

PROGRAM and ABSTRACTS

of the

AMERICAN NEUROTOLOGY SOCIETY

51st Annual Spring Meeting

May 20 - 22, 2016

GRAND BALLROOM AB EAST TOWER GOLD LEVEL

Hyatt Regency Chicago Chicago, IL

AMERICAN NEUROTOLOGY SOCIETY 2015-2016 EXECUTIVE COUNCIL

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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 the 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 <u>7.00</u> AMA PRA Category 1 CreditsTM. Physicians should claim only the credit commensurate with the extent of their participation in the activity.



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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 identified as practice gaps through individual topics presentations and in depth panel discussions.

Based on the responses from the 2015 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 vestibular schwannomas and management.
- There is inconsistent knowledge amongst otologists/ neurotologists regarding the controversies and management in superior canal dehiscence syndrome.
- There is inconsistent knowledge amongst otologists/ neurotologists regarding the evaluation and management of facial nerve injuries and techniques to restore facial nerve function.

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 51st Annual Spring Meeting of the ANS will kick off Saturday afternoon, May 21st. ANS President, Dr. John T. McElveen Jr. will honor the following individuals with a Presidential Citation.

Christian Parahy, MD Professor Carlo Antonio Leone, MD Richard L. Goode, MD Joseph G. Feghali MD M. Miles Goldsmith, MD

Highlights of the program include the William F. House Memorial Lecture entitled, "*Changing the Natural History of Vestibular Schwannomas*", presented by Dr. Per Cayé-Thomasen.

In collaboration with AOS, Dr. John Carey joined by a group of esteemed colleagues will present a combined ANS/AOS panel entitled, "*Current Controversies in Superior Canal Dehiscence Syndrome*".

Dr. Clough Shelton, accompanied by an outstanding group of speakers will close the program Sunday moderating a panel called "Facial Nerve Injury: 2016 State of the Art Evaluation & Management".

The ANS is pleased to present three awards for outstanding abstract submissions. The Neurotology Fellow Award recipient is Dr. Seth E. Pross for his presentation entitled. *"TeleAudiology in the Veterans Health Administration"*.

Dr. Jacob B. Hunter is the recipient of the ANS Trainee Award for his presentation entitled, "Correlation of Superior Canal Dehiscence Surface Area with Vestibular Evoked Myogenic Potentials and Audiometric Thresholds".

The Nicholas Torok Vestibular Award goes to Dr. Jeffrey D. Sharon for his presentation entitled, *"Revision Surgery for Superior Canal Dehiscence Syndrome"*. In addition, there are a vast number of oral presentations exploring the latest research and findings.

Be sure to visit the Riverside Exhibit Hall, located in the East Tower on the purple level of the Hyatt Regency where you will find an outstanding display of ANS poster submissions. Posters will be available for viewing on Friday & Saturday beginning at 9:00 A.M. Recipients of the ANS poster awards will be announced at the close of the AOS Scientific program on Friday, May 20th at 5:00 P.M.

The Combined Poster/Meet the Authors Reception will take place Friday evening, May 20th in the Riverside Exhibit Hall from 5:30-7:00 P.M. followed by the 51st Annual ANS President's Reception at 7:00 P.M. in the Columbus Ballroom at the Hyatt.

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:

- Participants will learn the history, evaluation and management of vestibular schwannomas.
- Participants will learn current controversies in superior canal dehiscence syndrome and management. They will learn the advantages and techniques of middle fossa repair and the advantages of transmastoid repair. Participants will gain knowledge on the role of round window reinforcement and the procedures of plugging, resurfacing and round window reinforcement and the effect on inner ear dynamics.
- Participants will learn the evaluation and management of facial nerve injuries. Participants will gain knowledge in the changes in Bell's Palsy and unusual neoplasms causing facial paralysis. They will learn management options of traumatic facial nerve injury the use of neural conduit to restore facial function.

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

- This activity will improve competence by providing physicians a more thorough understanding of the history and management of vestibular schwannomas. Detailed information on current and emerging options providing optimal patient care for treatment of vestibular schwannomas.
- This activity will improve competence by providing physicians details in the management and surgical treatment of canal dehiscence syndrome. Detailed information will be provided on the advantages and techniques of middle fossa repair and transmastoid repair. Detailed information will be provided on the procedures of plugging and resurfacing the round window reinforcement and what these procedures do to inner ear dynamics, providing the current and emerging options for patient care gaining the best possible outcomes.
- This activity will improve competence by providing physicians education of state of the art evaluation and management of facial nerve injuries, facial paralysis and management of Bell's Palsy. Participants will gain knowledge in the changes in Bell's Palsy and unusual neoplasms causing facial paralysis. They will learn management options of traumatic facial nerve injury the use of neural conduit to restore facial function, providing the current and emerging options for optimal patient care.

Learning Objective(s)

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

- Describe the history and management of vestibular schwannonas and implement optimal patient treatment and management.
- Describe and implement the evaluation and management strategies of canal dehiscence syndrome by identifying the procedures and inner ear dynamics to gain the best possible outcomes and patient care.
- Describe the management of facial nerve injuries, facial paralysis and management of Bell's Palsy. Identify the unusual neoplasms causing facial paralysis and evaluate the current and emerging options for treatment of facial paralysis, traumatic facial nerve injury and restoring facial function for optimal patient care..

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.

In compliance with 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.

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 scientific program 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 partnership with ACS, to manage any reported conflict and eliminate the potential for bias during the activity. All scientific 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. Disclosure Information

PUBLICATION STATEMENT

The material in this abstract, <u>(Name of Abstract)</u>, 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.

American Neurotology Society Statement

All authors, presenters, panelists, guest lecturers, Executive Council members, Education and Scientific Program Committee members, Moderators, Administrative staff and any other contributing individuals who may be in a position to control content of a CME activity were required to complete a Disclosure/ Conflict of Interest/Attestation declaration prior to consideration for presentation or appointment to a CME planning Committee. All potential conflicts of interest were resolved prior to participation in the planning of this activity.

Authors were instructed to read and sign the following Attestation statement, indicating their understanding of and willingness to comply with each statement below.

- 1. I will disclose all relevant financial relationships to the ANS, disclose this information to learners verbally (for live activities) and in print.
- 2. The content and/or presentation of the information with which I am involved will promote quality or improvements in healthcare and will not promote a specific proprietary business interest of a commercial interest. Content for this activity, including any presentation of therapeutic options, will be well-balanced, evidence-based and unbiased.
- 3. I have not and will not accept any honoraria, additional payments or reimbursements beyond that which has been agreed upon directly with the ANS.
- 4. If I am presenting at a live event, I am aware that a CME monitor will attend the event to ensure that my presentation is educational, and not promotional, in nature. If presentation is found to be promotional in any way, I understand I will be ineligible to participate in an *ANS/ACS* CME accredited activity for a period up to two years.
- 5. If I am providing recommendations involving clinical medicine, they will be based on evidence that is accepted within the profession of medicine as adequate justification for their indications and contraindications in the care of patients. All scientific research referred to, reported or used in CME in support of justification of a patient care recommendation will conform to the generally accepted standards of experimental design, data collection and analysis.
- 6. If I am discussing specific healthcare products or services, I will use generic names to the extent possible. If I need to use trade names, I will use trade names from several companies when available, not just trade names from any single company.
- 7. If I am discussing any product use that is off label, I will disclose that the use or indication in question is not currently approved by the FDA for labeling or advertising.
- 8. If I have been trained or utilized by a commercial entity or its agent as a speaker (e.g., speaker's bureau) for any commercial interest, the promotional aspects of that presentation will not be included in any way with this activity.
- 9. If I am presenting research funded by a commercial company, the information presented will be based on generally accepted scientific principles and methods, and will not promote the commercial interest of the funding company.

DISCLOSURES

(In alphabetical order)

ANS Executive Council – 2015-2016

The following Council Members disclose: Moises A. Arriaga, MD Cochlear Corp- Organizer - Temporal Bone lab support MED-EL- Organizer-Temporal Bone lab support Advanced Bionics- Organizer-Temporal Bone lab support Stryker- Organizer-Temporal Bone lab support Craig A. Buchman, MD Cochlear Corp- Consultant- Honorarium Colin L. W. Driscoll, MD Advanced Bionics - Consultant- Consulting fee Stryker-Instructor- Consulting fee Anil K. Lalwani, MD Advanced Bionics - Medical Advisory Board- Honorarium Lawrence R. Lustig, MD MED-EL- Surgical Advisory Board- Travel Reimbursement Advanced Bionics- Medical Advisory Board- Travel Reimbursement John T. McElveen, Jr., MD Stryker- Consultant- Consultant EarLens- Medical Advisory Board- Honorarium Nancy M. Young, MD Resonance- Stockholder- Purchased Stock Cochlear Corp- Medical/Surgical Advisory Board- Consulting fee MED-EL- Medical/Surgical Advisory Board - Consulting fee Advanced Bionics- Medical/Surgical Advisory Board -Consulting fee The following Council Member has nothing to disclose: Michael J. McKenna, MD

ANS Education Committee – 2015-2016

The following Education Committee Members disclose: Craig Buchman, MD - ANS Education Director Cochlear Corp- Consultant- Honorarium David R. Friedland, MD, PhD MED-EL- Co-investigator- Grant Funding Rick A. Friedman, MD, PhD Otonomy- CoFounder- Consultant fees Timothy E. Hullar, MD Advanced Bionics- Medical Advisory Committee- fee Fred F. Telischi, MD MED-EL – Surgical Advisory Board – Honorarium Medtronic - Consultant - Consulting fee Nancy Young, MD Resonance- Stockholder- Purchased Stock Cochlear Corp- Medical/Surgical Advisory Board - Consulting fee MED-EL- Medical/Surgical Advisory Board – Consulting fee Advanced Bionics- Medical/Surgical Advisory Board -Consulting fee

The following Education Committee Members have nothing to disclose: Joni K. Doherty, MD **Barry Hirsch, MD** John P. Leonetti, MD John S. Oghalai, MD Jack A. Shohet, MD Konstantina M. Stankovich, MD Andrea Vambutas, MD ANS Scientific Program Committee - 2016 The following Scientific Program Committee Members disclose: Craig A. Buchman, MD- ANS Education Director Cochlear Corp- Consultant- Honorarium John T. McElveen, MD- ANS President Stryker- Consultant- Consultant contract EarLens- Medical Advisory Board- Honorarium Patrick Antonelli, MD Alcon Laboratories, Pharmaceuticals, Otonomy, Next Science, Medtronic ENT- Independent Contractor- Research Support Alkem Laboratories, Vindico Medical Education- Speaking/ teaching- Honorarium Otonomy- Consultant- Consultant fees Adrien A. Eshraghi, MD MED-EL- Consultant, Research Support- NA Advanced Bionics- Consultant, Research Support- NA Auris Medical- Research Support- NA Timothy E. Hullar, MD Advanced Bionics- Medical Advisory Committee- fee Joe Walter Kutz Jr., MD GLG Consulting- Consultant- Consulting fee Ravi Samy, MD Cochlear Corp- Research Advisory Board- Department Research Funding, Honorarium Stryker- Advisor- Honorarium MED-EL- Researcher- Research to department George Wanna, MD MED-EL- Consultant- Travel Expenses Advanced Bionics- Consultant- Honorarium Cochlear Corp- Consultant- None Oticon Medical- Consultant- Honorarium The following Scientific Program Committee Members have nothing to disclose: Yuri Agrawal, MD Joseph M. Chen, MD Roberto A. Cueva, MD Howard W. Francis, MD Ronna Hertzano, MD Ana Hae-Ok Kim, MD

- H. Jeffrey Kim, MD
- Stephanie Moody-Antonio, MD
- Brian Perry, MD

The following Poster judges have nothing to disclose: Andrea Vambutas, MD Nancy M. Young, MD Craig A. Buchman, MD The following individuals have nothing to disclose: Moises A. Arriaga, MD William H. Slattery III, MD Patrick J. Antonelli, MD Craig A. Buchman, MD Alejandro Rivas, MD

ANS Administration The following individuals have nothing to disclose: Kristen Bordignon Ashley Westbrook

DISCLOSURES Oral Presentations Primary Authors/Presenters/Panel Participants/Guest Disclosures (listed in order of presentation) Saturday May 21, 2016

1:35pm - WILLIAM F. HOUSE MEMORIAL LECTURE The following individual has nothing to disclose: Per Cayé-Thomasen, MD, DMSc

2:15pm - The Impact of EMR on Neurotologic Practice The following individual discloses: John T. McElveen Jr., MD Stryker- Consultant- Consultant contract EarLens- Medical Advisory Board- Honorarium The following individual has nothing to disclose: Jack A. Shohet, MD

2:25pm - Round and Oval Window Reinforcement for the Treatment of Severe Hyperacusis The following individual has nothing to disclose: Herbert Silverstein, MD

2:33pm - Initial Results of a Safety and Feasibility Study of Auditory Brainstem Implantation in Congenitally Deaf Children The following individual discloses: Eric P. Wilkinson, MD Cochlear Americas - Research Support - None MED-EL - Research Support - None

3:19pm - Chondrosarcoma of the Petroclival Synchondrosis: A Review of 44 Cases The following individual has nothing to disclose: Matthew L. Carlson, MD

3:27pm -Epidermoids of the Cerebellopontine Angle: A Review of 47 Cases The following individuals have nothing to disclose: Robert J. Yawn, MD

3:35pm - Long Term Outcomes for Patients with Petrous Apex Cholesterol Granulomas: Surgery vs. Observation The following individual has nothing to disclose: Shawn M. Stevens, MD

3:43pm - Stereotactic Radiosurgical Treatment of Glomus Jugulare Tumors The following individual has nothing to disclose: Tyler W. Winford, MD

3:56pm - ANS/AOS PANEL - "Current Controversies in Superior Canal Dehiscence Syndrome" The following individual has nothing to disclose: John P. Carey, MD - Moderator Daniel J. Lee, MD Shakeel R. Saeed, MD, MBBS Seilesh C. Babu, MD Hideko Heidi Nakajima, MD, PhD 7:34am - Single Institutional Experience with Observing Vestibular Schwannomas The following individual has nothing to disclose: Jacob B. Hunter, MD

7:42am - Inhibiting P21-Activated Kinase Induces Cell Death in Vestibular Schwannoma and Meningioma via Mitotic Catastrophe The following individual has nothing to disclose:

Melania E. Mercado-Pimentel, PhD

7:50am - Peri-Operative Complications and Readmission Rates following Surgery for Cerebellopontine Angle Neoplasms The following individual has nothing to disclose: Hossein Mahboubi, MD, MPH

7:58am - Tinnitus Suppression after Auditory Brainstem Implantation in NF2 Patients The following individual has nothing to disclose: Daniel S. Roberts, MD, PhD

8:10am - PANEL – "Facial Nerve Injury: 2016 State of the Art Evaluation & Management" The following individuals have nothing to disclose: Clough Shelton, MD, Moderator Bruce J. Gantz, MD John P. Leonetti, MD J. Walter Kutz Jr., MD Tessa A. Hadlock, MD

9:12am - NEUROTOLOGY FELLOW AWARD TeleAudiology in the Veterans Health Administration The following individual has nothing to disclose: Seth E. Pross, MD

9:20am - Bridging the Gap: Use of Neural Conduit to Restore Facial Function The following individual has nothing to disclose: Joshua M. Sappington, MD

9:28am - Successful Treatment of the Mal de Debarquement Syndrome (MdDS) The following individual has nothing to disclose: Eric E. Smouha, MD

9:36am - NICHOLAS TOROK VESTIBULAR AWARD Revision Surgery for Superior Canal Dehiscence Syndrome The following individual has nothing to disclose: Jeffrey D. Sharon, MD

9:44am - TRAINEE AWARD Correlation of Superior Canal Dehiscence Surface Area with Vestibular Evoked Myogenic Potentials and Audiometric Thresholds The following individual has nothing to disclose: Jacob B. Hunter, MD

10:17am - Intracochlear Pressure Transients during Cochlear Implant Electrode Insertion The following individual has nothing to disclose: Nathaniel T. Greene, PhD 10:25am - Investigating the Air-bone Gap: Changes in Intracochlear Sound Pressure with Air- and Bone-conducted Stimuli after Cochlear Implantation The following individual has nothing to disclose: Renee M. Banakis Hartl, MD, AuD

10:33am - Degree of Hearing Preservation after Cochlear Implantation Impacts Early Speech Recognition The following individual has nothing to disclose:
Sarah A. Sydlowski, PhD, AuD The following individual discloses:
Erika A. Woodson, MD (Presenter) Oticon Medical - One-time Consultant – None

10:41am - The Compound Action Potential in Cochlear Implant Patients The following individual has nothing to disclose: William C. Scott, BA

10:49am - Automatic Cochlear Duct Length Estimation for Selection of Cochlear Implant Electrode Arrays
The following individual has nothing to disclose:
Alejandro Rivas, MD
Oticon, Advanced Bionics, MED-EL, Cochlear – Consultant -None

11:03am - Flat Panel CT Evaluation of Place-Pitch Mismatch in Cochlear Implant Users The following individual has nothing to disclose: Nicole T. Jiam, BA

11:11am -The Mitochondria-Targeted Antioxidant Mitoquinone Reduces Cisplatin-induced Ototoxicity in Guinea Pigs The following individual has nothing to disclose: Alan D. Tate, MD

11:19am - Activation of IGF1 Signaling in the Cochlea Induces the Transcription of Its Mediators during the Protection of Cochlear Hair Cells against Aminoglycoside The following individual has nothing to disclose: Norio Yamamoto, MD, PhD

11:27am - Intratympanic Dexamethasone Did Not Protect Against High Dose, Single Fraction Radiation Ototoxicity in Rats in Vivo The following individuals have nothing to disclose: Christine T. Dinh, MD Si Chen, MD (Presenter)

11:35am - Early Adoption of Hearing Aids Reduces Temporal Lobe Atrophy Associated with Presbycusis The following individual has nothing to disclose: Z. Jason Qian, BS

11:43am - A Retrospective Review of Pediatric Temporal Bone Imaging with Respect to Bone-Anchored Hearing Aid Guidelines The following individual has nothing to disclose:

Aaron R. Baker, MD

Posters

E001 - Predictive Value of EABRs in NF2 Adults and Non-NF2 Children Receiving ABIs The following individual has nothing to disclose: Abbas A. Anwar, MD

E002 - The Oncomir Mir-21 Facilitates AKT Pathway Activation in Vestibular Schwannomas and Meningiomas The following individual has nothing to disclose: Melania E. Mercado-Pimentel, PhD

E003 - Initial Operative Experience and Hearing Preservation Results with a Mid-Scala Cochlear Implant Electrode Array The following individual has nothing to disclose:

Maja Svrakic, MD

E004 - Depression, Self-Esteem, and Quality of Life in Vestibular Schwannoma Treatment Decision-Making The following individual has nothing to disclose: Jason C. Nellis, MD

E005 - Defining the Limits of Endoscopic Access to Internal Auditory Canal: Anatomical and Computed Tomographic Analysis of an Exclusively Endoscopic Approach The following individual has nothing to disclose: Adam N. Master, MD

E006 - Dosimetric Analysis of Adjacent Neurovascular Structures in Treatment of Skull Base Tumors with CyberKnife Radiation Therapy

The following individual has nothing to disclose: Jay Bhatt, MD

E007 - Treatment of Lateral Skull Base and Posterior Cranial Fossa Lesions Utilizing the Extended Middle Cranial Fossa Approach The following individual has nothing to disclose: Joseph P. Roche, MD

E008 - Treatment Paradigms in the Management of Late Stage Neurofibromatosis Type II Patients The following individual has nothing to disclose: Stephanie E. Teng, MD

E009 - Rare Metastatic Lesions of the Internal Auditory Canal The following individual has nothing to disclose: Richard J. Wiet, MD

E010 - Vestibular Schwannoma Volume to Posterior Fossa Volume Ratio as a Predictor of Clinical Outcomes following Resection The following individual has nothing to disclose: Robert J. Macielak, MS

E011 - Facial Nerve Schwannomas Mimicking as Vestibular Schwannomas The following individual has nothing to disclose: **Beth N. McNulty, MD** E012 - An Easy and Reliable Method to Locate the Dehiscence during Middle Fossa Superior Canal Dehiscence Surgery: It's a (C) inch The following individual has nothing to disclose: Neil S. Patel, MD

E013 - Semicircular Canal Dehiscence in Patients with Cadherin 23 Related Hearing Loss The following individual has nothing to disclose: Kathryn Y. Noonan, MD

E014 - Pediatric Superior Semicircular Canal Dehiscence and Inner Ear Anomalies The following individual has nothing to disclose: Eric M. Sugihara, DO

E015 - Cochlear Patency is maintained after Transmastoid Labyrinthectomy The following individual has nothing to disclose: Eric W. Sargent, MD

E016 - Evaluation of Cochlear Anatomy Models for Determining Intra-cochlear Electrode Position The following individual has nothing to disclose: Ahmet Cakir, Mres

E017 - The Central Auditory System and Cochlear Implantation: Using Olfactory Testing to Evaluate a Potential Central Component in Cochlear Implant Performance The following individual has nothing to disclose: Hinrich Staecker, MD, PhD

E018 - Cochlear Histopathology as Seen in Two Patients with a Clarion® Cochlear Implant Electrode with Positioner The following individual has nothing to disclose:

Takefumi Kamakura, MD, PhD

E019 - Interactive iPad-Based Education for Cochlear Implant Candidates The following individual has nothing to disclose: Omid Moshtaghi, BS

E020 - Preservation of Low Frequency Hearing in Children with Enlarged Vestibular Aqueduct The following individual has nothing to disclose: Kevin D. Brown, MD, PhD Baishakhi Choudhury, MD (presenter)

E021 - Hearing Loss after Round Window Surgery in Mice is due to Middle Ear Effusion The following individual has nothing to disclose: Bovey Z. Zhu, MD

E022 - Incidence of Sigmoid Sinus Wall Anomalies in PatienWaith Algorith Sinus PatienWall Anomalies in The following individual has nothing yo disclose. Kristen Angster, MD E023 - Outcomes of the Suture "Pull-through" Technique after Repair of Lateral Skull Base CSF Fistula and Encephaloceles The following individual has nothing to disclose: Brendan P. O'Connell, MD

E024 - Transverse Sinus Considerations in Idiopathic Intracranial Hypertension and Visual Impairment Intracranial Pressure Syndrome The following individual has nothing to disclose:

Glenn W. Knox, MD

E025 - Reconstruction Outcomes Following Lateral Skull Base Resection The following individual has nothing to disclose: Nicholas J. Thompson, BS

E026 - Cost Analysis of Cerebrospinal Fluid Leaks and Cerebrospinal Fluid Leak Prevention in Patients Undergoing Cerebellopontine Angle Surgery The following individual has nothing to disclose: Alexander Chern, BS

E027 - Corneal Complications after Lateral Skull Base Surgery The following individual has nothing to disclose: Jeffrey D. Sharon, MD

E028 - Endoscopic-Assisted Repair of CSF Otorrhea and Temporal Encephaloceles via Keyhole Craniotomy The following individual has nothing to disclose: Pamela C. Roehm, MD, PhD

E029 - Middle Cranial Fossa (MCF) Approach for the Management of Spontaneous Cerebral Spinal Fluid (CSF) Leaks

The following individual has nothing to disclose: **Rick F. Nelson, MD, PhD**

E030 - Visualization of Vestibular Structures using Optical Coherence Tomography in Mouse Models The following individual has nothing to disclose: **Yosuke Tona, MD**

E031 - The Efficacy of Color Mapped Fusion Imaging in the Postoperative Follow-up Evaluation for Residual Cholesteatomas

The following individual has nothing to disclose: **Tomoo Watanabe**, **MD**, **PhD**

E032 - Effects of Large-dose Steroid Administration in Bell's Palsy The following individual has nothing to disclose: Takatoshi, Furukawa, MD, PhD

E033 - Investigation of Piezoelectric Sensors for Totally Implantable Otologic Microphones The following individual has nothing to disclose: Francis Creighton, MD E034 - Modification of Osseointegrated Device Parameters to Improve Speech in Noise and Localization Ability: Clinical Recommendations The following individual has nothing to disclose: P. Cody Buchanan, DO

E035 - Management of Mal de Debarquement Syndrome as Vestibular Migraines The following individual has nothing to disclose: Yaser Ghavami, MD

E036 - Cochlin-tomoprotein (CTP) Detection Test Revealed Idiopathic Perilymphatic Fistula in Patients with Idiopathic Sudden Sensorineural Hearing Loss The following individual has nothing to disclose: Toshinori Kubota, MD, PhD

E037 - Vestibular Functions in Otitis Media with Antineutrophil Cytoplasmic Antibody (ANCA)-Associated Vasculitis (OMAAV) Patients The following individual has nothing to disclose: Yuka Morita MD, PhD

E038 - A Retrospective Review of Temporal Bone Imaging with Respect to Bone-Anchored Hearing Aid Placement The following individual has nothing to disclose: Aaron R. Baker, MD

E039 - Content Validity of Temporal Bone Models Printed Via Inexpensive Methods and Materials The following individual has nothing to disclose: T. Michael Bone, BS

Mark Your Calendar

FRIDAY, MAY 20, 2016 ANS Young Members Symposium Building research success – early career advice 5:15 pm - 6:15 pm Grand Ballroom AB

Combined Poster Reception ANS/AOS/ASPO/TRIO

Friday, May 20, 2016 5:30 pm - 7:00 pm Exhibit Hall Riverside Center

ANS 51st Annual President's Reception

Friday, May 20, 2016 7:00 pm - 9:00 pm Columbus Ballroom G-J

Join your colleagues for a casual evening of stimulating conversation, great food and libations!

Members, Presenters, & Invited Guests ticket required for entry Business Casual



American Neurotology Society 51st Annual SCIENTIFIC PROGRAM

SATURDAY, MAY 21, 2016

1:00	Business Meeting (<i>Members only</i>) Induction of New Members
1:20	Scientific Session (Open to Registered Members and Non-members – Badge required for admittance)
1:20	Welcome & Opening Remarks by the President John T. McElveen Jr., MD
1:25	PRESIDENTIAL CITATIONS Christian Parahy, MD Professor Carlo Antonio Leone, MD Richard L. Goode, MD Joseph G. Feghali MD M. Miles Goldsmith, MD
1:35	WILLIAM F. HOUSE MEMORIAL LECTURE "Changing the Natural History of Vestibular Schwannomas" Per Cayé-Thomasen, MD, DMSc
2:15	The Impact of EMR on Neurotologic Practice Jack A. Shohet, MD John T. McElveen Jr., MD
2:25	Round and Oval Window Reinforcement for the Treatment of Severe Hyperacusis Herbert Silverstein, MD Jack Wazen, MD Julie Daugherty, PhD Rosemary Ojo, MD Ronen Nazarian, MD

2:33	Initial Results of a Safety and Feasibility Study of Auditory Brainstem Implantation in Congenitally Deaf Children Eric P. Wilkinson, MD Laurie S. Eisenberg, PhD Mark D. Krieger, MD Marc S. Schwartz, MD Margaret Winter, MS Jamie L. Glater, AuD Robert V. Shannon, PhD
2:41	DISCUSSION
2:45	BREAK WITH EXHIBITORS
3:15	INTRODUCTION Moises A. Arriaga, MD, Moderator
3:19	Chondrosarcoma of the Petroclival Synchondrosis: A Review of 44 Cases Matthew L. Carlson, MD Brendan P. O'Connell, MD Joseph T. Breen, MD David S. Haynes, MD Paul W. Gidley MD Colin L. W. Driscoll, MD Michael J. Link MD
3:27	Epidermoids of the Cerebellopontine Angle: A Review of 47 Cases Robert J. Yawn, MD Neil S. Patel, MD Colin L.W. Driscoll, MD Michael J. Link, MD David S. Haynes, MD Reid C. Thompson, MD Matthew L. Carlson, MD
3:35	Long Term Outcomes for Patients with Petrous Apex Cholesterol Granulomas: Surgery vs. Observation Shawn M. Stevens, MD Amy Manning, MD Myles L. Pensak, MD Ravi N. Samy, MD

3:43 Stereotactic Radiosurgical Treatment of Glomus Jugulare Tumors Tyler W. Winford, MD

Leighanne H. Dorton, MD Eric R. Oliver, MD Michael D. Chan, MD Stephen B. Tatter, MD, PhD John S. May, MD James D. Browne, MD

3:51 **DISCUSSION**

3:56 COMBINED ANS/AOS PANEL "Current Controversies in Superior Canal Dehiscence Syndrome" John P. Carey, MD - Moderator

> Advantages of Middle Fossa Repair Daniel J. Lee, MD

Advantages of Transmastoid Repair Shakeel R. Saeed, MD, MBBS

Role of Round Window Reinforcement *Seilesh C. Babu, MD*

Plugging, Resurfacing and Round Window Reinforcement: What Do These Procedures Do to Inner Ear Dynamics? Hideko Heidi Nakajima, MD, PhD

5:00 ADJOURNMENT

SUNDAY MAY 22, 2016

7:00	Business Meeting/Committee Reports (<i>Members only</i>)
7:30	Scientific Session (Open to Registered Members and Non-members – Badge required for admittance)
7:30	Remarks by the President John T. McElveen Jr., MD
7:32	INTRODUCTION William H. Slattery III, MD
7:34	Single Institutional Experience with Observing Vestibular Schwannomas Jacob B. Hunter, MD Brendan P. O'Connell, MD Marc L. Bennett, MD Alejandro Rivas, MD George B. Wanna, MD Reid C. Thompson, MD David S. Haynes, MD
7:42	Inhibiting P21-Activated Kinase Induces Cell Death in Vestibular Schwannoma and Meningioma via Mitotic Catastrophe Melania E. Mercado-Pimentel, PhD Edrick F. Villalobos Prithvi M. Mohan Cecilia M. Reid Ross H. Francis, BS Daniela N. Rolph Abraham Jacob, MD
7:50	Peri-Operative Complications and Readmission Rates following Surgery for Cerebellopontine Angle Neoplasms Hossein Mahboubi, MD, MPH Yarah Haidar, MD Yaser Ghavami, MD Marlon Maducdoc, MD Harrison W. Lin, MD Hamid R. Djalilian, MD

7:58	Tinnitus Suppression after Auditory Brainstem Implantation in NF2 Patients Daniel S. Roberts, MD, PhD Steve Otto, MA Brian Chen, MD Kevin Peng, MD Derald E. Brackmann, MD John W. House, MD
8:06	DISCUSSION
8:10	PANEL – "Facial Nerve Injury: 2016 State of the Art Evaluation & Management" Clough Shelton, MD, Moderator
	Bell's palsy: Has Anything Changed? <i>Bruce J. Gantz, MD</i>
	Unusual Neoplasms causing Facial Paralysis: Wolves in Sheep's Clothing John P. Leonetti, MD
	Traumatic Facial Nerve Injury: Management Options <i>J. Walter Kutz Jr., MD</i>
	Facial Reanimation: State of the Art <i>Tessa A. Hadlock, MD</i>
9:10	INTRODUCTION Patrick J. Antonelli, MD
9:12	NEUROTOLOGY FELLOW AWARD TeleAudiology in the Veterans Health Administration Seth E. Pross, MD Andrea L. Bourne, AuD Steven W. Cheung, MD
9:20	Bridging the Gap: Use of Neural Conduit to Restore Facial Function Joshua M. Sappington, MD Jeffrey M. Hotaling, MD Younan Xia, PhD Liu Wenying, PhD John P. Leonetti, MD Eileen M. Foecking, PhD

9:28	Successful Treatment of the Mal de Debarquement Syndrome (MdDS) Eric E. Smouha MD Mingjia Dai, PhD Sergei Yakushin, PhD Catherine Cho, MD Bernard Cohen, MD
9:36	NICHOLAS TOROK VESTIBULAR AWARD Revision Surgery for Superior Canal Dehiscence Syndrome Jeffrey D. Sharon, MD Seth E. Pross, MD John P. Carey, MD
9:44	TRAINEE AWARD Correlation of Superior Canal Dehiscence Surface Area with Vestibular Evoked Myogenic Potentials and Audiometric Thresholds Jacob B. Hunter, MD Katie Makowiec Jianing Wang Brendan P. O'Connell, MD Matthew L. Carlson, MD Devin L. McCaslin, PhD Jack H. Noble, PhD George B. Wanna, MD
9:52	DISCUSSION
9:56	INTERMISSION
10:15	INTRODUCTION Craig A. Buchman, MD
10:17	Intracochlear Pressure Transients during Cochlear Implant Electrode Insertion Nathaniel T. Greene, PhD Jameson K. Mattingly, MD Renee M. Banakis Hartl, MD, AuD Daniel J. Tollin, PhD Stephen P. Cass, MD, MPH

10:25	Investigating the Air-bone Gap: Changes in Intracochlear Sound Pressure with Air- and Bone- conducted Stimuli after Cochlear Implantation Renee M. Banakis Hartl, MD, AuD Jameson K. Mattingly, MD Nathaniel T. Greene, PhD Herman A. Jenkins, MD Stephen P. Cass, MD Daniel J. Tollin, PhD
10:33	Degree of Hearing Preservation after Cochlear Implantation Impacts Early Speech Recognition <i>Sarah A. Sydlowski, PhD, AuD</i> <i>Erika A. Woodson, MD (presenter)</i>
10:41	The Compound Action Potential in Cochlear Implant Patients William C. Scott, BA Christopher Giardina, BS Tatyana Fontenot, MD Andrew Pappa, BS Harold C. Pillsbury, MD Craig A. Buchman, MD Doug Fitzpatrick, PhD
10:49	Automatic Cochlear Duct Length Estimation for Selection of Cochlear Implant Electrode Arrays Alejandro Rivas, MD Ahmet Cakir, MRes Jacob Hunter, MD Robert Labadie, MD, PhD Geraldine M. Zuniga, MD George B. Wanna, MD Benoit Dawant, PhD Jack Noble, PhD
10:57	DISCUSSION
11:01	INTRODUCTION Alejandro Rivas, MD

11:03	Flat Panel CT Evaluation of Place-Pitch Mismatch in Cochlear Implant Users Nicole T. Jiam, BA Monica S. Pearl, MD Courtney Carver, AuD Charles J. Limb, MD
11:11	The Mitochondria-Targeted Antioxidant Mitoquinone Reduces Cisplatin-induced Ototoxicity in Guinea Pigs Alan D. Tate, MD Patrick J. Antonelli, MD Kyle R. Hannabas, BS Jerin K. Joseph, BS Carolyn O. Dirain, PhD
11:19	Activation of IGF1 Signaling in the Cochlea Induces the Transcription of Its Mediators during the Protection of Cochlear Hair Cells against Aminoglycoside Norio Yamamoto, MD, PhD Yushi Hayashi, MD, PhD Takayuki Nakagawa, MD, PhD Koichi Omori, MD, PhD Juichi Ito, MD, PhD
11:27	Intratympanic Dexamethasone Did Not Protect Against High Dose, Single Fraction Radiation Ototoxicity in Rats in Vivo Christine T. Dinh, MD Si Chen, MD (presenter) Stefania Goncalves, MD Kyle Padgett, PhD Perry Johnson, PhD Nagy Elsayyad, MD Fred F. Telischi, MD
11:35	Early Adoption of Hearing Aids Reduces Temporal Lobe Atrophy Associated with Presbycusis Z. Jason Qian, BS Peter D. Chang, MD Gul Moonis, MD Anil K. Lalwani, MD
11:43 A Retrospective Review of Pediatric Temporal Bone Imaging with Respect to Bone-Anchored Hearing Aid Guidelines Aaron R. Baker, MD David G. Fanelli, BS Sangam Kanekar, MD Huseyin Isildak, MD

- 11:51 **DISCUSSION**
- 11:55 **INTRODUCTION OF INCOMING ANS PRESIDENT** *Lawrence R. Lustig, MD*

12:00 CLOSING REMARKS/ ADJOURNMENT

Friday, May 20, 2016 5:15-6:15PM Grand Ballroom AB

ANS YOUNG MEMBERS RESEARCH SYMPOSIUM Building research success – early career advice for young ANS members

<u>Moderators</u>: Wade Chien, MD Erika Woodson, MD; Maura Cosetti, MD

<u>Panelists:</u> Securing Funding- Within-Specialty Resources John Oghalai, MD

Research and Industry, Additional Comments on CORE Grants *Oliver Adunka, MD*

Chair Advice for Early Success in Research in an Academic Department *Larry Lustig, MD*

Securing National Funding- NIH/DD *Marlan Hansen, MD*

Finding a Research Mentor *Ronna Hertzano, MD*

ALL ARE WELCOME

sponsored by the ANS Young members group and the ANS Research committee

THE AMERICAN NEUROTOLOGY SOCIETY WOULD LIKE TO THANK THE FOLLOWING MEMBERS FOR THEIR CONTRIBUTION TO THE 2016 ANS SCIENTIFIC PROGRAM

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Scientific Program Moderators

Moises A. Arriaga, MD William H. Slattery III, MD Patrick J. Antonelli, MD Craig A. Buchman, MD Alejandro Rivas, MD

Poster Judges

Craig A. Buchman, MD Nancy M. Young, MD Andrea Vambutas, MD

UPCOMING MEETINGS

51st Annual ANS Fall Meeting

American Neurotology Society "Super Saturday"- September 17, 2016 Hilton Bayfront - San Diego, CA

"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 2016 Fall registration fee is \$100 (\$150 onsite) for all ANS members and \$200 (\$250 onsite) for nonmembers to attend the ANS Fall Meeting. Preliminary registration will take place online via the ANS website or by mail. Further details will be provided in the coming weeks.

AAO-HNSF Annual Meeting & OTO EXPO September 18-21, 2016 San Diego Convention Center, San Diego, CA

52nd Annual ANS Spring Meeting

(in conjunction with COSM) April 28-30, 2017 Manchester Grand Hyatt, San Diego, CA

The Abstract deadline for the 52nd Annual ANS Spring

meeting is <u>Saturday</u>, <u>October 15, 2016</u>. Abstract submission instructions will be available on ANS website in July 2016. 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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Round and Oval Window Reinforcement for the Treatment of Severe Hyperacusis

Herbert Silverstein, MD; Jack Wazen, MD Julie Daugherty, PhD; Rosemary Ojo, MD Ronen Nazarian, MD

Objective: To evaluate the efficacy of a minimally invasive surgical procedure in patients with severe hyperacusis.

Study Design: Prospective, longitudinal design.

Setting: Tertiary referral center.

Patients: Adult patients with history of severe hyperacusis.

Intervention: Using a transcanal approach, the round and oval window were reinforced with temporalis fascia or tragal perichondrium in six patients (9 ears).

Main Outcome Measures: Pre and postoperative noise tolerance was measured using loudness discomfort level (LDL) test scores. In addition, a self-report validated hyperacusis questionnaire was used to assess psychosocial and quality of life impairment before and after the intervention.

Results: Preliminary analysis of the data reveals improved postoperative mean LDL test scores of 10.2 dB (SD = 5.4) in nine ears. Further, a negative linear trend was observed in the mean subjective scores for the hyperacusis questionnaire, decreasing from a mean of 32.6 (SD = 10.4) pre-operative to a mean of 17.6 (SD = 6.1) following surgery. Postoperatively, there was no subjective complaints of hearing loss. However, a mild loss in the high frequencies was observed in 3 ears. Full data analysis will be presented.

Conclusion: The results suggest that reinforcement of the round and oval window with temporalis fascia or tragal perichondrium may offer significant benefit for individuals with severe hyperacusis that has not responded to traditional therapy. LDL scores and self-report measures postoperatively demonstrate improved noise tolerance, high patient satisfaction and enhanced quality of life.

Define Professional Practice Gap & Educational Need: There is a lack of contemporary knowledge regarding the treatment of hyperacusis. The presentation will offer information for a new minimally invasive surgical procedure that improves noise intolerance in patients with severe hyperacusis.

Learning Objective: To describe the results of a pilot study evaluating the efficacy of a new minimally invasive surgical procedure for the treatment of severe hyperacusis.

Desired Result: Following this presentation, attendees will gain an understanding of the criteria for appropriate patient selection, have an overall understanding of the efficacy of this procedure and will learn the steps of this novel minimally invasive surgical technique.

Initial Results of a Safety and Feasibility Study of Auditory Brainstem Implantation in Congenitally Deaf Children

Eric P. Wilkinson, MD; Laurie S. Eisenberg, PhD Mark D. Krieger, MD; Marc S. Schwartz, MD Margaret Winter, MS; Jamie L. Glater, AuD Robert V. Shannon, PhD

Objective: To determine the surgical and programming safety of auditory brainstem implantation (ABI) in children with cochlear aplasia and cochlear nerve deficiency.

Study Design: NIH-funded, IRB-Approved Clinical Trial.

Setting: Multidisciplinary ABI surgical and audiological team and children's hospital.

Intervention(s): ABI Surgery and Audiological mapping of the device.

Main outcome measure(s): The primary outcome measure is surgical and audiological programming safety as measured by number and type of adverse events. The secondary outcome measure is audiological detection using standard behavioral techniques.

Results: Seven children have been enrolled in the clinical trial. One patient was excluded for medical reasons, one family voluntarily withdrew from the study prior to surgery, and one patient was found to be progressing satisfactorily with their cochlear implant (CI) and ABI was deferred in favor of monitoring their progress. Four children underwent ABI surgery and postoperative mapping, all of whom had CI first with the exception of one patient with cochlear aplasia. All children will be one year post-surgery at the time of this presentation. One expected adverse event, a CSF leak, occurred in one patient who underwent simultaneous CI explantation, which resolved with lumbar drainage. One patient had vestibular side effects during mapping which resolved by excluding one electrode. All four children have measured detection thresholds in the longterm average speech spectrum, with three demonstrating emerging pattern perception.

Conclusions: ABI surgery and audiological mapping appears to be safe in this preliminary cohort. A total of 10 patients are anticipated to be implanted in this clinical trial.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness of auditory brainstem implantation as a treatment option in pediatric patients with cochlear nerve deficiency, cochlear aplasia, or cochlear ossification 2. Lack of contemporary knowledge of current expected outcomes of auditory brainstem implantation in children

Learning Objective: The learning objectives of this presentation are 1. Educate clinicians on the new application of auditory brainstem implantation as a treatment option in pediatric patients with cochlear nerve deficiency, cochlear aplasia, or cochlear ossification, and describe the initial results of a clinical trial of such, and 2. Describe the potential early outcomes of auditory brainstem implantation in children and how this could affect parental counseling

Desired Result: Attendees will be able to discuss the relative risks and benefits of a new application of auditory brainstem implantation in children who are not candidates for cochlear implantation or who have failed cochlear implantation. Attendees will be able to discuss how subjects are chosen for this intervention and understand the surgical and audiological challenges related to such an intervention

Chondrosarcoma of the Petroclival Synchondrosis: A Review of 44 Cases

Matthew L. Carlson, MD; Brendan P. O'Connell, MD Joseph T. Breen, MD; David S. Haynes, MD Paul W. Gidley MD; Colin L. Driscoll, MD Michael J. Link MD

Objective: To analyze clinical outcomes following treatment of petroclival chondrosarcomas (PCC).

Study Design: Retrospective case review, 1995-2015.

Setting: Multicenter study

Patients: Consecutive patients with histopathologically proven PCC

Intervention(S): Microsurgery, radiation therapy

Main Outcome Measures: Disease- and treatment-associated morbidity, recurrence, mortality

Results: Forty-four patients (mean age 43 years; 39% men) presenting with primary (N=36) or recurrent (N=8) PCC were analyzed. The mean duration of follow-up was 75 months. Among primary cases, the most common symptom was diplopia (53%) and the mean tumor size at diagnosis was 3.2 cm. Subtotal resection was performed in 27(79%) patients and gross total resection in 7(21%). Adjuvant postoperative radiation was administered in 24(71%) cases. Preoperative cranial neuropathy improved in 11(32%), worsened in 9(26%) and remained stable in 14(41%) patients; notably, 9 of 15(60%) preoperative sixth nerve palsies resolved following treatment. Six recurrences occurred at a median of 47 months. Lack of postoperative adjuvant radiation was associated with an increased risk of disease progression (8% vs. 40%; p=0.047), while tumor size, grade, and extent of resection did not reach statistical significance. One patient (3%) died 46 months following treatment. Analyzing the separate cohort of 8 cases presenting with recurrent disease, 1 received salvage surgery alone, 3 radiation therapy alone, while 4 received multimodality treatment. Tumor control was achieved in 7(88%) cases. One patient (12%) with grade 3 PCC died of rapidly progressive disease within 1 year of treatment.

Conclusions: Gross total or subtotal resection with adjuvant radiation provides durable tumor control with minimal morbidity in most patients. Surgery may improve preoperative cranial nerve dysfunction, particularly in the case of cranial nerve 6 paralysis.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge regarding optimal management of petroclival chondrosarcoma using multimodality therapy

Learning Objective: To understand management and outcome following contemporary treatment of petroclival chondrosarcoma using multimodality therapy

Desired Result: To apply this knowledge toward improving treatment outcomes for patients presenting with petroclival chondrosarcoma

Epidermoids of the Cerebellopontine Angle: A Review of 47 Cases

Robert J. Yawn, MD; Neil S. Patel, MD Colin L. W. Driscoll, MD; Michael J. Link, MD David S. Haynes, MD; Reid C. Thompson, MD Matthew L. Carlson, MD

Objective: To analyze clinical outcomes following treatment of cerebellopontine angle (CPA) epidermoids

Study Design: Retrospective case series

Setting: Multicenter study

Patients: Consecutive patients with previously untreated CPA epidermoids

Intervention(S): Observation and microsurgery

Main Outcome Measures: Disease- and treatment-associated morbidity, recurrence

Results: 47 patients (mean age 39 years; 53% female) were analyzed and the mean duration of follow-up was 42 months. The most common presenting symptom was headache (27; 59%); 13 (28%) exhibited preoperative asymmetric sensorineural hearing loss, 3 (6%) facial nerve paresis, and 2 (4%) hemifacial spasm. 12 patients (26%) were initially observed over a mean interval of 56 months; however 5 experienced disease progression requiring operation. 38 patients (79%) underwent surgical resection; 18 (47%) received gross total, 5 (14%) near total, and 15 (39%) subtotal resection. Three patients (8%) recurred at a median of 53 months; 2 following subtotal and 1 following gross total resection. 93% of patients with serviceable hearing maintained the same hearing class following treatment and 1 patient (3%) experienced mild long-term postoperative facial palsy (HB II/VI). All patients with preoperative facial nerve paresis or hemifacial spasm recovered normal function postoperatively. There were no episodes of stroke or death.

Conclusions: Surgical intervention is effective in alleviating symptoms in patients with cranial neuropathy or brainstem compression. Gross total resection is preferred, however subtotal removal should be considered with adherent or extensive disease as reoperation rates are low, even in the setting of aggressive subtotal resection. Conservative observation with serial imaging is a viable initial strategy in asymptomatic or minimally symptomatic patients.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge regarding outcomes following subtotal and gross total resection of cerebellopontine angle epidermoids.

Learning Objective: To understand management and outcomes following contemporary treatment of cerebellopontine angle epidermoids.

Desired Result: To apply this knowledge toward improving counseling and treatment outcomes for patients presenting with cerebellopontine angle epidermoids.

Long Term Outcomes for Patients with Petrous Apex Cholesterol Granulomas: Surgery vs. Observation

Shawn M. Stevens, MD; Amy Manning, MD Myles L. Pensak, MD; Ravi N. Samy, MD

Objective: Review long-term clinical outcomes of cholesterol granulomas (CG) of the petrous apex (PA)

Study design: Retrospective review

Setting: Tertiary Center

Patients: Radiographically confirmed PA CG from 1998-2015 (n=28)

Intervention(s): Compare patients who underwent observation with those who underwent surgery.

Main outcome measure(s): Comparison of clinical symptoms, signs and audiometric outcomes. Resolution rate of presenting symptoms following surgery.

Results: Mean age of all patients was 42 years. The majority of patients were white females (percentage?). Median follow up was 37 months (2-167). The most common presenting complaints were headache (50%), otalgia/aural fullness (35%), dizziness (35%), visual/retro-orbital complaints (21%) and cranial nerve palsies (21%). Thirteen of twenty-eight patients (46%) ultimately received surgery. Surgical patients had a significantly higher rate of concomitant chronic otitis media (46% vs 0%, p=0.0046) and longer follow up (44months vs. 17months, p=0.033). Infra-cochlear and infra-labyrinthine drainage procedures, with or without silastic stents, were performed at equal rates. The most likely pre-operative symptoms to be resolved by surgery were retro-orbital pain (100%) and cranial neuropathy. Resolution rates were less than 50% for headache, dizziness, and otalgia/aural fullness. The chief complaint resolution rate was 38%. Hearing was significantly worse in surgical patients both at presentation and on long-term follow up. Two patients underwent revision surgery for refractory retro-orbital pain.

Conclusions: Long-term outcomes following surgery for PA CG are highly symptom dependent. Proper patient selection is imperative. Patients who undergo surgery can have worse hearing results and may fail to resolve complaints of headache, dizziness, and otalgia/aural fullness.

Define Professional Practice Gap & Educational Need: 1. Lack of understanding regarding surgical outcomes for petrous apex cholesterol granuloma (PA CG) 2. Inconsistencies in patient selection for observation versus surgery 3. Inability to properly counsel patients with PA CG in the perioperative period

Learning Objective: 1. Identify presenting symptoms and signs most amenable to surgical intervention 2. Identify patients who are the best candidates for surgery versus observation. 3. Described hearing outcomes in patients with PA C3.G

Desired Result: 1. Improve patient selection for surgery versus observation 2. Optimize surgical outcomes 3. Improve patient counseling in the perioperative period.

Stereotactic Radiosurgical Treatment of Glomus Jugulare Tumors

Tyler W. Winford, MD; Leighanne H. Dorton, MD Eric R. Oliver, MD; Michael D. Chan, MD Stephen B. Tatter, MD, PhD; John S. May, MD James D. Browne, MD

Objective: To determine treatment outcomes of stereotactic radiosurgery (SRS) for glomus jugulare (GJ) tumors, focusing on three-dimensional volume changes and symptoms before and after SRS, as well as complications related to SRS.

Study Design: Retrospective case review

Setting: Tertiary referral center

Patients: Forty-one patients (34 female, 7 male) treated with SRS between 2000-2014

Intervention: SRS treatment of GJ tumors

Main outcome measures: The three-dimensional tumor volume on pre-treatment and post-treatment imaging was compared utilizing the Leskell® treatment plan software to assess tumor growth. Pre-treatment and post-treatment symptoms, Fisch classification, and complications were recorded to compare clinical and tumor responses.

Results: The mean radiographic follow-up was 41.9 months. The mean dose-to-tumor margin was 12.9 Gy. The mean tumor size at treatment was 6.06 cm3 and 5.67 cm3 at last follow-up. Eighteen tumors (43.9%) decreased in size, seventeen (41.5%) remained unchanged, and six (14.6%) increased in size. The mean-marginal dose for treatment success and failure were 12.7 Gy and 13.0 Gy, respectively. Fisch classification D tumors demonstrated a relative increased chance for tumor progression after treatment. Initial tumor volume had no significance on tumor response to treatment. Symptoms improved or remained stable in 39 patients (95%), and 12 patients (29%) demonstrated possible radiation associated toxicity.

Conclusions: SRS is an effective treatment option for GJ tumors. The mean marginal dose between treatment successes and failures was not significantly different. In this study, a higher Fisch classification seems to correspond with an increased risk of tumor growth.

Define Professional Practice Gap & Educational Need: Studies have shown that stereotactic radiosurgery is an effective treatment alternative to surgical resection for glomus jugulare tumors. There is a generalized lack of knowledge in how well radiosurgery controls tumor growth and affects patient symptoms, as well as some of the complications associated with radiosurgery. This study looks into comparing pre-treatment and post-treatment three- dimensional tumor volume using a treatment planning software and compares pre-treatment and post-treatment symptoms.

Learning Objective: Learn presenting symptoms of glomus jugulare tumors Understand clinical and tumor responses of glomus jugulare tumors to stereotactic radiosurgery Appreciate some possible complications that can occur as a results of stereotactic radiosurgery

Desired Result: Appreciate that sterotactic radiosurgery is an effective treatment alternative to surgery for management of glomus jugulare tumors and understand the types of tumors and symptoms that respond best to treatment.

Single Institutional Experience with Observing Vestibular Schwannomas

Jacob B. Hunter, MD; Brendan P. O'Connell, MD Marc L. Bennett, MD; Alejandro Rivas, MD George B. Wanna, MD; Reid C. Thompson, MD David S. Haynes, MD

Objective: To characterize growth rates and hearing outcomes during conservative observation of sporadic vestibular schwannoma (VS).

Study Design: Retrospective review.

Setting: Single academic center.

Patients: 711 consecutive patients with sporadic VS and at least two MRI studies prior to any intervention.

Intervention(s): Serial MRI and audiometry

Main outcome measure(s): Tumor growth and audiometric decline

Results: Between 1995 and 2015, 1,296 patients with sporadic VS were evaluated. 711 patients (average age 58.5 years; 52.3% female) were observed prior to intervention and the mean time period between the first and last MRI was 29.4 months (SD 26.6 months, range 1.1-188.3). The average maximum tumor dimension at time of diagnosis was 10.9 mm (SD 0.77 mm; range 0.2-3.54). The mean initial pure-tone average was 47.9 dB HL (SD 21.7 dB HL), the mean speech discrimination score was 65.9% (SD 35.7%), and (59%) had serviceable hearing. At last follow-up, 32.0% tumors demonstrated growth of at least 2 mm and 8.0% shrank; the average rate of growth among enlarging tumors was 0.24 mm/year. Overall, 65% of patients presenting with serviceable hearing maintained serviceable hearing at last follow-up. Age, BMI, and gender were not associated with tumor growth. Of patients initially observed, 14.5% eventually underwent surgery, and 5.8% radiation.

Conclusions: In the largest reported study of observed VS, 32.0% of tumors demonstrated growth over time and 20.3% eventually underwent treatment. These data further validate a strategy of initial observation in select patients with small to medium sized sporadic VS.

Define Professional Practice Gap & Educational Need: Inconsistencies within observed sporadic vestibular schwannoma growth rates and hearing outcomes, alone and in relation to each other, exists.

Learning Objective: To characterize growth rates and hearing outcomes during conservative observation of sporadic vestibular schwannomas.

Desired Result: Attendees will be aware of vestibular schwannoma growth rates and hearing outcomes based on presenting tumor size, hearing status, and initial growth rates.

Inhibiting P21-Activated Kinase Induces Cell Death in Vestibular Schwannoma and Meningioma via Mitotic Catastrophe

Melania E. Mercado-Pimentel, PhD Edrick F. Villalobos; Prithvi M. Mohan Cecilia M. Reidk; Ross H. Francis, BS Daniela N. Rolph; Abraham Jacob, MD

Hypothesis: p21-Activated Kinase (PAK) regulates signaling pathways that promote cell survival and proliferation; therefore, pharmacological inhibition of PAK will induce cell death in vestibular schwannomas (VS) and meningiomas.

Background: All VS and many meningiomas result from loss of the neurofibromatosis type 2 (NF2) gene product merlin, with ensuing PAK hyperactivation and increased cell proliferation/ survival.

Methods: The novel small molecule PAK inhibitors PI-8 and PI -15 - tested in schwannoma and meningioma cells - perturb molecular signaling and induce cell death. MTT, flow cytometry and TUNEL assay analyzed PAK inhibitors' effect on cell viability, cell cycle and cell death, respectively. Western blots evaluated activation and expression of cell proliferation, apoptotic, and mitotic catastrophe markers while light microscopy evaluated cell morphology and immunohistochemistry analyzed cellular localization of phospho-Merlin.

Results: Treatment with PI-8 and PI-15 decreased cell viability at 0.65-3.7 µM IC50 in schwannoma and meningioma cells. Treatment increased G1-phase by 4% and decreased S-phase by 3.5%. TUNEL and western blot for apoptotic markers found that both PAK inhibitors did not induce apoptosis; instead, the expression and activation of proliferation markers (aurora B and GSK-3Î²) known to play a role in microtubule length and chromosomal alignment/ aggregation decreased after 48 hours treatment. PAK inhibitor treated cells stained for phospho-Merlin localized to over-duplicated centrosomes of dividing cells, multiple enlarged nuclei, and misaligned/missegregated chromosomes' markers for mitotic catastrophe. Increased ATG5 levels and caspases-2 activation confirmed this cell death type.

Conclusion: PAK inhibitors induce cell death in schwannoma and meningioma cells, at least in part, by mitotic catastrophe.

Define Professional Practice Gap & Educational Need: There are no drugs currently FDA approved for the treatment of vestibular schwannomas and meningiomas; therefore, the development of novel therapeutics represents an urgent and unmet clinical need.

Learning Objective: (1) To describe the mechanisms whereby loss of the neurofibromatosis type 2 gene product merlin results in hyperactivation of the p21-activated kinase; (2) to discuss the end biological effects of treating schwannoma and meningioma cells with the novel PAK inhibitors PI-8 and PI-15; and (3) to describe hallmarks of mitotic catastrophe and discuss evidence for this mechanism of cell death in cells treated with PAK inhibitors.

Desired Result: To develop and translate PAK inhibitors as a viable treatment strategy for vestibular schwannomas and meningiomas.

Peri-Operative Complications and Readmission Rates following Surgery for Cerebellopontine Angle Neoplasms

Hossein Mahboubi, MD, MPH; Yarah Haidar, MD Yaser Ghavami, MD; Marlon Maducdoc, MD Harrison W. Lin, MD; Hamid R. Djalilian, MD

Objective: To investigate the 30-day peri-operative complication, readmission, and re-operation rates following surgery for cerebellopontine angle (CPA) neoplasms.

Study Design: Cross-sectional analysis.

Setting: National Surgical Quality Improvement Program data set (NSQIP 2013).

Patients: All surgical cases with an ICD-9-CM diagnosis code of 225.1, benign neoplasms of cranial nerves, which had one of the following CPT codes, were included: 61606, 61615, 61616, 61518, 61619, 61526, 61530, and 61520.

Intervention(s): Surgical resection as indicated by the CPT codes above.

Main outcome measure(s): 30-day peri-operative complications, readmission rate, and re-operation rate.

Results: Overall, 170 cases were identified, of which 63.5% were females. The average age was 52.8 (range 20-87). Deep vein thrombosis (DVT) occurred in 5 (2.9%), cerebrospinal fluid (CSF) leak in 5 (2.9%), meningitis in 2 (1..2%), sepsis in 2 (1.2%), blood transfusion in 2 (1.2%), wound dehiscence in 2 (1.2%), deep incisional infection in2 (1.2%), superficial wound infection in 1 (0.6%), (0.6%),myocardial infarction in 1 obstructive hydrocephalus in 1 (0.6%), ventilator dependence in 1 (0.6%), and pulmonary embolism in 1 (0.6%) patients. Seventeen (10.0%) were readmitted and 8 (4.7%) underwent re-operation within 30 days post-op. Mortality occurred in one case (0.6%).

Conclusions: Readmission and re-operation rates following surgery for CPA neoplasms are 10% and 4.7%, respectively. Most common complications are infections, CSF leak, and DVT. Reasons for readmission and CPT codes associated with re-operations will be discussed.

Define Professional Practice Gap & Educational Need: Lack of data on 30 day post-operative complications, readmission rates, and re-operation rates, their causes, and outcomes.

Learning Objective: To describe the most common complications of surgeries for CPA neoplasms, the reasons for readmission and re-operation as well as their most common timing to occur post-op.

Desired Result: Identifying the complications and reasons for readmission and re-operation will result in improved informed consent, patient safety improvement, and postoperative care.

Indicate IRB or IACUC Approval: Exempt

Tinnitus Suppression after Auditory Brainstem Implantation in NF2 Patients

Daniel S. Roberts, MD, PhD; Steve Otto, MA Brian Chen, MD; Kevin Peng, MD Derald E. Brackmann, MD John W. House, MD

Objective: To evaluate whether an auditory brainstem implant (ABI) can impact levels of tinnitus in neurofibromatosis type-2 (NF2) patients who have undergone translabyrinthine craniotomy for vestibular schwannoma (VS) removal and to evaluate the burden of tinnitus in these patients.

Study Design: A retrospective case series and a prospectively collected survey.

Setting: Tertiary neurotologic referral center.

Patients: NF2 patients who underwent translabyrinthine removal of VS and ABI placement between 1994 and 2015.

Interventions: A survey, retrospective review and two validated tinnitus handicap questionnaires (Tinnitus Handicap Inventory (THI) scored 0-100 and tinnitus Visual Analogue Scale (VAS) scored 0-10) were used to characterize the degree of tinnitus and whether an ABI can alter tinnitus levels.

Main Outcome Measures(s): Survey results, THI and VAS scores.

Results: 112 ABI users were contacted and 43 patients (38.3)% responded to our survey. Tinnitus was reported in 83.7% of patients. The mean THI score was $17.8\hat{A}\pm 20.5$ SD representing notable degree of tinnitus. The ABI provided a self-reported reduction of tinnitus in 54% of patients and increased tinnitus in 5.4%. For patients who believed the ABI reduced tinnitus loudness, the ABI reduced tinnitus levels immediately on activation and after 1 hour of use (mean VAS: Off=4.8; On=2.4; On 1-hr=1.8; p<0.01). Suppression did not continue after the device was turned off. Audiological performance with the ABI did not correlate with tinnitus suppression.

Conclusion: NF2 patients who have undergone removal of VS have a significant tinnitus handicap and a subgroup of patients benefit from tinnitus suppression through utilization of an ABI possibly through masking or electrical stimulation of the auditory brainstem.

Define Professional Practice Gap & Educational Need: Lack of evidence suggesting that an auditory brainstem implant can alter levels of tinnitus in neurofibromatosis type-2 patients and insufficient evidence quantifying levels of tinnitus handicap in these patients.

Learning Objective: To investigate whether an auditory brainstem implant can impact levels of tinnitus in neurofibromatosis type-2 patients who have undergone resection of vestibular schwannoma and to understand the burden of tinnitus in these patients.

Desired Result: Participants will recognize that neurofibromatosis type-2 patients who have undergone removal of vestibular schwannoma have a significant tinnitus burden and a subgroup of patients benefit from tinnitus suppression through utilization of an auditory brainstem implant.

NEUROTOLOGY FELLOW AWARD

TeleAudiology in the Veterans Health Administration

Seth E. Pross, MD; Andrea L. Bourne, AuD Steven W. Cheung, MD

Objective: To assess effectiveness of TeleAudiology for hearing aid services

Study design: Retrospective case-control

Setting: Ambulatory Veterans Health Administration and Community-Based Outpatient Clinics (CBOCs) Patients: 42,697 Veterans who received hearing aids from January through September, 2014

Intervention(s): TeleAudiology (TA) and conventional inperson (IP) Audiology care

Main outcome measure(s): International Outcome Inventory for Hearing Aids (IOI-HA) effectiveness data. The IOI-HA is a 7-item survey used to assess hearing aid effectiveness. Scored from 7 to 35 points, higher scores are more favorable.

Results: Among Veterans nationwide who received hearing aids and completed the IOI-HA survey, 1,009 received TA and 41,688 received IP care. TA and IP groups have comparable mean IOI-HA values (TA=29.6, SD=3.9; IP=28.7, SD=4.2). While comparison showed a statistically significant difference (p<0.0001, t-test), principally due to large sample size, the distinction is not clinically meaningful. Subgroup analysis of Veterans from San Francisco and six affiliated CBOCs showed 169 received TA and 338 received IP care. TA and IP groups have similar mean age (TA=74, SD=9.8; IP=76, SD=10.3) and gender distribution (TA male=100%; IP male=96%) with statistically significant (p<0.05, t-test) but clinically insignificant differences. Mean IOI-HA scores (TA=30.7, SD=3.6; IP=30.5, SD=3.1) are not different between groups (p>0.05, t-test).

Conclusions: IP and TA encounters to provide hearing aid services to Veterans are comparable, as both are highly effective based on IOI-HA results. The non-inferiority of TA suggests its adoption to non-Veterans may improve access while preserving high satisfaction. Financial impact of migration to TA will require future econometric analysis.

Define Professional Practice Gap & Educational Need: TeleHealth has been identified by the Institute of Medicine and others to have the potential for improved access, increased quality, and decreased expense. Otology and audiology care has lagged behind other specialties in providing TeleHealth services.

Learning Objective: To learn of ways in which hearing care can be delivered remotely using TeleHealth. To recognize that high satisfaction and effectiveness can be achieved using TeleAudiology to provide hearing aid services to Veterans. To gain perspective on immediate cost savings with the use of TeleAudiology.

Desired Result: Practitioners should become aware of the benefits of TeleAudiology care for hearing aid services and consider instituting TeleAudiology into their own practices.

Indicate IRB or IACUC Approval: Exempt

Bridging the Gap: Use of Neural Conduit to Restore Facial Function

Joshua M. Sappington, MD; Jeffrey M. Hotaling, MD Younan Xia, PhD; Liu Wenying, PhD John P. Leonetti, MD; Eileen M. Foecking, PhD

Hypothesis: The use of nanofiber neural conduits would result in improved reinnervation following a facial nerve segmental resection when compared to controls.

Background: Facial paralysis is a devastating condition, leaving patients with many physical and psychological deficits. The gold standard for such injury is an autograft. The use of a conduit can eliminate the need for nerve graft harvest by bridging the gap caused by resection and provide a medium to facilitate reinnervation. We investigated the use of a neural conduit on functional recovery following a resection facial nerve injury.

Methods: 16 male, Sprague-Dawley rats were randomly assigned to one of 2 treatment groups: No conduit (Control) or Conduit (Experimental). Each rat underwent microsurgical removal of a 2.0 cm section of the buccal branch of the facial nerve. A neural conduit was sutured to the remaining facial nerve stumps in the conduit group. Functional recovery of whisker movement was then assessed immediately after resection by daily behavioral observations and video analysis.

Results: The use of a neural conduit enhanced vibrissae movement when compared to controls. The conduit group demonstrated faster resolution of nose asymmetry, faster return of coordinated sweep of vibrissae, as well as a higher average mobility score. Additionally animals with the conduit demonstrated a statistically significant increased percent injured vibrissae muscle mass when compared to control animals.

Conclusion: This study demonstrates reinnervation via a neural conduit following a transection facial nerve injury. This data has exciting clinical implications for repair the facial nerve following injury regardless of etiology.

Define Professional Practice Gap & Educational Need: 1. Describe a unique use of neural conduit in a facial nerve injury model. 2. Lack of awareness of nano fiber neural conduit use in neural regeneration. 3. Lack of a truly ideal repair for facial nerve injury

Learning Objective: 1. To educate attendees about the use of nano fiber neural conduits in a rat facial nerve resection model to evaluate facial nerve outcome.

Desired Result: 1 - Attendees will be knowledgeable of nano fiber conduits in a facial nerve injury model and that the conduits hold exciting clinical promise and future research possibilities.

Successful Treatment of the Mal de Debarquement Syndrome (MdDS)

Eric Smouha, MD; Mingjia Dai, PhD Sergei Yakushin, PhD; Catherine Cho, MD Bernard Cohen, MD

Objective: The Mal de Debarquement Syndrome (MdDS) is characterized by continuous rocking, swaying or bobbing after a cruise or flight, which can last for months or years and previously has been refractory to treatment. We determined that MDDS resulted from maladaptation of the vestibulo-ocular reflex to head roll during rotation, and that MdDS could be successfully treated with a novel form of vestibular therapy.

Study design: Case review.

Setting: Ambulatory patients in a tertiary referral center.

Patients: have continuous oscillation at 02-0.3 Hz that caused substantial mental distress, after a cruise or flight (classic form) or occurring spontaneously (aberrant form). Other physical findings included lateral movement on the Fukuda stepping test, and vertical nystagmus when the head was rolled slowly to either side. Symptoms disappeared during car rides, but promptly recurred after the ride ended.

Intervention: The head was rolled at the frequency of rocking, while viewing a rotating full-field visual surround for 3 minutes, 3-10 sessions/day, for 5 days.

Outcome measure(s): Self-rated symptom reduction by >50% on a 0-10 scale.

Results: We treated 127 patients (109 females; 18 males; 107 classic, 20 aberrant) age 46+/-12 years (from 20-81), with symptom duration of 33.7 - 40.4 months (1 month to 20 years). The treatment was successful in 76% of classic and 45% of aberrant cases. Success rate was 74% if symptom duration was <3 years and 66% if >3 years.

Conclusion: MdDS can be successfully treated in most patients. The success rate was not dependent on symptom duration or gender.

Define Professional Practice Gap & Educational Need: 1. Lack of awareness of effective treatment of Mal de Debarquement Syndrome 2. Lack of understanding of pathophysiology of Mal de Debarquement Syndrome

Learning Objective: 1. to learn an effective method for treating Mal de Debarquement Syndrome 2. to gain knowledge of the maladaptive VOR response in Mal de Debarquement Syndrome

Desired Result: Attendees will apply knowledge gained from this presentation to the diagnosis and treatment of Mal de Debarquement Syndrome

Indicate IRB or IACUC Approval: Exempt

NICHOLAS TOROK VESTIBULAR AWARD

Revision Surgery for Superior Canal Dehiscence Syndrome

Jeffrey D. Sharon, MD; Seth E. Pross, MD John P. Carey, MD

Objective: To identify factors associated with surgical failure for superior canal dehiscence syndrome (SCDS) and define rates of complications and cure after revision SCDS repair.

Study Design: Retrospective case series

Setting: Tertiary care referral center

Patients: Adults who underwent revision surgery for SCDS

Interventions: None

Main Outcome Measures: Initial surgical approach, intraoperative findings at time of revision, persistence of symptoms, and complications for revision surgery.

Results: 222 patients have undergone SCDS surgery at our institution, including 22 subjects who underwent revision surgery and met inclusion criteria. 13 (59%) underwent prior middle fossa and 9 (41%) underwent prior transmastoid approaches. Intraoperative findings showed that in 16 (72%) the prior material used to plug or resurface the canal was present but not entirely covering the dehiscence. In 1 (4%) the material was not present. In 1 (4%) the material was in proper position, while in 4 (18%) the material was in proper position with very thin bone adjacent to the plug. After revision surgery, symptoms were completely resolved in 8 (36%), partially resolved in 8 (36%), and not resolved in 5 (23%). Normalization of ocular vestibular-evoked myogenic potential was associated with complete or partial symptom resolution, and findings of thin bone adjacent to the prior plug was associated with failure of symptom resolution. Three subjects (14%) experienced a significant drop in their word recognition score after revision surgery.

Conclusions: Revision surgery for SCDS is curative in some cases, but is associated with a higher failure and complication rate than primary surgery.

Define Professional Practice Gap & Educational Need: Lack of awareness of factors related to treatment failure and the need for revision surgery in superior canal dehiscence syndrome

Learning Objective: To provide education regarding factors associated with need for revision surgery in superior canal dehiscence syndrome, and provide information on surgical findings at revision surgery, and information on cure and complication rates in revision surgery

Desired Result: Attendees will be able to better understand what contributes to treatment failure in superior canal dehiscence surgery, and thereby improve rates of surgical success

Indicate IRB or IACUC Approval: Exempt

ANS TRAINEE AWARD

Correlation of Superior Canal Dehiscence Surface Area with Vestibular Evoked Myogenic Potentials and Audiometric Thresholds

Jacob B. Hunter, MD; Katie Makowiec Jianing Wang; Brendan P. O'Connell, MD Matthew L. Carlson, MD; Devin L. McCaslin, PhD Jack H. Noble, PhD; George B. Wanna, MD

Objective: To correlate vestibular evoked myogenic potential (VEMP) amplitudes and thresholds, and audiometric thresholds, with the surface area of the superior canal dehiscence (SCD)

Study Design: Retrospective chart review and radiological analysis

Setting: Single tertiary academic referral center

Patients: Preoperative CT imaging, audiometric thresholds, and VEMP testing in patients with confirmed SCD

Intervention(s): A previously validated software algorithm was applied to preoperative CT imaging to measure the surface area of each SCD

Main outcome measure(s): Preoperative ocular and cervical VEMPs, air and bone conduction thresholds and surface area of the SCD

Results: Thirty-three patients (mean age 54 years) with 45 dehiscent superior canals were analyzed. The surface area of each dehiscence was calculated, with an average area of 2.22 mm2 (0.34-8.23 mm2). Pearson correlation analysis demonstrated ocular (r = 0.56, p < 0.0001) and cervical (r = 0.49, p < 0.0001) VEMP amplitudes, cervical VEMP thresholds (r = -0.63, p < 0.0001), and air conduction thresholds at 250 Hz (r = 0.30, p = 0.013) and 500 Hz (0.26, p = 0.032) were significantly correlated with the surface area of the dehiscence. Age, air bone gap, as well as air and bone conduction thresholds greater than 500 Hz were not correlated with SCD surface area.

Conclusions: Among patients with confirmed SCD, ocular and cervical VEMP amplitudes, cervical VEMP thresholds, and air conduction thresholds at 250 Hz and 500 Hz are significantly correlated with the surface area of the dehiscence.

Define Professional Practice Gap & Educational Need: There are no studies comparing oVEMP and cVEMP amplitudes and thresholds, audiometric thresholds, and SCD surface area.

Learning Objective: To correlate oVEMP and cVEMP amplitudes and thresholds, and audiometric thresholds in patients with confirmed SCD and the surface area of the dehiscence.

Desired Result: Attendees will be aware of significant correlations between SCD surface area and oVEMP and cVEMP amplitudes and thresholds, and air-conduction thresholds.

Intracochlear Pressure Transients during Cochlear Implant Electrode Insertion

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

Hypothesis: Cochlear implant (CI) electrode insertion into the round window induces pressure transients in the cochlear fluid comparable to a high intensity sound.

Background: Many patients receiving a CI have some remaining functional hearing at low frequencies, thus surgical techniques have focused on preservation of this residual hearing. To maintain functional acoustic hearing, it is important to retain function of any hair cells and auditory nerve fibers innervating the basilar membrane; however, in a subset of patients, residual low-frequency hearing is lost following CI insertion. Here, we test the hypothesis that transient intracochlear pressure spikes are generated during CI electrode insertion, which could cause damage and compromise residual hearing.

Methods: Human cadaveric temporal bones were prepared with an extended facial recess. Pressures in the scala vestibuli (PSV) and tympani (PST) were measured with fiber-optic pressure sensors during insertion of five CI electrodes, from two different manufacturers, via a round window approach.

Results: CI electrode insertion produced high intensity, low frequency pressure transients in the cochlea, which could occur alone or as part of a train of spikes. PST tended to be larger in magnitude than PSV. Pressure transients were recorded with all electrode styles tested.

Conclusions: Results suggest surgical technique and anatomical considerations likely affect the magnitude and rate of intracochlear pressure transients during CI electrode insertion. Some transients were comparable in intensity to sound pressure levels high enough to cause damage to the basilar membrane, thus all possible efforts should be undertaken to prevent these events.

Define Professional Practice Gap & Educational Need: Limited understanding of the cochlear environment during cochlear implant electrode insertion.

Learning Objective: Appreciate the potential for causing traumatic injury to the auditory system during cochlear implant surgery.

Desired Result: Contribute to the discussion on improving intraoperative strategies for minimally traumatic cochlear implant surgery.

Indicate IRB or IACUC Approval: Exempt

Investigating the Air-bone Gap: Changes in Intracochlear Sound Pressure with Air- and Bone-conducted Stimuli after Cochlear Implantation

Renee M. Banakis Hartl, MD, AuD; Jameson K. Mattingly, MD Nathaniel T. Greene, PhD; Herman A. Jenkins, MD Stephen P. Cass, MD; Daniel J. Tollin, PhD

Hypothesis: A cochlear implant electrode within the cochlea contributes to the air-bone gap component of postoperative changes in residual hearing after electrode insertion.

Background: Preservation of residual hearing after cochlear implantation has gained importance as simultaneous electric-acoustic stimulation allows for improved speech outcomes. Postoperative loss of residual hearing has previously been attributed to sensorineural changes; however, presence of increased postoperative air-bone gap remains unexplained and could result in part from altered cochlear mechanics. Here, we sought to investigate changes in intracochlear pressure after electrode implantation to quantify the contribution to postoperative air-bone gap.

Methods: Human cadaveric heads were implanted with titanium fixtures for bone conduction transducers. Velocities of stapes capitulum, round window, and cochlear promontory between the two windows were measured using single- axis laser Doppler vibrometry. Fiber-optic sensors measured intracochlear pressures in scala vestibuli and tympani for air-and bone-conducted stimuli before and after cochlear implant electrode insertion through the round window.

Results: Intracochlear pressures revealed only slightly reduced responses to air-conducted stimuli consistent with prior literature. Both increases and decreases in pressure were noted to bone-conducted stimuli after implantation. Velocities of the stapes capitulum and the cochlear promontory to both stimuli were stable following electrode placement.

Conclusion: Presence of a cochlear implant electrode causes alterations in intracochlear sound pressure levels to bone conducted stimuli and helps to explain changes in residual hearing noted clinically. These results suggest the possibility of a cochlear conductive component to postoperative changes in hearing sensitivity.

Define Professional Practice Gap & Educational Need: Unclear mechanism of postoperative clinical air-bone gap following cochlear implantation in some patients with significant low-frequency residual hearing.

Learning Objective: Understand changes in intracochlear pressure to air- and bone-conducted stimuli after electrode implantation to quantify the contribution to postoperative airbone gap.

Desired Result: Improve understanding of causes of postoperative air-bone gap following cochlear implantation.

Indicate IRB or IACUC Approval: Exempt

Degree of Hearing Preservation after Cochlear Implantation Impacts Early Speech Recognition

Sarah A. Sydlowski, PhD, AuD; Erika A. Woodson, MD

Objective: Previous investigations suggest that low frequency hearing preservation (HP) in cochlear implant (CI) recipients and subsequent use of electric-acoustic stimulation (EAS) improves comprehension in complex listening environments. However, the perception exists that patients without HP will achieve comparable overall benefit to those patients with EAS capability. This study seeks to associate HP after CI with speech recognition skills.

Study Design: Retrospective Case Review

Setting: Tertiary referral center; ambulatory

Patients: CI recipients with preoperative low-frequency hearing

Intervention(s): Rehabilitative

Main outcome measure(s): Using pure tone averages for 125-1000 Hz, postoperative outcomes were categorized based on degree of HP (Minimal/No preservation = 0-25% HP; Partial = >25% to 75% HP; Complete = >75% HP) (Skarzynski, 2013). Preoperative aided speech recognition scores were converted to standardized potential performance scores, indicating the difference between a perfect score (100%) and the patient's baseline score. Post- operative scores at 1, 3, and 6 months were compared to the possible degree of improvement with results categorized based on degree of residual hearing preservation.

Results: Although nearly all recipients demonstrated benefit with their CI, patients with complete (>75%) HP achieved more of their potential improvement in speech recognition than patients with partial, minimal, or no HP.

Conclusions: Hearing preservation positively affects postoperative outcomes, and should be a goal in all CI surgeries. Considering degree of improvement based on standardized potential for improvement rather than raw scores demonstrates the impact of HP on success with CI in patients close to the ceiling of the test batteries.

Define Professional Practice Gap & Educational Need: 1. Importance of residual hearing to level of speech recognition improvement after cochlear implantation. 2. Limitations of current test batteries to assess patient improvement when near the ceiling.

Learning Objective: 1. Appreciate the contribution of any level of residual acoustic hearing to speech recognition gains.2. Discover a method to measuring relative improvement in speech understanding to account for the ceiling effect on high-performing individuals.

Desired Result: 1.Attendees will aim to preserve residual hearing in all cochlear implant surgeries even for those individuals outside of traditional electroacoustic range. 2. Attendees will consider the described method in analyzing their own patient outcomes, and explore other means to measure speech understanding improvement near the ceiling.

The Compound Action Potential in Cochlear Implant Patients

William C. Scott, BA; Christopher Giardina, BS Tatyana Fontenot, MD; Andrew Pappa, BS Harold C. Pillsbury, MD; Craig A. Buchman, MD Doug Fitzpatrick, PhD

Hypothesis: The response to tones in electrocochleography (ECochG) typically includes a compound action potential (CAP) that represents the summed, synchronous response of the auditory nerve at the onset of sounds. For patients receiving cochlear implants, who typically have severe hearing loss with preserved physiology only to low frequencies, the CAP may be absent even if significant neural activity is present.

Background: ECochG is being increasingly used during cochlear implantation (CI) to assess cochlear health. The response obtained is a complex mixture of responses from hair cells and the auditory nerve. The CAP is a well- established marker of purely neural origin. The auditory nerve neurophonic (ANN) is also neural, but is mixed with the cochlear microphonic, a hair cell response. Whether the CAP is a reliable marker of neural activity in subjects receiving cochlear implants is not known.

Methods: Intraoperative round window ECochG was performed in adult and pediatric subjects undergoing CI (n>200). Responses to tones of multiple frequencies at a high sound level (90 dB nHL) were recorded, and the CAP amplitude was measured.

Results: Only about half of the subjects analyzed had a measurable CAP at any frequency. Of those subjects without a CAP, a considerable number showed evidence of an ANN to low frequency tones.

Conclusions: Many subjects without a CAP had residual nerve activity. Therefore, measurement of the CAP alone cannot define the health of the auditory nerve in CI subjects.

Define Professional Practice Gap & Educational Need: Lack of consistency in how the compound action potential is interpreted in electrocochleography, specifically from cochlear implant patients.

Learning Objective: Recognize neural elements of electrocochleography, even if the CAP is absent.

Desired Result: Learners will be able to more accurately interpret electrocochleography results from cochlear implant patients, especially with respect to the contributions of the auditory nerve.

Automatic Cochlear Duct Length Estimation for Selection of Cochlear Implant Electrode Arrays

Alejandro Rivas, MD; Ahmet Cakir, MRes Jacob Hunter, MD; Robert Labadie, MD, PhD Geraldine M. Zuniga, MD; George B. Wanna, MD Benoit Dawant, PhD; Jack Noble, PhD

Hypothesis: Automatic measurement of cochlea size could aid selection of cochlear implant (CI) electrode arrays.

Background: Cochlear duct length (CDL), which can be used to select CI electrode arrays, is estimated by measuring the distance in CT between the round window and the medial wall of the cochlea when passing through the modiolus, aka "length". Even when using special radiologic software to obtain an appropriate Stenvers view, inter-rater agreement is variable. In this work, we evaluate an automatic way to measure A as well as to directly measure the two-turn (2T) CDL.

Methods: Existing algorithms for localizing cochlear anatomy were modified to permit measuring A and 2T automatically in pre-op CT-images of 309 ears. Manual measurement of A (mA) and the estimated two-turn CDL using mA (m2T) were also measured for 88 ears. Based on these measurements, a recommendation between two different length electrode arrays was determined using the manufacturer's guidelines.

Results: Mean and maximum differences between A and mA were 0.44 and 1.86 mm. Mean and maximum differences of 2.0 and 7.1 mm were observed between 2T and m2T. Using either 2T or A did not result in any difference in choice of array, confirming accuracy of our system. A different array was chosen when using m2T vs. 2T in 3 of 88 cases.

Conclusion: Our automatic approach permits more accurate, consistent, and less labor intensive determination of CDL and could facilitate widespread patient-customized selection of arrays.

Define Professional Practice Gap & Educational Need: Currently, the cochlear duct length is determined from manual measurements to assist some cochlear implant surgeons to select appropriate length electrode arrays, while no automatic approach that simplifies the process has been described.

Learning Objective: To compare the accuracy of automatically measuring the cochlear duct length with manually measuring the diameter of the basal turn of the cochlea and estimating the cochlear duct length.

Desired Result: Attendees will be aware of an automatic approach that accurately and consistently measures the cochlear duct length.

Flat Panel CT Evaluation of Place-Pitch Mismatch in Cochlear Implant Users

Nicole T. Jiam, BA; Monica S. Pearl, MD Courtney Carver, AuD; Charles J. Limb, MD

Objective: This study evaluates electrode placement postcochlear implantation and quantifies frequency deviation between users' ideal and actual pitch maps.

Study Design: Retrospective case control

Setting: Tertiary Referral Hospital

Patients: 17 cochlear implant users (9 males, 8 females; mean age: 54.4) with Med-El standard 12-electrode contact arrays (31.5 mm linear insertion length, 2.4 mm between contacts).

Intervention: Flat-panel computed tomography (FPCT) images were collected for all participants. Cochlear lengths and electrode location were measured using three-dimensional curved multiplanar reconstruction on high-resolution secondary reconstructions. Ideal pitch maps were created using a modified Greenwood's function.

Main Outcome Measures: All subjects' strategy pitch maps were retrieved from electronic medical records and compared to their ideal pitch maps.

Results: Among 260 electrodes, 216 (83%) fell outside of their programmed frequency range. When differences in frequency were normalized as a function of frequency band filter size, 46 (17%) of deviations were \leq 50%; 88 (34%) of deviation were 51% to 150%; 60 (23%) of deviations were 151% to 250%; 66 (25%) of deviations were \geq 251%. The most apically and basally located electrodes were most misaligned with the actual pitch map. Deviations from the center frequency range from 158 to 12,872 hertz.

Conclusion: The results from this study reveal significant deviation between ideal and programmed characteristic frequencies. These deviations from ideal placement may be even more pronounced with shorter electrode arrays. We cautiously suggest that these deviations may impact pitch perception by increasing place-pitch mismatch of individual electrode contacts within the cochlea.

Define Professional Practice Gap & Educational Need: 1. Lack of tools available for post-cochlear implantation evaluation; 2. Lack of contemporary knowledge on discrepancies between actual and ideal electrode placement; 3. Inconsistencies in electrode array insertion and cochlear implant user outcomes.

Learning Objective: Learners will be able to identify electrodes most vulnerable to misalignment with the ideal pitch map and the direction of these mismatches.

Desired Result: Attendees will be able to apply this knowledge in post-operative management and reprogramming of cochlear implants. Attendees may also tailor selection of cochlear implant to minimize pitch-place mismatch. The results from this study may impact biomedical design towards creating strategy maps that align closely with an aggregated theoretical pitch map.

The Mitochondria-Targeted Antioxidant Mitoquinone Reduces Cisplatin-induced Ototoxicity in Guinea Pigs

Alan D. Tate, MD; Patrick J. Antonelli, MD Kyle R. Hannabas, BS; Jerin K. Joseph, BS Carolyn O. Dirain, PhD

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

Background: MitoQ is an antioxidant that is derived from ubiquinone through an attached lipophilic triphenylphosphonium cation. This enables its accumulation inside mitochondria several hundred-fold higher than untargeted antioxidants. MitoQ has improved bioavailability and demonstrated safety in humans. MitoQ has been shown to reduce gentamicin ototoxicity in guinea pigs and cisplatininduced nephropathy in mice. Cisplatin chemotherapy is commonly complicated by ototoxicity, typically manifest by sensorineural hearing loss. The goal of this study is to evaluate if MitoQ can protect against cisplatin ototoxicity.

Methods: Guinea pigs were injected subcutaneously with either 5 mg/kg MitoQ (n=9) or normal saline (control, n=9) for 7 days and 1 hour before receiving a single dose of 10mg/kg cisplatin. Auditory brainstem response thresholds were measured before MitoQ or saline administration and 3 to 4 days after cisplatin administration. Cochlear hair cell damage was assessed using scanning electron microscopy.

Results: Auditory brainstem response threshold shifts at 3 to 4 days after cisplatin treatment were smaller (27-45 dB) in guinea pigs injected with MitoQ compared with those in the control group at all tested frequencies (4, 8, 16 and 24 kHz, p=0.001-0.03). Electron microscopy showed less outer hair cell damage in the MitoQ group.

Conclusions: MitoQ reduced cisplatin-induced cochlear toxicity in guinea pigs. MitoQ appears worthy of further investigation as a means of preventing cisplatin ototoxicity in humans.

Define Professional Practice Gap & Educational Need: There is a lack of contemporary knowledge and awareness whether the mitochondria-targeted antioxidant, mitoquinone, can be used as a therapeutic agent for the prevention of hair cell death and hearing loss induced by cisplatin.

Learning Objective: At the conclusion of this presentation, the attendees will learn that the mitochondria-targeted antioxidant, mitoquinone, reduced cisplatin-induced ototoxicity in guinea pigs and should be investigated further as a means of preventing ototoxicity in humans

Desired Result: The attendees may be able apply this knowledge by recognizing that mitochondria targeted antioxidants such as MitoQ may be a promising therapeutic agent for protecting against cisplatin-induced ototoxicity.

Activation of IGF1 Signaling in the Cochlea Induces the Transcription of Its Mediators during the Protection of Cochlear Hair Cells against Aminoglycoside

Norio Yamamoto, MD, PhD; Yushi Hayashi, MD, PhD Takayuki Nakagawa, MD, PhD; Koichi Omori, MD, PhD Juichi Ito, MD, PhD

Hypothesis: Transcription of Erk and Akt genes as well as phosphorylation of their products are promoted by Insulin-like growth factor 1 (IGF1) during hair cell protection

Background: IGF1 protects mammalian hair cells in animal models from various damages including aminoglycoside. Moreover, the clinical trial revealed that IGF1 was effective for idiopathic sudden sensorineural hearing loss. In this process, activation of the downstream of IGF1 signaling, that is, the phosphorylation of ERK and AKT proteins is indispensable. However, the regulation of IGF1 signaling mediators at a transcriptional level has not been studied.

Methods: We used a neomycin damage model on neonatal mouse cochlear explant culture. Explants established from neonatal mice were treated with either neomycin only or neomycin and IGF1. The expression levels of IGF1 signaling mediator genes, Akt1, Erk1, and Erk2, in the explants were compared using quantitative reverse transcriptase polymerase chain reaction (qRT-PCR) at several time points. Inhibitors of IGF1 were added to confirm that this observation was dependent on IGF1 signaling.

Results: The expression levels for all genes tested were significantly upregulated in neomycin+IGF1 treatment samples (p < 0.0001, ANOVA). Addition of inhibitors of IGF1 signaling significantly attenuated the up-regulation of the expression levels (p < 0.0001, ANOVA).

Conclusions: IGF1 treatment causes up-regulation of the expression levels of its mediator genes during the protection of hair cells against aminoglycoside. The regulation of the mediator gene expression may serve as the novel treatment of sensorineural hearing loss.

Define Professional Practice Gap & Educational Need: Lack of knowledge about the mechanisms of the protection of cochlear hair cells against aminoglycoside by IGF1

Learning Objective: The learner will understand how IGF1, a novel treatment option for sensorineural hearing loss, protects cochlear hair cells against aminoglycoside and will have opportunity to consider about the novel treatment of sensorineural hearing loss.

Desired Result: The attendees will be able to apply the knowledge obtained from this presentation to the development of an innovative treatment method of sensorineural hearing loss.

Intratympanic Dexamethasone Did Not Protect Against High Dose, Single Fraction Radiation Ototoxicity in Rats in Vivo

Christine T. Dinh, MD; Si Chen, MD Stefania Goncalves, MD; Kyle Padgett, PhD Perry Johnson, PhD; Nagy Elsayyad, MD Fred F. Telischi, MD

Background: Stereotactic radiosurgery for lateral skull base tumors can cause hearing loss when cochleae are exposed to high doses of radiation (HD-XRT) in a single fraction. Currently, there are no preventative treatments for radiation- induced ototoxicity.

Hypothesis: Intratympanic (IT) dexamethasone (DXM), a synthetic steroid, protects against HD-XRT-initiated auditory hair cell (HC) and hearing losses in rats in vivo.

Methods: Six rats received HD-XRT (12 Gy) to both cochleae. In the radiated rats and six non-radiated (control) rats, IT DXM was randomized to one ear, while tympanic puncture without DXM (placebo) was performed on the contralateral ear. Baseline and 4-week post-radiation auditory brainstem response (ABR) tests were performed. Cochleae were processed for HC viability studies.

Results: Cochleae exposed to HD-XRT demonstrated more outer HC (OHC) loss in the middle and basal turns than non-radiated ears (p<0.01). OHCs were more susceptible to HD-XRT injury than inner HCs in the basal turn (p<0.05). In radiated cochleae, there was less OHC loss with IT DXM in the basal turn, when compared to placebo; however, the difference was not statistically significant. HD-XRT was associated with higher ABR threshold shifts (p>0.05). No significant differences in ABR thresholds were demonstrated between IT DXM and placebo ears in radiated rats at all frequencies.

Conclusion: HD-XRT initiated loss of OHCs in the middle and basal turns of the cochlea and shifts in ABR thresholds at all tested frequencies. IT DXM did not protect against HD-XRT-induced OHC loss and ABR threshold shifts at 4 weeks post-radiation in vivo.

Define Professional Practice Gap & Educational Need: 1. Lack of current therapies for radiation ototoxicity 2. Lack of contemporary knowledge regarding effects of radiation on the cochlea

Learning Objective: 1. Understand that radiation can cause auditory hair cell and hearing loss in a rat in vivo model 2. Intratympanic dexamethasone did not significantly protect against radiation induced auditory hair cell loss or auditory brainstem response threshold shifts in rats in vivo

Desired Result: 1. Be aware that single fraction, high dose radiation exposure to the cochlea may cause auditory hair cell and hearing losses that can be irreversible. Significant counseling should be done with patients prior to making recommendations regarding radiation or radiosurgery for the treatment of lateral skull base tumors. 2. Currently, there is no preventative treatment for radiation ototoxicity.

Early Adoption of Hearing Aids Reduces Temporal Lobe Atrophy Associated with Presbycusis

Z. Jason Qian, BS; Peter D. Chang, MD Gul Moonis, MD; Anil K. Lalwani, MD

Objective: A growing body of work suggests that hearing aids ameliorate the structural and functional brain changes associated with presbycusis. Here we investigate if hearing aids prevent temporal lobe atrophy using a novel method of quantitative MRI analysis, which we have previously used to demonstrate that temporal lobe atrophy (but not whole brain atrophy) is associated with hearing loss.

Intervention: MRI images of hearing aid users over 75 years of age were used to determine brain atrophy. A fully automated computer algorithm was used to quantify temporal lobe, whole brain, and surrounding CSF volume. Atrophy was computed by dividing the parenchymal brain volume by the total brain plus CSF volume.

Results: The 34 patients had a mean age of 83 ± 4 years. Temporal lobe atrophy was $16.39\pm2.49\%$ and whole brain atrophy was $20.44\pm2.19\%$ on average. The mean temporal lobe to whole brain atrophy ratio was 0.8033 ± 0.1013 . When the contribution of age to brain atrophy was removed, hearing aid users had less temporal lobe atrophy than non-users. The greatest reduction of atrophy was in younger hearing aid users and the protective effect declined with age. Stratification of the results by age was not statistically significant likely due to insufficient n value.

Conclusions: Early adoption of hearing aids is likely protective against temporal lobe atrophy, however this effect was lost with age. This preliminary study shows the benefits of early implementation of hearing aids and should be followed up with a larger study to achieve greater significance.

Define Professional Practice Gap & Educational Need: There is a lack of contemporary knowledge with regards to the protective effects hearing aids and the timing of hearing aid implementation.

Learning Objective: The protective effect that hearing aids have on structural brain changes associated with hearing loss, specifically temporal lobe atrophy, is greatest in younger patients.

Desired Result: Clinicians should recommend early adoption of hearing aids in patients with presbycusis to reduce the degree of temporal lobe atrophy associated with hearing loss.

A Retrospective Review of Pediatric Temporal Bone Imaging with Respect to Bone-Anchored Hearing Aid Guidelines

Aaron R. Baker, MD; David G. Fanelli, BS Sangam Kanekar, MD; Huseyin Isildak, MD

Objective: Current FDA guidelines allow the placement of bone-anchored hearing aids (BAHAs) in patients greater than 5 years old. This guideline is at least partially due to concern for thickness of bone stock at the implant site. International experience suggest that BAHAs may be safely placed in patients younger than 5. We aim to show that, anatomically, BAHAs may be safely placed in patients younger than 5.

Study Design: A retrospective review of high-resolution temporal bone CTs was undertaken comparing measurements between ears with chronic ear disease and controls.

Setting: Images were obtained at a single academic medical center.

Patients: 100 patients between 1-5.99 years had temporal bone CTs performed between 2000 and 2009. Patients with chronic ear disease were identified by ICD-9 code, as well as confirmation by review of the imaging.

Main Outcome Measures: Temporal bone thickness was measured on axial CT slices at a point 1cm posterior to the sigmoid sinus, at the superior margin of the bony canal.

Results: Temporal bone thickness showed little correlation to age. Average thickness was greater than 3mm in 1, 2, 3, 4, and 5 year olds (3.2mm, 3.4mm, 3.0mm, 3.7mm, and 3.4mm respectively). No significant difference was found between normal ears and ears with chronic disease (3.5mm vs. 3.3mm, p=0.21).

Conclusions: This data shows pediatric temporal bone thickness is frequently greater than the recommended 3mm, even in patients as young as 1. Anatomically, any concerns regarding temporal bone thickness in patients less than 5 could be reliably addressed with imaging.

Define Professional Practice Gap & Educational Need: 1. Current FDA guidelines allow for placement of BAHA implants in patients >5 years of age, while younger patients are able to receive implants in other countries.2. There is little data regarding the thickness of temporal bones in patients <5 years of age.

Learning Objective: Our objective is to objectively show the learner that anatomically, children >1 year of age have similar thickness temporal bones to those >5 years of age.

Desired Result: 1. Learners will be able to consider placement of BAHA in the appropriate patient at ages <5 years of age. 2. Further research and adjustment of FDA guidelines on the placement of BAHA in children.

ABSTRACTS OF SELECTED POSTERS

E001

Predictive Value of EABRs in NF2 Adults and Non-NF2 Children Receiving ABIs

Abbas A. Anwar, MD; Alison Singleton, AuD Yixin Fang, PhD; William H. Shapiro, AuD J. Thomas Roland, MD; Susan B. Waltzman, PhD

Objective: To compare the predictive value of intraoperative electrically evoked auditory brainstem response (EABR) between NF2 adult ABI recipients and non-NF2 pediatric ABI recipients.

Study design: Retrospective case series.

Setting: Single tertiary academic referral center.

Patients: All ABI recipients from 1994 to 2015, which included 34 NF2 adults and 10 non-NF2 children.

Intervention(s): EABR recordings during ABI placement.

Main outcome measure(s): The morphologies of the intraoperative EABRs were evaluated for the number of waveforms showing a response, the number of positive peaks in those responses, and the latencies of each of these peaks.

Results: 27/34 adult NF2 patients and 9/10 children had EABR waveforms. 20/27 (74.0%) of the adult patients and all of the children had ABI devices that stimulated post-operatively. When comparing the waveforms between adults who stimulated and those who did not stimulate, the proportion of total number of intraoperative EABR peaks to total possible peaks was significantly higher for the adults who stimulated than for those who did not (p<0.05). Children had a significantly higher proportion of total number of peaks to total possible peaks when compared to adults who stimulated (p<0.02). Additionally, there were more likely to be EABR responses at the initial stimulation than intraoperatively in the pediatric ABI population (p=0.065)

Conclusions: This study shows that a higher number of total peaks seen on intraoperative EABRs may indicate a higher likelihood of eventual device stimulation, although the predictive value of intraoperative EABR for speech perception outcome requires further study.

Define Professional Practice Gap & Educational Need: 1. Unclear utility of intraoperative EABRs during ABI placement and whether they may be predictive of clinical outcome. 2. Lack of contemporary knowledge about EABRs in children receiving ABIs

Learning Objective: To compare the predictive value of intraoperative electrically evoked auditory brainstem response (EABR) between NF2 adult ABI recipients and non-NF2 pediatric ABI recipients.

Desired Result: Attendees will try to obtain the most number of peaks on intraoperative EABRs when placing the ABI device. They will further investigate whether EABRs are predictive of clinical outcome.

The Oncomir Mir-21 Facilitates AKT Pathway Activation in Vestibular Schwannomas and Meningiomas

Melania E. Mercado-Pimentel, PhD Edrick F. Villalobos; Daniela N. Rolph Macken Yrun-Duffy; Abraham Jacob, MD

Hypothesis: Over expression of oncomir miR-21 in vestibular schwannomas (VS) represses tumor suppressor genes involved in the inhibition of the PI3K/AKT pathway.

Background: MicroRNAs regulate gene expression at the post-transcriptional level by binding to the 3-UTR of their targets. The oncomir (oncogene) miR-21 is up-regulated in different types of cancers during tumor growth inducing cell proliferation and inhibiting cell death. VS are caused by mutations in the neurofibromatosis type 2 (NF2) gene and activation of the PI3K/AKT signaling pathway drives VS tumor growth. PTEN, BTG2, and TIMP1 are targets of miR-21 and function as inhibitors of the PI3K/AKT pathway. Therefore, miR-21 may represent a putative target for VS therapy.

Methods: Expression levels of miRNAs were analyzed by stem-loop quantitative Real Time PCR (qRT-PCR) based on SYBR-Green I. MirVana kit was used to isolate miRNA and RNA fractions. Expression of miRNA targets was analyzed by qRT-PCR. Protein expression of the miR21 targets was analyzed by western blots. MiRNA expression was normalized to the small RNA U6 while expression of miRNA targets was normalized to GAPDH.

Results: High expression levels of miR-21 were found in VS and meningioma cells as well as in VS tumors compared to Schwann primary cell lines. Additionally, miR21 targets and tumor suppressors, PDCD4, BTG2, PTEN and TIMP1, were found in very low expression levels.

Conclusion: MiR-21 over-expression supports VS tumor growth by inducing the AKT signaling pathway via the repression of PTEN, BTG2, TIMP1 and PDCD4. MiR-21 is a promising molecular target for the development of VS therapy.

Define Professional Practice Gap & Educational Need: There are no drugs currently FDA approved for the treatment of vestibular schwannomas and meningiomas; therefore, the discovery of new molecular targets represents an urgent clinical need for the development of novel therapeutics.

Learning Objective: (1) To study molecular mechanisms of microRNA regulation in Vestibular Schwannomas growth. (2) To reveal microRNA targets for putative VS therapy.

Desired Result: To develop microRNA inhibitors as a viable treatment strategy for vestibular schwannomas and meningiomas.

E003

Initial Operative Experience and Hearing Preservation Results with a Mid-Scala Cochlear Implant Electrode Array

Maja Svrakic, MD; J. Thomas Roland, Jr., MD Sean O. McMenomey, MD Mario A. Svirsky, MD

Objective: To describe our initial operative experience and hearing preservation results with the Advanced Bionics (AB) HiFocus Mid Scala Electrode (MSE)

Study Design: Retrospective review.

Setting: Tertiary referral center.

Patients: Sixty-three MSE implants in pediatric and adult patients were compared to age- and gender-matched 1j electrode implants from the same manufacturer.

Intervention: Cochlear implantation with either the AB 1j electrode or the AB MSE.

Main Outcome Measures: The MSE and 1j electrode were compared in their angular depth of insertion (aDOI) and ability to preserve residual hearing. Hearing preservation was analyzed as a function of aDOI. Secondary outcome measures included operative time, incidence of abnormal intraoperative impedance and telemetry values, and incidence of postsurgical complications.

Results: The aDOI was slightly shallower for the MSE electrode (391° vs. 418° for the 1j, p<0.01). Patients with MSE electrodes had better hearing preservation. Thresholds shifts at four audiometric frequencies ranging from 250 to 2,000 Hz were 10 dB, 7 dB, 2 dB and 6 dB smaller for the MSE electrode (p<0.05). Hearing preservation at low frequencies was worse with deeper insertion. Operative time was similar and complication rate was similarly low for both electrodes. The incidence of abnormal intraoperative impedances and neural response telemetry was slightly higher for the MSE.

Conclusions: The MSE electrode resulted in slightly shallower insertions and significantly better hearing preservation than the 1j electrode. Differences in other outcome measures were small or unlikely to have a meaningful effect.

Define Professional Practice Gap & Educational Need: Lack of surgical experience and lack of knowledge in depth of insertion and hearing preservation with a new mid scala electrode compared to the older electrode from the same device company

Learning Objective: To characterize the surgical aspects, depth of insertion and hearing preservation outcomes with a new mid scala electrode compared to the older electrode from the same device company

Desired Result: Will know what to expect with respect to depth of insertion and hearing preservation as well as operative time, incidence of abnormal intraoperative impedance and telemetry values, and incidence of postsurgical complications for the new mid scala electrode compared to the older electrode from the same device company

E004

Depression, Self-Esteem, and Quality of Life in Vestibular Schwannoma Treatment Decision-Making

Jason C. Nellis, MD; Jeff D. Sharon, MD Seth E. Pross, MD; Lisa Ishii, MD, MSH Masaru Ishii, MD, PhD Howard W. Francis, MD, MBA

Objective: To identify psychological factors associated with treatment modality selection in vestibular schwannoma.

Study Design: Prospective observational study

Setting: Tertiary care neurotology clinic

Patients: Data was prospectively collected from patients initially presenting to a tertiary care neurotology clinic between 2013-2015. Patients who did not have MRI, demographic, psychometric, or audiometric data were excluded from analysis.

Intervention: Demographic information, tumor size, Beck depression inventory, Rosenberg self-esteem scores, headache severity, and clinical symptoms were collected to determine factors associated with undergoing acoustic neuroma surgical resection using univariate and multiple logistic regression analysis.

Results: A total of 143 acoustic neuroma patients (mean age 54.2 years, 50.4% female) were included. 62 patients (43.3%) pursued surgical resection, 81 patients (56.6%) pursued active surveillance. Surgical treatment was significantly associated with larger tumors, lower word discrimination scores, and higher headache severity scores (p<0.05). Depression, self-esteem, quality of life, hearing thresholds, and clinical symptoms were not significantly associated with treatment modality. On multiple logistic regression analysis, the likelihood of undergoing surgical resection significantly increased in patients with moderate (OR 115.75; 9.21-1454.34) and large grade tumors (OR 72.75; 95% CI 4.33-1221.28), and higher headache severity scores (OR 1.03;95% CI 1.01-1.06). The likelihood of undergoing surgical resection was not significant for small and medium grade tumors.

Conclusions: Patients with larger acoustic neuromas and worse headaches are more likely to undergo surgery rather than active surveillance. However, psychometric factors such as depression, quality of life, and self-esteem do not seem to impact patient decision-making.

Define Professional Practice Gap & Educational Need: Lack of understanding regarding the impact of psychological factors on treatment decision-making by acoustic neuroma patients.

Learning Objective: To identify psychological factors associated with treatment modality selection in vestibular schwannoma patients.

Desired Result: With a better understanding of the factors impacting treatment decision-making, clinicians may provide better patient-centered discussions regarding management of acoustic neuromas.
Defining the Limits of Endoscopic Access to Internal Auditory Canal: Anatomical and Computed Tomographic Analysis of an Exclusively Endoscopic Approach

Adam N. Master, MD; L. Gale Gardner, MD Maura K. Cosetti, MD

Hypothesis: It is possible to quantify surgical access to internal auditory canal (IAC) via a transcanal endoscopic technique in reference to neurovascular and osseous surgical landmarks of the temporal bone

Background: Transcanal endoscopic ear surgery is a reliable, effective and minimally invasive technique for middle ear and mastoid pathology, however its application to the IAC has not been widely investigated.

Methods: Anatomic dissection of 2 paired and 15 unpaired cadaveric temporal bones was performed through an exclusively endoscopic approach to the IAC. Dissection proceeded until access to the cerebellopontine angle (CPA) was achieved. Following dissection, all specimens underwent computed tomography (CT) scans. Anatomage InVivo5 software was used to analyze the CT scans and record measurements.

Results: Access to the CPA and visualization of the labyrinthine segment of the facial nerve was achieved in all specimens. The mean distance from the carotid artery, jugular bulb, and middle fossa from our fundostomy of the IAC was 4, 5, and 5 mm, respectively. Mean surface area of the fundostomy and tympanic ring were 42 and 81mm2. The mean distance from the osteocartilaginous junction and tympanic ring to the porus acousticus was 29 and 21mm.

Conclusion: Transcanal access to the entire IAC can be achieved safely achieved via an endoscopic approach. Generous removal of the cochlear promontory can be accomplished while maintaining a safe distance from key neurovascular structures. The endoscopic transcanal approach to the IAC offers a minimally invasive alternative in patients without serviceable hearing for intra-meatal and medial IAC tumors.

Define Professional Practice Gap & Educational Need: 1. Need for better understanding of the emerging applications of transcanal endoscopic ear surgery to the lateral skull base 2. Need for greater understanding of the anatomic limitations and potential application of exclusively endoscopic technique to the internal auditory canal

Learning Objective: to quantify surgical access to internal auditory canal (IAC) via a transcanal endoscopic technique in reference to neurovascular and osseous surgical landmarks of the temporal bone

Desired Result: Attendees will understand the anatomic limitations and potential applications of the exclusively endoscopic approach to the internal auditory canal

Indicate IRB or IACUC Approval: Exempt

Dosimetric Analysis of Adjacent Neurovascular Structures in Treatment of Skull Base Tumors with CyberKnife Radiation Therapy

Jay Bhatt, MD; Yarah M. Haidar, MD Yaser Ghavami, MD; Hamid R. Djalilian, MD

Objective: To examine the relationship between the prescribed target dose and the dose to healthy neurovascular structures in patients with skull base tumor treated with CyberKnife radiation therapy.

Study Design: Retrospective analysis

Setting: Academic Tertiary Care Center

Patients/Interventions: Twenty patients with vestibular schwannomas who were treated with fused CT/MRI-guided CyberKnife radiation therapy.

Main outcome measures: Average radiation dose delivered to healthy neurovascular structures (e.g. carotid artery, basilar artery, and facial nerve, trigeminal nerve, and cochlea) was analyzed.

Results: The prescribed dose ranged from 18-23.35Gy over 1-5 fractions to cover 95% of the target tumor volume. The mean dose to the carotid artery was 5.71Gy (range 0.36-17Gy); basilar artery was 2.14Gy (range 0.20-5.32Gy); facial nerve was 2.95Gy (range 1.74-7.54Gy); trigeminal nerve was 5.21Gy (range 0.39-17.09Gy); and the cochlea was 8.06Gy (range 2.45 -12.61Gy).

Conclusions: Stereotactic radiosurgery for some vestibular schwannomas can expose the basilar artery and carotid artery to radiation doses that can initiate atherosclerotic processes. The dose delivered to other structures such as the cochlea and facial nerve appears to be lower and much less likely to cause immediate issues. The relationship between the size and location of the tumor with the radiation doses will be discussed.

Define Professional Practice Gap & Educational Need: Lack of knowledge on the dosing to adjacent healthy neurovascular structures when using CyberKnife radiation therapy in the treatment of skull base tumors.

Learning Objective: To examine the relationship between the prescribed target dose and the dose to healthy neurovascular structures in patients with skull base tumor treated with CyberKnife radiation therapy.

Desired Result: Participants will be able to discuss toxicity of adjacent healthy neurovascular structures as a result of CyberKnife radiation therapy when treating skull base tumors.

Indicate IRB or IACUC Approval: Exempt

Treatment of Lateral Skull Base and Posterior Cranial Fossa Lesions Utilizing the Extended Middle Cranial Fossa Approach

Joseph P. Roche, MD; Andrew J. Goates, BS Marlan R. Hansen, MD; Bruce J. Gantz, MD

Objective: Define the indications and outcomes for patients undergoing treatment utilizing the extended middle cranial fossa approach (EMCF).

Study design: Retrospective records review.

Setting: University-based tertiary referral center.

Patients: Patients undergoing treatment of PCF lesions.

Intervention(s): EMCF exposure and treatment of the indicating PCF lesion.

Main outcome measure(s): Demographic, indication for surgery, audiometric, and cranial nerve functioning variables were assessed.

Results: Thirty-five subjects who underwent an EMCF exposure were identified over a 12-year period. The most common indication was meningioma (18, 51%) followed by various schwannomas (6, 17%) and vascular lesions (5, 14%). Preoperative cranial nerve complaints were common (31, 91%) as were objective cranial nerve abnormalities on physical exam (21, 60%). Available pre-operative audiometric data were demonstrated good functioning including threetone pure tone averages (23 +/- 15 dB HL and word understanding scores (92 +/- 20 %). Most (34, 97%) subjects intact facial nerve function. There were no intraoperative complications and no perioperative deaths attributable to the surgical intervention. The average length of stay was 11.6 days (median = 9). Cranial neuropathies were common postoperatively with 24 (68%) subjects demonstrating some objective cranial nerve dysfunction, the most common of which was triggeninal nerve hypesthesia (20, 57%). Subjects with identifiable pre- and post-operative audiometric data demonstrated small declines in the three-tone average (<3dB HL) and word recognition scores (~9%). Four subjects had complete hearing loss postoperatively. No subject had a change in facial nerve function postoperatively.

Conclusions: The EMCF approach can provide safe and effective exposure of the anterior PCF.

Define Professional Practice Gap & Educational Need: The extended middle cranial fossa (EMCF) approach to the cerebellopontine angle, parapontine and prepontine cisterns can be utilized for a variety of skull base and posterior cranial fossa (PCF) lesions. Currently, few reports exist documenting the variety of lesions that can be approached and outcomes that can be expected. This report adds large series of patients undergoing EMCF approachs to the petrous apex and PCF and the outcomes that can be expected using this approach.

Learning Objective: To recognize the breadth of indications and possible outcomes that can be expected when utilizing the EMCF approach.

Desired Result: To aid in the decision making process when choosing how to best approach PCF lesions.

Treatment Paradigms in the Management of Late Stage Neurofibromatosis Type II Patients

Stephanie E. Teng, MD; David R. Friedmann, MD Sean O. McMenomey, MD; Matthias A. Karajannis, MD John G Golfinos, MD; J. Thomas Roland, Jr. MD

Objective: Available treatments for neurofibromatosis type II patients at a comprehensive multi-disciplinary center are presented along with algorithms for decision-making to maximize patients' quality of life.

Study design: Retrospective case series

Setting: Tertiary academic medical center.

Patients: Neurofibromatosis type II patients managed at a comprehensive center.

Intervention(s): Medical and surgical treatments for tumor control and to rehabilitate cranial neuropathies including resection of symptomatic tumors, treatments of hearing loss, dynamic and static facial nerve reanimation and systemic therapy and drug trials where eligible.

Main outcome measure(s): Restoration of function or delay in debilitating dysfunction.

Results: Eleven patients with a broad spectrum of disease progression were included. Age ranged from 12-54 years. Patients were managed with serial volumetric imaging, surgical resection, and systemic therapeutic drug trials, such as bevacizumab, trametinib, everolimus, and lapatinib. Co-morbidities from disease progression include facial paresis, hearing loss, and poor nutritional status. Patients were offered facial nerve grafts, cochlear or auditory brainstem implants and procedures for the treatment of dysphagia. Through a well -coordinated algorithmic approach, these patients are able to enjoy improved quality of life.

Conclusions: Management of late-stage neurofibromatosis type II patients, especially at a young age, is a complex issue requiring extensive counseling and discussion about the goals of care. There are multiple medical and surgical treatment options that can be utilized to maximize quality of life for these patients. Some of these address the disease process while others seek to rehabilitate functions lost from disease progression or surgery. Management requires a multi-disciplinary team well versed in these options in order to create individualized treatment plans.

Define Professional Practice Gap & Educational Need: Neurofibromatosis type II is a complicated potentially life threatening disease with various considerations that direct the course of management. Certain approaches in the management of aggressive phenotypes may maximize quality of life.

Learning Objective: After this presentation, participants should have an understanding of: 1.) the clinical presentation of late-stage neurofibromatosis type II, 2.) the importance of a multi-disciplinary approach to management, and 3.) current management options to maximize the quality of life for neurofibromatosis type II patients as it relates to hearing and facial nerve outcomes.

Desired Result: Attendees will have a better understanding of the approach to management in advanced neurofibromatosis type II. Use of the discussed algorithms will allow them to provide more thoughtful, patient-centered care.

Rare Metastatic Lesions of the Internal Auditory Canal

Richard J. Wiet, MD, Robert A. Battista, MD R. Mark Wiet, MD; Jenna K. Little, BS

Objective: The goal of this study is to elucidate the key differences between the more common vestibular schwannoma of the internal auditory canal (IAC), and the rare metastatic lesion to the IAC.

Study design: Retrospective case series

Setting: Tertiary referral center

Patients: A review of 1200 known IAC/cerebellopontine angle (CP angle) tumor cases was conducted. Six patients (0.5% of the known cases) were found to have tumors metastatic to the IAC. A study of patterns that set the metastatic cases apart from vestibular schwannoma was conducted.

Outcome measures: History, histology, audiogram, MRI scans, cerebrospinal fluid (CSF) cytology.

Results: All six patients presented with sudden hearing loss; two were bilateral. Leptomeningeal carcinomatosis was found in two of three CSF samples. Three cases presented with facial paralysis. Except for one, all five died within months of the diagnosis. Histology was available for four cases. Two cases had metastatic breast cancer; one case had adenocarcinoma, mammary type. Histology in the remaining two cases was squamous cell carcinoma and gastrointestinal adenocarcinoma. The diagnosis of breast carcinoma preceded the IAC lesion by two years in one case. The remaining patients demonstrated variability in time between the primary carcinoma diagnosis and the metastatic IAC lesion finding.

Conclusion: Metastatic disease to the IAC/CP angle should be suspected in cases with sudden hearing loss, age exceeding 55 years, facial nerve neuropathy, and/or a history of prior malignancy. CSF cytology should be considered as a diagnostic tool in cases suspected of metastatic disease.

Define Professional Practice Gap & Educational Need: Few case studies present more than one to two cases on metastatic lesions of the internal auditory canal. Our efforts are to broaden the scope of these rare cases by offering more evidence and identifying key factors that distinguish suspicion for metastatic lesions of the IAC from vestibular schwannoma.

Learning Objective: To learn the range of symptoms that may require additional evaluation for possible metastatic lesions of the internal auditory canal.

Desired Result: To obtain a greater knowledge on the differentiation between the diagnostic investigation of rare metastatic lesions and vestibular schwannoma. In addition, the study aims to classify instances where metastatic disease should be suspected.

Indicate IRB or IACUC Approval: Exempt

Vestibular Schwannoma Volume to Posterior Fossa Volume Ratio as a Predictor of Clinical Outcomes following Resection

Robert J. Macielak, MS; Michael S. Harris, MD Claudia F. Kirsch, MD; Luciano M. Prevedello, MD Oliver F. Adunka, MD

Hypothesis: Radiographically-determined vestibular schwannoma volume relative to posterior fossa volume is a better predictor of postoperative outcomes than tumor volume alone.

Background: Larger tumor volume is known to portend a poorer prognosis with respect to post-operative outcomes such as hearing preservation and facial nerve function. Current clinical practice, however, does not take into account the size of the posterior fossa relative to the tumor dimensions.

Methods: A retrospective review of patients undergoing retrosigmoid or translabyrinthine vestibular schwannoma resection at the study institution was conducted. Individual volumetric posterior fossa dimensions and preoperative tumor volumes were determined. Clinical outcomes considered included post-operative House-Brackmann Score, resection status, complications, and surgical duration. One-way and twoway ANOVAs were performed.

Results: A total of 95 patients were identified. A one-way ANOVA demonstrated that surgical time (p < 0.001) and whether a Good Outcome (House-Brackmann score of 1 or 2, no complications, and a complete resection) was achieved (p = 0.009) correlated very well with preoperative tumor volume, but not with posterior fossa volume (p = 0.412 and p = 0.345, respectively). However, in medium sized tumors, facial function was significantly correlated with posterior fossa volume (p = 0.032).

Conclusions: Our results suggest that the ratio of vestibular schwannoma volume to posterior fossa volume may hold clinically-useful potential in planning surgery and prognosticating outcomes for patient with medium sized tumors.

Define Professional Practice Gap & Educational Need: This submission targets lack of awareness and lack of contemporary knowledge.

Learning Objective: The primary learning objective is to make the audience aware of the potential utility of considering the ratio of vestibular schwannoma volume to posterior fossa volume in pre-operative planning and predicting post- operative outcomes.

Desired Result: The desired result of this knowledge is that the audience could use vestibular schwannoma volume to posterior fossa volume ratio as an additional variable to guide surgical approach selection and planning, as well as preoperative patient counseling.

Indicate IRB or IACUC Approval: Exempt

Facial Nerve Schwannomas Mimicking as Vestibular Schwannomas

Beth N. McNulty, MD; Sean R. Wise, MD Jason R. Bell, MD; Dennis I. Bojrab, MD Michael J. LaRouere, MD; Matthew L. Kircher, MD Seilesh C. Babu, MD

Objective: To describe our series of presumed vestibular schwannomas, found to be facial schwannomas, and to determine methods to distinguish their differences preoperatively.

Study Design: Retrospective chart review.

Setting: Tertiary Referral Center.

Patients: Eighteen cases with a presumed diagnosis of vestibular schwannoma found to have a facial schwannoma intraoperatively, from October 2002 to July 2015, were reviewed.

Intervention: Thirteen patients underwent tumor resection: 9 incomplete, 4 complete. Five patients had decompression of the tumor and two of those required no further treatment.

Main Outcome Measures: Demographics, surgical approach, intra-operative findings, hearing and facial nerve status, and adjunctive treatment were documented.

Results: Pre-operative hearing loss and imbalance were seen in 72% and 61%, respectively. Pre-operative electroneuronography (ENOG) revealed a mean weakness of 19%. Pre-operative imaging showed a mean tumor size of 1.6 x 1.6 cm. Suspicious intraoperative findings included: facial nerve incorporated intimately with the tumor capsule in 12 cases; spontaneous action potentials noted while drilling the bony IAC in 3 cases; and action potentials noted on stimulation of the entire tumor capsule in 10 cases. The mean long-term facial function was House-Brackman grade 2 and the mean length of follow-up was five years.

Conclusions: Facial neuromas are rare and may be difficult to distinguish from a vestibular schwannoma pre- operatively. Surgical findings that should raise concern include: spontaneous action potentials during drilling the bony IAC, absence of a plane of dissection between the facial nerve and tumor, or stimulation of the tumor capsule.

Define Professional Practice Gap & Educational Need: Facial Nerve Schwannomas are rare tumors of the temporal bone but may be difficult to distinguish from a vestibular schwannoma, as classic clinical and radiological findings may be absent.

Learning Objective: To describe our series of presumed vestibular schwannomas, found to be facial schwannomas, and to determine methods to distinguish their differences preoperatively.

Desired Result: That attendees gain knowledge in the diagnosis and treatment of facial nerve schwannomas and are equipped to provide better care for these patients.

An Easy and Reliable Method to Locate the Dehiscence during Middle Fossa Superior Canal Dehiscence Surgery: It's a (C) inch

Neil S. Patel, MD; Jacob B. Hunter, MD Brendan P. O'Connell, MD; George B. Wanna, MD Matthew L. Carlson, MD

Objective: The middle fossa floor lacks reliable surface landmarks. Furthermore, in cases of superior semicircular canal dehiscence (SSCD), multiple skull base defects may be present further confounding the location of the labyrinth. Misidentification of the SSCD during surgery may lead to treatment failure or sensorineural hearing loss. Anecdotally, the authors have observed the distance from the lateral edge of the craniotomy to the SSCD to be consistently one inch. Herein we present radiologic evidence of this practical and clinically useful relationship.

Study Design: Retrospective radiological analysis and chart review.

Setting: Tertiary center.

Patients: Consecutive patients with radiological evidence of SSCD.

Interventions: Analysis of CT imaging.

Main outcome measures: The horizontal distance from the outer cortex of the squama temporalis immediately superior to the bony external auditory canal (approximating lateral edge of craniotomy) to the SSCD was measured in the coronal plane by two independent reviewers.

Results: A total of 151 adult ears with SSCD were analyzed. A Shapiro-Wilk goodness-of-fit test confirmed that measurements were normally distributed. Pearson inter-rater correlation was 0.95, confirming very strong agreement between observers. The mean distance between the outer cortex of the squama temporalis and SSCD was 25.9 mm, or 1.02 inches. Sixty-eight percent of the SSCD population would fall between 0.92 and 1.12 inches and 95% would lie between 0.83 and 1.21 inches.

Conclusions: The horizontal distance from the outer cortex of the squama temporalis to the SSCD consistently approximates one inch. This easily-remembered distance can aid surgeons in locating or confirming the SSCD during middle fossa surgery.

Define Professional Practice Gap & Educational Need: 1. Lack of anatomic landmarks to guide middle fossa superior semicircular canal dehiscence surgery.

Learning Objective: 1. To learn that the average distance from the lateral edge of a middle fossa craniotomy defect to a dehiscent superior semicircular canal is approximately one inch.

Desired Result: 1. To apply the one-inch distance estimate to superior semicircular canal dehiscence surgery to promote safe surgery and improve outcomes.

Semicircular Canal Dehiscence in Patients with Cadherin 23 Related Hearing Loss

Kathryn Y. Noonan, MD; Jun Shen, PhD Jack E. Russo, MD; Clifford J. Eskey, MD Einar Hopp MD, PhD; James Saunders, MD

Objective: To investigate the prevalence and relative risk of semicircular canal dehiscence in pediatric patients with CDH23 mutations compared to an aged-matched control group.

Study Design: Retrospective cohort study

Setting: Multi-institutional study

Patients: Sixteen pediatric patients (ages 0-5 years) were compared based on the presence of a CDH23 mutation with a control population.

Interventions: Retrospective review of high resolution CT temporal bone scans

Main outcome measures: Superior and posterior semicircular canals were evaluated by a neuroradiologist for presence of semicircular canal dehiscence in the CDH23 variant and control groups

Results: Sixteen CT scans were reviewed for semicircular canal dehiscence. Five of six children with CDH23 variant had dehiscence in at least one canal compared to only one child out of ten in an agematched control population. Out of six patients (12 ears) in the CHD23 variant group there were five dehiscencent superior semicircular canals (RR=8.3) and three dehiscencent posterior canals (RR= 5.9). Three children had bilateral dehiscence of the canals. However no children had dehiscence in both the superior and posterior canals. Relative risk of semicircular canal dehiscence in children with CDH23 mutation is 8.33 compared to the pediatric control population. 95% confidence interval (1.25, 55.35).

Conclusions: Children with CDH23 mutations are at significantly increased risk of having semicircular canal dehiscence in both the superior and posterior semicircular canals and may be a contributing factor to the vestibular dysfunction in USH1D patient population.

Define Professional Practice Gap & Educational Need: Lack of awareness/contemporary knowledge: There are several competing theories about the etiology of semicircular canal dehiscence and the ossification of the otic capsule. It has been theorized that CDH23 mutations may be associated with delayed ossification. This study sheds new light on the topic by showing a correlation between canal dehiscence and mutations of the cadherin 23 protein.

Learning Objective: To describe the correlation between CHD23, a gene linked to Usher Syndrome 1D and non- syndromic hearing loss, and semicircular canal dehiscence in children.

Desired Result: Increased awareness of the correlation between this genetic mutation and semicircular canal dehiscence will allow physicians to better evaluate and treat children with CDH23 associated hearing loss

Pediatric Superior Semicircular Canal Dehiscence and Inner Ear Anomalies

Eric M. Sugihara, DO; Prasad J. Thottam, DO Dennis J. Kitsko, DO; Seilesh C. Babu, MD

Objectives: To determine the incidence and association of superior semicircular canal dehiscence (SSCD) with inner ear (IE) anomalies in the pediatric population.

Study Design: Retrospective chart review.

Setting: Three tertiary referral centers in ambulatory and hospital settings.

Patients: Children less than 18 years who received a 0.5 mm or less collimated CT including the temporal bones between 2010 to 2013 for reasons including, but not limited to, hearing loss, trauma, and infection.

Interventions: Radiologic software was used to reformat images into Pöschl and Stenver planes. Five hundred three CT images were reviewed by experienced neuroradiologists.

Main Outcome Measures: Incidence of SSCD and IE anomalies, noting laterality. Patient age, sex, and diagnosis were recorded. Statistical analysis was performed to compare CT findings across outcome measures and patient demographics.

Results: Pediatric incidence of SSCD was 6.2% (31/503) and an IE anomaly was 15.1% (76/503). Within SSCD patients, incidence of an IE anomaly was 22.6% (7/31); and within IE anomaly patients, incidence of SSCD was 9.2% (7/76). Incidence of SSCD with an IE anomaly together was not significantly correlated (1.4%, 7/503; P=0.23). The Incidence of an IE anomaly with bilateral (0.8%, 4/503) vs. unilateral (0.6%, 3/503) SSCD was similar.

Conclusions: SSCD incidence is higher in the pediatric population compared to adults. SSCD and inner ear anomalies rarely occur together and are unlikely related. Similar incidences of having an IE anomaly with unilateral vs. bilateral SSCD further supports this.

Define Professional Practice Gap & Educational Needs: Lack of contemporary knowledge regarding pediatric superior semicircular canal dehiscence and its relationship with inner ear anomalies.

Learning Objective: To understand the increased incidence of pediatric superior semicircular canal dehiscence and its rare occurrence with inner ear anomalies, being unlikely related.

Desired Result: Changes in physician knowledge of superior semicircular canal dehiscence, specifically in pediatric populations as it may contribute to the understanding of its pathogenesis.

Cochlear Patency is Maintained after Transmastoid Labyrinthectomy

Eric W. Sargent, MD; Eric Liao, MD Roger L. Gonda, Jr., MD

Objective: Labyr inthectomy is considered the 'gold standard' in the treatment of intractable vertigo attacks due to Ménière's Disease (MD) but sacrifices all residual hearing. Interest in auditory rehabilitation has lead to cochlear implantation in some patients. Concern remains that the cochlear lumen may fill with tissue or bone after surgery. This study sought to determine the incidence of obliteration of the cochlea after transmastoid labyrinthectomy.

Study Design: Retrospective observational study.

Setting: Tertiary referral center.

Patients: 18 Patients with intractable vertigo from MD who underwent surgery.

Interventions: Transmastoid labyrinthectomy between 2008 and 2013. Cochleas were imaged with unenhanced, heavily T2-weighted MRI.

Main Outcome Measure: Presence of symmetrical cochlear fluid signals on MRI.

Results: There was no loss of fluid signal in the cochleas of operated ear compared to the contralateral, unoperated ear in any subject an average of 3 years (SD: 1.2) after surgery. 3/18 patients had the vestibule blocked with bone wax at the time of surgery. Blocking the vestibule with bone wax did not change the cochlear fluid signal.

Conclusion: The risk of cochlear obstruction after labyrinthectomy for MD is very low. The significance of this finding is that patients with MD who undergo labyrinthectomy will likely remain candidates for cochlear implantation in the labyrinthectomized ear long after surgery if this becomes needed. Immediate cochlear implantation or placement of a cochlear lumen keeper during labyrinthectomy for MD is probably not necessary.

Define Professional Practice Gap: The persistence of cochlear patency after labyrinthectomy is unknown. There is concern that labyrinthectomy may lead to later cochlear obstruction in some labyrinthectomized patients, making them less able to benefit from cochlear implantation should it become required. This has lead some surgeons to advocate implanting labyrinthectomized ears immediately, perhaps unnecessarily.

Learning objective: To show that obliteration of the cochlea by tissue or bone after labyrinthectomy for Ménière's Disease is probably rare.

Desired Results: Patients undergoing labyrinthectomy for Ménière's Disease do not require immediate cochlear implantation or placement of a cochlear lumen keeper to remain eligible for later cochlear implantation. This result varies from findings after translabyrinthine vestibular schwanomma surgery in which cochlear obliteration is common.

Evaluation of Cochlear Anatomy Models for Determining Intra-cochlear Electrode Position

Ahmet Cakir, MRes; Robert Labadie, MD, PhD Benoit Dawant, PhD; Jack Noble, PhD

Hypothesis: Use of high-resolution non-rigid models of intracochlear anatomy permits more accurate determination of cochlear implant (CI) electrode position than rigid models.

Background: Quantifying intra-cochlear position of CI electrodes is important for studying the relationship between electrode position and hearing outcomes and when using electrode position-based CI programming strategies. Evaluating electrode position within the cochlea requires identifying the basilar membrane, which is not visible in CT images. Two commonly used approaches for estimating basilar membrane position in CT are: (1) Register scans with a high resolution image of a single cochlear specimen where the membrane is visible (rigid model) and (2) register scans with a non-rigid model created based on the anatomy of 10 individual cochleae. There were no studies quantifying the utility of the non-rigid versus the rigid model.

Methods: The automatic non-rigid method was used to localize cochlear anatomy of 79 ears. Rigid anatomical models of 7 cochlear $\hat{A}\mu CT$ specimens were registered to each ear. Electrode position was quantified relative to each model.

Results: Standard deviation across rigid models in measures of electrode depth, distance to modiolus, and distance to basilar membrane were, 4.92. 0.53, and 0.67 mm. Mean difference in those measures between the non-rigid model and the average result of the rigid models was 0.64, 0.49, and 0.35 mm.

Conclusion: Variance of inter-rigid-models is high. In contrast, differences between non-rigid and the average of rigid model estimations are relatively low, demonstrating that non-rigid models are necessary to achieve the most accurate estimate of intra-cochlear electrode position.

Define Professional Practice Gap & Educational Need: Multiple methods exist for identifying the intra-cochlear position of cochlear implant electrodes, but no studies have been performed to contrast the performance of the two methods.

Learning Objective: To inform the community of the reliability and limitations of different methods that have been proposed to assess electrode position using CT images.

Desired Result: Attendees will be aware of the limitations of existing techniques for assessing cochlear implant electrode position.

The Central Auditory System and Cochlear Implantation: Using Olfactory Testing to Evaluate a Potential Central Component in Cochlear Implant Performance

Hinrich Staecker, MD, PhD; Thomas Muelleman, MD Valerie Wood, MD; Elizabeth Ripley, AuD

Hypothesis: Olfactory testing may identify patients that are at risk for poor cochlear implant performance.

Background: Cochlear implantation is a highly successful intervention that despite remarkable improvements in hardware and software continues to show a high degree of variability in outcomes. Performance in adult patients can potentially be affected by the integrity of spiral ganglion neurons or by the performance of the central auditory system. Prolonged deafening and dementia are conditions that affect the central auditory system and can negatively impact cochlear implant outcomes. Central auditory test batteries can evaluate the central component of hearing in patients that significant residual hearing but can not be effectively used in most cochlear implant patients. A wide variety of recent studies have shown that decline in olfaction predates and often predicts a variety of central nervous system degenerative disorders. We set out to evaluate if olfaction testing could identify patients with poorer implant outcomes than age matched controls.

Methods: Adult cochlear implant candidates were recruited and olfaction measured with the University of Pennsylvania smell identification test (UPSIT). At 6 months post implant activation composite scores of the UPSIT were compared to the patients CNC and AzBIO scores. Poor performance on the UPSIT was correlated with poorer speech scores suggesting that olfactory testing may be useful in preoperative evaluation of cochlear implant patients.

Conclusions: Identification of patients at risk for central auditory system dysfunction may be possible by evaluation of patients' olfactory function.

Define Professional Practice Gap & Educational Need: Awareness of the role of central auditory function in cochlear implantation

Learning Objective: Understand the relationship between olfactory function and neurodegeneration

Desired Result: Screening patients for central auditory degeneration prior to cochlear implantation may alter rehab strategies

Cochlear Histopathology as Seen in Two Patients with a Clarion® Cochlear Implant Electrode with Positioner

Takefumi Kamakura, MD, PhD Joseph B. Nadol Jr., MD

Hypothesis: This study reports the cochlear histopathology of two cases who during life underwent cochlear implantation with a positioner.

Background: A silastic positioner introduced by the Advanced Bionics Corporation in 1999 was designed to position the electrode of the Clarion® cochlear implant close to the modiolus. The positioner was recalled in the United States in July 2002 because of an apparent higher incidence of bacterial meningitis in patients in whom the positioner had been placed.

Methods: Four celloidin-embedded temporal bones from two patients with cochlear implants with a positioner were included in the study. In a previous study, we reported histopathologic findings in Case 1, and in this report, we present the findings in a second case in a 94-year-old woman (Case 2), and the similarities and differences between the two cases. All four specimens were prepared for histologic study by conventional techniques and 2-D reconstruction.

Results: Evidence of insertion trauma was seen in all three implanted specimens. More significant trauma was found in Case 2 than Case 1 including disruption of the osseous spiral lamina and the basilar membrane. In addition, there was more new fibrous tissue and bone in Case 2 than Case 1. There was a large fluid space in all three implanted temporal bones around the electrode and positioner.

Conclusion: The findings seen in the two cases may help to explain the increased risk of meningitis in patients implanted with a positioner. Significant cochlear trauma was seen in all implanted specimens.

Define Professional Practice Gap & Educational Need: Lack of awareness of cause of bacterial meningitis after cochlear implantation with a positioner.

Learning Objective: To discuss possible causes of bacterial meningitis after cochlear implantation with a positioner as revealed by histopathologic study.

Desired Result: Evidence of insertion trauma, new fibrous tissue and bone, and a large fluid space around the electrode and positioner were seen in all three implanted specimens, which may help to explain the increased risk of meningitis.

Interactive iPad-Based Education for Cochlear Implant Candidates

Omid Moshtaghi, BS; Ronald Sayhouni, BS Yaser Ghavami, MD; Hossein Mahboubi, MD Afsheen Moshtaghi, BS; Harrison W. Lin, MD Hamid R. Djalilian, MD

Objective: One challenge cochlear implant (CI) teams face is the tremendous counseling required prior to the procedure. This study seeks to evaluate the efficacy of an iPad-based interactive educational module in patient education on CI, the various devices and their unique features, expectations/ outcomes, and the surgery.

Methods: CI candidates were randomized into two groups. One group received the iPad-based interactive iBook while the other didn't. Both groups received standardized verbal information from the surgeon. The iBook provides a step-bystep interactive description of all necessary information regarding CI. Complete with animations and illustrations, the patient learns all the risks and benefits associated with the surgical procedure in addition to what to expect post operatively. Pre and post-education surveys were performed.

Results: Data is still being collected, however, preliminary results indicate statistically significant (p=.026) increases in patient understanding of: CI, expectations post-CI, differences between CI devices, long-term expectations of CI, CI risks, and recovery post-CI surgery when given the iBook.

Conclusion: By using the iBook to increase patient knowledge, the patient can have a more effective and productive conversation with the physician and audiologist. In this setting, the physician and audiologist can use his/her expert knowledge to address difficult question specifically pertaining to the patient to achieve a superior level of understanding.

Define Professional Practice Gap & Educational Need: There might be a lack of knowledge about the cochlear implanta among the patients or their families and several sessions for consultations may be required. The proper and ideal method for giving information prior the surgery still remains a challenging problem.

Learning Objective: To observe the effectiveness of the iPad-based education for cochlear implant in improvement of the knowledge in patients and their families prior to consultation with physician and surgery.

Desired Result: To evaluate the efficacy of an iPad-based interactive educational module in patient education on Cochlear Implant, the various devices and their unique features, expectations/outcomes, and the surgery.

Indicate IRB or IACUC Approval: Exempt

Preservation of Low Frequency Hearing in Children with Enlarged Vestibular Aqueduct

Kevin D. Brown MD, PhD; Baishakhi Choudhury, MD Lisa Park, AuD; Erika Gagnon, AuD Jennifer Woodson, AuD; Holly Teagle, AuD

Objective: To determine the rates of preservation of functional acoustic hearing in children undergoing cochlear implantation with enlarged vestibular aqueduct and the benefits of hybrid (electric and acoustic) stimulation in this population

Study Design: Case series

Setting: Tertiary children's hospital

Patients: Pediatric subjects 12 months to 18 years with preoperative low frequency hearing < 80 dB at 250 and 500Hz.

Intervention: Cochlear implantation with 20mm electrode by soft round window technique Main Outcome Measure: Preservation of functional acoustic hearing following cochlear implantation defined as < 80 dB at 250 and 500Hz.

Results: Pediatric patients with enlarged vestibular aqueduct consistently achieve high levels of hearing preservation and have substantial benefits of hybrid stimulation of the implanted ear similar to other hearing preservation candidates.

Conclusions: High levels of hearing preservation are possible in pediatric patients with enlarged vestibular aqueduct and substantial benefits are realized with hybrid stimulation.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge of high likelihood of hearing preservation in children with enlarged vestibule aqueduct and benefits of hybrid hearing in children with enlarged vestibule aqueduct.

Learning Objective: The learner will understand that children with enlarged vestibular aqueduct can have high levels of low frequency hearing preservation and substantially benefit from hybrid stimulation of their cochleas.

Desired Result: The learner will be able to apply this information to educate parents of children with enlarged vestibular aqueduct of high likelihood of hearing preservation after cochlear implantation and the benefits of hybrid sound stimulation.

Hearing Loss after Round Window Surgery in Mice is due to Middle Ear Effusion

Bovey Z. Zhu, MD; Jasmine Saleh, MD Kevin T. Isgrig, BS; Lisa L. Cunningham, PhD Wade W. Chien, MD

Hypothesis: Hearing loss associated with round window (RW) injection in mice is caused by middle ear effusion (MEE).

Background: Delivery of therapeutic agents directly through the RW offers promise for treating sensorineural hearing loss. However, hearing loss can result from the surgical approach itself, and the reasons for this are poorly understood. We examined the hearing loss following the three major steps involved with the RW approach to access the mouse cochlea: bullostomy, RW puncture, and RW injection.

Methods: 21 adult CBA/J mice underwent bullostomy alone; 10 underwent RW puncture, and 8 underwent RW injection with PBS with 5% glycerol. Auditory brainstem responses and otoscopy were performed preoperatively and up to six weeks postoperatively. Hair cells were stained and survival was assessed using immunofluorescence.

Results: One week postoperatively, mice in all groups showed significant threshold shifts. Otoscopy revealed approximately half of all mice had MEE, with a higher incidence of effusion in the RW puncture and RW injection groups. Those with MEE had significant ABR threshold shifts, whereas those without MEE had minimal hearing loss. MEE persisted through six weeks in a majority of cases, but in those mice with MEE resolution, there was at least partial improvement in hearing. Immunohistochemistry showed minimal loss of hair cells in all animals.

Conclusion: MEE is highly correlated with hearing loss in mice undergoing bullostomy, RW puncture, and RW injection. Otoscopy is an important adjunct to consider after ear surgery in mice, as MEE may contribute to post- surgical hearing loss.

Define Professional Practice Gap & Educational Need: Lack of knowledge regarding the causes of hearing loss after round window surgery in mice.

Learning Objective: Middle ear effusion is a major cause of hearing loss after round window surgery in mice.

Desired Result: Otoscopy should be performed after ear surgery in mice, and otoscopic findings should be taken into account when assessing hearing outcomes.

Incidence of Sigmoid Sinus Wall Anomalies in Patients with Idiopathic Intracranial Hypertension

Kristen Angster, MD; Erica Archer, MD Michaela Matthews, MD; Prashant Raghavan, MD Robert Morales, MD; David Eisenman, MD

Objective: Determine the incidence of signal source wall anomalies (SSWA) in patient with only above Atracranial hypertension (IIH).

Study Desigy: Prosper joyn liagy ossie interventional study Settive IT in liagy on ler

Patient: Adults with papilledema referred to neuroophthalmology and subsequently diagnosed with IIH

Intervention(s): Diagnostic Computed tomography (CT) Main outcome measure(s): Subjective pulse synchronous tinnitus (PST) and diagnosis of SSWA by CT scan

Results: 20 subjects were enrolled. The incidence of SSWA in patients with IIH and PST was 71%. No subjects without PST had a SSWA, though 2 had PST without a SSWA. All identified anomalies were sigmoid plate dehiscences without diverticulum. This incidence of SSWA in subjects with IIH and PST is significantly higher than than the 23% reported for patients who underwent CT for PST (p<0.001) and far exceeds the 1.2% reported for patients undergoing CT for complaints other than PST. The mean BMI was lower in subjects with SSWA (32.46 kg/m2) compared to subjects with no SSWA (43.9 kg/m2)(44.47) (p=0.02).

Conclusions: There is a high incidence of sigmoid sinus dehiscence in subjects with IIH and PST. These results further support an association between sigmoid sinus dehiscence and IIH, and implicate SSWA as necessary, though possibly not sufficient, cause of PST in patients with IIH. Patients with IIH and PST should undergo high-resolution diagnostic CT. Transmastoid sinus wall reconstruction should be considered if PST persists despite medical management. Patients with SSWA and PST should be screened for IIH.

Define Professional Practice Gap & Educational Need: The incidence of SSWA in patients with Idiopathic Intracranial Hypertension has yet to be defined, and the relationship between these two pathologies is poorly understood.

Learning Objective: Know the incidence of sigmoid sinus wall anomalies (SSWA) in patients with idiopathic intracranial hypertension (IIH), and explain the need to screen for IIH in all subjects with sigmoid sinus dehiscence.

Desired Result: Following the presentation, attendees will recognize the importance of screening patients with sigmoid sinus dehiscence for IIH. Attendees will also be able to counsel patients with IIH about potential medical and surgical treatment options for associated pulse synchronous tinnitus.

Outcomes of the Suture "Pull-through" Technique after Repair of Lateral Skull Base CSF Fistula and Encephaloceles

Brendan P. O'Connell, MD; Jacob B. Hunter, MD Alex D. Sweeney, MD; Reid C. Thompson, MD Lola B. Chambless, MD; George B. Wanna, MD Alejandro Rivas, MD

Objective: 1) Report recurrences after repair of lateral skull base CSF fistula and encephalocele utilizing suture "pull- through" technique; 2) Examine post-operative audiometric outcomes using this method.

Study Design: Retrospective

Setting: Tertiary care hospital

Patients: Patients undergoing surgery for CSF fistula and/or encephalocele

Intervention: Combined transmastoid and middle fossa approach using suture pull-through technique

Main Outcome Measures: The primary outcome measures of interest were recurrence of CSF fistula or encephalocele, and post-operative ABG.

Results: 21 patients were included; mean age at surgery was 59 ± 14 years and 66%(14/21) of patients were female. The majority of defects involved both the tegmen mastoideum and tympani (62%, 13/21); multiple defects were present in 9 cases. Small craniotomy(2X3 cm) was performed and defects were repaired using composite grafts constructed with fascia, bone and/or cartilage, and dural substitute affixed with suture. The suture tail was left long and passed from the middle fossa through the defect into the mastoid. This allows centered and accurate reconstruction of the defect. At average follow-up of 9 ± 8 months, no cases of recurrent CSF leak or encephalocele were noted. After excluding patients with ossicular chain discontinuity related to chronic ear pathology, a trend towards improved post-operative ABG at last follow-up(15 ± 7 dB) was noted when compared to pre-operative ABG(24 ± 12 dB)(p=0.06).

Conclusion: A combined transmastoid and middle fossa approach for repair of lateral skull base CSF fistula and encephaloceles using the aforementioned technique is highly efficacious. This method facilitates reliable placement of a composite graft in the center of skull base defects, even though small craniotomies.

Define Professional Practice Gap & Educational Need: This is a novel technique, there is lack of awareness of this surgical technique.

Learning Objective: Describe the combined transmastoid and middle fossa approach with suture pull through and report clinical outcomes.

Desired Result: Attendees will have an understanding of our technique.

Transverse Sinus Considerations in Idiopathic Intracranial Hypertension and Visual Impairment Intracranial Pressure Syndrome

Glenn W. Knox, MD

Objective: Visual impairment intracranial pressure syndrome (VIIP) can occur in astronauts exposed to microgravity. VIIP is characterized by visual decrements, cotton-wool spot formation, choroidal fold development, papilledema, optic nerve sheath distention and/or posterior globe flattening, along with elevated ICP. All of these manifestations can occur in idiopathic intracranial hypertension (IIH). The objective of the present study is to compare IIH to VIIP with respect to transverse sinus stenosis and pulsatile tinnitus.

Study Design: Retrospective case review.

Setting: Primary care and occupational medicine ambulatory center.

Patients: The first 15 astronauts identified as having developed VIIP syndrome during long-duration (six months) missions on the International Space Station. Six patients had been analyzed in detail sufficient for comparative purposes. Interventions: Diagnostic. The VIIP patients were analyzed for the presence or absence of pulsatile tinnitus and transverse sinus stenosis. This series of patients was compared to a recently published meta-analysis of 19 studies with a total of 207 patients which examined outcomes of transverse sinus stenting for treatment of IIH.

Main Outcome Measures: Presence or absence of pulsatile tinnitus; presence or absence of transverse sinus stenosis on MRV.

Results: In the group of patients with VIIP syndrome, none of them had pulsatile tinnitus. Of the six cases, three of them had post-flight MRVs, all of which were negative for transverse sinus stenosis. In the meta-analysis of a total of 207 patients which looked at the overall clinical outcomes of transverse sinus stenting for the treatment of IIH, the authors reported an improvement rate of 81% with regard to headaches, 87% for papilledema, and 95% for pulsatile tinnitus.

Conclusions: Stenting of the transverse sinus does appear to be of therapeutic benefit in IIH. The small number of patients with VIIP syndrome suggests that the temporary elevation of ICP seen in microgravity does not result in transverse sinus stenosis. Transverse sinus stenosis may be a causative factor in IIH. In addition, transverse sinus stenosis may be a causative factor in the pulsatile tinnitus seen in IIH, since pulsatile tinnitus is absent in VIIP.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge of the pathophysiology and treatment of IIH.

Learning Objective: To characterize pathophysiologic factors in IIH by comparison with an analogous disorder, VIIP.

Desired Result: Attendees can use this information to counsel IIH patients regarding pulsatile tinnitus and visual disturbances, and provide information to the patients regarding transverse sinus stenting as a possible treatment modality.

Reconstruction Outcomes Following Lateral Skull Base Resection

Nicholas J. Thompson, BS; Joseph P. Roche, MD Nathan M. Schularick, MD; Kristi E. Chang, MD Marlan R. Hansen, MD

Objective: Compare reconstruction outcomes for various lateral skull base closure techniques.

Study design: Retrospective medical records review.

Setting: University-based tertiary referral center.

Patients: Patients who underwent resections of tumors involving the lateral skull base requiring reconstruction beyond primary closure.

Intervention(s): Reconstructive techniques, from rotational flaps to free tissue transfer.

Main outcome measure(s): Outcome data including wound complications, CSF leakage, and need for surgical revision were tabulated.

Results: Eighty-six patients underwent lateral skull base tumor resection and reconstruction. Procedures were primarily lateral temporal bone resections but also included subtotal temporal bone, total temporal bone, and infratemporal fossa resections. Cutaneous malignancy was the most common resection indication (83%) and the temporalis rotational flap was the most commonly employed reconstructive option (30%). When free tissue transfer techniques were utilized, the radial forearm, anterolateral thigh, and latissimus dorsi were the most frequent donor sites. Patients with T2 disease were more likely to undergo temporalis flaps, whereas patients with T4 disease were more likely to undergo free flap reconstruction. Major complications were uncommon (~8%), the most frequent being stroke (~3%). The postoperative wound complication rate was approximately 45%. The majority involved minor dehiscence and were managed conservatively. Patients with T4 disease were more likely to have wound complications when compared to other reconstruction techniques (p<0.05).

Conclusions: Many factors go into planning lateral skull base reconstruction. Free flaps were more often utilized for T4 disease. Radial forearm free flaps tended to have lower wound complication rates when compared to other techniques.

Define Professional Practice Gap & Educational Need: There are currently no discrete guidelines regarding optimal management of reconstructing lateral skull base defects.

Learning Objective: To recognize the different reconstruction options following skull base surgery and compare complication rates for each.

Desired Result: To aid in the decision making process of reconstructing lateral skull base defects with a focus on complication rates.

Cost Analysis of Cerebrospinal Fluid Leaks and Cerebrospinal Fluid Leak Prevention in Patients Undergoing Cerebellopontine Angle Surgery

Alexander Chern, BS; Jacob B. Hunter, MD Marc L. Bennett MD

Objective: To determine if cranioplasty techniques following translabyrinthine approaches to the cerebellopontine angle (CPA) are cost-effective

Study Design: Retrospective case series

Patients: One hundred and eighty patients with available financial data who underwent translabyrinthine approaches at a single academic referral center between 2005 and 2015

Intervention: Cranioplasty with a dural substitute, layered fat graft and a resorbable mesh plate secured with screws

Main Outcome Measures: Billing data was obtained for each patient's hospital course for translabyrinthine approaches and postoperative cerebrospinal fluid (CSF) leaks

Results: One hundred and nineteen patients underwent translabyrinthine approaches with an abdominal fat graft (AFG) closure, with a median cost of \$25,759.89 (range \$15,885.65-\$136,433.07). Sixty-one patients underwent translabyrinthine approaches with a dural substitute, AFG, and a resorbable mesh for closure, with a median cost of \$29,314.97 (range \$17,674.28-\$111,404.55). The median cost of a CSF leak was \$50,401.25 (range \$0-\$384,761.71). The additional cost of a CSF leak when shared by all patients who underwent translabyrinthine approaches is \$6,048.15. The addition of a dural substitute and a resorbable mesh plate following translabyrinthine approaches reduced the CSF leak from 12% to 1.9%, an 84.2% reduction, and a median savings per patient of \$2,932.23. Applying our cohort's billing data to previously published cranioplasty techniques, costs, and leak rate following translabyrinthine improvements approaches, all techniques were found to be cost-effective.

Conclusions: Resorbable mesh cranioplasty is cost-effective at reducing CSF leaks following translabyrinthine approaches. Per our billing data and achieving the same CSF leak reduction, cranioplasty costs exceeding \$5,080.32 are not cost-effective.

Define Professional Practice Gap & Educational Need: Minimal literature has discussed costs associated with post- operative CSF leaks. It is imperative for physicians to appreciate such costs as the American healthcare system shifts towards a bundled payment system.

Learning Objective: To describe costs associated with CSF leaks and cranioplasty techniques used to reduce postoperative CSF leak formation.

Desired Result: Attendees will appreciate costs of postoperative CSF leaks and cranioplasty techniques that can drastically reduce both the incidence and costs of postoperative CSF leaks.

Corneal Complications after Lateral Skull Base Surgery

Jeffrey D. Sharon, MD; Courtney L. Kraus, MD Matthew Ehrenburg; Heather Weinreich, MD Howard W. Francis, MD

Objective: To analyze the rate of corneal complications after lateral skull base surgery, and the relative risk of each potential contributing factor.

Study Design: Retrospective cohort study

Setting: Tertiary care center

Patients: Adult patients who had undergone lateral skull base surgery involving an otolaryngologist at our institution from 2007 to 2015

Intervention: none

Main outcome measure: Relative risk (RR) for each potential contributing factor to corneal complications

Results: 469 patients met inclusion criteria. Of those, 35 developed mild exposure keratopathy, 13 developed moderate exposure keratopathy, and 5 developed severe exposure keratopathy. Age, gender, prior eye surgery, tumor side, and pathology were not significant predictors of keratopathy. Tumor size greater than 30 mm (RR 4.75), post-operative trigeminal palsy (RR 3.42), post-operative abducens palsy (RR 9.08), House-Brackman score 5-6 (RR 4.77), lagophthalmos (RR11.85), ectropion (RR 4.29), prior eye disease (RR 1.83), and an anatomically non-intact facial nerve (RR 3.95) were all significantly associated with the development of corneal complications. On multivariate analysis, lagophthalmos and the presence of an abducens palsy were independent predictors of keratopathy.

Conclusions: There are several important risk factors for exposure keratopathy after lateral skull base surgery, and knowledge of these risk factors can help identify high risk patients in whom early, aggressive preventative therapy is warranted.

Define Professional Practice Gap & Educational Need: Lack of awareness of risk factors for corneal complications after lateral skull base surgery

Learning Objective: To provide education regarding the relative risk for each potential risk factor in the development of corneal complications after lateral skull base surgery

Desired Result: Attendees will be better able to identify patients at high risk for corneal complications, and institute early and aggressive preventative therapy

Endoscopic-Assisted Repair of CSF Otorrhea and Temporal Encephaloceles via Keyhole Craniotomy

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Objective: Temporal lobe encephaloceles and cerebrospinal fluid otorrhea from temporal bone defects that involve the tegmen tympani and mastoideum are general repaired using middle fossa, mastoidectomy, or combined approaches. Standard middle fossa craniotomy exposes patients to dural retraction which may lead to postoperative neurologic complications. Here we describe novel approach using endoscope visualization through a keyhole middle fossa craniotomy to repair tegmen defects.

Study design: Retrospective case review of a series of patients treated for temporal encephaloceles or cerebrospinal fluid originating from defects in the tegmen utilizing an endoscopic-assisted middle fossa keyhole craniotomy approach.

Setting: Tertiary referral center.

Patients: Patients included in the study underwent endoscopicassisted or fully endoscopic repairs of temporal encephalocele and/ or cerebrospinal fluid otorrhea originating from a defect in the tegmen. Only adult patients were included. Patients of multiple ethnicities and body mass indices were included.

Intervention: Endoscopic-assisted or fully endoscopic middle fossa repair of tegmen dehiscence through a keyhole craniotomy approach.

Main outcome measure: Recurrence of cerebrospinal fluid otorrhea or temporal encephalocele.

Results: All cases were performed successfully using a keyhole craniotomy with endoscopic visualization and minimal retraction. There were no recurrences of encephaloceles or cerebrospinal fluid otorrhea in these patients. Additionally, surgical times did not increase. There were no major postoperative complications within this series.

Conclusions: Endoscopic visualization allows for smaller incisions and craniotomies and less risk of brain retraction injury without compromising repair integrity during temporal lobe encephalocele and tegmen repairs.

Define Professional Practice Gap & Educational Need: lack of knowledge of added advantage of use of endoscopy for visualization for care of temporal encephaloceles and cerebrospinal otorrhea

Learning Objective: Introduction of the technique of endoscopic visualization of the tegmen via a middle fossa keyhole craniotomy approach in the surgical treatment of temporal lobe encephaloceles and cerebrospinal fluid otorrhea

Desired Result: Attendees will understand the technique and advantages of the use of endoscopic visualization of the tegmen in the surgical treatment of temporal lobe encephaloceles and cerebrospinal fluid otorrhea

Middle Cranial Fossa (MCF) Approach for the Management of Spontaneous Cerebral Spinal Fluid (CSF) Leaks

Rick F. Nelson, MD PhD; Joseph P. Roche, MD Bruce J. Gantz, MD; Marlan R. Hansen, MD

Objective: To determine the efficacy and morbidity of repairing spontaneous CSF leaks with the MCF approach without the use of a lumbar drain (LD), as perioperative use of LD remains controversial.

Study Design: Retrospective review from 2008-2015

Setting: Two university academic centers

Patients: Those with lateral skull base spontaneous CSF leaks and/or encephaloceles.

Intervention: MCF approach for repair of spontaneous CSF leak and/or encephalocele

Main Outcome Measure: Spontaneous CSF leak patient characteristics (age, sex, BMI, obstructive sleep apnea) were collected. Length of stay (LOS), post-operative complications, CSF leak rate, and need for LD were calculated.

Results: 25 patients underwent MCF repair. CSF diversion with LD was not used in most of the patients (21 of 25). The average LOS was significantly shorter without the use of a lumbar drain (3.9 vs. 9.5 days). Post-operative complications included transient mental status change (2), meningitis (1) and seizure (1). No patients experienced long- term neurologic sequelae or long-term CSF leak recurrence with an average length of follow up of 21.9 months. All patients with spontaneous CSF leaks were overweight (BMI >25 kg/m2) with an average BMI of 38.8 + 8.6 kg/m2. The average age was 58.1 + 9.1 years and 56 % were female. Most patients had obstructive sleep apnea (15 of 25).

Conclusions: The morbidity of the MCF craniotomy for repair of spontaneous CSF leaks is low and the efficacy of repair is high without the use of lumbar drain. Obesity and obstructive sleep apnea are highly associated with spontaneous CSF leaks.

Define Professional Practice Gap & Educational Need: The use of CSF diversion with lumbar drain remains controversial in the repair of spontaneous CSF leaks. There is a need to understand the morbidity and efficacy of surgical management of spontaneous CSF leaks

Learning Objective: To demonstrate the low morbidity and high efficacy of MCF repair for spontaneous CSF leaks without the use of a lumbar drain.

Desired Result: Physicians who manage lateral spontaneous CSF leaks should consider the middle fossa craniotomy as a safe and effective. CSF diversion is often not required for successful repair of spontaneous CSF leaks.

Visualization of Vestibular Structures using Optical Coherence Tomography in Mouse Models

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Hypothesis: Optical Coherence Tomography (OCT) is an effective tool to visualize the internal structures of the vestibular systems in mouse models

Background: OCT is an imaging modality that utilizes near infrared light as an imaging medium. The strength of OCT is in the extremely high resolution. OCT has been utilized to visualize normal and abnormal internal structures of rodent cochleae through the cochlear bony capsules in vivo. However the feasibility of OCT for vestibular systems has not been elucidated yet.

Methods: ICR and Slc26a4 knock-out mice at the age of postnatal day 1 and 105 were used. After the removal of the inner ear and fixation with 4% paraformaldehyde, near infrared light was applied from the cranial side of the vestibule to image the internal structures. The inner ears were then prepared for paraffin sections, and stained with hematoxylin and eosin.

Results: OCT effectively demonstrated granules of otoconia, as strong signals in the vestibule of P1 and adult ICR mice. After decalcification, signals of otoconia showed attenuation, and deeper structures such as the stapedial footplate could be visualized. Giant otoconia in the utricle and saccule were observed in Slc26a4 knock-out mice.

Conclusion: OCT is a useful modality for inspection of the internal morphology of normal and abnormal vestibular structures in mouse models.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge for the effectiveness of optical coherence tomography applied to the mouse vestibule.

Learning Objective: To reveal the ability and limitation of optical coherence tomography for use in the mouse vestibular structures, including otoconia and membranous labyrinth.

Desired Result: Audience will recognize the effectiveness of optical coherence tomography for the vestibular systems and hopefully it will be applied further for the basic research of vestibules and development of the imaging device for clinical application.

The Efficacy of Color Mapped Fusion Imaging in the Postoperative Follow-up Evaluation for Residual Cholesteatomas

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Objective: To assess the efficacy of color mapped fusion imaging (CMFI) in evaluating shadows found on CT scans during postoperative follow-up evaluations for residual cholesteatomas in patients whom had undergone surgery for removal of primary acquired cholesteatomas.

Study Design: Prospective case study

Setting: Single university hospital

Patients: Ninety patients who had undergone surgery for removal of primary acquired cholesteatomas and were undergoing postoperative follow-up evaluations for residual cholesteatomas at 6-month intervals.

Intervention: Patients underwent a CT scan. If shadows were found suggesting the presence of a residual cholesteatoma, CMFI was performed to determine if the shadows were a cholesteatoma.

Main Outcome Measure(s): Shadows were found on the CT scan in 68 of 90 patients. The presence of a residual cholesteatoma was strongly suggested in 5 of the 68 patients based on CMFI and these 5 patients all underwent additional surgery. The CMFI evaluations for these patients were compared to intraoperative findings.

Results: All 5 patients were found to have a residual cholesteatoma in the same anatomical location as indicated by CMFI and these cholesteatomas were all successfully removed. CMFI facilitated accurate and immediate detection of the cholesteatoma anatomical location in contrast to a CT scan. A CT scan alone requires waiting until the next 6-month follow-up evaluation to determine whether the shadow is a cholesteatoma based on its growth. Thus all residual cholesteatomas were removed at the earliest possible stage in the postoperative follow-up evaluation process.

Conclusions: CMFI is a reliable diagnostic modality for postoperatively identifying early-stage residual cholesteatomas.

Define Professional Practice Gap & Educational Need: To spread awareness of the newly developed CMFI which facilitates accurate identification of early-stage residual cholesteatomas.

Learning Objective: To demonstrate that CMFI is a reliable diagnostic modality for not only preoperatively identifying cholesteatomas but also postoperatively identifying early-stage residual cholesteatomas.

Desired Result: CMFI will be widely applied to all types of cholesteatomas to more precisely determine the anatomical location of cholesteatomas at an earlier stage than previously possible. These improvements will also facilitate determination of whether a patient is indicated for transcanal endoscopic surgery (TEES) in the treatment of such cholesteatomas.

Effects of Large-dose Steroid Administration in Bell's Palsy

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Objective: Recent large-scale investigations have not been conducted on the efficacy of large-dose steroid administration of prednisone (PSL) for Bell's palsy. We compared treatment results between normal dose steroid (PSL 1 mg/kg/day) and large-dose steroid (PSL 200 mg/day) administration.

Study Design: Retrospective case review

Setting: Tertiary referral center

Patients: A total of 923 patients with Bell's palsy were treated in our department between 1995 and 2014. These patients could be divided into a normal dose group of 355 and large-dose group of 568 patients.

Methods: We separately assessed treatment outcomes for the three groups of H-B grade V patients, H-B grade IV patients and all patients. Logistic regression analysis was also performed to investigate factors which can impact treatment outcomes, i.e. gender, age, days to start of treatment, PSL dosage and antiviral drug administration.

Results: Recovery rates were significantly better in the PSL 200 mg/day group in comparison with the PSL 1 mg/day for H-B grade V (83.5% vs. 96.2%) H-B grade IV (77.7% vs. 100%) and all patients (68.2% vs. 92.5%). Recovery rates were also superior in the PSL 200 mg/day group when an antiviral agent was also administered. Significant factors for treatment outcomes were PSL 200 mg/day administration and early initiation of treatment for grade IV and PSL 200 mg administration for all patients. Insignificant factors were gender, age and the antiviral agent.

Conclusion: We showed the PSL 200 mg/day administration produced significantly better outcomes than PSL 1 mg/kg/day administration in the treatment of patients with Bell's palsy.

Define Professional Practice Gap & Educational Need: Lack of large-scale investigation about efficacy of large-dose steroid (PSL) administration for Bell's palsy.

Learning Objective: We showed large-scale investigation about efficacy of large-dose steroid (PSL) administration for Bell's palsy.

Desired Result: To demonstrate that PSL 200 mg administration and early initiation of treatment are superior in terms of treatment outcomes.

Investigation of Piezoelectric Sensors for Totally Implantable Otologic Microphones

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Hypothesis: To determine if piezoelectric sensors can measure umbo motion or intracochlear pressure change to function as totally implantable otologic microphones.

Background: Current implantable microphones have functional and design limitations. We have previously reported on the idea of a microphone to be imbedded in a cochlear implant electrode array. Additionally, we have been exploring feasibility of sensing umbo motion. Here we report resolution, sensitivity and limitations of our piezoelectric microphone designs.

Methods: An extended facial recess was created in fresh human cadaveric temporal bones, and sound pressure was applied to the ear canal. Intracochlear pressures were measured with a piezoelectric sensor in scala tympani. Umbo motions were measured with a piezoelectric device above the cochlear promontory. Both piezoelectric sensors were constructed of polyvinylidene fluoride (PVDF) material. Ear canal pressure, stapes velocity and umbo velocity were concurrently measured.

Results: Both intracochlear pressure and umbo motion were successfully recorded with our sensors, with minimal effect on ossicular motion. These sensor measurements were similar to the ear-canal pressures across a broad frequency range.

Conclusions: Sensing umbo velocity and intracochlear pressures are feasible for implantable microphones. Future studies will focus on refining these designs to increase sensitivity, improve signal to noise ratio, improve the design for surgical ease, and ultimately incorporate the design for use with active middle ear devices and cochlear implants.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge of methods to create fully implantable otologic microphones

Learning Objective: To understand the current possibilities for the use of piezoelectric sensors as fully implantable otologic microphones

Desired Result: Attendees will be able to apply knowledge of different technologies for fully implantable microphones to future research directions in active middle ear implants and fully implantable cochlear implants

Modification of Osseointegrated Device Parameters to Improve Speech in Noise and Localization Ability: Clinical Recommendations

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Objective: To determine how best to modify osseointegrated (OI) device or environmental settings to maximize hearing ability.

Study Design: Prospective cohort study

Setting: Tertiary referral center

Patients: 13 adults with single-sided deafness (SSD), normal contralateral hearing, and a minimum of 6 months OI usage

Interventions: Speech in noise (SIN) and localization were assessed in a multi speaker array (R-Space) with patients repeating sentences embedded in competing noise and verbally indicating the source speaker, respectively.

Main Outcome Measures: SIN and localization were assessed with multiple OI microphone settings (adaptive, fixed- directional and omnidirectional) as well as an unaided (i.e., OI off) condition. Participants completed the Abbreviated Profile of Hearing aid Benefit.

Results: Localization performance remains compromised for OI users with a high number of front-back confusions, but fixed-directional microphone settings improve side angle localization (p<0.01). SIN performance is greatly enhanced with speech presented to the contra hearing ear (+6dBSNR; p<0.001). Subjective report of hearing ability is highly predictive of objective localization measures (p<001).

Conclusions: Clinicians should consider implementing a fixeddirectional microphone setting for improved localization performance. For better hearing in noise, clinicians should counsel OI recipients to orient the speech signal to their normal hearing ear rather than their OI device.

Define Professional Practice Gap & Educational Need: 1. Lack of clinician awareness for maximizing osseointegrated device performance with device or environmental settings. 2. Variation in practice patterns for maximizing hearing in noise and sound localization ability for osseointegrated device users.

Learning Objective: 1. To determine how to maximize osseointegrated device performance with device and environmental settings. 2. To determine how to maximize hearing in noise and sound localization ability for osseointegrated device users.

Desired Result: Clinicians will know how to maximize hearing in noise and sound localization ability for osseointegrated device users by appropriately adjusting device and environmental settings.

Management of Mal de Debarquement Syndrome as Vestibular Migraines

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Objective: Mal de debarquement syndrome (MdDS) is a balance disorder which typically starts after an extended exposure to passive motion such as boat and plane rides. Management is typically supportive (e.g. physical therapy), and symptoms that persist beyond six months have been described as unlikely to remit. This study was conducted to evaluate the response of MdDS to management with migraine prophylaxis, including lifestyle changes and medical therapy.

Study Design: Prospective review.

Setting: Outpatient clinic, tertiary medical center

Methods: Clinical history, detailed questionnaires and audiograms were used to diagnose patients with MdDS. Those patients with the diagnosis of the MdDs were placed on our institutional vestibular migraine management protocol.

Results: Fifteen patients were diagnosed with MdDS with a predominance of females (11 (73%) female), with a mean age of 50 ± 13 years. Concurrent diagnosis of vestibular migraine, Meniere's disease and sinus headaches was present in 11 (73%), 9 (60%) and 13 (87%) of these patients, respectively. Nine patients (60%) responded well to management with a vestibular migraine protocol, which included lifestyle changes, as well as pharmacotherapy with verapamil, nortriptyline or topiramate.

Conclusions: Management of MdDS as vestibular migraine yields successful results in improving patients' symptoms and increasing the quality of life. Nearly all the patients suffering from MdDS had a personal or family history of migraine headaches or had signs or symptoms suggestive of atypical migraine.

Define Professional Practice Gap & Educational Need: Sometimes there might be a lack of knowledge about Mal de Debarquement Syndrome (MdDS) and its diagnosis. Also the proper and ideal treatment for these patients still remains a challenging issue.

Learning Objective: To observe response of the patients with MdDS to the medications used for (vestibular) migraine and changes in the quality of life in these patients.

Desired Result: To find out the prevalence of patients with MdDS and also to improve the quality of life in patients with MdDS.

Cochlin-tomoprotein (CTP) Detection Test Revealed Idiopathic Perilymphatic Fistula in Patients with Idiopathic Sudden Sensorineural Hearing Loss

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Objective: To demonstrate that the presence of the previously ignored idiopathic perilymphatic fistulas (PLF) in patients with idiopathic sudden sensorineural hearing loss (ISSNHL) using a cochlin-tomoprotein (CTP) detection test.

Study design: A prospective case series

Setting: Tertiary referral center

Patients: Twenty-one patients with ISSNHL received intratympanic steroid therapy using dexamethasone (IT DEX) between December 2013 and July 2015.

Intervention: Dexamethasone was injected through a perforation made by laser-assisted myringotomy. IT DEX administration was performed on 8 consecutive days. A lavage was performed on the middle ear through the perforation on the first or second day of treatment to collect samples for the CTP detection test. CTP is defined as present at a value of 0.8 ng/ ml or higher.

Results: The CTP detection test revealed that 5 out of the 21 patients (23.8%) with ISSNHL were CTP positive (0.81 to 3.44 ng/ml, mean 1.5 ng/ml). This result suggests that idiopathic PLF can be a cause of ISSNHL.

Conclusions: Five of the 21 patients with ISSNHL were CTP positive, suggesting that idiopathic PLF may be a causative factor in some cases of ISSNHL. These findings underscore the need for physicians to consider idiopathic PLF in their diagnosis of ISSNHL.

Define Professional Practice Gap & Educational Need: To spread awareness that idiopathic perilympatic fistula can be important cause of idiopathic sudden sensorineural hearing loss.

Learning Objective: To show that idiopathic perilympatic fistula is not a rare but can be an important cause of idiopathic sudden sensorineural hearing loss.

Desired Result: More than 20% of patients with idiopathic sudden sensorineural hearing loss were idiopathic perilympatic fistula.

Vestibular Functions in Otitis Media with Antineutrophil Cytoplasmic Antibody (ANCA)-Associated Vasculitis (OMAAV) Patients

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

Objective: Otitis media with antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis (OMAAV) is a recently reported novel ear disease, which is characterized by a rapidly progressing, mixed or sensorineural hearing loss with presence of serum ANCA. OMAAV is sometimes accompanied by systemic lesions in the lungs and kidneys, for which steroid plus cyclophosphamide therapy is provided. OMAAV causes profound hearing loss, sometimes bilaterally, and in the absence of immediate treatment, cochlear implants may be needed. Although characteristics of auditory disturbance in patients with OMAAV have been briefly described, there is no report on vestibular dysfunction in these patients. In this study, we investigated vestibular function and the clinical features of dizziness in patients with OMAAV.

Study Design: Retrospective case series.

Setting: University hospital.

Patients: Twenty-eight patients diagnosed with OMAAV.

Main outcome measures: Clinical findings and caloric response.

Results: Nine of the 28 patients (32.1%) complained of dizziness: 1 patient showed acute vertigo with sudden hearing loss and the other 8 patients slowly developed dizziness with the progression of hearing loss. Among these 9 patients, 3 (33.3%) still had dizziness after the treatment. All 9 patients showed absence of vestibular response on caloric testing. Eight patients with OMAAV who had no vestibular symptoms underwent equilibrium function test. Of these, 5 patients showed caloric weakness.

Conclusions: These results suggest that vestibular function is disturbed in almost all patients with OMAAV, but may not be noticed because of gradual progression. However, early treatment such as vestibular rehabilitation is important for symptomatic patients.

Define Professional Practice Gap & Educational Need: Lack of contemporary knowledge of otitis media with antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis(OMAAV)

Learning Objective & Desired Result: To understand of the inner ear function of OMAAV patients OMAAV causes vestibular dysfunction as well as profound hearing loss.

A Retrospective Review of Temporal Bone Imaging with Respect to Bone-Anchored Hearing Aid Placement

Aaron R. Baker, MD; David Fanelli, BS Sangam Kanekar, MD; Huseyin Isildak, MD

Objective: Current bone-anchored hearing aid (BAHA) guidelines recommend placement of the titanium implant 5-7cm posterior to the ear canal. Previous studies show that bone conducted hearing is maximized the closer the transducer is to the cochlea. We aim to demonstrate that BAHA implants may be safely placed closer to the ear canal in patients with chronic ear disease, enhancing the amplification available to the patient.

Study Design: We performed a retrospective review of highresolution temporal bone CTs, comparing multiple measurements between ears with chronic ear disease and normal controls.

Setting: Images were obtained at a single academic medical center.

Patients: 80 patients (160 ears) with temporal bone CTs performed between 2006 and 2009 were measured. Patients with chronic ear disease were identified by ICD-9 code and confirmation by review of the imaging.

Main Outcome Measures: Measurements were made on axial CT slices from a point 1cm posterior to the sigmoid sinus to the posterior margin of the external canal. The squamous temporal bone thickness was also measured a this point.

Results: 47 patients (55 ears) had chronic ear disease. Distance from the posterior canal was significantly different between normal and diseased ears (36.3mm vs. 33.5mm, p<0.001). Squamous temporal bone thickness varied widely, and was similar between groups (6.9mm vs. 6.8mm, p=.76).

Conclusions: According to our data, titanium implants for bone-anchored hearing aids may be safely placed closer to the external canal than the current recommendations. This could allow for better transduction as well as sound localization in BAHA patients.

Define Professional Practice Gap & Educational Need: 1. Current guidelines for BAHA placement are based on safety concerns 2. Lack of contemporary data on the safety of alternative locations for placement of BAHA implants, and comparison between normal ears and ears with chronic disease.

Learning Objective: 1. We will show the learner that placement of BAHA implants closer to the ear is safe while avoiding the sigmoid sinus, especially in patients with known chronic ear disease.

Desired Result: The learner will be able to consider placement of BAHA implants closer to the ear, particularly in patients who have known chronic ear disease.

Content Validity of Temporal Bone Models Printed Via Inexpensive Methods and Materials

T. Michael Bone, BS; Sarah E. Mowry, MD

Hypothesis: The 3D printed models will be within 15% accuracy of the scans of the cadaveric temporal bones.

Background: Previous studies have evaluated the face validity of 3D-printed temporal bone models designed to train otolaryngology residents. The purpose of the study was to determine the content validity of temporal bone models printed using inexpensive printers and materials.

Methods: Four cadaveric temporal bones were randomly selected and clinical temporal bone CT scans were obtained. Models were generated using previously described methods in acrylonitrile butadiene styrene (ABS) plastic using Makerbot Replicator 2x and Hyrel printers. Models were radiographically scanned using the same protocol as the cadaveric bones. Four images from each cadaveric CT series and four corresponding images from the model CT series were selected, and voxel values were normalized to black or white. Scan slices were compared using PixelDiff software. Gross anatomic structures were evaluated in the model scans by 4 board certified otolaryngologists on a 4 point scale.

Results: Mean pixel percent difference between the cadaver and model scans was $16.89\% \pm 6.8\%$. Mean cortical bone width difference and mean external auditory canal width difference were 0.58 ± 0.66 mm and 0.55 ± 0.46 mm respectively. Expert raters felt the mastoid air cells were well represented (2.5 ± 0.5), while middle ear and otic capsule structures were not accurately rendered (all averaged <1.8)..

Conclusion: These results suggest that these models would be sufficient adjuncts to cadaver temporal bones for training residents in cortical mastoidectomies, but less effective for middle ear procedures.

Define Professional Practice Gap & Educational Need: Lack of knowledge about the internal structures of printed temporal bone models

Learning Objective: Identify why printed temporal bone models are useful. Describe a novel method to assess the accuracy of the printed temporal bone. Explain why portions of the model are poorly rendered by the printing process.

Desired Result: Attendees will be able to assess the accuracy of models regardless of the method used to create them.

Indicate IRB or IACUC Approval: Exempt

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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.

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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

The American Neurotology Society Research Grant will provide \$25,000 for one year of support. The purpose of this 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. Grants are available to physician investigators in the United States and Canada only.

If you would like to submit a grant for consideration, a letter of intent must be submitted to by December 31st one month prior to the January 31st deadline for the applications. The letter of intent must state the grant mechanism for the proposal, the Principle Investigator and Institution(s) for the work, contain an abstract with title of no more than 500 words to summarize the proposal.

Letters should be sent via email to Dr. John Oghalai, joghalai@stanford.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: Cochlear Irradiation and Dosimetry: Apoptosis, Necrosis, and Hearing Loss Principal Investigator: Christine T. Dinh, M.D. Co-PIs: Fred F. Telischi, M.D., and Esperanza Bas, Ph.D.

Our long term goal is to unravel the key molecular processes that lead to radiation ototoxicity, in order to develop effective drug therapies that can arrest radiation-induced hearing loss. The central hypothesis of this research proposal is that higher dosages of cochlear irradiation initiate hearing loss through necrotic cell death of auditory hair cells. We are testing our hypothesis by performing the following aims:

Specific AIM 1 investigates the cellular expression of apoptosis and necrosis of auditory hair cells exposed to radiation (0, 3, 6, 9, 12, 15, and 18 Gray [Gy]) in neonatal rats We hypothesize that higher dosages of radiation in vivo. preferentially induce necrosis of auditory hair cells. To assess for cell death, organ of Corti were harvested 12 and 72 hours after radiation, processed with fluorescent stains for apoptosis and necrosis, and visualized with a confocal microscope. Progress: We determined that lower dosages of radiation (0, 3, 3)6, and 9 Gy) did not initiate noticeable apoptotic or necrotic cell death of auditory hair cells at all turns of the cochleae. However, higher dosages of radiation (12, 15, and 18 Gy) initiated higher levels of apoptotic cell death in the basal turn, compared to the middle and apical turns at 72 hrs (but not 12 hours). Necrotic cell death was not visualized in any of the specimens, which was contradictory to our original hypothesis.

<u>Specific AIM 2</u> investigates the expression levels of apoptosis and necrosis genes in organ of Corti exposed to radiation (0, 6, 12, and 18 Gy) in neonatal rats in vivo. We hypothesize that higher dosages of radiation would preferentially increase necrosis-related genes in neonatal rat cochlea in vivo. Eightyfour cell death genes were screened using real-time PCR. Progress: Pro-apoptotic genes Bax, Fas, Pidd, and TNF were upregulated 6 hours after radiation in a dose-dependent fashion. However, twelve hours after radiation, high levels of *Bax*, *Pidd*, and *TNF* were only seen in 18 Gy specimens. *Fas* remained elevated at 12 hours in all radiation dosages, albeit at lower levels than 6 hours. *Ripk3* was the only necrosis-related gene that was up-regulated; however, this increase was marginal and only seen at 18 Gy at 12 hours. These results suggest that radiation-induced ototoxicity occurs primarily through apoptosis (not necrosis), which is contradictory to our original hypothesis.

Specific AIM 3 determines the short and long term hearing outcomes in adult rats exposed to single fraction radiation (0, 3, 6, 9, 12, 15, and 18 Gy). We hypothesize that higher doses of radiation initiate acute (≤ 10 weeks) and progressive (≥ 16 weeks) high frequency hearing losses. To assess for hearing loss, auditory brainstem response testing were performed at 4, 8, 16, 24, and 32 kHz. <u>Progress</u>: Hearing thresholds have been evaluated up to 16 weeks after radiation, but not yet 24 weeks. Lower doses of radiation (3, 6, and 9 Gy) did not cause a shift in hearing thresholds at all frequencies and at all time points.

Higher doses of radiation (12, 15, and 18 Gy) caused temporary threshold shifts 1 and 4 weeks after radiation exposure that recovered almost completely at 10 weeks; however, a second threshold shift was demonstrated at these radiation dosages in varying degrees 16 weeks after radiation. This finding was not expected and is yet to be confirmed at 24 weeks. Histological analysis to determine auditory hair cell viability will proceed after the final auditory brainstem response testing.

Specific AIM 4 determines if hypofractionated radiation augments long term hearing outcomes in adult rats. We hypothesize that limited fractionation (6 Gy daily x 3 days, and 4 Gy daily x 5 days) produces less hearing loss than the equivalent radiation dose of 12 Gy in a single fraction. Progress: Although 12 Gy resulted in a hearing threshold shift in the high frequencies, both hypofractionated regimens of radiation were not associated with hearing loss at 16 weeks. This finding is consistent with our hypothesis but needs to be confirmed at 24 weeks. Histological analysis will also need to be completed.

For the remaining five months of this research, we will perform auditory brainstem response testing 24 weeks after radiation and histological analysis for auditory hair cell viability. At the completion of this study, we will have a better understanding of radiobiology in the inner ear and radiation effects on short and long term hearing. This knowledge will direct our future investigations on radiation ototoxicity and otoprotection. 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 1980-81 Harold Schuknecht, MD 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

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Richard R. Gacek, MD (Emeritus 1970) Worcester, MA

Malcolm Graham, MD (Emeritus 1972) Atlanta, GA

Lee Harker, MD (Emeritus 1974) Omaha, NE

Cecil W. Hart, MD (Emeritus 1968) Palm Springs, CA

C. Gary Jackson, MD (Emeritus 1979) Mt Pleasant, SC

Donald B. Kamerer, MD (Emeritus 1974) Pittsburgh, PA

Athanasios Katsarkas, MD (Emeritus 1978) Montreal, Canada Robert Kohut, MD (Emeritus 1975) Woodleaf, NC

S. George Lesinski, MD (Emeritus 1976) Cincinnati, OH

Frederick H. Linthicum, Jr., MD (Emeritus 1968) Los Angeles, CA

Robert D. McQuiston, MD (Emeritus 1976) Indianapolis, IN

Pierre B. Montandon, MD (Emeritus 1974) Geneva, Switzerland

William Morgan, MD (Emeritus 1973) Charleston, WV

James Nelson, MD (Emeritus 1976) La Jolla, CA

Fred Owens, MD (Emeritus 1976) Dallas, TX

Leonard R. Proctor, MD (Emeritus 1975) Baltimore, MD

Fredric W. Pullen, MD (Emeritus 1974) Wellington, FL

William J. Rice, MD (Emeritus 1978) Grosse Pointe, MI

Jose Antonio Rivas, MD (Emeritus 1977) Bogota, Colombia

Mendell Robinson, MD (Emeritus 1974) Rehoboth, MA

Robert J. Ruben, MD (Emeritus 1969) Bronx, NY

Wallace Rubin, MD (Emeritus 1968) Metairie, LA

Fred T. Shaia, MD (Emeritus 1975) Richmond, VA

M Coyle Shea, MD (Emeritus 1976) Memphis, TN

James B. Snow, Jr., MD (Emeritus 1968) West Grove, PA

Gershon J. Spector, MD (Emeritus 1976) St. Louis, MO

James T. Spencer Jr, MD (Emeritus 1973) Charleston, WV

Jun-Ichi Suzuki, MD (Emeritus 1978) Tokyo, Japan

Ruediger Thalmann, MD (Emeritus 1970) Saint Louis, MO

Vern B. Tubergen, MD (Emeritus 1977) Indianapolis, IN William Updegraff, MD (Emeritus 1976) Lagrangeville, NY

Richard J. Wiet, MD (Emeritus 1983) Sawyer, MI

Robert J. Wolfson, MD (Emeritus 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.

> Congratulations to the following ANS Associates who UPGRADED to FELLOW this year:

> > (by way of application) Michael B. Gluth, MD Kevin X. McKennan, MD Michael J. Shinners, MD Mark Widick, MD

(by way of Neurotology board certification) Yuri Agrawal, MD Kyle P. Allen, MD K. Paul Boyev, MD Adam M. Cassis, MD Wade W. Chien, MD Richard K. Gurgel, MD Selena Heman-Ackah, MD, PhD Michael Hoa, MD Robert S. Hong, MD Daniel Jethanamest, MD Elina Kari, MD Matthew L. Kircher, MD Jerry W. Lin, MD Mia E. Miller, MD Aaron C. Moberly, MD Howard S. Moskowitz, MD Sarah E. Mowry, MD Brian D. Nicholas, MD Ryan G. Porter, MD Betty Tsai, MD Esther X. Vivas, MD Sean R. Wise, MD Yu-Lan Mary Ying, MD

ALL AMERICAN NEUROTOLOGY SOCIETY MEMBERSHIP INQUIRIES SHOULD BE DIRECTED TO THE ANS ADMINISTRATIVE OFFICE

Kristen Bordignon, Administrator Email: <u>administrator@americanneurotologysociety.com</u>
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)

Kristen Angster, MD Baltimore, MD

Joseph T. Breen, MD Houston, TX

William Colby Brown, MD Cleveland, OH

Patrick Cody Buchanan, DO Seattle, WA

Richard Cannon, MD Salt Lake City, UT

Si Chen, MD Miami, FL

Brian S. Chen, MD Glendale, CA

Susan D. Emmett, MD Baltimore, MD

Antoine Eskander, MD Toronto, ON Canada

Jonathan K. Frankel, MD Shaker Heights, OH

David R. Friedmann, MD New York, NY

Michele M. Gandolfi, MD Los Angeles, CA

Mark Gelpi, MD Cleveland, OH Michael S. Harris, MD Columbus, OH

Douglas M. Hildrew, MD Pittsburgh, PA

Candace E. Hobson, MD San Diego, CA

Kathryn Hoppe, MD Cleveland, OH

Emily N. Hrisomalos, MD Cleveland, OH

Jacob B. Hunter, MD Nashville, TN

Neal M. Jackson, MD Baton Rouge, LA

Elizabeth Kelly, MD Woodbury, MN

Daniel Killeen, MD Dallas, TX

Ruwan Kiringoda, MD Boston, MA

Pelin Kocdor, MD Chapel Hill, NC

Raymond Kung, MD Iowa City, IA

Shawn Li, MD Shaker Heights, OH

Nauman Manzoor, MD Cleveland, OH

Frank H. Masters III, MD Cleveland, OH

Beth N. McNulty, MD Farmington, MI

Aaron M. Metrailer, MD Royal Oak, MI

James Naples, MD Farmington, CT

Ryan S. Nord, MD University Hts, OH

Brendan O'Connell, MD Nashville, TN

Kevin A. Peng, MD Los Angeles, CA

Seth E. Pross, MD Baltimore, MD

Aaron K. Remenschneider, MD, MPH Boston, MA Daniel Roberts, MD Pasadena, CA

Joseph P. Roche, MD North Liberty, IA

Brian Rodgers, MD Royal Oak, MI

Douglas S. Ruhl, MD Charlottesville, VA

Joshua Sappington, MD Baton Rouge, LA

Alec Barry Gale Sevy, MD Palo Alto, CA

Jeffrey D. Sharon, MD Baltimore, MD

Shawn M. Stevens, MD Cincinnati, OH

John Gerka Stuyt, MD Cleveland, OH

Akina Tamaki, MD Cleveland, OH

Jason E. Thuener, MD Rocky River, OH

Anthony M. Tolisano, MD Honolulu, HI

Yvonne Y-W Tsui, MD Cleveland, OH

Nopawan Vorasubin, MD San Diego, CA

Erika M. Walsh, MD Birmingham, AL

Tammy Wang, MD Cleveland, OH

Cameron C. Wick, MD Dallas, TX



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.

> Christopher J. Linstrom, MD (Fellow 1990) Robert Sofferman, MD (Senior Fellow, 1995)

The following schedule has been coordinated for the 2016 ANS Fall meeting in San Diego, CA Hilton Bayfront San Diego "Super Saturday" September 17, 2016

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 *Lawrence R. Lustig, MD* - ANS President-elect

<u>A FRIENDLY REMINDER!</u> 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 or mail a check in advance. Registration will begin in June.

The registration fee schedule is as follows:

ANS Member - \$100 (after September 1st, \$150)

ANS Trainee Member - No registration fee

Resident/MS - No registration fee

Nonmember - \$200 (after September 1st, \$250)

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

<u>General registration & housing for the AAO-HNS Annual</u> meeting, Sept 18-21, 2016 will open in May 2, 2016

In order to secure housing and take advantage of the negotiated group rate at the Hilton Bayfront, you MUST register for the AAO-HNS meeting first. There are NO exceptions. There will be a large block of rooms available at the Hilton 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 on May 2nd.

http://www.entannualmeeting.org/16/registration/registration

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, 2016 and June 1, 2016. The abbreviated abstracts should include a title AND clinical presentation only. The format is an "unknown" or "complicated" case presentation generate audience participation designed to and discussion.

submit Please all abstracts to Kristen Bordignon at 1^{st,} administrator@americanneurotologysociety.com by June 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 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. Thank you,

John P. Leonetti, MD

STEREOTACTIC RADIOSURGERY STUDY GROUP

The 2016 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, 2016 and June 1, 2016 for 5 minute SRS SG case presentations followed by discussion. The abbreviated abstracts should include a title AND <u>clinical</u> 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 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 32nd gathering of the WHCISG as a part of the "Super Saturday" events during the ANS 51st Annual Fall meeting in conjunction with the AAO-HNSF Annual Meeting & OTO EXPO in San Diego, CA. 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 cosponsored 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 CarberyC@ent.wustl.edu no later than Friday, July 15th 2016.

Sincerely, Craig A. Buchman, MD, FACS