PROGRAM and ABSTRACTS

of the

AMERICAN NEUROTOLOGY SOCIETY

52nd Annual Spring Meeting

April 28 - 29, 2017

SEAPORT DE
SEAPORT TOWER
LEVEL 2

Manchester Grand Hyatt
San Diego, CA

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CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

Accreditation

This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the American College of Surgeons and American Neurotology Society. The American College of Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

AMA PRA Category 1 Credits™

The American College of Surgeons designates this live activity for a maximum of 6.75 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

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AMERICAN COLLEGE OF SURGEONS
DIVISION OF EDUCATION
Accredited with Commendation by the Accreditation Council for Continuing Medical Education

American Neurotology Society Mission Statement

Purpose: The American Neurotology Society (ANS) is committed to improving public health care through the provision of high-quality continuing medical education (CME) to our members. The overall goal of the ANS Continuing medical Education program is to provide CME activities that will address the knowledge gaps and enhance the clinical competence of the participants. The ANS is dedicated to improving public health care through the development, dialogue and dissemination of advances in evidence-based diagnosis and management of neurotologic and related skull base disorders. The focus on the scientific advances in these combined fields is translated into approaches to quality care that are consistent with ACGME/ ABMS general competency areas and the Institute of Medicine recommendations.

Target Audience: The primary target audience includes members of both the American Neurotology Society and our sister Society, the American Otological Society as well as healthcare professionals in the fields of otology, otolaryngology neurotology and skull base research and healthcare. The members served include physicians, otologists, neurotologists, residents, fellows, researchers, nurses, occupational and speech therapists and other healthcare professionals who are involved in the care of patients with otologic and neurotologic conditions.

Types of Activities Provided: In order to accomplish the goals of the ANS CME program, the Education committee will offer a range of activities with specific educational outcomes in mind. Current offerings include:

- Scientific symposia, delivered twice per year at national venues, showcasing the latest research in the field and featuring national and international experts on related clinical topics.
- Study groups & mini-seminars offered at the annual meeting of the American Academy of Otolaryngology-Head and Neck Surgery.
- Facilitation of manuscript submission on presented materials for publication in a peer reviewed journal (Otology & Neurotology).
- The Otology & Neurotology Journal provides an additional vehicle for further collaboration and dissemination of new information, science and standards of care.

Content: The content of the ANS CME program centers on clinical issues related to Neurotology and disorders of the skull base. The ANS also strives to respond to our members' educational needs that are not being met by other organizations, and therefore also offers activities in the areas of risk management, patient safety, physician-patient communications, coding, HIPAA compliance, and other regulatory issues as they relate to Neurotology. The educational efforts will also highlight the ACGME/ABMS general competencies within the context of this field and relate the significance of communication, professionalism, patient safety and systems-based practice within these workplace environments.

Expected Results: The CME program of the ANS strives to enhance the participants' knowledge and clinical competence in subject areas relevant to the field of Neurotology. The other expected outcome from this CME program is continued development of new evidence-based science, dissemination of ongoing research in the clinical area of Neurotology.

ANS Continuing Medical Education
Planning Process

Practice gaps in Neurotology are identified through polling the ANS membership at the close of each CME activity by way of an exit evaluation at the close of the activity. The responses of the membership are discussed in meetings of the ANS Education Committee, ANS Executive Council and Scientific Program Committee. The evaluation is used as a tool to determine the success of the CME program in meeting program objectives, addressing professional practice gaps and educational needs. The responses are peer reviewed by the ANS Education Committee and the ANS Executive Council prior to the next meeting to assist the Education & Program Committee in developing future ANS Continuing Education programs. The educational program is designed to address the topics identified as practice gaps through individual presentations and in depth panel discussions.

Based on the responses from the 2016 evaluations and follow up questionnaires, the following data regarding professional practice gaps among attendees were noted:

- There is inconsistent knowledge amongst practitioners in the field regarding the history of Neurotology and the struggles that William House had while innovating in the field.
- There is inconsistent knowledge amongst practitioners in the field regarding the role of Telemedicine in Neurotology.
- There is inconsistent knowledge amongst practitioners in the field regarding the various complications that can occur in the field of neurotology and appropriate management strategies to mitigate bad outcomes.

Speakers are advised of the learning objectives and goals of the scientific program. Presenters of the topics will create content based on the practice gaps and learning objectives. They then create presentation using the instructional methods above to present the critical content. Specifically, using didactic lectures, panel discussion and case studies, instructors will focus on conveying the information that is needed to achieve the goals. Content will be reviewed prior to the activity, to be sure they adhere to ANS and ACGME standards. In question and answer sessions, the participants will have the opportunity to ask questions to clarify the conveyed concept. Participants will be queried after the presentation by way of an on-site CME evaluation form on whether the speakers have met the educational goals. Certificates of attendance are handed out only after the attendee completes the evaluation.

The 52nd Annual Spring Meeting of the ANS will begin Friday, April 28th at 1:30 PM. ANS President, Dr. Lawrence R. Lustig will honor the following individuals with a Presidential Citation: Steven W. Cheung, MD; Paul A. Fuchs, PhD; Robert K. Jackler, MD; Anil K. Lalwani, MD; Lloyd B. Minor, MD

Professor Gerard M. O'Donoghue will kick off the Scientific program on Friday as the William F. House Memorial Lecturer. His presentation is entitled, *"The Struggles of Medical Innovation: Honoring the Legacy of Dr. House"*. Dr. Lustig chose Professor Marcus Atlas as the William E. Hitselberger Memorial Lecturer. Professor Atlas will present his innovative lecture, entitled *"Beating the Drum: An Australian Story of Innovation"* at 9:10AM on Saturday.

Additional highlights of the program include a revolutionary panel entitled, *"Telemedicine in Neurotology"*. Invited guest panelists are Jonathan E. Gordon, Dr. David Massaro, and Dr. John Kokesh. Don't miss this panel on Friday at 4PM.
Always a favorite topic among attendees are complications, Dr. Robert Jackler, along with an outstanding group of panelists, will moderate a panel entitled, *"Complications in Neurotology"*. This will conclude the ANS scientific program on Saturday at noon.

The ANS is pleased to present three awards for outstanding abstract submissions. The Neurotology Fellow Award recipient is Dr. Michael S. Harris for his presentation entitled. *"Real-time Intracochlear Electrocochleography Obtained Directly through a Cochlear Implant"*. Dr. Yarah M. Haidar is the recipient of the ANS Trainee Award for her presentation entitled, *" Selective Stimulation of Facial Muscles following Chronic Intraneural Electrode Array Implantation and Facial Nerve Injury in the Feline Model"*. The Nicholas Torok Vestibular Award goes to Dr. Anne K. Maxwell for her presentation entitled, *"Investigating Vestibular Blast Injury: Semicircular Canal Pressure Changes during High-Intensity Acoustic Stimulation"*.

We have two special presentations this year. Dr. Christine Dinh, the first recipient of the ANS Research Grant will present her work titled, *"Cochlear Irradiation: Apoptosis, Necrosis, and Hearing Loss"*. Dr. Dylan Chan was awarded the ANS/AAO-HNSF/Silverstein Otology & Neurotology Research Award in 2014-16. His presentation is entitled, *"Gap Junctions in the Cochlear Response to Sound and Noise in Vitro"*. In addition, there are a vast number of superior oral presentations exploring the latest research and findings.

Be sure to visit the Grand Hall and Foyer where you will find an outstanding display of ANS poster submissions. Posters will be available for viewing on Friday & Saturday, 9:00-4:00. Recipients of the ANS poster awards will be announced at the close of the ANS Scientific program on Friday, April 28th at 5:00 P.M. The Combined Poster Reception/Meet the Authors will take place Friday evening in the Grand Hall/Foyer from 5:30-7:00 PM followed by the 52nd Annual ANS President's Reception at 7:00 P.M. in Coronado DE at the Hyatt. Members and invited guests and speakers are welcome to attend.

Purpose:
The purpose of this CME activity is to provide up-to-date information to physicians in order to increase knowledge, gain competence, enhance practice patterns and improve patient outcomes. The target audiences are neurotologists, otologists, and otolaryngologists and allied health professionals with specific interests in neurotologic and otologic issues.

To close the identified practice gaps, participants of this activity will need to learn:

- Physicians should have a broad understanding of the history of Neurotology and the struggles William House had in innovation.

- Physicians should have a broad understanding of the potential role of Telemedicine in Neurotology.

- Physicians must have a broad understanding of complications that can occur in the field of Neurotology.

How will this educational activity improve competence, practice performance, or patient outcomes?

- The activity will improve physician competence by providing a more thorough understanding of the history of Neurotology as it relates to William F. House as an innovator. Specifically, understanding his successes and failures will help physicians avoid his pitfalls, thereby improving patient care (and safety).

- This activity will improve physician performance and patient outcomes by providing detailed information on the 'how and why' of telemedicine techniques as they relate to neurotology practice. Examples might include remote cochlear implant programming and remote audiology in hearing impaired patients. Other aspect might include remote consultation in the operating theatre or in the ambulatory care setting.

- This activity will improve physician competence, performance and patient outcomes by better understanding the recognition, interventions when identified, and avoidance of complications. A thorough understanding of these details is critical to the safe practice in the field.

Learning Objective(s)

At the end of this activity, participants will be able to:

- Describe the struggles that William F. House had while innovating in the field of Neurotology.

- Describe the rationale, techniques and results of Telemedicine in the field of Neurotology.

- Describe the various complications (both common and rare) that are seen in the field of Neurotology. Explain methods for identifying/diagnosing these complications, strategies for treating and preventing these complications with a focus on optimizing patient outcomes and avoid permanent sequelae.

Position Statement: Any presentations, conversations, exhibits, or other meeting communications, including descriptions of the use of drugs or devices, does not imply or constitute endorsement of any company, product, application, or use by the American Neurotology Society.

The following statement was read, submitted, and signed by every individual connected with this educational activity. Failure to comply disqualifies the individual from planning or speaking at any ANS Continuing Medical Education program.

Disclosure Information

In compliance with the ACCME Accreditation Criteria, the American College of Surgeons, as the accredited provider of this activity, must ensure that anyone in a position to control the content of the educational activity has disclosed all relevant financial relationships with any commercial interest. All reported conflicts are managed by a designated official to ensure a bias-free presentation. Please see the insert to this program for the complete disclosure list.

In accordance with the ACCME Accreditation Criteria, the American College of Surgeons, as the accredited provider of this activity, must ensure that anyone in a position to control the content of the educational activity has disclosed all relevant financial relationships with any commercial interest. Therefore, it is mandatory that both the program planning committee and speakers complete disclosure forms. Members of the program committee were required to disclose all financial relationships and speakers were required to disclose any financial relationship as it pertains to the content of the presentations. The ACCME defines a 'commercial interest' as "any entity producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients". It does not consider providers of clinical service directly to patients to be commercial interests. The ACCME considers "relevant" financial relationships as financial transactions (in any amount) that may create a conflict of interest and occur within the 12 months preceding the time that the individual is being asked to assume a role controlling content of the educational activity.

ANS is also required, through our joint providership partners, to manage any reported conflict and eliminate the potential for bias during the activity. All program committee members and speakers were contacted and the conflicts have been managed to our satisfaction. However, if you perceive a bias during a session, please report the circumstances on the session evaluation form.

Please note we have advised the speakers that it is their responsibility to disclose at the start of their presentation if they will be describing the use of a device, product, or drug that is not FDA approved or the off-label use of an approved device, product, or drug or unapproved usage.

The requirement for disclosure is not intended to imply any impropriety of such relationships, but simply to identify such relationships through full disclosure and to allow the audience to form its own judgments regarding the presentation.

PUBLICATION STATEMENT

The material in this abstract, (Name of Abstract), has not been submitted for publication, published, nor presented previously at another national or international meeting and is not under any consideration for presentation at another national or international meeting. The penalty for duplicate presentation/publication is prohibition of the author and co - authors from presenting at a COSM society meeting for a period of three years. Submitting Author's Signature (required)

All authors were advised that the submitted paper becomes the property of *Otology & Neurotology* and cannot be reprinted without permission of the Journal.

THE AMERICAN NEUROTOLOGY SOCIETY WOULD LIKE TO THANK THE FOLLOWING MEMBERS FOR THEIR CONTRIBUTION TO THE 2017 ANS SCIENTIFIC PROGRAM

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Craig A. Buchman, MD
Moisés A. Arriaga, MD, MBA
Bradley W. Kesser, MD

Poster Judges
Craig A. Buchman, MD
Yuri Agrawal, MD
Barry Hirsch, MD
Jennifer Maw, MD

AMERICAN NEUROTOLOGY SOCIETY
52nd Annual Meeting
April 28-29, 2017
San Diego, CA

FRIDAY, APRIL 28, 2017

1:00 **Business Meeting**
(New member induction)
(Members Only)

1:30 **Scientific Program**
(Open to registered Members and Non-members – Badge required for admittance)

1:30 **Welcome & Opening Remarks by the President**
Lawrence R. Lustig, MD

Presidential Citations
Steven W. Cheung, MD
Paul A. Fuchs, PhD
Robert K. Jackler, MD
Anil K. Lalwani, MD
Lloyd B. Minor, MD

1:45 **WILLIAM F. HOUSE MEMORIAL LECTURE**
"The Struggles of Medical Innovation: Honoring The Legacy of Dr. House"
Professor Gerard M. O'Donoghue, FRCS

SECTION I: COCHLEAR IMPLANTS

2:15 **INTRODUCTION**
Larry R. Lustig, MD

2:18 **Abnormal Cochleovestibular Nerves and Pediatric Hearing Outcomes: "Absent Cochlear Nerves" Can Derive Benefit from Cochlear Implantation**
Elina Kari, MD
John L. Go, MD
Janice Loggins, AuD
Laurel Fisher, PhD

2:26 **An In-vitro Insertion-force Study of Magnetically Guided Lateral-wall, Cochlear-implant Electrodes**
Lisandro Leon
Frank M. Warren, MD
Jake J. Abbott, PhD

NEUROTOLOGY FELLOW AWARD

2:34 **Real-time Intracochlear Electrocochleography Obtained Directly through a Cochlear Implant**
Michael S. Harris, MD
William J. Riggs, AuD
Brendan P. O'Connell, MD
Kanthaiah Koka, PhD
George B. Wanna, MD
Robert F. Labadie, MD, PhD
Oliver F. Adunka, MD

2:45 BREAK WITH EXHIBITORS

INTRODUCTION
Craig A. Buchman, MD

3:15 Assessing Cochlear Implant Outcomes in Older Adults Using HERMES, a National Web-Based Database
Stephanie Y. Chen
Jedidiah J. Grisel, MD
Anne Lam
Justin S. Golub, MD

3:23 Early Outcomes with a Slim, Modular Cochlear Implant Electrode Array
Jonathan L. McJunkin, MD
Jacques A. Herzog, MD
Andrew Drescher, MD
Richard A. Chole, MD, PhD
Craig A. Buchman, MD

3:31 Intracochlear Measurements and Histologic Findings Relevant to Cochlear Implantation in Malformed Cochleae: A Human Temporal Bone Study
Reuven Ishai, MD
Joseph B. Nadol Jr., MD
Alicia M. Quesnel, MD

3:39 Prospective Evaluation of Patients Undergoing Concurrent Translabyrinthine Excision of Vestibular Schwannoma with Concurrent Cochlear Implantation
Kevin D. Brown, MD, PhD
Margaret Dillon, AuD
Meredith Anderson, AuD

ANS TRAINEE AWARD

3:47 Selective Stimulation of Facial Muscles following Chronic Intraneural Electrode Array Implantation and Facial Nerve Injury in the Feline Model
Yarah M. Haidar, MD
Ronald Sahyouni
Omid Moshtaghi
Hamid R. Djalilian, MD
John C. Middlebrooks, PhD
Harrison W. Lin, MD

3:55 INTRODUCTION - ANS RESEARCH GRANT

3:57 Cochlear Irradiation: Apoptosis, Necrosis, and Hearing Loss
Christine Dinh, MD
University of Miami Miller School of Medicine
ANS research grant recipient - 2015-16

4:05 DISCUSSION

4:10 PANEL
Telemedicine in Neurotology
Jonathan E. Gordon, MBA
David Massaro, MD
John Kokesh, MD

5:00 ADJOURNMENT

SATURDAY, APRIL 29, 2017

7:00 Business Meeting
(*Committee Reports)*
(Members Only)

7:30 Scientific Program
(Open to registered Members and Non-members – Badge required for admittance)

7:30 Welcome & Opening Remarks by the President
Lawrence R. Lustig, MD

SECTION II - TRANSLATIONAL SCIENCE AND GENERAL NEUROTOLOGY

7:32 INTRODUCTION
Bradley W. Kesser, MD

7:35 MitoQ as Novel Agent for Protecting against Amikacin Ototoxicity
Carolyn O. Dirain, PhD
Maria Raye
Ann V. Ng
Bailey Milne-Davies
Jerin K. Joseph
Patrick J. Antonelli, MD

7:43 The Small Molecule Oral Drug Candidate SENS-341 Effectively Reduces Cisplatin-induced Hearing Loss in Rats
Mathieu Petremann
Christophe Tran Van Ba
Désiré Challuau
Stéphanie Bressieux
Jonas Dyhrfjeld-Johnsen, PhD

7:51 Age-related Increase in Serum Levels of Otolin-1 in Humans
Ryan D. Tabtabai
Laura Haynes, PhD
George A. Kuchel, MD, PhD
Kourosh Parham, MD, PhD

7:59 Connexin 26 Immunofluorescence in Temporal Bones with Cochlear Otosclerosis
Mia E. Miller, MD
Ivan A. Lopez, PhD
Akira Ishiyama, MD
Fred H. Linthicum, MD

8:07 **Patulous Eustachian Tube Dysfunction: Patient Demographics and Comorbidities**
Bryan K. Ward, MD
Yehia Ashry, MD
Dennis S. Poe, MD

8:15 **DISCUSSION**

8:19 **INTRODUCTION - ANS/AAO/HERBERT SILVERSTEIN AWARD**

8:22 **Gap Junctions in the Cochlear Response to Sound and Noise in Vitro**
Dylan Chan, MD, PhD
University of California, San Francisco
ANS/AAO-HNSF/Silverstein Otology & Neurotology Research Award recipient 2014-2016

SECTION III - VESTIBULAR DISORDERS

8:30 **INTRODUCTION**
Moisés A. Arriaga, MD, MBA

8:33 **Radiographic Signs of Intracranial Hypertension in Patients with Meniere's Disease May Predict Poor Audiovestibular Outcomes**
Shawn M. Stevens, MD
Nithin Peddireddy
Kareem O. Tawfik, MD
David Mihal, MD
Rebecca S. Cornelius, MD
Ravi N. Samy, MD
Myles L. Pensak, MD

8:41 **Large Vestibular Aqueduct: Radiological Review of High-Resolution CT versus High- Resolution Volumetric MRI**
Nicholas L. Deep, MD
Matthew L. Carlson, MD
Steven M. Weindling, MD
David M. Barrs, MD
Colin L.W. Driscoll, MD
John I. Lane, MD
Joseph M. Hoxworth, MD

NICHOLAS TOROK VESTIBULAR AWARD

8:49 **Investigating Vestibular Blast Injury: Semicircular Canal Pressure Changes during High-Intensity Acoustic Stimulation**
Anne K. Maxwell, MD
Renee M. Banakis Hartl, MD, AuD
Nathaniel T. Greene, PhD
Victor Benichoux, PhD
Jameson K. Mattingly, MD
Stephen P. Cass, MD, MPH
Daniel J. Tollin, PhD

8:57 **Long-Term Outcomes for Surgical Treatment of Superior Canal Dehiscence Syndrome**
Mohammed Alkhafaji
Seth E. Pross, MD
Sanskriti Varma,
Jeffrey D. Sharon, MD
John P. Carey, MD

9:05 **DISCUSSION**

9:10 **WILLIAM E. HITSELBERGER MEMORIAL LECTURE**
"Beating the Drum: An Australian Story of Innovation"
Marcus Atlas, MBBS, FRACS

9:45 **BREAK WITH EXHIBITORS**

SECTION IV: SKULL BASE SURGERY

10:15 **INTRODUCTION**
Moisés A. Arriaga, MD, MBA

10:17 **Systematic Review of Hearing Outcomes after Radiotherapy for Vestibular Schwannoma**
Adam R. Coughlin, MD
Tyler J. Willman, MD
Samuel P. Gubbels, MD

10:25 **Impact of Surgical Volume on Vestibular Schwannoma Surgical Outcomes**
Michael J. Bauschard, MD, MS
Jonathan L. Hatch, MD
Shaun A. Nguyen, MD, MA
Paul R. Lambert, MD
Ted A. Meyer, MD
Theodore R. McRackan, MD

10:33 **Is Routine Chemical Prophylaxis Needed for Prevention of Deep Vein Thrombosis in Acoustic Neuroma Surgery?**
Geoffrey C. Casazza, MD
Richard K. Gurgel, MD

10:41 **Audiologic Natural History of Small Volume Cochleovestibular Schwannomas in Neurofibromatosis Type 2**
Alvin T. deTorres, MD
Chris K. Zalewski, PhD
Kelly A. King, PhD
Carmen C. Brewer, PhD
Prashant Chittiboina, MD
H. Jeffrey Kim, MD

10:49 **Unlike in Vestibular Schwannoma, Cochlear Dysfunction is not Common in Meningioma of the Cerebellopontine Angle**
Lukas D. Landegger, MD
Jong D. Lee, MD, PhD
Sonaali Aggarwal
Fred H. Linthicum Jr., MD
Konstantina M. Stankovic, MD, PhD

10:57 **Surgical Management of Tumors Involving Meckel's Cave and Cavernous Sinus: Role of a Lateral Sphenoidectomy Approach**
Daniel Q. Sun, MD
Arnold H. Menezes, MD
Matthew A. Howard III, MD
David M. Hasan MD
Bruce J. Gantz, MD
Marlan R. Hansen, MD

11:05 **DISCUSSION**

11:10 **PANEL**
Complications in Neurotology
Robert K. Jackler, MD - Moderator
Derald E. Brackmann, MD
Erika A. Woodson, MD
Christine Dinh, MD
Jacques A. Herzog, MD

12:00 **ADJOURNMENT**

Combined Poster Reception
ANS, AOS, AAFPRS, TRIO
Friday, April 28, 2017
5:30 pm - 7:00 pm
Grand Hall A-D and Grand Hall Foyer

Immediately following

ANS President's Reception
(members and invited guests only)
Friday, April, 28, 2017
7:00 pm - 8:30 pm
Coronado DE
Level 4

UPCOMING MEETINGS

52nd Annual ANS Fall Meeting
American Neurotology Society
"Super Saturday"- September 9, 2017
Sheraton Grand - Chicago, IL

"Super Saturday" program will include:
The Facial Nerve Study Group
The Stereotactic Radiosurgery Study Group
The William House Cochlear Implant Study Group
The ANS Scientific Program

FALL REGISTRATION!

The 2017 Fall registration fee is $125 ($175 onsite) for all ANS members and $250 ($300 onsite) for nonmembers to attend ANS *"Super Saturday"*. Registration will take place online via the ANS website beginning June 1st 2017. Details of the program will be provided in the coming weeks.

AAO-HNSF Annual Meeting & OTO EXPO
September 10-13, 2017
Chicago, IL

53rd Annual ANS Spring Meeting
(in conjunction with COSM)
April 20-22, 2018
Gaylord National Resort and Convention Center
National Harbor, Maryland

The Abstract deadline for the 53rd Annual ANS Spring meeting is Sunday, October 15, 2017.
Abstract submission instructions will be available on ANS website in July 2017. Primary authors are required to complete a disclosure/conflict of interest statement on behalf of ALL authors at time of abstract submission in order for the abstract to be considered by the Scientific Program Committee.

Manuscripts are required of selected ORAL & POSTER presentations. Manuscripts must be submitted online a minimum of four weeks prior to the annual meeting, via the journal's website. Instructions for registering, submitting a manuscript, and the author guidelines can be found on the Editorial Manager site: https://www.editorialmanager.com/on/ Manuscripts will be peer reviewed prior to the Annual meeting for conflict of interest review and resolution.
Failure to comply with the guidelines & requirements of the American Neurotology Society result in the disqualification of your presentation.

For Society business, please forward all inquiries to:

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Ashley Eikenberry, ANS/AOS Administrative Assistant
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Abnormal Cochleovestibular Nerves and Pediatric Hearing Outcomes: "Absent Cochlear Nerves" Can Derive Benefit from Cochlear Implantation

Elina Kari, MD; John L. Go, MD
Janice Loggins, AuD; Laurel Fisher, PhD

Objective: Analyze imaging and hearing characteristics of children with cochleovestibular nerve (CVN) abnormalities and correlate these imaging characteristics with hearing and language outcomes after hearing aid fitting, cochlear implantation (CI) and/or auditory brainstem implantation (ABI).

Study Design: Retrospective.

Setting: Tertiary referral academic center.

Patients: Twenty-eight children with CVN abnormalities with magnetic resonance (MRI) and/or computed tomography (CT).

Intervention(s): none.

Main Outcome Measure(s): Ability to determine presence or absence of a cochlear nerve, cochleovestibular abnormalities, and correlate imaging findings with response to auditory stimulation.

Results: A total of 26 children with bilateral sensorineural hearing loss and abnormal CVNs and 2 children with unilateral findings (28 patients total) were evaluated (MRI/CT). There were equal numbers of males and females. Twelve children (39%) had comorbid conditions. Fifty-four (54) ears were identified with CVN abnormalities and analyzed. Fifteen (28%) ears were implanted with a CI and 8 (15%) with an ABI. The absence of a cochlear nerve was associated with an abnormal cochlear aperture, a narrow IAC and cochlear malformation. Thirteen (50%) ears with abnormal CVNs (n=26) exhibited normal cochlea. Hearing data were available on 23 anomalous ears. Eleven (49%) exhibited reproducible hearing thresholds either with or without a hearing aid, CI, or ABI. Some achieved open-set word recognition.

Conclusions: Current imaging modalities cannot accurately characterize the functional status of the cochleovestibular nerve or predict a child's benefit with either a CI or ABI. Several children who would have otherwise been denied a CI exhibited responses to auditory stimuli after implantation.

Define Professional Practice Gap & Educational Need: Current imaging technology does not predict pediatric hearing outcomes and current literature typically describes "aplastic" or "absent" cochlear nerves. Our data show that despite this "absence", many children exhibit responses to sound and in some cases open set word recognition after hearing aids, CIs or ABIs. Our data highlight the need for novel imaging technologies and demonstrate that many of these children may achieve the same benefit from a CI than from an ABI.

Learning Objective: To better understand the limits of MRI/CT in the evaluation of children with congenital SNHL and abnormal cochleovestibular nerves. To better appreciate that an absent cochlear nerve does not predict lack of auditory awareness or lack of benefit from a CI

Desired Result: Attendees will consider CI for children with CVN abnormalities Attendees will understand the limitations of current imaging technologies and potentially revise their imaging protocols.

Indicate IRB or IACUC Approval: Approved

An In-vitro Insertion-force Study of Magnetically Guided Lateral-wall, Cochlear-implant Electrodes

Lisandro Leon, MS; Frank M. Warren, MD
Jake J. Abbott, PhD

Hypothesis: Insertion forces are reduced by magnetically guiding the tip of lateral-wall electrodes during insertion.

Background: Steerable electrodes have the potential to minimize intracochlear trauma by reducing the contact between the electrode tip and the cochlear walls. We have experimented with lateral-wall electrodes with magnets at their tips. Magnetic torque can be applied to the tip so that it can be guided away from the medial wall through the cochlear hook and the lateral wall of the basal turn. To date, steerable electrodes have only been designed to curve in the direction of the basal turn.

Methods: Automated insertions of electrodes with magnets are conducted into a scala-tympani phantom with a force sensor attached to it to provide the measurements needed to evaluate our hypothesis. An external magnet is used to apply magnetic bending torque to the magnetic electrode tip with the goal of directing the tip down the lumen. Experiments are conducted to mimic both cochleostomy and round-window insertions

Results: T-test results indicate that magnetic guidance reduces insertion forces for all electrodes tested with certain electrode models achieving more than 50% reduction. For cochleostomy insertions, this benefit can be expected beyond 8 mm insertion depth while eliminating direct-tip contact with the lateral wall. For round- window insertions, direct-tip contact with the medial wall through the cochlear hook was also eliminated.

Conclusions: Significant insertion force reduction can be obtained by applying magnetic guidance to the insertion of lateral-wall electrodes. This augments the superior flexibility of lateral-wall electrodes with a steerable mechanism.

Define Professional Practice Gap & Educational Need: Clinicians are typically too busy or not connected with academic researchers to realize what the current state of the art is with engineered medical devices.

Learning Objective: In this specific instance, a new technology is being developed to guide the insertion of a standard cochlear-implant electrode array with a robotic magnetic manipulator.

Desired Result: Our goal is simply to educate the clinician of a possible robotic cochlear-implant insertion method that enables a lateral-wall electrode array to be navigated through the lumen using a non-stylet-based method.

Indicate IRB or IACUC Approval: Approved

NEUROTOLOGY FELLOW AWARD

Real-time Intracochlear Electrocochleography Obtained Directly through a Cochlear Implant

Michael S. Harris, MD; William J. Riggs, AuD
Brendan P. O'Connell, MD; Kanthaiah Koka, PhD
George Wanna, MD; Robert Labadie, MD, PhD
Oliver F. Adunka, MD

Hypothesis: Electrocochleography (ECochG) obtained through the cochlear implant (CI) will provide the surgeon unprecedented real-time feedback reflective of cochlear micromechanical changes occurring during electrode advancement.

Background: Contemporary CI surgery is performed without real-time feedback reflecting the impact of electrode insertion on cochlear micromechanical health. ECochG obtained at the round window (RW) has proven to be a highly efficacious method of monitoring cochlear micromechanics immediately before and after electrode insertion. ECochG obtained directly through the CI provides surgeons an opportunity to monitor cochlear dynamics and potentially tailor electrode placement.

Methods: ECochG was recorded directly from the apical electrode during CI electrode advancement via RW insertion. The cochlear microphonic and auditory nerve neurophonic response magnitude – the "on-going response" – indicative of the current generated by outer hair cell stereocilia and neural phase-locking of CN VIII, was analyzed at three points: upon RW entry, at its peak, and upon completion of full insertion.

Results: Detectable intracochlear ECochG was achieved in all patients. Comparison of the on-going response magnitude upon RW entry, at its peak, and upon completion of insertion revealed several distinct response patterns: the amplitude generally increased steadily with electrode insertion, but in several patients the on-going response amplitude fell below the peak amplitude upon completion of insertion. Implications for post-operative hearing prediction and in-clinic post-CI ECochG are discussed.

Conclusions: ECochG obtained directly from the CI electrode array is highly feasible, unencumbered by added instrumentation or dedicated acquisition time, and provides the CI surgeon previously unavailable feedback reflective of cochlear health.

Define Professional Practice Gap & Educational Need: 1. A progress-limiting gap exists in our ability to monitor in real-time the effects of cochlear implant electrode insertion on cochlear micromechanics. This talk addresses the use of intra-cochlear electrocochleography obtained directly through the cochlear implant as a solution to this problem. 2. There persists a lack of fundamental knowledge regarding the impact of cochlear implant electrode placement on cochlear electrophysiology. This talk presents the electrophysiologic response patterns observed in a sample of cochlear implant users. 3. The field of cochlear implant surgery is currently limited in its ability to achieve the goal of minimally traumatic cochlear implantation and hearing preservation. Intracochlear electrocochleography, as discussed here, has the potential to allow the cochlear implant surgeon to better achieve these goals.

Learning Objective: 1. The learner will appreciate the impact that cochlear implant electrode insertion has on the delicate micromechanics of the cochlea. 2. The learner will be exposed to the variability that exists across patients in electrocochleographic response to electrode insertion and the distinct response patterns observed. 3. The learner will consider the utility of intracochlear electrocochleography obtained directly through the cochlear implant for minimally traumatic insertion, hearing preservation, and predicting post-implant performance.

Desired Result: 1. Attendees may have the opportunity to apply the knowledge learned from this study directly to their own cochlear implant practice: possibly by adopting this or a similar methodology or simply by becoming more cognizant of the impact of insertion on cochlear electrophysiology. 2. Attendees may eventually have the opportunity, on the basis of knowledge gained from this study, to inform patient expectations regarding functional outcomes depending on which of the electrocochleography response patterns they exhibit during insertion.

Indicate IRB or IACUC Approval: Approved

Assessing Cochlear Implant Outcomes in Older Adults Using HERMES, a National Web-Based Database

Stephanie Y. Chen, BM; Jedidiah J. Grisel, MD
Anne Lam, BS; Justin S. Golub, MD

Objective: Cochlear implant (CI) outcomes research has been limited to retrospective or single-institution studies in the US. The objective is to demonstrate the feasibility of using a novel, national, web-based CI database through evaluating CI outcomes in older adult

Study design: Analysis of a prospective, national, web-based database designed for CI outcome tracking (HERMES; HIPAA-secure, Encrypted, Research Management and Evaluation Solution)

Setting: Multi-centered at 14 private practice and academic US medical centers

Patients: Older (age≥75, n=43) or younger (age<75, n=88) adult CI patients (n=131 total, n=139 ears)

Main outcome measure(s): AzBio scores, CI usage, postoperative complications

Results: Older adults had slightly lower performance on most recent AzBio (57.0%, n=24, 12.5 months) compared to younger adults (75.2%, n=47, 12.3 months; p<0.01, Mann Whitney). However, on multiple regression, age was not a significant predictor of AzBio scores after controlling for sex, hearing loss duration, time since implantation, and use (p=0.10). Most recent CI use was similar but significantly different (10.6 hours/day in older, n=14 vs. 12.8 in younger, n=26; p<0.01). Usage also did not decline over time (p=0.97 in older vs. p=0.22 in younger). The most common complications were similar (26% vs. 30% for vertigo; p=0.58) or less frequent (5% vs. 21% for tinnitus; p=0.02) in older and younger adults, respectively.

Conclusions: We demonstrate the feasibility of a novel user-friendly, web-based, national CI database to analyze CI outcomes. Older age was not a significant predictor of AzBio scores after adjusting for multiple factors. Additionally, CI use did not decline over time.

Define Professional Practice Gap & Educational Need: Lack of awareness of a national database to evaluate cochlear implant outcomes

Learning Objective: Gain knowledge of a new national, web-based prospective cochlear implant database

Desired Result: 1. Use of the database to evaluate cochlear implant outcomes by conducting larger scale, prospective studies 2. Consider contributing to a database to enable better quality research on cochlear implant outcomes

Indicate IRB or IACUC Approval: Approved

Early Outcomes with a Slim, Modular Cochlear Implant Electrode Array

Jonathan L. McJunkin, MD; Jacques Herzog, MD
Andrew Drescher, MD; Richard A. Chole, MD
Craig A. Buchman, MD

Objective: Describe outcomes from cochlear implantation with a new, slim modiolar electrode array.

Study Design: Cohort study

Setting: Tertiary referral centers

Patients: Adult cochlear implant candidates

Interventions: Cochlear Implantation with CI532 (Cochlear Corp).

Main Outcome Measures: Pre- and postoperative speech perception scores, audiometric behavioral thresholds, electrode impedance/neural response telemetry measures and postoperative CT reconstructions of array location.

Results: 48 patients are implanted to date. There were 2 tip rollovers identified with intraoperative x-ray and resolved with re-insertion. There were no open circuits on impedance testing. At 1-month post-activation, mean CNC word scores improved from 13% to 46% and mean AzBio (quiet) scores improved from 16% to 63%. Mean preoperative pure tone thresholds were 70 dB, 74 dB, 84 dB and 88 dB at 250 Hz, 500 Hz, 1 kHz and 2 kHz, respectively. After 1-month of stimulation, mean thresholds are 85 dB, 91 dB, 104 dB and 102 dB at these frequencies. Many patients had < 20dB change in thresholds. CT reconstructions in 8 patients show scala tympani placement of the entire array with a wrap factor of 60% (range 57-64%) and a mean insertion angle of 408o (360-433o). Mean neural response telemetry (NRT) thresholds at 1-month are 165 (+/-21) CUs. At the time of presentation, 3-month outcomes on at least 50 patients will be presented.

Conclusions: CI532 array insertion results in consistent scala tympani location and provides expected audiologic performance. Initial hearing preservation results are promising.

Define Professional Practice Gap & Educational Need: 1. New technology and device design 2. Lack of outcomes for new technology

Learning Objective: The objective of this research is to present early outcomes with a slim, modiolar cochlear implant array.

Desired Result: Attendees will gain a better understanding of the slim, modiolar array cochlear implant and its outcomes.

Indicate IRB or IACUC Approval: Approved

Intracochlear Measurements and Histologic Findings Relevant to Cochlear Implantation in Malformed Cochleae: A Human Temporal Bone Study

Reuven Ishai, MD; Joseph B. Nadol Jr., MD
Alicia M. Quesnel, MD

Hypotheses: 1) The cochlear duct length in temporal bones (TBs) with incomplete partition type II (IP-II) and cochlear hypoplasia (CH) is significantly smaller than normally formed cochleae. 2) The spiral ganglion cell (SPG) counts in TBs with MC are not significantly reduced.

Background: Understanding the cochlear duct and scala tympani dimensions in various types of malformed cochleae (MC), such as IP-II and CH, may inform the surgeon's choice of electrode array in these cases.

Methods: TBs from patients with MC including IP-II, CH type II, and CH type III were identified, and compared to TBs from patients with normally formed cochleae whose hearing met cochlear implantation criteria. A 2D cochlear reconstruction was performed. The cochlear duct and number of SPG were evaluated. The size of scala tympani in the basal turn of each cochlea was measured.

Results: The average length of cochlear duct in the MC (n=9, 3IP-II, 6CH) was significantly shorter than normally formed cochleae (n=8) in TBS from possible cochlear implant candidates (21.8mm vs. 33.2mm, t-test, $p << 0.05$). The height of scala tympani in lower/upper basal turns of the MC (1.0mm) was not different than the normally formed cochleae (0.9mm), ($p=0.07$). The average SPG count (in % of normal age-matched) was significantly lower in TBS with cochlear malformations (15% vs. 46%, $p<<0.05$).

Conclusion: The cochlear ducts lengths are shorter in IP-II and CH compared to normal cochleae, but the scala tympani is not smaller; this may inform electrode array selection. MC had significantly lower SPG counts.

Define Professional Practice Gap & Educational Need: Lack of awareness

Learning Objective: Evaluation of the the length of cochlear duct in temporal bones with malformed cochleae, and quantification of spiral ganglion cell populations in these malformed cochleae.

Desired Result: Understanding the histopathology of various types of malformed cochleaemay inform the surgeon's choice of electrode array.

Indicate IRB or IACUC Approval: Exempt

Prospective Evaluation of Patients Undergoing Concurrent Translabyrinthine Excision of Vestibular Schwannoma with Concurrent Cochlear Implantation

Kevin D. Brown, MD PhD; Margaret Dillon, AuD
Meredith Anderson, AuD

Objective: Translabyrinthine (TL) vestibular schwannoma (VS) resection may be accomplished with preservation of the cochlear nerve, permitting successful, concurrent cochlear implantation. In this single institution, FDA – approved feasibility study, we wished to determine the success and outcomes of concurrent cochlear implantation at the time of TL resection of VS.

Study Design: Prospective cohort

Setting: Tertiary referral center

Patients: Patients with small VS <1.5 cm in size and speech understanding < 60% in affected ear.

Intervention: Concurrent TL VS resection and cochlear implantation.

Main Outcome Measure: Sound localization and speech understanding

Results: All cochlear nerves were anatomically preserved. Five out of 6 patients had auditory precepts at the time of activation. At 1 month following surgery, AzBio scores (0dB SNR, with sound front, noise to normal ear, speech to implant ear) were improved by an average of 10% with implant on, persisting to 6 months out from surgery. Localization 1 month after surgery was markedly improved with RMS 81 degrees ± 13 in the "implant off" condition and 39 degrees ± 9 in the "implant on" condition. This was likewise maintained out 6 months.

Conclusions: These data demonstrate preservation of potential electrical hearing in TL VS surgery is consistently possible, with excellent improvement in sound localization. The delay in improvement of speech perception may reflect trauma to the cochlear nerve at the time of surgery, which may continue to improve.

Define Professional Practice Gap & Educational Need: To become aware of possible preservation of electrical hearing in vestibular schwannoma patients undergoing translabyrinthine surgery

Learning Objective: The learner will understand outcomes following translabyrinthine surgery to remove vestibular schwannomas as they relate to sound localization and speech understanding.

Desired Result: Attendees will be able to select patients from their practice that may benefit from concurrent vestibular schwannoma surgery and cochlear implantation.

Indicate IRB or IACUC Approval: Approved

ANS TRAINEE AWARD

Selective Stimulation of Facial Muscles following Chronic Intraneural Electrode Array Implantation and Facial Nerve Injury in the Feline Model

Yarah M. Haidar, MD; Ronald Sahyouni, BA
Omid Moshtaghi, BS; Hamid R. Djalilian, MD
John C. Middlebrooks, PhD; Harrison W. Lin, MD

Background: Our group has previously shown that activation of specific facial nerve (FN) fiber populations and selective contraction of facial musculature can be achieved through acute intraneural multi-channel microelectrode array (MEA) implantation in the feline model.

Hypothesis: Selective stimulation of facial muscles will be maintained in the setting of (1) chronic MEA implantation and (2) acute MEA implantation following FN injury recovery.

Methods: This study included seven cats. In three cats with normal facial function, chronic intraneural implantation was performed and tested biweekly for three months. Electrical current pulses were delivered to each channel individually, and elicited electromyographic (EMG) voltage outputs were recorded for each of several facial muscles. For FN injury experiments, two cats received a standardized hemostat-crush injury, and two received a transection-reapproximation injury to the FN. These four underwent acute implantation of a 4-channel penetrating MEA three months' post-injury.

Results: Stimulation through individual channels selectively activated restricted nerve populations, resulting in versatile contraction of individual muscles in cats with chronic array implantation and following nerve injury. Increasing stimulation current levels resulted in increasing EMG voltage responses in all cases.

Conclusion: We have established in the animal model the ability of a chronically implanted MEA to selectively stimulate restricted FN fiber populations and elicit contractions in specific FN, adding more evidence to the feasibility of a FN implant system. Likewise, following FN injury, selective stimulation of restricted FN fiber populations and subsequent contraction of discrete facial muscles can be achieved following acute MEA implantation.

Define Professional Practice Gap & Educational Need: To date, surgical management of patients with chronic facial paralysis has limited utility with inconsistent outcomes. This work serves to elucidate the functional and histological changes that occur following chronic microelectrode implantation and stimulation post-facial nerve injury in reanimating facial musculature following facial paralysis.

Learning Objective: To understand the utility of selective stimulation of facial muscles in the setting of (1) chronic muti-electrode array implantation and (2) acute multi-electrode array implantation following facial nerve injury recovery.

Desired Result: Attendees will further understand the ability of intraneural stimulation in rehabilitation of injured nerves.

Indicate IRB or IACUC Approval: Approved

MitoQ as Novel Agent for Protecting against Amikacin Ototoxicity

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Bailey Milne-Davies, BS; Jerin K. Joseph, BS
Patrick J. Antonelli, MD

Hypothesis: Mitoquinone (MitoQ) attenuates amikacin ototoxicity in guinea pigs.

Background: MitoQ, a mitochondria-targeted derivative of the antioxidant ubiquinone, has improved bioavailability and demonstrated safety in humans. Thus, MitoQ is a promising therapeutic approach for protecting against amikacin-induced ototoxicity.

Methods: Both oral and subcutaneous administration of MitoQ were tested. Amikacin-treated guinea pigs (n=12 to 18 per group) received water alone (control), decyl-TPP (positive control), or MitoQ 0.03 or 0.075g/L- supplemented drinking water; or injected subcutaneously with 3 mg/kg MitoQ or saline (control). Auditory brainstem response and distortion product otoacoustic emission were measured before MitoQ or control solution administration and after amikacin injections. Cochlear hair cell damage was assessed using scanning electron microscopy and Western blotting.

Results: With oral administration, animals that received 0.03g/L MitoQ had better hearing than controls at 24 kHz only at 3-weeks ($p=0.017$) and 6-weeks ($p=0.027$) post-amikacin. With subcutaneous administration, MitoQ-injected guinea pigs had better hearing than controls at 24 kHz only, 3-week post-amikacin ($p=0.013$). DPOAE amplitudes were decreased after amikacin injections, but were not different between treatments ($p>0.05$). Electron microscopy showed no difference in outer hair cell loss between treatments. Western blotting demonstrated limited attenuation of oxidative stress in the cochlea of MitoQ-supplemented guinea pigs.

Conclusions: Oral or subcutaneous MitoQ provided limited protection against amikacin-induced hearing loss and cochlear damage in guinea pigs. Other strategies for attenuating aminoglycoside-induced ototoxicity should be explored.

Define Professional Practice Gap & Educational Need: There is a lack of contemporary knowledge regarding the efficacy of clinically available antioxidants for the prevention of aminoglycoside ototoxicity. The mitochondria-targeted antioxidant, MitoQ, has shown potential as a prophylactic agent for the prevention of hearing loss induced by ototoxic drugs such as the aminoglycoside antibiotic, gentamicin, but it is unclear if this holds true for other aminoglycosides.

Learning Objective: At the conclusion of this presentation, the attendees will learn that the mitochondria- targeted antioxidant, MitoQ, provides limited protection against amikacin-induced cochlea oxidative damage and hearing loss.

Desired Result: The attendees may be able apply this knowledge by recognizing that although the mitochondria targeted antioxidant MitoQ has previously been shown to attenuate gentamicin- and cisplatin- induced ototoxicity, it provided very limited protection against amikacin-induced ototoxicity. Moreover, while oral MitoQ appear to be well-tolerated, with no significant adverse effects, subcutaneously injected MitoQ reduced weight gain in guinea pigs. Many questions need to be addressed if MitoQ is to be developed as a therapeutic against drug-induced hearing loss. Clinicians and researchers should consider other strategies for attenuating drug-induced ototoxicity.

Indicate IRB or IACUC Approval: Approved

The Small Molecule Oral Drug Candidate SENS-341 Effectively Reduces Cisplatin-induced Hearing Loss in Rats

Mathieu Petremann, MS; Christophe Tran Van Ba, MS
Désiré Challuau; Stéphanie Bressieux, BS
Jonas Dyhrfjeld-Johnsen, PhD

Hypothesis: SENS-341 protects against cisplatin ototoxicity in rats.

Background: SENS-341 is a small molecule, orally administered drug candidate. Among pediatric and adult cancer patients, ~20% or more suffer significant hearing loss when treated with platinum-based chemotherapies (Frisina et al., 2016; van As et al., 2016) and currently no treatment exists. As SENS-341 acts on oxidative stress, neuro-inflammation, excitotoxicity and apoptosis downstream of the effector of an inner ear insult, the goal of this study is to evaluate whether the drug candidate could be effective in the protection against cisplatin-induced hearing loss.

Methods: After baseline audiometry (ABR at 8/16/24 kHz and DPOAE at 4/8/16/24/32 kHz) Wistar rats were randomized to receive either daily oral placebo (n=7) or SENS-341 (n=8) treatment for 14 days initiated 15 min before slow intravenous infusion of 8 mg/kg cisplatin. ABR thresholds and DPOAE amplitudes were evaluated at D7 and D14 after cisplatin administration.

Results: ABR thresholds were elevated by up to 30 dB at D7 and D14 after cisplatin administration in placebo treated rats and DPOAE amplitudes reduced by up to 19 dB. In SENS-341 treated animals, ABR threshold shifts were significantly reduced ($p=0.008$ and $p=0.012$ respectively) by 10-22 dB depending on stimulus frequency. Similarly, SENS-341 treatment significantly reduced the DPOAE amplitude loss at 70 dB SPL stimulus intensity by 2-14 dB at D7 ($p=0.04$) and D14 ($p=0.041$).

Conclusions: Daily, oral SENS-341 treatment significantly reduced cisplatin-induced hearing loss in rats. SENS-341 appears to be a good candidate for clinical development in cisplatin-induced ototoxicity.

Define Professional Practice Gap & Educational Need: There is a lack of knowledge and awareness of whether the small molecule, oral drug candidate SENS-341 can be effective as a therapeutic agent for the treatment of hearing loss induced by cisplatin.

Learning Objective: At the conclusion of this presentation, the attendees will learn that the small molecule, oral drug candidate SENS -341 reduced cisplatin-induced hearing loss in rats and can be further developed as a treatment of ototoxicity in chemotherapy patients.

Desired Result: The attendees may be able apply this knowledge by recognizing that SENS-341 may be a promising future therapeutic agent for protecting against cisplatin-induced ototoxicity.

Indicate IRB or IACUC Approval: Approved

Age-related Increase in Serum Levels of Otolin-1 in Humans

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George A. Kuchel, MD, PhD
Kourosh Parham, MD, PhD

Objective: To test the hypothesis that age-related demineralization of otoconia will result in an age-related increase in serum levels of otoconia matrix protein, otolin-1.

Study design: Cross-sectional observational clinical trial.

Setting: Clinical research center.

Patients: Seventy-nine healthy men and women ranging in age from 22 to 95 years old.

Interventions: Diagnostic.

Main outcome measures: Serum levels of otolin-1 in relation to age.

Results: Mean serum levels of otolin-1 serum levels of subjects divided into four age groups (1: 20-30 [n=20], 2: 50-65 [n=20], 3: 66-80 [n=20], 4: 84-95 [n=19] years old) demonstrated an increasing trend with age. The difference between otolin-1 levels of groups 2 and 3 (P=0.04), as well as 2 and 4 (P=0.031) were statistically significant, but there was no significant difference between the two oldest groups.

Conclusions: Otolin-1 serum levels are significantly higher in patients older than 65 years of age. This is consistent with previous scanning electron microscopy findings of age-related otoconia degeneration and increased prevalence of benign paroxysmal positional vertigo (BPPV) with age. Together with our previous finding that serum otolin-1 levels are elevated in patients with BPPV, results support the use of serum otolin-1 as a biomarker for the structural health of otoconia and BPPV.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge of age-related otoconia degeneration in humans as well as lack of biomarkers to assess the structural health of otoconia for both research and clinical applications.

Learning Objective: To test the hypothesis that age-related demineralization of otoconia will result in an age- related increase in serum levels of otoconia matrix protein, otolin-1.

Desired Result: Serum otolin-1 level is a promising biomarker for the structural health of otoconia and BPPV. Otolin-1 has applications in both research and clinical diagnosis where direct examination of otoconia in humans is challenging and diagnosis of BPPV can be obfuscated and time-consuming, respectively.

Indicate IRB or IACUC Approval: Approval

Connexin 26 Immunofluorescence in Temporal Bones with Cochlear Otosclerosis

Mia E. Miller, MD; Ivan A. Lopez, PhD
Akira Ishiyama, MD; Fred H. Linthicum, MD

Hypothesis: Connexin-26 (Cx26) expression is diminished in the spiral ligament of subjects with hearing loss and cochlear otosclerosis (CO).

Background: Human temporal bone (HTB) studies have demonstrated that CO is associated with hyalinization of the spiral ligament. We hypothesize that hyalinization is associated with a loss of fibrocytes and a decline in fibrocyte expression of Cx26. Cx26 and Connexin-30 encode gap junction proteins expressed in supporting cells of the organ of Corti, the spiral limbus, stria vascularis and in fibrocytes of the spiral ligament. These gap junctions are critical for potassium recycling and maintenance of the endocochlear potential. Diminished expression of these proteins would likely be associated with hearing dysfunction.

Methods: Histopathology and clinical characteristics of 45 HTB specimens with CO and spiral ligament hyalinization were reviewed. A subset with a history of sensorineural or mixed hearing loss but normal or near- normal hair cell counts were analyzed with light microscopy and immunohistochemical analysis. Immunofluorescence was qualitatively assessed and quantitatively reviewed using the computer image analysis software Fiji (ImageJ).

Results: H&E staining demonstrated hyalinization in the spiral ligament and loss of type II and type III fibrocytes. Immunostaining with Cx26 demonstrated diminished expression of Cx26 in not only the spiral ligament but also throughout the cochlea compared with normal controls.

Conclusions: The expression of the key gap junction protein, Cx26, is reduced in the spiral ligament and cochlea of subjects with CO, and likely plays a role in hearing loss in CO subjects with normal or near-normal cochlear hair cell counts.

Define Professional Practice Gap & Educational Need: 1. Lack of understanding of causes of sensorineural hearing loss in cochlear otosclerosis 2. The need to advance the study of the temporal bone with novel immunohistochemical techniques 3. Lack of awareness of differential protein expression in the human temporal bone in cochlear otosclerosis

Learning Objective: 1. Outline possible causes of sensorineural hearing loss in cochlear otosclerosis based on temporal bone analysis. 2. Apply advanced immunohistochemical techniques to archival human temporal bone specimens. 3. Demonstrate differential Connexin expression in human temporal bones with cochlear otosclerosis.

Desired Result: 1. Better understand the pathology of cochlear otosclerosis. 2. Recognize the need for further advanced study of the human temporal bone. 3. Explain to patients the state of the art in otosclerosis research.

Indicate IRB or IACUC Approval: Approval

Patulous Eustachian Tube Dysfunction: Patient Demographics and Comorbidities

Bryan K. Ward, MD; Yehia Ashry, MD
Dennis S. Poe, MD, PhD

Objective: Describe a large cohort of patients presenting with patulous Eustachian tube (pET) dysfunction.

Study design: Retrospective case series

Setting: Tertiary referral center

Patients: All outpatient visits (2004-2016) that were assigned ICD9 code (381.7-Patulous Eustachian tube) were screened. Only patients with observed TM(TM) movements during ipsilateral nasal breathing or acoustic reflex decay testing demonstrating transmitted nasal breathing were included (n=190,n=239 ears).

Main outcome measures: Demographics and nasopharyngoscopy/ otomicroscopy findings by comorbidities.

Results: The majority (54%) was female and mean age of symptom onset was 38.0(SD 20.0) years. Common symptoms included voice autophony(93%), breath autophony(92%), aural fullness(57%), pulsatile tinnitus(17%), and crackling or rumbling sounds(14%). Symptoms increased in frequency and duration with time(65%), were exacerbated with exercise(27%) and improved with placing the head in a dependent position(65%), sniffing(28%), upper respiratory infection(8%), and ipsilateral internal jugular vein compression(12%). In 52% pET was bilateral. Common comorbidities include environmental allergy (49%), weight loss(35%), laryngopharyngeal reflux(33%), anxiety(31%), autoimmunity(13%) and neuromuscular disease(8%). Allergy and anxiety patients were younger and more likely to have tensor veli palatini spasm on exam($p<0.05$,chi-square). Allergy patients also had relief with sniffing and TM retraction ($p<0.01$,chi-square). Weight loss patients reported mean loss 19.7kg (SD 23.1), were older, more rapidly diagnosed and more likely to have persistent symptoms ($p<0.05$). Initially, all patients were treated medically, with 47% eventually electing surgical intervention.

Conclusions: pET is progressive and often bilateral. In this large series of pET, in addition to weight loss and chronic medical conditions, allergy and stress/anxiety were identified as novel risk factors. Most patients can be treated medically.

Define Professional Practice Gap & Educational Need: Lack of awareness of common presenting features of patulous Eustachian tube. 2. Lack of knowledge of risk factors for patulous Eustachian tube and clinical examination findings that accompany those risk factors.

Learning Objective: To better understand the range of presentations of patients with patulous Eustachian tube and common clinical examination findings. In particular, to recognize the risk that patients with chronic sniffing pose to middle ear function and its association with patulous Eustachian tube dysfunction.

Desired Result: Attendees will better recognize a patient with patulous Eustachian tube when they present to their clinic. This can lead to earlier and accurate diagnosis, and may prevent

Indicate IRB or IACUC Approval: Approved

Radiographic Signs of Intracranial Hypertension in Patients with Meniere's Disease May Predict Poor Audiovestibular Outcomes

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Rebecca S. Cornelius, MD; Ravi N. Samy, MD
Myles L. Pensak, MD

Objectives: Describe the relationship between radiographic signs of intracranial hypertension (ICH) and audiovestibular presentations/ outcomes in Meniere's Disease (MD).

Study design: Retrospective review.

Setting: Tertiary referral center.

Patients: 68 adults with MD were analyzed from 2011-2015 after meeting the following criteria: MRI and audiogram were performed within 1 month of presentation, duration of follow up was 6+ months, and there was no evidence of intracranial tumor(s), hydrocephalus, cerebral venous thrombosis, pregnancy, trauma or major infection.

Intervention(s): Three MRI signs of ICH were assessed: empty sella, optic nerve sheath dilation/tortuosity, and posterior globe flattening. Patients with 2+ signs were compared to those with 0-1 signs.

Main outcome measure(s): The following variables were compared between subgroups: age, gender, ethnicity, obesity and prevalence of bilateral MD. Pure tone average (PTA), air-bone gap (ABG) and word recognition scores (WRS) were compared at presentation and most recent follow up. The primary outcome was failed medical management with progression to surgery.

Results: 19 patients had 2+ signs of ICH. 49 had 0-1 signs. Patients with multiple signs were significantly more likely to be male (p=0.01), obese (p=0.02), and have worse mean PTA (53.0 vs. 39.1dB, p=0.02) and WRS (69% vs 84%, p=0.05) at presentation. ABG did not differ between the groups. Patients with 2+ signs were also significantly more likely to progress to surgery (84% vs. 42%, p=0.002) and have worse PTA and WRS at most recent follow up (p=0.02).

Conclusions: MD patients with multiple radiographic signs of ICH may have worse clinical presentations and treatment outcomes.

Define Professional Practice Gap & Educational Need: Lack of understanding regarding the association between idiopathic intracranial hypertension, obesity, and audiovestibular outcomes in Meniere's Disease.

Learning Objective: Describe the relationship between radiographic signs of intracranial hypertension (ICH) and audiovestibular presentations/outcomes in Meniere's Disease (MD).

Desired Result: Attendees will be provided evidence for a new predictor of audiovestibular outcomes in patients with Meniere's Disease. Using this information, they may consider obtaining MRI at the time of presentation in patients with Meniere's Disease (if not already doing so for asymmetric hearing loss) and in concert with a neuroradiologist review the imaging for signs of intracranial hypertension. If present, practitioners may modify their patient counseling and enact more rigorous medical management strategies.

Indicate IRB or IACUC Approval: Approved

Large Vestibular Aqueduct: Radiological Review of High-Resolution CT versus High-Resolution Volumetric MRI

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Steven M. Weindling, MD; David M. Barrs, MD
Colin L.W. Driscoll, MD; Jack I. Lane, MD
Joseph M. Hoxworth, MD

Objectives: To compare the diagnostic yield of high-resolution volumetric T2-weighted MRI (e.g. FIESTA-C, CISS, SPACE, CUBE) compared to high-resolution computed tomography(HRCT) for diagnosis of large vestibular aqueduct(LVA) and associated inner ear anomalies.

Study Design: Three board-certified neuroradiologists performed an independent, blinded radiological review for diagnosing LVA with 2:1 age-matched controls to eliminate bias.

Setting: Tertiary referral center

Patients: All patients between 2000-2016 with hearing loss who underwent both HRCT and volumetric T2-weighted MRI and diagnosed with LVA on either modality.

Main Outcome Measures: Diagnostic yield for LVA and associated inner ear anomalies using HRCT versus volumetric T2-weighted MRI.

Results: LVA was concurrently detected on both CT and MRI in 89.4% of cases (42/47). CT detected clinically significant LVA in 4 cases in which MRI was negative, while MRI detected clinically significant LVA in 1 case in which CT was negative. However, there was no statistical difference between MRI versus CT in detecting LVA($p=0.18$). The sensitivity for detecting associated cochleovestibular anomalies and the types of abnormalities uncovered between CT versus MRI differed and will be reported.

Conclusion: Historically, HRCT has been the imaging modality of choice for diagnosing LVA. However, this updated imaging review found a high concordance rate between the two imaging modalities. The diagnostic yield for LVA was not statistically different between high-resolution volumetric T2-weighted MRI versus HRCT. These data suggest that volumetric T2-weighted MRI-alone may be sufficient for diagnosis of inner ear anomalies and provides an added benefit over HRCT for interrogation of cochleovestibular nerve status and retrocochlear pathology. Future studies are needed to validate these early but promising findings.

Define Professional Practice Gap & Educational Need: It is not known which imaging modality (CT vs. MRI) has higher sensitivity for diagnosing a large vestibular aqueduct. Previous studies have employed older MRI technology (e.g. fast spin-echo T2-weighted images), however there has not been a study comparing CT to newer MRI technology which is currently widely available, specifically high resolution volumetric MRI, such as FIESTA or CISS sequences. We address this question in the current experiment.

Learning Objective: To compare the diagnostic yield of high-resolution volumetric T2-weighted MRI (e.g. FIESTA-C, CISS, SPACE, CUBE) compared to high-resolution computed tomography (HRCT) for diagnosis of large vestibular aqueduct (LVA) and associated inner ear anomalies. To provide guidance as to the best initial imaging test to obtain in the workup for hearing loss.

Desired Result: There is no consensus as to whether CT or MRI should be the initial imaging modality of choice when evaluating a patient for hearing loss. This study presents new evidence using the latest available MRI technology to provide guidance as to which imaging modality (CT vs. MRI) to choose.

Indicate IRB or IACUC Approval: Approval

NICHLOAS TOROK VESTIBULAR AWARD

Investigating Vestibular Blast Injury: Semicircular Canal Pressure Changes during High-Intensity Acoustic Stimulation

Anne K. Maxwell, MD; Renee M. Banakis Hartl, MD, AuD
Nathaniel T. Greene, PhD; Victor Benichoux, PhD
Jameson Mattingly, MD; Stephen P. Cass, MD, MPH
Daniel J. Tollin, PhD

Hypothesis: High-intensity acoustic stimulation causes measurable pressure waves in the semicircular canals.

Background: High-intensity acoustic trauma can cause hearing loss and balance disruptions. To examine the propagation of high-intensityacoustic stimuli to the vestibular end organs, we measured fluid pressure in the semicircular canals during both air- and bone-conducted high-intensity sound presentation.

Methods: Five full-cephalic human cadaveric heads were prepared bilaterally with a mastoidectomy and extended facial recess. Vestibular pressures were measured within the superior, lateral and posterior semicircular canals and referenced to intracochlear pressure within the scala vestibuli with fiber-optic pressure probes. Pressureswere measured concurrently with stapes velocity via laser Doppler vibrometry for both air- and bone-conduction. Stimuli were pure tones between 100 Hz and 14 kHz presented with custom closed-field loudspeakers for air-conducted sounds and via commercially available bone-anchored device for bone- conducted sounds.

Results: Pressures recorded in the superior, lateral and posterior semicircular canals in response to sound stimulation were equal to or greater in magnitude than those recorded in the scala vestibuli (up to 10 dB higher). The pressure magnitudes varied across canals in a frequency-dependent manner.

Conclusions: High sound pressure levels were recorded in the semicircular canals with sound stimulation, suggesting that similar acoustical energy is transmitted to the semicircular canals and the cochlea. Since these intralabyrinthine pressures are comparable to intracochlear pressure levels known to cause trauma in the auditory system, our results suggest that the vestibular end organs may also be at risk for injury during exposure to high-intensity acoustic trauma.

Define Professional Practice Gap & Educational Need: Sound pressure levels known to correspond to acoustic trauma have been measured in the cochlea but these have never been measured before in the vestibular end organs. There is a lack of awareness if similar pressure waves are present or measurable in the vestibular end organs.

Learning Objective: To show that pressure waves are present and measurable within the vestibular end organs with high-intensity a coustic stimulation and that these are similar to levels known to cause acoustic trauma in the cochlea.

Desired Result: To increase knowledge of potential for vestibular system injury following high-intensity acoustic trauma.

Indicate IRB or IACUC Approval: Approved

Long-Term Outcomes for Surgical Treatment of Superior Canal Dehiscence Syndrome

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John P. Carey, MD

Objectives: To evaluate the long term outcomes of surgery for Superior Canal Dehiscence Syndrome (SCDS).

Study Design: Cross-sectional survey

Setting: Tertiary referral center

Patients: Adults who have undergone surgery for SCDS with at least one-year follow-up

Interventions: 55-item web-based survey of symptoms and quality of life

Main outcome measures: Resolution of characteristic SCDS symptoms: dizziness, imbalance, oscillopsia, tinnitus, etc., and patient-reported quality of life.

Results: 95 (43%) out of 219 eligible patients completed the survey (60% female, mean age 55). Surgery was performed predominantly by middle fossa craniotomy (91%). The mean follow-up time was 5.3 years (range 1- 20). The most commonly bothersome symptoms pre-operatively were imbalance (43%), autophony (41%), and sensitivity to loud sounds (38%). The majority of patients reported improvement in overall symptoms (94%), and quality of life (90%), while a minority reported worse symptoms (3.2%) and quality of life (8.6%) at the time of survey. The majority of patients reported improved ability to function at work (76%) and socially (80%), while a minority reported worse ability to function at work (14%) and socially (11%). The symptoms with greatest mean improvement on a ten-point scale were autophony (6.5), pulsatile tinnitus (6.1), and sensitivity to loud sounds (5.2), while those with the least improvement were imbalance (2.4), dizziness (3.3), and headache (2.0).

Conclusions: This study represents the largest long-term follow up assessment of SCDS symptoms after surgical repair. Our results indicate a lasting benefit for the majority of patients, with auditory symptoms showing the most significant improvement.

Define Professional Practice Gap & Educational Need: 1. There are currently no large long-term studies of the outcomes of surgical treatment of Superior Canal Dehiscence Syndrome (SCDS). 2. Lack of adequate evidence on the long-term impact of surgery on quality of life. 3. Lack of knowledge of which symptoms of SCDS are more or less likely to improve after surgery.

Learning Objective: After this presentation, physicians will: 1. Understand the long-term benefits of surgical treatment of Superior Canal Dehiscence Syndrome (SCDS); 2. Understand the long-term impact of surgery on quality of life; 3. Understand that auditory symptoms show the most improvement.

Desired Result: Attendees will be able to use this unique, large long-term study to appropriately counsel their patients regarding the long-term outcomes of surgical treatment of Superior Canal Dehiscence Syndrome (SCDS).

Indicate IRB or IACUC Approval: Approved

Systematic Review of Hearing Outcomes after Radiotherapy for Vestibular Schwannoma

Adam R. Coughlin, MD; Tyler J. Willman, MD
Samuel P. Gubbels, MD

Objective: To determine the long-term serviceable hearing preservation rate for spontaneous vestibular schwannoma treated by primary radiotherapy

Data sources: The MEDLINE/PubMed, Web of Science, Cochrane Reviews, and EMBASE databases were searched using a comprehensive Boolean keyword search developed in conjunction with a scientific librarian. English language papers published from 2000 to 2016 were evaluated.

Study selection: Inclusion criteria: full articles, pre-treatment and post -treatment audiograms or audiogram based scoring system, vestibular schwannoma only tumor type, reported time to follow-up, published after 1999, use of either GammaKnife or linear accelerator radiotherapy. Exclusion criteria: case report or series with fewer than five cases, inadequate audiometric data, inadequate time to follow-up, neurofibromatosis type 2 exceeding 10% of study population, prior treatment exceeding 10% of study population, repeat datasets, use of proton beam therapy, and non-English language.

Data extraction: Two reviewers independently analyzed papers for inclusion. Serviceable hearing was defined as either PTA $\leq$ 50db with SDS $\geq$ 50%, AAO-HNS Hearing Class A or B, or Gardner-Robertson Grade I or II. Aggregate data was used when individual data was not specified.

Data synthesis: Means were compared with student t-test and Wilcoxon rank test.

Conclusions: 48 articles containing a total of 2002 patients with serviceable hearing were identified for analysis. The aggregate crude hearing preservation rate was 57.1% at an average reporting time of 40.7 months after radiotherapy treatment. Analysis of time-based reporting shows a clear trend of decreased serviceable hearing preservation extending to ten-year follow-up. This data encourages a future long-term controlled trial.

Define Professional Practice Gap & Educational Need: The current management of vestibular schwannoma includes observation, microsurgery, and radiotherapy. In addition to tumor control, hearing preservation is among the most important outcome factors which influence physician and patient decision making. The current literature reports a wide variation of hearing preservation rates following radiotherapy treatment of vestibular schwannoma. The majority of these articles report outcomes of single institution case series. This study attempts to more accurately define long-term serviceable hearing preservation rates and explore the factors influencing hearing preservation.

Learning Objective: Learn accurate hearing preservation rate following radiotherapy treatment of vestibular schwannoma. Understand the importance of time from treatment as critical factor when reporting in hearing preservation rates.

Desired Result: The physician should be able to better counsel patients with vestibular schwannoma on accurate, long term hearing preservation rates.

Indicate IRB or IACUC Approval: Exempt

Impact of Surgical Volume on Vestibular Schwannoma Surgical Outcomes

Michael J. Bauschard, MD, MS; Jonathan L. Hatch, MD
Shaun A. Nguyen, MD, MA; Paul R. Lambert, MD
Ted A. Meyer, MD; Theodore R. McRackan, MD

Objective: Determine the effect of hospital surgical case volume on the outcomes of vestibular schwannoma (VS) surgery

Study Design: Analysis of University HealthSystem Consortium inpatient database

Setting: University HealthSystem Consortium member hospitals (includes virtually every US academic medical center)

Patients: 3,697 patients who underwent VS resection over a three year timespan (2012 – 2015) grouped by race, age, comorbidities, payer, and gender with the exclusion of patients with neurofibromatosis type 2

Intervention: Surgical resection of VS

Main Outcome Measures: Comparing post-operative outcomes (length of stay, morbidity, and mortality) at hospitals grouped by volume (low, medium, and high) and complications at hospitals grouped into deciles by volume

Results: Baseline patient characteristics in terms of age, sex, gender, and baseline comorbidities were similar between hospital groups. Patients undergoing VS at high-volume centers had the shortest length of stay followed by medium- volume hospitals, then low-volume hospitals ($p \leq 0.005$). Low-volume hospitals had significantly higher rate of complications including stroke, aspiration, and respiratory failure ($p \leq 0.0175$). There was also a strong negative correlation between complication rates and hospital volume ($r = -0.8164$, $p = 0.0040$) when grouping hospitals into deciles by volume. However, patients at high-volume hospitals were more likely to be Caucasian (83.1%, $p = 0.0001$) and have private insurance (76.7%, $p < 0.0001$).

Conclusions: Volume of VS surgery performed at a hospital appears to impact length of stay and rates of postoperative complications. Most baseline demographics among hospital groups were similar though factors other than volume alone may impact patient outcomes.

Define Professional Practice Gap & Educational Need: 1) Lack of understanding of how surgical volume is associated with vestibular schwannoma surgical outcomes such as length of stay, complications, and mortality 2) Lack of understanding on the differences in patient demographics across hospitals of low, medium, and high surgical volume and how this may impact outcomes

Learning Objective: 1) Attendees will be able to identify differences in length of stay, complication rate, and mortality rate associated with hospitals of varying surgical volume 2) Attendees will have better understanding of the differences and similarities in patient demographics of low, medium, and high surgical volume hospitals

Desired Result: 1) Attendees will be more aware of how organizational practices and surgical experiences may lead to better outcomes and how they may implement these changes at their institution 2) Attendees will have a better understanding of contemporary outcomes for vestibular schwannoma surgery from a nationwide database. 3) Attendees will be able to improve care through mitigation of surgical risks

Indicate IRB or IACUC Approval: Exempt

Is Routine Chemical Prophylaxis Needed for Prevention of Deep Vein Thrombosis in Acoustic Neuroma Surgery?

Geoffrey C. Casazza, MD; Richard K. Gurgel, MD

Objectives: The benefit of routine chemical prophylaxis to prevent deep vein thrombosis (DVT) following skull base surgery is controversial. Chemical prophylaxis can prevent morbidity and mortality; however there are risks for devastating complications, including intracranial hemorrhage. Little is known about the safety of chemical prophylaxis following acoustic neuroma surgery.

Study Design: Retrospective case-control study.

Methods: A retrospective chart review of patients who underwent acoustic neuroma excision at the University of Utah from 2011 to 2016 was performed. Patients were divided by receipt of chemical DVT prophylaxis. Number of DVTs and post-operative complication (intracranial hemorrhage [IH], abdominal hematoma [AH], and post-auricular hematoma [PAH]) were recorded.

Results: 126 patients were identified, 55 received chemical prophylaxis and 71 did not. All patients received mechanical lower extremity prophylaxis. Two patients developed a DVT and no patient developed a pulmonary embolism. Both patients that developed a DVT received chemical prophylaxis. There was no statistically significant difference in the incidence of DVT's among the two groups ($p = 0.1886$). Five patients developed post-operative complications: 2 IH, 3 AH, and 0 PAH. All 5 patients with a complication received chemical prophylaxis ($p = 0.00142$). The relative risk for a complication was 14.14 (95% CI = 0.7987 to 250.4307; $p = 0.0778$).

Conclusions: There was a significant difference between numbers of post-operative complications but no difference between the numbers of DVTs. Interpretation of these results is limited due to a small sample size, however with a larger sample size we will likely generate similar results given the frequency of DVT in the entire population.

Define Professional Practice Gap & Educational Need: Lack of knowledge on the necessity of routine deep vein thrombosis prevention in acoustic neuroma surgery.

Learning Objective: Define the necessity of routine chemical deep vein thrombosis prophylaxis in acoustic neuroma surgery.

Desired Result: Develop an understanding of the benefits and risks of routine use of chemical deep vein thrombosis prophylaxis.

Indicate IRB or IACUC Approval: Approved

Audiologic Natural History of Small Volume Cochleovestibular Schwannomas in Neurofibromatosis Type 2

Alvin T. deTorres, MD; Chris K. Zalewski, PhD; Kelly A. King, PhD
Carmen C. Brewer, PhD; Prashant Chittiboina, MD
H. Jeffrey Kim, MD

Objective: To describe the natural history of audiologic features of neurofibromatosis type 2 (NF2), treatment-naïve, small volume (< 1000 mm3) cochleovestibular schwannomas (CVS).

Study design: Prospective, longitudinal cohort study.

Setting: Quaternary medical research institute.

Patients: NF2 patients with small volume, treatment-naïve CVSs enrolled in a prospective natural history study from 2008-2015 (n= 127 ears, 74 patients).

Interventions: Serial audiometry over a mean follow-up of 3.8 years.

Outcome measures: Pure tone audiometry at 500Hz, 1KHz, 2KHz, 3KHz, 4KHz, 8KHz, and four frequency PTA (4f-PTA) (.5, 1, 2, 4 KHz).

Results: Mean age at enrollment was 36.4 years (range 8 to 68) and mean 4f-PTA was 27.9 dB HL (range 0.00 to 118.3; SD=27.7). Progressive sensorineural hearing loss (SNHL) was defined as a loss of 10 dB or greater over the duration of follow-up. 4f-PTA worsened in 32.3% (n=41 ears) at a mean rate of 8.27 dB/year. This differed significantly from those whose hearing remained stable (n=86 ears, 67.7%, 1.4 dB/year, t-test, P=<0.001). 42.5% (n=54 ears) had progressive SNHL in at least one measured frequency. Progressive SNHL was seen most commonly at 8000Hz (n= 54 ears, 42.5%) and progressed at a rate of 6.2 dB/year. In affected ears, progression of hearing loss was most dramatic at 2000Hz with a rate of 9.0 dB/year (n=50 ears, 39.3%).

Conclusion: Within NF2, small volume CVSs with progressive SNHL and those without seem to represent two distinct populations. In tumors with progressive SNHL, hearing was affected most frequently at 8000Hz and most severely at 2000Hz.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge of the natural audiologic history of NF2 related cochleovestibular schwannomas, particularly in the small volume subtype.

Learning Objective: To understand the nature and progression of hearing loss in NF2 related CVSs

Desired Result: Attendees' understanding of the natural progression of hearing loss in NF2 CVSs can be applied in treatment decision making as well as patient and family education.

Indicate IRB or IACUC Approval: Approved

Unlike in Vestibular Schwannoma, Cochlear Dysfunction is not Common in Meningioma of the Cerebellopontine Angle

Lukas D. Landegger, MD; Jong D. Lee, MD, PhD
Sonaali Aggarwal, BA; Fred H. Linthicum Jr., MD
Konstantina M. Stankovic, MD, PhD

Hypothesis: Cochlear damage in human meningioma of the cerebellopontine angle is not as common as in vestibular schwannoma (VS).

Background: Meningioma and VS of the cerebellopontine angle and internal auditory canal typically cause hearing loss. Cochlear damage is known to contribute to VS-induced sensorineural hearing loss. Cochlear histopathology in meningioma has not been reported.

Methods: Retrospective analysis of cochlear histopathology in 8 unoperated meningiomas of the cererebellopontine angle identified after screening human temporal bone collections from 3 academic medical centers. The findings were contrasted with those from 32 unoperated VSs (Roosli et al. 2012).

Results: Cochlear damage was not detectable in 50% of meningiomas, in contrast to only 25% of VSs. A predominant or exclusive hair cells loss was not found in any meningioma, but was present in 18.8% of VSs. The incidence of strial atrophy and spiral ganglion neuron loss was similar in both groups. However, cochlear hydrops was absent in all mengiomas and present in 28% of VSs. Endolymphatic and
perilymphatic precipitate was infrequent in meningioma (12.5%) compared to VS (31.3% and an additional 12.5% with an exclusive perilymphatic precipitate).

Conclusions: Cochlear damage in human meningioma of the cerebellopontine angle is substantially rarer than in VS. This may explain the more commonly observed hearing improvement after surgical resection of meningioma than VS. The findings underline the importance of developing therapeutic strategies to prevent cochlear degeneration in tumors of the cerebellopontine angle and internal auditory canal.

Define Professional Practice Gap & Educational Need: 1. Cochlear histopathology in meningioma of the cerebellopontine angle has not been described. 2. Mechanisms of the more common hearing improvement after surgical resection of meningioma than vestibular schwannoma are not well understood.

Learning Objective: To identify differences in cochlear histopathology in meningioma and vestibular schwannoma of the cerebellopontine angle and internal auditory canal.

Desired Result: 1. To recognize that the infrequent cochlear damage in meningioma of the cerebellopontine angle may explain the observed hearing improvement after surgical resection of meningioma. 2. To appreciate that the much more common cochlear damage in vestibular schwannoma (VS) than meningioma may explain why surgical VS resection typically does not improve patients' hearing. 3. To highlight the need to develop therapeutic strategies that prevent cochlear degeneration in tumors of the cerebellopontine angle and internal auditory canal.

Indicate IRB or IACUC Approval: Exempt

Surgical Management of Tumors Involving Meckel's Cave and Cavernous Sinus: Role of a Lateral Sphenoidectomy Approach

Daniel Q. Sun, MD; Arnold H. Menezes, MD
Matthew A. Howard III, MD; David M. Hasan, MD
Bruce J. Gantz, MD; Marlan R. Hansen, MD

Objective: To study the indications and outcomes of lateral sphenoidectomy as part of a combined skull base approach in the treatment of tumors involving Meckel's cave and cavernous sinus.

Study design: Retrospective case series.

Setting: Tertiary referral center

Patients: Twenty-one consecutive patients (mean age: 45 years, range: 16 – 76) who underwent transzygomatic, extended middle fossa approaches for tumors involving Meckel's cave and cavernous sinus.

Interventions: Surgical access to Meckel's cave and cavernous sinus was achieved via extended middle fossa, trans-clinoid approach. Lateral sphenoidectomy was defined as drill-out of the greater sphenoid wing lateral to foramen rotundum. Reconstruction was achieved using combination of autologous and synthetic materials. Eleven patients (52%) received adjuvant radiation.

Main outcome measures: Tumor pathologies included meningioma (16 patients), epidermoid cyst (2), trigeminal schwannoma (1), and invasive pituitary adenoma (1). Mean (range) pre-operative tumor size was 4.1cm (1.3 – 9). Mean (range) length of follow-up was 4 years (range 0.1 – 10). Overall tumor control and gross total resection were achieved in 90% and 24% of patients, respectively. Lateral sphenoidectomy was performed in 15 patients (71%) for enhanced surgical access and/or tumor extension to the infratemporal fossa (4 patients). Post-operatively, cranial nerve deficits occurred in 11 (52%) patients (V – 7 patients; III, IV, or VI – 4; VII – 1; VIII – 1). CSF leak and hydrocephalus occurred in 1 and 4 patients, respectively.

Conclusion: In combination with middle fossa-based approaches to tumors involving Meckel's cave and cavernous sinus, lateral sphenoidectomy may play a viable role in tumor access and control.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness 2. Lack of contemporary knowledge

Learning Objective: 1. Gain awareness in skull base approaches 2. Understand lateral sphenoidectomy as an option in a combined skull base approach

Desired Result: 1. Improve the care of patients with skull base tumors

Indicate IRB or IACUC Approval: Approved

F001

Cost-Effective MRI Screening for Acoustic Neuromas in Patients with Asymmetric Hearing Loss

Matthew G. Crowson, MD; Daniel J. Rocke, JD, MD
David M. Kaylie, MD, MS

Objective: To determine if a screening MRI with FIESTA/CISS sequences is cost-effective compared to a traditional full MRI protocol with contrast for the evaluation of acoustic neuromas.

Study Design: Cost-effectiveness (CE) analysis from a third-party payer perspective.

Methods: A decision tree was constructed to evaluate full MRI and screening MRI strategies for patients with asymmetric sensorineural hearing loss. If a patient were to have a positive screening MRI, they received a full MRI. Acoustic neuroma prevalence, MRI specificity and sensitivity, and gadolinium anaphylaxis incidence were obtained through literature review. Institutional charge data were obtained using representative patient cohorts. One-way and probabilistic sensitivity analyses were completed to determine CE model threshold points for MRI performance characteristics and charges.

Results: The mean charge for a full MRI with contrast was significantly higher than a screening MRI ($4089 ± 1086 vs. $2872 ± 741; $p<0.05$). The screening MRI protocol was more cost-effective than a full MRI protocol with a willingness-to-pay from $0-20,000 USD. Sensitivity analyses determined that the screening protocol dominated when the FIESTA/CISS MRI charge was less than $4,318., and the specificity exceeded 63.8%. The
screening MRI protocol also dominated when acoustic neuroma prevalence was varied between 0 to 1,000 in 10,000 people.

Conclusions: A screening MRI protocol is more cost-effective than a full MRI with contrast in the diagnostic evaluation of an acoustic neuroma. A screening MRI also confers benefits of shorter exam time, and no contrast use. Further investigation is needed to confirm the performance of FIESTA/CISS MRI sequences for acoustic neuromas.

Define Professional Practice Gap & Educational Need: 1) Lack of awareness of the benefits of utilizing a screening MRI protocol in the assessment of a possible acoustic neuroma in an adult patient presenting with asymmetric hearing loss. 2) Lack of a contemporary economic evaluation of the utility of a screening MRI protocol compared to traditional MRI protocols with contrast.

Learning Objective: 1) At the conclusion of this presentation, the participants should be able: 1) To describe a cost-effective strategy using a screening MRI protocol for the evaluation of a patient with history and audiogram findings suggestive of an acoustic neuroma. 2) To compare the reported imaging performance of a screening MRI protocol without contrast versus a full MRI protocol with and without contrast for the identification of an acoustic neuroma.

Desired Result: It is the authors' hope that attendees will consider that a screening MRI protocol without contrast – a protocol that exclusively utilizes FIESTA or similar sequences – may be a more cost-effective strategy versus proceeding with a full MRI with and without contrast as the initial imaging modality in the evaluation of asymmetric hearing loss.

Indicate IRB or IACUC Approval: Approved

F002

Prevalence of Hearing Impairment and Hearing Care Utilization among Asian Americans

Janet S. Choi MD, MPH; Laurel M. Fisher, PhD
Rick A. Friedman, MD, PhD; Elina Kari, MD

Objective: To assess the prevalence of hearing impairment and utilization of hearing care among Asian Americans (AA), using the first nationally representative sample of AA adults.

Study design: National cross-sectional survey

Setting: Ambulatory examination centers

Patients: 3,733 adults (539 AAs) aged 20-70 in the 2011-2012 National Health and Examination Survey whose hearing were assessed by pure-tone audiometry

Intervention(s): Hearing impairment defined as a speech frequency pure-tone average (PTA) ≥25dB in better hearing ear.

Main outcome measure(s): Rates of hearing impairment, recent hearing test, and hearing aid use. Analyses incorporated sampling weights to account for complex sampling design.

Results: The prevalence of hearing impairment was 5.8% [95% CI: 3.0-8.6%] among AAs and increased substantially with age, which was comparable to other races/ethnicities including Whites, Blacks, and Mexican- Americans. After adjusting for age and PTA, AAs with hearing impairment were less likely to have received a recent hearing test compared to Whites (OR: 0.21 [95% CI: 0.08-0.53, p=0.003] and to Blacks (OR: 0.24 [95% CI: 0.08- 0.70, p=0.012]), less likely to have used hearing aids compared to Whites (OR: 0.07 [95% CI: 0.01-0.65], p=0.022), and less likely to report trouble hearing compared to Whites (OR: 0.30 [95% CI: 0.10-0.89], p=0.032). Among AAs, private insurance (OR: 2.4 [95% CI: 1.10-5.04]) and Medicare (OR: 7.6 [95% CI: 1.9-30.3]) was associated with higher levels of receiving a recent hearing test.

Conclusions: This first examination of a nationally representative sample of AA and hearing loss suggests that the prevalence is similar to other races. However, widespread adoption of a hearing assistive device may be a more difficult challenge.

Define Professional Practice Gap & Educational Need: 1. Lack of knowledge in prevalence of hearing loss and patterns of hearing care utilization among Asian Americans despite substantial growth of the population group in the US 2. Lack of awareness in racial disparities and barriers to hearing care among racial and ethnic minorities especially among Asian Americans

Learning Objective: 1. To understand the prevalence of hearing loss and hearing care utilization patterns among Asian Americans in comparison to Whites, Blacks, and Mexican-Americans using the nationally representative sample. 2.To investigate the extent of racial/ethnic disparities in hearing health including hearing exams, assistive device use, and differential factors associated with the hearing care utilization among Asian Americans.

Desired Result:1. Attendees will learn that the racial/ethnic disparities exist in hearing care utilization among Asian Americans based on the first nationally representative sample 2. Attendees will understand the need for further research to identify barriers to hearing care and ways to promote hearing health to address the racial/ethnic disparities.

Indicate IRB or IACUC Approval: Exempt

F003

Influence of Co-morbidity and Surgical Strategy on the Clinical Outcome in the Treatment of SCDS

Prof Arne Ernst, MD

WITHDRAWN BY AUTHOR

F004

Exclusive Transcanal Endoscopic Ear Surgery for Excision of a Facial Nerve Hemangioma with Interposition Nerve Grafting: A Case Report

Cameron C. Wick, MD; Mark Sakai, BS; Brandon Isaacson, MD

Objective: To illustrate a novel approach for surgical management of a facial nerve hemangioma, including interposition nerve grafting, via an exclusively transcanal endoscopic ear surgery (TEES) approach.

Patient: 39-year-old female with a preoperative House-Brackmann (HB) grade IV facial paresis secondary to a facial nerve hemangioma.

Intervention(s): Surgical excision and interposition nerve graft via a transcanal endoscopic approach.

Main Outcome Measure(s): Completeness of resection, approach morbidities, and facial nerve outcome.

Results: The TEES approach provided wide exposure of the facial nerve from the geniculate ganglion through the vertical segment. This visualization facilitated complete tumor resection, incus interposition ossicular reconstruction, and placement of an interposition nerve graft. The nerve graft was positioned in the fallopian canal and was secured at both ends with Surgical. The patient had no postoperative complications. At 11-month follow-up her facial function had returned to HB grade IV.

Conclusions: To our knowledge, this is the first report of a facial nerve hemangioma resection and interposition nerve graft via an exclusively endoscopic approach. This report adds to the growing body of evidence for an endoscopic role in the management of diverse middle ear and lateral skull base pathology. Additional studies are needed to fully elucidate the risk-benefit profile of this technique.

Define Professional Practice Gap & Educational Need: This is novel approach to resect and reconstruct a facial nerve tumor in the middle ear. To our knowledge, it is the first description of an entirely endoscopic approach for a facial nerve hemangioma resection and interposition nerve graft.

Learning Objective: Review differential diagnosis of middle ear neoplasms. Discuss when intervention is recommend for facial nerve tumors. Discuss different approaches and considerations for each approach.

Desired Result: Introduce a novel approach and reconstruction option.

Indicate IRB or IACUC Approval: Exempt

F005

Dizziness in Vestibular Schwannoma Patients Due to Underlying Comorbidities

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Objectives: To report findings from a cohort of vestibular schwannoma patients with a secondary comorbid vestibular disorder, and to discuss management strategies for this subset of patients presenting with both episodic vertigo and vestibular schwannoma (VS).

Study design: Retrospective case series.

Methods: VS patients presenting to a neurotology clinic in a tertiary care academic center with episodic vertigo.

Results: Nine VS patients presented with vertigo. Eight (89%) suffered from vestibular migraine (VM) and two (22%) had benign positional vertigo (BPV), one patient had both. All VM patients had at least partial improvement of their dizziness symptoms when treated with migraine lifestyle with migraine prophylactic therapy. One of the two patients with BPV had complete resolution of symptoms following particle repositions maneuvers. In seven of the nine patients (78%), treating the underlying non-VS condition resulted in complete dizziness resolution. Five patients (56%) avoided surgery and are continuing observation, while four patients (44%) had radiosurgery.

Conclusions: Many patients presenting with a VS report a history of recurrent episodic vertigo, and this may be due to underlying conditions and should be thoroughly elucidated prior to attributing it to the VS. All VS patients presenting with vertigo should have the standard vertigo history and examination, including a Dix- Hallpike exam, to determine if there is an alternate cause to their vertigo. Someauthors have advocated surgical treatment for VS patients with vertigo. Other vestibular pathologies should be ruled out prior to considering microsurgical excision for VS patients with episodic vertigo.

Define Professional Practice Gap & Educational Need: Lack of awareness of alternate causes of dizziness due to underlying comborbidities in patients with vestibular schwannomas.

Learning Objective: To understand the workup and treatment of dizziness in patients with vestibular schwannomas.

Desired Result: Practitioners will appropriately workup and treat additional comorbidities in vestibular schwannoma patients to treat their underlying dizziness.

Indicate IRB or IACUC Approval: Approved

F006

The Effect of Citalopram Versus a Placebo on Central Auditory Processing in the Elderly

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Objective: Evaluate the effects of therapy with citalopram on the central auditory processing in the elderly measured by central auditory tests.

Study Design: Prospective, randomized, double-blind, placebo-controlled study.

Setting: Tertiary referral center.

Patients: Forty-nine patients older than 60 years with normal hearing thresholds or symmetrical sensorineural hearing loss up to 70 dBHL, word-recognition score equal to or better than 70%, and diagnosed with central auditory processing disorders. They underwent the mini-mental state examination, as a way to screen those with the possibility of dementia; they also underwent the Beck depression inventory, for screening individuals with depression.

Intervention: Citalopram 20mg/day or placebo for 6 months.

Main outcome measure: The central auditory tests were applied to the selection of individuals with auditory processing disorders and repeated after 6 months' treatment. The tests were: sound localization, speech in noise, dichotic digits' test, pitch pattern sequence, duration pattern test and gaps-in-noise.

Results: Comparisons of central auditory tests pre - and posttreatment in groups showed: sound localization (p=0,735), pitch pattern sequence humming (p=0,102), pitch pattern sequence nomination (p=0,157) duration pattern test humming (p=0,102), duration pattern test nomination (p=0,196) and gaps-in-noise (p=0,683). Dichotic tests in right and left ear respectively: speech in noise (p=0,143; p=0,052), dichotic digits test (p=0,492; p=0,233). Conclusions: There was no statistically significant effect with the use of citalopram in central auditory processing tests of the subjects.

Define Professional Practice Gap & Educational Need: A general lack of contemporary knowledge on the use of selective inhibitors of serotonin reuptake in central hearing disorders, despite the pathophysiological evidence of the importance of serotonin in the functioning of central auditory pathways.

Learning Objective: To recognize the difficulty in the management of central hearing disorders and to analyze the effect of citalopram in their treatment.

Desired Result: Hope to encourage new thinking and research on new therapy approaches in central hearing disorders.

Indicate IRB or IACUC Approval: Approved

F007

Use of Positive Airway Pressure Following Middle Ear Surgery: A Practice Survey of Otologists

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Background: Positive Airway Pressure (PAP) devices are used as treatment for obstructive sleep apnea (OSA). PAP may increase middle ear pressure which is concerning for otologic surgeons. There is a lack of data to guide how surgeons should manage PAP therapy following middle ear surgery.

Objective: To elucidate how otologic surgeons manage PAP in their patients after ear surgery.

Study design: A survey e-mailed to practicing members of the American Neurotology Society.

Results: Among sixty respondents, the most common advice given to patients was to avoid PAP use for one week (40%), return to normal use immediately (20%), avoid PAP for one month (13.3%) or avoid PAP for one day (13.3%) after surgery. Twenty percent of providers reported that they change their advice based on the PAP pressure settings (i.e. shorter hiatus for higher settings). Among respondents, 40% believe that they have patients with middle ear issues secondary to PAP and 20% attributed surgical failures to PAP use. One- third of providers routinely pack the Eustachian tube during surgery. Providers that attributed a negative surgical outcome to PAP use were more likely to routinely pack/plug the Eustachian tube during otologic surgery ($p=0.0013$).

Conclusion: Postoperative PAP treatment for OSA varies greatly among practicing otologists. Providers who believe that an adverse outcome was attributed to PAP use were more likely to prophylactically plug the Eustachian tube during surgery. Future research will provide additional information which will allow us to better understand the effect of PAP on the middle ear especially following otologic surgery.

Define Professional Practice Gap & Educational Need: 1. There is a lack of awareness that positive airway pressure (PAP) may affect middle ear pressure. 2. There is a paucity of data to guide how surgeons should manage PAP therapy following middle ear surgery.

Learning Objective: 1. Explain that positive airway pressure (PAP) may increase middle ear pressure - which is of concern for otologists. 2. Elucidate how otologic surgeons manage PAP in their patients after ear surgery.

Desired Result: 1. Attendees will better understand the potential relationship that positive airway pressure may have on the middle ear. 2. Attendees will consider the variations in practice patterns when managing PAP after ear surgery.

Indicate IRB or IACUC Approval: Approved

F008

Epidemiology of Dizzy Patient Population in a Neurotology Clinic and Predictors of Peripheral Etiology

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Objective: To compare the proportion of peripheral versus non-peripheral etiologies among all patients, inclusive of those presenting primarily or as referrals, to rank diagnoses in order of frequency, to determine whether or not age and gender predict diagnosis, and to determine which subgroups tended to undergo formal vestibular testing.

Study design: Retrospective cohort.

Setting: Academic neurotology clinic.

Patients: Age >18 neurotology clinic patients with the chief complaint of dizziness.

Intervention(s): None.

Main outcome measure(s): Age, gender, diagnosis, record of vestibular testing.

Results: 2079 patients were assigned 2468 diagnoses, of which 57.7% and 42.3% were of peripheral and non-peripheral etiologies, respectively. The most common diagnoses were Meniere's (23.0%), vestibular migraine (19.3%), BPPV (19.1%), and central origin, non-migraine (16.4%). Peripheral diagnoses are more likely to be found in men than in women (odds ratio 1.59). Peripheral diagnoses were most likely to be found in the 60-69 age group (odds ratio 3.82). There was not a significant difference in rate of vestibular testing between women and men. Among patients with two diagnoses, the most common combinations were vestibular migraine and BPPV then vestibular migraine and Meniere's.

Conclusions: A large proportion of patients seen for the chief complaint of dizziness in the neurotology clinic were found not to have a peripheral etiology of their symptoms. These data challenge a prevalent dogma that the most common causes of vertigo are peripheral: BPPV, vestibular neuritis, and Meniere's disease. Age and gender are statistically significant predictors of peripheral etiology of dizziness.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness of proportion of non-peripheral causes of dizziness in patients in neurotology clinic 2. Lack of collaboration to optimize clinical care for patients with dizziness 3. There are numerous studies of demographics of dizzy patients from various populations: general population, population in primary care clinics, geriatric patients, emergency department patients, and neurology clinics. Interestingly, there have not been reports in the literature of demographics of dizzy patients in a neurotology clinic.

Learning Objective: 1. To understand the proportion of peripheral etiologies of dizziness to non-peripheral etiologies 2. To understand the most common diagnoses for dizzy patients in neurotology clinic 3. To understand whether or not age and sex predict peripheral dizziness 4. To understand whether which subgroups of dizzy patients tend to undergo formal vestibular testing 5. To understand which dizzy diagnoses are commonly associated with each other

Desired Result: Attendees will be able to contextualize their own neurotology practice relative to this large population of dizzy patients and better appreciate the importance of a close working relationship with other services in the treatment of patients who suffer from dizziness.

Indicate IRB or IACUC Approval: Approved

F009

An Analysis of Safety and Adverse Events Following Cochlear Implantation in Syndromic Children

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Objectives: To determine the safety profile and perioperative morbidity of syndromic children undergoing cochlear implantation (CI).

Study Design: Retrospective study utilizing the American College of Surgeons National Surgical Quality Improvement Program Pediatric Database (ACS-NSQIP).

Methods: Pediatric patients who underwent CI were queried using the ACS-NSQIP database from 2012-2014. Univariate analysis and multivariate logistic regression were used to determine group comparisons. Outcomes included prematurity, comorbidities, operative time, length of stay, complications, readmissions, and related reoperations.

Results: 395 of the 1,993 cases of pediatric CI were found to have an associated congenital abnormality. The mean age of syndromic children was 4.98 years compared to 5.27 years for non-syndromic children. Syndromic patients were more likely to have an unplanned readmission (4.3% vs. 2.3% of children, $p=0.045$), unplanned reoperation (2.0% vs. 0.8% of children, $p=0.035$), and present with significant medical comorbidities (i.e. prematurity $p=0.002$, cardiac anomalies $p<0.001$, asthma $p=0.015$). However, syndromic children were found to have no statistically significant difference in postoperative complications including superficial and deep wound infections. Finally, syndromic children had significantly shorter operative times (145.90 vs. 166.81 minutes, $p<0.001$) and a shorter length of stay (0.54 vs. 0.90 days, $p=0.041$).

Conclusions: In spite of the medical complexity of syndromic patients, these children have no increase in adverse events in the immediate postoperative period although readmissions and reoperation were found to be more common.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge with respect to the safety and adverse events associated with cochlear implantation in syndromic children.

Learning Objective: To determine the safety profile and adverse events of syndromic children undergoing cochlear implantation (CI).

Desired Result: As early CI continues to reveal decreased auditory deprivation, improved speech perception, and early primary language development, considerations may be made for the equivalent safety profile of CI in syndromic children.

Indicate IRB or IACUC Approval: Exempt

F010

Publishing Trends in Otology and Neurotology

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Objectives: 1) Describe publishing trends for otologic/neurotologic disorders over a 35 year span 2) Compare trends in publishing with disease prevalence.

Methods: PubMed searches were performed on 35 otologic/ neurotologic disorders using medical subject headings (MeSH) terms from 1980-2015 to determine the number of published articles per year. A Mann- Kendall trend analysis evaluated changes in publication frequency over time as a discrete variable while correcting for total number of articles published per year. Topics were evaluated both as annual count and as a percentage of the total number of articles cited.

Results: The total number of publications on the 35 topics increased from 853 in 1980 to a peak of 3068 in 2013. Otitis externa ($\tau = -0.634$, $p < 0.001$), cholesteatoma ($\tau = -0.629$, $p < 0.001$), and Meniere's disease ($\tau = -0.724$, $p < 0.001$) all showed decreasing publication trends with otitis media ($\tau = -0.799$, $p < 0.001$) showing the largest decrease. Topics with positive trends included cochlear implants ($\tau = 0.740$, $p < 0.001$), congenital hearing loss ($\tau = 0.629$, $p < 0.001$), and temporal bone encephaloceles ($\tau = 0.743$, $p < 0.001$). Glomus jugulare showed the least variability ($\tau = -0.0244$, $p=0.085$). Rapid rise in publications on superior canal dehiscence and vestibular migraine illustrate novel diagnoses.

Conclusion: This study displays trends in the literature over the past 35 years that are often inconsistent with common disorders seen by otologists/neurotologists. Certain diagnoses that are currently being researched less commonly continue to impact patients with the same regularity.

Define Professional Practice Gap & Educational Need: There are currently inconsistencies in publication trends in Otology and Neurotology with disorders encountered more frequently being published with decreasing frequency.

Learning Objective: To identify disorders at the forefront of current research efforts while recognizing the disorders being published at decreasing rates but effecting individuals with the same regularity.

Desired Result: This study will attempt to identify the current direction of the field of Otology and Neurotology and promote research efforts in disorders that continue to effect patients despite decreasing publication trends.

Indicate IRB or IACUC Approval: Exempt

F011

Bilateral Bifurcation of the Vertical Facial Nerve Segments in an Asymptomatic Patient

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Objective: To describe a clinical encounter with asymptomatic, bilateral vertical segment facial nerve bifurcation and literature review of the anomaly

Study design: Case study, literature review

Setting: Veterans Administration hospital

Patient: 32 year old Asian American male with bilateral conductivehearing loss and Eustachian tube dysfunction, noted to have asymptomatic facial nerve bifurcation on pre-operative imaging for right tympanoplasty and bilateral Eustachian tube balloon dilation. Patient noted to have bilateral bifurcation of the distal vertical segment of the facial nerve, with complete duplication unliaterally and incomplete on the contralateral. He did not exhibit any signs of facial weakness or other temporal bone anatomical variations.

Intervention: CT temporal bone, MRI IAC with and without contrast

Results: Approximately five prior publications reporting facial nerve bifurcations and anomalies exist in the otolaryngology literature.
Facial nerve anomalies are most commonly associated with other dysplasias of the middle and inner ear. Tympanic segment anomalies, typically unilateral, are most commonly identified, though labyrinthine and mastoid anomalies have been reported as well. The presentation of our patient is novel in that it represents a rare bilateral distal mastoid segment facial nerve bifurcation in a non-syndromic patient without any other anatomic abnormalities. The possibility of incomplete extension from the temporal bone of the extratemporal facial nerve is raised.

Conclusions: Facial nerve bifurcation is a rare malformation that can occur along any segment of the nerve and can have significant effect on potential complications. While the incidence is low, pre-operative high resolution CT imaging is key to its detection.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness of condition 2. Unknown incidence of this variant 3. Poorly defined significance of finding

Learning Objective: To increase awareness of a rare anatomical variant and potential effects on surgical planning and potential complications. To encourage identification and further study of this variant.

Desired Result: To educate providers regarding a rare anomaly in order to increase pre-operative identification and avoid complications through use of imaging and careful surgical planning. To improve documentation of the variation in the reported literature

Indicate IRB or IACUC Approval: Exempt

F012

Decreased Percutaneous Threshold of Facial Nerve Stimulation Predicts Facial Canal Dehiscence

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Objective: Preoperative temporal bone high-resolution computed tomography (HRCT) is used to assess middle ear and mastoid anatomy. However, HRCT is an unreliable method of detecting facial canal dehiscence. We aimed to determine if preoperative transcutaneous facial nerve (FN) stimulation at the stylomastoid foramen could predict middle ear facial canal dehiscence.

Study design: Retrospective review

Setting: Tertiary center

Patients: Records of adult patients who underwent otologic surgery at our institution from January 2015 to October 3, 2016 were reviewed. Those selected for inclusion had preoperative FN stimulation and HRCT available for review.

Intervention: Using an FN stimulator placed on the skin over the stylomastoid foramen, the FN was stimulated at amperages ranging from 0.01—30 milliamperes (mA). Thresholds to waveform formation and amplitudes of compound muscle action potential (CMAP) were recorded at all electrodes.

Main outcome measures: Threshold to CMAP, average threshold to CMAP, threshold to maximum amplitude of CMAP, and maximum amplitude of CMAP.

Results: 34 patients met inclusion criteria. Of the 11 with intra operatively confirmed dehiscences, 6 were identified by the attending surgeon on HRCT and 2 were identified on official radiology report. Mean lowest threshold to CMAP (0.75mA vs 8.0mA), and mean maximum amplitude of CMAP (1835μV vs 1197μV) of dehiscent versus non-dehiscent nerves were significantly different ($p<0.05$).

Conclusions: Iatrogenic facial nerve injury is one of the most devastating potential complications of otologic surgery. The use of facial nerve stimulation is a simple and cost-effective tool that can give the surgeon presurgical confirmation of facial nerve anatomy.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge

Learning Objective: Understand that preoperative facial nerve stimulation can be used to provide information about facial nerve anatomy to supplement high resolution CT scan.

Desired Result: They will use preoperative facial nerve stimulation to supplement knowledge of patient's facial nerve anatomy as described by high resolution CT scan.

Indicate IRB or IACUC Approval: Exempt

F013

Serum Levels of Prestin in a Mouse Model of Cisplatin Ototoxicity

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Hypothesis: Prestin in circulation may serve as a biomarker after exposure to cisplatin.

Background: Biomarkers are commonly used in detection of disease processes and provide an easy method of early diagnosis and monitoring. At present, no serologic biomarkers are available for inner ear diseases. Our group has proposed outer hair cell-specific protein, prestin, as a possible biomarker of inner ear damage in circulation. Here we investigate prestin as a biomarker in a mouse model of cisplatin ototoxicity.

Methods: Control and five groups of experimental mice were used. Baseline click-evoked auditory brainstem response (ABR) thresholds were recorded for all mice. Baseline blood was collected from untreated, control mice. The remaining groups were injected with cisplatin (16 mg/kg) and ABR threshold measurements and blooddraws were repeated either 12 hr, 1, 3, 7 or 14 days later. Prestin concentrations in the serums were measured using ELISA.

Results: ABR thresholds were significantly elevated 24 hrs after cisplatin injection, but declined over days 3-14. There was a trend toward increased prestin concentrations reaching a maximum at 24 hr after cisplatin and then declined over days 3-14. These changes, however, failed to reach statistical significance.

Conclusions: The preliminary results presented here suggest that the time course of change in circulatory prestin parallels that of ABR threshold changes. Additional work is needed to further clarify the relationship between serum prestin levels and ABR thresholds as well as histological changes present in the cochlea. Prestin appears to have the potential to serve as a biomarker.

Define Professional Practice Gap & Educational Need: 1. Lack of an early detection system for inner ear diseases. 2. Lack of awareness that the outer hair cell-specific protein, prestin, can serve as a biomarker.

Learning Objective: To understand that the current methods used to measure inner ear disease lack the ease of use and reliability that a biomarker measured in circulation can provide.

Desired Result: They will begin to actively seek ways in which prestin can be used as a biomarker to monitor inner ear disease.

Indicate IRB or IACUC Approval: Approved

F014

Mastoid and Inner Ear Measurements in Patients with Ménière's Disease

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Objective: To determine the relationship between radiographic temporal bone anatomy of patients with Meniere's disease in medically and surgically managed populations.

Study Design: Retrospective chart review.

Setting: Two tertiary referral centers.

Patients: Adults older than 18 years with Meniere's disease treated with endolymphatic sac decompression (ESD) or medical management (non-ESD) vs controls.

Interventions: MRI and CT imaging studies of the temporal bones were reviewed by blinded radiologists.

Main Outcome Measures: Radiographic temporal bone dimensions were measured in Meniere's disease and control patients. Age, sex, symptoms, nadir audiogram data, academy classification of Meniere's disease, number of acute medical interventions, further surgery, and follow up were recorded. Statistical analysis was performed to compare outcome measures across groups and demographics.

Results: A total of 90 imaging studies were reviewed. Meniere's disease represented 52/90 studies (ESD 22/52; non-ESD 30/52). ESD and non-ESD groups had similar pure tone averages (33.95±20.55 vs 41.63±22.56 dB HL; p=0.21) and frequency of definite Meniere's disease (59.1% vs 53.3%; p=0.69). Mean vestibule width was less in Meniere's disease (2.99±0.46mm) vs controls (3.19±0.39mm; p=0.024). Mean vestibule length significantly increased between the control (5.45±0.54mm), non-ESD (5.80±0.96mm), and ESD (5.94±0.81mm) groups (p=0.018). Mean mastoid height was less in the ESD group (35.3±8.7mm) compared to non-ESD (38.9±4.9mm) and controls (38.9±5.8mm), which approached significance (p=0.11).

Conclusions: Medically and surgically managed Meniere's disease patients were clinically similar based on academy classification. Although surgical Meniere's disease patients may have more compact mastoid and elongated vestibular anatomy, these radiographic differences may not be a conclusive clinical predictor.

Define Professional Practice Gap & Educational Need: There are very few studies investigating the relationships between mastoid and inner ear anatomy and Meniere's disease. As a result, there is a lack of knowledge and awareness of such a relationship. Furthermore, there has never been a clinical study looking at the temporal bone anatomy and the various degrees of Meniere's disease, such as medically and surgically managed patients.

Learning Objective: The learning objective is to understand the different measurements of mastoid and inner ear anatomy in Meniere's disease patients versus controls, especially in the surgical subset of patients.

Desired Result: The desired result will be to introduce awareness of radiographic differences in Meniere's disease patients, which may be applied as a possible predictor or guide in otologic surgery for these patients.

Indicate IRB or IACUC Approval: Approved

F015

Hearing Preservation after Cochlear Implantation and Administration Different Models Steroid Therapy

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Objective: The objective of the study is to assess how different models of steroid therapy influence hearing preservation.

Data sources: During the last decade we observed the increase of number of scientific reports on topical application of steroids in treatment of inner ear diseases such as sudden deafness, tinnitus, Meniere's disease, autoimmune inner ear disease and hearing loss caused by the introduction of the cochlea electrode implant.

Study selection: To assess influence of different models of steroids administration on hearing preservation after cochlear implantation Pure Tone Audiometry was applied. The hearing preservation was calculated based on special formula developed by the Hearring Group, meaning Hearing preservation = (1- (PTApost-PTApre/PTAmax-PTApre)) x 100.

Data extraction: Patients included in the study were divided into 3 groups: intravenous steroid administration, intravenous + oral steroids administration and a control group. Since May to October (2016) 15 patients were included to the study group. By the end of the year 2016 additionally 10 patients will be included in the study. In all of the cases the cochlear implant electrode was inserted via the RW approach.

Data synthesis: After the analysis, the first data obtained from 13 out of 15 patients. The complete hearing preservation was observed in 5 cases, partial hearing preservation was observed in 6 cases andminimal hearing preservation was observed in 2 cases.

Conclusions: In the most of cases we observed hearing preservation after application of intravenous or combination of intravenous and oral steroids. A larger number of patients is required to assess the effectiveness and compare the two models of steroid therapy.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge on use of steroids in Partial Deafness Treatment

Learning Objective: Information about feasibility of using steroids in this kind of treatment

Desired Result: Application of knowledge in everyday clinical practice

Indicate IRB or IACUC Approval: Approved

F016

Forward Masking of the Speech-Evoked Auditory Brainstem Response

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Hypothesis: The goal is to determine if susceptibility to forward masking of the speech-evoked Auditory Brainstem Response (sABR) increases with advancing age.

Background: Older listeners have difficulty understanding speech in background noise even when their audiograms are normal. This is partly due to deficits in the processing of time-domain speech information, including masking of speech sounds by prior sounds (forward masking). The goal of this study was to determine if forward masking of the sABR can be used as an objective measure of temporal processing ability.

Methods: Forward-masked sABRs were measured in normal hearing young adults using a 40-ms synthetic /da/ signal preceded by a 100-ms speech-shaped noise masker. The masker was presented at 75 dB SPL and the signal at 70 dB peSPL. The interval between masker offset and signal onset (Δt) was 4, 16, 32, or 64 ms. Baseline was the response to the unmasked signal. The dependent variables were the latencies of vertex-positive peaks in the response waveform.

Results: Response peak latency varied inversely with Δt. This was most pronounced for the initial peak ($\approx$ ABR Wave V) which showed a maximal mean shift of > 1 mSec. Later peaks showed only minor systematic latency shifts. The initial peak was generated primarily by the plosive onset of the signal. Preliminary data on older listeners suggests a similar behavior but with latency shifts extending out to later peaks.

Conclusion: Forward-masked sABRs provide a viable and objective measure of temporal processing that appears to be sensitive to listener age.

Define Professional Practice Gap & Educational Need: Clinical use of the auditory brainstem response (ABR) test has been limited primarily to threshold estimation or site-of-lesion assessment using simple click or tone stimuli. This study demonstrates that the ABR test is capable of providing much more information regarding auditory function such as temporal processing ability.

Learning Objective: The learner will understand how speech-evoked ABRs can be used in the assessment of age-related temporal processing deficits

Desired Result: The desired result is a rigorous demonstration that the forward-masked sABR can provide a reliable objective gauge of temporal processing that, in turn, will lead to a better assessment of the speech understanding difficulties of older listeners even with normal audiograms.

Indicate IRB or IACUC Approval: Approved

F017

Prevalence of Extracochlear Electrodes: CT Scans CI Maps, and Operative Reports

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Objective: To quantify and compare the number of cochlear implant (CI) electrodes found to be extracochlear on postoperative CT scans, the number of basal electrodes deactivated during standard CI mapping (without knowledge of the post-operative CT scan results), and the degree of electrode insertion noted by the surgeon.

Study Design: Retrospective

Setting: Academic Medical Center

Methods: 357 patients underwent standard cochlear implantation followed by postoperative temporal bone CT scanning, which was analyzed to determine the number of extracochlear electrodes. Standard CI programming was completed without knowledge of the number of extracochlear electrodes identified on the CT. These standard CI maps were reviewed to record the number of deactivated basal electrodes. Lastly, each operative report was reviewed to record the degree of reported electrode insertion.

Results: Twenty-eight percent (n=100) of the CIs were found to have at least one electrode at the entrance of or outside of the cochlea on the CT scan. Review of CI mapping indicated that audiologists had deactivated extracochlear electrodes in 62% (n=62) of these cases. Review of operative reports revealed that surgeons indicated incomplete insertion in only 8% of cases (n=8).

Conclusions: Extracochlear electrodes were identified audiologically in 62% of cases and in surgical reports in 8% of cases; however, it is possible that at least a portion of these cases involved postoperative electrode migration. Nevertheless, given these findings, postoperative CT scans can provide information regarding basal electrode location which could help improve programming accuracy, associated frequency allocation, and audibility with appropriate deactivation of extracochlear electrodes.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness of the prevalence of extracochlear electrodes 2. Lack of understanding of how extracochlear electrodes can adversely affect audibility for CI patients, if not deactivated appropriately 3. Incomplete information provided in operative reports, which could help guide CI programming, if reported more accurately

Learning Objective: 1. Understand prevalence of extracochlear electrodes and how extracochlear electrodes are identified 2. Recognize the importance of postoperative CT scanning to optimize CI mapping 3. Recognize the importance of thorough and descriptive operative reports to help guide CI mapping

Desired Result: Increased awareness of the prevalence of extracochlear electrodes will lead to more postoperative CT scans and/ or more accurate operative reports to help guide appropriate deactivation of these electrodes during CI mapping, which will in turn improve programming accuracy, associated frequency allocation, and audibility for patients.

Indicate IRB or IACUC Approval: Approved

F018

Vestibular Preservation After Cochlear Implantation with Modern Electrode Arrays

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Objective: To determine the prevalence of vestibular symptoms and functional change after cochlear implantation (CI) with slim or mid-scalar electrode arrays.

Study design: Prospective, single-blinded pilot study

Setting: Tertiary care academic center

Patients: Eleven ears from 10 patients who underwent CI with slim or mid-scalar electrode arrays. Exclusion criteria included history of a vestibular disorder or preoperative vestibular hypofunction (VH).

Intervention: Cochlear implantation

Main outcome measure: Subjective and objective vestibular function was assessed using the Dizziness Handicap Inventory (DHI), caloric electronystagmography (ENG) and cervical vestibular evoked myogenic potentials (c-VEMP) before CI and >2 months post-CI. Hearing was assessed by unaided pure tone audiometry.

Results: Postoperatively, 2 implanted ears had clinically significant VH (>25% caloric asymmetry), but no ear lost >50% caloric response. Three ears had a total loss of c-VEMP response, including both ears with postoperative VH. The median postoperative low-frequency pure tone average (LF-PTA) shift was 18 dB (range 4-31 dB). The two ears with VH and c-VEMP loss had postoperative LF-PTA shifts of 16 and 18 dB, and the ear with c-VEMP response loss had a LF-PTA shift of 11 dB. The DHI for the subjects with objective findings did not change after CI.

Conclusions: All patients who underwent CI with a slim or mid-scalar electrode array had labyrinthine preservation, with only 2 of 11 ears (18.1%) showing clinically significant VH. Neither DHI score nor low - frequency hearing preservation appeared predictive of postoperative VH.

Define Professional Practice Gap & Educational Need: 1. Lack of contemporary knowledge of the impact of modern-era cochlear implantation on vestibular function. 2. Inconsistencies in preoperative evaluation of patients considering sequential cochlear implantation.

Learning Objective: 1. Understand the risk to vestibular function after modern cochlear implant surgery, 2. Recognize that hearing preservation and vestibular symptoms may not predict vestibular loss after cochlear implantation.

Desired Result: Pursue vestibular testing when evaluating candidates for sequential cochlear implantation. Utilize knowledge of vestibular loss after cochlear implant surgery to guide candidacy evaluation, primary and sequential. Counsel patients appropriately on their likelihood of dizziness or vestibular loss after cochlear implantation.

Indicate IRB or IACUC Approval: Approved

F019

Everyday Listening Experience Does Not Improve Osseointegrated Device Performance in Single-sided Deafened Individuals

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Objective: Determine if 12 months of daily osseointegrated (OI) device usage improves hearing in noise and localization performance in single-sided deafened individuals.

Study Design: Prospective longitudinal study

Setting: Tertiary referral center

Patients: 10 adults with single-sided deafness (SSD) and normal contralateral hearing; minimum of 6 months OI usage prior to initial visit.

Interventions: Speech in noise (SIN) understanding and localization were assessed in a multi-speaker array (R-space) with patients either repeating sentences embedded in competing noise or verbally indicating the source speaker of a sentence stimuli (i.e. Where am I coming from now?), respectively. To gauge the impact of microphone settings on performance, directional, omnidirectional, and adaptive microphone modes were used. Tests were completed at two time points: 1) following 6 months of consistent device use (i.e., initial visit), and 2) 12 months post initial visit.

Main Outcome Measures: SIN understanding and localization abilities were assessed longitudinally over a 12- month time period using multiple microphone modes.

Results: Localization and SIN understanding performance show no significant improvement for OI users after 12 months of daily use regardless of microphone mode.

Conclusions: Daily usage of an OI device in SSD individuals does not result in performance gains over a 12-month period. Developing a targeted auditory training program focused on improving OI hearing in noise and localization performance will be important future directions for improving OI user SIN and localization abilities.

Define Professional Practice Gap & Educational Need: 1. Lack of knowledge of ways to improve osseointegrated device performance among single-sided deafened individuals. 2. Lack of the ability to counsel single-sided deafened individuals on their performance using osseointegrated devices over time.

Learning Objective: 1. To understand the effect of everyday listening experience on osseointegrated device performance in single-sided deafened individuals. 2. To understand how to properly counsel single -sided deafened patients regarding osseointegrated device performance over time.

Desired Result: Attendees will be able to properly counsel single-sided deafend individuals regarding osseointegrated device usage over time.

Indicate IRB or IACUC Approval: Approved

F020

Vestibular Rehabilitation Utilizing a Novel Palatal Alternative Sensory Feedback Device

Benjamin F. Erhardt, MD; Carmen Casanova Abbott, PT, PhD
Arnaldo Luis Rivera, MD

Objective: Establish the feasibility of palatal alternative sensory feedback utilizing a novel device (EquiCue V1.0, Innervo Technology LLC) to improve vestibular function in patients with vestibular loss or vestibulopathy.

Study design: Pilot case series

Setting: Tertiary Care Medical Center

Patients: Four English speaking adults, ages 18-85, with documented vestibulopathy who completed a course of vestibular rehabilitation.

Intervention: Patients were custom fit with a novel frequency modulated electrostimulatory palatal device (EquiCue V1.0, Innervo Technology LLC), which was custom calibrated to their sensory sensitivity. Patient underwent 1 to 3 90-minute sessions administered by physical therapists.

Main outcome measures: Validated outcome measures (Sensory Organization Test (SOT), Dynamic Gait Index (DGI), and Verbal Analog Dizziness Scale(VADS)) were administered with and without the appliance.

Results: SOT: 4/4 patients saw consistent improvement in vision and vestibular integration with use of the device. Their reliance on the somatosensory/visual systems normalized with use of the appliance. All patients showed correction of posterior center of gravity alignment to central. DGI/VADS: 3/4 of patients had immediate relief of symptoms of dizziness/nausea/unsteadiness with the appliance on their first visit, as calculated using the VADS, which persisted on repeat sessions. Total DGI score increased 1-2 points. Increased speed of movement and steadiness was observed. Patients were able to perform pivot turns and stepping over obstacles without staggering.

Conclusions: Use of a novel non-invasive frequency modulated electrostimulatory palatal device may afford relief of vestibular symptoms and improvement in vestibular function in patients with documented vestibulopathy. Further study is indicated to confirm these results.

Define Professional Practice Gap & Educational Need: Patients with documented vestibulopathies not amenable to medical or surgical therapy are currently offered vestibular rehabilitation with physical therapy. Motivated investigation has taken place to produce alternative sensory feedback devices to assist in augmentation of the patients' residual balance and vestibular function. These have included devices focusing on intraoral alternative sensory feedback, specifically, the tongue. We present our initial experience with a novel palatal alternative sensory feedback device (Equicue V1.0, Innervo Technology LLC) which, if effective, could prove to be a more practical and ergonomic alternative.

Learning Objective: Those in attendance will learn about our initial positive subjective and objective results in vestibular rehabilitation utilizing a novel palatal alternative sensory feedback device (Equicue V1.0, Innervo Technology LLC).

Desired Result: Attendees will understand the potential application of this novel palatal alternative sensory feedback device (Equicue V1.0, Innervo Technology LLC). With further research, such a product could provide benefit to many of their patients.

Indicate IRB or IACUC Approval: Approved

F021

Non-Contrast MRI for Monitoring of Patients with Acoustic Neuroma

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Dwayne Anderson, MD; Christian Morel, MD
Laura Miller, MD; Alexander Sevy, MD
Moises Arriaga, MD

Objective: To assess the feasibility of high resolution non-contrast T2 MRI images as compared to T1 post- contrast images for detecting acoustic neuroma growth.

Study design: Retrospective clinical study.

Setting: Tertiary referral center.

Patients: Adults with a diagnosis of acoustic neuroma who underwent an MRI of the internal auditory canals with and without contrast in the past 9 years.

Intervention: T1 post-contrast and T2 non-contrast MRI images were separately, randomly, and blindly reviewed by neuroradiologists. Measurement of tumor size on T1 post-contrast MRI was used as the "gold standard."

Main outcome measure: Tumor size was measured in one millimeter increments. The accuracy of the measurements on T2 non-contrast images was defined as a difference of less than or equal to two millimeters from the measurement on T1 post-contrast image. The mean of the measurements on T1 and T2 images were compared.

Results: 203 MRI images of 88 acoustic neuroma patients were reviewed. Measurements of tumor size on T2 non-contrast MRI were 80% accurate. Measurements of tumor size on T2 images were on average 13.5% smaller than on T1 images.

Conclusions: Our results suggest that acoustic neuroma growth could accurately be detected with non-contrast high resolution T2 MRI images. For patients monitored with serial imaging, this avoids the risks to patient health associated with intravenous gadolinium and saves significant time and hospital resources. We recommend T1 post -contrast images still be used for initial diagnosis. Additional analysis including inter-observer reliability and serial comparisons of each modality will be included in the final presentation.

Define Professional Practice Gap & Educational Need: Lack of evidence comparing the efficacy of non- contrast and post-contrast MRI images for detecting growth of acoustic neuromas.

Learning Objective: 1. Understand the capability and limits of non-contrast T2 images for detecting acoustic neuroma size and growth. 2. Define the role of non-contrast T2 images and post-contrast T1 images in the diagnosis and management of acoustic neuromas.

Desired Result: 1. Appropriate use of non-contrast MRI for monitoring of patients with acoustic neuromas. Decrease in patient health risks related to intravenous gadolinium, such as Nephrogenic Systemic Fibrosis. Decreased use of hospital resources and time spent in serial imaging of patients with acoustic neuromas.

Indicate IRB or IACUC Approval: Approved

F022

Stratification of Presentation and Management of Encephaloceles by Etiology

Maja Svrakic, MD; Spiros Manolidis, MD

Objective: To characterize the clinical and surgical findings in patients with temporal bone defects and describe surgical repair methods.

Study Design: Retrospective chart review

Setting: Multiple tertiary referral centers

Patients: Eighty-nine temporal bone encephaloceles diagnosed in eighty-seven patients

Intervention: Tegmen defects were repaired via a transmastoid (TM) approach alone or in combination with a middle cranial fossa (MCF) exposure. Repair methods included reconstruction with cartilage, bone, fat and fascia, including a pedicled superficial temporal fascia flap. Other surgical interventions were tympanoplasty, facial nerve decompression and mastoidectomy.

Main Outcome Measures: Etiology of encephalocele, presence of cholesteatoma, infection and cerebrospinal fluid (CSF) leak, incidence of prior surgeries, size of tegmen dehiscence, facial nerve and labyrinthine involvement, surgical intervention, and approach and tissue materials utilized for repair.

Results: Etiology of encephaloceles included chronic otitis media (74.2%), spontaneous (15.7%) and all other causes (9.0%). In chronic otitis media, most bony defects were associated with cholesteatoma (90.9%) and 80.3% cases had prior surgeries. The encephaloceles were repaired via a TM approach only in 26 (29.2%) ears, in combination with a mini-craniotomy in 37 (41.6%) ears, via a MCF approach in 18 (20.2%) ears and with fat obliteration in 8 (9.0%) ears. The approach, associated surgical interventions and reconstructive materials were dependent on the etiology of encephalocele.

Conclusions: Encephaloceles resulting from chronic otitis media present differently and are managed differently than those from spontaneous or traumatic etiologies. Associated findings and proposed algorithms for surgical management are described.

Define Professional Practice Gap & Educational Need: Inconsistencies within the field on reconstructive methods utilized for encephalocele repairs based on etiologies

Learning Objective: Characterize the clinical and surgical findings in patients with temporal bone defects and describe surgical repair methods based on etiology of the defects

Desired Result: The attendees can utilize our proposed algorithms for the surgical management of encephaloceles based on their etiology.

Indicate IRB or IACUC Approval: Exempt

F023

Assessment of Disruptive Behavioral Problems in Children with Hearing Loss

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Philip M. Westgate, PhD; Julie A. Jacobs, MPH
Christina R. Studts, PhD; Matthew L. Bush, MD

Objective: To compare the prevalence of disruptive behavioral problems between children with hearing loss and normal hearing.

Study design: Prospective cross-sectional study

Setting: Tertiary academic center

Patients: Caregivers of children (2-5 years old) with normal hearing (n=39), hearing loss using hearing aid(s) (n=29), or cochlear implant (s) (n =21) were recruited.

Intervention(s): Demographic information and a childhood mental health history were obtained. Childhood behavior and language development were assessed.

Main outcome measure(s): The Child Behavior Checklist, the Young Child-Diagnostic Interview Schedule and the MacArthur-Bates Communication Development Inventory (MBCDI)

Results: Similar distributions of race, socioeconomic and insurance status were observed across all groups. Parents of children with hearing loss were significantly more likely to report disruptive behavior (HA=41%, CI=38%) than parents of normal hearing children (10%) (p=0.002). Children with hearing loss were significantly more likely to meet criteria for oppositional defiance disorder (HA=48%, CI=48%) than normal hearing children (23%) (p=0.02). Few normal hearing children (8%) and no hearing impaired children had accessed mental health services (p=0.08). Normal hearing children were found to have more advanced language development on MBCDI than hearing impaired children (p=0.01), but controlling for MBCDI percentiles, the observed behavioral differences remained.

Conclusions: Controlling for language development, children with hearing loss have higher prevalence of disruptive behaviors than their normal hearing peers. These children are less likely to receive appropriate behavioral interventions. Further research is warranted to investigate the impact of disruptive behavioral problems on speech and hearing rehabilitation and to explore methods to improve access to effective behavioral intervention.

Define Professional Practice Gap & Educational Need: 1. The prevalence of behavioral problems in children with hearing loss is not known 2. No previous studies have investigated the type and degree of behavior problems using validated structured-diagnostic interviews in children who are deaf and hard of hearing 3. Few previous studies have looked at the family impact, parent sense of competence and parental stress in raising children with hearing loss

Learning Objective: 1. To determine the prevalence of behavior disorders in children with hearing loss versus normal hearing 2. To assess the level of parenting sense of competence and parent stress in parents of children with hearing loss versus normal hearing 3. To provide novel information on the impact on families of having children with hearing loss versus normal hearing

Desired Result: 1. To provide data obtained with validated structured diagnostic interviews on behavioral problems and related outcomes in children who are deaf and hard of hearing versus normal hearing

Indicate IRB or IACUC Approval: Approved

F024

Development of Bone Density of the Temporal Bone in Healthy Subjects

Kuniyuki Takahashi, MD; Yuka Morita, MD
Shinsuke Ohshima, MD; Yamato Kubota, MD
Shuji Izumi, MD; Arata Horii, MD

Hypothesis: The maturation of bone density in the temporal bone shows regional differences.

Background: Severe cases of acute otitis media can spread laterally and progress to acute mastoiditis in infants. However, they can cause intracranial complications more often in older children than in infants. Bone density maturation may affect the spread pattern of acute otitis media. Although the developing forms of mastoid air cells have been well studied, few research studies have been conducted on bone density maturation.

Methods: Eighty subjects aged 3 months to 42 years who had normal hearing participated in this study. Computed tomography (CT) values (Hounsfield unit [HU]) in various regions of the temporal bone, such as the otic capsule (OC), lateral surface of the mastoid cavity (LS), posterior cranial fossa (PCF), and middle cranial fossa (MCF), were measured. Bone density maturation was defined if the CT value exceeded 1000 HU, which is an indicator of compact bone. The age at which bone density maturation occurred was compared between regions of the temporal bone.

Results: The bone density of the OC showed maturation even just after birth, while that of the LS, PCF, and MCF matured at 1.7, 3.9, and 10.8 years of age, respectively. Bone density maturation showed significant regional differences.

Conclusion: Regional differences in bone density maturation may be a factor influencing the spread pattern of acute otitis media.

Define Professional Practice Gap & Educational Need: Lack of awareness of healthy temporal bone development

Learning Objective: To learn the development of bone density of various regions in healthy temporal bone

Desired Result: The bone density maturation showed significant regional differences. This may affect the spreading pattern of acute mastoiditis. We can learn that we should change management of acute mastoiditis according to age.

Indicate IRB or IACUC Approval: Approved

F025

Use of an Endoscope for Resection of Acoustic Neuroma through Middle Fossa Craniotomy

Adam N. Master, MS, MD; Daniel S. Roberts, MD, PhD
Gregory P. Lekovic, MD, PhD

Objective: Visualization of the fundus of the internal auditory canal, especially below the transverse crest, is limited in conventional surgical exposure. The surgeon's impression of extent of resection may therefore be inaccurate. This study examines the utility of the endoscope to assess complete tumor removal in middle cranial fossa approach for acoustic neuroma

Study design: Prospective case series

Patients: Eight consecutive patients from December 2014 to August 2016 (6F,2M; mean age 51, range 22-66) undergoing middle fossa craniotomy for acoustic neuroma resection.

Intervention: After completion of microsurgical resection, surgical endoscopes were used to visualize the fundus of internal auditory canal and confirm extent of resection of tumor. Prior to introduction of the endoscope, the surgeon's response to questions including whether tumor residual is expected, et al. were recorded.

Main outcome measures: The primary outcome measure was to determine whether residual tumor was present after standard microsurgical resection, and whether the presence of residual tumor was expected or not expected by the surgeon. Additional data included were: 1) whether the endoscope changed management; 2) rate of hearing preservation; 3) facial nerve outcome.

Results: In two (25%) patients additional tumor was identified using the endoscope that was not seen during microsurgical resection. In both patients the residual tumor was removed under endoscopic guidance.

Conclusion: The endoscope may be a beneficial tool to identify residual tumor in patients undergoing middle fossa craniotomy for removal of acoustic neuroma.

Define Professional Practice Gap & Educational Need: Lack of knowledge of whether there is a benefit of using an endoscope in surgical resection of acoustic neuroma during middle fossa craniotomy

Learning Objective: Examines the utility of the endoscope to assess complete tumor removal in middle cranial fossa approach for acoustic neuroma

Desired Result: attendees will have a better understanding on the applications of endoscopic visualization in middle fossa craniotomy for acoustic neuroma resection

Indicate IRB or IACUC Approval: Approved

F026

The Combined Linguistic and Indexical Speech Perception Assessment (CLISPA): A Novel Measure of Speech Perception for Cochlear Implants

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Charles W. Yates, MD

Background: Perception of the words in spectrally degraded speech requires high cognitive load that may interfere with simultaneous perception of indexical speech cues.

Hypothesis: The number of indexical cues that a listener perceives while simultaneously maintaining maximal levels of linguistic speech perception is significantly less than if assessed as a single outcome measure.

Subjects: Three different subgroups (N = 15 each) of normal hearing native speakers of American English.

Methods: The AzBio Sentence Lists were re-recorded to include greater indexical variation and more speakers. These stimuli were processed through a noise band vocoder. All three groups listened to the same sentence lists. The Sentence-only subgroup (N = 15) performed sentence discrimination. The Indexical-only subgroup (N = 15) identified indexical cues. The primary task of the Sentences+Indexical subgroup (N = 10 of targeted 15) was sentence perception followed by the secondary task of identifying indexical cues.

Results: The Sentences-only and Sentences+Indexical group exhibited high and similar levels of linguistic speech perception (94.7% ± 2.6 vs. 92.9% ± 2.7; p = 0.12). Indexical performance was significantly better in the Indexical-only vs. the Sentences+Indexical subgroup on gender discrimination (80.2% ± 4.7 vs. 72.5% ±7.2; p = 0.005) and emotion discrimination (41.8% ± 4.9 vs. 33.0% ± 7.2; p = 0.001). There were no differences in speaker identification between groups (40.9% ±11 vs. 37.3 ±9.3; p= 0.42)

Conclusions: Under spectrally degraded conditions, listeners are significantly less fluent at integrating linguistic and indexical speech cues. This has important implications in designing outcome measures for CIs.

Define Professional Practice Gap & Educational Need: Highlight the insufficiency of traditional methods of assessing speech perception.

Learning Objective: The learner will identify alternative methods of assessing speech perception.

Desired Result: The learner will identify the gap in

Indicate IRB or IACUC Approval: Approved

F027

Environmental Sound Awareness among Cochlear Implant Users and its Relationship to Spectral Resolution and Speech Perception Skills

Michael S. Harris, MD; Lauren Boyce, BA
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Hypothesis: The objective of this study was to evaluate environmental sound awareness (ESA) as a means of studying auditory perception among cochlear implant (CI) users and to determine to what extent ESA is correlated with speech perception and spectral resolution abilities.

Background: ESA is an ecologically valid auditory perception skill about which little is known following CI. It is largely a presumed benefit of implantation, often discussed clinically, but a paucity of objective data exists. The degree to which ESA relates to spectral resolution and speech perception skills is incompletely characterized among CI users.

Methods: A cohort of post-lingually deaf adult CI users and a cohort of normal hearing peers were assessed using an environmental sound identification task (Familiar Environmental Sound Test), a spectral ripple task, and a battery of speech and word perception tasks including recognition of isolated words (CID-22), phonetically balanced sentences (Harvard Sentences), and challenging sentences involving multiple speakers and dialects (PRESTO). The contributions of patient age and duration of auditory deprivation were considered.

Results: Environmental sound identification accuracy among CI users was poorer compared to that of normal hearing listeners. Speech perception skills were strongly and consistently correlated with environmental sound identification accuracy among CI users. This relationship remained significant when controlling for patient age and spectral resolution. No relationship was observed between duration of auditory deprivation and ESA.

Conclusions: ESA is a poorly understood aspect of auditory perception among CI users, which represents an opportunity for development of new assessment strategies and potential training targets.

Define Professional Practice Gap & Educational Need: 1. Environmental sound awareness is often discussed in clinical settings as an anticipated benefit of cochlear implantation. Little objective research has been performed to provide an evidence basis for this expectation. This study specifically addresses this gap. 2. Since the introduction of cochlear implants as an intervention for hearing loss, a need for non-speech measures of auditory sensitivity has been clear. This study introduces data that supports the use of environmental sound awareness as a new avenue of auditory perception assessment following implantation. 3. This study addresses the incompletely characterized relationship among speech perception, spectral resolution, and environmental sound awareness.

Learning Objective: 1. The learner will come away with an evidence base to ground their counseling of patients on environmental sound awareness following cochlear implantation. 2. The learner will be up-to-date on the potential utility of environmental sound awareness as an additional target for auditory perception assessment among patient with hearing impairment and cochlear implant users. 3. The learner will have an appreciation for the connection between speech perception skills and environmental sound awareness: how they are similar, how they are dissimilar, and why the difference matters.

Desired Result: 1. Learners will have the opportunity to apply what they learn regarding environmental sound awareness among cochlear implant users in their routine counseling of patients anticipating cochlear implant surgery -- this is a topic that families and patients often raise in clinical encounters. 2. Learners may consider incorporating the concept of non-speech indicators of auditory perception into their evaluation of cochlear implant candidates. 3. Learners may be able to use knowledge that speech perception skills are highly correlated with environmental sound awareness to inform patient expectations and in considering non-speech auditory perception assessments for patient who cannot perform speech perception testing.

Indicate IRB or IACUC Approval: Approved

F028

Risk Factors of Recurrence in Pediatric Congenital Cholesteatoma

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Objective: To examine the risk factors of residual and retraction recurrence in pediatric congenital cholesteatoma.

Study Design: Retrospective chart review.

Setting: University hospital.

Patients: Sixty-seven patients having tympanic type of congenital cholesteatoma under 15 years-old at surgery.

Interventions: Canal wall-up tympanoplasty (n=30) or transcanal atticotomy (n=37) was performed depending on cholesteatoma extension, 16 of which were followed by second-look surgery. Preoperative CT before second-look surgery or follow-up CT was performed to detect residual recurrence one year after the surgery. Cholesteatoma found at the second surgery was also included in the recurrence. All patients had no recurrent cholesteatoma at the last follow-up (Median, 61 months after surgery).

Main outcome measures: Possible predictive factors were compared between the groups.

Results: Residual cholesteatoma and retraction cholesteatoma occurred in 21% and 6%, respectively. There was no significant difference in age, gender, and type of cholesteatoma (open or closed) between the groups; however, Potsic stage and status of stapes involvement were more advanced in the residual recurrence group. All residual lesions could be detected by follow-up CT or by second-look surgery. All of four retraction recurrence (+) patients were male and young at the surgery.

Conclusions: Recurrence mostly occurred as residual cholesteatoma, suggesting that CT is recommended as a follow-up tool for congenital cholesteatoma. Advanced lesions had the risk of residual recurrence, suggesting that complete removal of epithelium is important. Although rare, young advanced-stage patients had risk of retraction cholesteatoma and therefore normal mucosa should be preserved as much as possible for these patients.

Define Professional Practice Gap & Educational Need: Lack of awareness of risk factors of recurrent lesions in pediatric congenital cholesteatoma

Learning Objective: To examine the risk factors of residual and retraction recurrence in pediatric congenital cholesteatoma. Potsic stage and status of stapes involvement were more advanced in the residual recurrence group.

Indicate IRB or IACUC Approval: Approved

F029

Fluoroscopy-assisted Transnasal Onyx Occlusion of the Eustachian Tube for Lateral Skull Base Cerebrospinal Fluid Fistula Repair

Neil S. Patel, MD; Matthew L. Carlson, MD

Hypothesis: Transnasal occlusion of the Eustachian tube (ET) with Onyx liquid embolic solution (LES) is feasible for lateral skull base cerebrospinal fluid (CSF) leaks.

Background: The rate of CSF leak following vestibular schwannoma surgery can be as high as 12%, exposing patients to risk of meningitis, pneumocephalus, and the need for lumbar drainage or additional surgery. We sought to develop a minimally-invasive approach to occlusion of the ET when CSF fistulae develop after lateral skull base surgery.

Methods: A CSF fistula model was developed by the authors using fresh cadaveric heads. Using a trans- tympanic needle, regulated pressurized pigmented saline was continuously irrigated into the middle ear cleft and visualized endoscopically in the nasopharynx. An angioembolization catheter and Onyx 18 LES was placed just medial to the bony ET. Under endoscopic and fluoroscopic guidance, the material was deployed into the bony ET segment up to the middle ear space.

Results: In two cadavers, a CSF fistula model was developed and endoscopic visualization of irrigant flow into the nasopharynx was confirmed. Fluoroscopy provided adequate anatomic views of the ET and middle ear, in addition to dynamic views of embolization. Cessation of flow after occlusion was achieved with pressures up to 25 mm Hg, mimicking physiological intracranial pressure in patients with meningitis or benign intracranial hypertension.

Conclusion: Eustachian tube occlusion with Onyx is feasible in a novel cadaveric CSF leak model. This may be employed as a short, outpatient treatment for intermittent or low-flow CSF fistulae following lateral skull base surgery.

Define Professional Practice Gap & Educational Need: 1. Lack of widely accepted technique for occlusion of the Eustachian tube for lateral skull base CSF fistulae 2. Lack of minimally-invasive treatment for lateral skull base CSF fistulae

Learning Objective: 1. The learner will be able to describe a minimally-invasive technique for transnasal Eustachian tube occlusion and acknowledge its value in repairing lateral skull base CSF fistulae

Desired Result: 1. Attendees will include this option among presently available treatments for lateral skull base CSF fistulae

Indicate IRB or IACUC Approval: Exempt

F030

Heat Shock Proteins in Human Perilymph

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Thomas Lenarz, MD, PhD

Objective: Data about the etiology and pathophysiology of inner ear diseases leading to hearing loss and especially changes of the composition of the perilymph fluid are still very limited. This is mainly due to the difficult access to structures and cochlear fluids. Heat shock proteins (HSP) belong to a superfamily of stress proteins and promote refolding of denatured proteins. Interestingly, HSP may either prevent or promote cell injury. The aim of the study was to analyze the presence of HSP in human perilymph derived from cochlear implant patients and to correlate their presence with audiological and etiologic data.

Methods: Sampling of the perilymph was performed during CI implantations and vestibular schwannoma surgeries with translabyrinthine approach via the round window or the semicircular canal. Individual proteins were identified by a shot-gun proteomics approach and data-dependent analysis using orbitrap mass spectrometry (Thermo Fisher Scientific) and Max Quant software for identification. The residual hearing of patients was determined by prae - and postoperative data and compared with different HSP identified in the perilymph. Also, differences in HSP occurrence of children and adults and vestibular schwannoma patients were analyzed.

Results: 10 subgroups of HSP were identified in HP samples. Only 33% of the patients with protected residual hearing showed an expression of HSP90. However, in two of three patients that lost their hearing, HSP90 (alpha and the beta subtype) were identified. In the perilymph of all patients with preserved residual hearing, HSP70 (subtypes 1 and 6) was identified, whereas subtype 4 was identified in only 17%.

Conclusions: In-depth proteome analyses of perilymph samples in correlation to patients' audiogram data leads to the hypothesis that HSP70 is associated with preservation of residual hearing after cochlear implantation, whereas HSP90 is associated with loss of residual hearing.

Define Professional Practice Gap & Educational Need: 1) Currently there are no prior studies showing sampling of perilymph as a potential diagnostic test for inner ear disease 2) There currently is no way to sample inner ear tissue for diagnostic purposes

Learning Objective: 1) Show that perilymph sampling could be used to better understand inner ear disease 2) Perilymph sampling is feasible without damaging the ear

Desired Result: 1) The inner ear produces proteins that may alter its response to stress. 2) Different disease states may be defined by changes in the perilymph proteome

Indicate IRB or IACUC Approval: Approval

F031

Multidisciplinary Management of Head and Neck Malignancies Involving the Lateral Skull Base

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Chad Zender, MD; Sarah Mowry, MD; Cliff Megerian, MD
Maroun Semaan, MD

Objective: Analyze loco-regional control after management of advanced stage malignancies involving lateral skull base.

Study design: Retrospective chart review.

Setting: Tertiary care center.

Patients: Adult patients with malignancies involving lateral skull base.

Intervention(s): Lateral temporal bone resection with transpetrous approach to the stylomastoid foramen and jugular foramen ± post operative radiotherapy.

Main outcome measure(s): Loco-regional control and distant failure rates. Facial nerve sacrifice and post operative radiotherapy was assessed using the using Kaplan-Meier method and compared with log -rank test.

Results: Between 2011 and 2016, 29 patients were identified. Mean age was 73 years and 86.2 % were male. Median follow up was 8.3 months (range 0.6-46.8). 65.5 % cases were recurrent disease. Site of origin was external auditory canal (EAC) in 9 (31 %) cutaneous (auricle, lateral facial and scalp) in 17 (58.6%) and parotid in 3 (10.3 %). Of the 9 EAC cases, 5 were T2 while 2 cases each were T3 and T4 (Pittsburg staging system). 8 cutaneous primaries were AJCC stage 3 (temporal bone involvement) and 9 were AJCC stage 4 (facial nerve involvement at skull base). Histologically 72.4 % were squamous cell cancer (SCC), 17.2 % were basal cell cancer (BCC), and 10.3 % were malignant parotid disease (stage T4a). The facial nerve was sacrificed in 10 cases (32.3 %). 20 patients (69.0 %) received post operative radiotherapy. Five (17.2 %) patients had recurrent disease (3 loco-regional and 2 distant). Unadjusted recurrence free survival trended toward significance when facial nerve was not sacrificed (p=0.06, log rank). Unadjusted recurrence free survival was significantly improved when post op radiotherapy was used (p=0.04, log rank).

Conclusions: Improved loco-regional control can be achieved in advanced stage malignancies involving lateral skull base with multi-modality treatment. Facial nerve sacrifice portends a worse survival.

Define Professional Practice Gap & Educational Need: Inconsistencies with the extent of lateral skull base resection and utilization of post operative radiotherapy.

Learning Objective: Multi-modality treatment with ablative procedure including facial nerve sacrifice (when indicated) and adjuvant radiation improves loco-regional control in various malignancies involving the lateral skull base.

Desired Result: Pre-operative planning to achieve negative margins including facial nerve sacrifice when indicated and the utility of post operative radiation. Extending traditional LTBR to remove disease around stylomastoid foramen and jugular bulb in the presence of peri-neural spread.

Indicate IRB or IACUC Approval: Approval

F032

Single Stage Removal of Osseointegrated Implant and Insertion of Ipsilateral Cochlear Implant with Myofacial Temporalis Muscle Flap: A Novel Technique

Michael F. Foster, DO; Douglas D. Backous, MD

Objective: To describe a novel technique for conversion from an ipsilateral osseointegrated implant (OI) to a cochlear implant (CI) utilizing a single stage myofascial tissue rearrangement and traditional cochlear implant insertion.

Case: One patient with single-sided deafness (SSD) whom had an OI placed using the dermatome technique had their bone anchored hearing aid abutment removed in office then later underwent a single stage operation including fixture removal then rotation of a temporalis myofascial flap to fill in the soft tissue defect immediately followed by a traditional uncomplicated cochlear implantation.

Conclusion: With emerging interest in cochlear implantation for single sided deafness we predict an increase in the number of patients undergoing cochlear implantation whom have previously had an ipsilateral OI. This can be complicated by the significant soft tissue defect in the anticipated location of a CI receiver stimulator after a past OI placement using the dermatome technique. This case presents a safe and efficient technique to accomplish cochlear implantation and traditional placement of the receiver-stimulator in this group of patients. A single staged procedure prevents inconvenience to the patient and the potential complications of multiple trips to the operating room.

Define Professional Practice Gap & Educational Need: 1. Lack of contemporary knowledge

Learning Objective: 1. To provide a novel technique that will become more prevalent as Cochlear Implantation for Single-Sided Deafness is performed more frequently in patients with poor performance using an Osseointegrated Implant

Desired Result: Attendees will use this technique when necessary.

Indicate IRB or IACUC Approval: Exempt

F033

3D Reconstruction and Topographical Analysis of Human Cochlear Nucleus: Designing a Better Auditory Brainstem Implant Array

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M. Christian Brown, PhD; Daniel J. Lee, MD

Hypothesis: Quantification of the cochlear nucleus curvature will inform design of a flexible auditory brainstem implant (ABI) array.

Background: The ABI is an auditory neuroprosthesis placed on or near the surface of cochlear nucleus (CN) to restore hearing in children and adults who are not candidates for cochlear implantation. Current ABI arrays are stiff and do not conform to brainstem topography. Recent advancements in flexible electrode arrays allow for anatomy conforming electrical stimulation. Herein, we measure the surface curvature of the cochlear nucleus and adjoining regions to assist in design of next generation flexible ABI arrays.

Methods: Data collection and sharing for this project was provided by the MGH-USC Human Connectome Project and was IRB exempt. Images were obtained from the advanced Siemens 3T Connectome imaging system. T1 weighted MRI sequences were imported into segmentation software (Amira; TGS, Berlin, Germany) to create accurate volumetric models and surface rendering. Local curvature analysis was performed on manually-selected regions of interest.

Results: 3D reconstruction of the left cochlear nucleus and adjoining brainstem regions was successfully rendered. Mean principal curvature values were calculated along 5 equidistant points along the lateral – medial (range: -0.28 to 0.08) and rostral-caudal (range: -0.10 to 0.11) axes. These values were plotted on kmin-kmax graphs and indicated significant complexity in curvature with broad variation and a unique combination of convex and concave surfaces.

Conclusions: This study reveals the complex curved topography of the human cochlear nucleus. This supports and informs the design of soft moldable flexible electrodes for the ABI.

Define Professional Practice Gap & Educational Need: Lack of Contemporary Knowledge

Learning Objective: Define the complex surface topography of the cochlear nucleus and auditory brainstem. Gain insight into improved Auditory Brainstem Implant (ABI) electrode design.

Desired Result: The attendees will gain an improved understanding of the surface anatomy of the cochlear nucleus and adjacent brainstem along with an introduction into recent advancements in Auditory Brainstem Implant technology

Indicate IRB or IACUC Approval: Exempt

F034

Cartilage or Abscess Found Instead of Cholesteatoma in Five Patients who Underwent Tympanomastoidectomy Following False Positive Non-Echo-Planar Diffusion-Weighted MR Imaging

Alexander Sevy, MD; Joshua Sappington, MD
Rahul Mehta, MD; Moises Arriaga, MD, MBA

Objective: To evaluate the false positive cholesteatoma diagnoses on MRI in results from patients who underwent tympanomastoidectomy surgery.

Study design: Retrospective case series.

Setting: Tertiary referral center. Patients: n=5 adults, single institution with diagnosis of cholesteatoma based on clinical findings Non-echo-planar diffusion-weighted MR Imaging who underwent tympanomastoidectomy for resection of presumed cholesteatoma. All patients were found to have no evidence of cholesteatoma during surgery and surgical pathology.

Intervention: Patients with clinical suspicion for cholesteatoma underwent Non-Echo-Planar Diffusion- Weighted MR Imaging. Half-Fourier acquisition single-shot turbo-spin echo (HASTE) protocols were used for this imaging. All of these patients underwent tympanomastoidectomy and surgical findings and surgical pathology specimens were analyzed.

Main outcome measure: Comparison of preoperative HASTE MR imaging with surgical findings and surgical pathology results.

Results: 80% (4/5) with falsely positive detection of cholesteatoma on HASTE MRI were found to have cartilage only at the site of presumed cholesteatoma, and in 20% (1/5) there was an abscess at the site of presumed cholesteatoma.

Conclusions: Non-echo-planar diffusion-weighted MR Imaging has become the gold standard in the detection of cholesteatoma, particularly in the setting of possible residual or recurrent disease with better sensitivity and specifity than any other current clinical imaging. However, it is important to realize that the specifity of these imaging protocols are not 100%. What may resemble cholesteatoma on MR imaging may indeed be other entities such as cartilage or infection, which should be included in the differential of patients with prior ear surgery.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness

Learning Objective: Awareness of false positives in Non-echo-planar diffusion-weighted MR Imaging, and discussion on ways to reduce false positive scan results, in addition to more information for counselling of patients

Desired Result: Review of images by surgeon prior to surgery with suspicion for potential false positives and additional information for counselling to patients

Indicate IRB or IACUC Approval: Exempt

F035

Duration of Eligibility Prior to Cochlear Implantation: Have We Made Any Progress?

Eric N. Appelbaum, MD; Shannon S. Yoo, BS
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Objective: To determine if eligibility (as defined as the duration of severe to profound hearing loss prior to cochlear implantation (CI)) has changed over the 30 years since FDA approval.

Data Sources: English language, peer-reviewed articles, theses, and trial data available through PubMed and Cochrane Library databases up until and including May 31st, 2016.

Study Selection: 1006 unique articles were identified. Prospective studies that reported duration of severe/ profound hearing loss before CI in adult patients were included. Retrospective studies, reviews, meta-analyses, articles reporting pediatric or mixed data, hybrid/ electroacoustic CI, and articles from centers outside the United States were excluded. 71 studies met inclusion criteria and were included for analysis.

Data Extraction: Contributing authors independently reviewed included studies for data validity and applicability.

Data Synthesis: Meta-regression was used to assess the relationship between the year of publication and duration of hearing loss. To account for a possible age effect, a second model was estimated including mean age at time of study as a covariate.

Conclusions: A positive association between study year and the duration of hearing loss prior to implantation was found showing a 0.30 year increase in the duration of hearing loss for every increasing study year. Contrary to conventional assumption, duration of eligibility for CI appears to be increasing. Though the reasons for this are not clear, current strategies to increase both awareness and access to CI appear to be falling short.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness 2. Lack of contemporary knowledge

Learning Objective: 1. To determine if eligibility (as defined as the duration of severe to profound hearing loss prior to cochlear implantation (CI)) has changed over the 30 years since FDA approval.

Desired Result: 1. Attendees will attain greater understanding of change in referral patterns of cochlear implantation candidates.

Indicate IRB or IACUC Approval: Exempt

F036

Getting the Feeling? Salience of Musical Emotion with a Cochlear Implant

David R. Friedmann, MD; Daniel Jethanamest, MD
Joshua Horton MD; David Landsberger, PhD
J. Thomas Roland Jr., MD; Susan B. Waltzman, PhD

F037

Hearing Outcomes after Stereotactic Radiosurgery for Glomus Jugulare Tumors

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Colin L. W. Driscoll, MD; Bruce W. Pollock, MD
Brian A. Neff, MD; Christine M. Lohse, MS
Matthew L. Carlson, MD

Objective: Describe audiometric outcomes following stereotactic radiosurgery (SRS) for glomus jugulare tumors (GJT).

Study Design: Retrospective review.

Setting: Tertiary referral center.

Patients: Patients with serviceable hearing (AAOHNS Class A or B) and serial audiometric follow-up who underwent Gamma Knife SRS for GJT between 1990 and 2015.

Intervention(s): Gamma Knife SRS.

Main outcome measure(s): Preservation of serviceable hearing; univariate and multivariate associations with time to non-serviceable hearing.

Results: Of 81 patients with GJT who underwent SRS during the study period, 34 (65% female, median age 54) had pretreatment class A or B hearing and post-treatment audiometry. Median tumor volume at the time of treatment was 7180 mm3, the mean cochlear point dose was 5.6 Gy (range 2-8.8 Gy), and the median marginal and maximum tumor dose were 16 and 32 Gy, respectively. Seven patients (21%) developed non-serviceable hearing (class C or D) at a median of 13.2 months following SRS (IQR 0.4-2.0 years). Among those who maintained serviceable hearing, median audiometric follow up was 35 months (range 5-123 months). The Kaplan-Meier estimated rates of serviceable hearing at 1, 3, and 5 years following SRS were 91%, 79%, and 79%, respectively. Associations between time to non-serviceable hearing and pre-treatment hearing levels, tumor volume, marginal and maximum dose, cochlear dose, and age are reported.

Conclusions: The short- and intermediate-term risk of progression to non-serviceable hearing following SRS for GJT is low. In contrast to vestibular schwannoma, the impact of marginal tumor dose and cochlear dose on hearing preservation appears to be less significant.

Define Professional Practice Gap & Educational Need: 1. Lack of understanding of the effect of stereotactic radiosurgery on hearing in patients with glomus jugulare tumors. 2. Lack of contemporary knowledge on the etiology of hearing loss after radiosurgery for glomus jugulare tumors.

Learning Objective: 1. Describe the risk of progression to non-serviceable hearing after stereotactic radiosurgery for glomus jugulare tumors. 2. Describe factors associated with a higher risk of developing sensorineural hearing loss after radiosurgery for glomus jugulare tumors.

Desired Result:1. Attendees should be able to estimate the frequency of progression to non-serviceable hearing among patients with glomus jugulare tumors 2. Attendees should acknowledge the difference between hearing outcomes following stereotactic radiosurgery for vestibular schwannoma and glomus jugulare tumors.

Indicate IRB or IACUC Approval: Approved

F038

Endoscopic Infracochlear Approach for Drainage of Petrous Apex Cholesterol Granulomas: A Case Series

Cameron C. Wick, MD; Alexander R. Hansen, BS
Joe Walter Kutz Jr., MD; Brandon Isaacson, MD

Objective: To describe the feasibility and technical nuances of a transcanal endoscopic infracochlear approach for drainage of petrous apex cholesterol granulomas.

Study Design: Retrospective case review.

Setting: Tertiary care university hospital.

Patients: A 32-year-old male with bilateral petrous apex cholesterol granulomas and a 54-year-old male with a left-sided petrous apex granuloma each with symptoms necessitating surgical intervention.

Interventions: Transcanal endoscopic infracochlear approach for drainage of the cholesterol granulomas.

Main Outcome Measures: Operation efficacy, corridor size, and perioperative morbidity.

Results: All three cholesterol granulomas were successful drained without violating the cochlea, jugular bulb, or carotid artery. The dimensions of the infracochlear surgical corridor measured 5 mm by 6 mm, 3.5 mm by 3.5 mm, and 6 mm by 4 mm, respectively. All corridors facilitated visualization within the cyst and allowed lyses of adhesions for additional cyst content eradication. All patients had resolution of their acute symptoms. Two of the three subjects had serviceable hearing prior to and after their procedures. One patient required revision surgery 2-months after their initial procedure secondary to recurrent symptoms from acute hemorrhage within the cyst cavity. The infracochlear tract in this patient was noted to be patent.

Conclusions: A transcanal endoscopic infracochlear approach appears to be a viable and effective technique for the management of cholesterol granuloma. The surgical access was wide enough to introduce the endoscope into the petrous apex cavity in each case. Further studies are needed to compare the efficacy and perioperative morbidity versus the traditional post-auricular transtemporal approaches.

Define Professional Practice Gap & Educational Need: The petrous apex remains a challenging anatomical location to reach surgically. This has led to multiple approaches for the surgical management of petrous apex cholesterol granuloma. We report on the feasibility and efficacy of the endoscopic transcanal infracochlear approach for drainage of petrous apex cholesterol granulomas. This route has potential to be less invasive and less morbid than the more traditional transtemporal routes.

Learning Objective: To describe the feasibility and technical nuances of a transcanal endoscopic infracochlear approach for drainage of petrous apex cholesterol granulomas.

Desired Result: Knowledge of this surgical approach may change the way neurotologists approach petrous apex cholesterol granulomas.

Indicate IRB or IACUC Approval: Exempt

F039

The Effect of Materials Used for Superior Canal Dehiscence Repair on Inner-ear Pressures

Deepa J. Galaiya, MD; Xiying Guan, PhD
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Introduction: The effects of repairing superior canal dehiscence (SCD) on the vestibular and auditory system are poorly understood. By measuring inner-ear pressures, we can determine the input drive for the cochlea and the superior canal ampulla in a controlled manner, furthering our knowledge of such repairs. Using this technique, we studied how different materials used to repair the SCD affect inner-ear pressures evoked by air and bone conduction (AC and BC) stimulation.

Methods: Intracochlear pressures in the scala vestibuli (Psv) and scala tympani (Pst) were measured in 6 human cadaveric temporal bones using micro-fiberoptic pressure sensors sealed and firmly glued to the otic capsule near the oval and round windows. Psv, Pst, ear-canal pressure (Pec) and stapes velocity were measured while stimulated by AC (with speaker at ear canal) or BC (with a bone anchored hearing aid) in normal intact superior canal, with SCD, and with repaired SCD. Repairs were made with soft materials (e.g. dental impression material, Jeltrate), hard materials (e.g. dental cement), and bone wax.

Results: With AC, SCD reduced both Psv and Pst, and reduced the cochlear and ampulla input drives at low frequencies. Patching the dehiscence with various materials reversed this effect to the normal initial pressures, as long as a hermetic seal was achieved. In BC, SCD reduced Psv across a limited low-frequency bandwidth, but did not generally change Pst. Estimates of cochlear and ampulla input drives were reduced at limited low- frequency bandwidths. The type of material used to repair the SCD affected the ability to reverse the effect of SCD during BC. A soft material was not effective in fully reversing the SCD effect during BC. However, a harder material could reverse the SCD effect on BC. Bone wax had a variable impact on SCD reversal.

Discussion and Conclusion: Reversing SCD effects on bone-conducted inner-ear pressures were more challenging than reversing air-conducted inner-ear pressure effects. The type of material used for SCD repair affected reversal of the SCD effect on the input drive to the auditory and vestibular systems during BC.

Define Professional Practice Gap & Educational Need: 1) Lack of a clear model to explain the effects of superior canal dehiscence on air -conducted and bone-conducted inputs to the cochlea and ampulla. 2) Absence of an understanding of which kind of surgical repair of superior canal dehiscence will result in the most complete reversal of these effects on air-conducted and bone-conducted inputs to the cochlea and ampulla.

Learning Objective: 1) Understand the effects of superior canal dehiscence on air-conducted and bone- conducted inputs to the cochlea and ampulla. 2) Understand that the material properties of the substance used to repair the superior canal dehiscence can affect how well the repair can reverse the effects of superior canal dehiscence.

Desired Result: 1) Consider which of the myriad materials that are used to surgically repair superior canal dehiscence would be most effective in reversing the symptoms of superior canal dehiscence, based on its physical and material properties.

Indicate IRB or IACUC Approval: Exempt

F040

A Report of Two Distal AICA Aneurysms Presenting as IAC Masses A Review of the Literature and Characteristic Radiologic Features

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Objective: Medial branch of Distal Anterior Inferior Cerebellar Artery (AICA) aneurysms are exceedingly rare, but potentially lethal if ruptured. We report on two cases of a distal AICA aneurysm masquerading as an intracanalicular vestibular schwannoma and review the literature.

Case 1: 47yo Hispanic male experienced right sudden SNHL and was treated with combined high dose oral prednisone taper and intratympanic (IT) Dexamethasone injections with complete recovery. An MRI revealed a right 1cm intracanalicular internal auditory canal lesion. The patient underwent elective craniotomy through a retrosigmoid approach. Intraoperatvely the mass was identified as an aneurysm arising from a loop of the AICA within the IAC. The aneurysm was successfully clipped. 4-year post op angiogram demonstrated patent AICA without aneurysm.

Case 2: 51yo Caucasian male with sudden deafness on the left side. Subsequent MRI showed a 7x7mm left cerbellopontine angle (CPA) mass with unusual calcification. Patient elected to have the mass surgically resected via a translabyrinthine approach. Inraoperatively the mass was identified as a distal AICA aneurysm and was clipped successfully. Postoperative angiogram revealed no residual or recurrent aneurysm and a patent AICA.

Conclusion: Vestibular Schwannomas make up the 85% of CPA and intracanalicular masses. Aspects of our cases and review of the literature provide insight into atypical signs and symptoms that can raise suspicion for a distal AICA aneurysm. These characteristics can provide prudent insight when counseling a patient on etiology of their IAC lesion and the plan of intervention.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness 2. Lack of contemporary knowledge

Learning Objective: 1. To call to attention the prevalence and characteristic clinical and radiologic features of a distal AICA aneurysm that can mimic the presentation of a vestibular schwannoma.

Desired Result: Physicians will critically examine an atypical appearing IAC mass and order further angiographic testing when necessary.

Indicate IRB or IACUC Approval: Exempt

F041

Safety of Intratympanic Fludrocortisone Injection in a Mouse Model

George Kurien, MD; Vincent Lin, MD

Background: Intratympanic glucocorticoid injection is commonly used in the treatment of various otologic conditions. In addition to their anti-inflammatory effect, there is evidence that their mineralocorticoid effects on ionic transport in the inner ear may be partially responsible for their therapeutic effect. Intratympanic mineralocorticoid injection has not been tested for safety.

Hypothesis: Fludrocortisone (a mineralocorticoid) is safe for intratympanic injection in mice, with no difference in hearing thresholds from carrier injection in normal hearing mice.

Methods: 25 Swiss Webster Mice between 9-12 weeks of age had ABR testing followed by transbullar injection of one of four treatments. The mice had repeat ABR testing at 1 week and 4 weeks post-procedure. Treatment groups were - (A) Fludrocortisone (0.14mg/mL) in Normal Saline (B) Fludrocortisone (0.14mg/mL) in DMSO (0.5%) in Normal Saline (C) DMSO (0.5%) in Normal Saline (D) Normal Saline

Results: Six mice were in groups A,B, D, and 7 mice in group C. Five mice had middle ear infections following injection, and resultant hearing loss (A,B,D,D,D). At 1 week, the mean difference from baseline in hearing thresholds at 8, 16, and 32KHz were (A)1dB,-1dB,8dB, (B)14dB,11dB,21dB (C)9dB,2dB,22dB (D) 13dB,13dB,52dB. Three mice died between week 1 and 4 post-procedure (A,B,C) for unrelated reasons. At 4 weeks, the mean difference from baseline in hearing thresholds at 8, 16, and 32KHz were (A)3dB,-3dB,14dB, (B)8dB,4dB,20dB (C)3dB,-2dB,18dB (D) 12dB,18dB,48dB. The Kruskal-Wallis test showed no statistically significant differences between groups at any frequency at any time point ($p>0.05$).

Conclusions: Fludrocortisone has a similar safety profile in intratympanic injection in normal hearing mice when compared to carrier. Intratympanic mineralocorticoid injection has potential utility in the treatment of disorders of the inner ear.

Define Professional Practice Gap & Educational Need: 1. Lack of intratympanic treatments available for inner ear conditions. 2. Uncertainty about the exact mechanism of action of intratympanic injected corticosteroids.

Learning Objective: 1. Examine the potential role for injected intratympanic mineralocorticoids in the treatment of inner ear conditions. 2. Understand the safety profile of intratympanic mineralocorticoid in a mouse model.

Desired Result: 1. Further investigate the role for intratympanic mineralocorticoids in the treatment of inner ear conditions.

Indicate IRB or IACUC Approval: Approved

F042

Ultra Long-term Audiometric Outcomes in the Treatment of Vestibular Schwannoma with the Middle Cranial Fossa Approach

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Marlan R. Hansen, MD; Bruce J. Gantz, MD

Objective: Define the long-term audiometric outcomes from vestibular schwannomas treated with the middle cranial fossa (MCF) approach.

Study design: Retrospective records review.

Setting: University-based tertiary referral center.

Patients: Patients undergoing treatment of small vestibular schwannomas with the MCF approach.

Intervention(s): MCF exposure and treatment of the small vestibular schwannomas.

Main outcome measure(s): Demographic and audiometric variables were assessed.

Results: Thirteen subjects had audiometric data for review. The average time between surgery and the most recent audiometric testing was 14 years (range 10-18 years). The mean baseline pure-tone average (PTA) was 36dB and the most recent PTA was 59dB in the operated ear. The mean baseline PTA was 16dB and the most recent PTA was 37dB in the non-operated ear. The mean change from baseline to most recent follow-up was a threshold elevation of 22dB and 19dB in the operated and non-operated ears, respectively. The mean baseline speech discrimination score (SDS) was 83% and the most recent SDS was 73% in the operated ear. The mean baseline SDS was 98% and the most recent SDS was 94% in the non-operated ear. The mean changes from baseline to most recent follow-up were 10% and 0% SDS depression in the operated and non-operated ears, respectively. The rates of changes in PTA and SDS were not statistically different between the operated and non-operated ears.

Conclusions: Surgically preserved hearing is maintained in the majority of patients at more than 10 years from surgery. PTA and SDS changes were similar between the ipsilateral and contralateral ears.

Define Professional Practice Gap & Educational Need: The middle cranial fossa approach to the internal acoustic canal allows for the treatment of vestibular schwannomas with hearing preservation in appropriately selected patients. Currently, few reports exist documenting the long-term hearing outcomes at greater than 10 years. This report adds a series of patients with audiometric data at greater than 10 years from the index procedure and compares these outcomes to hearing results from the contralateral ear.

Learning Objective: To recognize the long-term hearing outcomes from treatment of vestibular schwannoma via the middle cranial fossa approach.

Desired Result: To aid in the decision making process when choosing how to best approach small vestibular schwannomas and understand the long-term hearing outcomes that can be expected with the MCF approach.

Indicate IRB or IACUC Approval: Approved

F043

Validation of a Subjective Visual Vertical Test App

George Kurien, MD; Day Dai, BSc; Leah Smith, MA
Euna Hwang, MDCM; Vincent Lin, MD

Objective: To validate a subjective visual vertical test app in healthy controls

Study design: Cross-sectional sample

Setting: Medical office

Patients: Volunteers

Intervention: Healthy subjects underwent a subjective visual vertical (SVV) test using the validated bucket with plumbline method and simultaneously had a measurement made with the Visual Vertical iOS app. Each subject underwent 10 iterations of the test.

Main outcome measure(s): Internal reliability, intraclass correlation, comparison of means.

Results: 22 healthy subjects underwent testing. Mean (SD) results using the plumbline were 0.330 (1.37), and using the app, were 0.350 (1.34). Internal reliability (Cronbach's) for both tests were high at 0.976 for the plumbline method, and 0.978 for the app. Correlation (Pearson coefficient) between the two testing methods was high at 0.974 ($p < 0.0001$). Comparison of means showed a mean (SD) difference of 0.02 (0.12), which was not statistically significant ($p=0.382$, Paired T-test).

Conclusions: The Visual Vertical iOS app is a reasonable alternative to the standard SVV plumbline test with a high degree of internal reliability, correlation with the established test, and no statistically significant difference from the established test when tested in healthy patients. Further testing is required for assessment of those with vestibular pathology.

Define Professional Practice Gap & Educational Need: 1. Lack of a practical test battery in clinical assessment of vestibular dysfunction

Learning Objective: 1. Recognize the utility of an app-based subjective visual vertical test used in the clinical assessment of vestibular dysfunction

Desired Result: 1. Utilize the app-based subjective visual vertical test clinically

Indicate IRB or IACUC Approval: Exempt

F044

Middle Ear Cancer in the American College of Surgeon's National Cancer Database

Jason A. Brant, MD; Michael J. Ruckenstein, MD

Objective: Evaluate patterns in carcinoma of the middle ear in a large national database.

Study Design: Retrospective review of a nationally collected cancer database.

Setting: The American College of Surgeon's National Cancer Database Patients: Patients with tumor location of the middle ear (C30.0)

Interventions: Surgery. Main Outcome Measures: Demographics and survival.

Results: From 2004 to 2013, 329 cases of primary cancer of the middle ear were included in the database. A majority of patients were male (51.7%) and white (82.7%). Most cases were squamous cell carcinoma or its variants (60.0%). The only other tumor types that represented over five percent of tumors were carcinoid (5.8%) and embryonal rhabdomyosarcoma (5.5%). Seventy-one percent of patients underwent surgery. Overall median survival was 71.3 months, and those who had surgery had a significant survival advantage over those that did not (85.4 vs 45.2 months, $p = 0.03$).

Conclusions: Carcinoma of the middle ear is a relatively rare condition and understanding of the impact it has on patient's as well as the treatments those patients are receiving can be advanced by evaluation of large national databases. The National Cancer Database includes important variables that can add to the understanding of this disease and help to impact treatment decisions for individual patients. This evaluation found that a majority of patients with cancer of the middle ear underwent surgery and this was correlated with a significant increase in survival.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge of the full extent of carcinoma of the middle ear across geographic location and practice types.

Learning Objective: To define the extent of disease and evaluate treatment and survival patterns in a large national database.

Desired Result: Better understanding of the treatment patterns of carcinoma of the middle ear and their impact on patient outcomes.

Indicate IRB or IACUC Approval: Exempt

F045

Radiosurgery of Glomus Tumors of Temporal Bone: A Meta-Analysis

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Harrison W. Lin, MD; Hamid R. Djalilian, MD

Objectives: (1) Perform a meta-analysis of the available data on the outcomes of stereotactic radiosurgery (SRS) for treatment of temporal bone glomus tumors (GT), and (2) evaluate the collective outcomes of SRS treatment with respect to tumor control.

Data Sources: A thorough literature search of published English-language literature from 2011-2016 was performed in PubMed, Ovid, and Cochrane databases using the keywords ("gamma knife" or "CyberKnife" or "linear accelerator" or "radiosurgery") and ("glomus jugulare" or "jugular paraganglioma.")

Study Selection: Studies reporting outcomes of SRS for temporal bone GT were included.

Data Extraction: Of 24 articles found, 9 studies met our inclusion and exclusion criteria and were used for qualitative and quantitative analyses containing 395 patients.

Data Synthesis: Average margin dose, modality, isodose line, volume decrease, follow-up duration, and tumor control rate data were extracted and analyzed.

Conclusions: The mean follow-up duration ranged from 37-148 months. Margin dose varied from 13.6-50.4 Gy. The collective mean tumor control rate was 95.7% (95% CI: 93.4%-98.0%). Clinical data on outcomes of SRS for treatment of GTs are sparse and primarily limited to single institutional analyses, with considerable variation in tumor volume and follow-up time. This meta-analysis provides an in-depth analysis of available data in the literature and reviews reported outcomes. Combined data with a meta- analysis performed in 2011 will be presented.

Define Professional Practice Gap & Educational Need: Lack of contemporary data on radiosurgery of glomus tumors in the temporal bone, and studies are primarily single institutional experiences with different tumor control rates.

Learning Objective: The reader may develop a better understanding of tumor control rates and and outcomes following radiosurgery of glomus tumors in the temporal bone.

Desired Result: Radiosurgical approaches can be considered in patients presenting with glomus tumors of the temporal bone with a better understanding of tumor control rates.

Indicate IRB or IACUC Approval: Approved

F046

Vestibular Schwannoma Resection via Keyhole Retrosigmoid Craniotomy Approach

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Michael E. Sughrue, MD; Betty S. Tsai Do, MD

Objectives: The purpose of this study is to describe the surgical technique and outcomes of the keyhole retrosigmoid craniotomy for the resection of small to large vestibular schwannomas.

Study Design: Retrospective chart review.

Setting: Single-institution tertiary referral center.

Patients: 15 patients underwent a keyhole retrosigmoid craniotomy between for a primary diagnosis of vestibular schwannoma between 2012 and 2015.

Intervention: Keyhole retrosigmoid craniotomy with resection of tumor.

Main Outcome Measures: Outcomes studied include residual tumor volume, facial function as classified by the House-Brackmann (HB) scale, complication rates, and length of hospitalization. Results: Average preoperative tumor volume was 12.9 cm3 (range 1.2 cm3 - 33.8 cm3) with median extent of resection of 79% (range 37%-89%). Preoperative facial dysfunction (House-Brackman II) was present in 2 patients. Postoperative facial function at 1 month was HB I in 80% of patients, HB II in 13% of patients, and HB V in 6% of patients; at 1 year one patient had HB III with remainder all HB I. Postoperatively, disequilibrium was documented in 20, CSF leak was recorded in 13%, while unilateral dysesthesia, dysgeusia, and diplopia were recorded in 6%. Symptomatic dysesthesia and disequilibrium resolved within first year; however dysgeusia, and diplopia persisted. No infectious or hemorrhagic complications were recorded. The average length of hospitalization was 5.8 days (median 4 days, range 1-20 days).

Conclusions: Keyhole retrosigmoid craniotomy is a safe and feasible option for the resection of vestibular schwannomas with excellent long term facial function preservation and low rate of complications.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness of the use of keyhole craniotomy for resection of acoustic neuroma. The keyhole craniotomy approach is routinely used for many neurosurgical procedures, but little has been described regarding the safety and efficacy in skull base surgery.

Learning Objective: 1. Describe the keyhole retrosigmoid craniotomy approach. 2. Evaluate the outcomes in consecutive patients who have undergone the keyhole retrosigmoid craniotomy approach for resection of an acoustic neuroma. 3. Compare the keyhole approach to the standard retrosigmoid craniotomy.

Desired Result: Attendees may change their practice in the retrosigmoid approach for resection of acoustic neuromas. This may result in better outcomes as the keyhole craniotomy is a smaller craniotomy and does not require the use of retractors that are commonly used in the standard approach. These retractors increase likelihood of intracranial injury and smaller craniotomies have been shown to result in fewer headaches.

Indicate IRB or IACUC Approval: Approved

F047

Ultra-high Resolution MRI Aids in Treatment of Audiovestibular Symptoms in Patients with Acoustic Neuroma and Endolymphatic Hydrops

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Objective: To use high-resolution MRI to detect co-morbidity of endolymphatic hydrops (EH) and acoustic neuroma (AN) in patients presenting with audiovestibular complaints and correlate the MRI findings with clinical symptoms and audiovestibular testing.

Setting: Academic tertiary care referral center

Patients: Nine patients imaged with high resolution MRI had AN. Materials and Methods: Magnetic resonance EH imaging sequences on 3-Tesla included "cisternographic" 3D T2, and delayed intravenous enhanced three- dimensional fluid-attenuation-inversion-recovery (DIVE 3D FLAIR).

Results: Of the nine patients, three (33.3%) had coexisting AN and EH, on side ipsilateral to AN. All of the patients with comorbidity of AN and EH had a presentation indistinguishable from Meniere's disease: recurrent spells of vertigo associated with ipsilateral aural fullness, tinnitus, and hearing loss. One patient with both AN and EH had resection of AN at outside hospital, but continued to suffer imbalance likely secondary to central vestibular complications. The other two opted for surveillance of AN and are well-managed with low-salt diet and diuretics. The six patients with AN but not EH had varied presentations: one patient meets criteria for MD, and three had hours-long vertigo spells, but unaccompanied by otological symptoms.

Conclusion: Patients with AN presenting with episodic vertigo may have coexisting EH. We recommend that patients with AN and recurrent vertigo undergo high-resolution MRI with EH protocol, and if EH is present, then medical management should be considered prior to making surgical decisions.

Define Professional Practice Gap & Educational Need: The purpose of this study is to highlight a lack of awareness in detection which has only become possible with recent technology advances. New ultra-high resolution MRI can now detect patients with endolymphatic hydrops. Currently, standard protocol MRI is used to detect and perform surveillance for acoustic neuroma. We would like to share that ultra-high resolution MRI can be used to detect co-morbid endolymphatic hydrops in patients with acoustic neuroma who present with audiovestibular systems that are indistinguishable from Meniere's disease.

Learning Objective: The primary learning to objective is to recognize that patients with audiovestibular systems, which are indistinguishable from Meniere's disease, may in fact have two co-existing disease processes e.g. acoustic neuroma and endolymphatic hydrops. The second learning objective is to understand that ultra-high resolution MRI findings are critical in the work-up and treatment of patients with episodic vertigo.

Desired Result: It is our goal to propose that patients with acoustic neuroma who present with episodic vertigo should first undergo ultra-high resolution MRI to rule out endolymphatic hydrops prior to proceeding with surgery, as patients with co-morbid endolymphatic hydrops may be successfully treated medically.

Indicate IRB or IACUC Approval: Approved

F048

Quantifying the Hair Cell and Neural Sources of ECochG Signals Recorded in Patients with ANSD Receiving a Cochlear Implant

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Kevin D. Brown, MD, PhD; Harold C. Pillsbury, MD
Douglas C. Fitzpatrick, PhD

Hypothesis: To characterize the contribution of the auditory nerve neurophonic (ANN) to electrocochleography (ECochG) of pediatric CI recipients with and without auditory nerve spectrum disorder (ANSD).

Background: ECochG is an emerging technique for predicting outcomes in cochlear implant (CI) recipients. Its utility may be increased using a computational model to independently quantify cochlear microphonic (CM), produced by hair cells, and the ANN, which are mixed in the ongoing portion of the response to low frequency tones.

Methods: Study conducted with UNC prior IRB approval. ANSD was diagnosed by a present CM and abnormal or absent Wave V on auditory brainstem response testing. The CM was modeled using a sinusoid modified by rectification and saturation. The ANN was modeled using a convolution of the unit potential and cycle. CM and ANN waveforms were extracted from ECochG signals recorded from the round window of pediatric CI recipients using 250-1000 Hz tones (90 dB nHL).

Results: The model matched 112 raw signals from ANSD and 314 from non-ANSD patients with mean $R2>0.95$. Signals of ANSD patients (n=112) had larger overall magnitudes (mean±std 3.04±4.32 uV) than non-ANSD patients (n=314, 0.73±1.23uV). The model identified similar ranges of ANN magnitudes in both groups (0-5.75 uV for ANSD compared to 0-3.54 uV).

Conclusions: The neural contribution to the typically large ECochG signals of ANSD patients is highly variable, often larger than is typical for non-ANSD subjects. The presence of a neural contribution would be expected to improve their clinical outcomes with the CI.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness of the role of ECochG in predicting speech perception outcomes of cochlear implant recipients with auditory neuropathy spectrum disorder (ANSD). 2. Lack of knowledge of the newly developed signal analysis methods used with ECochG to separate neural and hair cell potentials.

Learning Objective: 1. Characterize the patterns of neural contribution to ECochG signal in patients with ANSD. 2. Demonstrate the advances in ECochG signal analysis methods which improve our ability to quantify the functional status of the neural components of the peripheral auditory system.

Desired Result: Improved understanding and confidence in the information conveyed by an ECochG recording as it relates to counselling the patient or their family regarding the potential range of outcomes for a patient with ANSD receiving cochlear implant.

Indicate IRB or IACUC Approval: Approved

F049

The Pattern of Hearing Outcome Following Surgeries of the Semicircular Canals

Amit Wolfovitz, MD; Thomas A. Babcock, MD
Simon I. Angeli, MD

Objective: to analyse demographic, clinical and surgical factors that predict hearing outcome following surgeries of the semicircular canals (SCC) for various vestibular indications

Study design: retrospective case review

Setting: Tertiary referral center

Patients: adults who underwent surgeries for superior SCC dehiscence, Meniere's disease (MD), or BPPV

Intervention: therapeutic.

Main outcome measure: post surgical hearing outcome and its association with preoperative demographic, clinical features as well as surgical features.

Results: 11 cases underwent surgery for superior SCC dehiscence (5 middle fossa and 6 transmastoid approach), 4 cases for the lateral SCC (intractable MD) and 2 for the posterior SCC (BPPV). The mean age in the cases with postoperative similar (or better) bone conduction thresholds (n=15; 88.2%, 6 males) was 47.9±13.3 (21-66) while in cases with deteriorated thresholds (n=2, 1 male) was 50.5 ±2.1 (49-52). age, side, gender, indication for procedure, presenting symptoms and preoperative air and bone pure tone averages as well as surgical approach and technique were not found to be associated with worse hearing outcome. Moreover, in cases of deteriorated bone conduction threshold (a case of superior SCC dehiscence treated via middle fossa approach and another case of lateral SCC plugging for intractable MD), there was no unified audiometric pattern of hearing loss

Conclusions: hearing outcome was found to be favorable in 88.2% of SCC surgeries. none of the assessed demographic, clinical and surgical parameters was found to be associated with worse audiologic outcome.

Define Professional Practice Gap & Educational Need: 1. There is uncertainty regarding how many of the surgeries for the semicircular canals (SCC) for various vestibular indications, are ending with worse bone conduction threshold. 2. In cases of post surgical worse bone conduction threshold, it is unknown what preoperative demographic and clinical, as well as intra-operative approach and technique might played a key factor in the final outcome 3. additionally it is unknown whether there is a stereotypic pattern of hearing loss post surgeries of the semicircular canals

Learning Objective: 1. Assess the percentage of cases post surgeries for the SCC that are ending with worse bone conduction 2. Analyse demographic, clinical and surgical factors that predict postoperative hearing outcome 3. Understand the nature and pattern of hearing loss in cases of worse postoperative audiologic outcome

Desired Result: Clinicians aiming to perform surgery for the SCC for their patients will have additional tool in their armamentarium for prediction of post surgical outcome and for better counselling their patients about possible outcome and complications.

Indicate IRB or IACUC Approval: Approved

F050

Recurrent Vestibular Migraine Vertigo Attacks Associated with the Development of Profound Bilateral Vestibulopathy: A Case Series

Jacob L. Wester, MD; Akira Ishiyama, MD
Gail Ishiyama, MD

Background: Idiopathic bilateral vestibulopathy is a debilitating condition characterized by gait ataxia, oscillopsia, and imbalance.

Objective: Case series of patients with profound bilateral vestibulopathy with migraine-linked vertigo spells.

Patient 1: 69 yo male with recurrent severe vertigo spells lasting up to 3 days in duration associated with prostrating migraine headaches starting at age 60. Hearing was normal. Misdiagnosed for 9 years as anxiety syndrome. At age 68, an ENG revealed absent caloric responses, and profound vestibulopathy.

Patient 2: 51 yo male presents with a history of brief "earthquake-like" vertigo, sharp head pains and phonophobia, occurring a handful of times in his lifetime over 7 years. At age 43, ENG was normal; however, ENG at age 48 revealed profound bilateral vestibulopathy. Subjectively, he noted improved balance with acetazolamide, although ENG was unchanged.

Patient 3: 49 yo female with a history of recurrent migraines with visual aura associated with vertigo lasting one hour. ENG at age 50 revealed profound bilateral vestibulopathy. Subjectively, she noted improved balance with acetazolamide, and ENG demonstrated mild improvement.

Patient 4: 43 yo male with a 5-year history of optical migraines and recurrent vertigo spells lasting 30 seconds presented with a 10 year history of oscillopsia. Misdiagnosed as BPPV. ENG at age 61 revealed profound bilateral vestibulopathy.

Conclusion: In these cases, migraine was linked with vertigo spells that eventually led to complete bilateral vestibular loss. Potential pathophysiological mechanisms are discussed.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge of migraine-linked vertigo and its temporal relation to complete bilateral vestibular loss

Learning Objective: Relation of migraine-linked vertigo to complete bilateral vestibular loss

Desired Result: Attendees will have a better understanding of migraine-linked vertigo spells leading to complete bilateral vestibular loss and its underlying pathophysiology

Indicate IRB or IACUC Approval: Exempt

RECIPIENTS OF AWARDS & NAMED LECTURERS

In honor of the 50th anniversary of the American Neurotology Society, 1965 - 2015, the House/Hitselberger Lifetime Achievement Award was established to honor the legacy of two giants in the field of neurotology, Dr. William F. House and Dr. William E. Hitselberger. The award recognizes those individuals who have demonstrated superb surgical skills and patient care, a commitment toward education and cumulative scientific contributions that have profoundly impacted the field of neurotology. At the 50th Annual Fall meeting in Dallas, TX on September 26, 2015, the first awards were presented to nine neurotologists from the USA and Europe.

HOUSE/HITSELBERGER LIFETIME ACHIEVEMENT AWARD

Derald E. Brackmann, MD
House Ear Clinic - Los Angeles, CA

Prof. Ugo Fisch, MD
Fisch International Microsurgery Foundation
Zurich, Switzerland

Emilio García-Ibáñez, MD
Instituto De Otologia Garcia-Ibanez - Barcelona, Spain

Michael E. Glasscock, III, MD
The Otology Group, Nashville, TN
The Glasscock Hearing Center - Houston, TX

Malcolm D. Graham, MD
Emory University - Atlanta, GA

David A. Moffat, PhD, FRCS
Addenbrooks Hospital - Cambridge, UK

Joseph B. Nadol, Jr., MD
Massachusetts Eye & Ear Infirmary - Boston, MA

Prof. Mario Sanna, MD
Gruppo Otologico, Piacenza-Rome, Italy

Prof. Jean-Marc Sterkers, MD
Paris, France

WILLIAM F. HOUSE MEMORIAL LECTURE

William F. House, MD - 1988, Palm Beach, CA
Michael E. Glasscock III, MD - 1989, San Francisco, CA
Prof. Ugo Fisch, MD - 1990, Palm Beach, FL
Harold F. Schuknecht, MD - 1991, Hawaii, HI
Frederick H. Linthicum Jr., MD - 1992, Palm Desert, CA
William W. Montgomery, MD - 1993, Los Angeles, CA
Robert J. Keim, MD - 1994, Palm Beach, FL
Derald E. Brackmann, MD - 1995, Palm Desert, CA
Antonio De La Cruz, MD - 1996, Orlando, FL
Malcolm D. Graham, MD - 1997, Scottsdale, AZ
Brian F. McCabe, MD - 1998, Palm Beach, FL
William Lo, MD - 1999, Palm Desert, CA
Jens Thomsen, MD - 2000, Orlando, FL
Mansfield Smith, MD - 2001, Palm Desert, CA
Bruce J. Gantz, MD - 2002, Boca Raton, FL
John W. House, MD - 2004, New York, NY
Professor Richard Ramsden - 2005, Boca Raton, FL
John K. Niparko, MD - 2006, Chicago, IL
Robert K. Jackler, MD - 2007, San Diego, CA
Richard A. Chole, MD, PhD - 2008, Orlando, FL
Lloyd B. Minor, MD - 2009, Phoenix, AZ
Jeffrey P. Harris, MD, PhD - 2010, Las Vegas, NV
Debara L. Tucci, **MD** - 2011, Chicago, IL
Paul R. Lambert, MD - 2012, San Diego, CA
D. Bradley Welling, MD, PhD - 2013, Orlando, FL
Yehoash Raphael, PhD - 2014, Las Vegas, NV
Noel L. Cohen, MD - 2015, Boston, MA
Per Cayé-Thomasen, MD, DMSc - 2016, Denmark

WILLIAM E. HITSELBERGER MEMORIAL LECTURE

William E. Hitselberger, MD - l999, Palm Desert, CA
Peter Dallos, PhD - 2000, Orlando, FL
James Battey, MD, PhD - 2001, Palm Desert, CA
David Fabry, PhD - 2002, Boca Raton, FL
Amin B. Kassam, MD - 2004, New York, NY
William W. M. Lo, MD - 2005, Los Angeles, CA
G. Michael Halmagyi, MD - 2006, Toronto, Canada
Takanori Fukushima, MD, DMSc - 2007, Wash DC
D. Bradley Welling, MD, PhD - 2008, Chicago, IL
Philip H. Gutin, MD - 2009, San Diego, CA
David A. Moffat, MD - 2010, Boston, MA
George T. Hashisaki, MD - 2011, San Francisco, CA
Karen I. Berliner, PhD - 2013, Orlando, FL
Dennis S. Poe, MD - 2014, Las Vegas, NV
Jeffrey W. Kysar, PhD - 2015, Boston, MA
Ali R. Zomorodi, MD - 2015, Dallas, TX

FRANKLIN M. RIZER MEMORIAL LECTURE

Stefan Heller, PhD - 2004, New York
Philip Theodosopoulos, MD -2006, Toronto, Canada
Charley C. Della Santina, MD, PhD - 2007, Wash. DC
Conrad Wall III, PhD - 2007, Wash. DC
Ebenezer Yamoah, PhD - 2008, Chicago, IL
Gerard O'Donoghue, MD - 2009, San Diego, CA
Saumil N. Merchant, MD - 2010, Boston, MA
Richard L. Goode, MD - 2012, Washington, DC
Richard A. Chole, MD, PhD - 2013, Vancouver, BC
Karen B. Avraham, PhD - 2014, Orlando, FL
Professor Mario Sanna - 2015, Dallas, TX
Thomas Lenarz, Prof. Dr.med - 2016, San Diego, CA

NEUROTOLOGY FELLOWSHIP AWARD

Colin L.W. Driscoll, MD - 1998, Palm Beach, FL
Robert M. Owens, MD - 1999, Palm Desert, CA
Katrinia R. Stidham, MD - 2000, Orlando, FL
Zoran Becvarovski, MBBS - 2001, Palm Desert, CA
John S. Oghalai, MD - 2002, Boca Raton, FL
Anthony O. Owa, MD - 2002, Boca Raton, FL
Richard J. Kennedy, MD - 2003, Nashville, TN
Ana H. Kim, MD - 2006, Chicago, IL
Marc D. Eisen, MD - 2007, San Diego, CA
Benjamin T. Crane, MD, PhD - 2008, Orlando, FL
R. Mark Wiet, MD - 2008, Orlando, FL
Kevin D. Brown, MD, PhD - 2009, Phoenix, AZ
Jerry W. Lin, MD, PhD - 2009, Phoenix, AZ
John C. Goddard, MD - 2010, Las Vegas, NV
Matthew L. Bush, MD - 2011, Chicago, IL
Felipe Santos, MD - 2011, Chicago, IL
Alicia Quesnel, MD - 2012, San Diego, CA
Mia Miller, MD - 2013, Orlando, FL
Peter L. Santa Maria, MBBS, PhD -2014, Las Vegas, NV
Christine T. Dinh, MD - 2015, Boston, MA
Seth E. Pross, MD - 2016, Chicago, IL

ANS TRAINEE AWARD

Thomas R. Pasic, MD - 1990, Palm Beach, CA
University of Washington, Seattle, WA
Charles A. Syms III, MD - 1991, Hawaii, HI
USAF Medical Center, Lackland AFB, TX
Eric Tallan, MD - 1992, Palm Desert, CA
Mayo Clinic, Rochester, MN
Mark E. Reiber, MD - 1993, Los Angeles, CA
Vanderbilt University Medical Center, Nashville, TN
Gary B. Coleman, MD - 1994, Palm Beach, FL
University of Michigan, Ann Arbor, MI
Donald D. Robertson, MD - l995, Palm Desert, CA
University of Manitoba, Winnipeg, Manitoba Canada
Greg A. Krempl, MD - l997, Scottsdale, AZ
University of Texas, San Antonio, TX
Bac H. Nguyen, MD - 1998, Palm Beach, FL
University of Minnesota, Minneapolis, MN
Jennifer L. Maw, MD - 1999, Palm Desert, CA
Hearing Institute for Children & Adults, San Jose, CA
Wayne E. Berryhill, MD - 2000, Orlando, FL
University of Minnesota, Minneapolis, MN
Dmitriy Niyazov - 2001, Palm Desert, CA
Medical Student, Los Angeles, CA
Stacey L. Halum, **MD** - 2003, Nashville, TN
Medical College of Wisconsin
Norman N. Ge, MD - 2004, Phoenix, AZ
Davis Medical Center, Sacramento, CA
Ritvik P. Mehta, MD - 2005, Boca Raton, FL
Massachusetts Eye & Ear; Harvard Medical School
Wade Chien, MD - 2006, Chicago, IL
Massachusetts Eye & Ear, Harvard Medical School
Hideko Heidi Nakajima, MD, PhD - 2009, Phoenix, AZ
Massachusetts Eye & Ear; Harvard Medical School
Yuri Agrawal, MD - 2012, San Diego, CA
Johns Hopkins University, Baltimore, MD
Samuel A. Spear - 2013, Orlando, FL
The Ohio State University, Columbus, OH
Christine T. Dinh, MD - 2014, Las Vegas, NV
University of Miami, Miami, FL
James Naples, MD - 2015, Boston, MA
University of Connecticut, Farmington, CT
Jacob B. Hunter, MD - 2016, Chicago, IL
Vanderbilt University, Nashville, TN

NICHOLAS TOROK VESTIBULAR AWARD

Stephen P. Cass, MD - l990, Palm Beach, FL
Michigan Ear Institute, Farmington Hills, MI
P. Ashley Wackym, MD - 1992, Palm Desert, CA
University of Iowa Hospitals and Clinics, Iowa City, IA
Robert P. Muckle, MD - 1993, Los Angeles
University of Minnesota, Minneapolis, MN
Thomas A. Salzer, MD - 1994, Palm Beach
Baylor College of Medicine, Houston, TX
Akira Ishiyama, MD - 1995, Palm Desert
UCLA School of Medicine, Los Angeles, CA
Michael P. McCue, MD - 1996, Orlando
University of Minnesota, Minneapolis, MN

NICHOLAS TOROK VESTIBULAR AWARD (CONT)

Anil K. Lalwani, MD - 1998, Palm Beach, CA
University of California, San Francisco, CA
Lloyd B. Minor, MD - 1999, Palm Desert, FL
Johns Hopkins University, Baltimore, MD
Vincent B. Ostrowski, MD - 2000, Orlando, FL
Northwestern University Medical School, Chicago, IL
D. Bradley Welling, MD, PhD - 2001, Palm Desert, CA
The Ohio State University, Columbus, OH
John P. Carey, MD - 2003, Nashville, TN
Johns Hopkins University, Baltimore, MD
John C. Li, MD - 2005, Boca Raton, FL
Loyola University Medical Center, Chicago, IL
Judith A. White, MD, PhD - 2006, Chicago, IL
The Cleveland Clinic, Cleveland, OH
Abraham Jacob, MD - 2007, San Diego, CA
The Ohio State University - Columbus, OH
Rahul Mehta, MD - 2014, Las Vegas, NV
Louisiana State University - New Orleans, LA
Benjamin T. Crane, MD, PhD - 2015, Boston, MA
University of Rochester Medical Center - Rochester, NY
Jeffrey D. Sharon, MD - 2016, Chicago, IL
Johns Hopkins University - Baltimore, MD

RECIPIENTS OF THE SILVERSTEIN AWARD

ANS/AAO-HNS Otology/Neurotology Research Award
Funding provided by Dr. Herbert Silverstein/ANS/AAO

Lawrence R. Lustig, MD - 7/1999
Johns Hopkins University
David R. Friedland, MD - 7/00-6/02
Johns Hopkins University
Rose Mary Stocks, MD - 7/02-6/204
University of Tennessee
Clifford R. Hume, MD, PhD - 7/03-6/05
University of Washington
Alan G. Micco, MD - 7/04-6/06
Northwestern University
Romaine Johnson, MD - 7/05-6/07
Children's Hospital Cincinnati
Joseph P. Roche, MD - 7/08-6/10
University of North Carolina
Alan Cheng, MD - 07/10 - 06/12
Stanford University
Yuri Agrawal, MD - 07/10 - 06/12
Johns Hopkins University
Nathan Schularick, MD - 07/12 - 06/14
The University of Iowa
Dylan Chan, MD, PhD - 07/14 - 06/16
University of California-SF
David H. Jung, MD, PhD - 07/16 - 06/18
Harvard University/ MEEI

RECIPIENTS OF THE ANS RESEARCH AWARD

$25,000 annual award established in 2014/15

Funding provided by the American Neurotology Society

Christine T. Dinh, MD - 2015
"Cochlear Irradiation and Dosimetry: Apoptosis, Necrosis, and Hearing Loss"
University of Miami, Miami, FL

Harrison Lin, MD - 2016
"Chronic Implantation of the Facial Nerve for Selective Facial Muscle Contraction"
University of California-Irvine, Orange, CA

The purpose of the American Neurotology Society (ANS) Research Grant is to encourage and support academic research in sciences related to the investigation of otology and neurotology. Appropriate areas of research include diagnosis, management, and pathogenesis of diseases of the ear and/or skull base. Grants that focus on addressing clinical gaps are especially encouraged. Grants may involve cell/molecular studies, animal research, or human subjects research.

The maximum award request is $25,000 per year (US dollars) and is annually renewable on a competitive basis. Indirect costs (overhead) are not allowed. Grants are available to physician investigators in the United States and Canada only. We particularly encourage those individuals without a history of K08, R03, R21, or R01 funding to apply.

If you would like to submit a grant application, the deadline is January 31st.

Applications should be sent via email to Dr. Ronna Hertzano, rhertzano@som.umaryland.edu Chair of the ANS Research Committee. Full instructions and the application form can be found at the ANS website.

American Neurotology Society Research Award

Progress Report

Title: Chronic Implantation of the Facial Nerve for Selective Facial Muscle Contraction
PI: Harrison Lin, M.D.

Background: The facial nerve is a single motor nerve that activates the muscles of facial expression, which importantly support the expression of emotions, oral competency, and eyelid closure, among other important functions. Patients with permanent hemifacial paralysis from a tumor, surgery, trauma or infection often suffer from debilitating functional problems and emotionally disheartening cosmetic deformities of a grossly asymmetric and flaccid face. Many surgical interventions have been described for patients with hemifacial paralysis, the majority of which are highly invasive and address only a limited number of functional and cosmetic issues. Concurrently, several bioelectric prosthetic devices are in routine clinical use to provide rehabilitative and therapeutic neural stimulation to the head and neck, including the cochlear implant, vagal nerve stimulator, hypoglossal nerve stimulator, and deep brain stimulator. We have recently described the ability of a penetrating multichannel thin-film electrode array to selectively stimulate highly-specific neural fibers within the facial nerve and activate movement in specific muscles of the face of a cat.

Objectives: In the *American Neurotology Society Research Grant* award period, we proposed to advance these studies in the cat model to further assess the ability of an implantable, penetrating, platinum-iridium electrode microarray to selectively elicit specific movements of the face. We moreover aimed to chronically implant this electrode into the facial nerve to test for its efficacy and stability of function over time. Finally, we tested the intraneural stimulation approach in the context of established animal models of facial nerve injury and paralysis. Ultimately, we anticipate developing a facial nerve implant system in the animal model that may have a clinical application to provide functional and cosmetic rehabilitation for patients with permanent hemifacial paralysis.

Hypothesis: Selective stimulation of facial muscles will be maintained in the setting of (1) chronic microarray intraneural implantation, and (2) acute microarray implantation following facial nerve injury recovery.

Methods: This is an animal study using the feline model for facial nerve testing. Commercially-available intraneural multichannel microarrays were used for acute and chronic implantations into the facial nerve, and electrical current pulses were delivered to each channel individually. Elicited electromyographic voltage outputs from key muscles of the upper and lower face were measured and recorded by a standard nerve integrity monitoring system. Chronic intraneural implantations were performed, and animals were tested biweekly for six months. Facial nerve injuries were performed via the validated methods of surgical clamping, and transection and reapproximation, four months prior to acute testing. All nerves were harvested for histologic evaluation.

Results: Stimulation through individual channels selectively activated restricted nerve populations, resulting in versatile contraction of individual muscles in cats with chronic array implantation and following nerve injury. Increasing stimulation current levels resulted in increasing electromyographic voltage responses in all cases. Notably, voltage responses were considerably lower than previously-reported responses in the acute, non-injury setting. Nerve histology showed mild foreign body tissue reaction to the implant, and atypical axons, fibrosis, and vacuolization in injured nerves.

Conclusion: We have established in the animal model the ability of a chronically-implanted intraneural microarray to selectively stimulate restricted neural fiber populations and elicit contractions in specific facial muscles. Similarly, following nerve injury and recovery, selective stimulation of restricted facial nerve fiber populations and subsequent contraction of discrete facial muscles can be achieved following acute microarray implantation. Overall, electromyographic voltage responses were diminished when compared to those from acutely-tested, uninjured nerves. Future studies should be directed at investigating methods for improving and optimizing neuromuscular responses in these clinically-relevant settings.

1965-69 Fred Harbert, MD
1969-70 Richard E. Marcus, MD
1970-71 Wallace Rubin, MD
1971-72 Malcolm H. Stroud, MD
1972-73 Martin Spector, MD
1973-74 Nicholas Torok, MD
1974-75 Cecil W. Hart, MD
1975-76 Sidney N. Busis, MD
1976-77 Brian F. McCabe, MD
1977-78 Bruce Proctor, MD
1978-79 David A. Dolowitz, MD
1979-80 Fred H. Linthicum Jr., MD
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1981-82 Hugh Barber, MD
1982-83 Kenneth H. Brookler, MD
1983-84 Richard Gacek, MD
1984-85 Derald Brackmann, MD
1985-86 Robert J. Keim, MD
1986-87 Jack D. Clemis, MD
1987-88 Malcolm Graham, MD
1988-89 Robert A. Jahrsdoerfer, MD
1989-91 Shokri Radpour, MD
1992-92 Antonio De La Cruz, MD
1992-93 Fredric W. Pullen II, MD
1993-94 Charles M. Luetje II, MD
1994-95 Sam E. Kinney, MD
1995-96 Joseph DiBartolomeo, MD
1996-97 Jack M. Kartush, MD
1997-98 Bruce J. Gantz, MD
1998-99 John W. House, MD
1999-00 Richard J. Wiet, MD
2000-01 Richard T. Miyamoto, MD
2001-02 Stephen G. Harner, MD
2002-03 Newton J. Coker, MD
2003-04 Paul R. Lambert, MD
2004-05 Robert K. Jackler, MD
2005-06 Debara L. Tucci, MD
2006-07 Joel A. Goebel, MD
2007-08 D. Bradley Welling, MD, PhD
2008-09 Karen J. Doyle, MD, PhD
2009-10 Samuel H. Selesnick, MD
2010-11 J. Douglas Green Jr., MD
2011-12 Jeffrey T. Vrabec, MD
2012-13 Clough Shelton, MD
2013-14 Hilary A. Brodie, MD, PhD
2014-15 Anil K. Lalwani, MD
2015-16 John T. McElveen, Jr., MD
2016-17 Lawrence R. Lustig, MD

1965-68 Richard E. Marcus, MD
1968-70 Bruce Proctor, MD
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1971-72 Cecil Hart, MD
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1974-76 Jack Pulec, MD
1976-79 Michael Glasscock III, MD
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1985-88 Shokri Radpour, MD
1988-92 Charles M. Luetje II, MD
1992-95 Jack M. Kartush, MD
1995-98 Richard J. Wiet, MD
1998-01 Newton J. Coker, MD
2001-04 Debara L. Tucci, MD
2004-07 Karen J. Doyle, MD, PhD
2007-10 Jeffrey T. Vrabec, MD
2010-13 Anil K. Lalwani, MD
2013-16 Moisés A. Arriaga, MD, MBA
2016- Bradley W. Kesser, MD

AMERICAN NEUROTOLOGY SOCIETY
2016-2017 Membership Roster
(includes new members inducted at 2017 Spring meeting)
Please notify the Administrative Office of any address or email changes.

FELLOW MEMBERS

Meredith E. Adams, MD (2011)
Minneapolis, MN

Oliver F. Adunka, MD (2010)
Columbus, OH

Yuri Agrawal, MD (2013)
Baltimore, MD

Syed F. Ahsan, MD (2012)
Detroit, MI

Thomas H. Alexander, MD (2017)
San Diego, CA

George Alexiades, MD (2015)
New York, NY

Kyle P. Allen, MD (2014)
Tampa, FL

Ronald G. Amedee, MD (1990)
New Orleans, LA

James Andrews, MD (1996)
Manhattan Beach, CA

Simon I. Angeli, MD (2013)
Miami, FL

Philip F. Anthony, MD (1980)
Fort Worth, TX

Patrick Antonelli, MD (1995)
Gainesville, FL

Moises A. Arriaga, MD (1993)
Metairie, LA

H. Alexander Arts, MD (1993)
Ann Arbor, MI

James S. Atkins, Jr., MD (1988)
Celebration, FL

Seilesh C. Babu, MD (2004)
Farmington Hills, MI

Douglas D. Backous, MD (2005)
Seattle, WA

R. Stanley Baker, MD (1996)
Oklahoma City, OK

Ben J. Balough, MD (2015)
Sacramento, CA

Manohar L. Bance, MD (2017)
Cambridge, United Kingdom

Loren J. Bartels, MD (1984)
Tampa, FL

Alex S. Battaglia, MD (2007)
San Diego, CA

Robert A. Battista, MD (1995)
Hinsdale, IL

Carol A. Bauer, MD (1996)
Springfield, IL

Charles W. Beatty, MD (1989)
Rochester, MN

James E. Benecke, MD (1985)
Saint Louis, MO

Sanjay Bhansali, MD (1994)
Atlanta, GA

Alexander G. Bien, MD (2011)
Albany, NY

Douglas C. Bigelow, MD (1992)
Philadelphia, PA

Nikolas H. Blevins, MD (2004)
Stanford, CA

Dennis I. Bojrab, MD (1987)
Farmington Hills, MI

K Paul Boyev, MD (2002)
Tampa, FL

Thomas G. Brammeier, MD (2003)
Belton, TX

Robert E. Brammer, MD (1988)
St Clr Shores, MI

Robert J. S. Briggs, MD (1996)
Kooyong, Australia

Hilary A. Brodie, MD, PhD (1999)
Sacramento, CA

Gerald B. Brookes, FRCS (1994)
London, UK

Jeffrey J. Brown, MD, PhD (1988)
Portland, OR

Kevin D. Brown, MD (2012)
Chapel Hill, NC

J Dale Browne, MD (1995)
Winston Salem, NC

Craig A. Buchman, MD (1998)
St. Louis, MO

Don L. Burgio, MD (1995)
Scottsdale, AZ

Matthew L. Bush, MD (2012)
Lexington, KY

Audrey P. Calzada, MD (2015)
La Jolla, CA

John P. Carey, MD (2004)
Baltimore, MD

Matthew J. Carfrae, MD (2010)
Clive, IA

Matthew L. Carlson, MD (2015)
Rochester, MN

Stephen P. Cass, MD, MPH (1991)
Aurora, CO

Adam M. Cassis, MD (2014)
Morgantown, WV

Peter J. Catalano, MD (1997)
Brighton, MA

Sujana S. Chandrasekhar, MD (1995)
New York, NY

C. Y. Joseph Chang, MD (1996)
Houston, TX

Douglas A. Chen, MD (1988)
Pittsburgh, PA

Joseph M. Chen, MD (2007)
Toronto, Ontario Canada

Steven Wan Cheung, MD (2006)
San Francisco, CA

Wade W. Chien, MD (2014)
Potomac, MD

Won-Taek Choe, MD (2008)
New York, NY

Richard A. Chole, MD, PhD (1994)
Saint Louis, MO

Daniel H. Coelho, MD (2008)
Richmond, VA

Candice C. Colby-Scott, MD (2016)
Grand Rapids, MI

Maura K. Cosetti, MD (2012)
Shreveport, LA

Benjamin T. Crane, MD, PhD (2011)
Rochester, NY

James V. Crawford, MD (2011)
Dupont, WA

Roberto A. Cueva, MD (1991)
San Diego, CA

Robert D. Cullen, MD (2008)
Kansas City, MO

Calhoun D. Cunningham III, MD (2005)
Raleigh, NC

Frank S. Curto, Jr., MD (1996)
Bethesda, MD

Robert L. Daniels, MD (2007)
Grand Rapids, MI

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Tampa, FL

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Alexander Sorin, MD (2007)
New Hyde Park, NY

Jeffrey P. Staab, MD (2006)
Rochester, MN

Katrina R. Stidham, MD (2003)
Tuckahoe, NY

B. Joseph Touma, MD (2004)
Huntington, WV

Mark J. Van Ess, DO (2012)
Springfield, MO

Christophe G. Vincent, MD, PhD (2015)
Lille Cedex, France

Peter G. Volsky, MD (2016)
Coral Gables, FL

John W. Wayman, MD (1994)
Rochester, NY

Thomas White, MD (1983)
Oakland, CA

Marc Wong, MD (1994)
Honolulu, HI

Benjamin J. Wycherly, MD (2012)
Farmington, CT

Takao Yabe, MD, PhD (1997)
Tokyo, Japan

Heng-Wai Yuen, MD (2009)
Singapore

SENIOR ASSOCIATE MEMBERS

Gregory A. Ator, MD (1994)
Kansas City, KS

George A. Gates, MD (1970)
Boerne, TX

Dominic W. Hughes, PhD (1984)
West Linn, OR

Makoto Igarashi, MD (1968)
Tokyo, Japan

Robert Kimura, PhD (1984)
Middleton, WI

Wolf J. Mann, MD, PhD (1999)
55137 Mainz, Germany

Larry D. McIntire, DO (1996)
Joplin, MO

Lars Odkvist, MD, PhD (1995)
Linkoping, Sweden

Dennis P. O'Leary, PhD (1984)
Pasadena, CA

Michael M. Paparella, MD (1976)
Minneapolis, MN

Rodney Perkins, MD (1976)
Woodside, CA

George T. Singleton, MD (1974)
Gainesville, FL

Jens Thomsen, MD, PhD (1999)
Hellerup, Denmark

Joseph B. Touma, MD (1983)
Huntington, WV

Galdino E. Valvassori, MD (1968)
Winter Park, FL

HONORARY MEMBERS

Jerome Goldstein, MD (1993)
Wellington, FL

G. Michael Halmagyi, MD (2006)
Sydney, Australia

Yasuya Nomura, MD (1993)
Tokyo, Japan

AFFILIATE MEMBERS

Thomas Meyer, MD (2015)
Basel, Switzerland

EMERITUS MEMBERS

Bobby R. Alford, MD (1968)
Houston, TX

Sean R. Althaus, MD (1976)
Georgetown, TX

Irving Arenberg, MD (1977)
Centennial, CO

Arnold K. Brenman, MD (1973)
Jenkintown, PA

B. Hill Britton, MD (1973)
San Antonio, TX

Kenneth H. Brookler, MD (1972)
Norwalk, CT

Sidney N. Busis, MD (1968)
Pittsburgh, PA

Robert W. Cantrell, MD (1976)
Charlottesville, VA

Noel L. Cohen, MD (1968)
New York, NY

George H. Conner, MD (1976)
Lebanon, PA

Charles Phillip Daspit, MD (1973)
Paradise Valley, AZ

John R.E. Dickins, MD (1989)
Little Rock, AR

Hamilton S. Dixon, MD (1972)
East Ellijay, GA

David A. Drachman, MD (1974)
Worcester, MA

George W. Facer, MD (1975)
Bonita Springs, FL

Richard R. Gacek, MD (1970)
Worcester, MA

Michael E. Glasscock, III, MD (1970)
San Antonio, TX

Malcolm Graham, MD (1972)
Atlanta, GA

Lee Harker, MD (1974)
Omaha, NE

Cecil W. Hart, MD (1968)
Palm Springs, CA

C. Gary Jackson, MD (1979)
Mt Pleasant, SC

Donald B. Kamerer, MD (1974)
Pittsburgh, PA

Athanasios Katsarkas, MD (1978)
Montreal, PQ Canada

Robert Kohut, MD (1975)
Wilmington, NC

S. George Lesinski, MD (1976)
Cincinnati, OH

Frederick H. Linthicum, Jr., MD (1968)
Los Angeles, CA

Robert D. McQuiston, MD (1976)
Indianapolis, IN

William Morgan, MD (1973)
Charleston, WV

J. Gail Neely, MD (1976)
St. Louis, MO

James Nelson, MD (1976)
La Jolla, CA

Leonard R. Proctor, MD (1975)
Baltimore, MD

Fredric W. Pullen, MD (1974)
Wellington, FL

William J. Rice, MD (1978)
Grosse Pointe, MI

Jose Antonio Rivas, MD (1977)
Bogota, Distr Especial Colombia

Mendell Robinson, MD (1974)
Rehoboth, MA

Robert J. Ruben, MD (1969)
Bronx, NY

Fred T. Shaia, MD (1975)
Richmond, VA

M. Coyle Shea, MD (1976)
Memphis, TN

James B. Snow, Jr., MD (1968)
West Grove, PA

Gershon J. Spector, MD (1976)
St. Louis, MO

Jun-Ichi Suzuki, MD (1978)
Tokyo, Japan

Ruediger Thalmann, MD (1970)
Saint Louis, MO

Richard J. Wiet, MD (1983)
Sawyer, MI

Robert J. Wolfson, MD (1968)
Philadelphia, PA

ANS MEMBERSHIP

Membership applications are accepted thru November 15th of each calendar year. Selected Candidates are inducted at the following Spring Business meeting. ANS Trainee applications are accepted throughout the year.

All Applications may be found on the ANS website.
www.americanneurotologysociety.com

Associate members are expected to upgrade to Fellow status after completion of (5) five years of practice *post training. Sub certification in neurotology will automatically upgrade an Associate member to Fellow; those not certified in neurotology must complete application and submit required materials.*
Fellow status brings many advantages, such as holding office, Committee appointments, voting privileges, attending Executive sessions, and the honor of endorsing prospective ANS Candidates.

Please notify the Administrative office if you have passed your Neurotology board exams.

Congratulations to the following ANS Associates who UPGRADED to FELLOW this year:

(by way of application)
Hernan Goldsztein, MD
Bulent Mamikoglu, MD

(by way of Neurotology board certification)
Audrey P. Calzada, MD
Matthew L. Carlson, MD
Candice C. Colby-Scott, MD
Justin S. Golub, MD
David H. Jung, MD, PhD
J. Eric Lupo, MD
Theodore R. McRackan, MD
Rick F. Nelson, MD, PhD
Eric L. Slattery, MD
Samuel A. Spear, MD
Emily Z. Stucken, MD
Maja Svrakic, MD
Alex D. Sweeney, MD
Courtney C. J. Voelker, MD, PhD
Heather M. Weinreich, MD

ALL AMERICAN NEUROTOLOGY SOCIETY MEMBERSHIP INQUIRIES SHOULD BE DIRECTED TO THE ANS ADMINISTRATIVE OFFICE

Kristen Bordignon, Administrator
Email: administrator@americanneurotologysociety.com

The ANS Trainee membership category was created in 2004 by the ANS Executive Council with hopes that all Neurotology Fellows, Otolaryngology-HNS Residents, and Post Doctorate Researchers would apply for ANS entry-level membership as a full member at the close of his or her training. Trainee membership will co-terminate with the residency/training program at which time the Trainee member will be notified to apply for membership.

The following qualifications are required for Trainee Membership in the American Neurotology Society.

1. The candidate shall have earned a Medical Degree of MD, DO, PhD, or the equivalent.
2. In training in a field of study related to the field of Neurotology (Otolaryngology-Head and Neck Surgery Residency, Neurotology Fellowship or post doctoral research position).
3. Special interest in the field of Neurotology
4. Highest ethical and moral standards
5. Letter from Department Chair and/or Fellowship/Program Director validating Trainee status including Certification of Trainee status and the duration of the program.

TRAINEE MEMBERS (in alphabetical order)

Sameer Alvi, MD
Kansas City, KS

Jennifer C. Alyono, MD
Stanford, CA

Kristen Angster, MD
Ann Arbor, MI

William Colby Brown, MD
Cleveland Hts, OH

Melissa Castillo Bustamante, MD
Buenos Aires, Argentina

Si Chen, MD
Miami, FL

Matthew D. Cox, MD
Little Rock, AR

Matthew G. Crowson, MD
Durham, NC

Nicholas L. Deep, MD
Phoenix, AZ

Susan D. Emmett, MD
Baltimore, MD

Michael F. Foster, MD
Seattle, WA

Michele M. Gandolfi, MD
Los Angeles, CA

Mark Gelpi, MD
Cleveland, OH

Ariel B. Grobman, MD
Aventura, FL

Michael S. Harris, MD
Columbus, OH

Douglas M. Hildrew, MD
Pittsburgh, PA

Candace E. Hobson, MD
San Diego, CA

Kathryn Hoppe, MD
University Hts, OH

Emily N. Hrisomalos, MD
Cleveland, OH

Neal M. Jackson, MD
Royal Oak, MI

Elizabeth Kelly, MD
Woodbury, MN

Daniel Killeen, MD
Dallas, TX

Ruwan Kiringoda, MD
Boston, MA

Raymond Kung, MD
Iowa City, IA

Lukas D. Landegger, MD
Boston, MA

Shawn Li, MD
Shaker Heights, OH

Nauman Fazal Manzoor, MD
Cleveland, OH

Frank H. Masters, Ill, MD
University Hts, OH

James Naples, MD
Farmington, CT

Brendan O'Connell, MD
Nashville, TN

Kevin A. Peng, MD
Los Angeles, CA

Seth E. Pross, MD
Baltimore, MD

Brian Rodgers, MD
Royal Oak, MI

Douglas S. Ruhl, MD
Charlottesville, VA

Joshua Sappington, MD
Baton Rouge, LA

Scott Shapiro, MD
Morgantown, WV

Shawn M. Stevens, MD
Cincinnati, OH

John Gerka Stuyt, MD
Cleveland, OH

Akina Tamaki, MD
University Hts, OH

Lucía Tapia, MD
Buenos Aires, Argentina

Jason E. Thuener, MD
Rocky River, OH

Anthony M. Tolisano, MD
Honolulu, HI

Yona Vaisbuch, MD
Palo Alto, CA

Varun Varadarajan, MD
Gainesville, FL

Erika M. Walsh, MD
Birmingham, AL

Tammy Wang, MD
Cleveland, OH

Elizabeth H. Wick, MD
Seattle, WA

Cameron C. Wick, MD
Dallas, TX

Amit Wolfovitz, MD
Miami, FL

The ANS Administrative office was notified of the following members death since the last Spring meeting. Please take a moment of silence to remember these colleagues & friends.

Josef M. Miller, PhD

John K. Niparko, MD

Fred Owens, MD

Wallace Rubin, MD

Vern B. Tubergen, MD

The following schedule has been coordinated for the 2017 ANS Fall meeting in Chicago, IL
Sheraton Grand Chicago
"Super Saturday"
September 9, 2017

7:00 – 8:00am Facial Nerve Study Group
John P. Leonetti, MD

8:10 – 9:50am Stereotactic Radiosurgery Study Group
P. Ashley Wackym, MD

10:00am – 12:00pm Wm House Cochlear Implant Study Group
Craig A. Buchman, MD

12:00 – 12:45pm Lunch Break

12:45– 1:00pm ANS Business Meeting

1:00 – 5:15pm ANS Scientific Program
Moisés A. Arriaga, MD, MBA

A FRIENDLY REMINDER!
ANS REGISTRATION REQUIRED

Everyone is invited to Super Saturday! ALL attendees are required to register to attend the ANS Fall program. It is in your best interest to register online. Registration will begin June 1st.
The registration fee schedule is as follows:
ANS Member - $125 (after August 1st, $175)
ANS Trainee Member - No registration fee
Resident/MS - No registration fee
Nonmember - $250 (after August 1st, $300)

Questions regarding registration and the ANS Scientific Program may be directed to the ANS Administrator, Kristen Bordignon at administrator@americanneurotologysociety.com

General information for the Facial Nerve Study Group, the Stereotactic Radiosurgery Study Group, and the William House Cochlear Implant Study Group will be handled independently by the Coordinator of each Study Group. (see "Call for papers", next page)

SAVE THE DATE

General registration & housing for the AAO-HNS Annual meeting, Sept 10-13, 2017 will open in May 2017
In order to secure housing and take advantage of the negotiated group rate at the Sheraton Grand, you MUST register for the AAO-HNS meeting first. There are NO exceptions. There will be a large block of rooms available at the Sheraton this year; however, early registration is necessary in order to secure housing at the headquarters hotel. A full list of hotel options will be available on the AAO-HNS website in May
http://www.entannualmeeting.org/17/registration_housing/registration_housing

If you are not attending the Academy meeting, but planning to attend the ANS Fall meeting, you will be responsible for securing your own housing and will not have access to the Academy housing link. Look for additional information via email as well as the ANS website.

CALL FOR PAPERS - STUDY GROUPS

FACIAL NERVE STUDY GROUP

Abstracts will be accepted for 5 minute Facial Nerve study group case presentations followed by discussion between April 1, 2017 and June 1, 2017. The abbreviated abstracts should include a title AND clinical presentation only. The format is an "unknown" or "complicated" case presentation designed to generate audience participation and discussion. Please submit all abstracts to Kristen Bordignon at administrator@americanneurotologysociety.com by June 1st, Don't forget to include submitting author's full name, designation, email, and mailing address. Please limit abstract to 125 words or less; abstract must be in Microsoft WORD format please, no pdf's. AUTHOR'S ARE PERMITTED TO SUBMIT MORE THAN ONE CASE, HOWEVER, DUE TO TIME CONSTRAINTS AND IN FAIRNESS TO ALL, ONLY ONE ABSTRACT PER AUTHOR MAY BE SELECTED FOR PRESENTATION.

Thank you,

John P. Leonetti, MD

STEREOTACTIC RADIOSURGERY STUDY GROUP

The 2017 Stereotactic Radiosurgery Study Group meeting will be comprised of two invited presentations followed by interesting case studies and discussion. This is a "Call for Papers" for such case studies. I am also encouraging suggestions for specific topics and/or speakers to be included in the design of the invited presentations.

Abstracts will be accepted between April 1, 2017 and June 1, 2017 for 5 minute SRS SG case presentations followed by discussion. The abbreviated abstracts should include a title AND clinical presentation only. The format is an "unknown" or "complicated" case presentation designed to generate audience participation and discussion. Please submit all abstracts to P. Ashley Wackym, MD at wackym@alumni.vanderbilt.edu by June 1st.

Abstracts must include submitting author's full name, designation, email, and mailing address. Please limit abstract to 125 words or less; abstract must be in Microsoft WORD format please — no PDFs. AUTHOR'S ARE PERMITTED TO SUBMIT MORE THAN ONE CASE, HOWEVER, DUE TO TIME CONSTRAINTS AND IN FAIRNESS TO ALL, ONLY ONE ABSTRACT PER AUTHOR MAY BE SELECTED FOR PRESENTATION.

Please feel free to contact me at wackym@alumni.vanderbilt.edu with any questions regarding the Abstract submission process for the Stereotactic Radiosurgery Study Group. Authors will be notified the end of June whether their abstract was selected for presentation.

Thank you!

P. Ashley Wackym, MD

WILLIAM HOUSE COCHLEAR IMPLANT STUDY GROUP

Please plan to attend the 33rd gathering of the WHCISG as a part of the "Super Saturday" events during the ANS 52nd Annual Fall meeting in conjunction with the AAO-HNSF Annual Meeting & OTO EXPO in Chicago, IL. Difficult/interesting/unusual cases that illustrate novel concepts or management dilemmas are encouraged for presentation and discussion during the first hour. Presenters may also choose to submit, at their discretion, written manuscripts for inclusion in the Cochlear Implant International journal. The second hour is co-sponsored by the **American Cochlear Implant Alliance (ACIA)** and is intended to discuss contemporary issues relevant to clinics, industry and the field in general.

I encourage you all to submit your interesting or perplexing cases to BuchmanC@ent.wustl.edu and emilyharvey@wustl.edu no later than Friday, July 7, 2017

Sincerely,

Craig A. Buchman, MD, FACS