTnet.org, are "an itchy ear and mild to moderate pain that gets worse when you tug on the outer ear. Other signs and symptoms may include any of the following:

- sensation that the ear is blocked or full
- drainage
- fever
- decreased hearing
- intense pain that may radiate to the neck, face or side of the head
- the auricle (ear lobe) may appear to be pushed forward or away from the skull
- swollen lymph nodes (located in your neck)
- redness and swelling of the skin around the ear."

The pain drives a person to get help, but if left untreated, complications could include hearing loss, recurring ear infection and even damage to the bone or cartilage. Treat early symptoms in an otherwise healthy ear by using eardrops of a mixture of half alcohol and half vinegar. However, ENTnet.org cautions, "before using any drops in the ear, it is important to verify that you do not have a perforated eardrum. Check with your otolaryngologist if you have ever had a perforated, punctured or injured eardrum, or if you have had ear surgery." More severe infections may require topical or oral antibiotics, or both, and appropriate follow-up.

Dry ears are healthy ears, so prevent swimmer's ear by using ear plugs while swimming and drying ears thoroughly after swimming. A quick way to dry ears is with a hair dryer set on low. If the ear is wet it will feel cold initially, but once the water evaporates, it starts to feel hot, meaning the job is done. Additionally, it is important to avoid cotton swabs and visit an ENT to treat extensive earwax build-up or itchy/flaky ear canals.

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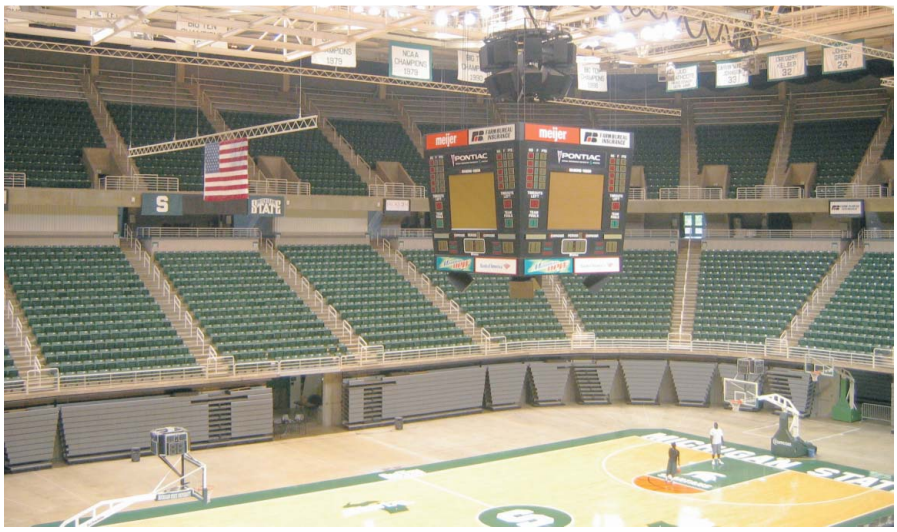
North America's Biggest Induction Loop

Hearing Loop Systems recently announced a contract to loop Michigan State University's Breslin Center – all 14,759 seats. The stadium is the arena for one of America's top college basketball programs, as well as many other major events and concerts.



Blogging from the Beloved Country

Remote villages in the Mpumalanga province of South Africa will benefit from the Oticon Xanthia Hearing Clinic, which will provide school screenings for hearing loss and community hearing clinics to identify and refer those with treatable hearing loss. Led by Jackie L. Clark, Ph.D., of the University of Texas at Dallas, the effort will underwrite the cost of sending two young audiologists to meet the hearing healthcare needs of the impoverished communities. To enable hearing care professionals and other supporters of the mission to experience the day-to-day successes and challenges of this life-changing undertaking, the doctors on the Mission to Xanthia team will post their thoughts on a blog which can be viewed by clicking on Professionals at www.oticonusa.com.

An Awards Sweep

Starkey's Sweep technology earned a Silver 2010 International Design Excellence (IDEA®) award in June from the Industrial Designers Society of America. World-renowned designers and design experts from 29 countries judged 1,800 entries and honored Starkey's innovative touch panel on the spine of its behind-the-ear hearing aids, which allows wearers to adjust volume and change the memory setting with a simple sweep or touch of a finger. The award winners were featured in *Fast Company* magazine and are housed permanently in the Henry Ford Museum in Dearborn, Mich.

Jentry Taylor, a 22-year-old bilateral cochlear implant recipient from Oklahoma City, Okla., listens closely to the sounds of the jungle during the first-ever Hear the World expedition to the Peruvian Amazon.

Photo courtesy of Jo Piazza on behalf of Tonic.com

Listening to the Rainforest

The Peruvian Amazon was the destination for a July 2010 expedition of students of mixed hearing abilities from around the U.S. Spearheaded by Hear the World, an initiative of Phonak, the tour educated students about the importance of hearing, the consequences of hearing loss and the ever-growing need to break the stigma surrounding hearing loss and those living with it. The rainforest provided a complex listening environment exploding with life. Thus it was the perfect backdrop for hearing loss simulation experiments and underwater sound exercises. Videos of the expedition can be found by clicking on the video tab at Hear the World's Facebook page: www.facebook.com/CanYouHearTheWorld. ■

LIFE WITH HEARING LOSS

Ashley Fiolek
Courtesy of American Honda

She Leaves Competitors in a Twitter

BY JULIE ANN DESMOND

Not long ago, Ashley Fiolek announced on Twitter that she had lost her cell phone – a near catastrophe for most 19-year-olds. Indeed, for Fiolek it was like losing her lifeline. As a deaf motocross racer, Fiolek uses texting and tweeting to interact with her fans, among other vital communication functions.

And with two Women's Motocross Association championships, two X-Games gold medals, numerous action sports honors, fierce determination, competitive spirit and a happy-go-lucky attitude, it's no wonder she has legions of supporters. In addition to the high adrenaline this extreme sport stirs, watching Fiolek race is an inspiration to those who understand what she has overcome to be on top in women's motocross.

When Fiolek was a toddler, her parents and doctors began to notice that her developmental progress wasn't keeping pace. "Mildly retarded" was the initial diagnosis. Then one day, when Fiolek was three years old, her mother noticed she failed to startle at the sound of a loud clang. Doctors suggested that Fiolek receive cochlear impacts, but after researching the matter, the Fioleks decided to wait until Ashley was older and let her decide. When that time came, Fiolek decided to forego implants.

Even so, Fiolek is open to options. She has recently acquired a new sponsor, Able Planet, a company that specializes in high-tech assistive listening products for people with profound hearing loss. She is looking forward to working with them, but right now, during racing season, she has a one-track mind.

Fiolek's love of motorcycles developed naturally from watching her father and grandfather (a.k.a. Grandpa Motorcycle) ride. Fiolek began riding through the Michigan woods well before her fourth birthday and began racing on the youth amateur circuit a few years later. In 1998, the Fiolek family moved to Florida so that Ashley could attend the Florida School for the Deaf and the Blind. Of course, there was an ulterior motive: The active southern motocross scene would allow their daughter to compete in more races.

Motocross is an extreme sport that requires not only cat-like reflexes and agility, but upper and lower body strength. Up to 40 riders race on off-road circuits of hills, dirt roads and muddy tracks and turns. Wheels fling mud everywhere as riders make jumps and try to control the traction of the bike while manuevering the circuit.

When Fiolek was 10, she had her first major motocross accident at a raceway in Kentucky. Attempting a jump she wasn't ready for, she crashed, lost consciousness, broke her nose and smashed her two front teeth. It was a trying time for Fiolek: Not being able to hear, it was hard for her to understand the explanations of the

Ashely Fiolek
Courtesy of Fuel TV © 2010

medical procedures she was going through. For the first time in her racing life, Fiolek considered quitting. But her faith, which plays a major role in her life, supplied the strength she needed to continue racing.

"I tried to find other things that interested me but I feel that God gave me a talent to ride a dirt bike and he kept pulling me in that direction," Fiolek said.

She continued to develop her talent as she competed her way up the amateur motocross ranks, winning race after race and perfecting her skill as a rider, despite having a hearing loss. Initially, there were many critics, skeptical at how a deaf rider like Fiolek would fare in such a dangerous sport. They questioned whether she would be a hazard to other riders or herself; whether she would even be competitive; and how she would cope with the physical demands of riding. Fiolek and her family ignored these concerns and the naysayers were soon silenced. Fiolek proved herself through hard work and by learning tricks that would assist her in riding without auditory perception.

Fiolek relies on vibrations to know when to shift gears on her motorbike. And, because she can't hear other riders coming up behind her, she has learned to watch for their shadows. She says that being deaf gives her both an advantage and disadvantage: "I can't hear when other riders are behind me so I don't really stress out about it. But at the same time I have to hold my lines out on the racetrack until I'm sure no one is behind me. I sometimes hit neutral because I can't hear – and I have flipped over the handlebars."

She also says that not being able to hear "smack talk" from competitors is a definite advantage.

Fiolek turned pro in 2007 and continued to enjoy the success that she experienced in the amateur circuit. She won the Women's Motocross Association championship in 2008 and again in 2009 despite snapping her collarbone in half during the season finale. Fiolek's sheer determination and competitive spirit fully manifested themselves as she got back on her bike, despite extreme pain, and finished the race to clinch her second championship.

Fiolek is winning off the track as well. Her passion for advancing women in motocross has culminated in her becoming the first female rider to be featured on the cover of *Transworld Motocross* magazine and the first woman rider to be invited to join a factory team. As a factory rider for Honda, sponsorship pays for Fiolek's transportation to races and provides and maintains her bike and equipment. Much remains to bring women "up to speed" in this largely male-dominated sport. For example, women don't always receive equal track time or television coverage and usually earn smaller salaries.

Fiolek is also inspiring the deaf community by touring and giving motivational speeches at schools for the deaf. Her message? "Deafness is not something to hold you back," she says. "I can do just about anything with computer technology. I can talk to people all over the world with texting and let everyone know what I am doing and [know] what they are doing with tweeting."

As long as she has a cell phone, that is. Fortunately, she found that missing phone the next day and cheerfully resumed her thousand-texts-a-day habit. In between texts, Fiolek keeps on fighting for what she believes in. Along the way she also manages to keep winning and inspiring others to triumph over adversity.

Want to know what Ashley Fiolek is doing right now? Follow her on Twitter: http://twitter.com/AshleyFiolek67. Also, visit http://ashleyfiolek.com and www.facebook.com/ashleyfiolek to keep "track" of her. ■

Ashley Fiolek, Firsthand

"Firsthand," now in its 12th season on Fuel TV, takes you into the daily lives of action sports athletes. On July 25, 2010, "Firsthand" got on track with Ashley Fiolek. The crew followed her straight off the high of her second National AMA Women's Motocross Championship title and subsequent rebound from a broken collarbone; to high-performance training with family and friends at her personal track in Florida; then en route to competing in the FIM Race in the Netherlands; and finally, flying back to New York for her book release. ■

Boidman Named DRF Executive Director

Deafness Research Foundation (DRF), announced on July 1 that Andrea Boidman has been unanimously promoted to executive director. Boidman joined DRF in June 2007 as chief operating officer. She will be responsible for all facets of the foundation, including fundraising and *Hearing Health* magazine.

Andrea Boidman
Photo courtesy of Andrea Boidman

"Andrea has demonstrated her leadership at DRF and dedication to funding hearing research," said Clifford P. Tallman, Jr., chairman of DRF. "She has done an outstanding job during her years at DRF at managing the foundation, and especially expanding the reach of DRF's award-winning magazine, *Hearing Health*. She is a talented leader with a team approach and is ideally suited to DRF."

Boidman has created new partnerships and programs for DRF, which include, among others, the "It's a Noisy Planet. Protect Their Hearing" campaign with the National Institute on Deafness and Other Communication Disorders to educate tweens about noise-induced hearing loss; DRF's participation in the CORE awards program with the American Academy of Otolaryngology-Head and Neck Surgery; and her development of the new Centurion Clinical Research Award with the DRF's professional "Centurion" organization.

Boidman holds a B.A. from Temple University and an M.A. from New York University. Prior to coming to DRF, she worked at Bear, Stearns & Co. and New York University. She and her husband Mark are residents of South Orange, N.J.

DRF Seeking Applications for Research Grants

The 2011 DRF grants cycle has begun! The online applications for first-year research funding in hearing and balance science are due by 5 p.m. EST on December 8, 2010. Letters of intent for second-year funding must be e-mailed to grants@drf.org by 5 p.m. EST on December 1, and the application must be submitted by 5 p.m. EST on January 14, 2011. For more information, including our grants policy, or to apply, please visit www.drf.org/grant+application or e-mail grants@drf.org for assistance with additional questions. Applications with a focus in Meniere's disease research are particularly invited.

DRF is also offering the annual Centurion Clinical Research Award for clinical research in hearing and balance science. To submit a letter of intent, due by December 15, at midnight EST, or to apply, by January 15, 2011, at midnight EST, please visit http://proposalcentral.altum.com. For more information, including eligibility and policy for this award, please visit www.entnet.org and search for "CORE grants" or e-mail SLJones@entnet.org.

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Healthy Hearing Today and Tomorrow

BY ANDREA BOIDMAN

There are 36 million Americans with hearing loss – that's nearly one in 10 people in this country. And, while 30 percent of adults 65-74 years old, and 47 percent of adults 75 years old or older have a hearing impairment, there is something that can be done about hearing loss.

Studies have shown that untreated hearing loss in seniors contributes to isolation and depression, and is linked to cognitive decline. The technology for hearing aids has changed dramatically even in just the past few years, and while it does take time to get used to a hearing aid, it can dramatically improve your life. Only one in five Americans who can benefit from a hearing aid actually uses one! Another alternative – which is a real option for older Americans – is a cochlear implant. A cochlear implant is a small electronic device that can help to provide a sense of sound to a person who is severely hard of hearing. The implant consists of an external portion that sits behind the ear and a second portion that is surgically placed in the inner ear.

Most hearing loss is caused by damage to the hair cells, which are inside your ear and allow you to sense sound and send those messages to your brain. Once hair cells die, hearing loss is permanent. The most exciting and promising treatment for hearing loss is hair cell regeneration, or re-growing hair cells, which would in effect restore hearing. It was discovered that some animals – like chickens – can regenerate hair cells spontaneously. Scientists are still working on how to regenerate human hair cells. But hopefully, with adequate research funding, clinical trials in hair cell regeneration will be available in the next decade. In the meantime, don't let hearing loss stop you from enjoying the beautiful sounds of life.

And, if you haven't seen a hearing healthcare professional recently, make an appointment today! ■

Reprinted from *Growing Up Again*, an independent supplement from Media Planet to the *Los Angeles Times*, July 2010.

NOISE-INDUCED HEARING LOSS

Adolescent Hearing Loss on the Rise

BY ROBERT L. FOLMER, PH.D.

Josef Shargorodsky, M.D., and colleagues analyzed data from the annual National Health and Nutrition Examination Survey and compared the record of the softest sounds that could be heard by American 12- to 19-year-olds in 1988 through 1994 with those recorded from adolescents of the same age in 2005 and 2006. Their findings, published in the August 18 issue of the *Journal of the American Medical Association* (*JAMA*), indicate that the prevalence of hearing loss increased from 14.9 percent in 1988-1994, to 19.5 percent in 2005-2006. The percentages of teens with "slight" (between 15 and 25 dB) and "mild" (greater than 25 dB) hearing loss also increased during this time frame.

What are possible reasons for these increases in hearing loss among our nation's children? One difference between the groups emerged in the *JAMA* report: 55 percent of children in 1988 through 1994 reported a history of three or more ear infections in their lifetime; this prevalence increased to 61 percent for children surveyed in 2005 to 2006. A greater number of ear infections might contribute to the higher prevalence of hearing loss seen in the more recently surveyed teens. Because these children exhibited more high-frequency hearing loss than their 1988-1994 counterparts, it is also possible that they experienced more exposure to loud sounds and are starting to develop noise-induced hearing loss.

The recent study by Shargorodsky et al. is not the first to demonstrate that hearing loss among children is increasing. Studies by Charles Woodford, Gail Chermak, Judith Montgomery and their colleagues reported similar increases in the 1980s and 1990s. Even though the degree of change in hearing loss detected in these studies was generally mild and usually not even noticed by the children involved, Norman Lass and others warned that mild hearing loss in adolescents may deteriorate to debilitating hearing loss in later life. A 2006 study by Sharon Kujawa and Charles Liberman demonstrated that exposure to loud sound early in life makes hearing loss more likely to occur later in life.

Studies have shown that children with hearing loss tend to have more learning difficulties, behavioral problems and lower self esteem than their classmates who have normal hearing. In 1998, Fred Bess and colleagues reported that children with minimal sensorineural hearing loss scored significantly lower on the Comprehensive Test of Basic Skills compared with normal-hearing children.

In response to this trend of increasing hearing loss among children, numerous experts have recommended that hearing loss prevention should be taught in our nation's schools. In 2008, the Centers for Disease Control and Prevention (CDC) added noise-induced hearing loss to its list of "important topics that affect the health and well-being of children and adolescents." On the Healthy Youth Web site (www.cdc.gov/healthyyouth/noise), the CDC recommends that hearing loss prevention education programs and curricula should be implemented in schools on a regular basis. Under "Links," the Web site lists many resources and programs that can be used to teach children to protect their hearing from exposure to loud sounds, including the Noisy Planet program from National Institute on Deafness and Other Communication Disorders (www.noisyplanet.nidcd.nih.gov), of which Deafness Research Foundation is a partner, along with Dangerous Decibels (www.dangerousdecibels.org), and many more.

If children are taught to implement healthy behaviors and strategies in noisy situations, future generations may reverse the trend of increased hearing loss seen during the last few decades. Many people will then be spared the debilitating and expensive consequences of hearing loss and tinnitus. ■

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RESEARCH

Meningitis: A Deafening Disease

BY LARRY D. HARTZELL, M.D., AND JOHN L. DORNHOFFER, M.D.

Hearing loss stems from a variety of sources, including age, genetics, embryologic development, infection and trauma. Congenital hearing loss – that is, hearing loss at birth – occurs in two to three out of every 1,000 infants. Congenital hearing loss can be caused by a genetic condition or an infection to which the mother or infant was exposed. In addition to these intrauterine and neonatal infections, people of all ages can acquire infections that may lead to hearing loss. Sometimes the infection damages hearing while other times the treatment may be the culprit, such as when ototoxic antibiotics are used (read "The Ototoxic Drug Dilemma: You Live, Hair Cells Die" from the Summer 2010 issue of *Hearing Health*, online at www.drf.org). Among infections that can cause hearing impairment, meningitis is the most common. At least some degree of hearing loss has been reported in up to 29 percent of bacterial meningitis cases, with a portion of these resulting in profound deafness.

Meningitis is an infection of the lining (the meninges) and fluid around the brain and spinal column. These infections can spread quickly, leading to significant illness and even death. While meningitis can affect people of all ages, those most affected and negatively impacted by this disease are individuals under the age of 20 years. A recent review (May 2010) by Karen Edmond, Ph.D., found that children younger than five years of age were twice as likely to develop associated chronic conditions compared to older individuals. Elderly people and people with compromised immune systems are also at increased risk of meningitis.

The source of infectious meningitis may be bacterial, viral, fungal or parasitic. Although viral meningitis is the most common, the symptoms related to it are typically less severe and have fewer long-term consequences than symptoms of other forms of the disease. Bacterial meningitis can be very serious and is more likely to have increased morbidity and mortality. The major symptoms of all types of meningitis are fever, headache, stiff neck and altered mental status. Most individuals have at least two of these symptoms when they seek medical attention. Nausea, vomiting, seizures and sensitivity to light (photophobia) are also frequently reported symptoms.

Even though the different forms of meningitis have similar symptoms, treatment differs significantly based on the cause of the infection. For this reason, a thorough patient history and physical examination by a licensed physician becomes critical. The most reliable and beneficial test for making the diagnosis and determining the treatment is the sampling of the fluid around the brain (cerebrospinal fluid or CSF) by a lumbar puncture (or spinal tap). Using microscopic analysis, CSF is analyzed for opening pressure and the type and presence of organisms. In addition, cell count, glucose and protein concentration are examined. If an organism is identified, special stains and cultures are performed to isolate the specific strain and tailor the medications to the individual infectious agent.

In-patient treatment in a closely monitored setting is often required for cases of meningitis, especially bacterial infections. As the laboratory studies may take some time to provide a final and conclusive answer, broad-spectrum antibiotics, as well as steroids, are often initiated. The addition of steroids to meningitis treatment is believed to alleviate the neurological effects of the disease and prevent long-term consequences, such as blindness and hearing loss. A recent meta-analysis by Van den Bruel et al. published in *The Lancet* (March 2010) found no significant reduction in mortality or other serious consequences with the addition of steroids; however, the authors did find a significant reduction in hearing loss (24.1 percent hearing loss with steroids compared to 29.5 percent without steroids). Some recent studies have looked at directly injecting steroids into the inner ear to achieve further and more directed hearing preservation in cases of meningitis.

While certain types of meningitis may be directly transmitted from one person to another, meningitis often stems from an infection elsewhere in the body, such as the lungs, ears, sinuses or other parts of the body. Fortunately, the treatment for the related meningitis also treats the primary infection and additional therapy is not required. Occasionally, if the source is a severe ear infection, the placement of an ear tube with application of ear drops is often sufficient additional management.

Modern-day advances in vaccines have had an enormous impact on the incidence and prevalence of meningitis. According to the Centers for Disease Control and Prevention, before the *Haemophilus influenzae* type B (H *flu*) vaccine, known as Hib, was introduced in the mid-1980s and then entered widespread use in the 1990s, H *flu* was the leading cause of bacterial meningitis. Thanks to the routine immunization of children with the Hib vaccine, H *flu* no longer contributes as significantly to the number of meningitis cases, and the overall number of cases of meningitis has been reduced. Vaccines against the other two main causes of bacterial meningitis, *Streptococcus pneumoniae* and *Neisseria meningitidis*, are also available and routinely used in select groups that are at higher risk.

Treatment of Associated Hearing Loss

Despite prompt evaluation and treatment, serious chronic health conditions often result from meningitis. Blindness, deafness, mental retardation and even death can occur. Hearing loss is the most common of these consequences, particularly in cases of meningitis caused by H *flu*. The national incidence of hearing impairment caused by meningitis was 3.2 percent, according to the 2005-2006 Annual Survey of Deaf and Hard of Hearing Children and Youth by the Gallaudet Research Institute. While it was the leading cause of post-natal hearing loss less than a decade ago, it is now the second most common cause. In addition to hearing loss, other ear-related functions can be affected by meningitis, resulting in balance problems and tinnitus (an abnormal subjective ringing sound experienced in the ear).

Mild hearing loss due to meningitis may be effectively treated with hearing aids and those who develop severe to profound hearing loss may benefit from cochlear implantation. The cause of significant hearing loss related to meningitis is often unique, therefore, results and outcomes for cochlear implantation are optimal when the procedure is done without delay. While some cases of meningitic hearing loss are due to death of the nerve endings (hair cells) in the hearing organ (cochlea), bacterial meningitis can also lead to a severe disorder called labyrinthitis ossificans. This is a progressive obliteration of the structure of the cochlea that can make cochlear implantation much more difficult and even result in only partial electrode array insertion, reducing the implant's capacity to achieve good hearing outcomes.

Daniel Philippon, D.M.D., M.D., and his colleagues in Quebec recently published a scholarly article regarding their 20-year experience with post-meningitic cochlear implants. Their conclusion was that rapid obliteration of the cochlea can occur and that recovery from profound deafness is very rare. They support early assessment and intervention to maximize hearing outcomes, as opposed to a watchful, waiting approach. More intensive investigation to identify and treat these patients is warranted since earlier intervention may improve implant efficacy.

Meningitis continues to be a life-threatening disease and a menace to hearing health. However, medical and technological advances have provided us with some critical protections and interventions, with vaccinations and cochlear implants being key among them. But most importantly, a clear understanding of the clinical presentation and proper treatment of meningitis and associated chronic conditions is crucial if we are to continue to make headway in the prevention and treatment of this devastating disease. ■

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LIFE-CHANGING TECHNOLOGY

I See What You're Saying

BY SAMUEL R. ATCHERSON, PH.D., AND RACHEL SMITH, M.S.

You pick up your remote to turn on the TV and do a little channel-surfing. For many people with hearing loss, this is also the time to activate the TV's closed-caption (CC) function. Closed-captioning makes otherwise inaudible speech readable: words spoken on the nightly news, favorite sitcoms, a documentary or sporting event. Text displayed on screen brings these programs to life for people with hearing loss. As for movies, we've come to expect the option to see subtitles in English as well as other languages. Clearly, people with hearing loss aren't the only ones to benefit. Subtitles and captions aid comprehension for everyone in noisy environments, like sports bars or airports. The case for text on screen has been irrevocably established.

Now imagine how helpful it would be to a student with hearing loss to be able to read everything that is spoken in a typical classroom lecture or discussion. Believe it or not, the technology is already available to achieve just that. Known as speech-to-text services, this technology captures auditory information (speech) and translates it directly into a readable format (text), in real time.

A major obstacle for students who are deaf or hard of hearing is not having complete access to auditory information presented in the classroom. Noisy classrooms, group discussions and even the limited ability of younger students to sit still can make it difficult to hear the teacher and other students. Another problem with noise is that teachers tend to talk louder to compensate for the loud noise. But talking louder is not only physically exhausting, it can also exaggerate or distort the sounds of speech. Over the course of the day, as teachers get tired of speaking, they will normally begin to talk more softly, which makes it even more difficult for a student with hearing loss to understand them.

In many cases, a personal assistive listening device (ALD) or classroom speaker system is provided as an accommodation for these students so that they can gain better access to auditory information. However, if the student depends heavily on lip-reading or speech-reading, auditory information may only be of limited help. Depending on the age group or the type of class, the teacher may need to move around the classroom and the student with hearing loss will lose visual contact with the teacher's face if he or she turns around or walks away. Students who do not use hearing aids or other "auditory" devices may use a sign language interpreter but

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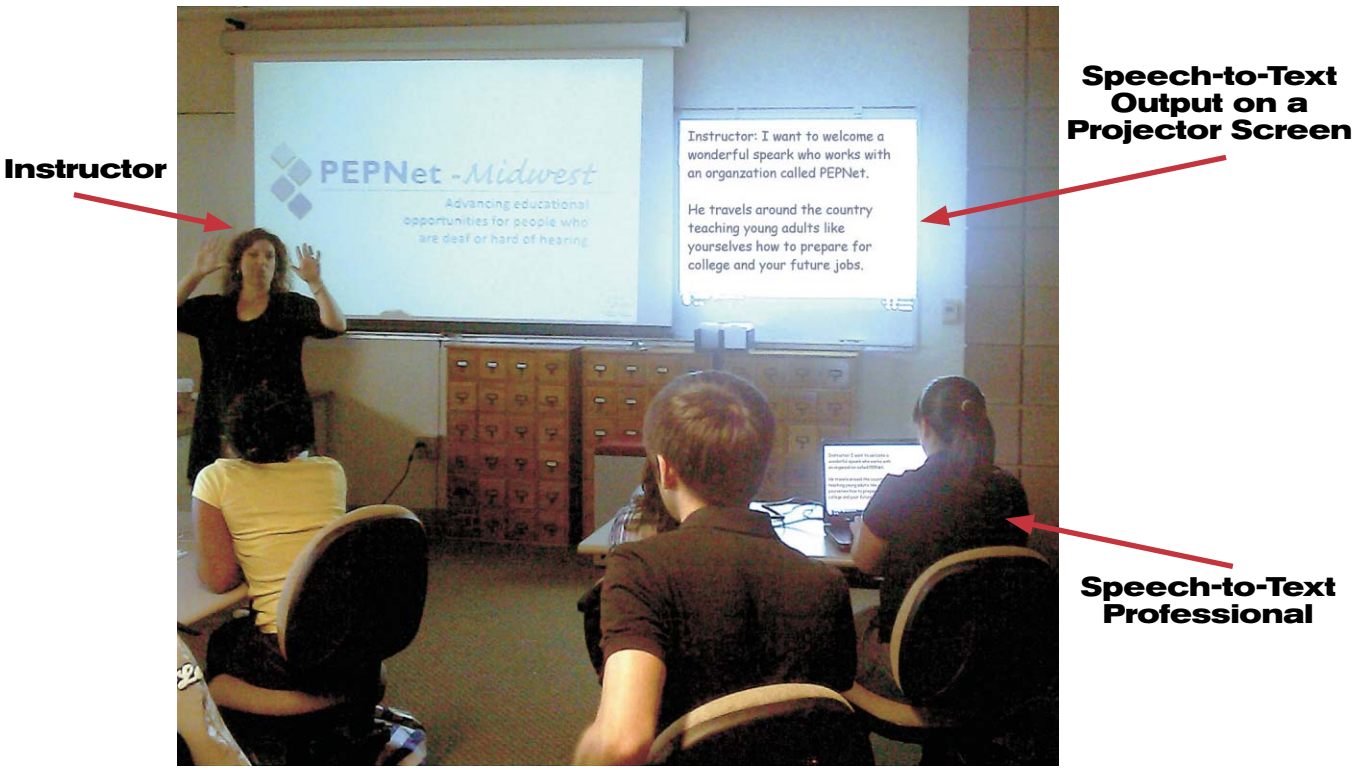

Figure 1. An example of text interpreting for several students with hearing loss in one classroom. The instructor (left) takes her usual position in front of the classroom where she interacts with the entire class. In a strategic location, the speech-to-text provider (right) sets up her computer, which is connected to a projector. The projector displays the text typed by the speech-to-text provider in "real-time" on a projector screen (top, right corner).
Photo courtesy of Samuel R. Atcherson, Ph.D.

this option is only beneficial for those who communicate fluently in sign language. Students with hearing loss often have the added challenge of trying to take their own notes, and the moment they take their eyes off of the teacher or the interpreter, they may miss important information.

Speech-to-text services solve the glitches in current classroom accommodations and provide benefits for all students. Spoken auditory information is transcribed and displayed on a projector screen or laptop display almost simultaneously as it is being spoken (see Figure 1). An electronic or paper copy of the entire lecture as it was produced is usually available afterwards – potentially benefiting even hearing students.

Speech-to-text services are generally categorized into three broad groups: steno-based Communication Access Realtime Translation (CART), text interpreting (C-Print® or Typewell™) and automatic speech recognition. Each of these services requires a specially trained professional who knows how to properly set up and operate the software and equipment. CART and text interpreting services require that the provider listen and type while automatic speech recognition requires that the provider listen and

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Service	Attributes	Output Example
CART	Verbatim-ness: High Accuracy: High No. of Pages: ~15-20 Typing using a special keyboard	Teacher Says: I forgot my textbook in the office. Oh, wait a minute. No, I have it here. Okay, let's get started now. This science experiment can be done in Australia, Europe, or South America and the result is always the same because the elements are the same. Display Reads: I FORGOT MY TEXTBOOK IN THE OFFICE. OH, WAIT A MINUTE. NO, I HAVE IT HERE. OKAY, LET'S GET STARTED. THIS SCIENCE EXPERIMENT CAN BE DONE IN AUSTRALIA, EUROPE, OR SOUTH AMERICA AND THE RESULT IS ALWAYS THE SAME BECAUSE THE ELEMENTS ARE THE SAME.
C-Print/ Typewell	Verbatim-ness: Medium to High Accuracy: High No. of Pages: ~6-10 Typing using a laptop computer	Teacher Says: This science experiment can be done in Australia, Europe, or South America and the result is always the same because the elements are exactly the same. Display Reads: THIS SCIENCE EXPERIMENT CAN BE DONE ANYWHERE IN THE WORLD AND THE RESULT WILL ALWAYS BE THE SAME BECAUSE THE ELEMENTS ARE EXACTLY THE SAME.
Automatic Speech Recognition	Verbatim-ness: High Accuracy: Medium to High No. of Pages: ~15-20 Speaking into a special mask with built-in microphone	Teacher Says: Good morning! Are you ready to learn about the history of this great nation? Let's start with the Civil War. Display Reads: COULD MORNING! ARE YOU READY TO LEARN ABOUT THE HISTORY OF DISCRIMINATION? LETTUCE START WITH THE CIVIL WAR.

speak (see Table 1 for a comparison of services). Providers undergo many hours of training and practice to develop and improve their efficiency and accuracy in listening and typing, or listening and speaking, at the same time for fairly long durations. For extended classes or sessions, there may be two providers who work as a team, enabling each one to take breaks at regular intervals. Additionally, most if not all of these services can be provided remotely – without a provider being physically present. This is ideal for rural or small-town schools where resources may be lacking.

CART providers use a stenograph or stenotype machine. Unlike the traditional computer keyboard, stenographs have two rows of keys without markings. Rather than typing each word exactly as it is spelled, the provider uses a shorthand method in which various keys are pressed in particular clusters to construct each word. CART has the advantage of being practically verbatim – that is, every word that is spoken, regardless of relevance to the lecture, is captured and typed. A potential disadvantage, however, is that a lecture may produce as much as 20 pages of transcript!

With text interpreting (C-Print and Typewell) the provider uses a laptop computer and employs a partial shorthand method. Although all letter keys are available on a laptop computer keyboard, abbreviations of common words are typically used to form whole words. Long words can often be written without the vowels and the software will select the closest word match possible and fill in the vowels. The output of text interpreting typically uses a meaning-to-meaning approach, rather than a verbatim approach. Unlike CART, where every single word is transcribed, only the main points of the information are included and any repetitions and corrections that the teacher makes are not included. Text interpreting is a lot like American Sign Language interpreting because the full meaning of the message is relayed without having to translate every word. Because of the meaning-to-meaning approach, a hard copy of the lecture will take up fewer pages than a CART transcript. Certain versions of C-Print and Typewell allow students a more interactive experience. For example, if the output of C-Print or Typewell is projected to another laptop, then the student may have the option of adding their own notes, or deleting anything that they feel is irrelevant.

Finally, automatic speech recognition involves the provider speaking into a special mask with a built-in microphone which enables everything the provider says to be transcribed automatically by computer software. Because of the speech recognition capabilities of the software, little to no typing is involved. For automatic speech recognition to work well, the provider sets up a profile and "trains" the software, correcting common errors for that user. Whenever the computer misunderstands a word, the provider can correct it immediately, or later when reviewing the transcript. Like CART, automatic speech recognition is practically verbatim.

Whereas none of these services is perfect, speech-to-text providers are trained to provide the highest quality service and to

ensure that their equipment is working properly. Nonetheless, the providers are human beings who may not always feel their best every day, may be ill or might need to miss work. And, though rare, all technology is prone to glitches. Therefore, having a backup plan is wise.

At present, speech-to-text services are most commonly used in educational settings at larger universities, though they are also provided in secondary schools when included in a student's individualized education plan (IEP). In these cases, the university or school usually bears the cost of the service, which is comparable to that of certified sign language interpretation. In a school setting, the speech-to-text provider follows the student to each class where the service is needed. Thus, the provider is a team member in the education of and advocacy for the student. However, the provider is not personally responsible for the welfare of the student, is typically not involved in educational decisions, and should not be used as a personal messenger to communicate with the student. The provider uses time between classes to set up and pack the equipment for transport.

Speech-to-text is useful in other settings as well, such as for transcribing legal proceedings in the courtroom. And it is not unusual to see these services at large conferences. The output of the speech-to-text service is prominently displayed on a large screen so that anyone in the audience is able to read the text.

Here in Arkansas, each summer we host an annual mock college camp for students with hearing loss. Students are exposed to various kinds of assistive technology, including speech-to-text service. Many of these high school campers have neither seen nor used speech-to-text services and are often amazed when they realize how much they might have been missing. Some of our campers request this accommodation when they go on to college.

Speech-to-text services are a great resource for people with hearing loss, as well as the public in general. Each of the services described above is an attractive option for visual and readable access to spoken auditory information. Not only is the information displayed in real time, but the same information is likely to be just as easily accessed later for comparing notes and studying. They powerfully contribute to making information accessible to all. ■

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Rachel Smith, M.S., CF-SLP, a recent UAMS graduate, focused her research project on speech-to-text awareness in high school students with hearing loss. She is a speech-language pathologist with Children's Therapy TEAM in Fayetteville, Ark.

What About Speech Recognition Technology?

The cost of implementing systems such as CART, C-Print, Typewell and automatic speech recognition can be significant, as they require one transcriber to one lecturer to work. Yet speech-recognition products, like Dragon NaturallySpeaking, turn spoken words into text via a computer without being personally attended. Couldn't this be a much more cost-effective solution for the classroom?

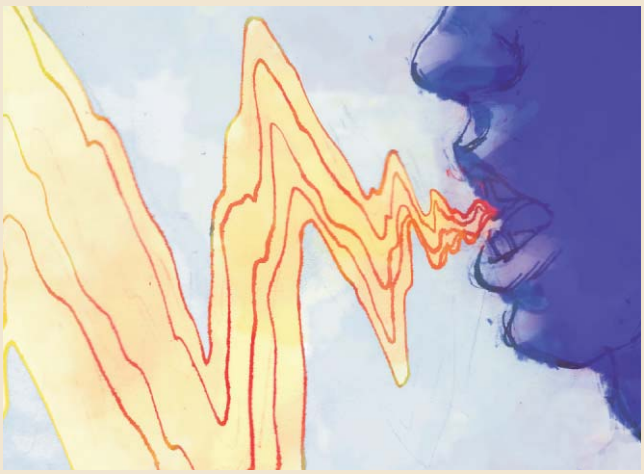
Many students with learning disabilities find it much easier to speak their words in preparing a research paper than to write them. And professors use NaturallySpeaking as a time-saving tool to provide feedback to students on papers and exams. While NaturallySpeaking is already well utilized in education, it is neither designed nor advertised as a solution for real-time transcription and captioning for academic lectures.

Voice recognition technology that could work in the academic environment is on the radar screen of educators and technology companies. A network of

researchers and educators formed the Liberated Learning Consortium some 25 years ago to spearhead projects such as the development of an effective, automated speech-to-text system that could be used in classrooms to help people with hearing loss. Based at Saint Mary's University in Halifax, Nova Scotia, the consortium involves researchers in universities around the world, as well as corporations like IBM, in the work of programming speech-recognition software that can provide accurate, real-time captioning of live speech.

When using a program like NaturallySpeaking, the user must say words like "period" to end a sentence, or "new paragraph" to begin a new paragraph. Plus, users can easily correct mistakes as they go, helping the program to "learn" to understand their unique speech patterns. But professors often speak in incomplete sentences or engage in discussion with students, factors which create extra difficulties for software programs to deal with. One solution to this has been to employ human "editors" to read the computer's transcription and make corrections on the fly. Once again, however, this reintroduces the cost factor of paying a person to perform this task.

Clearly, software is not ready to be left on its own in the classroom, but given the advancements in speech recognition technology over the past few years, it seems within reach. In the meantime, speech-to-text services are making education accessibility to students with hearing loss. Another system, Elluminate Live!, utilizes a live provider for the closed-captioning capability combined with software for other features. The program connects on-site and distance learners with visual, hearing, mobility and/or cognitive disabilities with audio and visual lesson elements, making it a very accommodating solution for institutions on a tight budget. ■



Applause

Hands & Voices Is for Whatever Works

BY KAREN APPOLD, STAFF WRITER

A person with hearing loss has several modes of communication available to them: oral, sign language, cued speech and a combination of any of these methods, as well as others. But is one method better than another?

If you ask Hands & Voices, a nonprofit organization dedicated to supporting families with children who are deaf or hard of hearing, the answer is "no." The organization's mission statement – "What works for your child is what makes the choice right" – reflects its lack of bias regarding communication modes or methodology.

"The fact that we don't support a particular form of communication is what distinguishes us from other support groups and resources to families with kids who are deaf or hard of hearing," says Leeanne Seaver, executive director of Hands & Voices National. "Our 5,500-member organization doesn't base our philosophy on how children communicate, but rather the journey to discover the right fit. We also support the fact that the communication choice may need to change over time. It is about what is best for the child, not the parents or family."

Hands & Voices, founded in 1995, provides parents of children with hearing loss, as well as the professionals who serve them, with a wealth of resources, networks and information to improve communication access and educational outcomes for their children. "Our outreach activities, parent/professional collaboration and advocacy efforts are focused on enabling deaf and hard of hearing children to reach their highest potential," Seaver says.

Seaver stresses the importance of early intervention to take advantage of the critical window of language acquisition in children from birth to age five. "It is vital that language is poured into a deaf or hard of hearing child during that time, whether it is signed or spoken," Seaver says. "If a child doesn't have the same number of words (whether signed or spoken) in his vocabulary at 24 months of age that is equivalent to children with normal hearing, that is a problem that needs to be addressed. If a decision isn't working, Hands & Voices provides parents with lots of resources to try something different."

Hands & Voices has built a strong network of families, professionals, technology support resources, groups in support of various communication modes, institutions of higher education, service providers and consumers with hearing loss who help each other by sharing ideas and advice, collaborating on projects and circulating information of interest.

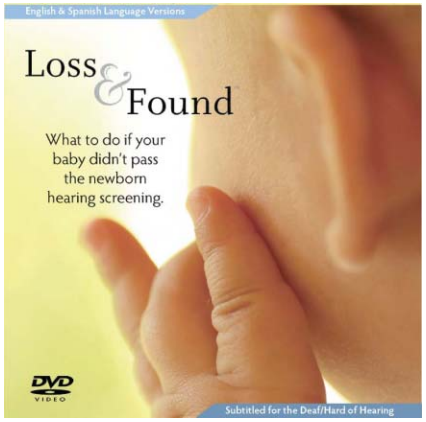
Hands & Voices provides information, training, advocacy support, parent-to-parent networking, a quarterly newspaper, Web site, special events and other activities designed to provide families with the information they need to make good choices for their children. The organization is parent-driven, but highly collaborative with professionals and consumers who are represented on its board of directors and advisory board. Thirty-five state chapters provide local and regional support consistent with Hands & Voices' nonbiased philosophy and mission.

At the national level, the organization represents the deaf and hard of hearing community through the involvement of Hands & Voices personnel as advisory board members of such organizations as the National Center on Low-Incidence Disabilities (NCLID), the Marion Downs National Center for Infant Hearing and many more.

Hands & Voices, along with several other parent groups, began an international family support in 2008 known as the Global Coalition of Parents of Deaf/Hard of Hearing Children (GPOD). GPOD promotes improved protocols and practices which empower families and encourage informed choice of communication modes. There are four international chapters.

Services Offered

Among Hands & Voices' services is a Speaker's Bureau comprised of parents and professionals who speak at conferences, webinars and workshops on issues related to parenting or educational advocacy.



Available from Hands & Voices, the "Loss & Found™" DVD is for parents who have just learned that their infant failed a newborn hearing test.
Photo courtesy of www.handsandvoices.org

Another offering is the popular Guide by Your Side program, which is mostly used by parents who have recently realized that their child has a hearing loss. The program is based on direct feedback from families sharing their opinions on what is most helpful to them. The program is modeled after Hands & Voices' unbiased support philosophy and is replicable in early intervention systems.

The Educational Advocacy Support program is used by families with school-age children. "If I drop my child off at school at the beginning of kindergarten, and don't get actively involved in her education, the statistics say that she will graduate with a third- to fourth-grade reading level by the time she leaves high school – if she is an average deaf student," reports Janet DesGeorges, Hands & Voices' national outreach director. "Most parents aren't willing to accept that. That's why Hands & Voices works so hard to help families become more effective advocates for their children."

Often, as families attempt to improve educational outcomes for their children, they lack professional support that is uniquely familiar with issues facing children with hearing loss. After so many requests for this kind of support, Hands & Voices decided to provide educational advocacy support to families (and professionals) who have questions about special education law and its applicability to students who are deaf or hard of hearing.

Additionally, Hands & Voices publishes *The Communicator*, which contains articles by families as well as authors and experts in the fields of research, technology, education, psychology and medicine. An online Author's Corner provides a forum where parents can pose their questions and get clarifications from researchers so they can improve their educational advocacy.

Hands & Voices' Web site contains a wealth of information about its mission, services, resources and courses for professionals. The Web site also features a captioned DVD, "Loss & Found™," for parents who have just learned that their infant failed a newborn hearing test.

A Unique Project

Finally, Hands & Voices offers a first in its Observe, Understand and Respond (O.U.R.) Children's Safety program. Directed by Hands & Voices' board member, Harold Johnson, Ph.D., of Michigan State University, the project's aim is to address the disproportionately high incidence of child abuse and neglect of children with hearing loss. Says Seaver, "To my knowledge, this is the only national endeavor to create resources and curriculum as well as systemic change regarding child abuse and neglect of hard of hearing children."

For parents of children with hearing loss who haven't found a good fit in an advocacy and support organization, Hands & Voices' unbiased approach may offer new hope.

For more information, call Hands & Voices National at 866.422.0422 or visit www.handsandvoices.org. ■

Total Communication Story Time

Scholastic Storybook Treasures™ DVD series has launched a new line of DVDs designed to teach early sign language skills to preschool children, while reinforcing oral language, to help children of all hearing abilities to gain literacy and pre-reading skills. The first releases are "Goodnight Moon and More Great Bedtime Stories," "A Pocket for Corduroy and More Stories about Friendship" and "Five Little Monkeys and More Great Children's Stories." Each DVD features three stories enhanced by vocal and sign language narration, sign language vocabulary lessons and reading comprehension questions to support early literacy skills – all developed by educational experts. Each video has a 60+ minute running time and suggested retail price is $12.95. Purchase through your favorite local or online DVD retailer. ■

ACOUSTICS

The ancient theater of Epidavros (or Epidaurus), constructed in the late fourth century B.C., is renowned for its great acoustics. The theater is still in use. The actors can be heard perfectly by all 15,000 spectators without mechanical amplification.

The Secret of Architectural Acoustics Revealed

BY CHRISTOPHER BROOKS

Have you ever noticed that your radio seems awfully loud when you stop your car after listening on the highway? Or have you ever felt that palpable sense of relief when the air conditioner shuts off? We don't notice it but background noise determines what we can hear and understand in the foreground.

Sometimes we don't want to hear everything. Imagine if you could hear and understand every conversation at your office. It would be terribly distracting. But when we do want to hear every little thing – in an important meeting, at a play or a concert, at a religious service – reducing background noise is critical.

There are, of course, many aspects to excellent acoustical design, but in these spaces intended for listening – what I call "critical-listening spaces" – strict control of noise is fundamental. Sources of noise include traffic, airplanes, machinery, plumbing, lights and people in other spaces. In critical-listening spaces, the worst offender is usually the heating, ventilating and air-conditioning system (HVAC).

Background noise determines the softest sound that a performer or speaker can effectively utilize. Even in spaces that most people would consider quiet, the background noise level can be 20 to 30 decibels (dB) above the threshold of hearing. You don't notice this, but the performer has lost 20 to 30 dB of dynamic range! (See Figure 1.)

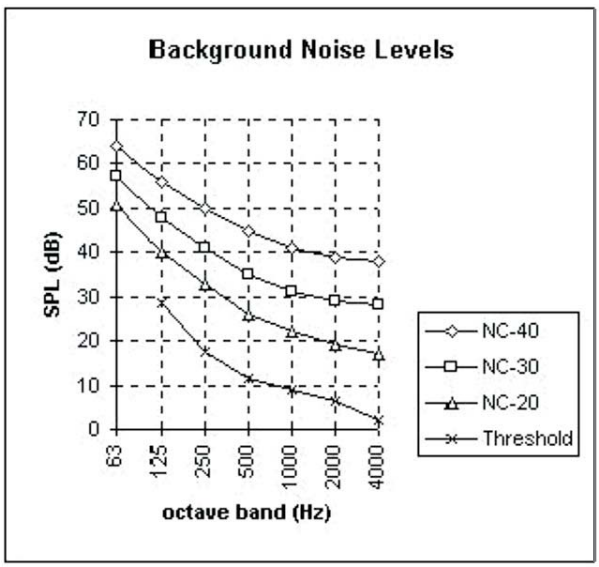


Figure 1. A comparison of HVAC noise criteria curves for different types of spaces. NC-40 is considered acceptable for such noncritical spaces as lobbies and corridors. NC-30 would be acceptable for a motel room. NC-20 is often given as acceptable for churches or drama theaters. Notice the difference between the threshold of hearing curve and NC-20. There is good deal of audible sound being covered up by an HVAC system at NC-20.

Hearing Speech and Music

When a theater is truly quiet, an actor can use his entire dynamic range, from a shout to a whisper, and still be clearly understood. Since the quiet moments in a drama are often the most electrifying, strict control of background noise is essential.

The ancient Greek theaters are known for their remarkable acoustics for speech. One can hear a coin drop from the farthest seats in the theater at Epidaurus. How can this be? The answer is that no audible sound covers up the sound of the coin striking stone – and so it is heard.

Similarly for music, a silent background allows a performer to exploit his entire dynamic range. The loud climaxes of a musical performance can be wonderfully stirring, but the quiet moments set off these climactic moments and give them their power. Without the quiet moments, music would be all on the same dull level. Furthermore, some of the most intense, magical moments in music are the softest. These moments are only possible when the hall in which they occur is truly quiet. Recording engineers understand this concept. They commonly turn off all mechanical systems and most lights while recording.

Many spaces are used for both speech and music, the best example being places of worship. For such mixed use, a silent background is particularly important. This is because reverberation (the persistence of sound in space) is necessary for music. Without reverberation, music sounds flat and dull. But reverberation can interfere with speech intelligibility by prolonging the sounds of speech, smearing them in time.

A good speaker corrects for this effect by speaking slowly and clearly, working with reverberation to enhance the sound of his voice. However, reverberation amplifies background noise, creating a double difficulty for speech. Contrary to common belief, speech can work quite well in a properly designed reverberant space, but only if background noise is minimized.

Audience Noise

Audience noise is beyond the direct control of the architect or acoustical consultant. However, research shows that audience members are significantly quieter when background noise levels are very low. In the City of Birmingham Symphony Hall in Birmingham, England, a hall with exceptionally low background noise, audience members are so attentive during quiet music passages that they often hold their breath to listen. Other famous spaces with extremely low background noise levels include Meyerson Symphony Hall, Dallas; Domain Forget, Charlevoix, Quebec; New Jersey Performing Arts Center, Newark; and Clemens Theatre, Christopher Dock Mennonite School, Lansdale, Pa.

Even in spaces where listening may not be the primary function, people are always hearing and the acoustics of these spaces can almost always be improved, among other measures, by lowering background noise. I was recently in a gymnasium, for instance, where there was a horrible screeching noise from the lights. The poor gym teacher who has to work in that space must have a perpetual headache!

In the vast majority of places where I listen – churches, theaters, lecture halls, recital halls, concert halls – background noise

imposes a haze in front of the sound. This noise itself goes unnoticed by most people. Instead, they notice that their experience is diminished: the tone color of the violins is dull; the sound lacks clarity; they can't quite understand the words. The most common response is to turn up the volume, which can add 15 to 20 dB to overall noise levels. Wouldn't it be better to unveil the speaker by removing 20 to 30 dB of background noise? Furthermore, lower background noise would make the sound system technician's job vastly easier.

See and Hear for Yourself

The effect of background noise can be compared to looking through a dirty window: You don't notice the dirt on the window; you simply can't make out the view. Clean the window for a striking improvement in clarity. And so it is when background noise is controlled. You can hear this for yourself by doing the following simple experiment among three people: Two people stand on opposite ends of the room. The third person is on hand to manage the noisemakers: fans, ventilation systems, lights, dimmer racks, air conditioning, etc. Turn on all noisemakers. In actuality, not all these devices would be on at the same time, but for the sake of demonstration, turn them on to create the greatest contrast. Converse with the person across the room. Note the effort necessary to understand and make yourself understood. Turn off all the noisemakers at once. Listen. Proceed with your conversation and note the change in effort necessary to understand and be understood. Even in rooms that have other acoustical difficulties, the improvement should be clear and palpable.

Cutting Down on Noise

When designing a new critical-listening space, consider the location of noise-producing machinery such as air-handlers, and consider a silent mechanical ventilation system from the very beginning. Few people realize that it is possible to supply cool air to a room without creating any noise; however, such a system must be considered from the beginning of design.

An architect once called me to help with the design of a high school auditorium. I discovered that it was too late in the design to move two large air-handlers from their location on the roof of the auditorium. They might just as well have been put on stage! I did my best to help out but nothing I could recommend for the inside of the room would cancel out the deleterious effect of those two huge noisemakers.

In the case of historic renovation, noise control may be the only option available for improving the acoustics of a space. In some cases, merely quieting a noisy mechanical ventilation system will effect a drastic improvement in the acoustics.

Conversely, many a perfectly lovely space has been ruined acoustically by a loud, new ventilation system. When planning the renovation of a worship or performance space, make noise control among the first considerations.

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Even on a tight budget, noise control is fundamentally important to the success of any building for listening. It can mean the difference in sound quality and the usefulness of the building. Since buildings are designed to endure – even to last hundreds of years – it is well worth it to invest in good acoustical design. If you have to cut corners somewhere, it would be better to buy cheap seating than to skimp on sound. Better seats can always be purchased later, but acoustical design is for the life of a building.

Since the level of background noise determines what we can hear in a space, it determines the level of acoustical excellence. This is truly the secret of great acoustics. Awareness of this secret in the early stages of design brings excellent acoustics within your grasp for your new critical-listening space. ■

Christopher Brooks is a senior consultant with Acoustic Dimensions, an architectural acoustics firm with offices in New Rochelle, N.Y., Dallas, Texas, San Diego, Calif., and Coventry, England. Brooks works for the New York office out of Lancaster, Pa., and may be reached at cbrooks@ad-ny.com or 717.291.9123.

Sound Support: Acoustical Society of America

The Acoustical Society of America (ASA), founded in 1929, is a network of experts from a variety of fields related to sound, including physics, electrical, mechanical, and aeronautical engineering, oceanography, biology, physiology, psychology, architecture, speech, noise and noise control and music. This diversity leads to an interchange of knowledge and research among its 7,000 members that has served to stimulate further progress in many of the disciplines which make up the society. Much of the research carried out by ASA members is published in the society's monthly publication, *The Journal of the Acoustical Society of America*. Additionally, the society recognizes landmark achievements in acoustics through various awards.

The ASA also provides various resources that contribute to the construction of good listening environments. One of these, "Classroom Acoustics" (available online at http://asa.aip.org/classroom/booklet.html) educates school districts and administrators on how to ensure that students benefit from the best classroom acoustics possible. According to the ASA, "In many classrooms in the United States, the speech intelligibility rating is 75 percent or less. That means listeners with normal hearing can understand only 75 percent of the words read from a list." When constructing new schools or renovating existing ones, educators would help both students with and without hearing loss by consulting "Classroom Acoustics." ■

DRF Increases Grantmaking: 2010 Grant Recipients Announced

Each year, the Deafness Research Foundation's (DRF) National Hearing Health Grants Center awards research grants to young investigators who are exploring new avenues in hearing and balance science. DRF is excited to announce that it has awarded $550,000 to 22 outstanding research scientists in 2010. This represents a 16 percent increase in our grantmaking over last year. These funds will support research in the following areas:

- Fundamental Auditory Research – development, genetics, molecular biology, physiology, anatomy and regeneration biology;
- Hearing and Balance Restoration – infants, children and adults;
- Cochlear Implants/Surgical Therapy for Otosclerosis, Hair Cell Regeneration, Hearing Aids and Medical Therapy;
- Hearing Loss – aging, noise-induced, otosclerosis, viral infection (sudden deafness), ototoxicity, temporal bone pathology, otitis media, cholesteatoma and tumors;
- Vestibular and Balance Disorders (dizziness and vertigo, Meniere's disease); and
- Tinnitus (ringing in the ears) and Hyperacusis (decreased tolerance of sound).

DRF is the leading national source of private funding for research in hearing and balance science. Research made possible by DRF grants has resulted in dramatic innovations that have increased options for those living with hearing and balance disorders, and has protected those at risk. Since its inception in 1958, DRF has awarded over $26 million through more than 2,000 scientific research grants to researchers who are dedicated to exploring new avenues of hearing and balance science. With the potential of hearing restoration through regeneration biology, the scope of DRF-funded research has expanded enormously. Since 1972, DRF has funded close to 40 research grants that have been instrumental in the development, evaluation and improvement of cochlear implants. Over 188,000 procedures have been completed worldwide with beneficial results, particularly when the procedure is undertaken in infants.

For this year's grants selection, DRF's Council of Scientific Trustees reviewed applications from scientists at renowned research institutions around the U.S. The selected research projects underwent detailed peer review for scientific merit and program relevance. A complete list of the 2010 grant recipients is provided below, including recipients whose research is funded in whole or part by the DRF Centurion Clinical Research Award, the C.H.E.A.R. Endowment Award, The Burch-Safford Foundation, Inc., and The Todd M. Bader Research Grant of The Barbara Epstein Foundation, Inc.

First-Year DRF Grant Recipients

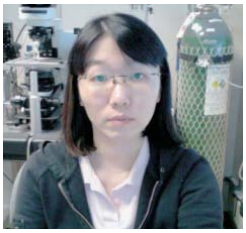
Ranjan Batra, Ph.D., University of Mississippi Medical Center Batra received a B.Sc. in biophysics from the University of Guelph, Canada, in 1976. He went on to receive a Ph.D. in sensory science from Syracuse University and then did postdoctoral research in auditory neurophysiology at the University of Connecticut Health Center from 1983 to 1986. Currently he holds the position of associate professor in anatomy, otolaryngology and communicative sciences at the University of Mississippi Medical Center.

Organization of frequency encoding in the inferior colliculus Understanding how frequency is processed by the brain is key to improving technology that can assist people with extreme hearing loss. A center in the brain that is important for analyzing frequency is called the inferior colliculus. Presently, there are two competing theories for how information about frequency is organized within the inferior colliculus. Batra's research will test these theories against one another.

Fangyi Chen, Ph.D., Oregon Health and Science University Chen received a B.S. and M.S. from Tsinghua University, China, in 1997 and 2000, and a Ph.D. from Boston University in 2005. He began his postdoctoral training at the Oregon Hearing Research Center in the Oregon Health and Science University and is currently a research associate there.

Live imaging of the developing cochlea The otoacoustic emission (OAE) test, which measures an acoustic response that is produced by the cochlea in the inner ear, has become a useful clinical tool because it provides a noninvasive and objective test

for proper outer hair cell function. Chen's research will improve our knowledge of how OAEs transmit backwards to the ear canal, making it possible to quantitatively evaluate cochlear function.



Soyoun Cho, Ph.D., Vollum Institute, Oregon Health and Science University Cho received a Ph.D. in neuroscience from the University of Pittsburgh in 2007. Since then she has been working as a postdoctoral fellow at the Vollum Institute at the Oregon Health and Science University in Portland.

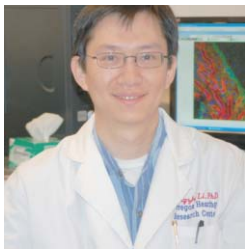
Dynamics of exo- and endocytosis at hair cells The sense of hearing begins at the hair cell synapses in the cochlea. Hair cells convert sound waves into bioelectrical signals. To hear sound correctly, the amplitude, duration and frequency of sound information needs to be delivered to the auditory nerve extremely accurately at this first synapse of the auditory system. It is essential for hair cell synapses to manage this task continuously for extended periods of time and throughout a person's lifetime. However, the mechanisms underlying this unique synaptic transmission are not fully understood. Cho's research will investigate the basic characteristics of the hair cell synapse. This information will also be useful for future clinical aspects related to cochlear implants.

Zhengqing Hu, M.D., Ph.D., Wayne State University School of Medicine Hu earned M.D. and Ph.D. degrees from Shanghai Medical University in China in 1999 and a second Ph.D. from Karolinska Institute in Sweden in 2005. He began his postdoctoral training at the University of Virginia in 2005 and is currently a tenure-tracked assistant professor in the Department of Otolaryngology-HNS at Wayne State University.

Innervation of in vitro-produced hair cells by neural progenitor-derived glutamatergic neurons The focus of this project is to determine whether sensory cells can be innervated by the inner ear stem cell-derived auditory, neuron-like cells in a culture dish. The long-term goal is to develop effective strategies of replacing damaged sensory cells and auditory neurons using stem cell-based approaches, in the hope of restoring hearing.

Judith S. Kempfle, M.D., Massachusetts Eye and Ear Infirmary Kempfle received a medical degree from Ulm University Medical School, Germany, in 2008. Since 2008, she has been working as a postdoctoral research fellow in the Eaton-Peabody Laboratory at the Massachusetts Eye and Ear Infirmary in Boston.

Differentiation of hair cells and neurons from inner-ear stem cells The goal of Kempfle's research is to understand and influence the pathways that lead to the formation of hair cells and neurons from inner ear stem cells in vitro, and to increase the yield of both cell types with specific compounds. In the future, this could potentially be used as a tool to stimulate dormant inner-ear stem cells to regenerate in vivo, thus restoring hearing.



Hongzhe Li, Ph.D., Oregon Health and Science University Li received a B.S. degree in physiology and biophysics from Peking University College of Life Science, Beijing, China, in 1997 and a Ph.D. in neurophysiology from Arizona State University in 2003. Currently he is a senior research associate at the Oregon Hearing Research Center at Oregon Health and Science University.

Mechanisms of ototoxic synergy due to sound and aminoglycosides Exposure to loud sounds causes temporary or permanent threshold shifts in auditory perception, with reversible or irreversible cellular damage in the cochlea. Aminoglycoside antibiotics, such as gentamicin, used for treating or preventing life-threatening bacterial infections, also induce cytotoxicity (toxic agents to cells) in the cochlea. Li's research will determine if sound stimulation synergistically enhances sensory cell uptake of aminoglycosides. The long-term goal of his research is to develop effective strategies to prevent aminoglycoside ototoxicity induced by sound.

Sho Ohta, Ph.D., University of Utah Ohta received a degree in molecular biology from Okayama University of Science, Japan, in 2000 and a Ph.D. from Kumamoto University in 2006. He began postdoctoral training at Kumamoto University and is currently a postdoctoral associate in the Department of Neurobiology and Anatomy at the University of Utah.

The role of BMP signaling in regulating E-cadherin endocytosis during vestibular organ formation Ohta's research seeks to understand how E-cadherin endocytosis is regulated by Bmp signaling during vestibular development. The long-term goal is to understand the molecular mechanisms that generate the complex 3-D structure of the vestibular organ.

Albert Park, M.D., University of Utah, School of Medicine Park received a medical degree at Washington University School of Medicine in St. Louis before completing a residency in otolaryngology at Loyola University Medical Center and a pediatric otolaryngology fellowship at the Hospital for Sick Children in Toronto, Canada. He is currently a professor in

otolaryngology-head and neck surgery and pediatrics at the University of Utah.

Translational studies for antiviral treatment of cytomegalovirus-induced sensorineural hearing loss The goal of Park's research is to determine whether an antiviral agent, ganciclovir, prevents hearing loss in newborn guinea pigs infected with cytomegalovirus. The long-term goal of his research is to develop optimal antiviral therapies to treat the devastating consequences of cytomegalovirus-induced hearing loss.

Neeliyath A. Ramakrishnan, Ph.D., Wayne State University School of Medicine Ramakrishnan earned a Ph.D. in 2002 in molecular biology from Calcutta University, India. He began his postdoctoral work at Wayne State University, studying ion channel expression in vertebrate hair cells. He is currently a research associate at the Department of Otolaryngology, Wayne State University.

Molecular interactions of the hair-cell afferent synapse Ramakrishnan's research aims to understand how the synaptic neurotransmissions from hair cells are regulated. Protein-protein interaction is an essential part of this regulatory mechanism. His goal is to identify hair cell synaptic proteins that interact with these two proteins. His study will also focus on the calcium- and lipid-binding properties of otoferlin. In the long run, these studies will provide valuable information about the nature of molecular interaction in hair cell synaptic transmission and may help develop noninvasive methods of treatment for some forms of deafness.

Soledad Miranda-Rottmann, Ph.D., Howard Hughes Medical Institute, The Rockefeller University Miranda-Rottmann received a degree in biochemistry in 1994, as well as a Ph.D. in 2003 from the Catholic University of Chile. She completed her postdoctoral training in sensory neuroscience with A.J. Hudspeth in 2007 at The Rockefeller University, were she is currently a research associate in the laboratory of Robert B. Darnell.

Regulation of the efferent innervation to the mouse cochlea The goal of Miranda-Rottmann's research is to understand how the brain forms connections toward the ear to send feedback information. This information is crucial in preventing noise-induced damage and for understanding selective attention to a specific sound. She proposes the use of a novel mouse model, developed in her laboratory, to find the genes that regulate the growth and maintenance of the neurons that form these connections.

Deafness Research Foundation

Armin H. Seidl, Ph.D., Virginia Merrill Bloedel Hearing Research Center, University of Washington Seidl received a degree in biology from Ludwig Maximilian University of Munich in 1999, followed by a Ph.D. and postdoctoral studies in neurobiology from the Max Planck Institute of Neurobiology in Martinsried, Germany. He also engaged in postdoctoral neuroscience work at the University of Washington, where he is currently a senior fellow at the university's Virginia Merrill Bloedel Hearing Research Center.

Morphometrics of the Mammalian Low-Frequency Sound Localization Circuit The ability to localize sounds is one of the most important tasks our nervous system performs. Sound segregation, the ability to focus on specific sound sources and suppress others (for example at a loud party with many people talking in the same room), is equally important and can be observed throughout our daily lives. Seidl's research will focus on examining the biophysical properties of nerve fibers that form the circuit responsible for sound localization and sound segregation. Understanding the low-frequency sound localization mechanism in the Mongolian gerbil will help develop tools to overcome hearing-related health issues, such as loss of sound discrimination with age.

Yuan Wang, Ph.D., Virginia Merrill Bloedel Hearing Research Center, University of Washington Wang received a B.S. in biomedical engineering from the Capital University of Medical Sciences in Beijing, China, in 1996 and a Ph.D. in biophysics from the Chinese Academy of Science in 2001. She did postdoctoral training at the University of California at San Diego and University of Washington and is currently on the professional staff at the Otolaryngology Department, Virginia Merrill Bloedel Hearing Research Center at the University of Washington.

The role of Subcellular Regulation of TrkB in Dendritic Geometry of Auditory Brainstem Neurons Hearing loss causes structural changes in binaural neurons that are essential for speech recognition and sound localization. These changes hinder accurate binaural encoding even when hearing function is restored by hearing aids or cochlear implantation. This research will provide insight on how to prevent degeneration in neurons and thus improve impaired speech recognition and sound localization.

Jeong-Im Woo, Ph.D., House Ear Institute Woo received a degree in biological sciences from the Sang Myung University, Seoul, South Korea, in 1994 and a Ph.D. from the Ajou University, Suwon, Korea in 2003. She received postdoctoral training at the University of Southern California and Cedars-Sinai Medical Center. Currently, Woo is a senior postdoctoral fellow in the House Ear Institute in Los Angeles.

Role of vasopressin-aqp2 system in endolymph regulation of es epithelial cells The endolymphatic sac is believed to play an important role in the regulation of liquid balance within the inner ear; its dysfunction can lead to diseases such as Meniere's disease. The study will characterize cells of the endolymphatic sac and determine their functionality. The long-term goals are to explore ways to prevent and manage Meniere's disease.

Second-Year DRF Grant Recipients

Ronna Hertzano, M.D., Ph.D., University of Maryland School of Medicine Hertzano received M.D. and Ph.D. degrees from the Sackler School of Medicine, Department of Human Molecular Genetics, at Tel-Aviv University in Israel. She is now a fourth year resident in the Department of Otorhinolaryngology-Head and Neck Surgery, at the University of Maryland, Baltimore. Her research is performed in the laboratory of Scott Strome, M.D., whose work is focused on the study of tumor immunology and autoimmunity.

A new protocol for selective and efficient sorting of the auditory sensory epithelium Identification of deafness-causing genes is instrumental in supplying molecular diagnostics and designing new molecular treatments for hearing loss. The goal of Hertzano's research is to develop methods for separating and characterizing the unique cell types of the auditory sensory epithelium using methods commonly used by immunologists. This would reveal the genetic profile of the different cells in the auditory sensory epithelium, identify new cell-type-specific genes and possibly discover new deafness-causing genes.

Olga Stakhovskaya, M.D., Ph.D., University of California, San Francisco School of Medicine Stakhovskaya received M.D. and Ph.D. degrees at the Russian State Medical University in Moscow. She did three years of post-doctoral training at the University of California, San Francisco, in the Department of Otolaryngology-Head and Neck Surgery, where she was recently appointed to the position of associate research specialist.

Estimating optimum insertion depth for the HiFocus electrode array in individual human cochleae based on high-resolution CT images The human cochlea, as with any structure in the human body, can vary substantially in size among different individuals. This study will continue to determine whether

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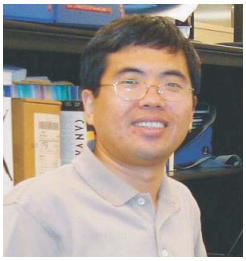
specific analyses of the anatomical dimensions of the cochlea obtained on CT images prior to implant surgery can provide more detailed information for the surgeon by defining the insertion depth required to cover the optimum frequency range in a given individual, and helping to minimize the risk of insertion trauma.

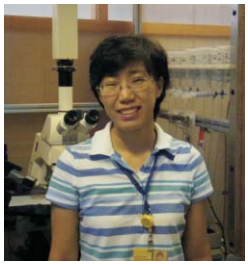
Arminda Suli, Ph.D., University of Washington School of Medicine Suli received a Ph.D. from the Department of Neurobiology and Anatomy at the University of Utah, where she studied nervous system and vascular system development during embryogenesis. Suli currently works as a post-doctoral fellow at the University of Washington in the laboratories of David Raible and Edwin Rubel, using zebrafish as a model system for understanding sensory hair cell regeneration.

Assessing functional recovery after mechanosensory hair cell regeneration in the zebrafish lateral line One way of restoring hearing loss due to hair cell damage is to promote the regeneration of the damaged sensory hair cells by restoring the molecules that instruct these cells to form. Suli's research will continue to establish a user-friendly method that will allow researchers to determine the functionality of the regenerated mechanosensory hair cells in larval zebrafish.



Ruili Xie, Ph.D., University of North Carolina at Chapel Hill School of Medicine Xie received a B.S. in biochemistry from Peking University in China and a Ph.D. in neuroscience from the University of Texas at Austin. Currently he is a post-doctoral research associate at the University of North Carolina at Chapel Hill.

Synaptic transmission in the principal cells of the anteroventral cochlear nucleus during age-related hearing loss Age-related hearing loss (AHL), or presbycusis, is a common disorder that affects most individuals and causes conditions ranging from deteriorated hearing sensitivity to complete deafness. Xie's research will continue to identify changes in the neural network during AHL by studying synaptic transmissions in the cochlear nucleus, which is the first neural station of the central auditory system that gates all the sound information going into the brain. This research will help to provide guidance in restoring normal synaptic transmission during AHL, thereby preventing or postponing its development.



Eunyoung Yi, Ph.D., The Johns Hopkins University School of Medicine Yi received a B.S. and M.S. in pharmacology from Chonnam National University in Kwangju, Korea, and a Ph.D. in pharmacology and toxicology from the University of Mississippi Medical Center. Yi is

currently a post-doctoral fellow at the Johns Hopkins School of Medicine, Department of Otolaryngology-Head and Neck Surgery in Baltimore, Md.

Dopaminergic modulation of inner hair cell afferent synaptic transmission Yi's research will continue to identify the cellular and molecular mechanisms of dopaminergic feedback signaling from the brain to the ear. This is most likely one of the body's own ways of protecting the ear from noise trauma. Therefore, identifying and understanding the underlying mechanisms may lead to the devising of pharmacological preventive measures against noise trauma.

RECIPIENT of the DRF CENTURION CLINICAL RESEARCH AWARD

Craig A. Buchman, M.D., University of North Carolina at Chapel Hill School of Medicine Buchman received a B.S. degree in microbiology from the University of Georgia in 1986 and an M.D. from the University of Florida. He then attended the University of Pittsburgh where he interned in surgery in 1991, was a research fellow in pediatric otolaryngology in 1992 and a resident in otolaryngology in 1996. He was a research fellow in neurotology at the House Ear Institute and Clinic in Los Angeles and is currently a professor in otolaryngology-head and neck surgery at the University of North Carolina at Chapel Hill School of Medicine.

Auditory neuropathy spectrum disorder in children Auditory Neuropathy Spectrum Disorder (ANSD) is an important clinical syndrome affecting about 10 percent of children with newly identified hearing loss. Currently available testing modalities are unable to predict auditory thresholds or speech perception abilities in children with ANSD, necessitating dependence on behavioral testing, thereby delaying intervention significantly. The goal of Buchman's research is to facilitate appropriate intervention among ANSD children by identifying functional biomarkers that can predict successful use of a particular intervention strategy, such as hearing aids or cochlear implants.

This research award is funded by the Centurions of the Deafness Research Foundation. DRF has partnered with the CORE Grants Program of the American Academy of Otolaryngology-Head and Neck Surgery to offer a one-year Centurion Clinical Research Award for clinical research in hearing and balance science.

RECIPIENT of the DRF C.H.E.A.R. ENDOWMENT GRANT

Frances Hannan, Ph.D., New York Medical College (First-Year DRF Grant Recipient) Hannan was educated at the University of Melbourne, Australia, receiving a B.Sc.Ed. in chemistry and biology in 1981, a B.Sc. in genetics in 1984, and a Ph.D. in genetics in 1990. She continued to pursue postdoctoral studies at Cold Spring Harbor Laboratory in New York, Cambridge University in England, and the University at Buffalo prior to taking a faculty position at New York Medical College in 2006.

The role of diaphanous in the auditory cytoskeleton Mutations in the human DIAPH1 and DIAPH3 genes cause dominant inherited deafness in people with nonsyndromic hearing loss (DFNA1) or auditory neuropathy (AUNA1), respectively. The auditory systems of fruit flies and humans share many features, including the use of stretch-sensitive nerve cells for sound detection. Hannan's study will characterize defects in the microtubule network of auditory neurons in diaphanous mutant flies and study the development and stability of these microtubule networks. This may eventually lead to novel treatments or diagnostics for hereditary hearing loss or auditory neuropathy.

The C.H.E.A.R. (Children Hearing Education and Research) endowment was created to support an annual Sensory-Neural Deafness Research Grant. C.H.E.A.R. was absorbed into DRF in 1991, and we are proud to continue their legacy of funding research in sensorineural deafness.

RECIPIENT of the BURCH-SAFFORD FOUNDATION GRANT

Saima Riazuddin, Ph.D., Cincinnati Children's Hospital Medical Center (First-Year DRF Grant Recipient) Riazuddin received a Ph.D. in molecular biology and completed post-doctoral training at the National Institutes of Health. She is currently an assistant professor in the Division of Pediatric Otolaryngology-Head and Neck Surgery at the Cincinnati Children's Hospital and the Department

of Otolaryngology at the University of Cincinnati.

Defining the role of tiucellular tight junction protein in the inner ear The goal of Riazuddin's research is to investigate the genetic factors associated with hearing impairment and the precise mechanism of various forms of hearing dysfunction. The long-term goal is a better understanding of the molecular mechanism of inherited hearing loss with the aim of discovering drugs or treatments to prevent this disease.

This research award is funded by The Burch-Safford Foundation, Inc.

RECIPIENT of the TODD M. BADER RESEARCH GRANT of THE BARBARA EPSTEIN FOUNDATION, INC.

Marcello Peppi, Ph.D., Massachusetts Eye and Ear Infirmary (First-Year DRF Grant Recipient) Peppi received a Ph.D. in physiology from the University of Cagliari, Italy, in 2003 and then underwent postdoctoral training at the Center for Molecular Medicine and Genetics at the Wayne State Medical School in Detroit. Peppi is currently a research associate in the Otology and Laryngology Department (Harvard Medical School) at the Massachusetts Eye and Ear Infirmary.

Molecular mechanisms of dexamethasone-mediated protection from acoustic trauma Corticosteroids are widely used for the treatment of inner-ear disorders. The possible presence of a protective sub-pathway among the broad variety of pathways initiated by corticosteroids may provide significantly improved therapies for degenerative hearing loss. Corticosteroids have also proven useful in other nervous system traumatic disorders, such as brain tumors and spinal cord injury, though those mechanisms of protection have not been identified. PLZF is present throughout the nervous system. If, as in the cochlea, PLZF is the trigger for protection in those cases, findings on its role in cochlear protection could have obvious broader implications.

This research award is funded in part by The Todd M. Bader Research Grant of The Barbara Epstein Foundation, Inc. ■

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SIPRelay is a free service provided by Sorenson Communications, which enables deaf and hard-of-hearing individuals to place text-based relay calls from a PC or mobile device to any hearing individual in the U.S. who uses a standard telephone.

www.SIPRelay.com
866.756.6729
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SOUNDAID Hearing Aid Warranties

SoundAid Hearing Aid Warranties is a direct-to-consumer hearing aid warranty company offering loss, damage and/or component failure coverage on all makes and models of hearing aids and tinnitus devices.

www.SoundAid.com
800.525.7936
p.8

SoundClarity™

Sound Clarity, Inc. offers a complete line of assistive devices for people with hearing loss, including amplified telephones, personal amplifiers, hearing aid batteries and supplies and much more.

www.SoundClarity.com
888.477.2995
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Deafness Research Foundation

Sprint CapTel

Do you shy away from the phone because you can't understand people? With Sprint CapTel you can read captions of your calls while you speak and listen to your caller! Visit our Web site to learn more!

www.SprintCaptel.com

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WCI WEITBRECHT

WCI is the nation's largest distributor of assistive listening devices for people with hearing loss, including the CapTel® captioned telephone. The company specializes in helping hearing professionals provide total overall solutions for their patients.

www.Ultratec.com
800.233.9130
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verizon

Verizon Center for Customers with Disabilities (VCCD) offers solutions for customers with vision, hearing, speech, cognitive or mobility limitations. Consultants are trained to understand accessibility issues, products and services, and disability-related exemptions and discounts in addition to routine Verizon customer sales/service.

800.974.6006 (Voice/TTY)
508.251.5301 videophone
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Dedicated to Healthy Hearing

Deafness Research Foundation announces our monthly e-newsletter

Hearing Health E-News

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Dedicated to Healthy Hearing

Deafness Research Foundation

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www.drf.org
212.328.9480, TTY 888.435.6104
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I AM AN ELECTRICAL ENGINEER *and I Chose AB*

Howard is a technology expert. As an electrical engineer, he knows the science of signal processing and understands how crucial technology is for hearing his best. Howard needed the high-performing, reliable cochlear implant system with the best possible sound processing in order to succeed at work and in life, which is why he chose AB.

If you're not benefiting from hearing aids, then it's time to consider a cochlear implant from Advanced Bionics. At home, at work, and on the town, many recipients hear their best with AB's Harmony™ HiResolution™ Bionic Ear System, the world's most advanced cochlear implant system.

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