Welcome to the Department of Otolaryngology Resident Research Day at the University of Colorado School of Medicine. The major educational function of the Department is to train the complete otolaryngologist – head and neck surgeon. Under supervision of the medical staff, residents participate in all phases of patient care, education, and research.

Patient care discussions go on every day. However, today the residents will have the opportunity to present their scholarly research activities to the group. We are aware that most are not going to do hands on research in the future, but you must be consumers of research in your daily practice. Developing critical judgment promotes better patient care. Understanding the basic scientific method principles is the first step. Most of the projects today were begun in the 2nd year of residency and completed over the course of the training.

Thank you for participating in our program today and we look forward to seeing everyone in June 2013 for the 6th Annual Resident Research Day.

Special Thanks
We would like to acknowledge our educational grant sponsor for our Annual Resident Research Day. We appreciate their continued support and commitment towards our resident educational endeavors.
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Robin T. Cotton MD, FACS, FRCS(C)
Professor, Department of Otolaryngology- Head and Neck Surgery
University of Cincinnati College of Medicine
Director, Department of Pediatric Otolaryngology, Children’s Hospital Medical Center, Cincinnati, OH

Originally from England, Robin T. Cotton, MD, director of the Department of Pediatric Otolaryngology – Head and Neck Surgery is a graduate of the University of Cambridge, Cambridge, England and of the University of Birmingham, Birmingham, England. His Otolaryngology residency and fellowship at the University of Toronto was followed by a Head & Neck Fellowship at the University of Cincinnati.

In 1973 he became director of the Department of Pediatric Otolaryngology -- Head and Neck Surgery at Cincinnati Children’s Hospital Medical Center. He is an accomplished author – publishing hundreds of articles and many books, chapters and monographs. Dr. Cotton is a member of multiple societies and committees, has held numerous offices over the course of his career and has received a long list of awards and recognitions for his accomplishments.

Dr. Cotton has built the world's premiere center for the diagnosis and treatment of airway abnormalities. He was instrumental in developing the Airway Management Unit, which has evolved into the Aerodigestive Sleep Center. The Aerodigestive Sleep Center is now the forefront of the multidisciplinary approach management for children with complex airway disorders.

The Department of Pediatric Otolaryngology has become the busiest surgical subspeciality at Cincinnati Children’s, with more than 36,000 visits and 15,000 surgeries each year. The Pediatric Otolaryngology -- Head and Neck Surgery Division was the first to utilize Cincinnati Children's outpatient facilities.

Dr. Cotton has been an invited speaker to many national and international functions each year. Because of his reputation, 70 percent of his patients requiring airway surgery are from outside the Ohio, Indiana and Kentucky area.

Together, Dr. Cotton and his colleagues have developed a world-renowned program to treat primary and specialized ear, nose and throat problems, including swallowing disorders, speech disorders and cochlear implants.

Named one of the “Best Doctors in the United States” in 1998, Dr. Cotton and his staff have built an international reputation for the treatment of hearing and aerodigestive conditions in children.
Sue C. Kinnamon PhD
Professor
Department of Otolaryngology Research Division, Department of Cell & Developmental Biology, and Department of Physiology & Biophysics

Dr. Kinnamon received her PhD from Kansas State University and completed postdoctoral fellowships at the University of Colorado Health Sciences Center. In 1985 she joined the faculty at Colorado State University, Department of Biomedical Sciences. In January, 2009, she became a tenured Professor at the UC Department of Otolaryngology, with joint appointments in Physiology & Biophysics and Cell & Developmental Biology. She is also a member of the Neuroscience Graduate Faculty at UC Denver.

Research Interests:
Dr. Kinnamon’s research focuses on the gustatory system and the common chemical sense. We are interested in how taste cells detect chemical stimuli, how stimuli are transduced into receptor potentials, and how this information is transmitted to gustatory afferent fibers. Studies on the common chemical sense include the function of solitary chemoreceptor cells in the nasal respiratory epithelium. These cells are innervated by the trigeminal nerve and detect noxious chemicals and the presence of bacteria in the airways. Activation of these cells provokes protective airway reflexes. Current studies are focusing on their role in human nasal tissue.

Publications:

Awards:
Dr. Kinnamon has been continuously funded by the NIH since 1987. Currently she has an R21 from NIDCD to study mechanisms of taste transduction & signaling. is PI on a subcontract from the University of Miami to study sweet taste, and is Co-PI with Dr. Tom Finger on the role of solitary chemoreceptor cells in the detection of pathogenic bacteria. Dr. Kinnamon has served on NIH and NSF study sections and was awarded the Association for Chemoreception Sciences Award for Outstanding Achievement in 2001. She is currently serving on two editorial boards and is a member of Faculty of 1000.
Shi-Long Lu MD, PhD
Assistant Professor
Department of Otolaryngology Research Division, Department of Dermatology, and Department of Pathology

Dr. Lu received his PhD from Tokyo Medical and Dental University, and his MD from China Medical University. He completed his post-doctoral training in the Howard Hughes Medical Institute Lab at the Case Western Reserve University. He was a Research Assistant Professor of Otolaryngology and Dermatology at the Oregon Health & Science University. He is currently an Assistant Professor of Otolaryngology, Dermatology, Pathology, and a member of the Cancer Biology Graduate Faculty, and the Cell and Developmental Biology at UCD. He is also a faculty member of the Head and Neck Cancer Research Program, and the Regenerative Medicine & Stem Cell Biology Program.

Research Interests:
Dr. Lu’s research interest is on head and neck squamous cell carcinomas. The goal is to understand the molecular mechanisms underlying the development and progression of HNSCC. It is hoped that these studies will lead to identification of novel molecular markers for future clinical diagnosis and experimental therapy.

Publications:


Awards:
Dr. Lu is currently funded by a R01 from NIDCR to study the role of PI3K pathway in head and neck cancer invasion and metastasis. Dr. Lu has also received grant awards from the American Cancer Society; the Thyroid, Head and Neck Cancer (THANC) Foundation; the Dermatology Foundation; Cancer League of Colorado; and the Oregon Medical Foundation. He is also a recipient of a Research Career Development Award from the Dermatology Foundation.
Katherine J. Rennie PhD
Associate Professor & Director
Department of Otolaryngology Research Division, and Department of Physiology & Biophysics

Dr. Rennie received her PhD from the University of Bristol, Avon, U.K. and completed a post-doctoral fellowship in the Department of Otolaryngology at the University of Texas Medical Branch in Galveston. She is currently an Associate Professor of Otolaryngology, Physiology & Biophysics, and a member of the Neuroscience Graduate Faculty at the University of Colorado.

Research Interests:
My research is focused on the peripheral vestibular system. The goal is to identify ion channels present in vestibular cells in order to understand how signals are transformed from a mechanical stimulus at the hair cell bundle into electrical activity of the primary vestibular neurons. Electrophysiological (patch clamp), molecular and mathematical modeling approaches are used. We have identified several different types of potassium channels in vestibular cells and are currently assessing synaptic mechanisms. It is hoped that results from these studies will clarify some of the mechanisms underlying vestibular disorders.

Publications:

Awards:
Dr. Rennie has received several grant awards from the NIH (NRSA postdoctoral fellowship, R03 & R29 FIRST Award) and is currently funded by the American Otological Society. She has also received funding from the Deafness Research Foundation, the American Hearing Research Foundation and the National Organization for Hearing Research Foundation and is a former recipient of a Research Career Enhancement Award from the American Physiological Society. Dr. Rennie has reviewed grants for the NIDCD (NIH), National Science Foundation, Wellcome Trust, RNID and Deafness Research Foundation and reviewed articles for Acta Pharmacologica Sinica, American Journal of Physiology-Cell Physiology, Experimental Neurology, JARO, Journal of Comparative Neurology, Journal of Neurophysiology, Journal of Neuroscience, Journal of Physiology, Journal of Vestibular Research and Neurochemical Research.
Kristin M. Uhler PhD
Assistant Professor
Department of Otolaryngology

Dr. Uhler received her PhD in 2008 from the University of Colorado, Boulder. She joined the Department of Otolaryngology in 2009 as an Assistant Professor of Otolaryngology, University of Colorado, Denver.

Research Interests:
Infant speech perception in deaf and hard-of-hearing children and the implantable hearing devices for listeners of all ages and their impact on speech understanding abilities.

Publications:
Uhler, K., Burns, S., Dalpes, M. & Yoshinaga-Itano, C (2011) An Auditory Spoken Language Matrix for Differential Diagnosis of Spanish-speaking Children Who are Deaf or Hard of Hearing, Special interest group 14, communication disorders and sciences in culturally and linguistically diverse populations

Presentations:
Dr. Vandenbeuch received her PhD from University of Paris, Denis Diderot in 2006. She completed a postdoctoral fellowship at Colorado State University (2006-2009) and at the University of Colorado Denver (2009-2011). In January 2011, she was appointed Instructor in the Department of Otolaryngology and is currently working in Sue Kinnamon’s laboratory.

**Research Interests:**
Her research interests are dedicated to the neurobiology of the chemical senses and more particularly on the taste system. Working in Sue Kinnamon’s lab, she is interested in the different transduction mechanisms that allow the gustatory information to be processed: from a molecule binding to its receptor on the tongue epithelium to the transmission to the central nervous system via the gustatory nerve fibers. Her attention is more focused on the peripheral system and how taste bud cells communicate with the afferent nerve fibers to transmit the information to the brain.

**Publications:**


**Awards:**
Dr. Vandenbeuch received the Polak Young Investigator award in 2008 from the Association for Chemical Senses (AChemS).
2012 Resident Research Day
Panel of Judges

Mona M. Abaza MD, MS
Associate Professor & Program Director

Kenny H. Chan MD
Professor

Vincent D. Eusterman MD, DDS
Associate Professor

Kristin M. Uhler PhD
Assistant Professor

Robin T. Cotton MD, FACS, FRCS(C)
Professor
Department of Otolaryngology- Head and Neck Surgery
University of Cincinnati College of Medicine
Director, Department of Pediatric Otolaryngology, Children's Hospital Medical Center

Awards
There will be a 1st and 2nd place award given for “Outstanding Resident Research Presentation” for best demonstration of either basic science or clinical research.

The criteria for selection will be based upon the significance of the research finding to the field of Otolaryngology, the quality of work performed and the quality of presentation.
Objectives:
To study characteristics of children under 2 years who underwent a tonsillectomy after having a polysomnogram (PSG). To identify predictors of severe obstructive sleep apnea (OSA) in this age group.

Design:
Retrospective chart review.

Setting:
Tertiary care pediatric hospital.

Patients:
Children under 2 years of age who underwent a PSG prior to tonsillectomy over a 7-year period.

Methods:
Race, weight-for-age percentile, prematurity, smoking exposure, daycare, presence of syndromes, craniofacial anomalies, or cerebral palsy, and preoperative oxygen use were collected. Children were stratified by OSA severity using two separate scales: the obstructive apnea-hypopnea index (OAHI) and the OAHI plus oxygen nadir (OAHI+nadir).

Results:
225 (2.5%) of 9,038 patients who underwent tonsillectomy were under 2 years of age. Of these, 72 patients (32.0%) had preoperative PSGs. The median age was 20.4 months (range: 10.6-23.9). The proportion of premature patients (26.4%) in our cohort was significantly different than the proportion of the general population in Colorado (9.1%; p<0.05).

Univariate association tests revealed a significant association between OSA severity and ethnicity only (p=0.02). In a multivariate model for the OAHI scale, African-Americans were 11 times more likely than Caucasians to get severe OSA according to the OAHI scale. There was no difference between African-Americans and Latin-Americans. Using the OAHI scale, 36 patients (50.7%) had severe OSA, while 54 patients (76.1%) were classified in the severe OSA using the OAHI+nadir scale. In a multivariate model for the OAHI+nadir scale, no significant predictors were found. The OAHI and OAHI+nadir scales had less than mediocre agreement (kappa=0.5) for defining OSA severity.

Conclusion:
Patient ethnicity seems to be a predictor of OSA severity in children under 2 years of age undergoing PSG. The OAHI scale for OSA also might be more adequate for patients under 2 years of age, especially if they live at higher altitudes and have more frequently low oxygen nadirs.
Postoperative Management in Laryngotracheal Reconstruction; Report of Sedation Related Outcomes in Varied Postoperative Management

Pamela Mudd MD, Matthew Powers, Peggy Kelley MD

1University of Colorado School of Medicine, Department of Otolaryngology
2Children’s Hospital Colorado, Aurora, CO

Objective:
To report sedation related outcomes in varied postoperative approach after single-stage laryngotracheal reconstruction in children.

Design:
Retrospective study.

Setting:
Tertiary care pediatric hospital.

Patients:
Thirty three children who underwent single-stage laryngotracheal reconstruction, excluding anterior cricoid split, tracheal resection, and cricotracheal resection.

Interventions:
Ten-year period of data collection regarding postoperative care and complications.

Results:
The medical records of all patients who underwent single-stage laryngotracheoplasty between 2001 and 2011 were reviewed. Tracheally intubated, minimally sedated, and awake patients (n=15) were compared with tracheally intubated, sedated, and medically paralyzed patients (n=20). The use of opioids, benzodiazepine, and precedex on either an as needed or continuous basis was recorded. Outcome measures examined as correlating to post operative sedation management included: total length of stay in ICU and hospital, nursing concerns, symptomatic atelectasis, accidental decannulation, requirement for additional surgical procedures including need for revision, and importantly incidence of associated withdrawal symptoms.

Conclusion:
Postoperative management after single-stage laryngotracheal reconstruction does not require the use of physical and pharmacologic restraints. Children who are awake and comfortable without medical restraint do not experience withdrawal symptoms, do not require adjunctive medications for withdrawal, and have fewer associated pulmonary complications. Five patients required tracheostomy and/or revision laryngotracheoplasty, four of whom had been medically paralyzed and one who was managed with minimal short term sedation. Nine patients required adjunctive balloon dilation, five of whom had been medically paralyzed and four who were managed without sedation.
Glomus Jugulare Tumors and Stereotactic Radiosurgery: Tumor Control and Hearing Preservation Over Time

Adam Holdt MD, Scott Mann MD, Stephen Cass MD, MPH
University of Colorado School of Medicine, Department of Otolaryngology

Background:
Glomus jugulare tumors (GJT) are traditionally treated surgically, but select tumors can be treated by radiation therapy based on location and patient factors. Recently, stereotactic radiosurgery (SRS) has been shown to be an effective treatment modality for GJT control, providing a more limited radiation dose to critical adjacent skull base structures compared with more traditional radiation therapies. This study retrospectively examines the rate of tumor control and hearing preservation in GJT patients after SRS.

Method:
This retrospective study reviewed all nineteen adult GJT patients treated by SRS at the University of Colorado Hospital between 2003 and 2012. Primary outcome was hearing loss. Secondary outcomes included radiologic progression or treatment failure, other cranial nerve deficits, and treatment adverse effects.

Results:
The current SRS protocol at the University of Colorado provides excellent radiologic tumor stabilization. Significant decrease in AAO-HNS hearing class was not seen in these patients.

Conclusion:
SRS treatment of GJT’s is a viable treatment modality as an alternative to surgical resection in selected patients.
Introduction:
Detection of DNA methylation has produced promising results as biomarkers for head and neck squamous cell carcinoma (HNSCC). However, current panels are limited by an insufficient number of sensitive and specific tumor markers. MicroRNAs (miR) play an important role in tumorigenesis, and may represent a novel panel of molecules for the development of cancer biomarkers.

Methods:
We investigated methylation of three miRNA promoter sites of miR-9 (miR-9-1, miR-9-2, miR-9-3) in 107 human head and neck tissue samples and controls. Total RNA, including MicroRNA, was extracted from tissue samples. DNA was also extracted and treated with a bisulfate protocol to allow for performance of methylation-specific PCR. MicroRNA expression was quantitated with real-time PCR, and methylation-specific PCR was performed in promoter regions.

Results:
We found methylations of miR-9-1 and miR-9-3 were higher in oral and oropharyngeal carcinomas than that in laryngeal carcinoma, achieving a combined sensitivity of 63% and 56%, respectively, for these two tumor types, compared to 21% for the laryngeal carcinoma. Quantitative PCR of miR-9 showed reduced expression associated with methylation of miR-9 in tumor tissues. To investigate the functional consequences of miR-9 methylation, we found that miR-9 methylation is correlated with miR-9 expression level in human HNSCC cell lines. Demethylation treatment using 5-azacytidine restored its expression in a miR-9 methylated human HNSCC cell line UMSCC22A. Furthermore, cell proliferation and viability was significantly inhibited, while PTEN expression was elevated after transfection of miR-9 into the UM-SCC22A cell line.

Conclusion:
Our results suggest that methylations of miR-9-1 and miR-9-3 are sensitive and specific biomarkers for HNSCC, particularly for oral and oropharyngeal squamous cell carcinomas. In addition, miR-9 may function as a tumor suppressor in HNSCC through inhibition of cell proliferation and elevation of tumor suppressor PTEN.
Methylation of MicroRNA-124 is a Novel Biomarker for HNSCCs

Matthew Whinery MD, John Song MD, Antonio Jimeno MD, PhD, Neil Gross MD, Molly Kulesz-Martin PhD, Shi-Long Lu MD, PhD

1University of Colorado School of Medicine, Department of Otolaryngology
Oregon Health & Science University, 1Department of Otolaryngology,
2Department of Dermatology

Introduction:
MicroRNAs, initially discovered in 1993 in the organism C. elegan, have become the focus of significant research in the last decade. These tiny RNA particles, only 15 to 25 nucleotides in length, are highly conserved across species and highly specific to tissue and developmental stage. Studies have demonstrated both over and under-expression of a variety of miRNAs in both solid and hematological malignancies. As miRNA expression patterns are tissue specific, they are potentially useful for identifying the progenitor cell line in highly undifferentiated cancers and with unknown primaries. Both genetic and epigenetic alterations can cause over/under transcription of miRNA and result in tumorogenesis. We chose to investigate miRNA under expression in Head and Neck Squamous Cell Carcinoma (HNSCC).

Materials/Methods:
We first extracted genomic DNA from our cell lines – 8 “normal/control” lines and 15 HNSCC cell lines. The genomic DNA underwent bisulfite conversion allowing us to perform methylation specific PCR (MS-PCR) using methylated and unmethylated miRNA primers. Those miRNA methylated primers that showed cancer cell specific signals became our candidate miRNAs. Each candidate was then tested upon bisulfate treated genomic DNA obtained from actual HNSCC samples, adjacent tissue, and control tissue again looking for hypermethylated miRNA specific to HNSCC tissue. Results were then statistically analyzed.

Results:
Our study identified three new promising miRNA markers for HNSCC in addition to two markers that our lab had previously identified. miR 124-1, 124-2, 124-3 had a combined sensitivity and specificity of 83.3% and 100% respectively. With the addition of miR 9-1 & 9-3, markers previously identified in our lab, the sensitivity increased to 88.1% while specificity (as controlled by our cut-off values) remained 100%. While not statistically significant, the markers had a trend toward the greatest sensitivity with oropharyngeal HNSCC.

Conclusion:
Our panel of 5 miRNA markers provides 88.1% sensitivity and 100% specificity as markers for HNSCC in our tumor bank. These results are significantly better than previously reported markers for HNSCC and provide exciting potential detection and treatment applications of miRNA with HNSCC.
Synthetic Hydrogel Scaffold is an Effective Vehicle for Delivery of rhBMP-2 (INFUSE®) to Critical-Sized Calvarial Bone Defects in Rats

Justin M. Wudel MD¹, Peter D. Mariner PhD⁴, David E. Miller², Erin Genova³, Sven-Olrik Streubel MD¹, Kristi S. Anseth PhD⁴,5

University of Colorado School of Medicine, ¹Department of Otolaryngology, ²Department of Radiology, ³Department of Pathology, ⁴University of Colorado Boulder, Department of Chemical and Biological Engineering, ⁵Howard Hughes Medical Institute

*INFUSE® is a registered trademark of Medtronic, Inc.

Objective:
To determine whether radical-mediated, thiol-ene chemistry can be used to create an effective polymer delivery vehicle for rhBMP-2, eliminating the use of xenografic materials and reducing the rhBMP-2 dose required to achieve therapeutic effects.

Methods:
Critical sized cranial defects (8mm) were created in 12-week-old male Sprague Dawley rats. The rats were randomly assigned to receive no treatment, absorbable collagen sponge (ACS), polyethylene glycol hydrogel (PEG), 0.2mg of bone morphogenic protein (rhBMP-2) + ACS, 2mg rhBMP-2 + ACS, 0.2mg rhBMP-2 + PEG, or 2mg rhBMP-2 + PEG. Micro CT scans were completed at 0, 2, and 6 weeks and three dimensional volumetric measures were used to track bone growth. At 6 weeks the rats were sacrificed and the calvaria were removed, sectioned, and stained for histologic evaluation.

Results:
PEG delivery of the rhBMP-2 resulted in significantly faster defect closure when compared to all other treatment groups (p<0.01). In addition, the PEG treated group was able to close the defect using a 10 fold lower concentration of rhBMP-2, as seen by 0.2mg rhBMP-2 + PEG closing at a similar rate to defects treated with 2.0mg rhBMP-2 + ACS (p<0.05). Histologic examination of the decalcified skulls showed excellent bone formation and near total replacement of the PEG with native tissue at 6 weeks.

Conclusion:
In a side by side comparison, the PEG hydrogel delivery system demonstrated the ability to close critical sized cranial defects faster and at a 10 fold lower concentration of rhBMP-2 than what was required using the current ACS delivery system.
Active Middle Ear Implant Third Window Vibroplasty: Electroc-ohleographic Assessment of Direct Mechanical Cochlear Stimulation in Experimentally-Induced Oval and Round Window Fixation

J. Eric Lupo MD, MS¹, Kanthaiah Koka PhD², Herman A. Jenkins MD¹, Daniel J. Tollin PhD¹²

University of Colorado School of Medicine, ¹Department of Otolaryngology, ²Department of Physiology and Biophysics

Introduction:
An alternate route of cochlear stimulation via the round window (RW) using active middle ear implants (AMEIs) has been shown to produce physiological responses similar to normal acoustic stimulation including in a model of stapes fixation. Pathological conditions such as advanced otosclerosis can preclude delivery of sound energy to the cochlea through the oval window (OW) and/or the RW. Mechanical stimulation through a cochlear third window in the scala tympani (ST) in a chinchilla model (Chinchilla Lanigera) with normal and occluded windows may generate cochlear responses equivalent to acoustic stimuli.

Methods:
Cochlear microphonic (CM) and laser Doppler vibrometer (LDV) measurements of stapes and RW velocities were performed in 6 ears of 4 chinchillas. Baseline measurements to acoustic sinusoidal stimuli (0.25 to 8 kHz) were made. The measurements were repeated with an AMEI driving either the RW or a third window at the ST before and after sequential oval and round window fixation.

Results:
AMEI stimulation of the third window produced CM waveforms with morphologies similar to acoustic stimuli. CM thresholds with RW and third window stimulation were frequency-dependent but ranged from 0.25 to 10 and 0.5 to 40 mV, respectively. Stapes fixation, confirmed by LDV measurements, resulted in a significant frequency dependent impairment in CM thresholds up to 13 dB (at < 3 kHz) for RW stimulation and a non-significant frequency dependent decrease in thresholds of up to 10 dB (at > 3 kHz) via third window stimulation. OW and RW fixation, confirmed by LDV measurements, resulted in a non-significant mild frequency dependent decrease in CM thresholds from to 1 to 15 dB.

Conclusion:
Mechanical stimulation with an AMEI through a surgically created cochlear third window into the ST produces CM responses that are nearly identical to those via traditional acoustical stimulation although with decreased efficiency.

Support: AAO-HNSF CORE Resident Research Grant, Otologics Education Grant
Objective:
The nasal epithelium in rodents contains a population of solitary chemosensory cells (SCCs) innervated by the trigeminal nerve. SCCs detect irritants including bacterially produced molecules, and evoke trigeminally-mediated protective airway reflexes including neurogenic inflammation and changes in respiration. This study will establish the location and impact of SCCs in humans.

Methods:
Using RT-PCR and immunohistochemistry on biopsies from human sinonasal mucosa, we screened biopsies for the presence of taste signaling effectors, which SCCs use to detect irritants. Our experimental group consisted of patients that have pain associated with chronic rhinosinusitis, while the control group consisted of healthy patients undergoing nasal surgery.

Results:
RT-PCR revealed expression of the downstream taste signaling effectors alpha-gustducin, PLC beta2, and TrpM5 in the human septum, the inferior and middle turbinates, and the uncinate process of experimental patients. Immunohistochemistry was used to reveal anatomical features of these cells and innervation of the epithelium by peptidergic fibers (polymodal nociceptors) of the trigeminal nerve. Taste signaling effectors were expressed in all regions examined in experimental patients, suggesting the presence of SCCs. However, decreased numbers of the control patients showed expression in the uncinate process, suggesting this region may differ between control and experimental patients.

Conclusion:
Solitary chemosensory cells are present in human nasal mucosa. These cells may have an impact on chronic diseases such as chronic rhinosinusitis and allergic rhinitis. Further study will better classify how these cells relate to patient characteristics of pain and inflammation.

Support:
American Academy of Otolaryngology, ARS Resident Research Grant
NIH grants R01DC009820 and P30DC004657
Dept. of Otolaryngology Resident Research Funds
Expression of Taste Receptors in Human Sinonasal Mucosa

Cooper SE MD¹,²,³, Tizzano M PhD²,³, Anderson CB MS¹,³, Ramakrishnan VR MD¹,³, Kingdom TT MD¹,³, Finger TE PhD²,³, Kinnamon SC PhD¹,³

University of Colorado School of Medicine, ¹Department of Otolaryngology ²Department of Cell and Developmental Biology ³Rocky Mountain Taste and Smell Center

Objective:
Solitary chemosensory cells (SCCs) are a population of cells that have been found to play a role in trigeminally-mediated protective airway reflexes in rodents. Rodent SCCs express the components of the bitter taste transduction pathway in taste receptor cells of the tongue including T2R bitter taste receptors. Some T2R receptors, such as T2R14 and T2R46, have been shown to respond to a class of chemicals called lactones, which can play a role as quorum-sensing molecules for certain bacteria. Our study aims to identify SCCs in a human population and investigate their possible role in sinonasal disease processes in humans.

Methods:
Biopsies were taken from the sinonasal mucosa of an experimental group of patients undergoing endoscopic sinus surgery for chronic rhinosinusitis and a control group of otherwise healthy patients having nasal surgery. These samples were examined with RT-PCR and immunohistochemistry to look for the presence of specific genes and gene products associated with the taste transduction pathway associated with SCCs. We also looked at patient Sinonasal Outcome Test (SNOT) and Visual Analog Score (VAS) for pain to see if there was any correlation with receptor expression.

Results:
RT-PCR revealed expression of the downstream taste signaling effectors T2R4, T2R14 and T2R46 in the human septum, the inferior and middle turbinates, and the uncinate process of both experimental and control patients. Immunohistochemistry appears to confirm the presence of SCCs. There was a significant difference between the SNOT and VAS scores of control and experimental patients, but the relationship to receptor expression needs additional research.

Conclusion:
Genes associated with the presence of SCCs have been found in biopsies of human sinonasal tissue, including 2 receptors, T2R14 and T2R46, activated by lactones, which are produced by certain bacteria as quorum-sensing signals. Further study is needed to elucidate their possible significance for chronic rhinosinusitis.

Support:
NIH grants R01DC009820 and P30DC004657
Dept. of Otolaryngology Resident Research Funds
Inhibition of K+ Currents in Type I Vestibular Hair Cells by Aminoglycosides

Scott Mann MD1, Hayley L. Ross MD1, Matthew S. Johnson MD1, Frances Meredith MS3, Katherine J. Rennie PhD1,2,3

University of Colorado School of Medicine, 1Department of Otolaryngology
2Department of Physiology and Biophysics, 3Neuroscience Program

Introduction/Methods:
Significant ototoxicity limits use of aminoglycoside antibiotics (AG). Several mechanisms may contribute to death of both auditory and vestibular hair cells. AG enter outer hair cells of the cochlea through apical transduction channels (Marcotti et al. 2005) and inhibit the basolateral KCNQ4-mediated current (IK,n) by PIP2 sequestration (Leitner et al. 2011). At birth, vestibular hair cells have delayed rectifier K+ current and by the 3rd postnatal week type I hair cells also express a low-voltage activated K+ current that resembles IK,n in outer hair cells. Using whole cell patch clamp, we tested the effects of AG and KCNQ channel modulators on K+ currents (IK) in type I vestibular hair cells isolated from gerbil semicircular canals.

Results:
Extracellular neomycin (1 mM) rapidly reduced peak outward IK by 16 ± 4% (n = 9) in mature type I hair cells. Gentamicin (5 mM) reduced peak IK by 16 ± 3% (n = 8). Intracellular neomycin (1 mM in the patch electrode solution) reduced IK by 17 ± 6% (n = 12). KCNQ modulators were used to probe KCNQ channel involvement. XE991 (20 μM) did not reduce IK in mature type I cells and the neomycin-induced reduction in IK was not reversed by the KCNQ agonist flupirtine (10 μM). Application of intracellular poly-D-lysine (200μg/ml) to sequester PIP2 did not reduce IK. Extracellular 4-aminopyridine (4-AP, 1mM) blocked a component of IK. Application of extracellular AG in the presence of 4-AP gave no further inhibition of IK. In immature type I cells (postnatal days 5-8), extracellular neomycin reduced IK by 19 ± 3% (n = 5). Fluorescent imaging confirmed that externally applied Texas Red conjugated gentamicin was rapidly taken up by vestibular hair cells.

Conclusion:
AG significantly reduce the 4-AP-sensitive IK in early postnatal and mature type I cells. K+ current inhibition differs from that seen in outer hair cells, since it does not involve PIP2 sequestration or KCNQ channels.

Support:
American Otological Society and NIDCD DC008297 to KJR
Objective/Introduction:
The "Unified Airway" has been a topic of recent interest, with evidence of common pathologic findings and shared inflammatory pathways between diseases of the sinuses and lower airways. In addition, several studies have shown similarities in microbiology between the upper and lower airways. Bronchiectasis is an uncommon disorder of the lower airways that, at least for immunocompetent adults, is thought to arise from an infectious origin and subsequent neutrophilic protease activity. Nontuberculous mycobacteria (NTM) have been implicated in a subset of these patients, as has chronic inflammation of the paranasal sinuses. NTM are rarely identified in patients with chronic sinusitis, however, they are suspected to be a source of refractory disease in some patients. We hypothesized that chronic NTM pulmonary patients with chronic sinus infection will demonstrate NTM in their sinus cultures. The objective of this study was to examine the prevalence of positive sinus cultures in patients with chronic sinusitis and NTM bronchiectasis.

Methods:
IRB approval was obtained for a retrospective chart review at a tertiary care respiratory hospital. The clinical database was searched using ICD-9 codes for patients treated with diagnoses of bronchiectasis, mycobacterial infection, and sinusitis from 2008 to 2012. Patients who met the specified criteria with available sinus and pulmonary culture results were included in the study. McNemar’s test was used to statistically correlate the presence of positive sinus and pulmonary cultures.

Results:
Fifty-five immunocompetent adults were identified with both bronchiectasis and chronic sinusitis. Eleven of these patients with positive pulmonary NTM cultures had endoscopically derived sinus cultures available for review (age 26-73, mean 58; 8/11 female). In these 11 patients no positive sinonasal cultures for AFB were found (p=0.0026).

Conclusion/Discussion:
Although the “Unified Airway” theory has been supported by a great deal of research, we found no correlation between sinonasal and pulmonary AFB cultures in patients with known mycobacterial pulmonary disease. This does not mean that NTM are not a potential source of chronic sinus inflammation in this patient population, however. But it can be surmised from this study that performing routine sinus cultures to evaluate for the presence of mycobacterium in these patients may not be necessary and does not appear to change the management strategy.
Introduction:
Pyoderma gangrenosum (PG) is a skin condition characterized by necrotic ulcers and most commonly occurs on the legs in association with inflammatory bowel disease and rheumatoid arthritis; however, PG rarely involves the head and neck. PG of the head and neck occurs rarely with an estimated incidence of 5% of all PG cases, and very rarely causes nasal septal perforation. At this time, only three cases of nasal septal involvement have been reported in the literature.

Methods:
Case report and literature review.

Results:
In this report, we present a case of PG-associated nasal septal perforation. A 71 year old male with a history of PG presented with a year history of headache and rhinorrhea. Despite optimal medical treatment for chronic sinusitis, he experienced persistent symptoms. CT scan revealed a widened maxillary antrum and near-total loss of the nasal septum without a prior history of sinusitis, sinus surgery, trauma, and cocaine use. A nasal mucosal biopsy showed chronic inflammatory changes but lacked evidence of necrotizing vasculitis, granulomatous disease, infection, or neoplasm. Additional studies including serologies failed to reveal other systemic inflammatory causes. As a diagnosis of exclusion, PG was diagnosed as the cause of septal perforation. The differential diagnosis and diagnostic consideration for nasal septal perforations are reviewed.

Conclusion:
The patient's lack of prior sinonasal surgery, trauma or cocaine use combined with serologic testing, histology, and immunohistochemical analysis eliminate other possible causes of nasal septal perforation and point to PG as the most likely cause.
Oropharyngeal Tularemia Presenting with Pharyngitis and a Neck Mass

Katherine K. Green MD, MS1, Jeremy Prager MD2

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2Children’s Hospital Colorado, Aurora, CO

Introduction:
Francisella (F.) Tularensis is the causative organism of tularemia, a highly infectious facultative gram negative intracellular bacteria. It is considered a potential bio-terrorism agent because of its high virulence, transmissibility when aerosolized, and ability to cause severe illness with a very small amount of bacteria. It is a very rare infection in the United States, with an average of 162 cases per year reported between 2000-2008.1 The oropharyngeal form most commonly presents as an exudative tonsillitis with necrotic lymphadenopathy, but here we present a case which appeared most consistent with an infected branchial cleft anomaly.

Methods:
Case report and review of literature.

Results:
We present the case of a 7 year-old female with two weeks of sore throat, fatigue, intermittent fevers to 39.4°C, and four days of painful left neck swelling. Social history was notable for a camping trip 1 week prior to the onset of symptoms. A computed tomography (CT) with contrast of the neck was performed, revealing a round, hypodense level II mass, appearance consistent with an infected second branchial cleft cyst versus a suppurative jugulodigastric lymph node. The patient was placed on IV antibiotics, but continued to be symptomatic with fevers and pain. She was taken to the operating room on hospital day two for incision and drainage of the infected mass, and a thin brown fluid was drained with a penrose left in place. The patient was afebrile and her neck pain improved following surgery. The patient was discharged on amoxicillin-clavulanate, after 72 hours of IV ampicillin-sulbactam, and cultures were negative at the time of discharge.

Several days after discharge the final culture results came back positive for F. tularensis. The patient was contacted and her antibiotics were changed to ciprofloxacin. According to the patient’s mother, the left neck had begun to swell again with local erythema and tenderness while on the amoxicillin-clavulanate, but these symptoms resolved after starting the ciprofloxacin. The literature is reviewed and proper identification and treatment is discussed.

Conclusion:
Oropharyngeal tularemia is an uncommon presentation of a rare disease. Here we present a patient with tularemia who demonstrated findings consistent with an infected branchial cleft anomaly. The ability of this disease to masquerade as uncomplicated pharyngitis or mononucleosis emphasizes the need for a high index of suspicion in order to make the proper diagnosis, particularly in patients who do not respond to typical first-line treatments for these more common diseases. Proper treatment with specific antimicrobial therapy for F. Tularensis is key.
Resident Research Day 2012 – Bio

University of Colorado School of Medicine
Department of Otolaryngology

Valérie Côté MD, CM, FRCS(C)

Education/Honors & Awards:

Residency:
McGill University, Otolaryngology — 2006 - 2011

Medical School:
McGill University — Graduated 2006

Abstracts/Presentations:

L’otorrée suite à l’insertion de tubes de ventilation: peut-on la prévenir? Côté V, Daniel SJ Presented by Valérie Côté at the 50th Congrès annuel de l’Association ORL du Québec Montreal, Quebec

La rhinoplastie rapide Fanous N, Côté V Presented by Dr. Nabil Fanous at the 50th Congrès annuel de l’Association ORL du Québec Montreal, Quebec

Laryngopharyngeal Reflux and Otitis Media with Effusion Al-Saab F, Manoukian JJ, Al-Sabah, Almot S, Côté V, Nguyen L Presented by Valérie Côté at the International Federation of Oto-Rhino-Laryngological Societies XIX World Congress Sao Paulo, Brazil

Post-thyroidectomy Prediction and Management of Hypocalcemia Côté V, Hier MP, Tamilia M, Young J, Sands N, Black MJ, Payne RJ Presented by Valérie Côté at the International Federation of Oto-Rhino-Laryngological Societies XIX World Congress Sao Paulo, Brazil

L’otorrée suite à l’insertion de tubes de ventilation: peut-on la prévenir? Côté V, Daniel SJ Presented by Valérie Côté at the Journées annuelles de formation de l’Association des Médecins Microbiologistes Infectiologues du Québec Bromont, Quebec


Hashimoto’s Thyroiditis as a Risk Factor for Post-Thyroidectomy Hypocalcemia Neaga O, Sands N, Côté V, Tamilia M, Hier MP, Black MJ, Payne RJ Presented at the Canadian Society of Otolaryngology – Head & Neck Surgery Annual Meeting Halifax, Nova Scotia
Valérie Côté MD, CM, FRCS(C) (cont)

Abstracts/Presentations:


Qualitative Impact of an Introductory Course on « The Art of Surgery » on Otolaryngology Residency Brousseau V, Fanous N, Côté V, Brousseau E, Yammine N, Shaw K Presented by Valérie Côté at the Canadian Society of Otolaryngology – Head & Neck Surgery Annual Meeting Jasper, Alberta


Valérie Côté MD, CM, FRCS(C) (cont)

Abstracts/Presentations:

IFMSA Campaign on Malaria (ICOM) Second International Conference Welcome and Introduction History & evolution of Malaria – Focus on the American situation Economics of Malaria in Endemic Countries IFMSA Campaign on Malaria (ICOM) - Overview Côté V Santiago de Chile, Chile

Pulse Rate and Pulse Rate Variability Decrease After Adenotonsillectomy for Severe Obstructive Sleep Apnea Syndrome Constantin E, McGregor C, Côté V, Brouillette RT Abstract submitted for presentation at the 24th Annual Conference on Sleep Disorders in Infancy & Childhood Rancho Mirage, California, USA

Publications:


Valérie Côté MD, CM, FRCS(C) (cont)

Publications:

*Pulse Rate and Pulse Rate Variability Decrease After Adenotonsillectomy for Severe Obstructive Sleep Apnea Syndrome* Constantin E, Mcgregor C, Côté V, Brouillette RT Pediatr Pulmonol. 2008 May;43(5):498-504


*Cancer of the Larynx* Côté V, Zeitouni A, Blouin E Patient Information Booklet, Royal Victoria Hospital McGill University Health Center Department of Otolaryngology, Montreal, QC

*Endoscopic Percutaneous Dilatational Tracheotomy: A Prospective Evaluation of 500 Consecutive Cases.* Kost KM. The Laryngoscope. 2005;115S:1-30. Côté V Article and Subject Review Presented at the Royal Victoria Hospital Intensive Care Unit Teaching Rounds Montreal, Quebec
Resident Research Day 2012 – Bio

University of Colorado School of Medicine
Department of Otolaryngology

Pamela A. Mudd MD

Education/Honors & Awards:

**Fellowship:**
Pediatric Otolaryngology Fellowship — Starting July, 2012
Children’s Hospital of Philadelphia

**Residency:**
Administrative Chief Resident — 2011 - 2012

**Medical School:**
Creighton University School of Medicine — Graduated 2007

**Undergraduate:**
B.S. Colorado State University — Graduated 2003

Abstracts/Presentations:


**P.Mudd MD**, Todd Kingdom MD, Rohit Katial MD; *Variations in expression of matrix metalloproteinase-9 (MMP-9) and tissue inhibitor of metalloproteinase-1 (TIMP-1) in nasal mucosa of aspirin sensitive versus aspirin tolerant patients with nasal polyposis*. Oral presentation at American Rhinologic Society 2010 Annual Meeting, Las Vegas, NV

D Boatright, M Johnson, **P Mudd**, J Song. *Sinonasal undifferentiated carcinoma metastatic to mandible*. Poster presentation at American Rhinologic Society 2009 Annual Meeting

**P.Mudd MD**: K. Lillehei MD, BK. DeMasters MD; T. Kingdom MD. *Ectopic pituitary adenoma with apoplexy isolated to the clivus Oct 2009*. Poster presentation at American Rhinologic Society 2009 Annual Meeting
Pamela A. Mudd MD (cont)

Publications:


P Mudd MD; S Mann MD, A. Edmunds, MD, PharmD; J. Kalkanis, MD; F. Glatz, MD. Inner Ear: Ototoxicity. eMedicine Journal, May 29 2006, Volume 7, Number 5, Updated May 2012
Pamela A. Mudd MD (cont)

Publications:


P. Mudd MD: A. Edmunds, MD, PharmD; J. Kalkanis, MD; F. Glatz, MD. *Inner Ear Ototoxicity*. eMedicine Journal, May 29 2006, Volume 7, Number 5, Updated May 2010
Adam M. Holdt MD

Education/Honors & Awards:

Residency:
Outstanding Clinical Research Award-Resident Research Day — 2010

Medical School:
University of Chicago, Pritzker — Graduated 2007

Undergraduate:
B.S. Northwestern University — Graduated 2002
Cum Laude

Abstracts/Presentations:


Publications:

Jacob S. Minor MD

Education/Honors & Awards:

Residency:
Outstanding Basic Science Award-Resident Research Day — 2010
Highest In-Service Exam Score — 2010

Medical School:
Baylor College of Medicine — Graduated 2007
International Health Track
Presidential Scholar Award

Undergraduate:
B.S. Texas A&M University — Graduated 2002
Summa Cum Laude

Abstracts/Presentations:


Publications:


Jacob S. Minor MD (cont)

Publications:


J. Eric Lupo MD, MS

Education/Honors & Awards:

**Residency:**
- Outstanding Resident Research Day - First Place - 2011
- Association for Research in Otolaryngology Travel Award — 2009 - 2011
- CORE AAO-HNSF Resident Research Grant — 2009

**Medical School:**
- University of Colorado School of Medicine — Graduated 2008
- UCD Professional Development Award

**Graduate:**
- M.S. Stanford University — Graduated 2001

**Undergraduate:**
- M.S. Stanford University — Graduated 2001
- B.S. University of Colorado Boulder — Graduated 1997
- Colorado Engineering Council Certificate of Merit

Abstracts/Presentations:


**Cochlear implantation in bilateral sporadic vestibular schwannoma: consideration of hearing and vestibular preservation.** 12th International Conference on Cochlear Implants. Baltimore, MD 5/2012


**Lupo JE, Koka K, Jenkins HA, Tollin DJ. 2012.** Cochlear stimulation via third window vibroplasty in Chinchilla Lanigera: Effects of round window and oval window occlusion. ARO Abs: 597

**Optimizing the Performance of Active Middle Ear Implants: Basic Studies.** University of Colorado Department of Otolaryngology MidWinter Meeting. Vail, CO 2/7/12
Abstracts/Presentations:


Lupo JE, Koka K, Jenkins HA, Tollin DJ. 2011. Third Window Vibroplasty: Assessment of Physiologic Responses in a Model of Stapes Fixation AOS Abs accepted


Lupo JE, Leuin S, Kelley PE. 2010. Anterior Laryngofissure Approach to an Airway Foreign Body After Migration Into the Paraglottic Space. ABEA Abs #10


Active middle ear implant cochlear stimulation in experimental models of stapes fixation. Otosclerosis Study Group 72nd Annual Meeting. Boston. 9/25/10
J. Eric Lupo MD, MS (cont)

Abstracts/Presentations:


The Effects of experimentally-induced conductive hearing loss on spectral and temporal aspects of sound transmission through the ear. American Federation for Medical Research Western Regional Meeting. Carmel, CA 2/1/2008

Publications:

J. Eric Lupo MD, MS (cont)

Publications:


Justin M. Wudel MD

Education/Honors & Awards:

Residency:
Outstanding Resident Research Day - Second Place - 2011

Medical School:
University of Minnesota — Graduated 2008
Alpha Omega Alpha

Undergraduate:
B.S. University of Minnesota — Graduated 2004

Abstracts/Presentations:


Wudel J, Kingdom T. *Seronegative sinusosal Wegener’s granulomatosis: A clinical challenge.* 2010 September - Boston, MA

Wudel J, Kingdom T, Durairaj V. *Outcomes after dacryocystorhinostomy in patients with nasolacral duct obstruction secondary to sarcoidosis.* American Rhinologic Society, April 2010 - Las Vegas, NV

Wudel J, Sidman J, Landers T, Rimell F. *Efficacy of balloon sinuplasty in the pediatric population.* American Society of Pediatric Otolaryngology, May 2008 – Orlando, FL

Wudel J, Wuertz B, Ondrey F. *Inhibition of Adenoid Cystic Cancer via Combination Chemotherapy and PPAR Gamma Activation in Vitro.* Triological Society Middle Section Meeting, January 2008 – Chicago, IL
Publications:

Green K, Wudel J, Prager J. Oropharyngeal tularemia in a child presenting with pharyngitis and a neck mass. 2012 March (Submitted)


Wudel J, Mariner P, Brown N, Streubel S, Anseth K. Synthetic hydrogel scaffold is an effective vehicle for the delivery of rhBMP-2 (InFUSE) to critical sized calvarial defects in rats. 2011 October (Submitted to Journal of Orthopedic Research)

Wudel J, Brown N, Mariner, P, Anseth K, Streubel S. In vivo application of polyethylene glycol hydrogel to promote wound healing in full thickness skin defects. 2011 September (Submitted to Journal of Tissue Engineering and Regenerative Medicine)

Wudel J, Wine T. Immune reconstitution causing regression of Kaposi's sarcoma. Ear Nose Throat J. 2011 September (Accepted for publication)

Wudel J, Kingdom T. Seronegative sinonasal Wegener's granulomatosis: A clinical challenge. 2010 September (In process)

Wudel J, Kingdom T, Durairaj V. Outcomes after dacryocystorhinostomy in patients with nasolacrimal duct obstruction secondary to sarcoidosis. 2010 April (In process)


Justin M. Wudel MD (cont)

Publications:


Henry P. Barham MD

Education/Honors & Awards:

Medical School:
Louisiana State University HSC — Graduated 2009
AMA Foundation Scholars Fund Recipient
Key Note Speaker to the Louisiana State University Board of Supervisors

Undergraduate:
B.S. Louisiana State University — Graduated 2004
Louisiana State University Board of Supervisors Scholarship, Lifetime

Abstracts/Presentations:


Henry P. Barham MD (cont)

Publications:


Curcumin inhibits HNSCC by modulating the Akt/mTOR pathway. C. A. Clark, Y. Rong, X. Rong, S. Shah, H. Barham, C. O. Nathan Oral Oncology, ISSN: 1368-8375, Vol: 3, Issue: 1, Date: 2009-01-01
Sarah E. Cooper MD

Education/Honors & Awards:

Internship:
University of California at San Francisco, Department of Surgery — June, 2009 - June, 2010

Medical School:
Texas Tech University HSC — Graduated 2009
Alpha Omega Alpha
Dean’s Recognition Award

Undergraduate:
B.S. The University of Notre Dame — Graduated 2003

Publications:
Scott E. Mann MD

Education/Honors & Awards:

Residency:
Outstanding Resident Research Day - Honorable Mention - 2011

Medical School:
University of Colorado SOM — Graduated 2009
Alpha Omega Alpha
Excellence in Medical Humanities Award
Presbyterian/St. Luke’s Hospital Auxiliary Scholarship

Undergraduate:
B.M. University of Denver — Graduated 2003
Magna Cum Laude
Phi Beta Kappa

Abstracts/Presentations:

Scott Mann, Hayley Ross, Matthew Johnson, Frances Meredith, Katie Rennie. Inhibition of K+ Currents in Type I Vestibular Hair Cells by Aminoglycosides. Association for Research in Otolaryngology 35th Mid-winter meeting, February 2012

Frances Meredith, Scott Mann, Katherine Rennie. Characterization of a Hyperpolarization-Activated Current (Ih) in Vestibular Calyx Terminals. Association for Research in Otolaryngology 35th Mid-winter meeting, February 2012

Mann SE, Dhawan R, Rennie KJ. Signaling Mechanisms at the Type I Hair Cell/Calyx Synapse. Association for Research in Otolaryngology Midwinter Research Meeting, Baltimore April 19, 2009.

Publications:


Matthew J. Whinery MD

Education/Honors & Awards:

Residency:
Outstanding Resident Research Day - Best Case Review - 2011
Highest In-Service Exam - 2011

Medical School:
UT Southwestern — Graduated 2009
Alpha Omega Alpha

Undergraduate:
B.S. Texas A&M University — Graduated 2005
Summa Cum Laude
Phi Beta Kappa
Phi Kappa Phi

Abstracts/Presentations:

Geoffrey R. Ferril MD

Education/Honors & Awards:

Medical School:
The University of Mississippi SOM — Graduated 2010

Undergraduate:
B.A. The University of Mississippi — Graduated 2006
Magna Cum Laude
Phi Beta Kappa
Phi Kappa Phi

Abstracts/Presentations:


Publications:

Katherine K. Green MD, MS

**Education/Honors & Awards:**

- **Medical School:**
  University of Southern California Keck SOM — Graduated 2010

- **Graduate:**
  M.S. Rush University — Graduated 2006

- **Undergraduate:**
  B.A. Northwestern University — Graduated 2004

**Publications:**


In submission: *The efficacy of treatments for autoimmune inner ear disorder*. Derebery, M.J., **Green, K.**, Chung, J., & Fisher, LM.
Brook K. McConnell MD

Education/Honors & Awards:

Medical School:
University of Colorado SOM — Graduated 2010

Undergraduate:
B.A. University of Colorado Boulder — Graduated 2005

Abstracts/Presentations:
Poster presentation COSM 2012: *Nasal septal perforation associated with pyoderma gangrenosum*, 2012

Abstract submission to AMP 55th Annual Meeting, presentation on *Genetics in cancer adaptation*, 2008
Leah J. Abrass MD

Education/Honors & Awards:

Medical School:
Northwestern University, Feinberg SOM — Graduated 2011
Alpha Omega Alpha

Undergraduate:
B.S. University of Southern California — Graduated 2006
Cum Laude

Abstracts/Presentations:


Publications:

Justin T. Casey MD

Education/Honors & Awards:

Medical School:
Florida State University SOM — Graduated 2011

Undergraduate:
B.S. Rensselaer Polytechnic Institute — Graduated 2006

Abstracts/Presentations:


Publications:


Benjamin M. Milam MD

Education/Honors & Awards:

Medical School:
University of Virginia — Graduated 2011

Undergraduate:
B.S. University of Virginia — Graduated 2006
Phi Beta Kappa

Abstracts/Presentations:

Shonka Jr DC, Milam BM, Jameson MJ. *Suprafascial harvest of the radial forearm free flap decreases the risk of postoperative tendon exposure.* Abstract presented at the American Head and Neck Society meeting which is part of the Combined Otolaryngological Spring Meetings in May 2011 in Chicago.


Publications:


Benjamin M. Milam MD (cont)

Publications:


Poster Display Session

Viewing from 12:00pm – 12:30pm

1. Cochlear Stimulation Via Third Window Vibroplasty in Chinchilla Lanigera: Effects of Round Window and Oval Window Occlusion
   J. Eric Lupo, MD, MS, Kanthaiah Koka, MD, Herman Jenkins, MD, Daniel J. Tollin, PhD

2. The Dependence of the Binaural Interaction Component (BIC) of the Auditory Brainstem Response (ABR) on the Binaural Cues to Sound Source Location on the Chinchilla
   Alexander T. Ferber, MD, Jennifer L. Thornton, PhD, Kanthaiah Koka, MD, Daniel J. Tollin, PhD

3. Neural Coding of Interaural Level Differences in the Inferior Colliculus is Altered in Adult Animals as a Result of Temporary Unilateral Conductive Hearing Loss
   Jennifer L. Thornton, PhD, Kanthaiah Koka, MD, Heath G. Jones, Dalian Ding, Richard Salvi, PhD, Daniel J. Tollin, PhD

4. Optimizing Active Middle Ear Implant Stimulation of the Round Window: Implant-Membrane Coupling Factors Influencing Stimulation Efficiency
   J. Eric Lupo, MD, MS, Kanthaiah Koka, MD, Herman Jenkins, MD, Daniel J. Tollin, PhD

5. Solitary Chemosensory Cells in Biopsies of Human Nasal Mucosa
   Barham HB, MD, Tizzano M, MD, Anderson CB, Cooper S, MD, Ramakrishnan VR, MD, Kingdom TT, MD, Finger TE, PhD, Kinnamon SC, PhD

6. Nasal Septal Perforation Associated with Pyoderma Gangrenosum
   Brook K. McConnell, MD, Carrie B. Marshall, MD, Vijay R. Ramakrishnan, MD

7. Utility of 18FDG-PET in the Initial Diagnosis and Workup of Sinonasal Malignancy
   Vijay R. Ramakrishnan, MD, Alexander G. Chiu, MD, James N. Palmer, MD, David W. Kennedy, MD, Bert W. O’Malley, MD

8. Sinonasal Malignancy with Two Distinct Histologies
   Henry P. Barham, MD, Sherif Said, MD, PhD, Vijay R. Ramakrishnan, MD
9. **Overexpression of PIK3CA Oncogene Drives Head and Neck Cancer Invasion and Metastasis**
   Fang Zhang, MD, Jacob Minor, MD, Yuexin Li, MD, Stephen Weber, Neil Gross, MD, John Song, MD, Sherif Said, MD, PhD, Xiao-Jing Wang, MD, PhD, Natalie Serkova, PhD, Shi-Long Lu, MD, PhD

10. **Immune Reconstitution Causing Regression of Kaposi’s Sarcoma**
    Justin M. Wudel, MD, Todd Wine, MD

11. **Congenital Nasolacrimal Duct Cyst/Dacryocystocele: An Argument for a Genetic Basis**
    Henry P. Barham, MD, Justin M. Wudel, MD, Robert W. Enzenauer, MD, MPH, Kenny H. Chan, MD