



SOUND *W*aves

Newsletter for Professionals

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Editors: Mary Joe Osberger, PhD • Patricia Trautwein, AuD • Dawn B. Koch, PhD • Tara Sherrill, MA

Implementing Active Current Steering for Increased Spectral Resolution in CII Bionic Ear® and HiRes 90K® Users

While many cochlear implant users do remarkably well understanding speech in quiet, many still have difficulty hearing in noise or distinguishing multiple talkers. Furthermore, most implant recipients do not enjoy listening to music. The reason implant users have difficulty hearing in challenging listening conditions or appreciating music is because of the limited spectral resolution delivered by current devices.

Thus, the challenge for today's cochlear implant systems is to maximize representation of frequency information with a limited number of fixed electrodes to increase the spectral resolution available to implant users. For normal-hearing people, spectral resolution derives from a complex interaction of an acoustic signal's fundamental frequency, spectral shape, temporal waveform and intensity. It is not understood completely how pitch is encoded, but it is known that two mechanisms underlie the representation of frequency in the auditory periphery. One mechanism—the place code—derives from the place of maximum stimulation

along the basilar membrane, which is dependent on the waveform of the acoustic stimulus. The other—the periodicity code—derives from the temporal patterns of neural firing in auditory nerve fibers. These two mechanisms interact in complex ways to allow normal-hearing listeners to resolve differences in pitch.

The mechanisms for conveying spectral information in a cochlear implant are different than in a normal cochlea. With electrical stimulation, the delivery of frequency information can be separated into 1) place of stimulation and 2) the rate of stimulation. However, unlike in normal hearing, the place of stimulation is not determined by the acoustic waveform, but rather it can be manipulated independently by encoding which electrode is stimulated. Historically, the number of electrodes in a system has defined the number of spectral bands. Therefore, the number of spectral bands of resolution was limited to the maximum number of electrodes.

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From the beginning, cochlear implant researchers have explored mechanisms for enhancing spectral resolution given the limited number of electrodes that could be inserted into the cochlea. Townshend and colleagues (1987) first reported that for three subjects with the UCSF device (precursor to the Bionic Ear), additional pitch percepts could be created by stimulating two electrodes at the same time. The study showed that the perception of pitch could be varied systematically by adjusting the proportion of current delivered simultaneously to two electrodes. The additional pitches were heard as one pitch rather than two separate pitch components and were intermediate to the pitches heard when either electrode was stimulated alone. A similar experiment by Wilson, et al. (1994) in an Ineraid user showed the same results. Wilson suggested that this simultaneous stimulation technique, also referred to as current steering, could be used to introduce additional spectral resolution to implant users.

Theoretically, with fine control over the proportion and amplitude of current delivered to each electrode of the pair, the locus of stimulation can be steered between the two electrodes. Thus, many intermediate spectral bands are created between the fixed electrodes.

An alternative mechanism proposed the use of non-simultaneous stimulation of electrode pairs for evoking pitches that are intermediate to those evoked by the corresponding electrodes when stimulated alone (McDermott and McKay, 1994). This is the only mechanism that can be implemented in cochlear implants with a single current source and is the one implemented by contemporary high-rate sound processing strategies. However, there are at least three potential disadvantages to this non-simultaneous scheme for representing spectral information.

- First, for complex stimuli, the filter “skirts” can create undesirable overlap between stimulus components causing “spectral smearing.” Consequently, listeners may not be able to distinguish between a tone presented at a frequency that is intermediate between two electrodes and two tones that are presented at frequencies matching both electrodes.
- Second, because non-simultaneous stimulation of adjacent electrodes requires substantial current to generate intermediate pitch percepts, the neural activation area is more diffuse compared to stimulating each electrode independently.

- Third, sequential stimulation in a single current source implant may require a further reduction in the number of spectral bands stimulated in each cycle (N of M versus $n/2$ of M) since each spectral band requires sequential stimulation of two adjacent electrodes.

Yet another suggested mechanism for creating an intermediate spectral band is to simply short adjacent electrodes together (Busby and Plant, 2005). However, this mechanism is limited in that only one single additional spectral band can be created between adjacent electrodes [$n + (n-1) =$ total possible spectral bands, where $n =$ the number of electrodes]. Moreover, the sound quality of each intermediate spectral band may vary since current will take the path of least resistance to the neural elements. Hence, sound quality cannot be assured because of uncontrollable fluctuations in electrode impedances.

Now with the advent of the HiRes 90K® and CII Bionic Ear® Systems, the technology exists to actively steer current between adjacent electrodes to create additional spectral bands as first demonstrated by Townshend (1987) and Wilson (1994). Active current steering is made possible in the HiRes System because each electrode has its own separate power source, thereby allowing current to be delivered simultaneously to pairs of electrodes. Theoretically, with fine control over the proportion and amplitude of current delivered to each electrode of the pair, the locus of stimulation can be steered between the two electrodes. Thus, many intermediate spectral bands are created between the fixed electrodes. As long as the total current delivered is constant, loudness perception remains essentially unaffected (Donaldson, et al., 2005).

A published study by Donaldson, et al. (2005) extended the work of earlier investigators by exploring the use of current steering to create additional spectral bands in between the electrodes in a small number of CII and HiRes 90K recipients. Their results showed that these listeners could hear multiple, unique pitches when current was steered between adjacent electrodes. Donaldson’s results suggest that some of the disadvantages

associated with non-simultaneous dual electrode stimulation can be overcome in HiResolution® Bionic Ear recipients. First, because a large number of spectral bands can be generated using one electrode pair, the effects of spectral smearing can be reduced or eliminated. Second, because simultaneous stimulation requires much less current than non-simultaneous stimulation, a narrower cochlear region may be maximally stimulated, thereby evoking more distinct pitch perceptions.


HiRes Fidelity 120™*

HiRes Fidelity 120 (HiRes 120) is the first commercial implementation of active current steering in a cochlear implant system. Building on the fine temporal resolution of the original HiRes, HiRes 120 was designed to enhance spectral resolution through the creation of additional spectral bands. HiRes 120 retains the time-efficient, simplified fitting approach of HiResolution® Sound (HiRes) to facilitate upgrading patients from HiRes to HiRes 120. In original HiRes, incoming sound is filtered into 16 spectral bands. The energy of each band is extracted, and its envelope modulates a high-rate pulse train that is delivered to a single corresponding electrode. In HiRes 120, the input signal is analyzed in greater spectral detail than with the original HiRes to achieve a maximum of 120 spectral bands. The four basic stages of HiRes 120 sound processing are: 1) *capture*, 2) *compose*, 3) *detail* and 4) *deliver*. After capturing the incoming acoustic input (Stage 1), the signal is composed (Stage 2) for finer spectral resolution using fast Fourier transformation (FFT) algorithms. Next, in Stage 3, a detailed analysis of temporal and spectral information is processed in parallel. The temporal detail is extracted with Hilbert processing, while a navigator locates the spectral maximum for each electrode pair across the 120 spectral bands. The estimated frequency of the spectral maximum is used to compute the rate of the pulse train and to continuously select the optimal location for delivering stimulation (Stage 4). As described above, the spectral bands are delivered by precisely varying the proportion of current delivered simultaneously to adjacent electrodes in each electrode pair. For each electrode pair, there are eight spectral bands. Therefore, when all 16 electrodes are enabled, 120 spectral bands are created (15 electrode pairs x 8 spectral bands = 120).

HiRes 120 was realized as a wearable sound processing strategy after a three-year research and development effort at Advanced Bionics. The effort that resulted in the first and only commercial

implementation of an optional feature to theoretically enhance spectral resolution for cochlear implant recipients was led by Dr. Leo Litvak. For his achievement, Dr. Litvak was awarded the prestigious John Abele Award from Boston Scientific Corporation in 2006.

Summary

The increased spectral resolution of HiRes 120, in combination with the fine temporal resolution already implemented in standard HiRes, has the potential to provide some Bionic Ear users with better speech perception (especially in noise), enhanced music appreciation and improved sound quality overall. HiRes 120 is the latest in software upgrades that take advantage of the untapped capability of the implanted CII and HiRes 90K electronics. 

REFERENCES

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*In the United States, an optional feature for adults only. See package insert for details.

Upcoming Events


Advanced Bionics Professional Events

Announcing the 2007 Clinician Introductory Training Workshops!

Advanced Bionics understands the importance of keeping current with evolving changes in implant technology. Thus, we are pleased to offer three Introductory Training Workshops for 2007: February 6–8, June 12–14 and October 23–25. These three day workshops will provide clinicians with the basic principles of implant design, signal processing, current fitting concepts, clinical applications of objective measures, and device manufacturing and reliability.

If you are interested in attending one of the upcoming 2007 Training Workshops or would like further course details, please visit our website:


<http://www.bionicear.com/professionals/events.asp>.

If you have specific questions and would like to contact us directly, e-mail or call us: registration@advancedbionics.com; (800) 678-2575, ext. 1593. 

We hope to see you at one of these workshops and look forward to working with you!

Web Class Update

E-Learning Opportunities for Clinicians

The Bionics Education Team invites you to join our seminar series. Each course is free, one hour in duration and is offered for 0.1 ASHA, AAA and IHS CEUs. Additionally, these classes will be recorded for those unable to attend the live sessions. To view or register for any of our current or recorded classes, visit our website at www.bionicear.com/professionals and select "online training events." To participate in these courses, we recommend a PC with high-speed Internet access and a sound card. The Web Class list offered for the coming months is listed below. We hope you will be able to join us. For further information or if you have any questions about our Web Classes, please contact Carissa Moegenburg at Carissam@advancedbionics.com. 

Courses

Bringing Music to Life:

Music and Language

October 17, 2006

12 PM & 8 PM

Amy Robbins and Chris Barton

Bringing Music to Life: Nurturing Music Development in Children With Cochlear Implants, Part I: Rhythm

November 21, 2006

12 PM & 8 PM

Chris Barton

Tuesdays With Mary: Tool Time

Listening Activities for the Schoolchildren

December 5, 2006

12 PM & 3 PM

Mary Koch

Bringing Music to Life: Nurturing Music Development in Children With Cochlear Implants, Part I: Rhythm

December 12, 2006

12 PM & 8 PM

Chris Barton

Courses continued

Extreme Makeover: Cochlear Implant Edition Webinar Series

January 16–March 6, 2007*

Course Description: It is time for a Makeover! These Webinars will modernize and rebuild your approach and knowledge of cochlear implants. This series consists of 8 episodes covering a variety of topics with invited speakers from across the country who are all experienced leaders in the field of early identification and early intervention of hearing loss. Each episode will provide practical suggestions and tips on how to improve therapy strategies for today's cochlear implant recipients.

Target audience: Educators, Auditory-Verbal Therapists, Audiologists, Speech-Language Pathologists, Early Intervention Specialists, Parents.

Registration is Free and CEUs are available for each episode! For those who can not attend a live episode each episode will be recorded for later viewing.

For further information visit: www.BionicEar.com/Onlinetrainingevents

*Series meets every Tuesday at 12 PM and 8 PM EST, and the episodes are one hour in duration.

Therapy GuidePosts Webinar Series

March 15–October 18, 2007*

Course Description: The cochlear implant journey begins from the moment a hearing loss is identified and a decision is made to receive a cochlear implant. Whether it is a young child or an adult, there will be a series of GuidePosts that are needed to maximize the recipient's success with the cochlear implant. This series will provide the participant with necessary GuidePosts to create a (re)habilitation plan that meets the unique needs of cochlear implant recipients, so that they can augment their performance outcomes.

Target audience: Educators, Auditory-Verbal Therapists, Audiologists, Speech-Language Pathologists, Early Intervention Specialists, Parents

Registration is FREE and CEUs are available for each session! For those who can not attend a live session each class will be recorded for later viewing.

For further information visit: www.BionicEar.com/Onlinetrainingevents

*The second and fourth Thursday of each month at 12 PM and 8 PM EST.

Listening for Littles All Day Long Webinar Series

March 20, May 22, September 25 and December 18, 2007*

Target audience: Educators, Audiologists, Speech-Language Pathologists, Early Intervention Specialists, Auditory-Verbal Therapists, Parents

Registration is FREE and CEUs are available for each session! For those who can not attend a live session each class will be recorded for later viewing.

For further information visit: www.BionicEar.com/Onlinetrainingevents

*Each course is offered at 12 PM and 8 PM EST and is one hour in duration.

Research News

Interim Research Bulletin

In 2005, Advanced Bionics published the inaugural issue of the Biennial Research Bulletin, a compendium of worldwide collaborative studies with its HiResolution Bionic Ear technology. In late 2006, an abbreviated summary of research, the Interim Research Bulletin, will be distributed. Highlighted research areas and studies will include:

HiRes Fidelity 120™

- U.S. and European results in adults

Auria Harmony Speech Processor

- U.S. and European results in adults and children

Current Steering Psychophysics

Music Perception and Appreciation

- HiRes Fidelity 120 adult results
- Pediatric HiRes music research
- Music Time
- Musical Stages Profile

Bilateral Implantation

- U.S. and European adult results
- Iowa HiRes Fidelity 120 research
- Pediatric bilateral study protocols

Sound Processing Research

- Novel stimulation waveforms
- New signal analysis and delivery algorithms

Electrode Development

- HiFocus Helix®/Slim Helix temporal bone research
- Preservation of residual hearing

Objective Measures

- NRI/eSRT results from the U.S. and Europe
- Banded NRI research
- Smart NRI
- Brain mapping

Connectivity and Accessory Studies

- iConnect results in adults and children
- T-Mic® Microphone studies in Asia

New Assessment Tools

- AB Questionnaire
- Everyday Listening Benefits Questionnaire (Europe)
- Family Questionnaire
- CUNY on DVD
- Direct Connect system

Advanced Research Tools

Look for the *Interim Research Bulletin* in December 2006.



Product Update

New Auria® Harmony™ Behind-the-ear (BTE) Speech Processor

The new Harmony Behind-the-ear (BTE) Speech Processor has the same good looks, reliability and user-friendly design as the award-winning Auria Processor. New features requested by Bionic Ear recipients include:

- 16-bit, CD-quality, front-end signal processing
- Greater power efficiency for longer battery life
- Built-in telecoil for easy access to loop systems
- Built-in status LED for easy monitoring of the system during use
- Ability to support a new generation HiResolution Sound designed to enhance performance


Like the Auria BTE, earhook options include the standard T-Mic® Microphone, iConnect, Firefly® and Direct Connect so that users can adapt the Harmony BTE to a variety of assistive accessories and listening environments. With its easy-to-use controls and low-profile headpiece, the Harmony is designed for comfortable real-world listening. Harmony is compatible with all CII Bionic Ear®/HiRes 90K implants and implements HiRes Sound Processing. Harmony also has the capability to provide HiRes Fidelity 120™ Sound Processing

Recently, a group of CII/HiRes 90K users evaluated the new Harmony Processor. Twenty-two adults participated in a clinical study that assessed speech perception, sound quality, battery life and processor satisfaction after using the Harmony for one week.

Overall, subjects experienced improved sound quality, greater power efficiency and increased satisfaction with external control features compared to their previous-generation processors. Specifically, significant improvements ($p < .05$) were noted in the clarity of environmental sounds and the clarity of speech on a mobile phone. After one week of Harmony use, 19 of 22 preferred Harmony to their previous processors with an average strength of preference of 7.1 (1 = weak preference, 10 = strong preference). The following percentages of listeners agreed or strongly agreed with the following statements with respect to Harmony:

79%	Overall quality of sound is better
63%	Speech sounds more natural
63%	Environmental sounds are more distinct and easier to hear
53%	Speech is easier to understand
50%–60%	Various aspects of music sound better

PowerCel™ battery operating times were longer with Harmony compared to the Auria. Average operating time increased from seven to 14 hours for the PowerCel Slim and from 14 to 25 hours for the PowerCel Plus. Furthermore, the reliability of Harmony was highly rated by the study participants.

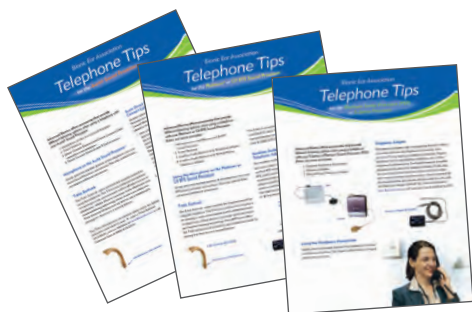
These results were presented by Christiane Seguin (Ottawa Civic Hospital, Ottawa, Ontario) at the 9th International Conference on Cochlear Implants, Vienna, Austria, June 14–17, 2006. 



Tips from the Trenches

BEA Tip Sheets

The BEA has developed a new series of Tip Sheets that provide answers to frequently asked questions. They are geared toward consumers, although professionals may find them useful as well. There are currently five categories in the Tip Sheet Series, including: BEA Telephone Tips, BEA Lifestyle Tips, BEA ALD Tips, BEA Candidate Tips and BEA Community Resource Tips. Each category includes multiple Tip Sheets. For example, under the category of BEA Telephone Tips, there are different sheets about using cell phones versus land line phones. Each series is further broken down by generations of speech processors. The first set of Tip Sheets is available at www.BionicEar.com. For more information, contact Jennifer Raulie at Jennifer.Raulie@advancedbionics.com.



The Enhanced T-Mic[®] Microphone



The enhanced T-Mic Microphone is an auxiliary input accessory for use with the Auria[®] Harmony[™] and BTE (Platinum and CII) Sound Processors.

The T-Mic is positioned in the concha to take advantage of the natural sound-collecting properties of the pinna. Although originally designed for telephone use, the majority of cochlear implant users have found that the T-Mic gives significant benefit in everyday listening situations, thereby making it the earhook of choice.

Unfortunately, the previous generation T-Mic had wires that could break at the transition point from the earhook to the stalk during normal and active lifestyle use. Consequently, the T-Mic

was redesigned based on feedback received from both cochlear implant users and audiologists. The new, enhanced one-piece T-Mic design has a thicker and more durable stalk to protect the wires from sustaining damage through normal wear and tear.

To monitor the success of the improved design, a year-long study was conducted to track the reliability and satisfaction of the enhanced T-Mic. Questionnaires were sent to 40 of our "toughest" T-Mic customers at one-, three-, six- and 12-month intervals. Results of the study (see Figure 1) show that overall reliability of the enhanced T-Mic compared to the standard T-Mic increased significantly from 3.65 to 8.85 on a 10-point scale. Overall satisfaction of the enhanced T-Mic compared to the standard T-Mic increased significantly from 4.39 to 8.74. In addition, overall retention and appearance increased. These ratings indicate that the wire breakage issues during normal use of the T-Mic have been resolved. Thus, the one-piece configuration of the enhanced T-Mic appears to be a successful design improvement for this popular accessory

Here is what some of the study participants had to say about the enhanced T-Mic Microphone:

"We really like the endurance (durability) of this T-Mic. It has been a great product for us. I am glad you decided to change the style—it has been a successful one for us."

"I am very pleased (ecstatic!) that the new T-Mic has lasted a year. I have worn it every day. You have a successful product. Thank you for including me in your study."

"It's a [little difficult] to move the T-Mic to the way I want it, but I suppose that is actually a good thing."

"The enhanced T-Mic lasts twice as long as the old T-Mic. Thank you for providing the stronger one!!"

"You know I LOVE my Auria and T-Mic. I wish the T-Mic would last longer for me—but I love it anyway. Thanks for allowing me to participate in the trial."

Fitting Tips

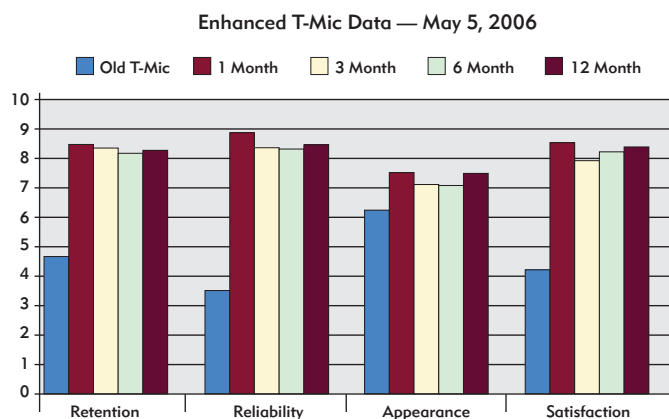


Figure 1. Results of the Enhanced T-Mic study. Attributes were rated on a scale from 1 to 10.

Throughout the course of the study, a handful of T-Mics were returned because of sound quality issues (i.e., muffled, drop in volume). Analysis of these T-Mics indicated a foreign (collagenous) material on the microphone, which is believed to be a combination of ear wax and skin debris. To avoid the collection of unwanted debris on the T-Mic microphone and to prolong the life of the T-Mic, the following steps are suggested:

- Ensure that the microphone does not touch or scrape the inner portion of your ear when putting on your processor.
- Pre-bend the microphone into position before placing the processor on your ear.
- Slightly twist the T-Mic earhook prior to putting on your processor and secure it back into position once it has been placed on the ear.
- Periodically, use a small brush (e.g., a hearing aid brush) to very gently clean any debris off the microphone screen.
- Should the T-Mic earhook become too loose to wear in the appropriate place, contact your programming audiologist because the O-ring may need to be replaced.
- Place the T-Mic and your processor in your DriAid kit regularly for optimal use.

Advanced Bionics hopes that your patients continue to enjoy the hearing benefits they receive from the enhanced T-Mic.

Increasing Communication Through the Visit History Report

What is an easy way to provide a child's outside team members with information regarding a recent programming session?

One easy communication tool is the SoundWave Visit History Report. Parents, educators and outside team members often want information about a child's recent programming session. Specifically, they may want to know what program and settings should be used, what changes were made, and if there are any special programs (e.g., an FM program) placed in the processor. The Visit History Report can be printed easily by the audiologist at the end of a programming session and distributed to parents and other team members who have permission to access this information.

The Visit History Report contains information regarding the specific programs that were created and downloaded to the patient's processor, including the mixing ratio, program number, alarm settings, IDR and notes. Additionally, the audiologist or the parent can write down other important information that may be necessary for the educator and/or outside team members to be aware of such as, *Johnny doesn't seem to like his new program, so please watch for any signs of discomfort or performance decreases and let the parents know.*

The Visit History Report is found under "Reports" on the task bar within SoundWave. Once Visit History Report is selected, the clinician is able to choose which programming session he/she would like to view and print. Simply check the session to view and then select print.

Turkish Centers of Research Excellence

Deborah Vickers, AB SARL

Cochlear implantation began in Turkey in 1986. Today, over 1,700 people in Turkey use cochlear implants. There are 11 cochlear implant centers in Turkey with a wealth of experience. Four of these centers have led the way in setting up and conducting high-quality research studies with Advanced Bionics.

Hacettepe University Hospital

Principal Investigators: Levent Sennaroglu and Erol Belgin

SB Ankara Diskapi Training and Research Hospital

Principal Investigator: Istemihan Akin

SB Izmir Hospital Cochlear Implant Center

Principal Investigators: Levent Olgun and Gül Caner

Osman Gazi University Hospital

Principal Investigator: Armagan Incesulu

Esra Yucel and Gonca Sennaroglu at Hacettepe University have recently developed and assessed a home training program for pitch and melody recognition. Their work was presented at the 8th European Symposium on Pediatric Cochlear Implantation (ESPCI) in Venice in March of 2006 and has formed the basis for one component of Advanced Bionics' pediatric music study. Levent Sennaroglu, Sarp Sarac and Erol Belgin are currently setting up a pediatric bilateral study at Hacettepe exploring new tools for bilateral processing.


Istemihan Akin from SB Ankara Diskapi always has been interested in using objective measures and conducting top quality research projects with the NRI system. The data collected at SB Ankara defined Advanced Bionics' guidelines for using tNRI for pediatric fittings. The most recent research explored the banded NRI system, which incorporated multiple band stimulation to evoke the eCAP, a measurement more similar to the fitting method used by Advanced Bionics. This work also was presented at the Venice conference. Dr. Akin will soon be investigating the SmartNRI system, an automated NRI assessment algorithm.

The results obtained in SSK Ankara have recently been published in the Journal of Laryngology and Otology.

Gül Caner from SB Izmir Hospital has been highly involved in objective measures studies. She initially started with an NRI study and then joined the European multi-center objective measures study, involving the measurement of both NRI responses and stapedius reflexes. Dr. Caner also studied the banded NRI research software. She recently participated in the spectral channels study collecting a large amount of data exploring the use of virtual channels in the Advanced Bionics system. Dr. Caner has presented her work at several international conferences, including the 7th ESPCI in Geneva in 2004, 4th International Symposium on Objective Measures in Hannover in 2005, 8th ESPCI in Venice in 2006 and CI 2006 in Vienna. Levent Olgun is currently working on a special surgical study investigating the preservation of residual hearing.

Armagan Incesulu and Cem Kecik from Osman Gazi University Hospital are exploring video analysis with young children with a particular focus on musical development.


As a group, these four centers make up a region of excellence for clinical studies. Many more Turkish centers are inspired to start Advanced Bionics clinical studies and join this impressive group. By collecting useful data, these centers have contributed significantly to recent advances in the cochlear implant field.

Together, this group of researchers co-hosted the 6th Advanced Bionics European Investigators Conference in Istanbul in 2005. They contributed a great deal to the event and ensured that it was one of the best attended. A benchmark of excellence was set for future events. 

Focus on Eastern Virginia Medical School

Apryl Sweat, Regional Manager, Southeast Region

Advanced Bionics Corporation and the Southeast Regional Team welcome the Eastern Virginia Medical School (EVMS) Cochlear Implant Team to the Advanced Bionics family. Although EVMS is not new to cochlear implants, the team has just started offering the HiResolution Bionic Ear System to patients. EVMS has been involved in cochlear implant studies over the years including, but not limited to, studies looking at residual hearing and bilateral implantation. The surgeons, Drs. Barry Strasnick and Stephanie Moody, operate out of three facilities: Children’s Hospital of The King’s Daughters (CHKD), Norfolk General and DePaul Medical


Center. Likewise, the audiologists (Ashley Wampler, PhD; Kate Berenguer, MS; and Jen McNamara, PhD) program at two facilities—CHKD and DePaul Medical Center—and an office in Virginia Beach. The audiology staff at EVMS is well-rounded and offers many services, including cochlear implant evaluations and management, hearing aid diagnostics and fittings, electrophysiology, newborn hearing screenings and intraoperative monitoring. The Southeast Team looks forward to supporting this well-established program. 

Advanced Bionics Welcomes These New Team Members

Lisa Gokstorp Joins Advanced Bionics in Canada

Advanced Bionics is pleased to introduce Lisa Gokstorp, MS, to the Advanced Bionics team. Lisa is an audiologist from Ontario, Canada. She joins Advanced Bionics as a Clinical Specialist in Western Canada and resides in Calgary. Lisa provides clinical support and training on the use of Advanced Bionics software and hardware at cochlear implant centers. We are pleased to welcome Lisa to the Advanced Bionics team.

Lalita Doughman Joins the West Regional Team

Lalita Doughman, MS, CCC-A, has joined Regional Manager Arlie Adam and Clinical Specialists Mike Page and Natalie Schmitt in the West Region as a Clinical Specialist. Lalita previously served as a Training and Education Specialist, providing education and training to customers, end users, candidates, allied and referring professionals as well as in-house staff and the field force at Advanced Bionics. Lalita’s education and training experience will serve her well as she supports and trains cochlear implant centers on the use of Advanced Bionics software and hardware. The West is pleased to welcome Lalita to the team! 

We welcome the following cochlear implant centers to the Advanced Bionics family.

Sounds of the Valley

Steamboat Springs, Colorado
 Corrin Stine, MA

Westerly Hospital

Westerly, Rhode Island
 David Cameron, MD

California State University Northridge (CSUN)

Northridge, California
 James Andrews, MD
 Karen Spayd, MS, CCC-A
 Bill McFarland, PhD

Online Survey

SoundWaves Survey: Share your experience!

Response from last survey:

The last issue of *SoundWaves* posed a survey question inquiring what percentage of your patients enjoy listening to music with their cochlear implants. Survey response choices were: 0–25%, 25–50%, 50–75% or 75–100%.

Twenty-two responses were received:

- 50% of the responses were 0–25%
- 36% were 25–50%
- 14% were 50–75%
- 0 responses were 75–100%

This issue's question is:

If you see adult cochlear implant patients, what percentage of them participates in some form of post-implant auditory therapy?

- 0 to 25%
- 25 to 50%
- 50 to 75%
- 75 to 100%

To share your answers and opinions, please:

- Visit www.BionicEar.com
- Select *Information Center*
- Go to *Hearing Professionals*
- Select *SoundWaves Survey*
- Submit response

Your feedback is valuable and can be helpful to other clinicians who may be asking similar questions. Please note that the survey will close on January 31, 2007 so that a summary of responses can be included in the next issue of *SoundWaves*.

Thank you to all of the clinicians who participated in this survey!

Mailbag

We welcome your comments on *SoundWaves* articles as well as other topics important to you. Please send your remarks to taras@advancedbionics.com. We may publish part or all of any correspondence you send and reserve the right to edit letters for length, clarity, and style. Please include your name, cochlear implant center, and contact information.

Correction

The last issue of *SoundWaves* incorrectly listed audiologist Nancy Gilston, MA, as Lisa Gilston, MA, in *Focus on The Beth Israel/New York Eye & Ear Cochlear Implant Center*. We apologize for the error.