

DEPARTMENT OF OTOLARYNGOLOGY / HEAD AND NECK SURGERY



# ANNUAL REPORT 2013



UNC

DEPARTMENT OF OTOLARYNGOLOGY/  
HEAD AND NECK SURGERY

# Boy Hears His Father's Voice For The First Time

It was a story that captivated the world and became a viral online sensation. It quickly became the most shared and viewed report ever produced by UNC Health Care: the story of Grayson Clamp, the 3-year-old boy from Charlotte, North Carolina, who heard his father's voice for the first time.

In the Spring of 2013, Grayson was among the first to have an auditory brain stem implant done as part of an

FDA-approved investigational device surgery at UNC Hospitals.

The video produced by

UNC Health Care has garnered more than 1.3 million views, and Grayson has been featured on many major news programs such as CNN, Today Show, Anderson Cooper 360, and CBS Evening News.

Grayson was born with no cochlear nerves and as a result could not hear.

"I've never seen a look like that today," said Grayson's father, Len Clamp, of the day that the implanted device was turned on for the first time. "I mean, he looked deep into my eyes. He was hearing my voice for the first time. It was phenomenal."



Len and Grayson Clamp with Dr. Craig Buchman after his spring 2013 ABS surgery.

The surgery, performed by Craig Buchman, MD, Professor Otolaryngology/Head and Neck Surgery, and Matthew Ewend, MD, Chair, Department of Neurosurgery, is the first of its kind performed in the United States as part of an FDA-approved investigational device.

"Seeing him respond, that had a lot of feelings for me," said Dr. Buchman. "I felt like there was a potential that we were effectively changing the world in some ways."

The device

Grayson received was originally used for patients with deafness due to auditory nerve tumors, which impacts hearing. The device is now being considered to help restore hearing in children.

Grayson is beginning to understand that sound is meaningful. He is pairing sound with visual information and using it for communication. He is also beginning to understand phrases and words.

Turn to page 8 for a message from the Clamps. To see the CBS Evening News' six-month update about Grayson, and the video that started it all, please visit [go.unc.edu/Mz8i3](http://go.unc.edu/Mz8i3)



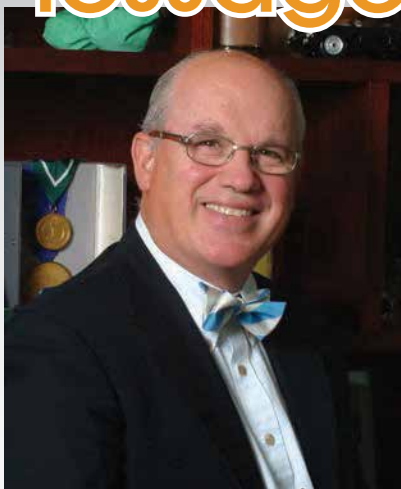
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# Message from the DEPARTMENT CHAIR



## In reviewing

this year's Annual Report, I am struck by the cohesiveness of our department. We have a tremendous group of dedicated professionals at all levels who work in concert to deliver the best clinical care, research expertise, and teaching excellence that is possible. Our efforts in each of these areas reach the level of national significance among Otolaryngology departments. As we embark upon the changing health care landscape, I am struck by the simple notion that Excellence will prevail and brilliant people will find ways to deliver Excellence if that commitment is held by all the parts of the organization. Our department is well aligned to face the future including challenges from Information Technology and the Affordable Health care Act. The wonderful multidisciplinary commitment in this Annual Report has been gratifying for me to witness. We have graduated outstanding residents and recruited equally outstanding students to fill the vacancies. Our dedication to teaching the next generation is as robust as ever.

The story of Grayson Clamp, a young boy who received an auditory brainstem implant is a striking example of the coalescence of research, clinical excellence, and operative genius. When all cylinders are firing in order, it is amazing what we can accomplish as a specialty, a medical center, and a university. We continue to push the envelope of advancing our specialty including the translational activities in Otolaryngology/Head and Neck Surgery from the bench to the bedside.

I hope you enjoy this report as much as I have.

A handwritten signature in black ink, reading "Harold C. Pillsbury III". The signature is fluid and cursive, with a large, stylized "H" and "P".

Harold C. Pillsbury III, MD, FACS  
Thomas J. Dark Distinguished Professor of Otolaryngology/Head and Neck Surgery  
Chair, Department of Otolaryngology/Head and Neck Surgery



# Message from the MEDICAL SCHOOL DEAN

## The Department

of Otolaryngology/Head and Neck Surgery (OHNS) at the School of Medicine thrived during a year of unprecedented change in health care. As concerns rose around cost and improving patient experience, UNC's OHNS faculty, residents and students addressed these issues through partnerships and innovation.

One of OHNS's most impressive advancements is featured on the cover of this Annual Report. Department faculty, staff and researchers worked together last spring to give the gift of hearing to Grayson Clamp, a 3-year-old from Charlotte, NC. Grayson was the first child in the country to receive an auditory brain stem implant, and he received it right here at UNC Hospitals. The surgery was a partnership between OHNS and the Department of Neurosurgery, and was performed as part of an FDA clinical trial.

Cutting-edge care like the kind provided to Grayson help put UNC Health Care and the School of Medicine in a position to lead – not just our own colleagues and patients, but also people from across the country. By translating research and discovery into real results for our patients, we are living out our mission to improve the health of North Carolinians and others whom we serve.

This year, U.S. News & World Report, ranked OHNS 22 nationally. OHNS is consistently one of the highest-ranking specialties at UNC. Through superb care, ground breaking research and enhanced opportunities for medical residents, our OHNS Department is leading the charge for innovation in medicine and health care delivery.

The list of accomplishments and accolades for the OHNS Department is long. From expanding otolaryngology services to Chatham Hospital in Siler City, to success in the Malawi Surgical Initiative, to the countless awards for care, humanitarian efforts and research faculty have received, your unwavering commitment to patients and the practice of medicine is clear.

Thank you for your research pursuits, and for your service to our students and each patient who walks through our doors. Because of your efforts, the practice of medicine and delivery of care are stronger.



A handwritten signature in black ink that reads "William L. Roper". The signature is fluid and cursive, with a large, stylized 'W' and 'R'.

William L. Roper, MD, MPH  
Dean, School of Medicine  
Vice Chancellor for Medical Affairs  
CEO, UNC Health Care System

The mission of the Department of Otolaryngology/Head and Neck Surgery is to improve health care by enhancing the field of otolaryngology/head and neck surgery and by advancing its clinical application. To fulfill this mission, our objectives are the following:

1. To provide excellent otolaryngologic/head and neck surgical patient care that can serve as a national model.
2. To provide outstanding undergraduate and postgraduate education that disseminates otolaryngology/head and neck surgery knowledge and facilitates more contributions to the knowledge base.
3. To carry out basic science, clinical, and health services research that advance the field of otolaryngology/head and neck surgery.



## Vision

To be the nation's leading public school of medicine.

## Mission

Our mission is to improve the health of North Carolinians and others whom we serve. We will accomplish this by achieving excellence and providing leadership in the interrelated areas of patient care, education, and research.

### • Patient Care

As a key component of the UNC Health Care System, the School of Medicine will provide superb care to North Carolinians and others whom we serve. We will maintain our strong tradition of reaching underserved populations. Excellence in education and research will enhance our delivery of the very best medical care, which will be presented in an environment that is exceptionally welcoming, collegial, and supportive both for those receiving and those providing the care.

### • Education

We will achieve excellence in educating tomorrow's health care professionals and biomedical researchers by providing exceptional support for outstanding teaching and research faculty. We will offer an innovative and integrated curriculum in state-of-the-art facilities. The School of Medicine will attract the very best students and trainees from highly diverse backgrounds.

### • Research

We will achieve excellence in research and in its translation to patient care by developing and supporting a rich array of outstanding research programs, centers, and resources. Proximity to the clinical programs of UNC Hospitals, to UNC-Chapel Hill's other premier health affairs Schools (Dentistry, Nursing, Pharmacy, and Public Health) and the other departments, schools, and programs on the UNC-Chapel Hill campus affords an exceptional opportunity for innovative, world-class research collaborations.

*In all of these missions, we will strive to meet the needs of our local, state, national, and global communities.*





The Clamp Family L-R: Ethan, Nicole,  
Len and Grayson

# Hello from The Clamp Family!

by Len & Nicole Clamp

We are and continue to be so blessed to have UNC as our medical partner and health care provider through what has been an absolute miracle in the life of our 3-year-old, Grayson.

We have had the great fortune of being able to work with UNC since 2010; through multiple surgeries on Grayson, time in the Pediatric

ICU, and countless hours of therapy. We now stand able to share a story of victory as our son becomes one of the first children in the world to gain

access to hearing through an Auditory Brainstem Implant (ABI), implanted at UNC Hospitals in April 2013.

Through North Carolina's early intervention process and UNC's phenomenal hearing program, our family was able to identify and diagnose Grayson's unique hearing needs very early on, and put a comprehensive plan together to address his challenges just after his 3rd birthday. At every step, both groups created a very collaborative atmosphere, ensuring

that we were well informed and educated on all options/risks, and able to make a decision together...as a unified team.

Throughout the process, UNC has provided access to both state-of-the-art approaches and a world-class treatment facilities. Knowing that our goal for Grayson was for him to learn and use spoken language, we elected to use Cued

Speech over American Sign Language (which is a more common visual approach). UNC supported our decision, which we knew would provide important benefits in developing speech when paired with a hearing device such

as a cochlear implant or (for us) an ABI. Finally, the treatment center at CASTLE where we go weekly for Audiology and Speech Therapy is a parent-centered, teaching environment where we work directly and alongside Grayson's specialists to become skilled "in home" therapists so we can keep the progress moving at home in between visits.

Grayson can now hear, has begun vocalizing vowels and consonant sounds, and will one day be able to tell his own

*"His success is in large part due to the team at UNC, and the confidence and care with which they work to help children."*

story of perseverance and thanksgiving. His success is in large part due to the team at UNC, and the confidence and care with which they work to help children. I wish all parents around the country had access to the network we have.

Grayson's story is but a glimpse of the miracle work God can do through faithful parents and expert physicians and specialists. God Bless.

### More about Grayson's Journey

Grayson was born with a condition called CHARGE, leaving him with a heart defect, no hearing, and no sight in his left eye. We adopted Grayson through North Carolina's Foster Care system in 2010.

Upon finding out for sure that Grayson could not hear (at about a year old), a blast email opened the door for us to a wonderful family in Charlotte who educated us



N.C. Senator Kay Hagan visited CCCDP to observe Grayson. (Sara Davis/Associated Press)



Drs. Holly Teagle and Lisa Park with Grayson. (Sara Davis/Associated Press)

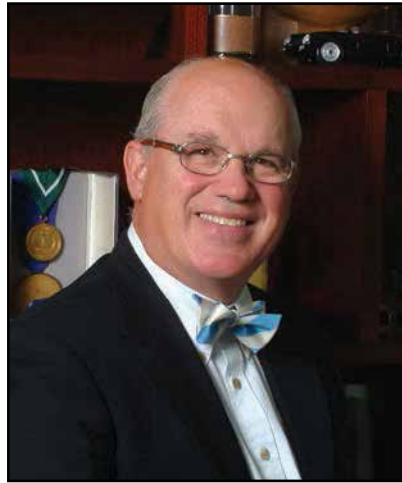
on cochlear implants and a unique form of sign language called Cued Speech. Cued Speech, unlike American Sign Language, signals every word that is spoken (through a combination of hand shapes and lip reading), which when accompanied by a hearing aid stimulates speech and language development. They also connected us to the audiology experts at UNC.

Grayson was implanted with a Cochlear implant at 18 months old. The device was a long-shot given his lack of hearing nerves in either ear, but we took the chance anyway, and in doing so, opened the door to develop a relationship with Dr. Craig Buchman and Dr. Holly Teagle. The cochlear implant did prove to be ineffective, so when Dr. Buchman offered us the chance to join the ABI trial, we jumped at the opportunity.

In April 2013, Grayson became the first child in the US to receive an ABI under the FDA approved trial through UNC's protocol. Dr. Craig Buchman (ENT) and Dr. Matt Ewend (Neuro) performed the surgery. We spent nearly 4 weeks in the hospital – 2.5 in the pediatric ICU where Grayson had to literally lay in a bed without moving for 14 days to stabilize a post operation cranial fluid leak.

Grayson's device was activated on May 21st...the most amazing day of our lives! Watch the videos online to see for yourself!

Our life verse throughout this journey has been 1 Corinthians 2:9, "No eye has seen, no ear has heard (until May 21st), no mind has conceived what God has prepared for those who love him."



Harold C. Pillsbury III, MD, FACS

Professor and Chair

Thomas J. Dark Distinguished Professor of Otolaryngology/Head and Neck Surgery  
Executive Director of the W. Paul Biggers, MD, Carolina Children's Communicative Disorders Program

MD: George Washington University

Residency: University of North Carolina School of Medicine

Special Interests: Otolaryngology-head and neck surgery, neurotology, facial plastic surgery, otolaryngic allergy, cochlear implantation, acoustic tumors, skull base surgery, laser utilization in head and neck cancer.



Craig A. Buchman, MD, FACS

Harold C. Pillsbury Distinguished Professor  
Chief, Division of Otolaryngology and Skull Base Surgery  
Vice Chair for Clinical Affairs  
Medical Administrative Director, CCCDP

MD: University of Florida

Research Fellowship (Otolaryngology): University of Pittsburgh School of Medicine, Children's Hospital of Pittsburgh

Residency: University of Pittsburgh School of Medicine

Fellowship (Otolaryngology and Skull Base Surgery):

House Ear Institute and Clinic, Los Angeles

Special Interests: Otolaryngology/neurotology and skull base surgery, lateral skull base surgery, acoustic tumors, cochlear implants, hearing preservation.



Brent A. Senior, MD, FACS, FARS

Nathaniel T. and Sheila W. Harris Professor  
Chief, Division of Rhinology, Allergy, and Endoscopic Skull Base Surgery  
Vice Chair for Academic Affairs

MD: University of Michigan

Residency: Boston University and Tufts University

Fellowship (Rhinology and Sinus Surgery): University of Pennsylvania Medical Center

Special Interests: Endoscopic minimally invasive management of sinusitis, CSF rhinorrhea, and tumors of the anterior skull base; surgical management of sleep apnea and snoring; allergy.





Oliver F. Adunka, MD, FACS

Associate Professor  
Director, Neurotology Fellowship  
Director, Surgical Education

MD: Medical University of Vienna, Austria  
Residency: J. W. Goethe University, Frankfurt, Germany  
Fellowship (Otology/Neurotology and Skull Base Surgery): UNC  
Department of Otolaryngology/Head and Neck Surgery  
Special Interests: Otology, neurotology, lateral skull base surgery, acoustic tumors, cochlear implants, hearing preservation.



Esa A. Bloedon, MD

Assistant Professor  
Otolaryngology/Head and Neck Surgery, Wake Medical Center

MD: Thomas Jefferson Medical College, Philadelphia, PA  
Residency: Thomas Jefferson University Hospital  
Special Interests: General and pediatric otolaryngology, endoscopic sinus surgery, thyroid and parathyroid disease, rhinology.



Robert A. Buckmire, MD

March Floyd Riddle Distinguished Research Professor  
Director, UNC Otolaryngology/Head and Neck Surgery  
Residency Program  
Chief, Division of Voice and Swallowing Disorders  
Director, UNC Voice Center

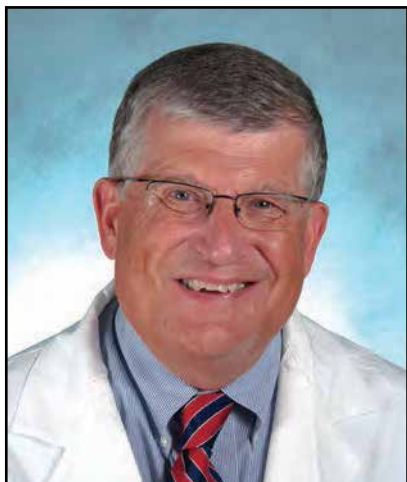
MD: University of Virginia School of Medicine  
Residency: University of North Carolina School of Medicine  
Fellowship (Laryngology): Vanderbilt University Voice Center  
Special Interests: Voice and swallowing disorders, diagnostic laryngeal EMG, laryngeal framework surgery, microsurgical treatment of laryngeal pathology, and micro-laryngeal, laser-control mechanisms.



Emily Buss, PhD

Professor

MS, PhD (Psychology): University of Pennsylvania  
Post-doctoral Research Fellowship (Psychoacoustics):  
University of North Carolina at Chapel Hill  
Special Interests: Normative psychoacoustics, development, speech perception, binaural hearing, auditory prostheses and sensorineural hearing loss.



Peter G. Chikes, MD, FACS

Assistant Professor

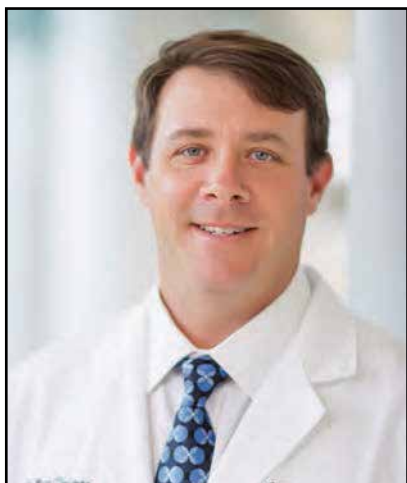
MD: University of North Carolina School of Medicine  
 Residency: Duke University Medical Center, Otolaryngology  
 Residency: Duke University Medical Center, General Surgery  
 Special Interest: Otolaryngic allergies, providing students and residents insights on private practice of medicine.



Margaret T. Dillon, AuD, CCC-A

Assistant Professor

AuD: University of North Carolina at Chapel Hill  
 Clinical Externship (Adult Cochlear Implants): UNC Hospitals  
 Special Interests: Cochlear implantation, hearing preservation, middle ear implantation, signal processing outcomes.



Brett E. Dorfman, MD

Assistant Professor  
 Otolaryngology/Head and Neck Surgery, Wake Medical Center

MD: Emory University School of Medicine  
 Residency: Duke University Medical School  
 Special Interests: Rhinology, allergy, sinus surgery, care of the professional voice.



Amelia F. Drake, MD, FACS

Newton D. Fischer Distinguished Professor of  
 Otolaryngology/Head and Neck Surgery  
 Associate Program Director, UNC Otolaryngology/  
 Head and Neck Surgery Residency Program  
 Director, UNC Craniofacial Center  
 Executive Associate Dean for Academic  
 Programs, UNC School of Medicine

MD: University of North Carolina School of Medicine  
 Residency: University of Michigan  
 Fellowship (Pediatric Otolaryngology): Cincinnati Children's Hospital  
 Special Interests: Pediatric otolaryngology, pediatric airway disorders, craniofacial anomalies.



Charles S. Ebert, Jr., MD, MPH

Assistant Professor

Co-Director, UNC Advanced Rhinology and Skull Base Surgery Fellowship  
Associate Director, UNC Otolaryngology/Head and Neck Surgery Residency Program

MD: University of North Carolina School of Medicine

MPH: University of North Carolina School of Public Health

Residency: University of North Carolina School of Medicine

Fellowship (Rhinology): Georgia Nasal and Sinus Institute

Special Interests: Chronic sinusitis, allergic fungal sinusitis, primary and revision sinus surgery, sinonasal tumors, computer guided surgery, allergic disease, and other nasal disorders; investigation into the genetic alterations in chronic eosinophilic rhinosinusitis.



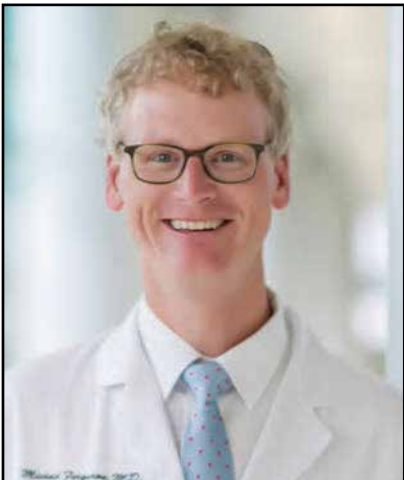
Hannah R. Eskridge, MSP, CCC-SLP

Assistant Professor

Director, Center for the Acquisition of Spoken language Through Listening Enrichment (CASTLE)

MSP: University of South Carolina

Special Interests: Pediatric hearing loss, cochlear implants, speech/language and audition development after cochlear implantation.



Michael O. Ferguson, MD

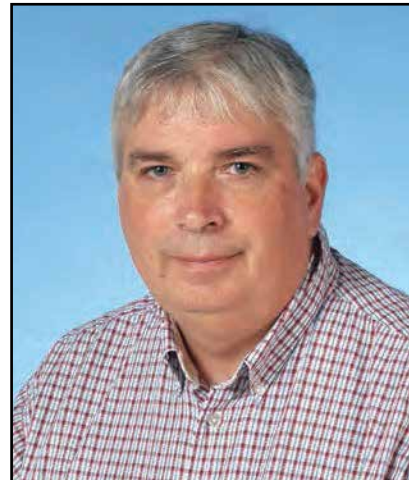
Associate Professor

Otolaryngology/Head and Neck Surgery, Wake Medical Center  
Director, WakeMed Faculty Physicians ENT-Head and Neck and Facial Plastic Surgery  
Associate Director, WakeMed Otolaryngology/Head and Neck Surgery Residency Program

MD: University of North Carolina School of Medicine

Residency: University of North Carolina School of Medicine

Special Interests: General and pediatric otolaryngology, rhinology, allergy, sinus surgery, head and neck oncology.



Douglas C. Fitzpatrick, PhD

Associate Professor

PhD (Anatomy): University of North Carolina at Chapel Hill

Special Interests: Physiology and anatomy of the auditory system, cochlear implants, electrical stimulation of the central auditory system, binaural hearing, auditory information processing.





John H. Grose, PhD

Professor

MSc: University of Southampton, United Kingdom  
PhD (Audiology): Northwestern University  
Special Interest: Psychoacoustics



Trevor G. Hackman, MD, FACS

Assistant Professor

Co-Director, UNC Advanced Head and Neck Oncology Fellowship

MD: University of Pittsburgh  
Residency: University of Pittsburgh  
Fellowship (Head & Neck/Microvascular):  
Washington University St. Louis

Special Interests: Head and neck surgical oncology, endocrine surgery, parotid surgery, transoral laser microsurgery, open and endoscopic skull base surgery, head and neck reconstruction, minimally invasive head and neck surgery, and sinus surgery.



Joseph W. Hall, PhD

James S. and June M. Ficklen Distinguished Professor  
Chief, Division of Auditory Research

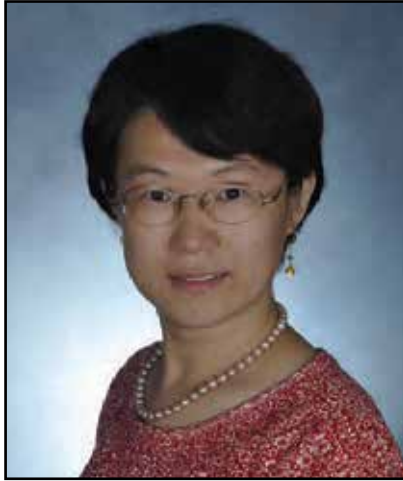
MS (Audiology): University of North Carolina at Chapel Hill  
PhD (Experimental Psychology): University  
of North Carolina at Greensboro  
Special Interests: Clinical psychoacoustics,  
cochlear implantation.



D. Neil Hayes, MD, MPH

Associate Professor

MD: University of North Carolina School of Medicine  
MPH: Harvard School of Public Health  
Residency (Internal Medicine): Boston University School of Medicine  
Fellowship (Hematology/Oncology): Tufts  
New England Medical Center  
Post-Doctoral Fellowship: Dana Farber Cancer Institute  
Special Interests: Clinical research in head and neck  
and lung cancer; clinical application of genomic  
testing; cancer therapeutics and chemotherapy.



Shuman He, MD, PhD

Assistant Professor

MD: Shandong Medical University  
 PhD (Speech and Hearing Sciences specialized in auditory electrophysiology): The University of Iowa  
 Residency (Otolaryngology): Shandong Provincial Hospital  
 Post-Doctoral Training (Psychoacoustics and Auditory Electrophysiology): The University of North Carolina at Chapel Hill  
 Special Interests: Cochlear Implantation, Auditory Electrophysiology.



Andrea Jarchow-Garcia, MD

Assistant Professor

MD: Brody School of Medicine, East Carolina University  
 Residency: University Hospitals, Case Medical Center  
 Fellowship: (Facial Plastic and Reconstructive Surgery) Tulane University/Hedgewood Surgical Center  
 Special Interests: Surgery for the aging face, facial rejuvenation with injectables & fillers, and rhinoplasty.



Julia S. Kimbell, PhD

Associate Professor

PhD (Mathematics): Duke University  
 Post-Doctoral Training: CIIT Centers for Health Research  
 Special Interests: Research in biomathematical modeling; the effects of nasal anatomy and respiratory airflow patterns on the uptake and deposition of inhaled gases and particles in the nasal passages of rodents, primates, and humans.



Paul B. Manis, PhD

Thomas J. Dark Research Professor  
 Chief, Division of Research Training and Education

PhD (Neuroscience): University of Florida  
 Postdoctoral Training (Neurobiology): Vanderbilt University School of Medicine  
 Special Interests: Cellular basis of auditory information processing; central nervous system plasticity.



Allen F. Marshall, MD

Assistant Professor  
Otolaryngology/Head and Neck Surgery, Wake Medical Center

MD: University of North Carolina School of Medicine  
Residency: University of North Carolina School of Medicine  
Special Interests: Adult and pediatric general otolaryngology, including rhinology, allergy, endoscopic sinus surgery, thyroid and salivary gland surgery, ear disease, and hearing.



Andrew F. Olshan, PhD

Professor  
Chair, Department of Epidemiology, UNC School of Public Health

MS, PhD (Epidemiology): University of Washington  
Special Interests: Molecular epidemiology of head and neck and childhood cancer.



James T. O'Neil Jr, MD

Assistant Professor  
Otolaryngology/Head and Neck Surgery, Wake Medical Center

MD: The University of Alabama School of Medicine  
Residency: Wake Forest University Baptist Medical Center  
Special Interests: Robotic surgery, head and neck cancer, diseases of the thyroid and parathyroid, laryngology, general and pediatric disorders.



Brien R. Pace, ACNP-BC

Nurse Practitioner

MSN: Duke University School of Nursing  
Special Interests: Acute care, cardiology, oncology, critical care, otolaryngology head and neck cancer.





Austin S. Rose, MD

Associate Professor  
 Director, UNC Pediatric Otolaryngology Fellowship Program  
 Co-Director, Newton D. Fischer Society Annual Meeting

MD: University of North Carolina School of Medicine  
 Residency: University of North Carolina School of Medicine  
 Fellowship (Pediatric Otolaryngology):  
 Johns Hopkins University  
 Special Interests: Pediatric Otolaryngology;  
 Pediatric Rhinology, Allergy & Sinus Surgery.



Patricia A. Roush, AuD

Associate Professor  
 Director of Pediatric Audiology

MA (Audiology): University of Iowa  
 AuD: University of Florida  
 Special Interest: Pediatric Audiology



William W. Shockley, MD, FACS

W. Paul Biggers Distinguished Professor  
 Chief, Division of Facial Plastic and  
 Reconstructive Surgery

MD: Indiana University  
 Residency: University of Cincinnati  
 Fellowship (Head and Neck Surgical Oncology):  
 Methodist Hospital, Indianapolis, Indiana  
 Board Certified by the American Board of  
 Facial Plastic and Reconstructive Surgery  
 Special Interests: Facial plastic and  
 reconstructive surgery, rhinoplasty, skin  
 cancer, salivary and thyroid gland surgery.



Carol G. Shores, MD, PhD, FACS

Professor

PhD (Biochemistry): University of North Carolina at Chapel Hill  
 MD: University of North Carolina School of Medicine  
 Residency: University of North Carolina School of Medicine  
 Special Interests: Head and neck surgical oncology,  
 including salivary malignancies, thyroid surgery,  
 and surgical airway management.



Holly F.B. Teagle, AuD

Associate Professor  
Program Director, W. Paul Biggers, MD, Carolina  
Children's Communicative Disorders Program

MA (Audiology): University of Iowa  
AuD: University of Florida  
Special Interests: Cochlear implants in children, childhood  
development after cochlear implantation, cochlear implant  
device efficacy and clinical management issues, audiology.



Mark C. Weissler, MD, FACS

Joseph P. Riddle Distinguished Professor  
Chief, Division of Head and Neck Oncology

MD: Boston University  
Residency: Harvard University  
Fellowship (Head and Neck Oncologic Surgery): University of Cincinnati  
Special Interests: Head and neck cancer, thyroid cancer,  
salivary gland neoplasms, skull base tumors, laser  
utilization in head and neck surgery, voice disorders,  
laryngeal/tracheal stenosis, head and neck trauma.



Adam M. Zanation, MD, FACS

Associate Professor  
Director, UNC Otolaryngology/Head and Neck  
Surgery Medical Student Affairs  
Co-Director, UNC Rhinology and Skull Base Surgery Fellowship  
Co-Director, UNC Advanced Head and Neck Oncology Fellowship

MD: University of North Carolina School of Medicine  
Residency: University of North Carolina School of Medicine  
Fellowship (Skull Base Surgery and Oncology/Rhinology):  
University of Pittsburgh Medical Center  
Special Interests: Skull base tumors, sinonasal tumors,  
CSF rhinorrhea, robotic and minimally invasive head  
and neck tumor surgery, parotid tumors, head and  
neck sarcomas, rhinology, sinus surgery.



Carlton J. Zdanski, MD, FACS, FAAP

Associate Professor  
Chief, Division of Pediatric Otolaryngology  
Surgical Director, North Carolina Children's Airway Center

MD: University of North Carolina School of Medicine  
Residency: University of North  
Carolina School of Medicine  
Fellowship (Pediatric Otolaryngology):  
Children's Hospital of Pittsburgh  
Special Interests: Pediatric otolaryngology, reconstructive  
airway surgery, cochlear implantation, microtia  
repair, cleft palate, pediatric head and neck masses.



# WakeMed ENT

The WakeMed ENT Department is comprised of five board-certified Otolaryngologists, and all hold adjunct faculty appointments in the UNC Department of Otolaryngology/Head and Neck Surgery. The veteran members of the practice are Dr. Michael Ferguson (Director and Chief), Dr. Brett Dorfman, Dr. Esa Bloedon and Dr. Allen Marshall. Additionally, they are pleased to introduce the newest member of their practice, Dr. James T. O'Neil. An Alabama native, Dr. O'Neil trained at the Wake Forest Department of Otolaryngology. Like the other members of the WakeMed practice, his skill set and clinical interests are diverse, but in particular, he is excited about bringing his skills in Trans-Oral Robotic Surgery to Wake County and the WakeMed system.

The group is proud of our proficiency in all subspecialties, whether it be acute pediatric care, complex facial trauma, airway emergencies, head and neck oncology, endocrine disorders, complex sinus disease, or just bread and butter ENT. WakeMed ENT welcomes the opportunity to provide comprehensive care to the citizens of Wake County and beyond. The WakeMed group continues to cherish our teaching relationship

with the UNC residents. We are confident that we provide a unique training experience for the residents that few programs can boast. Given our relatively small group size and our persistent focus on clinical training, the residents continue to thrive under the careful guidance of our physicians. The continuity of care and the repetition that the residents receive working so closely with each individual attending makes for an ideal training ground for the building blocks of our specialty. The six-month experience of the second year residents has them arriving with almost no clinical experience and leaving with confidence and clinical competence in a wide range of bread and butter surgical procedures.

The third year residents get their first real look at sinus and nasal surgery, middle ear surgery and the management of thyroid disease. And as always, our fourth year residents leave with a wealth of knowledge in the realm of head and neck surgical oncology.

WakeMed ENT has offices in Raleigh, North Raleigh, Knightdale, and opened an additional office in Garner in the Fall of 2013.



## NURSING STAFF



Bj Squires, RN



Joanne Griffin-McClain, LPN

## ASSOCIATE CHAIR FOR ADMINISTRATION

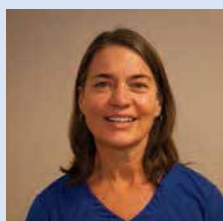


Carolyn Hamby

## ENT CLINIC SUPPORT SUPERVISOR



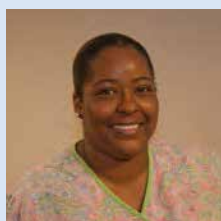
Anna Bradshaw



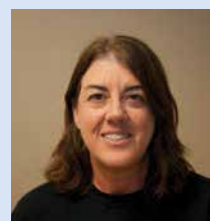
Kathy Tommerdahl, RN



Cathy Nakayama, RN, MSN



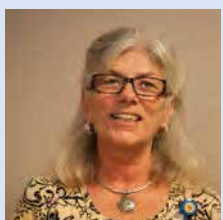
Samylia Alston, CNA



Sheila Ergle, RN, BSN



Jo Ann Kelly, RN



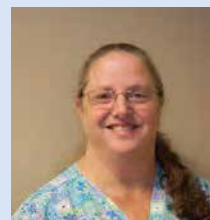
Teresa McInerney, RN



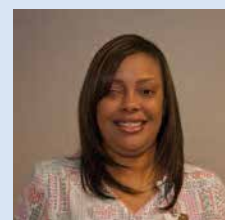
Kristen Jewell, RN



Samantha Wilson, CNA



Robin Gunter, RN



Brittany Wardrick, CNA



Traci McKinney, RN



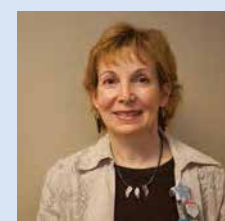
Sharon Rubischko, RN



Carla Toto, CNA



Ashley Tenney, RN



Gina Stoffel, RN



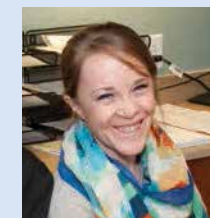
Elaine Hinkle, RN, BSN



Soon Young Rondinelli, RN



Diane Burden, CNA



Katie Sams, RN



Michelle Solano, CNA

## PATIENT BUSINESS ASSOCIATES



Wendy Boyd



Allison Turner



Venice Benitez



Ashley Myles



Nakia Hackney



Earlene Howze



Tammy Moore-Andrews



Angel Jeffries



Tery Armstrong

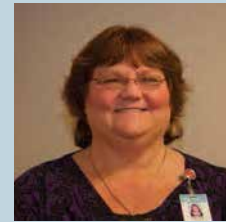


Shanta Beard



Paige McDaniel

## SURGERY SCHEDULERS



Phyllis Dixon



Katherine Eng



Patricia Longest



Michelle Handy



Sonia Meeks



## ADMINISTRATIVE ACADEMIC AFFAIRS

L-R: Donna Woodard (Assistant to Drs. Weissler, Buchman and Adunka), Ellen Doult (Residency Program Coordinator and Assistant to Drs. Drake and Ebert), Dawn Wilson (Assistant to Drs. Zdanski, Zanation and Rose), Kathy Bogie (Assistant to Drs. Buckmire and Senior), Kathy Harris (Executive Assistant to Dr. Pillsbury) and Jonna Apple (Assistant to Drs. Jarchow, Hackman, Shockley and Shores). Not pictured: Cheryl Goodrich (Personnel Manager) and Nicolette DeGroot (Communications Director).



L-R: Drs. Shadfar and Yin, & Drs. Harmon and Wong.

# Chief Residents

## REFLECT BEHTECT

**Jessica Smyth, MD** Not often are we privileged to so publically proclaim our gratefulness, but it is with a heart filled with gratitude that I depart Chapel Hill. I would be remiss if I didn't start by thanking Dr. Pillsbury for selecting me. From the moment I first drove through campus and met the staff, faculty, and residents, I wanted to train at UNC. After five years, I haven't been disappointed. The opportunities afforded me during my training have been incredible. All of the faculty have, in some way, mentored and educated me. I would especially like to thank Dr. Shores for allowing me to travel with her and share in the work she is doing in Malawi. The work done at UNC is benefiting not only the residents of North Carolina, but also individuals throughout the world.

Finally, I want to thank you for being my "military family." Your support during my husband's deployments and our geographic separation has been amazing. As I transition back to the military, I intend to continue to build on the foundation I've developed here and carry forward the excellent patient care I've come to know at UNC. It is truly my hope that I will be able to give back after so much has been given to me.

**Yu-Tung Wong, MD** North Carolina has given me growth in every way. In particular this expansive otolaryngology program has grown my scope of thinking. I feel fortunate to have opened my eyes to subspecialty fields that were not at my forefront before. I attribute this directly to the faculty's intensity for excellence. It has been a distinct pride to train at UNC.

My opportunity to maintain an engineering mentality also contributed to my future growth as a researcher. Without exception, every person who knew my background encouraged me to mix technical thinking with medical practice. I unexpectedly learned new technical skills in new arenas over the last five years. It has been a distinct pride to work with Dr. Buckmire.

Most notably my family grew here in North Carolina. My two "Carolina Girls" are wonderful, happy, healthy, and safe. I am so happy to have found the perfect neighborhood in Chapel Hill for them to run, play, ride, learn. Gianna will never forget volleyball camp, Lego Engineering, the BLT store, and Scroggs Frogs. It has been a distinct pride to grow as a daddy here in Chapel Hill.

**Scott Shadfar, MD** Farewells are often bittersweet. I anxiously began roaming the





L-R: Drs. Shores, Charles and Smyth, & Drs. Senior and Patel



halls of UNC hospital in 2008. This was the start of my intern year, far from my home in Oklahoma. I knew the path would be demanding, but to what extent was unpredictable. The relationships I have developed and solidified during my training at UNC have been invaluable, and drove my ability to thrive here in North Carolina.

Navigating life through residency has not been easy, nor should it. However, after finding myself surrounded by such gifted, industrious, courageous humans beings, I can safely say we have persevered. I am grateful to all my friends, operating room and clinic teams, colleagues, faculty, and mentors who have invested any of their time, life, and energy in

making me the best physician I could be. As I embark on future endeavors I will honor and embrace being a graduate of UNC. I will miss everyone as I begin my fellowship in facial plastic and reconstructive surgery in Indianapolis, Indiana. I wish you all the best.

### **Mihir Patel, MD**

**Einstein defines Insanity:**

**doing the same thing over and over again  
and expecting different results.**

**seven years of mentorship, forging  
friendships, my Wife and an Ariya later**

**.. feel free to call me insane.**

## Junior Residents



**Nathan H. Calloway, MD**

(PGY-2, 2017)  
Boston University  
School of Medicine, MD, 2012  
Boston University School of Medicine,  
MA Medical Sciences, 2007  
UNC School of Medicine, BS Biology, 2003



**Adam P. Campbell, MD**

(PGY-3, 2016)  
UNC School of Medicine, MD, 2011  
Vanderbilt University,  
BS Communication Studies, 2006  
University of Florence,  
Italian Language & History, 2004



**Baishakhi Choudhury, MD**

(PGY-3, Research Track, 2016)  
SUNY at Buffalo School of Medicine &  
Biomedical Sciences, MD, 2009  
National Cancer Institute, NIH,  
Post-Bac Research Fellow, 2005  
SUNY at Binghamton University,  
BS Psychology/Computer Science, 2002



**John P. Dahl, MD, PhD, MBA**

(PGY-5, 2014)  
 Jefferson Medical College, MD, 2009  
 The Pennsylvania State University,  
 PhD Pharmacology, 2001  
 The Pennsylvania State University, MBA, 2000  
 Villanova University, BS Biology, 1997



**Anand R. Dugar, MD**

(PGY-3, 2016)  
 University of Pittsburgh Medical Center,  
 Anesthesiology Residency, 2008  
 Penn Hospital, Residency, Internal Med, 2005  
 Jefferson Medical College, MD, 2004  
 The Pennsylvania State University, BS Science, 1999



**Deepak R. Dugar, MD**

(PGY-4, 2015)  
 George Washington University,  
 BA Biology/MD Seven-Year Program, 2010



**Alexander A. Farag, MD**

(PGY-5, 2014)  
 The University of Toledo  
 College of Medicine, MD, 2009  
 The College of Wooster, BA Chemistry, 2004



**Lauren W. Fedore, MD**

(PGY-2, 2015)  
 Tufts University School of Medicine, MD, 2012  
 Tufts University, BS Biological Sciences, 2008



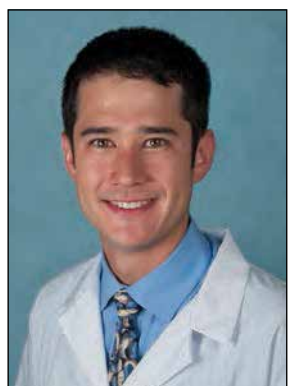
**Anna X. Hang, MD**

(PGY-4, 2015)  
 Uniformed Services University of the Health  
 Sciences, MD, 2010  
 University of Illinois at Urbana-Champaign,  
 BS Chemistry, 2006



**Grace K. Austin, MD**

(PGY-4, Research Track, 2017)  
 University of Medicine and Dentistry of  
 New Jersey, Robert Wood Johnson  
 Medical School, MD, 2010  
 University of Pennsylvania, Post-BS, 2006  
 Carengie Mellon University, BS Biology, 2003



**Adam J. Kimple, MD, PhD**

(PGY-2, 2016)  
 UNC School of Medicine, MD/PhD, 2012  
 Michigan State University,  
 MS Computational Chemistry and  
 BS Chemistry, 2003



**Cristine N. Klatt-Cromwell, MD**

(PGY-3, 2016)  
 University of Oklahoma  
 College of Medicine, MD, 2011  
 University of Oklahoma, BS Biochemistry/  
 Spanish, Medical Humanities, 2007



**Gita M. Fleischman, MD**

(PGY-3, Research Track, 2018)  
UNC School of Medicine, MD, 2011  
Georgetown University,  
MSc Physiology/Biophysics, 2006  
UNC-Chapel Hill, BS Biology/English, 2004



**Kibwei A. McKinney, MD**

(PGY-6, Research Track, 2016)  
University of Pennsylvania, MD, 2008  
Stanford University, BA Human Biology/Spanish, 2001



**Lewis J. Overton, MD**

(PGY-2, 2018)  
Medical University of South  
Carolina, MD, 2013  
UNC-Chapel Hill, BS Biology, 2009



**Rounak B. Rawal, MD**

(PGY-2, 2018)  
Boston University School of Medicine, MD, 2013  
Doris Duke Clinical Research Fellow in OHNS,  
UNC-Chapel Hill, 2012  
Boston University, BA/MD Program, 2009



**Joseph P. Roche, MD**

(PGY-7, Research Track, 2014)  
Medical College of Wisconsin, MD, 2007  
St. Mary's University of Minnesota,  
BS Biology, 2002



**Keimun A. Slaughter, MD**

(PGY-4, 2015)  
Duke University Medical Center, General  
Surgery Residency, 2011  
Morehouse School of Medicine, MD, 2009  
University of Georgia,  
BS Biology/Pre-Med, 2004



**Brian D. Thorp, MD**

(PGY-5, 2014)  
Eastern Virginia Medical School, MD, 2009  
James Madison University, BS Biology 2005



**Christopher M. Welch, MD, PhD**

(PGY-1, 2018)  
UNC-Chapel Hill, MD/PhD, 2013  
UNC-Chapel Hill, PhD Pharmacology, 2011  
Clemson University, BS Biological Sciences  
and Chemistry, 2004



# Message from the RESIDENCY COORDINATOR



Ellen Doult

The Otolaryngology/Head & Neck Surgery Residency Training Program at the University of North Carolina at Chapel Hill is one of the most highly sought after training programs in the country. Each year, our department receives hundreds of applications for consideration to fill three residency positions. We have seen a steady increase each year in the number of applicants to our Program, i.e. from 334 in 2011/2012 to 410 in 2012/2013 (nearly a 23% increase in the past year alone).

Working as a Residency Training Coordinator is a challenging occupation due to the increasing scope and complexity of program requirements and documentation. As clinical duties continue to increase for the Program Director, the Program Coordinator is often the person with the most global view of the program, including resident concerns and approaching deadlines, as well as changes in institutional policies, American Board of Otolaryngology (ABOto)

requirements, Residency Review Committee (RRC), and the Next Accreditation System (NAS).

As the Residency Training Coordinator for Otolaryngology, I am the front line representative of the program and strive to represent the program effectively and professionally. I am usually the first person a prospective residency applicant communicates with when requesting information about the program and usually the last person to say goodbye as the resident completes the program and turns in their clearance sheet. I just celebrated my thirteenth year as the Residency Training Coordinator in the department of Otolaryngology/Head & Neck Surgery and have seen many great and positive changes in the department over the years. I truly enjoy what I do and love working with our resident physicians. They are a wonderful group of young doctors and I am honored to be a part of their lives and training as they spend five to seven years of their career here with us at UNC!

As our department grows, our faculty continues to provide an extremely unique training opportunity for young physicians who have dedicated their careers to provide innovative, comprehensive, and compassionate medical care to patients with diseases of the head and neck, while remaining dedicated to academic medicine and research in the specialty.





**2013 Intern Residents:**  
Drs. Welch, Rawal and Overton

# Residency Program

Dr. Robert A. Buckmire serves as the Director of the Residency Program and Drs. Charles S. Ebert and Amelia F. Drake serve as the Associate Program Directors at UNC Hospitals. Dr. Michael O. Ferguson serves as the Director at Wake Medical Center. Responsibilities include implementing the six clinical competencies, as per ACGME guidelines, as well as ensuring the smooth transition of the residents through their specialty training.

## RESPONSIBILITIES

The residency program in Otolaryngology/Head and Neck Surgery is structured to have four residents for five years of Otolaryngology/Head and Neck Surgery. The first year, the intern year, includes five months of assorted General Surgery rotations, Neurosurgery, Emergency Medicine, Anesthesiology, Intensive Care, and three months of OHNS. Second-year residents participate in six months at Wake Medical Center in Raleigh and six months of research in the OHNS laboratories. A rotation in Audiology is incorporated into the research block. The third and fourth-year house officers spend three months

each at Wake Medical Center in Raleigh, as well as participate in the services of Head and Neck Oncology/Facial Plastics, Pediatric Otolaryngology/Otology, and Rhinology/Laryngology.

The clinical program consists of graduated responsibilities for residents at each level. Senior residents attend either the Annual Meeting of the American Academy of Otolaryngology/Head and Neck Surgery or the Combined Otolaryngology Spring Meeting. Many OHNS residents attend at least one other meeting during the year as scientific presenters. Upper level residents learn to balance clinical and administrative responsibilities with on-call duties and academic pursuits, such as completing publications from their basic research experiences or conducting clinical research projects.

Chief resident responsibilities include: supervising the specific OHNS clinical service, organizing and distributing the educational conference schedule, and assigning residents to specific clinics, call duties, consult responsibilities, and operative cases.



## RESIDENT EDUCATION

A curriculum of didactic lectures spans the academic year. During the summer months, our residents design and coordinate a head and neck anatomy dissection course. This entails preparation and pro-section of common procedures performed in OHNS. Attending physicians “take the residents through” the technical aspects of the procedure, and the discussion covers the indications, surgical options, technical highlights and pitfalls, as well as complications associated with the procedure performed.

A Temporal Bone Course and Competition is scheduled in the spring. In addition, there are weekly conferences that include Journal Club, Head and Neck Conference, Radiology, Pathology, Patient of the Month Program, Morbidity and Mortality, Speech Pathology, Audiology, and Research Conferences.

Finally, most residents participate in outside educational meetings. Second year residents attend the American Academy of Otolaryngologic Allergy. The third year residents attend the North Carolina/South Carolina Otolaryngology meeting as well as the Carolinas Airway Course, the fourth year residents attend an off-site didactic temporal bone course, and fifth year residents attend the annual meeting of the American Academy of Otolaryngology-Head & Neck Surgery. Many residents attend and present research at the Triological meetings, or other subspecialty meetings throughout the year.

## RESEARCH OPPORTUNITIES

Each resident in the Department is required to design and carry out a research project during the PGY-2 year. Many have chosen to undertake projects within the established laboratories in the Department, while others have chosen to work in related disciplines such as microbiology, molecular biology, tumor biology, audiology, or cochlear physiology. The Department also has affiliations with the Dental Research Center and the Department of Anatomy

and Cell Biology. The quality of resident research has been consistently high, tends to be collaborative and has resulted in numerous awards and publications.

The Department of Otolaryngology/Head and Neck Surgery has a number of laboratories engaged in both auditory and head and neck oncology research. Auditory research currently has separate laboratories engaged in human psychoacoustics, cochlear implant performance and modeling, information processing and plasticity in the auditory brainstem and midbrain, the neural basis of sound localization, and inflammatory mechanisms in viral otitis media.

With the addition of Dr. Julia Kimbell, PhD. to the research faculty, a novel focus in Computational Fluid Dynamics has been added to the departmental research efforts with a primary focus and collaboration within the Rhinology division.

Head and neck oncology research includes clinical research in the form of trials involving management of patients with squamous cell carcinoma, investigation of the mechanisms and treatment of cancer cachexia, analysis of genetic mechanisms of head and neck cancer, and studies in the pathogenesis, diagnosis, treatment, and epidemiology of head and neck squamous cell carcinoma. In addition to auditory and head and neck cancer studies, research is also currently being carried out in the area of dysphagia, robotics, allergies, and sinonasal disorders. The options for research by residents are limited only by imagination.



A photograph of a modern, multi-story building with a grid of large windows. The building is light-colored and has a flat roof. The windows are arranged in a regular pattern across the facade. In the foreground, there is a paved area with some potted plants and a small structure. The sky is clear and blue.

# The Department

**#1** in North Carolina, #7 among public institutions, and #22 in the nation in US News & World Report 2012 rankings

**#10** in NIH grant funding for all U.S. otolaryngology departments

Carolina Crossing **Speech & Audiology** made it in the **Top 5** UNC Clinics for Patient Satisfaction Commitment to Care Initiative

**1** New location added to our services in Siler City, North Carolina:  
**Chatham Hospital**

New surgical skills lab:  
**Pg138** A state-of-the-art practice space offering real hands-on simulations for otolaryngology, ophthalmology & neurosurgery

Practice location update: Carolina Pointe became **Carolina Crossing**, including a new address

Out of 18 residents passing the oral Membership of College of Surgeons exams, **6** are from the UNC Malawi Surgical Initiative

Installation of a **localization array** in the clinical research lab at Carolina Crossing.

Dr. **Hackman** completed his 20th Trans Oral Robotic Surgery on the da Vinci surgical robot in 2012

**8** Best Doctors for 2012-2013: Drs. Zdanski, Senior, Pillsbury, Shockley, Weissler, Adunka, Buchman, & Drake

Dr. **Eskridge** was awarded the 2013 CARE Project Humanitarian Award

Dr. He  
was awarded the  
NIH R03 grant of  
\$456,000

Dr. Campbell  
won a first place poster  
award at the 116th Annual  
Triological Society

Dr. Kim Austin  
was awarded the UNC  
Lineberger Comprehensive  
Cancer Center 2012 Clinical/  
Translational Developmental  
Research Award of \$40,000

Dr. Pillsbury  
was awarded a 2013  
Order of the Golden  
Fleece, UNC's oldest  
and most prestigious  
honor society

Dr. Fitzpatrick  
was awarded the NIH R01  
grant of \$250,000

Dr. Zdanski  
received the 2012 AAO-  
HNS Foundation Award.

Dr. Zanation  
was awarded the Harris  
P. Mosher Award & was  
inducted as a fellow into  
the Triological Society

Drs. Zanation &  
Klatt-Cromwell won  
a first place poster award at the  
116th Annual Triological Society

Dr. Ebert became  
a Member in the Academy  
of Educators

Dr. Pillsbury  
was awarded the Triological  
Society Gold Medal



# ADMINISTRATION



**Harold C. Pillsbury III, MD**  
Professor & Chair



**Craig A. Buchman, MD, FACS**  
Professor & Vice Chair - CA



**Brent A. Senior, MD, FACS**  
Professor & Vice Chair - AA



**Carolyn Hamby, ACA**  
Associate Chair for Administration

# PEDIATRIC OTOLARYNGOLOGY



**Carlton J. Zdanski, MD, FACS**  
Chief



**Amelia F. Drake, MD, FACS**  
Professor



**Austin S. Rose, MD**  
Associate Professor



**Jason M. Roberts, MD**  
Pediatric Fellow

# EAR & HEARING CENTER



**Craig A. Buchman, MD, FACS**  
Professor



**Harold C. Pillsbury III, MD**  
Professor and Chair



**Oliver F. Adunka, MD, FACS**  
Assistant Professor



**Meg T. Dillon, AuD**  
Research Assistant Professor



**Joseph W. Hall, PhD**  
Professor and Chief



**Douglas C. Fitzpatrick, PhD**  
Associate Professor



**Emily Buss, PhD**  
Professor

# RHINOLOGY, ALLERGY



**Adam M. Zanation**  
Associate Professor



**John H. Grose, PhD**  
Professor



**Shuman He, MD, PhD**  
Research Assistant Professor



**Peter G. Chikes MD, FACS**  
Assistant Professor

# RESEARCH TRAINING & EDUCATION



**Paul B. Manis, PhD**  
Professor and Chief



**Patricia A. Roush, AuD**  
Director



**Holly F.B. Teagle, AuD**  
Director



**Hannah Eskridge, MSP**  
Director

# AUDITORY RESEARCH

# AUDIOLOGY

# CCCDD

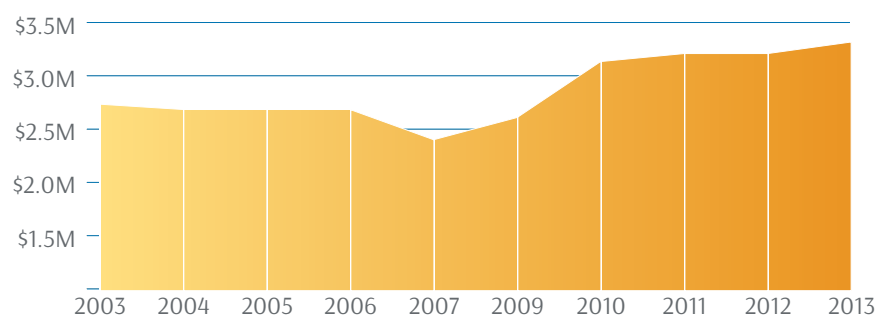
# CASTLE





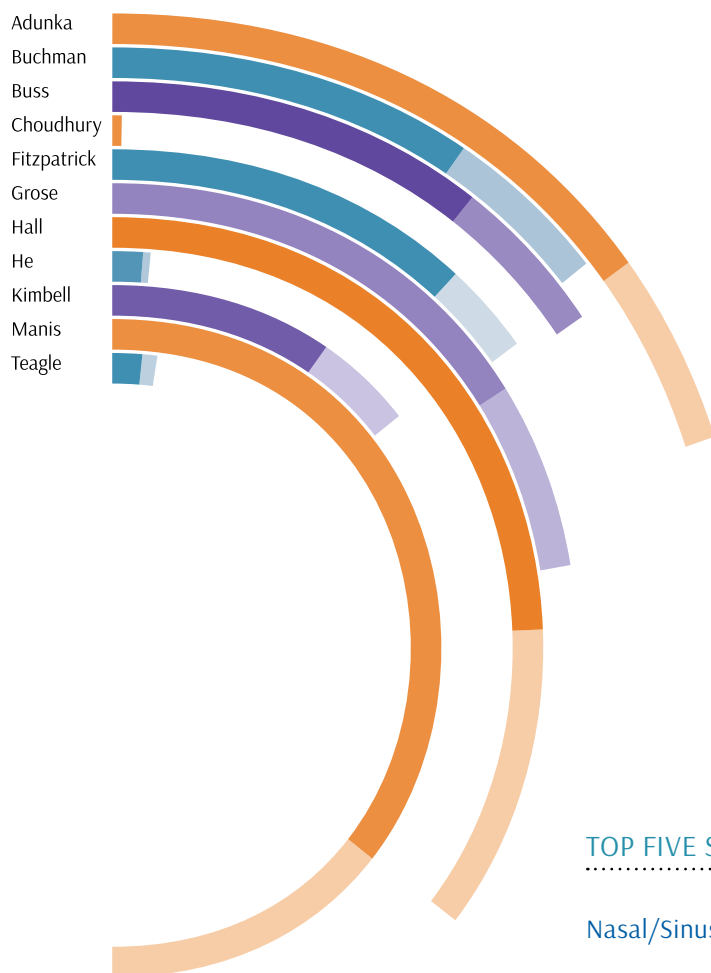
# Total FY13 Grants **\$3.3 Million**

## TRENDS IN GRANT FUNDING, 2003-2013



**#10** in NIH  
grant  
funding of all U.S.  
otolaryngology  
departments

## FUNDING BY PI, FY13 (*lighter shade denotes indirect costs*)



## FY13 STATISTICS

OR Cases	3,938
Inpatient Beds	830
Inpatient Admissions	630
Inpatient Discharges	630
Outpatient Visits	40,969
Emergency Department Visits	64,322
Faculty	36
Staff	76

## TOP FIVE SURGERIES

Nasal/Sinus Endoscopy

Laryngoscopy

Tympanostomy

Cochlear Implant

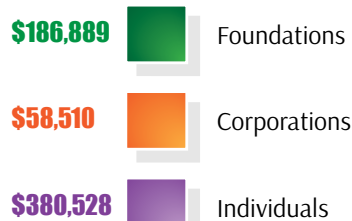
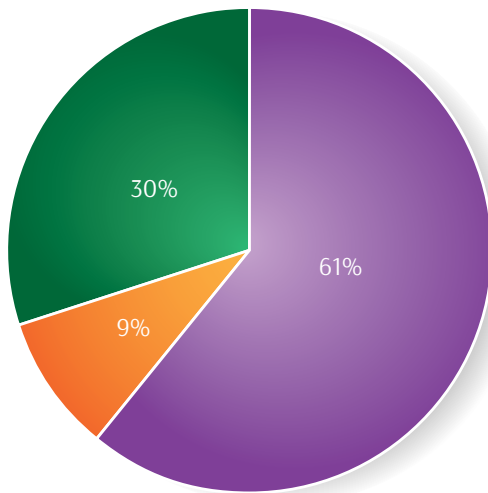
Cervical Lymphadenectomy



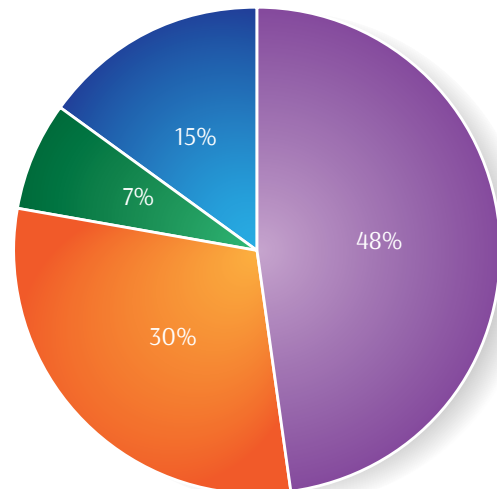


# Total FY13 Gifts **\$625,927**

## FY13 Giving by Donor Type



## FY13 Giving by Gift Type



## DONORS, 2013

Mr. and Mrs. Omir Ahdieh  
 Mr. Wayne Ayers  
 Mr. William Ayers  
 Mr. Stan Bailey  
 Mr. and Mrs. Robert A. Baillie  
 Mr. Sam Baker  
 Mr. and Mrs. Lewis B. Barnhardt  
 Mr. and Mrs. Thomas M. Barnhardt  
 Mr. Martin E. Birnbaum and  
     Ms. Roslyn G. Greenspon  
 Dr. Laura P. Boschini  
 Ms. Rachelle Boudreau  
 Ms. Mary A. Boudreau  
 Mr. Charles Burleson  
 Dr. and Mrs. Jeffrey P. Campbell  
 Mr. John R. Carlson and Ms. Caitlin  
     Fenhagle  
 Ms. Cynthia Carmola  
 Ms. Denise F. Carter  
 Mr. Charles B. Carver  
 Mr. Zhao Cheng

Ms. Mary C. Cooper  
 Dr. Benjamin J. Copeland  
 Dr. Adam C. Creech  
 Ms. Nicolette D. DeGroot  
 Ms. Janice DeRosa  
 Mr. Burke H. Dickens  
 Ms. Wendelyn V. Dickson  
 Dr. Stacy L. and Mr. Michael S. Dinges  
 Mr. and Mrs. Stephen P. Dorer  
 Dr. and Mrs. Brian W. Downs  
 Dr. Amelia F. and Mr. Craig L. Drake  
 Mr. and Mrs. Monty S. Edge  
 Dr. Samer Elbabaa  
 Mr. Jason Elmore  
 Dr. and Mrs. John P. Evans  
 Ms. Maegan K. Evans  
 Mrs. Ruth A. Everett  
 Drs. William and Gloria Fan  
 Dr. Joel F. Farley  
 Ms. Margot H. Filippini  
 Ms. Ruth Flowers

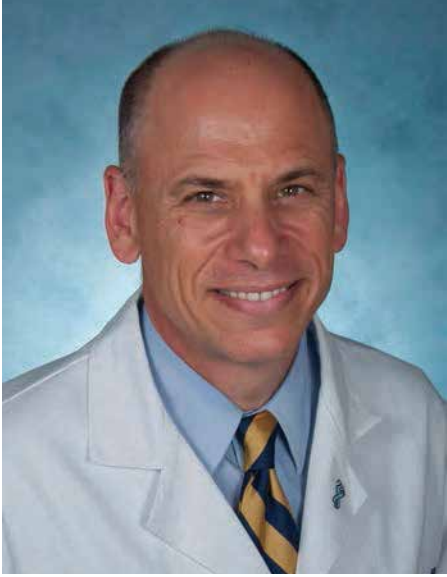
Ms. Bettie K. Formyduval  
 Mr. Tristan Fretwell  
 Mr. and Mrs. Brandon P. Gall  
 Dr. C. Gaelyn Garrett  
 Mr. and Mrs. Gordon K. Gold  
 Ms. Margo L. Grant  
 Mr. and Mrs. Kyle H. Gray  
 Mr. and Mrs. James C. Gray, Jr.  
 Ms. Anne E. Hager-Blunk  
 Ms. Marsha A. Hale  
 Mr. and Mrs. Jack R. Haley  
 Ms. Alison L. Halpern  
 Mr. and Mrs. Robert E. Hamby  
 Ms. Shirley D. Harder  
 Mr. Holt Hathaway  
 Ms. Yvonne C. Hauser  
 Ms. Kristina I. Helms  
 Mr. James S. Henderson  
 Dr. and Mrs. John T. Henley  
 Mr. and Mrs. Perry C. Hinkle  
 Mr. Curtis Holmes

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(Left to right) Harold C. Pillsbury Distinguished Professor Craig A. Buchman, MD, FACS (2012-present); Thomas J. Dark Distinguished Research Professor Paul B. Manis, PhD (2011-present); James S. and June M. Ficklen Distinguished Professor Joseph W. Hall III, PhD (2011-present)

### *The Thomas J. Dark Distinguished Professorships*

The Thomas J. Dark Professorship in Otolaryngology was established in the University's School of Medicine in 1976 by Thomas Jefferson Dark of Siler City and Ft. Lauderdale, Florida. Dark was a member of the class of 1925 and studied in the University's School of Commerce – now the Kenan-Flagler Business School.

Upon graduation, he returned to Siler City where he organized the community's first fire department and became its chief. He worked briefly for a chair company in High Point and an automobile company in Greensboro before moving on to a sales job with Collins & Aikman Corp. of Roxboro and New York.

In 1940, he invested in a small manufacturing company, the Buchmann Spark-Wheel Corp where he later became president. He also purchased 3,000 acres of land near Athens, Georgia, and converted a rundown cotton plantation into a highly prized farm for raising Black Angus beef cattle. He continued both of these vocations until his retirement in 1958.

Soon after his retirement, he bought a home in Ft. Lauderdale. He grew roses and raised bees in between recreational sailing trips. Because

of family in North Carolina, he divided his time between Ft. Lauderdale and Siler City, with visits to his alma mater in Chapel Hill. An avid sports fan, he rarely missed a home football game in the last two decades of his life. He died in Siler City in 1987 at age 93.

In addition to establishing the Dark Professorship, he provided other gifts to the University, including a scholarship fund in the School of Medicine, a challenge gift to his classmates and a gift to establish an office for the Order of the Bell Tower in the new George Watts Hill Alumni Center. He also inspired his friend, Eunice Bernhard, to endow a professorship in the School of Medicine. In recognition of his continuing loyalty and generosity, the School of Medicine presented him with its Distinguished Service Award in 1982.

Newton D. Fischer, MD was the first recipient of the Thomas J. Dark Distinguished Professorship which he held from 1977-1991. **Harold C. Pillsbury III, MD** currently holds this professorship.

The inaugural Thomas J. Dark Research Professorship was awarded to **Paul B. Manis, PhD** in 2011 through a bequest from Mr. Dark. Dr. Manis is currently studying how cells in the brain process sound information, by studying



the electrical activity of single cells, the chemical communication between cells and the organization of the neural cell assemblies. His research has been continuously funded by NIH grants for nearly 25 years. Additionally, he successfully submitted and has maintained our Department's NIH research training grant. This grant supports medical student and resident education, and is one of only about a dozen in the US. He also serves on the NIDCD Advisory Council and as the Editor-in-Chief of the Journal of the Association for Research in Otolaryngology.

### *The Joseph Palmer Riddle Distinguished Professorship*

The Joseph Palmer Riddle Distinguished Professorship in Otolaryngology was established in the University's School of Medicine in 1977 by a gift from Joseph "J.P." Riddle. Riddle was born in 1921 in Fayetteville, NC. As the eldest son of a railroad conductor, he went to work at an early age at his family's gas station and country store. The long hours and minimal living conditions motivated the young Riddle to look to other opportunities for his future. He began working at the shipyard in Wilmington, where he met his future wife, March Floyd of Fairmont, N.C.

Riddle went on to serve for a time in the U.S. Navy. Afterwards, the newlyweds returned to Robeson County and in 1952, Riddle began building homes in Cumberland County to respond to the military growth in the area. His construction and development company, the March Development Corp., concentrated its building efforts on the boundaries of Fort Bragg. The company is credited with contributing to the growth explosion of Fayetteville's west side beginning in the 1960s.

Mr. Riddle contributed substantially to projects that benefited education, medicine and quality

of life in Fayetteville and at the University. Although not an alumnus, he was a vigorous and untiring force on the Medical Foundation Board of Directors. He also served on the Board of Directors of the Educational Foundation, which supports the University's athletic programs. He was one of a growing number of individuals whose gifts have gone to support both the academic and athletic programs of the University.

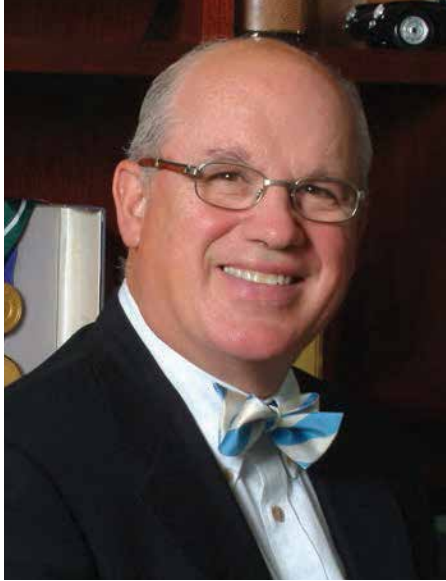
In addition to establishing this professorship, Riddle contributed funds to the Division of Cardiology and Lineberger Comprehensive Cancer Center. His support of the Otolaryngology Department led to advances in the study of otolaryngologic allergy and the establishment of an otolaryngology and microsurgery laboratory that bears his name. In recognition of his interest and support, he was presented the Distinguished Service Award by the School of Medicine in 1980.

Riddle and his wife, March, have three children: Sharlene (B.A.'84), Joseph III (B.S. '77) and Carolyn. Riddle died in 1995 at the age of 73.

### *The Newton D. Fischer, MD Distinguished Professorship*

The Newton D. Fischer Distinguished Professorship was established in 1993 in honor of Dr. Fischer, a longtime medical school professor who established the Division of Otolaryngology/Head and Neck Surgery in 1952. It was created by the members of the Newton D. Fischer Society, who funded it, envisioning an ongoing contribution to academic otolaryngology.

Fischer was born in San Antonio in 1921. He earned three degrees from the University of Texas: a B.S. in 1942, a B.A. in 1943, and an M.D. in 1945. Fischer completed his residency at Johns Hopkins University, where he was an instructor for one year before coming to Chapel Hill in 1952. Fischer was the first Chief of Otolaryngology, a post he



(Left to right) Thomas J. Dark Distinguished Professor Harold C. Pillsbury (1991-present); Joseph Palmer Riddle Distinguished Professor Mark C. Weissler, MD, FACS (2000-present); Newton D. Fischer Distinguished Professor Amelia F. Drake, MD, FACS (1998-present)

held for more than 30 years. He was among the first doctors to receive an otolaryngology training grant from the National Institutes of Health.

Fischer is credited with helping the Division of Otolaryngology/Head and Neck Surgery achieve national prominence, widely recognized as one of the top 10 in training programs for residents in otolaryngology. Fischer's numerous awards include "The Professor" Award in 1977 and The Central Carolina Bank Excellence in Teaching Award in 1988. In 1984, he and his wife, Janet, a Sarah Graham Kenan Professor in the School of Medicine, won the Thomas Jefferson Award, which is given annually to the UNC-CH faculty member who best exemplifies the ideals and objectives of Jefferson through personal influence, teaching, writing and scholarship. Newton and Janet Fischer have five children: twins Jeannette (M.D. '81) and Amelia (M.D. '81), and Duncan, Anne (B.A. '83) and Helen (B.A. '81, M.A. '86), and eight grandchildren: Sarah, Jake, and Eva Stein; Luke, Kent, and Duncan Fischer; and Connor and Cliff Drake.

#### *The James S. and June M. Ficklen Distinguished Professorship*

This professorship was established in 2008 by the late James Ficklen and June Ficklen of

Greenville, NC in honor of Dr. Harold C. Pillsbury III. Mr. Ficklen, a Greenville, NC, native, attended Woodberry Forest School in Virginia, graduating in 1942. The following fall he entered The University of North Carolina at Chapel Hill where he joined Sigma Alpha Epsilon and enrolled in Naval ROTC. After two years of study, he enlisted in the Naval Training School in Cambridge, Massachusetts followed by service as a Lieutenant on the USS Cleveland. Ficklen, a Communications Officer, witnessed the Japanese surrender to General MacArthur on board the USS Missouri. After the war, he completed his undergraduate studies and returned to Greenville where he joined E. B. Ficklen Tobacco Company in Greenville, NC as treasurer. Mr. Ficklen was known for his interest in the community and was active throughout his life in Greenville's civic and financial affairs. He served on various boards of directors including Home Federal Savings and Loan and Wachovia Bank. He worked with a number of charitable organizations including the Red Cross, United Way, Salvation Army and The Children's Home in Greensboro.

June Montague Ficklen is the spouse of the late James Skinner Ficklen, Jr. Ms. Ficklen is a founding member of Women for Women, a special interest fund of the Greater Greenville Community

Foundation. Ms. Ficklen provided the seed money to start this fund in 2005. Ms. Ficklen is a member and past Board of Advisors for the North Carolina Outward Bound School and the East Carolina University Board of Visitors. This professorship was awarded to its first recipient, **Joseph W. Hall III, PhD** in 2011. Dr. Hall's excellent research has resulted in over 25 years of continuous funding by the NIH and the receipt of the Claude Pepper Award of Excellence from the NIH Deafness Institute. He has served as Associate Editor of the Journal of the Acoustical Society of America and currently serves as a member of the FDA Division of Ophthalmic and Ear, Nose and Throat Devices Panel.

#### *The Nathaniel T. and Sheila W. Harris Distinguished Professorship*

This professorship was established in 2006 by Nat and Sheila Harris of Burlington, North Carolina in honor of their good friend and physician, Dr. Harold C. Pillsbury III. Nathaniel Thomas "Nat" Harris, Jr. was born and raised in Burlington, North Carolina. He is President and Senior Partner of Harris, Crouch, Long, Scott & Miller in Whitsett, NC. Mr. Harris attended The University of North Carolina at Chapel Hill and later joined Massachusetts Mutual as a national sales leader. In 1967, Mr. Harris founded Harris & Associates which later became Harris, Crouch, Long, Scott & Miller in 1981. Mr. Harris' previous service at Carolina includes the Educational Foundation (serving as President in 1988 and 1989), an Endowment Trustee for the Rams Club, Regional Volunteer for the Bicentennial Campaign and the National Development Council. Additionally, Mr. Harris served with distinction on the Board of Directors of the Medical Foundation of North Carolina, the Lineberger Comprehensive Cancer Center Board of Visitors and is a past member of the UNC Board of Visitors.

Sheila Eileen Westbrook Harris was also born and raised in Burlington, North Carolina. She has dedicated her life to serving her family. She enjoys spending time with her daughters, Kim (B.A. '89) and Lawson (B.A.'93), and her four grandchildren. She also enjoys time at their home on the coast of North Carolina. She has served on the Lineberger Comprehensive Cancer Center Board of Visitors and actively supports UNC's Arts and Sciences Foundation Professorship Program.

This professorship was awarded in 2011 to its first recipient, **Brent A. Senior, MD, FACS, FARS**. Dr. Senior has been at UNC for the last 12 years. He is Chief of the Division of Rhinology, Allergy, and Endoscopic Skull Base Surgery and Vice Chair for Academic Affairs for the Department

#### *The W. Paul Biggers, MD Distinguished Professorship*

The W. Paul Biggers Distinguished Professorship was established in 2000 to honor Dr. Biggers who had been an integral part of the University of North Carolina since becoming a medical student in 1959. Biggers was born in 1937 in Charlotte, North Carolina, earned a B.S. at Davidson College and his M.D. at the University of North Carolina at Chapel Hill. He also completed his internship and residency at UNC. In 1968 Dr. Biggers joined the faculty in Otolaryngology/Head and Neck Surgery at UNC.

Dr. Biggers offered an example of compassion, scholarly devotion, commitment to patient care, and teaching that is beyond compare. The numerous teaching awards bestowed upon him by the School of Medicine evidenced his contribution to medical teaching of students and residents.

Beyond these contributions, Dr. Biggers had a lifelong interest in speech and language and served on the Board of Examiners for Speech and





(Left to right) Nathaniel T. and Sheila W. Harris Distinguished Professor Brent A. Senior, MD, FACS, FARS (2011-present); March Floyd Riddle Distinguished Research Professor Robert A. Buckmire, MD (2013-present); W. Paul Biggers Distinguished Professor William W. Shockley, MD, FACS (2005-present)

Language Pathologists and Audiology. Through his tireless efforts, he ensured that the state legislature establish and continue a program designed to aid children with speech and hearing disorders. The Carolina Children's Communicative Disorders Program (CCCDP) was the result of these efforts and has already served thousands of children who are deaf or hard of hearing.

Outside of our Department, Dr. Biggers was very active within the University. He helped coach the football team and served on the Executive Committee of the Board of Directors for the Educational Foundation.

In recognition of Dr. Biggers' many contributions, the W. Paul Biggers Distinguished Professorship was established before he died in April of 2000 at the age of 62. Dr. Biggers asked that this Professorship be awarded to a physician who shares his passion for innovative teaching. In July 2005, **William W. Shockley, MD** was named as the first W. Paul Biggers Distinguished Professor of Otolaryngology/Head and Neck Surgery. Dr. Shockley continues the tradition of excellence in patient care, compassion, teaching, and service that Dr. Biggers exemplified.

### *The Harold C. Pillsbury III, MD Distinguished Professorship*

The Harold C. Pillsbury III MD Professorship in Otolaryngology/Head and Neck Surgery was established in honor of Dr. Pillsbury and his unwavering commitment to our Department, the School of Medicine and UNC. A native of Baltimore, Maryland, Dr. Pillsbury earned his B.A. and M.D. degrees from George Washington University in Washington, DC in 1970 and 1972, respectively. He completed his residency training in Otolaryngology/Head and Neck Surgery at the University of North Carolina School of Medicine in 1976.

Following five years at the Yale University School of Medicine, he joined the UNC faculty in 1982 as an Associate Professor. He served as Chief of the Division of Otolaryngology/Head and Neck Surgery from 1983 to 2001. Since 2001, he has served as the Chairman of the Department of OHNS.

Dr. Pillsbury served an eighteen year term on the American Board of Otolaryngology where he was Exam Chair and President. He is also past President of the American Academy of Otolaryngology-Head and Neck Surgery, The American Laryngological Association, The

Society of University Otolaryngologists, and the Triological Society. He is also past CME coordinator and Vice-President of the Southern Section Triological Society. He is currently serving as the immediate Past President of the American Academy of Otolaryngic Allergy.

Dr. Pillsbury has written and/or contributed to over 270 publications and over 45 textbooks. He has also given over 412 presentations nationally and internationally. He has been the primary investigator or co-investigator on over 21 grants. His special field of interest is neurotology and, most especially, cochlear implantation. Dr. Pillsbury's name is synonymous with honesty, integrity and excellence in life and the field of Otolaryngology.

The inaugural Harold C. Pillsbury III, MD Professorship was awarded to **Craig A. Buchman, MD, FACS** in 2012. Dr. Buchman has been at UNC for over 12 years and is currently serving the Department as Vice Chairman for Clinical Affairs, Chief of the Division of Otology/Neurotology and Skull Base Surgery and Director of the UNC W. Paul Biggers Carolina Children's Communicative Disorders Program (CCCDP). He is an exceptional teacher and researcher who is also beloved by his patients and their families.

### *The March Floyd Riddle Distinguished Research Professorship*

As testament to the Riddle Family's continued appreciation of the Department, Mrs. March Floyd Riddle of Fayetteville, NC established this research professorship in 2012.

Mrs. Riddle, matriarch of the Riddle Family, has been the primary support system for her family over the years. Often behind the scenes but always contributing to the community in so many ways and passing the values of

charity, humanity, love and friendship to her children, Joseph P. Riddle III, Carolyn Riddle Armstrong and Sharlene Riddle Williams, her ten grandchildren and six great-grandchildren.

Like her husband, Mrs. Riddle has always had a soft spot for projects that benefit children, especially underprivileged children. This love has led her to support organizations such as the Cumberland County Boys and Girls Club, Falcon Children's Home, Cumberland County Public Schools and Fayetteville Academy. She and her husband have also established scholarships at many local and regional colleges.

Mrs. Riddle served as a member of the Methodist University Board of Trustees, a board member at the Y.M.C.A and an active member of Haymount United Methodist Church. For many years, Mrs. Riddle enjoyed volunteering as a Pink Lady at Highsmith Rainey Hospital where she made flower arrangements that were sold at the gift shop. A member of her local garden club, she also helped start the Rose Garden at Fayetteville Technical Community College.

The first March Floyd Riddle Professorship was awarded to **Robert A. Buckmire, MD**. Dr. Buckmire currently serves as Chief of the Division of Voice and Swallowing Disorders, Director of the UNC Voice Center and as the Residency Program Director for our Department. He received his M.D. from the University of Virginia School of Medicine. He went on to complete his internship and residency at UNC in our Department. He also completed a fellowship in Voice and Swallowing Disorders from Vanderbilt University. He is an outstanding teacher and mentor to our students and has garnered high praise for his expert care to our patients.

# Medical Students

**D**r. Adam Zanation serves as Director of Medical Student Affairs within the Department of Otolaryngology/Head and Neck Surgery. This includes being fourth year Acting Internship and Critical Care Selective rotation coordinator. Dr. Zanation also meets with all 4th year students interested in Otolaryngology/Head and Neck Surgery to mentor them through the residency application process. **Dr. Austin Rose** serves as coordinator for the Otolaryngology Third Year Surgery rotations. **Dr. Charles Ebert**, coordinates the Head and Neck Surgery Specialty 4th Year Selective and Dr. Oliver Adunka serves as the second year Otolaryngology/Head and Neck Surgery course coordinator.



First-year medical students are provided a two-week intensive course in head and neck anatomy. This involves a series of one-hour lectures and includes three, four-hour afternoon sessions, including three dimensional dissections of the head and neck, as well as multiple radiologic demonstrations. Clinical faculty members from around the state also participate in these demonstrations, donating time from their practice. This rounds out the students' experience in head and neck anatomy and has been very well received over the years.

During the second year of medical school, the Special Senses Courses is offered to medical students over a ten week period during the fall semester. Mechanisms of disease are emphasized, covering a spectrum of diseases, disorders, and problems encountered in Otolaryngology/Head and Neck Surgery. This section of the curriculum is presented in coordination with the curriculum of Neurology and Ophthalmology. Small group sessions focus on case studies, differential diagnosis, and treatment options.

In the third year of medical school, there are

approximately over 50 medical students rotating on the OHNS service throughout the year. During this time, students attend clinics with OHNS faculty and gain exposure to operative procedures. Students make rounds each morning and are responsible for keeping up with assigned patients. At the beginning of the surgical rotation, all third year students participate in a soft tissue course entitled Soft Tissue Laboratory:

Principles and Techniques of Wound Closure. The OHNS residents and faculty serve as instructors as the fundamentals of suture techniques are introduced to the students.

During the fourth year of medical school, approximately 15-20 acting interns and 4th year students rotate through the OHNS service throughout the year. This constitutes a high

level of activity and responsibility to simulate the rigors of internship within our department.

Many of these students apply for residency positions in OHNS throughout the country. The Department offers many resources for medical student research. During the summer between first and second years of medical school, numerous students spend 6-8 weeks in short-term research projects throughout the department. Usually, 2-5 medical students also decide to take a year between third and fourth year of medical school to perform dedicated research within the departments. These students and their mentors garner competitive funding through the NIH T32 programs, the UNC School of Medicine Research Programs, and the Doris Duke Medical Research Program. During this year the students explore both research and the inner workings of an academic Otolaryngology/Head and Neck Surgery department. When they apply for residency, these students are some of the most competitive and sought-after applicants due to this experience.





# NIH Training Grant

The Department has held a training grant from the National Institutes on Deafness and Other Communication Disorders (NIDCD) for research training in Otolaryngology/Head and Neck Surgery since 2001, when the Department joined an elite group of about a dozen institutions that offer 2-year research training positions during residency. The grant also guarantees the Department's continued support and promotion of medical student research experiences at UNC. The training grant provides stipends for medical students (2 for the summer and 1 for a whole year, each year of the grant) and one resident for two years of research training each year. We are currently completing our second 5-year cycle of this grant, and **Dr. Paul Manis** is the PI. The training grant is undergoing review for renewal so that we can continue to provide these training opportunities.

This past year, we supported two medical students in the summer training program, **Andrew Barber (MS1)** and **Kola Agboola (MS1)**. Andrew worked with Dr. Manis and Dr. Xie on identification of glycine receptor subtypes in different classes of

neurons in the cochlear nucleus. Kola worked with Dr. Serody on characterization of myeloid-derived tumor suppressor cells.

**Mr. Matthew Woffard (MS3)** worked with **Dr. Julia Kimbell**. Mr. Woffard's work was in two areas using computational fluid dynamic (CFD) simulations to model sinonasal particle deposition. The first area was a mesh refinement study. A "mesh" is a three-dimensional (3D) grid that approximates an air space like the nasal passages with a large number of small, 3D elements that are used to solve the equations of airflow numerically. The main finding was that tetrahedral meshes without additional thin layers of prism elements near airway walls significantly over-predict deposition, especially at the lower end of the particle sizes that we investigated. The second broad area of work centered on studying topical drug delivery to the maxillary sinus (MS) pre- and post-functional endoscopic sinus surgery (FESS). Although topical medications are commonly used both pre- and post-FESS, there is little existing evidence describing how much delivery is actually achieved,

and how physical properties of the particles (namely size and velocity) affect that delivery. 3D reconstructions of the nasal passages were made using CT scans from four patients obtained before and 12-weeks post-FESS. An additional 4 virtual surgery models were also created from each post-FESS model to represent a range of clinically relevant maxillary antrostomy sizes. Both nebulized and sprayed particle delivery were simulated, and the fraction of released particles depositing in the maxillary sinus were analyzed by particle size. There were four main results. First, following FESS, airflow into the maxillary sinus may correlate with antrostomy size and may represent a substantial portion of total nasal airflow when antrostomy size is standard or larger. Second, the results support the idea that medical therapy via spray or nebulizer devices to the maxillary sinus is more feasible post-surgery than pre-surgery. We expanded on this finding by observing that larger antrostomies generally increase drug delivery, although the effects of increased antrostomy size are not simple. Third, delivery to the maxillary sinus is highly sensitive to particle size, so that maximal deposition in the post-surgical sinus requires optimally-sized particles. Fourth, there was considerable inter-individual variability in post-FESS delivery, and variability within an individual based on antrostomy size. By predicting the degree of drug delivery that can be anticipated for a given combination of individual sinonasal anatomy, antrostomy size, and particle size, use of CFD analysis based on individual pre-surgical CT scans may significantly guide clinical decision making about the use of topical medication post-FESS.

The crown jewel of the training grant is the 2-year research program for selected residents.

**Grace K. Austin, MD** just completed her 3rd residency year, and the second year of her 2-year

research track with Dr. John Serody (Dept. of Medicine and Immunology) and is internally mentored by **Dr. Adam Zanation**.

Dr. Austin completed several projects. Myeloid-derived suppressor cells (MDSCs) in squamous cell cancer: The goal of this research project is to better characterize myeloid-derived suppressor cells (MDSCs) in squamous cell cancer of the head and neck (SCCHN), especially in relation to cancer associated with HPV. When completed, the project will reveal whether HPV viral oncoproteins mediate a vigorous immune response in the tumor microenvironment that augments tumor progression or recurrence and if there is preferential accumulation of MDSCs (i.e., peripheral blood versus primary tumor site) in patients with HPV-associated SCCHN. The research project will also improve knowledge on effector mechanisms by which MDSCs directly and indirectly suppress T cell responses in patients with head and neck cancer. The project has 3 aims. Aim I: To measure and compare the accumulation of MDSCs in previously untreated patients with SCCHN between those who are HPV-positive and HPV-negative. This is being accomplished by isolating and immunophenotyping MDSCs by flow cytometry from peripheral blood and primary tumor tissue specimens, and the results will be stratified by tumor subsite and size. The hypothesis is that MDSCs present at the site of tumor inhibit this immune response and promote tumor progression, allowing for a new target for head and neck cancer therapy. An additional hypothesis is that chemoradiotherapy is more effective in HPV-associated SCCHN due to the ability to deplete MDSCs in the tumor environment. Aim II: The goal of this aim is to measure and compare the accumulation of MDSCs in previously untreated patients with SCCHN to normal controls. This will be accomplished by isolating and



immunophenotyping MDSCs by flow cytometry from blood and tissue specimens. The result of this experiment will reveal whether the number of MDSCs are different in patients with SCCHN relative to normal controls. In addition, this aim will further explore whether suppressive functions of MDSCs on effector immune cells in patients with SCC of the oropharynx are reduced by prior chemoradiation therapy. This is accomplished by isolating MDSCs from prospectively collected fresh blood and tissue specimens, then performing effector functional studies including the lymphocyte response test. Comparisons are made between previously untreated patients and patients with prior chemoradiation therapy who will be stratified by dose, type, and frequency of therapy. The result of this experiment will tell us how effectively MDSCs effector functions are suppressed by chemoradiation treatment.

Over one hundred subjects were enrolled in the study, with half of these having squamous cell cancer of the head and neck, approximately 10% with other diagnoses (e.g., melanoma, keratosis, mucoepidermoid), and 12% normal healthy subjects. Flow cytometry was used to evaluate the MDSC status for these subjects. Different gating strategies were evaluated to analyze the data by flow cytometry and to help in interpreting results. Preliminary results were presented at the Triological Combined Sections meeting in January 2013. Effector function assays were also run on peripheral blood of a subset of patients and normal controls. She also examined autologous T cells, which were found in variable amounts in the patients' tissues.

In addition to the Aims originally described, Dr. Kim added experiments using in vitro hybridization to detect MDSCs in paraffin-embedded tissues. At this time, the majority of tissue has been stained and analyzed. She is drafting a manuscript for submission and had a poster presentation at the American Society of Clinical Oncology meeting in June 2013.

In addition to this primary project, Dr. Kim has participated in several clinical research projects. One set of projects focused on the usage of different flaps for reconstruction of the head and neck, including analysis of the complication rates, case studies of specific flaps, and evaluation of treatment outcomes of patients with head and neck cancer. She also is evaluating an evolving pediatric tracheostomy protocol using polysomnography as an objective measure. Finally, she is studying longitudinal assessment of vocal outcomes of patients who underwent surgery for voice therapy.

**Gita Fleischman, MD** is currently in her 3rd residency year, and in the second year of her 2-year research track with Dr. Julia Kimbell (Dept. of Otolaryngology-Head and Neck Surgery).

Dr. Fleischman's primary project uses Computational Fluid Dynamics (CFD) to determine whether virtual functional endoscopic sinus surgery (FESS) can be used to predict post-FESS surgical airflow patterns. CRS represents a heterogeneous group of disorders resulting from chronic sinonasal inflammation. While FESS has been shown to





successfully eliminate obstructions and facilitate sinonasal ventilation and drainage, post-operative medical management is essential, as most patients continue to have persistent disease. The objective of this project is to use CFD to simulate the delivery of topical medication in the sinonasal cavities, to eventually optimize drug delivery after FESS. CFD techniques are used to conduct a systematic study of the physical effects of CRS, FESS, and patient-use factors on the deposition of sprayed nasal medications in the pre- and post-FESS paranasal sinuses. The specific hypotheses are: 1) Paranasal sinus deposition of nasal spray medication is lower in pre-FESS patients and higher in post-FESS patients than in normal nasal airways. 2) FESS increases paranasal sinus deposition of nasal spray particles. 3) Virtual Surgery may be used to predict deposition patterns and airflow patterns prior to actual surgery.

These are tested in the following two specific aims:

Aim 1: To create patient-specific CFD models based on pre- and post-FESS CT scans and compare paranasal sinus deposition of sprayed particles predicted in CRS patients with deposition predicted in normal nasal passages. Furthermore, pre- and post-FESS predictions of deposition in the same patient will be compared, which will provide a quantitative comparison of deposition improvement after FESS. Aim 2: To determine if virtual functional endoscopic sinus surgery (FESS) can be used to predict post-FESS surgical airflow patterns and drug-deposition using CFD. Eight subjects were consented and 5 were enrolled in the study. Of these, we have

completed modeling and simulation on four patients, and Dr. Fleischman has focused on one patient as the subject for the virtual surgical simulations. These simulations revealed a number of interesting results regarding particle deposition and FESS that were not necessarily intuitive, suggesting that deposition is a more complex process than might be expected. Additional drug-deposition simulations are also being run.

In addition to her primary project, Dr. Madan has two other CFD-related basic research projects. The first is Predictive Modeling for Treatment of Upper Airway Obstruction in Young Children. The goal of this project is to determine how CFD analysis might help in assessing post-surgical outcomes in children with subglottic stenosis (SGS) who undergo laryngotracheal reconstruction (LTR). The immediate objectives being to visualize and quantify airflow through the respiratory tracts of children before and after LTR, utilizing CFD modeling derived from pre- and post-operative CT scans. The preliminary results from this project were presented at the Combined Otolaryngological Spring Meetings (COSM) meeting in January 2013. A second objective of this study is to illustrate the effects of LTR in a child with SGS by comparing airflow in pre- and post-LTR airways with age/weight-matched normal airways using CFD. This research will be presented at the American Thoracic Surgery Meeting in 2013.

The second project is entitled "Characterization of Post-Surgical Changes in Nasal Airflow in Functional Nasal Surgery Through A Computational Fluid

Dynamics Model."

The goal of this project is to create anatomically correct computational models of the nasal passages of cadaveric heads which have received several functional nasal surgery (FNS) interventions, including septoplasty, rhinoplasty, turbinate or nasal valve surgery. These models will be used to evaluate CFD response, including nasal airflow, resistance, wall pressure, wall shear, air conditioning, and particle penetration, to surgical intervention for nasal valve obstruction (NAO). All modeling, simulation, and

post-processing has been completed, and the CFD data are currently being analyzed.

The trainees have been actively submitting papers for both their basic research and in the clinical arena, as well as attending a variety of conferences to present their work. Additional success in the program is evident in the number of applicants we have had from institutions outside UNC Chapel Hill, attesting to the national stature of the program and the strength of the research opportunities.

# Visiting Professors

## LANNY CLOSE, MD

Columbia University Medical Center  
July 10-11, 2012

- *History of Head and Neck Surgery in New York: A Columbia Perspective*
- *Endoscopic Approaches for Orbital Decompression & Resection of Orbital Tumors*

## BRADLEY KESSER, MD

University of Virginia  
August 21-22, 2012

- *An In-Vitro Model System to Study Gene Transfer in the Human Inner Ear Approach to the Tinnitus Patient*
- *Why Do We Need Two Ears? Studies in Congenital Aural Atresia*

## ROBERT LABADIE, MD

Vanderbilt University Medical Center  
September 25-26, 2012

- *Use of Robotics in Otologic Surgery*
- *Navigating Academic Otolaryngology*

## EARL HARLEY, MD

Georgetown University  
October 23-24, 2012

- *Pediatric Thyroid Disease*
- *Panday Syndrome*

## CHRIS MELROY, MD

Georgia Sinus & Nasal Institute  
October 30-31, 2012

- *Management of Nasal Disorders: The Forgotten Aspect of Rhinology*
- *Tips for a Successful Career Start in the Practice of Otorhinolaryngology*

## JEFFERY MYERS, MD

MD Anderson Cancer Center  
November 13-14, 2012

- *Personalizing Head and Neck Cancer Therapy*
- *Management of the N(+) Neck in Oral Cavity Cancer*

## MAROUN SEMAAN, MD

University Hospital Case Western Medical Center  
November 20-21, 2012

- *A Mouse Model of Endolymphatic Hydrops: Where are we now?*
- *Otologic Innovations at Case Western Reserve University*

## FRANK LIN, MD, PHD

Johns Hopkins School of Medicine  
November 27-28, 2012

- *Hearing Loss and Healthy Aging*
- *Outcome After Cochlear Implantation in Older Adults: Moving Beyond Speech*

## WILLIAM KEANE, MD

Thomas Jefferson University  
June 25-26, 2013

- *Microvascular Reconstruction of the Orbital Area*
- *Management of Sinonasal Malignancy*



# Newton Fischer 2013

The great tradition of the Department's Newton D. Fischer Society Meeting continued this year on Saturday, June 1st at the Paul J. Rizzo Conference Center here in Chapel Hill. For many years, this annual meeting has served as a forum for both practical clinical updates and the presentation of newly discovered research findings, as well as a terrific opportunity for alumni of the residency program to reconnect.

In recent years, under the leadership of Course Co-Directors **Drs. Austin S. Rose** and **Charles S. Ebert, Jr.**, the meeting has grown into a fully CME accredited and sponsored annual meeting. This year's accompanying exhibit, the NC ENT EXPO featured representatives from Acclarent, Alcon, Brainlab, Entellus, Gyrus/Olympus, Meda Pharmaceuticals, Medtronic, Karl Storz, Stryker, and the The Medical Foundation of North Carolina. The Department greatly appreciates the continued support of all the sponsors of this annual and growing meeting. This year, EXPO participants were eligible for several prize drawings including a new Apple iPad mini – and the lucky grand prize winner was one of our chief residents, Dr. Yu-Tung Wong, who has since completed his training at UNC and begun his neurotology fellowship in San Diego, California.

The 2013 program included a number of excellent presentations, including a keynote lecture from Dr. Peter D. Costantino of the New York Head & Neck Institute on the New Paradigms in Health care: Crossing the Chasm. Dr. Costantino also participated, along with **Drs. Brent Senior, Charles Ebert, Adam Zanation, and Brian Thorp**, in a well-received Skull-Base Surgery Panel.

The annual Newton D. Fischer Society Meeting, along with the accompanying NC ENT EXPO has now grown into the largest annual ENT meeting and forum for exhibitors here in the state of North Carolina – an achievement we hope will continue in the coming years. In fact, Drs. Ebert & Rose have already begun planning next year's meeting, which will be held, once again at the Rizzo Conference Center here in Chapel Hill, on Saturday, June 7th, 2014 – so save the date!

**ROBERT A. BUCKMIRE, MD**  
Laryngology Update 2013

**ANDREA JARCHOW-GARCIA, MD**  
The Science of Beauty

**CRAIG A. BUCHMAN, MD**  
What's New in Implantable Auditory Devices

**AUSTIN S. ROSE, MD**  
Evolution in the Management of Chronic Sialorrhea

**CHARLES S. EBERT, JR., MD, MPH**  
Management of Complications of Endoscopic Sinus Surgery

**KENNETH D. RODRIGUEZ, MD**  
Update on Allergic Fungal Sinusitis

**MATTHEW WOFFORD, BS, MS4**  
Functional Endoscopic Sinus Surgery & Nebulized Particle Delivery to the Maxillary Sinus

**ADAM M. ZANATION, MD**  
Skull Base Surgery Update 2013

**PETER D. COSTANTINO, MD, FACS**  
Keynote Speaker Lecture: New Paradigms In Health care – Crossing the Chasm

**BRIAN D. THORP, MD, CHARLES S. EBERT, JR., MD, MPH, ADAM M. ZANATION, MD, BRENT A. SENIOR, MD, AND PETER D. COSTANTINO, MD, FACS**  
Skull-Base Surgery Panel

**TREVOR G. HACKMAN, MD**  
Accuracy of Ultrasound Guided FNA in the Post-Radiated Neck

**CAROL G. SHORES, MD, PHD**  
Head and Neck Squamous Cell Carcinoma in Sub-Saharan Africa





The 4<sup>th</sup> Annual Carolina's Pediatric Airway Course took place on December 13-14, 2012 at the University of North Carolina at Chapel Hill. This two-day course is hosted by The University of North Carolina and the Medical University of South Carolina, alternating locations yearly. Co-Course Directors, **Carlton J. Zdanski, MD** and David R. White, MD have received high praise from its attendees for such a successful course and implementing the following objectives: Demonstrate proper management of the normal and abnormal pediatric airway during laryngoscopy and bronchoscopy; provide hands-on experience with open and endoscopic airway procedures in a living animal model, simulated human model, and microlaryngeal laboratory; expose participants to a variety of surgical techniques for management of pediatric airway problems; and develop and improve skills of airway management and bronchoscopic technique by managing emergent scenarios in a simulation laboratory.

With these objectives in mind the course reaches out to attendings, fellows and 3<sup>rd</sup> year residents from

the University of North Carolina, Medical University of South Carolina, Duke University Medical Center, Eastern Virginia Medical School, Georgia Health Sciences University, Vanderbilt University Medical Center, and Wake Forest University School of Medicine. All of these participants participated in lectures on the first day from our Visiting Professor, Michael J. Rutter from the University of Cincinnati College of Medicine in Cincinnati, OH who gave a lecture on Endoscopic Treatment of Pediatric Airway Problems. Other lectures were given by Dr. Amelia Drake on Airway Endoscopy and Foreign Body Management; Dr. David White, Open Techniques for Airway Reconstruction; and Dr. Robert Buckmire, Pediatric Laryngeal Microsurgery. The second day all participants were involved in the Simulation Laboratory and the Endoscopic Techniques Laboratory where they could develop and improve on their skills.

The Carolina's Pediatric Airway Course has proven to be a viable and important course for all physicians involved and will only grow with each coming year.



# Fellowship Programs

## PEDIATRIC OTOLARYNGOLOGY FELLOWSHIP

As the Division of Pediatric Otolaryngology grows, there has clearly developed an excellent opportunity for training at the fellow level. **Dr. Carlton Zdanski** serves as Director of the Pediatric Otolaryngology Fellowship Program.

Dr. Lorien Paulson completed the fellowship program in 2012. She joined us after her residency at Oregon Health & Science University in Portland, Oregon. She did rotations in Pediatric Plastic & Reconstructive Surgery for cleft lip and palate patients. Upon graduation, Dr. Paulson joined Children's Mercy Hospital in Kansas City, Missouri.



Our 2013 Pediatric Fellow is **Dr. Jason Roberts**, who completed his residency at Albany Medical College. UNC-CHNS played a formative role in his otolaryngology career: while in medical school, he received a NIH T32 Grant for

auditory electrophysiology study with Dr. Fitzpatrick, and worked with Drs. Shores, Rose, and Weissler.

As the only Pediatric Otolaryngology Fellowship in the state, the program helps to establish the Division's position as the premier group for Pediatric Otolaryngology care and training in North Carolina. UNC is home to a freestanding Children's Hospital, Pediatric Airway Center, Craniofacial Center, and Pediatric Cochlear Implant Program, offering pediatric otolaryngologists entering the field many ways to get involved and expand upon their residency training. In addition to clinical responsibilities, there are also opportunities for research, as well as

rotations in pediatric anesthesia, pediatric pulmonary medicine, and pediatric genetics. With three full-time faculty and approximately 3000 cases per year in the Children's Hospital OR and Ambulatory Surgical Center outpatient operating rooms, the position offers a great deal of clinical and operative experience.

## OTOLOGY/ NEUROTOLOGY/ LATERAL SKULL BASE SURGERY FELLOWSHIP

The Division of Otolaryngology/Neurotology continues to offer a fellowship in advanced otology/neurotology and lateral skull base surgery. Dr. Oliver Adunka has been serving as the fellowship director. Previously, Dr. Benjamin Wei completed his fellowship in 2012 and is currently practicing in Melbourne, Australia.

Subsequently, the Division was able to attract another fellow from Down Under. **Dr. Claire Iseli**, born and raised in Melbourne, Australia, has joined UNC in January 2013 for

a two-year fellowship. Dr. Iseli is a well-accomplished otolaryngologist with broad experience in auditory electrophysiology. Besides her busy clinical and surgical schedule, Dr. Iseli will help with various translational projects both in the lab as well as in a clinical setting.



## ADVANCED SURGICAL HEAD AND NECK ONCOLOGY FELLOWSHIP

The Department of Otolaryngology/Head and Neck Surgery continued its Advanced Head and Neck Oncology Fellowship on July 1, 2013, with **David Ludlow**,



**MD** as fellow. Co-directors of the fellowship, **Drs. Trevor Hackman** and **Adam Zanation**, are pleased to offer this unique one-year opportunity, which will provide the highest quality training in the medical and surgical management within the

field of Head and Neck Oncology. This includes ablative aerodigestive tract surgery, transoral laser microsurgery (TLM), transoral robotic surgery (TORS), endocrine surgery, skull base oncology, facial plastics and reconstructive surgery, including microvascular surgery. Jeremiah Traci, MD will begin his fellowship in July 2014.

## RHINOLOGY, ALLERGY & ENDOSCOPIC SKULL BASE SURGERY FELLOWSHIP

The highly sought after Rhinology and Skull Base Surgery Fellowship began in 2011 and is co-directed by **Drs. Adam Zanation** and **Charles Ebert**. **Drs. Brent Senior**, American Rhinologic Society past-President, **Austin Rose**, and **Julie Kimbell** comprise the remaining faculty. In just three short years, the fellowship has gained a place in the top tier of fellowship. Out of a total of 48 applicants our program received 36 applications, 75% of which were from UNC. The fellowship is a one-year fellowship program that provides comprehensive training in the medical and surgical management of sinonasal inflammatory disease, anterior and central skull base lesions (endoscopic and/or open management), allergic disease, and orbital pathology. The fellow also performs high quality and thoughtful research that ranges from basic science translational work to clinical trials. Our fellowship provides the highest-quality, broad-based training that imparts fellows with the knowledge and expertise to develop a successful tertiary rhinology/

skull base surgery practice. Dr. Mitchell Gore completed his fellowship in June 2012 and Dr. Kenneth Rodriguez completed his fellowship in June of 2013.

**Dr. Stanley McClurg**, who completed his residency at The Ohio State University, began his fellowship in July of 2013.



## JUDITH GRAVEL PEDIATRIC AUDIOLOGY FELLOWSHIP

In 2010 the UNC Pediatric Audiology program was invited by Hear the World Foundation to host an annual fellowship named for the late Judith Gravel who died in 2009. Dr. Gravel was recognized internationally for her expertise in pediatric audiology and her commitment to the advancement of educational opportunities for clinicians and students. The Gravel Fellowship is awarded each year to a 4th year AuD student whose externship is at UNC Hospitals, focusing on the needs of infants and young children with hearing loss and their families. The Judith Gravel Fellow for the 2013-14 academic year is **Bernadette Rakszawski**, a 4th year AuD student from Washington University in St. Louis. Judith Gravel Fellows from previous years are: Mallory Baker, a former UNC student currently



working as a pediatric audiologist at Children's Hospital in Philadelphia, Ashley Timboe from the University of Washington, now working as a pediatric audiologist at Seattle Children's Hospital and Nicole Duncan now working in Bangor, Maine as a pediatric audiologist with Penobscot Community Health Care (PCHC). Applications are being reviewed for 2013-2014.





# Outreach Programs

## ENT SURGEONS IN VIETNAMESE EXCHANGE

By Lily Lauer with Jeff Stebbins

It was a busy week in early April for the team of seven otorhinolaryngologists who served in Vietnam—and an adventure for Jeff Stebbins, who facilitated the trip. Jeff has a “Dr.” before his name, but he has a PhD in linguistics, not medicine. This was his first medical trip, so—besides offering his valuable skills in language, culture, logistical coordination, and ordering noodles—he was able to observe our very talented team of ENTs as they performed patient consultations, lectures, and surgeries.

Jeff met **Dr. Brent Senior**, ENT team leader from UNC, Chapel Hill (in North Carolina) in Hanoi a few days before the rest of the team arrived. Dr. Senior flew into Vietnam from Indonesia where he had been working with a humanitarian mission. Dr. Senior has taken a whopping sixteen trips to Vietnam since 1998. During this trip he divided his time in Hanoi between National ENT Hospital and Bach Mai Hospital, where he performed three surgeries and lectured on the development of sinuses from embryo to adulthood. Brent operated on one of our friends, Dr. Dinh, an REI-Vietnam Fellow and head of the ENT Department at Bach Mai Hospital. Dr. Dinh’s wife was moved by Dr. Senior’s expert care for her husband, and her farewell to Brent was very touching.

Jeff and Brent met the rest of the ENT team in Ho Chi Minh City. Dr. Harold Pine, pediatric ENT from the University of Texas Medical Branch (UTMB) in Galveston, is also a veteran traveler, with ten trips under his belt. He brought his colleague, Dr. Dayton Young, an Assistant Professor at UTMB, and two

residents, Dr. Eugene Son and Dr. Viet Pham, who has traveled with Dr. Pine on two previous trips. **Dr. Lorien Paulson**, a Pediatric Otolaryngology Fellow, and **Dr. Alex Farag**, both from UNC Chapel Hill, rounded out the team. Because of a blizzard on the east coast, Dr. Farag didn’t arrive in Ho Chi Minh City until hours before the team began their first day of work. Nevertheless, he dove into a full schedule of patient consultations.

Upon arriving, most of the doctors had two days to recover from jet lag and explore nearby shopping. Over the weekend, Drs. Pine, Pham and Young, and Dr. Young’s brother, Aaron (in Vietnam after a business trip in Korea), went on a bike and boat expedition in the delta south of Ho Chi Minh City. Dr. Young was surprised to see many children run outside their home to shout “hello” as they rode by on their bicycles. Arriving at the different hospitals, Drs. Pine and Senior were welcomed by old friends. They were able to reconnect with numerous REI-Vietnam Fellows including Drs. Đinh, Luong, Ha, Huong, and Huy, and they met a new Fellow, Dr. Tran (who is currently in the United States on a REI Fellowship).

Drs. Harold Pine and Lorien Paulson worked at Number One Children’s Hospital throughout the week. The other doctors divided time between Number One Children’s Hospital, Gia Định Hospital, HCMC’s ENT Hospital, and Nguyen Tri Phuong Hospital. Most of the doctors spent the first part of the day in patient consultations, often with cases specially chosen by our Vietnamese colleagues for their difficulty. The



doctors performed surgery in the afternoon on selected patients. Dr. Dayton Young, in particular, was given some challenging surgeries. He specializes in repairing large perforations of the ear drum. He often receives referrals of cases where previous surgery, sometimes multiple surgeries, have been unsuccessful. In Vietnam, he demonstrated a lateral graft technique to successfully close these large holes. There were roughly fifteen doctors observing in the operating room and up to sixty additional doctors watching in another room via live video stream. After surgery, he lectured on the technique to the doctors who had watched the surgery earlier.

Dr. Senior performed sinus surgery on a very special patient who is so dear to us: Mrs. Lien, REI-VN's Representative for Vietnamese Relations.

She had been suffering for months and had been hospitalized several times. Her husband, Dr. Long, traveled to Ho Chi Minh City to support her. The surgery was obviously successful as Mrs. Lien was back to work within 24 hours.

Several members of the ENT team were also able to observe a former REI-VN Fellow, Dr. Son of Number One Children's Hospital, perform an otoplasty on a child born with all the requisite parts of the inner ear, but missing the external cartilage of the visible parts of the ear itself. He removed a piece of cartilage from the patient's ribcage, traced the shape of the child's good ear onto the cartilage, and then inserted it under the skin where the child's ear should be. It will take several surgeries to achieve 'the final product.'

The ENT team was very appreciative of a generous donation of equipment from Karl Storz, Ltd. Tino Demmler and Philippe Lux, Product Specialists for Karl Storz, provided the team with equipment for navigation and endoscopy, both in Hanoi and in Ho Chi Minh City. Surgeries were much easier and more effective with this generous gift of equipment.

During their downtime, the team was able to enjoy delicious food at banquets provided by our friends at Gia Đình Hospital and Nguyen Tri Phuong Hospital. They enjoyed rich fellowship with their Vietnamese counterparts from each of the hospitals during other meals as well. A highlight was the team's enjoyment of the Rooftop Garden Restaurant at the Rex Hotel, where international correspondents dined during the war in the 1960s. Just before leaving, Dr. Paulson proudly noted that she had managed to avoid eating any western food during the entire trip.

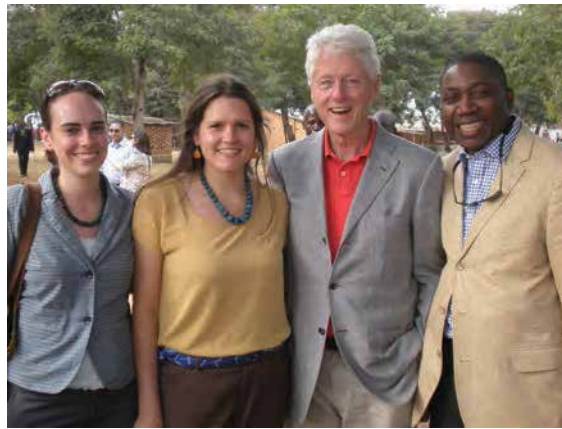
Dr. Young related that he especially appreciated the friendliness and welcoming disposition of the people of Vietnam. He found them to be "gracious, bright, and hard-working." He appreciated the time the Vietnamese doctors would take to get to know the team over a cup of tea before the busyness of the day began, as well as their enthusiasm and eagerness to learn. Team members had fun socializing with colleagues outside of the hospital after work. They cultivated delightful relationships within the team and with Vietnamese doctors, and they look forward to future trips when they can reconnect with their new friends.





## MALAWI SURGICAL INITIATIVE

In August 2009, the Kamuzu Central Hospital accepted the first class of general surgery residents. The program was the culmination of years of effort by Dr. Arturo Muyco, the chief emeritus of General Surgery at KCH, and is a collaborative effort with the Malawi Ministry of Health, the UNC Departments of Surgery and Otolaryngology/Head & Neck Surgery and the Haukland University Hospital (Bergen, Norway) Departments of Surgery and Orthopaedic Surgery. Dr. Carlos Varela, a Malawian surgeon trained in South Africa is the current Chairman of KCH Department of Surgery and our residency director is Dr. Leonard Banza.



L-R: UNC Surgery Residents Anna Tyson and Melanie Sion, President Bill Clinton, UNC Trauma Surgeon Anthony Charles

Six KCH residents, Gift Mulima, Chifundo Kajombo, Enock Ludzu, Judith Mkwaila, Boston Munthali, and Kumbukani Manda passed their written (September 2012) and oral (December 2012) College of Surgeons of East, Central and Southern Africa

(COSECSA) Membership exams. Charles Mabedi is looking forward to taking these exams this coming year. Vanessa Msosa, Keller Kumwenda, and Michael Phiri are finishing their intern year.

Two new residents will start the program in August 2013, Ms. Natasha Ngwira and Mr. Frank Mponya. Drs. Munthali and Manda are training in orthopaedic surgery, and all other residents are general surgery. In August 2013, all 5 years of the general surgery residency will be full, and we anticipate Gift Mulima and Tiyamike Chilunjike finishing next July, qualifying for the COSECSA Fellowship exams.

Drs. **Carol Shores** and Anthony Charles attended the COSECSA annual meeting in Addis Ababa, Ethiopia in December 2012. Dr. Shores was inducted as a COSECSA Fellow at this meeting.

For more information, please visit [med.unc.edu/msi](http://med.unc.edu/msi).

L-R: Class of 2016 resident Dr. Charles Mabedi, and Class of 2017 residents Drs. Vanessa Msosa, Michael Phiri and Keller Kumwenda.







## FREE ORAL, HEAD & NECK CANCER SCREENING

*The Department held its annual Head and Neck Cancer Screening Day on April 25, 2013: a free event that allows attendings and residents the opportunity to participate in community cancer outreach, and is open to the public. Rich Rivera, a volunteer for the event graciously offered to share the story of his partner, Bart Queen. For more information about Bart's recovery, please visit [go.unc.edu/a8MFd](http://go.unc.edu/a8MFd)*

I am often asked what were my initial reactions and thoughts when my partner and I learned that he had stage four throat cancer. Our first reaction, like many who have unexpectedly been diagnosed with a life threatening illness or ailment, was simply, disbelief. Bart, who was in his early 50s at the time had never smoked or used tobacco products. Anyone who has met Bart knows of his extraordinary active lifestyle, combining his busy professional life as a speaker and communications trainer with a disciplined exercise regimen at the gym and strenuous chores on the farm.

The idea of Bart having throat cancer was something he and I never anticipated. After our initial period of disbelief, we agreed that only through our combined acceptance, perseverance, and faith would we succeed in the many battles during the next several months to win the war over cancer! The oncologists along with the patient team at the Cancer Clinic were methodical and precise in the treatment plan that included radiation and chemotherapy.

The medical team at the Cancer Clinic agreed upon a treatment plan that would provide the greatest assurance of eliminating the cancer cells while striving to preserve and protect Bart's ability to speak. It was

a delicate balance of "not too much" treatment and "not too little" treatment. We quickly learned that the side effects of the treatment felt ten times worse than the cancer itself. Overcoming the occasional nausea, frequent digestive issues, excruciatingly persistent pain in the mouth and throat became a daily battle.

A few months following the completion of treatments, the nausea and digestive problems slowly began to subside. The pain became tolerable and the feeding tube inserted into his stomach and used for intake of water and liquid nutritional supplements was removed almost six months to the day of his first chemotherapy/radiation treatment.

In November, Bart and I waited anxiously, yet hopefully, for the results of the first post treatment full body PET scan and were absolutely joyful and thankful that all traces of cancer were gone. He and I had much to share and be grateful for during the Thanksgiving Holiday with our families. Nine months have passed since that first post-treatment PET scan and Bart is healthy and free of cancer. We celebrated the One Year Anniversary of the completion of his treatments in May and remind ourselves often of our blessings of his good health.

Bart is gradually gaining back much of the strength and stamina lost during the treatment and post-treatment recovery period. We know that our acceptance of the situation, perseverance to complete the painful and discomforting treatment plan and our belief in our faith got us through this difficult time. Bart has been and continues to be an inspiration to many. His triumph over cancer has renewed his strength and faith.



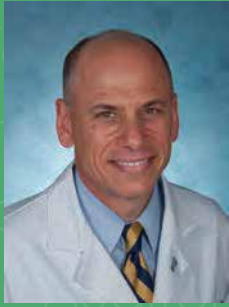
# Clinical Programs







## FACULTY



**Craig A. Buchman, MD, FACS**  
Professor and Center Director



**Harold C. Pillsbury, MD, FACS**  
Professor and Chair



**Oliver F. Adunka, MD, FACS**  
Associate Professor



**Carlton J. Zdanski, MD, FACS, FAAP**  
Associate Professor



**Holly F.B. Teagle, AuD, CCC-A**  
Director of Carolina Children's  
Communicative Disorders Program  
Associate Professor



**Hannah R. Eskridge, MSP, CCC-SLP**  
Director of Center for the Acquisition of Spoken  
Language Through Listening Enrichment  
Assistant Professor



**Meg Dillon, AuD, CCC-A**  
Clinical Research Audiologist,  
Assistant Professor



**Claire E. Iseli, MBBS, MS, FRACS**  
Fellow 2013-2014

Clinical services include consultation, diagnosis, disease treatment, medical/surgical intervention, rehabilitation and follow-up for patients with the entire range of diseases of the ear and related structures. These services transcend all ages, technologies, and interventions with the intent of providing one-stop care for all patients. Necessarily, the Center represents a comprehensive multidisciplinary effort to service delivery and patient care. We are fortunate to have world-class professionals trained in all aspects of hearing disorders staff the Center including pediatric and adult audiologists and otolaryngologists, neurosurgeons, geneticists, auditory/verbal therapists, speech pathologists, teachers of the hearing-impaired, and a designated Ear & Hearing Center nurse. These individuals are widely recognized as leaders in the field, placing us on firm ground at the cutting edge for both service delivery and investigative pursuit. This effort requires participation from a variety of departments within UNC's School of Medicine, UNC Hospitals, as well as professionals from the State of North Carolina's Departments of Health and Human Services (DHHS) and Public Instruction (DPI) and Beginnings.

Over the last decade, this group has worked together to eliminate redundant evaluations by related providers. We have created one-stop visits for very complex interdisciplinary visits. In addition to creating convenience, this organization has reduced the time needed for information transfer, intervention provision, as well as the number of anesthetics a child requires for evaluation (e.g. radiographic and electrophysiological hearing studies carried out in the same setting). These changes have improved patient safety, efficiency, and effectiveness while reducing costs. Significant research benefits have also been realized from analysis of the multi-dimensional data sets that are generated through this alliance.



Extensive audiology services, in conjunction with Otolaryngology/Head & Neck physicians, are an integral part of the Ear & Hearing Center. Newborn

to geriatric hearing screening; comprehensive audiological assessment, hearing aid evaluation, fitting, and dispensing; and cochlear implantation evaluation and mapping are offered. American Sign Language interpreter service is also readily available through "Deaf Talk," a video interpreting system. Diagnostic exams available include behavioral, evoked response, and vestibular testing. Patient education, on a wide variety of hearing related conditions, has been developed for patients and families.

Comprehensive medical and surgical care for a variety ear, hearing, balance, facial nerve disorders, and skull base tumors located from the outer ear to the brainstem are treated commonly. Surgeries include tympanostomy tubes, tympanoplasty, mastoidectomy, ossicular reconstruction, stapedectomy, cochlear implantation, osseointegrated implants, active middle ear implants, acoustic neuroma and lateral skull base surgeries, and auditory brainstem implants (ABI) among others. In addition to rehabilitative audiology, speech and language therapy, educational services, and vestibular therapy are readily available from highly experienced individuals.



**L-R:** Matt Ewend (Chair Neurosurgery), Craig Buchman, Kay Hagan (US Senator), Nicole, Ethan, Len and ABI recipient Grayson Clamp.

Central to the mission of the Ear & Hearing Center is the provision of research to help solve the problems of the patients we serve. A vision that all patients can teach us something about hearing loss is a cornerstone. Our scope of research includes both clinical and basic science efforts that span the entire auditory system (from pinna to cortex). Like the clinical domain, Ear & Hearing Center research is an integrated, multidisciplinary effort across departments within the School of Medicine. A clear focus on translational projects helps to bridge the gap between the research bench and the patient. Another key aspect to improving patient care is the routine collection of a variety of outcome measures during routine visits. Development of this research infrastructure makes it possible to capture data to identify therapeutic efficacy and improve patient care through quality improvement initiatives.

For the purposes of education and awareness, Center staff participate in 1) community-based efforts in the promotion of hearing wellness for schools and other groups, 2) professional organizations focused on the hearing impaired and related disorders, 3) development and



involvement in local, national and international events promoting the goals of the Center and academic interests of the University and the hearing-impaired community at large. We also participate extensively in the education of professionals at all levels and disciplines including audiology, speech pathology, teachers of the hearing impaired, as well as physicians and physicians in training.

The following pages give a peak in to some of the accomplishments at the Ear & Hearing Center last year. Some clinical highlights include:

### *Pediatric Hearing Program*

- Our first Auditory Brainstem Implantations in Children
- 1000th Cochlear implant surgery in a child
- >400 annual pediatric hearing evaluations
- >100 annual pediatric hearing aid fittings
- >400 Auditory Brainstem Response testing in children
- New findings regarding cortical auditory evoked responses

### *Adult Hearing Programs*

- More than 30 electroacoustic (EAS) stimulation surgeries

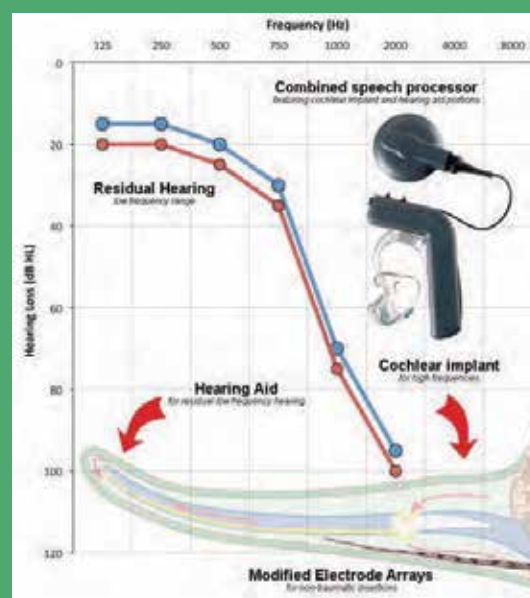
- Vibrant Soundbridge (VSB) trial recruitment
- Sound Localization booth at Carolina Crossing
- New clinical trials established for residual hearing
- Cognitive test battery as a part of the adult cochlear implant process

Leadership and advocacy continue to be important to the Center's mission. Many of us serve in a variety of leadership positions in related organizations.

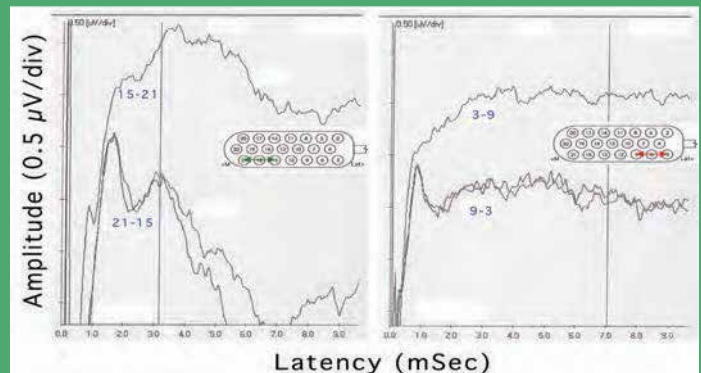
We were also very fortunate to have United States Senator Kay Hagan visit our program to showcase the work we are doing to enhance hearing loss rehabilitation in children.

On the research and education front, our group continues to be prolific: writing numerous manuscripts and giving lectures around the world that are furthering our understanding in the field. We have also proudly launched the new multidisciplinary surgical lab that provides the needed environment for training the next generation of doctors.

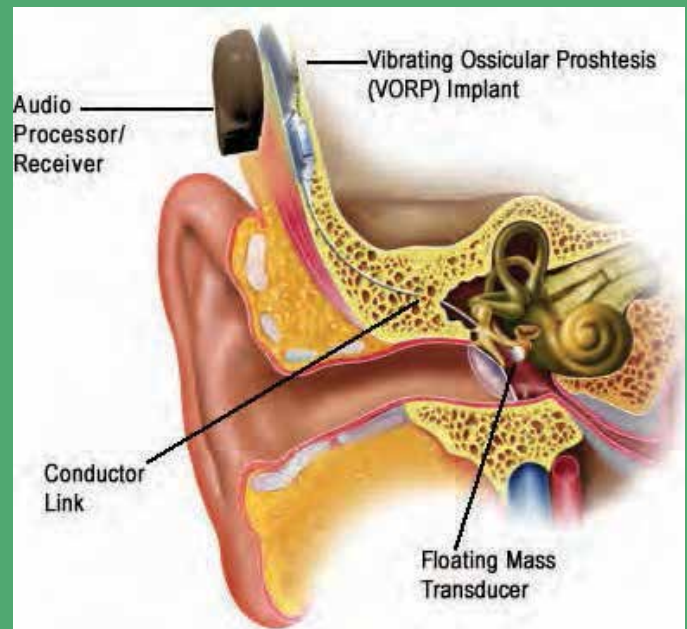
While these accomplishments make us all exceedingly proud, the people that make these things happen are truly the foundation for our success!



**HEARING PRESERVATION COCHLEAR IMPLANTATION AT UNC.** **LEFT:** The EAS Investigative Team - English King, AuD, Meg Dillon, AuD, Oliver Adunka, MD, Joseph Templeton, PhD (EAS Recipient and former UNC faculty chair), Craig Buchman, MD and Harold Pillsbury, MD. Not pictured, Marcia Clark Adunka, AuD and Ellen Pearce, AuD. **RIGHT:** Schematic of the EAS device implanted in Dr. Joe Templeton by Dr Buchman in May of 2008..



**AUDITORY BRAINSTEM IMPLANTATION (ABI) IN CHILDREN AT UNC.** LEFT TO RIGHT: Grayson Clamp after his surgery, and an illustration of the ABI implantation. **BOTTOM LEFT To RIGHT:** The team with Grayson and his family: Drs. Jennifer Woodard, Holly Teagle and Craig Buchman. **RIGHT:** Example of the electrical responses elicited by stimulating Grayson's brain in the operating room.



**VIBRANT MEDEL IMPLANTATION FOR CONDUCTIVE AND MIXED HEARING LOSS.** Former US Marine Dac Carpenter celebrates his restored hearing beside Dr. Oliver Adunka. Dr. Adunka implanted Dac's left ear in August 2011.



## UNC Hospitals Adult Cochlear Implant Program

The Adult Cochlear Implant Program at the University of North Carolina at Chapel Hill in collaboration with UNC Health Care represents the largest cochlear implant center in North Carolina and is among the nation's busiest and most progressive. The program has been in existence since the late 1970s and has grown significantly in terms of both patient care numbers and clinical staff under the leadership of **Dr. Harold C. Pillsbury**, Chairman of the Department of Otolaryngology/Head and Neck Surgery. Additional cochlear implant team members include, **Craig A. Buchman, MD**, **Oliver F. Adunka, MD**, **Marcia Clark Adunka, AuD**, **English King, AuD**, **Ellen Pearce, AuD**, and a valuable team of researchers, including **Joseph Hall, PhD**, **John Grose, PhD**, **Emily Buss, PhD**, and **Margaret Dillon, AuD**. Active collaboration between all team members

ensures development of novel approaches for everyday patient care.

The adult cochlear implant program also has a long-standing commitment to the training and mentoring of doctorate of audiology students. The final year of the doctorate of audiology program consists of a clinical work in the student's area of interest under the mentorship of seasoned clinicians. This year's audiology externs are Abby Bennett of the University of North Carolina at Chapel Hill and Theresa Bartoldus of City University of New York Graduate Center. Both students will spend the year furthering their knowledge on diagnostic assessment, adult hearing aids and cochlear implants under the direction of **Drs. Clark Adunka, King, and Pearce**. Two additional UNC doctorate of audiology students, Andrea Bucker (3<sup>rd</sup> year) and Sarah Obarowski (2<sup>nd</sup> year), will spend the year conducting clinical research with our team on implantable technologies.

The number of adult cochlear implant patients evaluated and treated at UNC Health care continues to increase with each passing year, and we as clinicians are proud of the growth we are experiencing and the level of care and services we can deliver. Cochlear implants represent a dynamic field in the realm of hearing health care, and we are routinely offering this technology to patients with more



Marcia Clark Adunka, AuD, CCC-A, English King, AuD, CCC-A, Ellen Pearce, AuD, CCC-A, and Meg Dillon, AuD, CCC-A





significant residual hearing. Candidacy criteria was once isolated to patients with only severe and profound degrees of hearing loss. The picture of a current candidate now includes patients with moderate to severe and profound sensorineural hearing loss. Not only have the audiometric requirements changed to reflect a new type of candidate, but the speech perception test battery for determining candidacy has evolved to include more challenging, real-world listening tasks. With all of these changes in testing materials, we can better examine and classify the limitations of those with hearing loss and simultaneously determine true candidacy for cochlear implantation. Both unilateral and bilateral applications of cochlear implantation are possible with the help of insurance support and recognition of this valuable procedure. With the continued growth of the Audiology and Otolaryngology/Head and Neck Surgery departments, the program moved in fall 2012 to a larger treatment facility at Carolina Crossing. The expanded space includes five sound suites for comprehensive audiometric testing, facilities for hearing aid dispensing, using state of the art fitting tools, three independent cochlear implant programming stations, and patient resources for aural rehabilitation training as well as a patient workstation for demoing patient driven rehabilitation tools. The traditional patient care associated with cochlear implants, including candidacy evaluations and postoperative

management via hearing evaluations, speech perception assessment and mapping of external hardware are routinely performed at this satellite location. Candidacy evaluations and intraoperative monitoring of cochlear implant surgeries are still completed at the main hospital campus location. The growth and development of our satellite location for cochlear implant treatment has not only provided our adult patients with comprehensive clinical care options, but also served to reduce commute times for our patrons. Carolina Crossing is located at 2226 Nelson Highway in Chapel Hill.

As a research hospital, we not only aim to provide quality clinical services but also to conduct cutting-edge research. Since 2007, UNC investigators initiated enrollment in the Electric-Acoustic Stimulation (EAS) clinical trial sponsored by MED-EL Corporation. This technology incorporates a hybrid cochlear implant system with a hearing aid to present acoustic stimulation to the low-frequency region of the cochlea and cochlear implant inserted partially into the cochlea to electrically stimulate the high-frequency region. Potential candidates have normal to moderate low-frequency hearing out to 1500 Hz, sloping to severe to profound sensorineural hearing loss in the high frequencies. The UNC Adult Cochlear implant program continues to lead the U.S. commitment to this clinical trial via subject enrollment and



monitoring of outcomes as defined by the study protocol. Currently, over 30 patients have been implanted and are participating in the clinical trial. The outcomes have been robust for all study participants, demonstrating improved hearing in both quiet and noise. By pursuing such research avenues and being dedicated to new advances in science, we are better able to serve our patients and their families. If you would like to receive information regarding our EAS investigational trial or other research associated with hearing, please contact the clinic at 919-966-5251 or 919-490-3716.

UNC research in the adult cochlear implant population continues to focus on the benefits of cochlear implants in patients with residual

hearing and soft surgery techniques, unilateral hearing loss, electric acoustic stimulation, bimodal and bilateral cochlear implantation, optimized programming of electric stimulation, and subjective benefits of cochlear implant recipients as measured by patient satisfaction questionnaires. The satellite office at Carolina Crossing also includes a research sound suite with an 11-speaker arc. This technology allows for the assessment of localization abilities and speech perception in spatially-separated noise. These topics are currently under investigation via our skilled team of otologists, audiologists, and hearing research scientists. Please contact us if you are interested in learning more about our clinical and scientific research.

## Pediatric Audiology

During the past year, the UNC Pediatric Audiology team, under the direction of **Patricia Roush, AuD** and in collaboration with otologists and otolaryngologists from the UNC Department of Otolaryngology and audiologists on the UNC pediatric cochlear team, has continued to provide timely diagnostic and habilitative care for infants and children with hearing loss within and outside of North Carolina. Dr. Roush is joined by a team of pediatric audiologists at UNC Hospitals that includes **Nissele Franco, AuD**, **Corinne Macpherson, AuD**, **Sarah Martinho, AuD**, and **Jill Ritch, AuD**. Patricia Reitz, M.S. retired

this year after serving for several years as the audiologist in charge of newborn hearing screening in the UNC newborn intensive care nursery. We welcomed **Dr. Shana Jacobs**, a graduate of the UNC Division of Speech and Hearing Sciences Audiology program to our pediatric team this year.

After graduation from UNC, Dr. Jacobs worked for five years in the UNC Department of Otolaryngology as an audiology research assistant on the “Moderators of Functional Outcomes in Children with Mild to Severe Hearing Loss” (OCHL) project. In addition to diagnostic and habilitative work with pediatric patients with hearing loss, Dr. Jacobs will work together with Dr. Nissele Franco to provide



newborn hearing screening and follow-up for babies in the UNC pediatric intensive care nursery. The UNC Pediatric Audiology team is also fortunate to have three talented 4th year AuD students working in our program this year: Ms. Bernadette Rakszawski, a student from Washington University in St. Louis, the current Judith Gravel Fellow, Ms. Beth Van Hollebeke and Ms. Danielle Verrilli both graduate students in UNC's Audiology program.

The number of children with hearing loss followed by the UNC team continues to grow with over 1000 children who wear hearing aids receiving care by the pediatric audiology team, and several hundred children with cochlear implants followed by the UNC pediatric cochlear implant team. In

addition to children with 'typical' sensorineural hearing loss, the UNC pediatric audiology team, working in collaboration with the UNC pediatric cochlear implant team, is following over 300 children diagnosed with "auditory neuropathy spectrum disorder" (ANSD), a condition that affects approximately 10% of children with permanent hearing loss. ANSD is a hearing impairment in which outer hair cell function is spared but neural transmission in the auditory pathway is disordered. While not a new problem, newer test techniques in recent years have made diagnosis of ANSD possible. This disorder presents new challenges in management for pediatric audiologists. The UNC pediatric team, in conjunction with UNC otolaryngologists, has developed an evidence-



Sarah Martinho, Bernadette Rakszawski, Danielle Verrilli, Pat Roush, Corinne Macpherson and Beth Van Hollebeke  
Not pictured: Shana Jacobs, Jill Ritch and Nissele Franco





based protocol for evaluation and management so that infants diagnosed with this disorder will have early and effective treatment. In addition to providing direct service to patients with ANSD, the UNC program is contributing to the education of other professionals. In September of 2012, Dr. Roush along with **Dr. Holly Teagle**, Director of the UNC pediatric cochlear program, gave a presentation on ANSD to early intervention specialists at the Language and Literacy Workshop in Greensboro, NC. In October, Dr. Roush gave an invited presentation to audiologists, otolaryngologists, and early intervention specialists at the Third Latin American Pediatric Audiology Conference in Buenos Aires, Argentina. In November of 2012, Dr. Roush and **Hannah Eskridge, MSP**, director of the UNC CASTLE Program gave an invited presentation entitled Collaborative Management of Auditory Neuropathy Spectrum Disorder at the American Speech-Language-Hearing Association Annual Convention in Atlanta.

The UNC pediatric audiology program together with the University of Iowa and Boys Town National Research Hospital in Nebraska just concluded the five-year research project entitled “Moderators of Functional Outcomes in Children with Mild to Severe Hearing Loss” (OCHL). The primary aim of the study was to investigate how hearing loss affects communication, educational performance, social skills, and psychological development. Results from the study are providing important information regarding the effects of early intervention and

amplification in infants and children up to nine years of age, whose hearing losses range from mild to severe. By the conclusion of the five-year project that ended in July 2013, 300 children across the three sites with mild to severe hearing loss and 100 children with normal hearing were enrolled. The study was funded by an \$8.9 million grant from the National Institute on Deafness and Other Communication Disorders, NIH, and differed from most other research on childhood hearing loss by focusing on children with milder degrees of hearing loss who use amplification.

This spring, we were pleased to celebrate the opening of the new Pediatric Audiology program at Mission Children’s Hospital in Asheville. This is an important partnership between Mission Hospital and the UNC pediatric audiology program that has as its goal to provide comprehensive pediatric audiology services in Western NC using an approach to management of pediatric hearing loss similar to that provided at UNC. After an extensive search for a pediatric audiologist for the Mission Hospital program, we were pleased to hear that Mission Hospital hired Dr. Melissa Aldana, a graduate of the UNC Doctor of Audiology program who completed her 4th year externship here at UNC with the pediatric audiology team. UNC has agreed to provide ongoing training and technical support to the Mission Hospital program. Our team is looking forward to working with Dr. Aldana and the Mission Hospital staff to serve children with hearing loss and reduce travel time for children and families living in western NC.



Members of the team are also engaged in a number of other research projects. Work continues on a clinical research project involving a new hearing aid technology called 'frequency compression,' a hearing aid processing strategy that allows access to higher

frequency sounds not available using conventional amplification. Dr. Roush is collaborating on this work with Department of Otolaryngology faculty member Dr. Emily Buss and Dr. Lori Leibold from the Division of Speech and Hearing Sciences.

## UNC Hospitals Hearing & Speech Center at Carolina Crossing

The UNC Hospitals Hearing and Speech Center at Carolina Crossing is a community-based Audiology and Speech Pathology clinic. In October 2012, we moved to our new building, which is located at 2226 Nelson Highway in Chapel Hill, NC. Our satellite clinic location is one of true convenience as we are located just south of the intersection of Highway 54 and Interstate 40 (Exit 273).

This Audiology and Speech Pathology satellite clinic is staffed by an interdisciplinary team of seven audiologists and two speech-language pathologists who work collaboratively with the physicians from the UNC Ear and Hearing Center. Many of the services and appointments that are available at our UNC Hospitals Neurosciences location are also available at our Carolina Crossing location.

The UNC Hospitals Hearing Center at Carolina Crossing provides specialty voice evaluation and treatment services. The Speech team at this location is comprised of two full time speech pathologists, **Ellen Markus** and **Elizabeth Ramsey**. Dr. Markus is dedicated to the diagnosis and treatment of patients with voice disorders with a special emphasis on the vocal development of both the professional and amateur singer. Ms. Ramsey joined the UNC Speech department in May 2012 and also specializes in voice disorders. In addition, both of these professionals have taken on an active role in providing Aural Rehabilitation (AR) to UNC's adult cochlear implant recipients. They help this patient population to learn how to listen and understand the new sounds that come from their cochlear implant.

The Audiology clinic space at Carolina Crossing includes five sound booths for comprehensive audiometric testing, facilities and state of the art fitting tools for hearing aid dispensing, three independent cochlear implant programming stations, and a patient resource center for aural rehabilitation training.

The Audiology team at the UNC Hospitals Hearing and Speech Center provides comprehensive diagnostic and rehabilitative audiology services for both pediatric and adult populations. The Audiology team provides auditory intervention and support to patients with traditional amplification or hearing aids, Bone Anchored Hearing Aids (BAHAs), Vibrant Soundbridge (VSB) middle ear implants, and cochlear implants. The Audiology team collaborated with the department of ENT in a new implant endeavor for UNC this year.



Five adult patients were successfully implanted with the Sophono, an implantable, abutment-free bone conduction hearing device. The fitting and programming of the external Alpha sound processors was successfully achieved at UNC Hospitals Hearing and Voice Center. The Audiology team is dedicated in learning and providing the latest, state of the art technology to their patients with hearing loss. A new option to patients with conductive hearing loss or single sided deafness is the SoundBite. It is a non-surgical option that uses bone conduction to transmit sound via the teeth.

Over the years, the Audiology program at the UNC Hospitals Hearing and Voice Center has experienced consistent growth and development

in the forms of new services as well as with the addition of clinical staff. As of July 2013, the team of participating audiologists at our Carolina Crossing location includes **Drs. Marcia Clark Adunka, Angela Byrd, Mark Haythorn, English King, Sarah Martinho, Ellen Pearce, and Jill Ritch.**

Dr. Martinho and Dr. Ritch are pediatric audiologists, who offer clinical support in the area of pediatric diagnosis and management of children with hearing loss. They specialize in the fitting and application of hearing aids and assistive listening devices for pediatric patients. Similarly, Drs. Clark Adunka, King, and Pearce specialize in the evaluation of adults with severe and profound sensorineural hearing loss, who qualify for cochlear implantation. The adult cochlear implant program at UNC is amongst the largest of its kind in the world and provides some of the most innovative and cutting edge approaches to hearing loss rehabilitation. Drs. Byrd, Haythorn, and Pearce contribute clinical skills in the fitting of state of the art hearing aid technology for the adult patient population. They have and continue to commit to the growth and development of the adult hearing aid dispensing program.

The UNC Hospitals Hearing and Voice Center is open Monday through Friday, from 8:00 AM to 5:00 PM. For more information regarding available services, appointments or referrals, please call (919) 490-3716.

The UNC Hospitals Hearing and Speech Center has been consistently voted as a Top Five Clinic of UNC Health Care by its patients in the surrounding community, and we would be pleased to offer our services to you.



## W. Paul Biggers Carolina Children's Communicative Disorders

The W. Paul Biggers Carolina Children's Communicative Disorders Program (CCCDP), The CCCDP Financial Grant Program, The Carolyn J. Brown Center for the Acquisition of Spoken language Through Listening Enrichment (CASTLE) are all part of the UNC Ear and Hearing Center. Located at a satellite clinic in Durham, the CCCDP and CASTLE are unique programs of the Department of Otolaryngology. **Dr. Harold Pillsbury** serves as Executive Director of the CCCDP, **Dr. Craig Buchman** is the Medical Director, **Dr. Holly Teagle** is the CCCDP Program Director and **Ms. Hannah Eskridge** is the CASTLE Director. They are joined by **Drs. Carlton Zdanski** and **Oliver Adunka**, surgeons, and a staff of talented and dedicated speech-language pathologists, audiologists, and support staff. Together they form a dynamic team

which has been recognized nationally for providing quality care to families of children with hearing loss.

The program is also unique in its ability to provide financial assistance to families in North Carolina and for its ongoing professional learning programs to mentor and train educators and speech and hearing specialists from around North Carolina and surrounding states.

The North Carolina General Assembly has provided for the core budget of the CCCDP with a recurring grant this year totaling \$519,919. With separate funding and a distinct budget, CASTLE is a public-private partnership. State funding for CASTLE has been provided since 2004, with \$550,000 allocated in 2012-2013. Other in-house funding and awareness raising efforts include staff and patient family participation in the Great Human Race 5k in March, and the second annual CASTLE Breakfast in April. Hosted at the Rizzo Center, invitations to the CASTLE breakfast were extended through CASTLE board members and friends of the program and over \$23,000 in support was generated towards a matching grant from the Oberkotter



Lillian Henderson, Chrissy Kramer, Shuman He, Hannah Eskridge, Erin Thompson, Velma Grose, Jennifer Woodard, Maegan Evans, Robert Humphreys, Deb Hatch, Holly Teagle, Lori Parker, and Lisa Park



Foundation. The 2012 CCCDP/CASTLE Summer Fun and Fundraiser held in October due to an earlier rain out, was a great success raising just over \$10,000. In 2013 this ever-popular and growing event is planned for September and will mark its 5th anniversary featuring the Nomads Band, led by staff member **Robert Humphreys**. CCCDP and CASTLE staff and patients always contribute their musical talents as well. And finally new this year, the First Annual CASTLE Golf Tournament was held in May in Greensboro at the Sedgefield Country Club-The Dye Course. This was an event conceived and executed by one of CCCDP/CASTLE's families and Board Members. A great first year effort generated over \$16,000 and a great time was had by all. Golfers from all over the state participated and encouraged all to make it an annual event.

### *The UNC Pediatric Cochlear Implant Team*

The UNC pediatric cochlear implant program at UNC continues to experience tremendous growth, making it one of the largest centers in the country. UNC surgeons and staff at the CCCDP care for over 1000 children. Between July 1, 2012 and June 30, 2013, 126 surgeries were performed. These included children receiving their first or second side devices, 13 revision surgeries and the first pediatric Auditory Brainstem Implant, which received global attention. As in previous years, many other children transferred into the program that were implanted elsewhere. The program is providing ongoing support for children who live in North Carolina as well as several surrounding states.

Early identification of hearing loss, a thorough medical work up followed by intensive audiological management, and appropriate intervention are all critical aspects of patient care that make eventual success with a cochlear implant possible. The pediatric audiologists at UNCH provide the important groundwork in diagnosis and hearing aid management for the child. When a child is referred as a potential candidate for cochlear implantation, the Team strives to identify the unique strengths and needs of the patient during the evaluation process. Counseling and plans for subsequent intervention are aimed at enabling each child the opportunity to reach his or her full potential to communicate. Excellent clinical care begins with communication and collaboration among team members. The relationship between the patient and the program is long-term, usually lasting throughout childhood, so the collaborative approach must be maintained at a high level. The Team is committed to monitoring each patient's performance with care, as well as to staying abreast of technological changes and state-of-the-art methods to ensure the best possible result for each child.

**Holly F.B. Teagle, AuD, CCC-A**, Associate Professor, and the other CCCDP audiologists, who include **Lisa Park, AuD, CCC-A**, **Debora Hatch, AuD, CCC-A**, and **Jennifer Woodard, AuD, CCC-A** provide audiological management for the children, ensuring their implant devices are carefully programmed and well-maintained to obtain the maximal benefit. **Lillian Henderson, MSP, CCC-SLP, LSLS Cert AVT** and **Maegan Evans, Ph.D, CCC-SLP, LSLS Cert AVEd**

provide speech/language evaluations for children before and after receiving cochlear implants.

The commitment to following patients with implants, to supporting a team approach, and to assuring that the technology is used to its full potential are all critical aspects of the CCCDP mandate. It was for this reason that The Carolyn J. Brown Center for Acquisition of Spoken Language Through Listening Enrichment (CASTLE) was created in 2001. **Hannah Eskridge, MSP, CCC-SLP, LSLS Cert AVT**, Assistant Professor and CASTLE Director, is supported by a staff of experienced speech-language pathologists and listening and spoken language specialists: **Maegan Evans, Ph.D, CCC-SLP, LSLS Cert AVEEd.**, **Sandra Hancock, MS, CCC-SLP, LSLS Cert AVT**, **Lillian Henderson, MSP, CCC-SLP, LSLS Cert AVT**, **Chrissy Kramer, MS, CCC-SLP, LSLS Cert. AVT**, **Erin Thompson, MA, CCC-SLP, LSLS Cert AVT**.

Other staff critical to the daily function of the CCCDP and CASTLE are **Robert Humphreys**, Financial Officer, **Lori Parker**, Receptionist and Scheduling Assistant, and **Velma Grose**, Assistant to the Directors. Robert, Velma, and Lori go above and beyond to help families and support the programs.

### *Collaborative Research*

The diverse characteristics of the large clinical population of cochlear implant candidates seen by the Pediatric Cochlear Implant Program have been the impetus for the research projects the CCCDP team has undertaken or plans to pursue. Study of special populations of children contributes to our overall understanding of the many variables affecting outcomes. Currently, projects underway include studies of children with a common etiology or characteristic of hearing loss, such as auditory neuropathy spectrum disorder (ANS), cochlear malformation, or a specific genetic marker. Management issues also provide questions for study, including outcomes for children with bilateral cochlear implants, or

children who use a hearing aid in addition to a cochlear implant. **Dr. Shuman He** collaborates with the team on various research projects that include electrophysiological measures, comparing objective measures to the behavioral data being collected in the clinic. These endeavors combine basic science with clinical care and, at some point, could shed light on patient management decisions.

Funded research includes a multi-centered NIH-sponsored project, Childhood Development after Cochlear Implantation, which is in its tenth year. This landmark study continues to generate interesting findings. Thirty children and their parents were initially enrolled in this study at the UNC site; most have been followed to document spoken language as well as psychosocial and academic development. With continued funding, we hope to follow this cohort of children into adulthood. After years of planning and preliminary work, an Investigational Device Exemption (IDE) was obtained from the FDA to pursue a feasibility study of Auditory Brainstem Implants (ABI) in children with severe cochlear malformations or absent cochlear nerves who do not benefit from cochlear implantation. The Pediatric cochlear implant team, headed by **Dr. Craig Buchman**, collaborates with Dr. Matt Ewend of the Division of Neurosurgery and **Dr. John Grose** and **Dr. Shuman He** for this study. The first child enrolled underwent surgery in April and his device was activated in May. We did not anticipate the magnitude of response when the video of his initial stimulation went viral and was covered in depth by all of the major news outlets in the US and around the world. We continue to monitor his progress and plan to eventually include 9 more children in this important project. This is an exciting opportunity to extend the benefits of technology to a patient population that has had limited remedial options in the past. A study of outcomes for children who have received CASTLE services over the years is now underway.



CASTLE's newest venture, REACH, is also being funded for two research projects. REACH is our tele-therapy and tele-training program described below. In collaboration with the University of Akron we will be studying the particular skills needed by therapists to conduct Listening and Spoken Language Therapy for children with hearing loss and their families using telemedicine. We are also analyzing parent skill development and the outcomes of children receiving therapy through REACH in comparison to children receiving face to face services in our clinic.

## CASTLE

The mission of CASTLE is to provide a quality listening and spoken language program for children with hearing loss; to empower parents as primary teachers and advocates; and to train and mentor specialists in listening and spoken language.

CASTLE is dedicated to providing quality Listening and Spoken Language intervention services to the families of children who are deaf or hard of hearing throughout North Carolina, especially those who reside in the rural areas and/or have limited financial resources. The program focuses on educating, encouraging, and empowering parents as the primary teachers of their children, in order to promote healthy parent-child bonding and to maximize the amount of time a child spends in a language-rich environment.

Last summer, CASTLE launched the UNC REACH program which provides tele-therapy and tele-training throughout the state. CASTLE therapists are currently able to provide speech-language services to children with hearing loss throughout North Carolina and Virginia. We are looking to expand this program to other states this coming year. With a pilot grant from the Kids 'N Community Foundation, we focused our tele-therapy for children ages birth to three. We are also able to work with teachers, speech pathologists & early interventionists throughout the state to provide distance training and coaching. This will allow the impact of the CASTLE mission to grow

tremendously as distance or lack of resources is no longer a barrier for accessing appropriate services.

### *Facets of CASTLE include the following:*

- Speech/language diagnostic evaluations determine need and eligibility for a variety of available programs, as well as assess outcomes for children with hearing loss.
- Individual therapy is provided for infants and toddlers with hearing loss, as well as older children, including both auditory-verbal therapy and preschool speech/language therapy, to facilitate language and speech development at home.
- A model toddler class is focused primarily on listening and talking – the development of spoken language. Language groups for preschool children are also offered.
- Tele-therapy and training program, UNC REACH, launched in summer 2012.

CASTLE offers training and hands-on experience for professionals and graduate students in teaching children who are deaf or hard of hearing how to listen and talk. This includes practical experience with supervision in a listening and spoken language approach for teachers and therapists working in the field. The program is focusing particular effort on supporting school professionals in rural areas where training opportunities are limited. In this way, CASTLE is building the capacity of early intervention and public school programs to fully support the ability of children who are deaf to develop spoken language while living at home and attending local schools. Currently in North Carolina there are approximately 2000 children with hearing loss in the public school system. However, most professionals working with children who are deaf have been and are still being trained to teach children through sign language. Teaching listening and speech to children with hearing loss requires an entirely different set of skills. Our ability to improve services in the public schools implies massive cost-savings to the public sector.



Our training program consists of many different elements that include workshop presentations, internships on-site at CASTLE, school observations and attendance at IEP (individual education planning) meetings. Our most intensive training takes place when we are mentoring/coaching a professional in their own setting.

## Other Training and Therapy Services

### *Other projects in recent years:*

- The CCCDP and CASTLE are proud to be part of a NC Consortium working to provide free training to NC professionals. This consortium sponsored 14 one- and two-day workshops this past year.
- The 16th annual Carolina Summer Institute was a resounding success. With special fundraising, CASTLE was able to provide \$11,300 in scholarship aid. Twenty-four participants came this year from North Carolina, Florida, South Carolina, Texas, and Virginia.
- The 2012 annual CCCDP Fall Conference, co-sponsored by the North Carolina A.G. Bell Association, featured Dr. Susan Wiley presenting on the Medically Complex Child. The Conference was attended by 144 professionals and parents from across the state.

## The Financial Assistance Program

The CCCDP Financial Assistance Program, which is funded by the North Carolina General Assembly, continues to provide supplies and clinical support to families who have children with hearing loss. The CCCDP was first proposed to the North Carolina General Assembly by W. Paul Biggers, MD, in the spring of 1992, and was funded later that year.

The program funds hearing technology and UNC-provided diagnostic and therapy services for children from birth to age 21 whose families need financial support to meet their children's special needs. Qualifying children are accepted into the CCCDP financial assistance program based on such criteria as family size, income, other medical expenses, and the limitations of insurance and other resources such as Medicaid. Since its inception, the program has provided financial assistance to 1,549 children from 92 North Carolina counties. From June 1, 2012 to May 31, 2013, 42 children were enrolled for the first time: seven were previous cochlear implant recipients and five of the new children received cochlear implants. A total of 313 children were served by the program at some point during the year.

The UNC Pediatric Cochlear Implant Program and the CCCDP and CASTLE programs are truly unique: No other state offers this level of support for children and families and for students and professionals who work with children with hearing loss. The collaboration between UNC Health Care, the University, the North Carolina General Assembly, and a number of private individuals and organizations have directly benefitted children and families in the State by providing excellent clinical care, expert educational and therapeutic services, a venue for conducting important research, and the financial assistance needed by many families.

## Facial Plastic & Reconstructive Surgery

The Division of Facial Plastic and Reconstructive Surgery continues to provide patients with reconstructive and cosmetic surgical excellence under the leadership of **Dr. William Shockley**. Dr.

Shockley dedicates his time to a variety of difficult reconstructive problems including revision cosmetic and functional rhinoplasty, microtia repair, scar revision, and complex facial defects. **Dr.**

**Andrea Jarchow** devotes her time to primary cosmetic and functional rhinoplasty, surgery of the aging face, and facial trauma. She has a special interest in performing facelifts, browlifts, and blepharoplasty.

The Division continues to expand with a new location at the Carolina Crossing office. A state of the art photography room, formal consultation office, a new procedure room, and comfortable exam rooms were added for an ideal patient experience.

[med.unc.edu/ent/for-patients/clinical-services/facial-plastic-and-reconstructive-surgery](http://med.unc.edu/ent/for-patients/clinical-services/facial-plastic-and-reconstructive-surgery)







**William W. Shockley, MD, FACS**  
 Chief of Facial Plastics  
 W. Paul Biggers Distinguished Professor



**Andrea Jarchow-Garcia, MD**  
 Assistant Professor

The building is easily spotted from Highway 54 with the Facial Plastic Surgery sign highlighting the building. We are also hard at work on a website for our practice. Look for us in the future at [med.unc.edu/uncfacialdocs](http://med.unc.edu/uncfacialdocs)

Dr. Shockley has been particularly busy this year, serving as Co-Chair of the Fall Meeting of the American Academy of Facial Plastic and Reconstructive Surgery (AAFPRS) in New Orleans on October 19-21, 2013. The meeting introduces a brand new format with four educational tracks: Non-Surgical Track, Aesthetic Track, Practice Management Track, and a Reconstructive Track.

### Resident Experience

We are very proud of our resident graduates and thrilled that they matched at AAFPRS accredited fellowships. Dr. Scott Shadfar started July 1st with Dr. Steve Perkins in Indianapolis for a one year fellowship. Dr. Joshua Surowitz and Dr. Maher Younes both completed their fellowships in June 2012. We look forward to inviting them back to share their experiences and teach our residents new and exciting techniques.

Resident education and enthusiasm for Facial Plastic Surgery continues to be one of the primary goals of the division. Residents have the opportunity with our new skills lab to discover firsthand the complexity of the facial anatomy



Ashley Tenney, RN, Anna Bradshaw (Patient Care Coordinator), Drs. Jarchow and Shockley, & Elaine Hinkle, RN





as well as to practice and perform many of our procedures in dedicated facial plastics labs. Our curriculum continues to be augmented by excellent guest lecturers including Dr. Madison Clark (Alamance Facial Plastic Surgery), Dr. George Blakey (UNC OMFS), Dr. Cynthia Gregg (Facial Plastic Surgery Cary, NC), Dr. Bradley Merritt (UNC Dermatology), and Dr. Amy Fowler (UNC Oculoplastic Surgery).

### Cosmetic Consultation

**Dr. Andrea Jarchow** offers comprehensive facial aesthetic care. Consultations place emphasis on rejuvenating facial aging according to the patient's concerns. We strive to restore a natural facial appearance offering a range of surgical procedures including open and endoscopic browplasty, upper and lower blepharoplasty, rhytidectomy, neck lifts, otoplasty, and chin implantation. Clinic services include placement of facial fillers, injection of neurotoxins, and counseling on optimal skin care regimens. By using digital photographs as well as facial mirror examinations, the patients are better

able to visualize objectively their concerns. The goal of each consultation is to give the patient an individualized analysis while adequately







communicating surgical goals and post-operative expectations.

### Reconstructive Consultation

Through this clinic we manage patients with post-traumatic facial deformities, facial scars, skin cancer and Mohs defects, long standing facial paralysis, and those that have had reconstructive or cosmetic surgeries elsewhere with unsatisfactory results. With the increased incidence of skin cancer and the improved access to Mohs surgery a number of patients are seen with facial and nasal defects. Those with nasal, lip, and ear defects present special anatomical problems, given the unique configuration of these specialized structures. Patients with major nasal defects may require multi-

stage procedures, such as forehead flaps, cartilage graft reconstruction, and repair of internal nasal lining defects. Even patients with major rhinectomy defects following resections for life threatening and advanced cancers have been successfully reconstructed using multi-staged procedures to rebuild the surrounding cheek and lip, along with their nasal defects.

UNC Hospitals Level 1 Trauma status facilitates an active facial trauma practice. We treat everything from simple zygomatic arch fractures, malar fractures, frontal sinus fracture, mandible fractures to complex LeFort fractures and nasoorbitoethmoid (NOE) fractures.



**LEFT:** Eight year old girl with a congenital malformation of the external ear (microtia).  
**RIGHT:** Final result after staged reconstruction of the ear using her own rib cartilage.



## Rhinoplasty Consultation

In recent years we established a Rhinoplasty Clinic devoted to patients with post-traumatic nasal deformities, congenital nasal anomalies, patients with nasal valve problems, and patients who have nasal obstruction and/or cosmetic deformities. The clinic offers a wide range of reconstructive procedures including rhinoplasty, septorhinoplasty, nasal valve repair, and correction of other deformities such as saddle nose deformities and soft tissue injuries. The most significant change that we have seen in the past couple of years is a significant increase in the number of revision cases that are referrals to UNC, especially with respect to septorhinoplasty and nasal valve repair

## Microtia Program

Our Microtia Program has been remarkably successful. Dr. Shockley and **Dr. Carlton Zdanski** offer a multidisciplinary approach to the treatment of these complex congenital anomalies. Patients are seen initially by both Dr. Zdanski and Dr. Shockley. Management decisions are made as to whether further anatomical imaging will be required with respect to their atresia abnormalities. Those with multiple anomalies and clinical syndromes are managed through the Craniofacial Clinic. Hearing evaluation by Audiology is critical in these young children and our Otology colleagues play a crucial role in this process. Once the

patient has been fully evaluated, the family can be counseled about the multiple options that exist with respect to aural rehabilitation. Luckily, many patients have a normal ear on the opposite side with normal hearing on that side. Once the patient is deemed a candidate for microtia repair the optimal age and timing of the repair is outlined for the family. In most patients this is at 6-8 years old.

For Grade III microtias we are using the traditional four stage technique popularized by Dr. Burt Brent. We have several children in the program at various stages of their reconstructive procedure. We have found many advantages to the two-team approach including saving operating time by being able to operate on two sites simultaneously. This allows harvesting the rib graft while removing the cartilaginous remnant and creating an appropriate recipient pocket for the auricular framework.

In addition we offer two aesthetic perspectives with respect to the shape and size of the final reconstructed cartilaginous framework. We have been very pleased with the success of this program and are grateful to our referring physicians.

THE UNC MULTIDISCIPLINARY

## Head & Neck Oncology Program

The Multidisciplinary Head & Neck Oncology Program offers the full range of cutting-edge diagnostic and therapeutic techniques for the treatment of all benign and malignant tumors of the Head & Neck including, but not limited to, tumors of the oral cavity, pharynx, and larynx; soft tissues; thyroid; nose and sinuses; ear and temporal bone; skull base; salivary glands; and the cerebello-pontine angle.

The Program's main goal is to cure head and neck cancer while maintaining optimal speech and swallowing function and achieving the best possible cosmetic result. We have extensive experience in minimally invasive endoscopic skull base surgery, transoral laser resection, transoral robotic surgery and microvascular free flap reconstruction. A Minimally Invasive Head and Neck Surgery Center has been formed and is starting to support quality of life and functional outcomes research.

[med.unc.edu/ent/for-patients/clinical-services/head-and-neck](http://med.unc.edu/ent/for-patients/clinical-services/head-and-neck) | [med.unc.edu/ent/for-patients/clinical-services/adult-speech-pathology](http://med.unc.edu/ent/for-patients/clinical-services/adult-speech-pathology) |  
[med.unc.edu/ent/for-patients/clinical-services/robotic-head-neck-surgery-program](http://med.unc.edu/ent/for-patients/clinical-services/robotic-head-neck-surgery-program)





## TEAM



**Mark C. Weissler, MD, FACS**  
Professor and Chief



**D. Neil Hayes, MD, MPH**  
Associate Professor



**Trevor G. Hackman, MD, FACS**  
Assistant Professor



**William W. Shockley, MD, FACS**  
Professor



**Brian Kanapkey, MA, CCC-SLP**  
Speech Pathologist



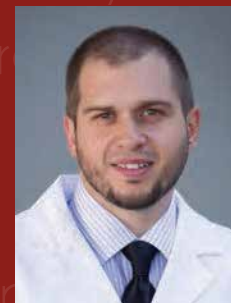
**Andrew F. Olshan, PhD**  
Professor,  
UNC SPH Epidemiology Chair



**Brien R. Pace, ACNP-BC**  
Nurse Practitioner



**Carol G. Shores, MD, PhD, FACS**  
Associate Professor



**Adam M. Zanation, MD**  
Assistant Professor

The team consists of surgeons, medical oncologists, radiation oncologists, pathologists, diagnostic and interventional radiologists, dentists, epidemiologists, prosthetic specialists, nutritionists, speech and swallowing specialists, nurses, and social workers. The exchange of knowledge and opinions among team members ensures that the best possible treatment plan is developed for each patient. Each week, the Program holds an interactive conference attended by Program members from each discipline. **Mark C. Weissler, MD, William W. Shockley, MD, Carol Shores, MD, PhD, Adam M. Zanation, MD, and Trevor G. Hackman, MD** serve as the Program's Head & Neck oncologic surgeons. Dr. Bhishamjit Chera is the H&N radiation oncologist and Drs. **David Neil Hayes, MPH, MD**, Juneko Grilley-Olson, MD and Jared Weiss, MD serve as the H&N medical oncologists. Robert P. Hollowell, Jr., DDS, MS and Lauren Patton, DDS serve as the programs dental experts.. This conference has the ability to be webcast around the state so that outside providers elsewhere can participate directly and discuss their patients. Patients from WakeMed in Raleigh are also regularly presented at this conference. Our weekly tumor board now routinely discusses over 35 patients per week, actively undergoing multidisciplinary cancer therapy at UNC. In 2009, 675 new patients came through the Multidisciplinary Head & Neck Cancer Program at UNC Hospitals.

The program now performs many ultrasound examinations in the ENT clinic for the evaluation and ultrasound guided needle biopsy of thyroid and other neck masses. Trans-nasal esophagoscopy and laryngeal video stroboscopy are also available for the evaluation of Head and Neck patients with special problems. Mr. Brian Kanapkey from speech pathology works hand in hand with the surgeons in the management of





**FRONT ROW:** Shannon Aumer, Mary Fleming, Lauren Fedore, MD, Ben Huang, Adam Zanation, MD, Ashley Tenney RN, Hazel Hampton RN, BSN, Bridgett Wesley MD, DDS, David Ludlow, MD, Gita Fleischman, **BACK ROW:** Jared Weiss, MD, Mark Weissler, MD, Laura Miller, William Shockley, MD, Bishamjit Chera, MD, D. Neil Hayes, MD, Dale Flowers, Glenda Blackwood, Daniel Duncan, Nathan Calloway, MD, Sharon Rubischko, RN, Trevor Hackman, MD, and Traci McKinney, RN

post-treatment speech and swallowing dysfunction. Dr. Glen Minsley from dental prosthetics assists our patients with prosthetic management of head and neck defects. Dr. Bill Shockley has a special interest in the rehabilitation of facial palsy resulting from cancer therapy, and the reconstruction of complex facial wounds resulting from Moh's chemosurgery.

Hazel Hampton RN, BSN and Nancy Jensen, RN serve as our nurse navigators for head and neck cancer patients. They assist patients as they navigate through their complex treatment protocols. They work closely with the patients and their families to insure that they are well informed about the multiple treatment modalities utilized in modern cancer treatment.

Ms. Laura Lyndon Miller and Glenda Blackwood are our program coordinators. They arrange for initial consultations at UNC from referring physicians,



Hazel Hampton, RN, BSN, Glenda Blackwood, Laura Miller and volunteer at the Free Head and Neck Cancer Screening Day 2013, Rich Rivera





gathering all the outside medical information on these often complex patients.

Elizabeth Sherwood, RN, MS, ANP-C, assists with psychological support through the trying period of treatment and follow-up. She is the Coordinator of Survivorship Programs and helps our patients by providing support during and after treatment as they transition from active treatment to surveillance. We offer a Symptom Management Clinic, which assists with follow-up of medications (i.e., anti-depressant, anti-anxiety) and emotional/mental health issues, as well as the whole range of side effects folks deal with related to surgery, chemotherapy, and radiation.

Dale Flowers, RN, OCN serves as the Clinical Trials Nurse and works with Dr. Neil Hayes and others in medical oncology to assist patients to navigate through the complexities of treatment on the wide variety of experimental protocols available.

Mary Fleming, MSN, ANP, is a nurse practitioner with the head and neck oncology program in the divisions of medical and radiation oncology. She returns to UNC after serving 5 years in the US Public Health Service providing care to

underserved populations. Her clinical interests include the role of stress management and disease response.

Xiaoying Yin, MD, MS is a full time basic science researcher in the Head and Neck laboratory within the Lineberger Cancer Center. Dr. David Neil Hayes along with Dr. Yin received a University Cancer Research Fund competitive grant in 2009 which continues to study Genomic Classification of Head and Neck Cancer in Paraffin Samples. The purpose of this research is to identify molecular fingerprints of clinically apparent subtypes of squamous cell cancer of the head and neck.

Each year we run a very successful oral cancer screening day. Under the auspices of the Head and Neck Cancer Alliance, formerly the Yul Brynner Foundation, physicians spend an afternoon in the Oto-HNS clinic screening the public for oral cancer and other diseases of the head and neck. The oncology nurse navigators and program coordinators put on an exhibit in the hospital lobby and provide information about head & neck cancer and smoking cessation. This was the busiest year ever, with over 100 people from 12 counties in North Carolina taking advantage of this special event.



## Clinical Trials

The Head and Neck Oncology Program continues to strive for a goal of having at least one clinical trial open for all of the clinical cancer scenarios seen frequently in our group. Present open (and pending) clinical trials are listed below.

LCCC 1120: Phase II Study of De-Intensification of Radiation and Chemotherapy for Low-Risk HPV-related Oropharyngeal Squamous Cell Carcinoma

LCCC1103: A Phase II study of carboplatin, nab-paclitaxel and cetuximab for induction chemotherapy for locally advanced squamous cell carcinoma of the head and neck

LCCC1125: Multimodality Risk Adapted Therapy including Carboplatin/Paclitaxel/Lapatinib as Induction for Squamous Cell Carcinoma of the Head and Neck Amenable to Transoral Surgical Approaches

RTOG 0920: A Phase III Study of Postoperative Radiation Therapy (IMRT) +/- Cetuximab for Locally Advanced Resected Head and Neck Cancer

RTOG1008: A Randomized Phase II Study of Adjuvant Concurrent Radiation and Chemotherapy versus Radiation Alone in Resected High-Risk Malignant Salivary Gland Tumors

CCCWFU-60107: Phase I/II Clinical Trial Of Combined Re-irradiation With Pemetrexed And Erlotinib Followed by Maintenance Erlotinib For Recurrent And Second Primary Squamous Cell Carcinoma of the Head and Neck

UPCC15309: A Phase II Study of Capecitabine and Lapatinib in Squamous Cell Carcinoma of the Head and Neck

09-266-B: Randomized Phase II Trial of Everolimus versus Placebo as Adjuvant Therapy in Patients with Locally Advanced Squamous Cell Cancer of the Head and Neck (SCCHN)

A041-03: Phase II An Open-label Phase 2 Study of ACE-041 in Patients with Recurrent or Metastatic Squamous Cell Carcinoma of the Head and Neck

I4E-MC-JXBA:(IMCL-CP02-0861) Phase 2 Study to Evaluate the Pharmacokinetics and Drug-Drug Interaction of Cetuximab and Cisplatin in Patients with Recurrent or Metastatic Carcinoma of the Head and Neck

CEP-37250/KHK2804-001:Two-Part, Open-Label, Multi-Center Phase 1 Study of Monoclonal Antibody CEP-37250/KHK2804 in Subjects with Advanced Solid Tumors

LCCC1037: Accuracy of ultrasound guided FNA in detecting persistent disease in lymph nodes of patients with head and neck squamous cell carcinoma after definitive chemoradiotherapy

# Voice Restoration and Swallowing Clinic

The Voice Restoration and Swallowing Clinic consists of a multidisciplinary team providing evaluations and therapy for a wide variety of head and neck cancer patients. Speech pathology services in the area of head and neck cancer are coordinated by speech pathologist **Brian Kanapkey** with additional coverage by **Shannon Aumer** and **Leslie Johnson**.

Shannon Aumer continues to expand speech pathology services within the head and neck oncology program. Working with Dr. Bhishamjit Chera, she provides comprehensive continued evaluation and treatment of speech and swallowing deficits for head and neck cancer patients receiving chemo and radiation therapy. In addition, she is a co-investigator with UNC

radiation oncologists, medical oncologists and ENT physicians on multiple clinical research trials. Shannon uses modified barium swallow studies and fiberoptic endoscopic swallow evaluations to objectively assess head and neck cancer patients prior to and following completion or radiation therapy, chemotherapy and surgery. Patients treated in the speech pathology clinic include but are not limited to those patients with partial and total laryngectomy with or without tracheoesophageal puncture, oral cavity cancers, neck cancers, skull base tumors, short and long term tracheostomy, and chemotherapy, and radiation injury patients. The ENT surgeons within the UNC ENT Clinic, along with oncology physicians, evaluate cancers and provide proper surgical and/or chemotherapy and radiation treatment for these patients. The speech pathologist works on order from the ENT physician or oncologist



Leslie Johnson, Brian Kanapkey & Shannon Aumer

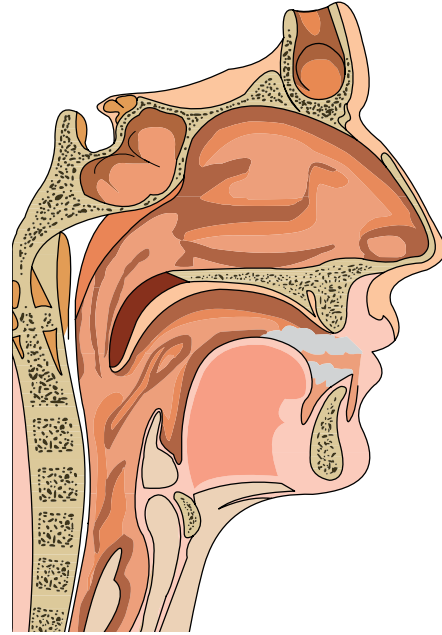


and provides evaluation and treatment for the functional disorders that result from cancer treatment. Functional deficits affecting maintenance of proper nutrition by mouth and aspiration risks are treated by the speech pathologist.

The latest in technology for swallowing therapy, such as surface electromyography for biofeedback and VitalStim electrical stimulation is used here at UNC. Both techniques allow for excellent data keeping for research analysis. In this way, the physicians and speech pathology team in the UNC ENT Clinic help to contribute new information in the area of swallowing rehabilitation after treatment for head and neck cancer.

Prevention and treatment of trismus remains a large focus for Kanapkey, who is actively involved in training patients with devices and techniques to both help prevent trismus due to radiation therapy and treat trismus that has already become a problem. The training with various devices extend to ENT, oncology as well as maxillofacial and dental services. The Dual Valve TEP prosthesis was pioneered here in UNC ENT. Product evolution and eventual manufacture was a result of collaboration between Kanapkey and Dr. Eric Blom of CENTA in Indianapolis, Indiana. Dr. Blom is largely responsible for historical development as well as the current state of the TEP prosthesis in the U.S. The professional collaboration between Blom and Kanapkey continues with hopes of continued contributions to the advancement of TEP prostheses and related products.

In yet another collaboration, Brian Kanapkey and Byron Kubik, speech pathologist at CENTA of Indianapolis, IN have developed a new device for treating trismus that is in prototype phase by an international company. The company plans to market the device internationally after appropriate trials take place. Thus far, patient data



regarding the device's use and effectiveness have shown significant success in alleviating trismus.

Yet another role filled by the Head and Neck Clinic Speech Pathologist is teaching about tracheotomy before and after surgery. Speech Pathology is part of the team seeing this population for the purpose of providing educational information, thus helping patients make more informed decisions.

The Head And Neck Clinic Speech Pathologist also provides therapy to help restore optimal communication to the patient who has had laryngectomy and oral cavity resections and reconstruction. Additionally, Botox injection(s) evaluations are available to those who fail to develop TEP speech post-operation.

Finally, a program for remediation of oversized TEP continues. In this technique, Brian Kanapkey uses silicone for creation of extended tracheoesophageal flanges to stop around the TEP prosthesis leakage. This process reduces pulmonary aspiration and risk of aspiration pneumonia due to around the prosthesis leaks.

## FACULTY



**Adam M. Zanation, MD, FACS**  
Associate Professor  
Director, Head & Neck Robotics Program



**Carlton J. Zdanski, MD, FACS, FAAP**  
Associate Professor



**Trevor G. Hackman, MD, FACS**  
Assistant Professor

## Robotic Head & Neck Surgery Program

In March 2010, **Dr. Adam Zanation** performed North Carolina's first Transoral Robotic Head and Neck Surgery (TORS) and since that time the OHNS Department has setup a Robotic Head and Neck Surgery Program. Currently **Dr. Trevor Hackman** and **Dr. Carlton Zdanski** are credentialed in TORS, giving the UNC Department of Otolaryngology/Head and Neck Surgery three active TORS surgeons. Currently, UNC has performed robotic surgeries for transoral tumor resections, complex obstructive sleep apnea surgery, pediatric airway reconstruction and even skull base tumor surgery.

The da Vinci robotic surgery system

is a three dimensional endoscope-based robot with three articulating instrument arms. As the surgeon operates, state-of-the-art robotic and computer technologies scale, filter and seamlessly translate the surgeon's hand movements into precise micro-movements of the da Vinci instruments. The primary advantage of the system is high definition 3D visualization, flexibility with complex instrument movements in tight spaces, and the ability to access areas of aerodigestive tract without incisions or splitting the mandible. This has the potential to reduce surgical morbidity and provide better patient functional outcomes.

Dr. Carlton Zdanski (Pediatric Otolaryngology) and Dr. Zanation have been working together on pediatric Transoral Robotic Surgeries. They performed the first



Dr. Hackman

reported Pediatric TOR surgery for a tumor in the nation and performed TORS on the smallest known child (8 pounds). The two of them have now successfully performed multiple pediatric TORS procedures without a complication. By combining the expertise in pediatric otolaryngology and TORS/head and neck surgery, Drs. Zanation and Zdanski are hoping to advance the care of children that need minimally invasive surgery.



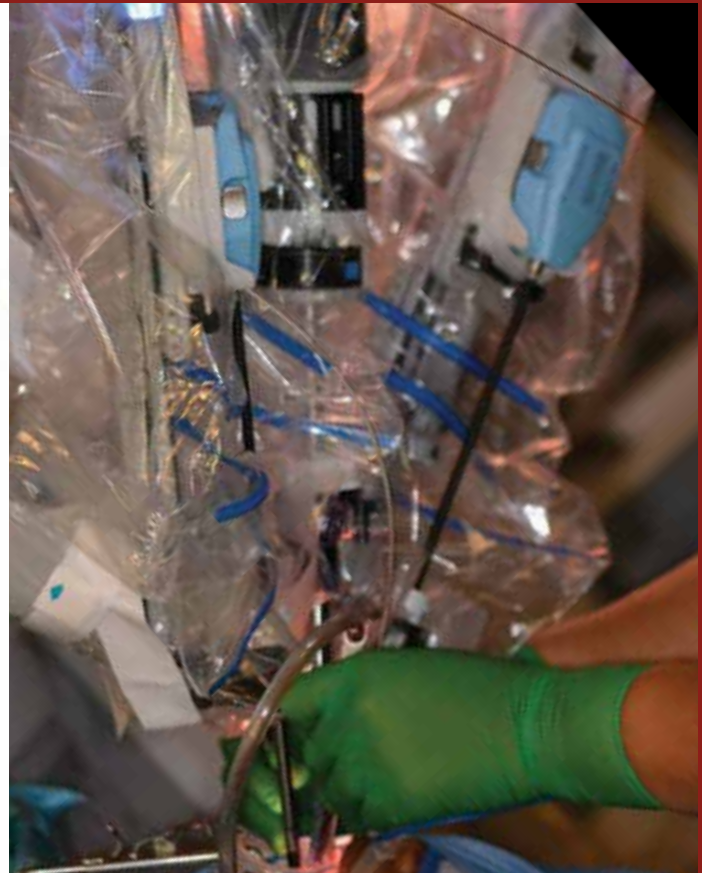
Drs. Zanation and Zdanski

The UNC Robotics Program is currently seeing patients for selected head and neck cancers, tongue base related obstructive sleep apnea, complex pediatric airway lesions, and skull base tumors. Future research plans

involve expanding robotic indications for skull base surgery and merging other technologies with the robotic interface. For patient referrals call Laura Miller at the Head and Neck Oncology Program at 919-966-9717.



da Vinci Robot





# Rhinology, Allergy & Endoscopic Skull Base Surgery

Sinusitis and allergy are two of the most common diseases occurring in the United States with millions of new cases being diagnosed every year. With a tradition dating back to 1979 with W. Paul Biggers, MD, and Libby Drake, RN, the Division of Rhinology, Allergy, and Endoscopic Skull Base Surgery provides a complete range of services for medical and surgical management of sinusitis and allergy, in addition to cutting edge management of tumors and other complex processes and diseases affecting the sinuses and skull base.

The Division is led by **Brent A. Senior, MD**, Past President of the American Rhinologic Society, with other members including **Adam M. Zanation, MD**; **Charles S. Ebert, MD**; **Peter Chikes, MD**; and **Harold C. Pillsbury, MD**, Immediate Past President of the American Academy of Otolaryngic Allergy.



## FACULTY



**Brent A. Senior, MD, FACS, FARS, FFAOA**  
Nathaniel T. and Sheila W. Harris Distinguished Professor  
Chief of Rhinology, Allergy & Endoscopic Skull Base Surgery



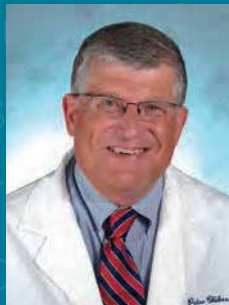
**Harold C. Pillsbury III, MD, FACS, FFAOA**  
Thomas J. Dark Distinguished Professor  
of Otolaryngology/Head & Neck Surgery



**Charles S. Ebert, Jr., MD, MPH, FFAOA**  
Assistant Professor  
Co-Director, Rhinology & Endoscopic  
Skull Base Surgery Fellowship



**Austin S. Rose, MD**  
Associate Professor  
Co-Director, Rhinology & Endoscopic Skull  
Base Surgery Fellowship



**Peter G. Chikes, MD, FACS, FFAOA**  
Assistant Professor  
Generalist



**Adam M. Zanation, MD, FACS**  
Associate Professor  
Co-Director, Rhinology & Endoscopic  
Skull Base Surgery Fellowship



**Stanley W. McClurg, MD**  
Rhinology, Allergy & Endoscopic  
Skull Base Fellow 2013-2014

Together, they perform the full range of allergy, medical, as well as minimally invasive endoscopic surgical management of diseases of the nose and paranasal sinuses, including Functional Endoscopic Sinus Surgery (FESS), a minimally invasive technique used to restore normal sinus ventilation and function in the setting of chronic inflammation and infection. Recent advances in these minimally invasive techniques developed by UNC surgeons now allow for performance of endoscopic surgery for cancerous and non-cancerous tumors of the nose and sinuses and skull base, including tumors extending into the eye and brain. Technological innovations, including the latest in powered instrumentation and drills, computer image guidance, and balloon sinus dilation, aid in these advanced techniques and provide significant advantages over traditional approaches. In addition, the division was among the first in the world to obtain and utilize intraoperative CT imaging for real-time surgical use.

As a leader in the field, the Division is proud to treat extremely complicated sinonasal inflammatory disorders such as allergic fungal rhinosinusitis. Allergic Fungal Sinusitis (AFS) is a refractory subtype of chronic rhinosinusitis and is noted for its difficulty to manage through typical medical regimens. Almost universally, a diagnosis of AFS requires operative intervention, with the goals of removing anatomic obstruction, clearing infection and inflammatory debris from the sinus cavities, creating patent sinus outflow tracts, and preserving the mucociliary function of healthy sinonasal mucosa. Our Division has become a leading innovator of postoperative adjuvant medical therapy for AFS. This



treatment may include the use of systemic and topical corticosteroids in irrigation solution or gels, immunotherapy directed at fungal-specific antigens, and/or systemic and topical antibiotics. The efficacy of these regimens is variable and the goal is to lengthen the time to recurrence rather than to cure the underlying disease. Therefore, long-term follow-up with serial physical and endoscopic examination is necessary to monitor for disease progression.

**Gina Stoffel, RN** and **Robin Gunter, RN** at our new Carolina Crossing facility provide full allergy service including allergy shots to over 400 patients a month. The Carolina Crossing satellite clinic provides unparalleled walk-up convenience and free parking right at the front door. New testing methods including immunocap blood testing as well as the multi-test 11skin test screen, have opened doors for diagnosis in younger children, while the imminent initiation of sublingual immunotherapy (SLIT), allowing shots to be given as drops under the tongue, will allow for painless treatment of children and adults who are apprehensive about traditional allergy injection therapy.

UNC physicians in the Division of Rhinology, Allergy, and Endoscopic Skull Base Surgery are pioneers in the use of in-office minimally invasive surgical treatments for sinusitis. One such technology is balloon catheter dilation of the sinus openings. This technology allows for a thin balloon catheter (similar to an angioplasty catheter for the heart) to be placed into the opening of a sinus and inflated. When the sinus balloon catheter is inflated, it gently restructures and dilates the opening of the passageway while maintaining the integrity of the sinus mucosal lining. In selected patients, this technology

may allow some to avoid general anesthesia while experiencing quicker recovery times.

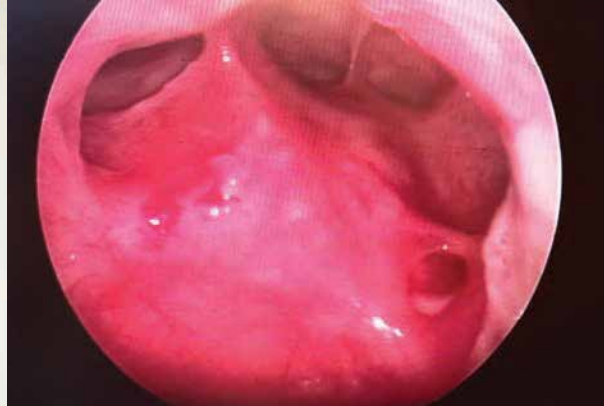
A major activity of the Division is co-sponsorship of educational programs in rhinology, sinus and endoscopic skull base surgery. One such effort, now in its tenth year is the Southern States Rhinology Course held each spring on Kiawah Island, South Carolina. Jointly sponsored by the Medical University of South Carolina, Georgia Health Sciences University, Emory University, and the Georgia Nasal and Sinus Institute, the course attracts annually over 80 participants from around



Robin Gunter, RN and Gina Stoffel, RN

the world in addition to over 30 residents. It provides an opportunity to participate in laboratory dissections while hearing renowned rhinologists over the course of this three-day meeting. The next course will take place May 8-10, 2014; for more info: [southernstatesrhinology.org](http://southernstatesrhinology.org).

The Division also sponsors the 360 Degree UNC Skull Base Surgery Course. This course brings together senior otolaryngology and neurosurgery residents and fellows from all over the nation,



pairing them in a novel team approach to learning and dissections. The course encompasses both endoscopic and transcranial approaches.

The new home of this course is the Harold C. Pillsbury Sinus and Temporal Bone Training facility, highlight for the division in 2012. Offering the latest in endoscopic technology and videoconferencing technology, this 1300 square foot, 16 station facility allows for full

training in all aspects of sinus, skull base, and temporal bone surgery. As a joint facility with colleagues in the departments of ophthalmology, neurosurgery, and thoracic surgery, the lab also offers the latest in surgical simulation technology as well as several full size operating room tables for more extensive dissection training. Starting in 2013, this lab will be the new home of the 360 Degree UNC Skull Base Surgery Course.



Drs. Senior, Ebert, Zanation, and Rose with 2013-2014 Rhinology Fellow, Dr. Stanley McClurg



Research remains a major focus for the Division. This year, numerous residents and medical students participated in Division research activities resulting in several presentations at major national and international otolaryngology meetings including the Annual Meeting of the AAO/HNS, the Annual Meeting of the American Rhinologic Society, the Annual Meeting of the North American Skull Base Society, as well as the Combined Otolaryngology Section Meeting. A highlight of this year's research activity is the completion of a very important, high impact study on the use of topical steroid rinses in treatment of polyp disease, currently in press in the International Forum of Allergy and Rhinology.

**Julie Kimbell, PhD** who joined the Division in 2010 as a basic science researcher with a background in mathematics, has developed several cutting edge projects in the realm of computer modeling of airflow through the nasal cavity and paranasal sinuses in healthy noses and in the presence of sinus and nasal disease. This cutting edge work has helped us to understand how medications are distributed in the nose and sinuses as well as the potential impact of airflow on disease development or progression of sinusitis. Ongoing work in this area is also leading to new understanding of the impact of different aspects of sinus surgery on the progression or resolution of sinusitis.

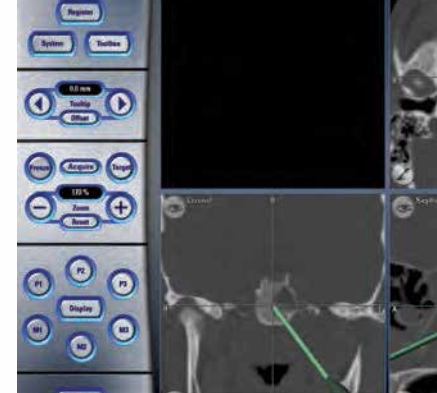
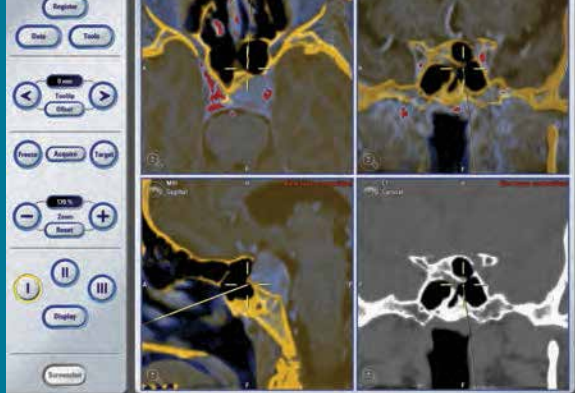
The Division collaborates with several departments in the UNC School of Medicine including exciting

work with the Division of Pulmonary Medicine yielding new insights into the molecular basis of inflammatory diseases of the nose and paranasal sinuses, and the Division of Nephrology examining involvement of the upper airway in vasculitis. Outside the UNC School of Medicine, the Division has an ongoing collaborative project with the UNC Gillings School of Public Health, Department of Biostatistics to specifically characterize the genetic expression profiles of patients with Allergic Fungal Rhinosinusitis through a comparative analysis of healthy and diseased specimens of sinonasal mucosa. Through both of these collaborations, we have received funding through the North Carolina Translational and Clinical Sciences Institute funded through Clinical and Translational Science Awards.

Other recent topics of division research have included investigations in the use of image guidance during endoscopic sinus and skull base surgery, cost effective analyses of endonasal, endoscopic surgical approaches to the skull base versus traditional open approaches, and quantification of the impact of Functional Endoscopic Sinus Surgery, and endoscopic skull base surgery via patient-rated quality of life (QOL) measures. All of these efforts have led to numerous grants, presentations, and publications in peer-reviewed journals.

As a result of the Division of Rhinology, Allergy, and Endoscopic Skull Base Surgery's leadership in the realm of nasal, sinus, and skull base disease,





UNC Otolaryngology/Head and Neck Surgery was named the first recipient of a National Center of ENT Excellence Award in 2004 by BrainLAB, AG, of Munich, Germany, one of the world's leading image guidance technology companies.

### Pioneering Minimally Invasive Skull Base Tumor Treatments: Minimally Invasive Pituitary Surgery and Expanded Endoscopic Approaches to the Skull Base

#### *Endoscopic Skull Base Surgery*

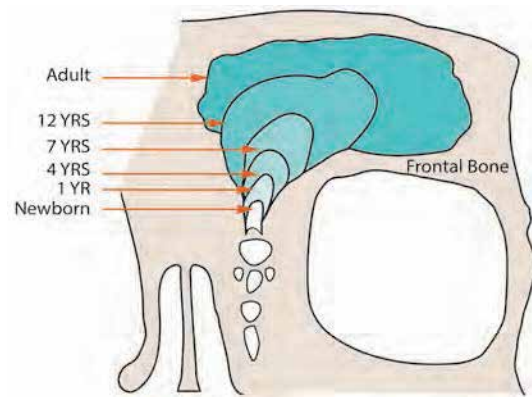
In March 2000, **Brent Senior, MD** along with Matthew Ewend, MD of the Department of Neurosurgery, became the first team in North Carolina to perform Minimally Invasive Pituitary Surgery (MIPS) using an endoscopic approach entirely through the nose to treat pituitary adenomas. In contrast to traditional open approaches, in this procedure the nose is used as a corridor to the tumor, so no facial or oral incisions are involved, dramatically reducing the overall morbidity of the procedure. Sinus endoscopes are used to directly access and open the sphenoid sinus. The scope is held in position and the sella is then accessed using a typical two-handed technique. The tumor is removed using only the endoscopes, allowing for visualization at angles deep in the sella for removal of residual tumor that may otherwise be missed using microscopic approaches. Recovery is rapid and no packing is typically used. Tumor removal is potentially more complete given the

ability of the angled endoscopes to see behind and under otherwise obstructing structures.

“Hydroscopy,” a technique developed by Drs. Senior and Ewend, is then performed in order to assess for residual tumor. Members of the Division along with collaborators in Neurosurgery have become recognized experts in this exciting area, lecturing nationally and internationally on the topic, in addition to authoring publications in several books and journals. They have performed over 600 of these procedures, placing the University of North Carolina at the forefront of minimally invasive approaches to skull base tumors.

In 2008, **Dr. Adam Zanation** joined Dr. Senior in the Division of Rhinology following his fellowship in Minimally Invasive Skull Base Surgery at the University of Pittsburgh. Teaming up with Dr. Deanna Sasaki-Adams in the Department of Neurosurgery, they are advancing minimally invasive skull base surgery to new and exciting levels for patients with a variety of skull base, brain, spine, orbital tumors, and even certain brain aneurysms.

With the role of expanded endonasal skull base surgery continuously growing, ever more advanced benign and cancerous skull base tumors are being successfully managed with these techniques. Some of these tumors include sinonasal cancers, meningiomas,



craniopharyngiomas, optic nerve and orbital tumors, and petrous apex lesions. Indeed, in the last year, UNC performed over 100 expanded endoscopic tumor surgeries. In a very special case in 2008, Drs. Zanation and Germanwala performed one of the first endoscopic endonasal clippings of a ruptured aneurysm in the world. The one year follow up of this patient revealed complete obliteration of the aneurysm and the manuscript describing this novel approach has been published in the prestigious journal *Neurosurgery* in the last year. This case illustrates the potential of the minimally invasive endoscopic approach and shows how UNC is expanding the limits in this new field.

As techniques and experience lead us to utilize the endoscopic corridor for more complex skull base lesions, the natural progression is to utilize this approach for pediatric skull base tumors. Drs. Zanation and Senior along with our Pediatric Otolaryngology Attendings (Drs. Austin Rose and Carlton Zdanski) have successfully performed numerous pediatric skull base surgeries together. Dr. Zanation's lab has recently published one of the first papers on endoscopic pediatric skull base surgery and reconstruction in *Laryngoscope* 2009, which illustrates the hurdles and offers solutions that these pediatric cases present. Two additional follow-up manuscripts in pediatric endonasal and skull base surgery have been accepted for publication this past year. What is clear is that all pieces of this multidisciplinary puzzle are integral and needed to optimize

patient care. Drs. Rose and Carlton Zdanski and the UNC Skull Base Surgery Program are all currently working together to provide the most advanced pediatric tumor care and advance the research in pediatric skull base tumor surgery.

### Treatment of Snoring and Obstructive Sleep Apnea

Snoring is a ubiquitous problem in the United States, affecting more than 50% of middle aged men and 40% of middle aged women. Obtrusive snoring can be associated with more severe medical conditions, including obstructive sleep apnea, or upper airway resistance syndrome (UARS), and treatments for these disorders of sleep are needed to prevent long-term problems with heart and lung disease.

For simple snoring, not associated with OSA or UARS, the division offers radiofrequency treatment of the palate as our procedure of choice. Now available in the United States for over 10 years, it is a time tested office-based procedure that is fast, with little pain and rapid recovery. The procedure involves the placement of a tiny needle electrode into the palate, delivering radiofrequency energy in the form of heat energy to the surrounding tissue. Research performed in the Department has resulted in an alteration of the technique yielding fewer treatment sessions and improved outcomes. Indeed 70% of patients will be significantly improved after two treatment sessions using our technique, while the side effects of this procedure are minimal.

The relatively minor amount of post-procedure pain is the major advantage of this technique over other snoring therapies. And as opposed to other minimally invasive treatments, no implants are required with no risk of implant extrusion.

## Obstructive Sleep Apnea Treatments

Nearly one-fourth of middle-aged men and one-tenth of middle-aged women have more severe problems with sleep disordered breathing including obstructive sleep apnea.

In addition to excessive daytime sleepiness, obstructive sleep apnea has been associated with increased risk of several serious medical problems including hypertension, heart attack, stroke, and even premature death, mandating diagnosis and treatment. For diagnosis, surgeons in the Department of Otolaryngology/Head and Neck Surgery perform a careful upper airway evaluation, including an upper airway endoscopic exam, while working with a multi-disciplinary team of sleep medicine specialists in the Departments of Neurology and the Division of Pulmonary Medicine, as well as dentists from the University of North Carolina School of Dentistry, and surgical colleagues in the Department of Oral and Maxillofacial Surgery, work to develop a personalized treatment plan for patients with sleep apnea, as there is not one simple treatment for all patients. Options for treatment and services provided include the full range of “multi-level” surgery. This treatment philosophy recognizes that the obstruction occurring in OSA occurs at several levels in the upper airway, requiring a variety of procedures to treat, including manipulation of soft tissues from the nose to the back of the throat, in addition to bony facial surgery involving primarily the jaw. Some of these options include:

### Septoplasty

Septoplasty consists of manipulation of the

bone and cartilage of the center wall of the nose, allowing for the repair of deviations causing nasal obstruction. Avoiding the need for packing of the nose or placement of splints makes this outpatient operation a remarkably painless procedure with rapid recovery. In some cases the procedure may be combined with turbinate reduction allowing for the reduction of the bulky tissues on the side wall of the nose contributing to nasal blockage, performed either in the office or in the operating room.

### Uvulopalatopharyngoplasty

For over thirty years, this procedure has been widely applied to individuals with OSA. It involves removing the uvula and portions of the palate and is frequently combined with tonsillectomy. This surgical procedure is usually performed with an overnight hospital stay and results in significant improvement in obstructive sleep apnea (OSA) in about half of all individuals undergoing the surgery.

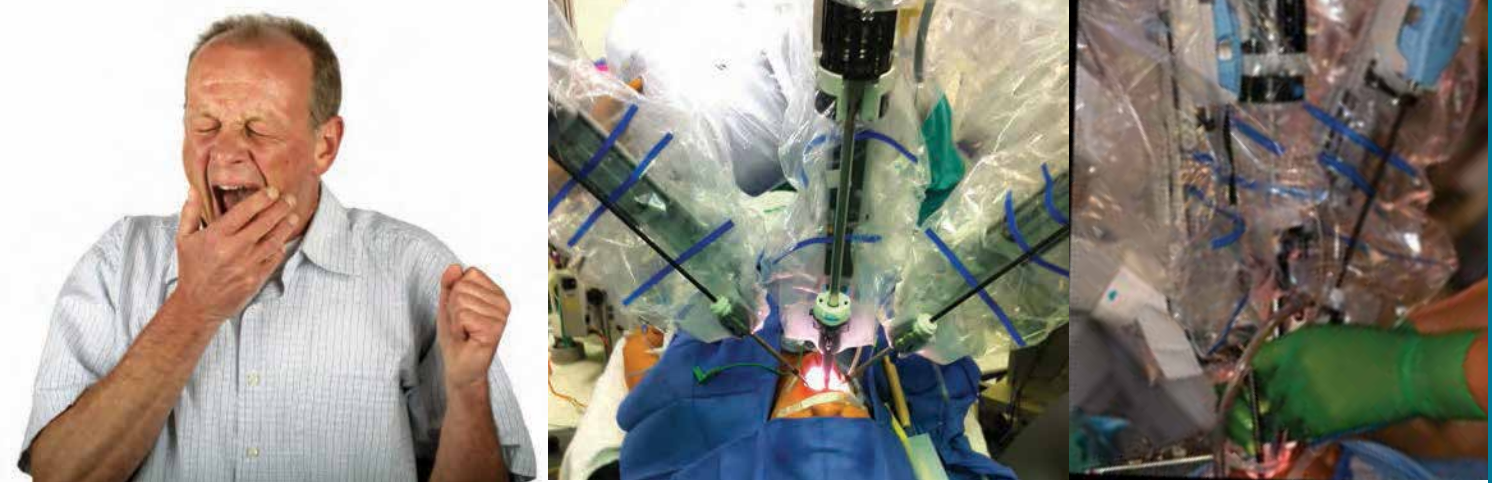
### Radiofrequency Tongue Base Reduction

Radiofrequency tongue base reduction is a minimally invasive procedure utilizing radiofrequency energy to heat tissue surrounding a small needle which is inserted into the tongue base. The heated tissue is resorbed by the body, creating a small area of scar, thereby reducing the size of the tongue base. This procedure has proven safe with few complications, as well as effective by several studies, in properly selected individuals.

### Genioglossus Advancement and Hyoid Repositioning

Working with colleagues in the Department of Oral and Maxillofacial Surgery, genioglossus advancement is a procedure frequently performed for obstructive sleep apnea in the presence of blockage in the upper airway caused by the position of the back of the tongue. The procedure requires making an incision between





the lower lip and the gum in the mouth. A small window of bone in the jaw is then cut and advanced slightly, thereby pulling the tongue forward and increasing the space in the breathing passage in the back of the throat. Repositioning of the hyoid bone over the front of the neck is frequently performed at the same time as genioglossus advancement in order to augment its effect.

### *Transoral Robotic Surgery of the Tongue Base*

Transoral robotic surgery (TORS) is exciting new technology that has gained acceptance in the treatment of oropharynx cancer.

This success with TORS has lead UNC surgeons as well as others to explore the utility of robotic assisted base of tongue reduction

for the treatment of sleep apnea as well for patients that have an enlarged tongue base as a suspected cause. To date, robotic base of tongue reduction has proven very efficacious for treatment of OSA in properly selected patients. As a primary (done with UPPP) and secondary (after prior UPPP) surgery, TORS for OSA has been shown to markedly reduce a patient's apnea hypopnea index, resulting in a greater than 50% reduction in nearly all cases and cure (AHI <10) in a large portion of patients. Even for those patients who do not receive full cure, TORS base of tongue reduction has been shown to result in significant benefit with a reduction in Epworth Sleepiness Score and pressure settings required for CPAP, markedly improving their CPAP tolerance/usage.

**Dr. Trevor Hackman** and **Dr. Adam Zanation** offer this unique service at UNC Hospital.

## Skull Base Center

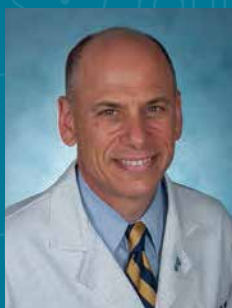
The UNC Skull Base Center continues to provide multidisciplinary care for complex pathologies found in both the anterior and lateral skull base regions. As such, the Skull Base Center provides a matrix network comprised of a variety of disciplines involved. This organizational structure allows the institution to leverage the considerable collective talents of the group for the benefit of individual

patients throughout the region. The team remains strongly committed to the concept of offering patients a balanced and unbiased opinion with all avenues being explored. The scope and experience of this group is vast, thereby providing patients the opportunity for a truly comprehensive evaluation.

In order to coordinate efforts, members of the Skull Base Team meet routinely. These meetings focus on multiple aspects including



**Oliver F. Adunka, MD, FACS**  
Director of Skull Base Center



**Craig A. Buchman, MD, FACS**  
Harold C. Pillsbury Distinguished Professor



**Carlos S. Ebert, Jr., MD, MPH**  
Assistant Professor



**Trevor G. Hackman, MD, FACS**  
Assistant Professor



**Harold C. Pillsbury III, MD, FACS**  
Thomas J. Dark Distinguished Professor



**Brent A. Senior, MD, FACS, FARS**  
Nathaniel T. and Sheila W. Harris  
Distinguished Professor



**William W. Shockley, MD, FACS**  
W. Paul Biggers Distinguished Professor



**Adam M. Zanation, MD, FACS**  
Associate Professor



**Matthew G. Ewend, MD, FACS**  
Chair of Neurosurgery



**Deanna M. Sasaki-Adams, MD**  
Assistant Professor of Neurosurgery

the complicated workflow of patient care, literature updates, and improvements to the complex organizational process. A special emphasis of the UNC Skull Base Team is to implement new treatment modalities as well as updated management concepts and technologies to ensure contemporary patient care.

### *Background and Philosophy*

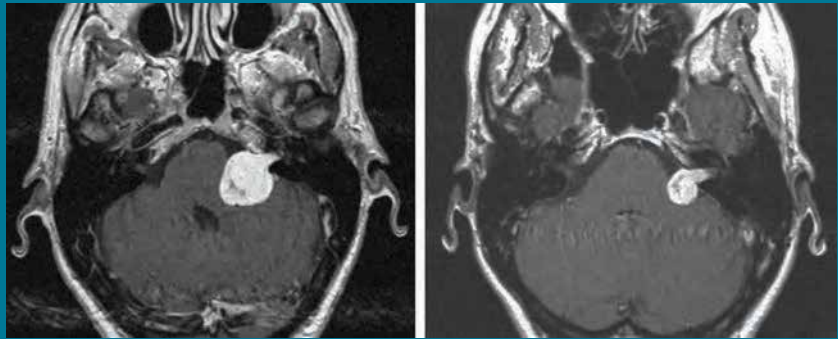
Historically, the complex anatomical relationships of many important structures within the skull base have made surgical management particularly difficult. Recent advances in surgical approaches, cranial nerve monitoring, endoscopic visualization, intraoperative imaging and navigation, neuroendovascular techniques, as well as intraoperative and stereotactic radiation have allowed dramatic improvements in patient outcomes and quality of life. Many of these improvements have been directly attributable to close collaborations between a variety of medical disciplines including Neurosurgery, Otolaryngology-Head & Neck Surgery, Radiation Oncology, Neurointerventional Radiology, and rehabilitative disciplines. For example, surgical approaches developed by rhinologists and neurotologists have allowed neurosurgeons access to tumors and other lesions involving the skull base without the need for traumatic brain retraction, resection, or in some instances, skin incisions. Moreover, working together, surgeons and radiation therapists have been able to apply precise anatomic knowledge to the delivery of highly focused radiation in an effort to avoid collateral tissue damage. Skull base lesions are uncommon and clinical trials for treating many of these

lesions are lacking. Patients are frequently left to seek opinions from a variety of clinical specialists including medical and radiation oncologists as well as surgeons in an attempt to find a consensus regarding optimal therapy. However, opinions are frequently divergent and dictated by the practitioner's area of expertise rather than by patient factors. This creates significant uncertainty among both patients as well as referring physicians during difficult times.

Both Neurosurgery and Otolaryngology/Head and Neck Surgery have added faculty members with special interests and training in this area. For several years, The Department of Radiation Oncology has been able to treat patients via the Cyberknife Radiosurgical System. This system has a number of distinct advantages over its competition in that it allows for precise frameless delivery of either single dose or fractionated dose radiation to tumors throughout the body including the skull base.

**Dr. Oliver Adunka** serves as Director of the UNC Skull Base Center. Others from the Department of Otolaryngology/Head and Neck Surgery who are directly involved include **Drs. Craig Buchman, Charles Ebert, Trevor Hackman, Harold Pillsbury, Brent Senior, William Shockley**, and **Adam Zanation** as well as nurses **B.J. Squires, RN** and **Kristen Jewell, RN**. Other UNC disciplines involved in the Skull base center include Drs. Matthew Ewend and Deanna Sasaki-Adams from the Department of Neurosurgery, Dr. Julie Sharpless from Endocrinology, Dr. Jonathan Dutton from the

Department of Ophthalmology, Drs. Mauricio Castillo, Benjamin Huang, Valerie Jewells, Keith Smit, and Sten Solander from the Department of Radiology, Dr. Robert Greenwood from Neurology, and Drs. Neil Hayes and Jing Wu from Medical Oncology. Sharon Cush, RN and Pasha Lemnah, RN help coordinate patient care and Diane Meyer, PT serves as the center's primary physical therapist.



Vestibular schwannomas (Acoustic tumors) are by far the most common lesion in the cerebellopontine angle. A multidisciplinary approach ensures proper management, which can include watchful waiting, stereotactic radiation, or surgical excision via various approaches.

### *Lateral Skull Base*

UNC has emerged a leader in the comprehensive management of acoustic neuromas (vestibular schwannomas) other intracranial neoplasms of the middle and posterior cranial fossae. While most tumors in this area are benign, they can pose a variety of clinical challenges and a highly individualized management scheme is typically required. Over the past decade, UNC has been able to build a substantial caseload with more than 75 evaluations per year. The Skull Base Team has continued to collect and evaluate patient outcomes using all three main surgical access routes. Overall, hearing preservation rates have remained around 75% in patients undergoing tumor removal via the middle fossa approach. Also, UNC offers

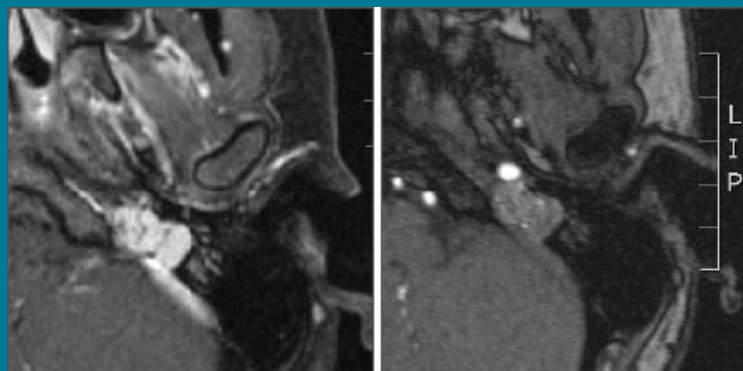


the CyberKnife as an option for stereotactic radiation for small and medium size tumors. A main emphasis of the UNC Skull Base Center is to offer hearing restoration via both cochlear and brainstem implantation in selected patients. Specifically, we have developed an FDA approved clinical protocol that will allow us to pursue auditory brainstem implantation (ABI) in children with cochlear nerve deficiency (CND) as part of a clinical trial. Typically, the ABI is a device that allows auditory stimulation in patients with Neurofibromatosis Type II (NFII), where both cochlear nerves are dysfunctional due to bilateral vestibular schwannomas. As such, the current efforts focus to potentially expand the indication criteria for this device beyond this group. For patients with Neurofibromatosis Type II, we have begun to offer adjuvant systemic treatments. Specifically, Avastin® (Bevacizumab), an angiogenesis inhibitor, has been used in the management of several patients with NFII to facilitate tumor control and hearing outcomes. Preliminary results are certainly encouraging and correlate with previous data from the literature.

Other pathologies of the lateral skull base include temporal bone paragangliomas, and specifically jugular foramen tumors (glomus jugulare tumors). These tumors are slow growing vascular neoplasms

mainly causing pulsatile tinnitus (pulsations that can be perceived in the affected ear) and hearing loss. Also, these tumors carry the potential to harm lower cranial nerves. In fact, their intimate involvement with certain nerves responsible for swallowing and voice production makes them difficult surgical cases. Radiation, on the other hand, often does not treat the patient's symptoms of hearing loss and pulsatile tinnitus. Also, radiation treatment alone can damage the inner ear irreversibly and can thus affect the patient's hearing and balance functionality. A new approach, which has been propagated by clinicians at Case Western University, has been to manage jugular foramen tumors via a planned subtotal resection and subsequent stereotactic radiation (CyberKnife). This treatment algorithm has been shown to resolve the patient's symptoms while moving the radiation field away from the inner ear. Therefore, the patient typically undergoes a relatively small outpatient procedure followed by outpatient stereotactic radiation treatment that will most likely not compromise inner ear function.

These latter examples demonstrate our dedication to a true multidisciplinary approach to managing skull base disease. In fact, members of the UNC Skull Base Team are proud to provide this type of clinical algorithm, which clearly benefits patient outcomes. It appears that most other centers use either a



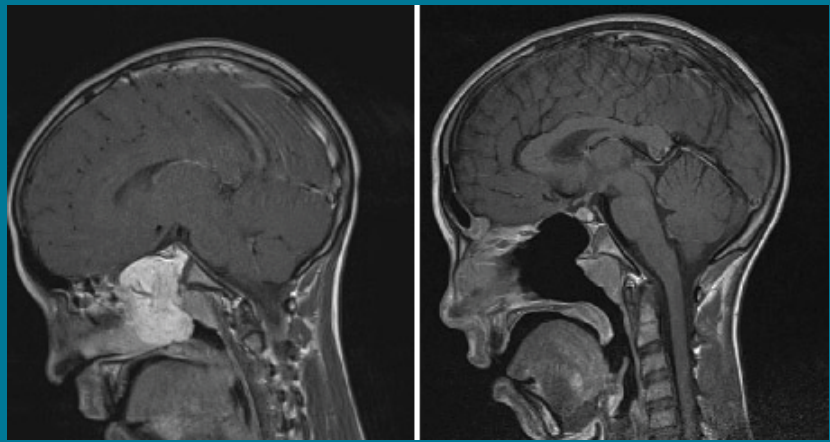
MRI of a glomus jugulare paraganglioma originating from the jugular foramen and extending into the middle ear. A multi-modal management approach using planned subtotal resection of the middle ear content with subsequent stereotactic radiation has been chosen.

“surgery-centric” or “radiosurgery-centric” model depending on the institution's expertise and interest. However, this institutional bias might not serve the patient's best interests. At UNC, we are fortunate to have a unique skull base program that combines professional experience and skills, cutting edge technologies and facilities, and a burning desire to provide a balanced and unbiased opinion of the treatment options. Cooperation through mutual respect for

one another's skills and opinions forms the backbone for this eclectic treatment philosophy.

### *Anterior Skull Base*

Over the last 15 years UNC has developed into a world leader in expanded endonasal skull base surgery generally and minimally invasive pituitary surgery (MIPS) specifically, with over 130 of these surgeries performed in the last year. Past UNC research has shown that MIPS results in shorter hospital stays, more rapid recovery, and less overall complications compared to traditional open approaches. More recent work in a study of 50 patients undergoing MIPS at an average of two years follow-up showed no significant detrimental impact of the surgery on a patient's sinonasal quality of life. Additional recent UNC research has shown a similar benefit with regards to the economics of this surgery, with a marked reduction in total health care costs related to MIPS compared to traditional techniques. With decreased length of stay and lower nursing costs, savings were found to average nearly 24%, over \$3,000 less for each procedure. In the field of expanded endonasal skull base surgery tumors such as meningiomas, craniopharyngiomas, and sinonasal/skull base cancers have all been successfully managed with an endoscopic minimally invasive approach. UNC's Skull Base Center is one of only a few in the country that offers expertise in both endoscopic and traditional transfacial or transcranial skull base surgery. This ability to offer all surgical options at the highest level allows for the best-individualized care. With this in mind, surgeons in the UNC Skull Base Center have been among the first in the world to perform an endoscopic endonasal clipping of a cerebral aneurysm.



Pre and 2 year post operative MRIs on a JNA with extensive skull base involvement with a complete resection via a single stage endoscopic endonasal approach (Drs. Zanation and Rose)

UNC surgeons have developed novel techniques of reconstruction of the skull base, including the development of the endoscopic pericranial flap for skull base cancer reconstruction. Additionally, UNC has the world's largest prospective series of nasoseptal flap skull base reconstructions (over 300). Also, UNC has the largest known prospective cohort of vascularized endoscopic skull base reconstructions. The primary goal of endoscopic skull base reconstruction is to prevent post-operative CSF leaks. With adequate reconstructive measures in place, the overall post-operative CSF leak rate is 2.3% with an overall meningitis rate of 0.33%. Both of these results are significantly better than outcomes associated with traditional transcranial skull base reconstructions.

Also, it was noted that there is likely a long-term learning curve associated with endoscopic skull base reconstructions. If one compares the first 25 nasoseptal flaps ever published upon and the first 150 patients and the most recent 150 patients from our institution, there is a significant improvement in outcomes with more experience. As such, outcomes for the last 150 patients show a CSF leak rate of only 0.67%.

therapeutic services • laryngeal pathologies • vocal cord  
paralysis • paresis • airway problems • Vocal Cord Dysfunction •  
behavioral assessment • videolaryngostroboscopy • acoustic  
measurements • vocal ergonomics • spirometric evaluation •  
voice rehabilitation • laryngeal dystonia • voice therapy •  
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THE UNIVERSITY OF NORTH CAROLINA

## Voice Center

The UNC Voice Center is comprised of a multidisciplinary team of highly-experienced physicians and speech pathologists providing specialized diagnostic and therapeutic services to dysphonic patients with all descriptions of voice disorders and laryngeal pathologies, including laryngeal dystonia, vocal cord paralysis and paresis, cysts, polyps, nodules, and other pathologies of the larynx in both casual and professional voice users. Evaluation and management of airway problems including Vocal Cord Dysfunction and laryngeal and tracheal stenosis is also available. Available voice and speech services include behavioral assessment, videolaryngostroboscopy, acoustic and aerodynamic measurements, assessment of vocal ergonomics, spirometric evaluation and assessment for voice rehabilitation candidacy.







## FACULTY



**Robert A. Buckmire, MD**  
**Director of Voice Center**  
 Chief of Voice & Swallowing Disorders  
 March Floyd Riddle Distinguished Professor



**Mark C. Weissler, MD, FACS**  
 Joseph P. Riddle Distinguished Professor  
 Chief of Head & Neck Oncology

**B**eyond the treatment of voice disorders, the Voice Center also acts as an information resource to the referring medical community along with providing educational materials, seminars, and outreach programs on voice science, care of the voice, and state of the art diagnosis and treatment of voice disorders.

Diagnostic voice evaluations are performed at The UNC Hearing and Voice Center at Carolina Crossing, the new home as of October 2012. The clinic is conveniently located at 2226 Nelson Highway, close to the intersection of Highway 54 and Interstate 40. The Voice Center expanded its presence in the fall of 2009 and is now providing

diagnostic voice evaluations one and one-half days each week, as well as all voice therapy services. (The Voice Center continues to provide one half day service at UNC in the Neuroscience Hospital for appropriate patient evaluations). The Voice Center sponsored an Open House on May 14th, 2010, which highlighted the art work of Marjorie Labadie. Ms. Labadie is a former voice patient who developed a series of art pieces about her experience with an initially devastating voice disorder, entitled Finding My Voice. The UNC Voice Center Team presented a case study with guest speaker, Ms. Labadie at the state Speech & Hearing convention in April, 2011.



Elizabeth Ramsey, Dr. Ellen Markus, Dr. Robert Buckmire, and Joanne McClaine-Griffin, LPN

## The Voice Center Team

The Voice Center Director, **Dr. Robert Buckmire** joined the faculty in September of 2004 after completing a post-graduate fellowship in Laryngology and Care of the Professional Voice, and a subsequent faculty position at the University of Pittsburgh. His special clinical and research interests include care of the professional voice, the application of robotics to microlaryngeal surgery, diagnostic laryngeal electromyography, laryngeal framework surgery and the diagnosis and treatment of swallowing disorders.

**Dr. Mark Weissler** has maintained an active practice in laryngology since 1986 with special emphasis on the treatment of laryngeal dystonias, benign and malignant laryngeal neoplasms, vocal fold paralysis, and laryngeal and tracheal stenosis.

**Dr. Ellen Markus** is the Voice Center Coordinator. She has a Master's Degree in Speech Pathology and a Doctorate in Vocal Music Performance and specializes in working with singers, from amateur to professional.

She has taught singing for over 38 years and cofounded the UNC Voice Wellness Clinic in 1991 with Dr. Mark Weissler. She specializes in rehabilitating singers who have experienced vocal injury, as well as working with all other types of voice disorders. She



"I want you to use those belly muscles; the belly is supporting all of this," says Dr. Ellen Markus, speech language pathologist, while teaching speaking techniques to 85-year-old Voice Center patient, Ray Carpenter. *SHNS photo courtesy Raleigh News & Observer*

has lectured regionally and nationally on the care and prevention of voice disorders.

**Elizabeth Ramsey** joined the Voice Center team in May 2012. She holds a Master's Degree in Speech Pathology, and has a background in voice disorders, swallowing disorders, and head & neck cancer. She specializes in voice disorders of various natures and also working with the pediatric voice population. She has expertise in performing laryngovideostroboscopic evaluation of the vocal folds and also in treating Vocal Cord Dysfunction, particularly in the population of athletes.



## Pediatric Otolaryngology

**Drs. Amelia F. Drake, Carlton J. Zdanski, and Austin S. Rose,** together, care for infants and children with problems relating to the ears, nose, and throat. They see patients in the NC Children's Hospital, the UNC ENT Clinic in the North Carolina Neurosciences Hospital, and the UNC Ear, Nose & Throat Clinic at Carolina Crossing.

As children presenting to UNC have complicated medical problems and multi-system diseases, work in Pediatric Otolaryngology is often carried out in conjunction with other providers in the fields of Pediatric Pulmonary Medicine, Pediatric Anesthesia, Pediatric Gastrointestinal Medicine and Pediatric Hematology/Oncology, as well as Pediatric Speech & Language Pathology and Audiology.



## FACULTY



**Carlton J. Zdanski, MD, FACS, FAAP**  
Associate Professor  
Chief of Pediatric Otolaryngology  
Director, NC Children's Airways Center



**Amelia F. Drake, MD, FACS**  
Newton D. Fischer Distinguished Professor



**Austin S. Rose, MD**  
Associate Professor



**Jason Roberts, MD**  
Pediatric Otolaryngology Fellow  
2013-2014

Over the last few years, the North Carolina Children's Airway Center, directed by Dr. Zdanski, has helped to better organize and facilitate this coordination of care. In a similar manner, the UNC Craniofacial Clinic, led by Dr. Drake and housed in the UNC School of Dentistry, has helped to coordinate the care of patients with cleft lip and palate and other craniofacial disorders from the entire Southeast United States, and as far away as Switzerland, since 1963. In addition to their clinical work, the faculty of the Division of Pediatric Otolaryngology dedicates significant time to both teaching and research responsibilities. Drs. Rose and Zdanski formerly served on the American Board

of Otolaryngology's Task Force for New Materials. Dr. Zdanski currently serves on the AAO-HNSF's Pediatric Otolaryngology Education Committee, as a guest examiner for the American Board of Otolaryngology, President of the Newton D.

Fischer Society, Secretary/Treasurer of the North Carolina Society of Otolaryngology/Head and Neck Surgery, and is the Co-Director of the Annual Carolina's Pediatric Airway Course.

Dr. Rose is a current Course Co-Director of the annual

Newton

D. Fischer

Society

meeting. Dr.

Drake now

serves as the

Executive Associate

Dean of Academic Programs,

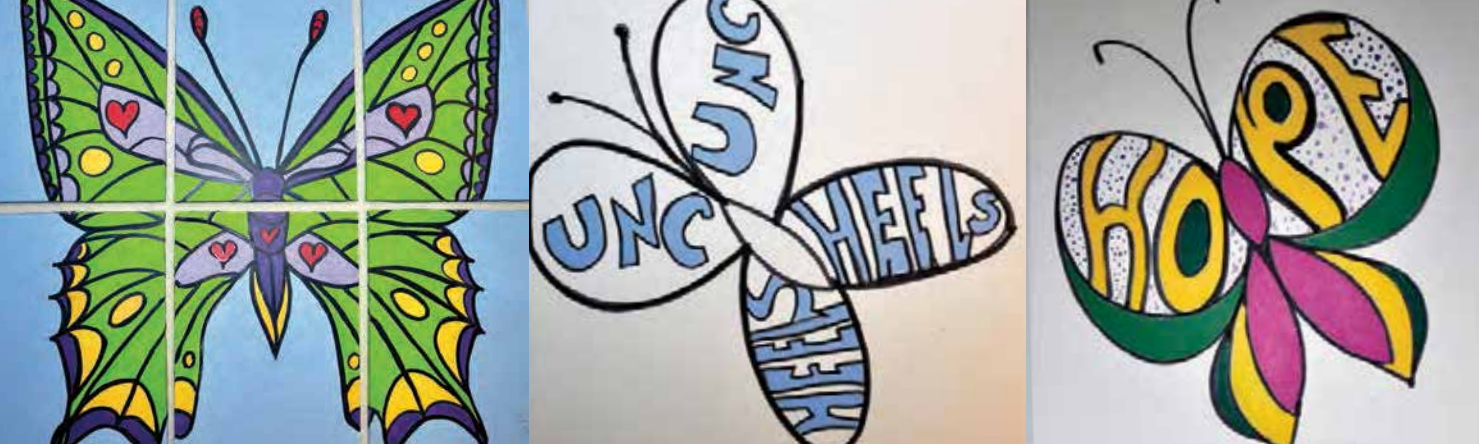
and works in this capacity for the

School of Medicine, helping to start a graduate program for Physicians Assistants, among other roles.

Recent publications have included research in the areas of computational fluid dynamic modeling of the pediatric airway, pediatric, cochlear implantation, management of caustic ingestion, management of hemangiomas in pediatric patients, and management of tracheal tumors in children. The Division is the recipient of NIH R01 HL105241-01, "Predictive Modeling for Treatment of Upper Airway Obstruction in Young Children."







In addition to work recognized both locally and nationally, the Division has been well represented internationally, with presentations to audiences overseas, such as at the International Cleft Congress and the European Society of Pediatric Otolaryngology. They participate in medical mission trips to Malawi, the West Bank, and Vietnam. The faculty has also worked to strengthen its ties with international colleagues in Pediatric Otolaryngology by hosting a number of visiting physicians from around the world, including the United Kingdom, Israel, and Thailand. As in the past year, the future should prove exciting for the Division of Pediatric Otolaryngology as it continues to provide state of the art care, expand its services, and renew its commitment to research and education in the field.

## North Carolina Children's Airway Center

The North Carolina Children's Airway Center again helped The North Carolina Children's Hospital achieve a ranking of 11th in the nation among children's hospitals caring for children with respiratory disorders by US News & World Report in their 2013 issue of America's Best Children's Hospitals, and to help the Department of OHNS to its 22nd ranking in the US in Ear, Nose, and Throat Disorders. The Center was awarded a generous grant from The Duke Endowment from 2007 to 2010 for the creation of a center to care for children with complex congenital or acquired airway problems and it continues to grow in clinical, educational, and research endeavors.

The Center is a unique endeavor, supported by the Department of Otolaryngology/Head and Neck Surgery, the Department of Pediatrics' Division of Pulmonology, and includes members from across multiple divisions and departments within the UNC Health Care system. The Center provides comprehensive cutting edge care for children with these unique airway problems in an efficient and timely manner. Additionally, the Center instructs families, medical students, clinicians and health care providers, and supports research in pediatric airway disorders including providing the supporting infrastructure for the National Institutes of Health R01 grant "Predictive Modeling for Treatment of Upper Airway Obstruction in Young Children."

The North Carolina Children's Airway Center officially opened its doors in September 10, 2007. Since then, thousands of children have been evaluated and treated by the multi-disciplinary team. Multiple, streamlined protocols have been implemented for the







evaluation of children with airway problems, and several collaborative research projects have been established and grants awarded with multiple presentations offered at the international, national, state, and local level. In addition, the Carolina's Pediatric Airway Course has been established in collaboration with the Medical University of South Carolina, teaching residents and practicing surgeons within the Southeastern United States.

Outreach efforts extend to Africa where Dr. Zdanski is visiting faculty, Department of Surgery, Kamuzu Central Hospital, Lilongwe, Malawi and involved in teaching of airway endoscopy and head and neck surgery to surgical residents and clinical officers.

The Center's core organizational structure includes Surgical Director **Carlton J. Zdanski, MD**; Medical Director George Retsch-Bogart, MD; Respiratory Therapist Mark Hall, RT (back from performing military service in Iraq); Tracheostomy Nurse Cynthia Reilly, PNP; Speech Pathologists Leah Thompson, SLP, and Krisi Brackett, SLP; Administrative Coordinator Amanda Gee; Administrative Assistant **Dawn Wilson**;

and Program Coordinator Kathy Abode, RN. Multidisciplinary involvement from Anesthesia, Neurology/Sleep Medicine, NICU, PICU, Pediatric Surgery, Maternal-Fetal Medicine, Cardiothoracic Surgery, Genetics, Hematology/Oncology and more are integral to coordinating care for these medically complex children.

The North Carolina Children's Airway Center provides an individualized, coordinated approach to each patient. The entire spectrum of pediatric medical and surgical services, including otolaryngology, pulmonology, anesthesia, radiology, ICU care, feeding and swallowing, nutrition, tracheostomy care, social work, respiratory therapy, speech and communication, are available to patients of the Airway Center.

The clinicians at the Center have an interest in caring for all children with airway problems, including those with existing tracheotomies or with new airway problems. If you have a patient you would like to refer to the North Carolina Children's Airway Center, please feel free to contact the OHNS Clinic at 919-966-6485 or call the Consultation Center at 800-862-6264, and request Dr. Zdanski.



**AIRWAYS COURSE 2012** Participants in the course experienced hands-on simulations of children with obstructed airways. Pictured here, a medical student quickly tries to remove a penny from the the airway of a simulation doll, which is hooked up to a beeping monitor, and makes breathing sounds.





# Department Research



### Carlton J. Zdanski, MD, FACS

Through the concerted efforts of many individuals within the Department of Otolaryngology/Head and Neck Surgery, The Department of Pediatrics, and multiple individuals within the UNC Hospitals system, we continue to build the North Carolina Children's Airway Center. Initially formed with the assistance of a generous grant from The Duke Endowment, the Airway Center specializes in the coordinated delivery of cutting edge, multi-disciplinary, specialized care for children with airway disorders. The Center also seeks to educate patients and their families, as well as clinicians, regarding airway disorders and to perform research.



The Airway Center's multi-disciplinary clinics began formally seeing patients in September of 2007. Multiple areas of research are currently being explored and protocols for efficient and safe evaluation and management of more common airway problems are being developed and finely tuned.

Work continues with the National Institutes of Health R01 grant "Predictive Modeling for Treatment of Upper Airway Obstruction in Young Children," with multiple manuscripts and presentations being produced. Enrollment of patients is at pace as is the development of new computational fluid dynamic modeling techniques and new research and clinical

tools such as the Virtual Pediatric Airway Workbench, the Pediatric Airway Atlas, quantitative bronchoscopy, and anatomic optical coherence tomography.

Additional selected invited publications include Section Editor for Pediatric Otolaryngology/Head and Neck Surgery Clinical Reference Guide, Airway for A Color Handbook of Otolaryngology, The Sisson Conference, Conversations in Pediatric Otolaryngology, and The Caribbean Pediatric Otolaryngology Conference.

The Department co-sponsored the Carolina's Pediatric Airway Course with the Department of Otolaryngology at the Medical University of South Carolina. Dr. Zdanski and former UNC OHNS resident and Pediatric otolaryngologist Dr. David White co-directed the two day course. This past year the course was hosted at the University of North Carolina and included faculty, fellow, and resident participants from the Medical University of South Carolina, Duke University, Wake Forest/Bowman Gray School of Medicine, Eastern Virginia Medical School, and Vanderbilt University. The course continues to grow in content and scale and will be hosted by the Medical University of South Carolina in 2013.

Clinical research has primarily revolved around our excellent Pediatric Cochlear Implant Program at UNC. This is one of the most active pediatric cochlear implant programs in the country. Our Internal Review Board approved protocol for the study to determine the optimal protocol for the auditory rehabilitation of children with Auditory Neuropathy/Dys-synchrony continues and data collection continues. Interest has been intense on an international level and across disciplines. We plan to continue to collect, present, and publish our data on as it matures.

### Adam J. Kimple, MD, PHD

Dr. Kimple completed his PhD in the laboratory of Dr. David Siderovski studying RGS21, a protein which turns off bitter taste (highlighted in J. Biol Chem 2012 Dec 7;287(50)). He gave a take



about the potential role of RGS21 in mucociliary clearance at the Triological Society meeting in Orlando, FL in April 2013. His current research interests are aimed at understanding how mucociliary clearance is affected by other Regulators of G-proteins Signaling proteins (RGS).

Dr. Kimple was awarded a resident research award from the American Rhinologic Society (ARS) for his proposal entitled "Regulator of G-Protein Signaling-22: a Putative Regulator of Motile Cilia." He is currently collaborating with



the Tarran laboratory in the UNC Cystic Fibrosis / Pulmonary Research and Treatment Center and the Roth Laboratory in the Pharmacology Department to understand how mucociliary clearance is affected by regulators of G-proteins signaling. He hopes his research will identify new pharmaceutical targets that could help treat disease conditions such as cystic fibrosis, chronic sinusitis, and otitis media with effusion.

### **Douglas C. Fitzpatrick, PhD**

Dr. Fitzpatrick and his colleagues study the physiology and anatomy of hearing using animal models and human subjects. A project that has continued this year is to obtain intraoperative electrocochleography (ECoG) recordings from patients receiving cochlear implants. This project is advanced and informed by parallel experiments in an animal (gerbil) model. Dr. Fitzpatrick also has an NIH grant in the form of

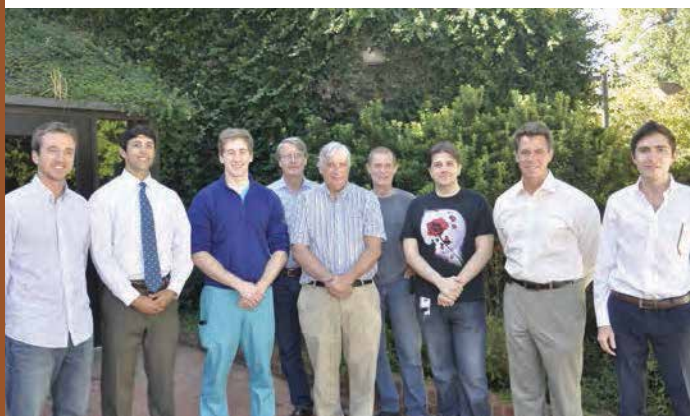
an RO1 to study auditory processing in pathways between the midbrain and cortex. As always, medical students and residents have contributed greatly to progress over the past year.

In the human cochlear implant subjects, we are testing the hypothesis that the outcomes with cochlear implants depend at least in part on the degree of cochlear function at the time of surgery. The degree of cochlear function is measured in the form of the ECoG responses to acoustic stimuli measured at the round window just prior to implant insertion. It has long been expected that the cochlear implant outcomes should depend in part on how many healthy neural elements exist to be stimulated through the implant. Our expectation is that the ECoG can indicate the neural survival in most subjects. Preliminary measurements that should be published next year indicate that there is indeed a high correlation between ECoG magnitudes and speech outcomes measured as word scores in adults. We expect to extend this analysis to pediatric patients in the next year. Current results show that the ECoG recordings are nearly identical between the adult and pediatric implant population.

An additional focus in the human ECoG studies is whether we can detect trauma to the cochlear that occurs during implant insertion or determine electrode position in near real-time. If so, this information could be used to avoid further trauma or to determine when the electrode was in an optimal position. This project has advanced in the last year through collaboration with cochlear implant companies (MED-EL, Advanced Bionics, and the Cochlear Corporation).

A major advance in the gerbil studies this year was to apply kainic acid to the cochlea to eliminate nerve responses. Kainic acid is a glutamate analogue that disrupts neural transmission due to excitotoxicity at the post-synaptic site where glutamate receptors are located. Using kainic acid we were able to study the contributions of hair cell and neural potentials to the ECoG across frequencies and intensities.

This work will allow for a more sensitive evaluation of cochlear potentials recorded from humans. In both human OR recordings and in animal studies we have continued to implement recordings through the implants themselves using hardware and software provided by cochlear implant manufacturers (Cochlear Corp, Advanced Bionics, Inc, and MED-EL Corp).



We have an ongoing study in collaboration with Dr. Nell Cant at Duke University to study the pathways and physiology from the inferior colliculus to auditory thalamus, and then from the thalamus to auditory cortex. There is a distinct transformation in the representation of auditory information that occur between the inferior colliculus, where information is arrayed according to frequency, and auditory cortex, where information is arrayed according to function. Our hypothesis is that this transformation first occurs in the auditory thalamus due to complex outputs from the inferior colliculus to the thalamus.

We also began a new study under the guidance of Dr. Buchman, to determine if electrocautery is contraindicated in tumor-removal surgeries where an auditory brainstem implant (ABI) is to be provided. Patients who are candidates for an ABI are those with no functional auditory nerve so that cochlear implants cannot be used. It has been found that patients with NF2 who lose their auditory nerve during surgery have poorer outcomes with the ABI than patients who have compromised nerves for other reasons. The hypothesis is that the relatively poor outcomes are due to damage to the cochlear nucleus

do to the electrocautery used during tumor removal. This possibility is being addressed in the gerbil model.

### Hannah Eskridge, MSP, CCC-SLP, LSLS Cert AVT

Hannah Eskridge is the NCFI/Barnhardt Director of the Carolyn J. Brown Center for the Acquisition of Spoken language Through Listening Enrichment (CASTLE). She has been working with children who are deaf or hard of hearing and their families for over 10 years. She directs the Professional Training Program, coordinates staff and various other programs at CASTLE as well as raises private funds to support the program. Hannah also conducts Listening and Spoken Language sessions with children and their families. She currently serves on the AG Bell Academy Certification Committee and is the chair of the OPTION SCHOOLS Strategic Planning Committee.

She has coordinated the implementation of REACH, a program using video-conferencing technology to conduct tele-therapy and tele-training. Current research being conducted with the REACH program includes a study to compare child outcomes in addition to parent skill development using tele-therapy with those obtained with direct services in the CASTLE clinic. In collaboration with the University of Akron, a study to assess therapist qualifications and skills that produce the best outcomes for children with hearing loss learning spoken language in a tele-therapy approach has just begun.



Research measuring outcomes of children having graduated or received services from CASTLE since

its inception in 2001 is underway. This data will help to demonstrate the effectiveness of CASTLE services, the impact of variables such as multiple disabilities on a child's future outcomes and school services as well as anticipated cost of special education for children receiving appropriate listening and spoken language services prior to age five.

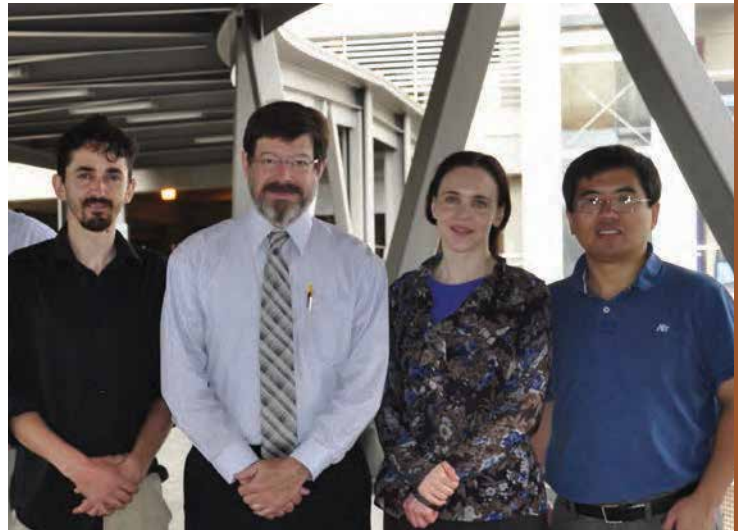
She traveled to Vietnam this year with the Global Foundation for Hearing Loss to train professionals in Hanoi and Ho Chi Minh City on the development of listening and spoken language for children with hearing loss.

### Paul B. Manis, PhD

Dr. Manis and his colleagues are studying cellular mechanisms of information processing in the central auditory system. The research has two principal goals. The first goal is to understand the normal cellular mechanisms and the organization and function of neural networks that are responsible for the remarkable sensory abilities of the auditory system. The second goal is to understand how these mechanisms are affected by hearing loss, and how they may contribute to tinnitus. This work is currently supported by 2 NIH R01 grants to Dr. Manis, and a 3-year R03 grant to Dr. Ruili Xie.

In the first research project, Dr. Manis, along with Dr. Ruili Xie and Mr. Luke Campagnola (Neurobiology graduate student), are investigating the integrative mechanisms of anterior ventral cochlear nucleus (AVCN) bushy and stellate neurons in normal animals, and in animals experiencing acute and chronic hearing loss. These cells are part of a major set of pathways that are important in both speech perception and for sound localization. Recent studies have shown that inhibition plays a much more important role in sculpting the responses of ventral cochlear nucleus (VCN) neurons to the temporal and spectral composition of sound than previously appreciated. Our studies have revealed that the time course of inhibition, even from a single source, is different in the two principal cell

types, the bushy and stellate cells. We created two detailed computational models based on these physiological studies that have helped to reveal the functional significance of the different time courses of inhibition. The first is that the slow inhibition onto bushy cells improves their ability to precisely respond to auditory nerve inputs. The second is that the fast inhibition onto the stellate cells seems essential for them to detect modulated signals in noise; slow inhibition does not work to improve this detection.



We are also evaluating how the function of these inhibitory circuits, as well as excitatory circuits, is affected by hearing loss and aging. In one study, we (Xie and Manis) found that the strength of inhibition in one pathway decreases with age, even in relatively young mice. Surprisingly, we also found that the time course of inhibition changed at the onset of hearing loss in a genetic mouse model of hearing loss, but that this recovered with age, even though the hearing sensitivity became much worse. We are also using optical methods of glutamate uncaging to map the organization of synaptic connections within the VCN and from the dorsal cochlear nucleus to the VCN with unprecedented resolution. This has revealed the specific patterns of circuit organization onto particular cell types in the cochlear nucleus. We are also studying the effects of aging and noise-induced hearing loss on synaptic transmission from the auditory nerve to the VCN. There are surprising



parallels between the effects of noise-induced hearing loss and aging on the function of the synapses between the auditory nerve and the cochlear nucleus neurons that suggest the involvement of molecular mechanisms of calcium homeostasis. This work will be continued by Dr. Xie with his new R03 grant.

The second project is supported by a research grant from NIH to study the auditory cortex. A key aspect of this grant was to bring new optical techniques into the laboratory. While auditory information processed by the brainstem and midbrain auditory nuclei is ultimately analyzed in the auditory cortex, which consists of a core or primary region and several highly interconnected surrounding areas defined by their tonotopic organization and acoustic responsiveness. Recent studies have shown that the primary auditory cortex is highly plastic, and that the properties of the cells can be modified by relevant interactions between the organism and its environment, and also in response to hearing loss. Furthermore, it has become evident that sensory cortex not only processes sensory information, but also plays an active role in the recall of prior sensory experience. This grant focuses first on examining the organization of local cortical circuits in normal animals and in animals with hearing loss using laser guided photostimulation of neural circuits using caged glutamate, the main excitatory neurotransmitter in the brain. The organization of circuits onto layer 4 neurons is being studied by Ms. Megan Kratz, a Research Specialist. Ms Kratz found a novel pattern of connections that may be related to certain patterns of auditory spectral processing. Dr. Deepti Rao, a recent graduate of the Department of Cell and Molecular Physiology, also investigated spike timing dependent plasticity, which is thought to be a learning rule that maximizes mutual information between inputs and outputs of simple neural networks, and is thought to be associated with learning and memory in the cortex. The final aim of this grant is to examine how the functional neural circuits of the cortex are rewired following noise-induced hearing loss. We expect

that the local circuits change both their spatial arrangement and synaptic strength to compensate for the loss of input. The changes in these circuits will affect how people with hearing loss process auditory information, and circuit remodeling at this level is likely to contribute to tinnitus.

Lastly, a collaborative project between the lab (Manis, Mancilla, Zhang) with Drs. Patricia Maness (Department of Biochemistry and Biophysics) is examining inhibitory circuits and their role in network activity in the auditory and prefrontal cortex in two mouse models of schizophrenia. The current project, with postdoctoral associate Dr. Xuying Zhang, uses an optogenetic approach (genetically controlled expression of light-activated ion channels in very specific sets of neurons) to examine the spatial and functional organization of inhibitory networks using laser-guided photostimulation of a specific set of cells expressing channelrhodopsins. This work has revealed the specific pattern of an increase in inhibitory connections in prefrontal cortex in a mouse model of schizophrenia in which neural cell adhesion molecules are manipulated.

### Charles S. Ebert, Jr., MD, MPH

Dr. Ebert completed advanced Rhinology training at the Georgia Sinus and Nasal Institute and returned to UNC as an Assistant Professor in the Division of Rhinology, Allergy and Endoscopic Skull Base Surgery. As the first former resident to complete the T32 NIH Training Program, he has remained active in his research pursuits, providing mentorship to numerous current residents, including Drs. Kibwei McKinney, Jessica Smyth, Alex Farag, Baishakhi Choudhury, Deepak Dugar, Brian Thorp, Gita Fleischman, and numerous medical students.

His basic science interests have been directed at investigating the molecular basis of inflammatory diseases of the nose and paranasal sinuses. In this research, he seeks to specifically characterize the genetic expression profiles of patients with Allergic Fungal Rhinosinusitis through a comparative analysis of healthy and diseased specimens of sinonasal

mucosa. Through a collaborative effort with the Department of Biostatistics in the UNC School of Public Health, he received a funding for this project through the North Carolina Translational and



Clinical Sciences Institute funded through Clinical and Translational Science Awards as well as from the Combined Otolaryngology Research Effort via the American Academy of Otolaryngic Allergy. Other research interests include: characterizing socioeconomic and demographic factors in patients with Allergic Fungal Rhinosinusitis, cost effective analyses of endonasal, endoscopic surgical approaches to the skull base versus traditional open approaches, attempting to quantify the impact of Functional Endoscopic Sinus Surgery via patient-rated quality of life (QOL) measures and through objective correlates with Computational Fluid Dynamics (CFD) models. Dr. Ebert is a fellow of the American Academy of Otolaryngic Allergy, the co-director for the Rhinology and Endoscopic Skull Base surgery fellowship, and is the Associate Residency Program Director.

### Craig A. Buchman, MD, FACS

Dr. Buchman is actively involved in research in a number of hearing-related topics. Together with a number of co-investigators from UNC and abroad, he continues to study cochlear nerve deficiency, auditory neuropathy spectrum disorder (ANSD), inner ear malformations, and a number of hearing restorative device-related topics. In the field of cochlear implantation, Dr. Buchman and colleagues have been studying the effects of

combining electrical stimulation from a cochlear implant with the natural acoustic signal from patients with preserved residual hearing following implant surgery in an attempt to improve hearing performance for patients. Newer areas of study include a clinical trial for auditory brainstem implants (ABI) in children and the use of the round window membrane for implantation of the Vibrant MedEl device for conductive and mixed hearing losses. We have recently implanted 2 children with deafness resulting from cochlear nerve deficiency with ABIs. We continue to be very interested in the field of ANSD in children. Here at UNC, we have a particularly robust clinical experience with this disorder as we are currently following more than 300 affected children. What is clear from our current research is that the findings of ANSD on hearing testing can be associated with a variety of medical conditions. We have learned that some children with ANSD can occasionally have absent or severely deficient cochlear nerves on MRI and that these children may not benefit from cochlear implants and may be ABI candidates. By contrast, most children with ANSD can benefit from either hearing aids or cochlear implants depending on their native hearing abilities. Identifying which children can benefit from the various intervention strategies is a major area of investigation. Dr Buchman, together with Drs Grose, Roush and He have recently begun to use a variety of electrophysiological test together with imaging studies to try and better characterize which children with ANSD can benefit from amplification and those that require cochlear implantation or no intervention. We are particularly excited about recent finding in this population of children that show correlations between auditory cortical responses and performance using either hearing aids or cochlear implants. These results hold great promise for helping to choose the most appropriate device for young children.

Together with the Office of Technology Development at UNC, Dr. Buchman and Dr. Adunka have applied for a US and International Patent to provide intracochlear measurements of acoustically evoked auditory potentials. This new technology should



provide improved means to monitor hearing during hearing preservation cochlear implantation. Also, this method might be helpful in the direct assessment of hair cell function rather than to gather in-direct data via conventional audiometric evaluation. The patent application has recently been published with the US Patent and Trademark Office.

### Adam M. Zanation, MD, FACS

Dr. Zanation continues to explore a research path that encompasses both clinical and translational science in Skull Base Surgery, Rhinology and Head and Neck Oncology. His passion for research began in residency and continues to grow as he embarks his career in a new surgical specialty in Otolaryngology. Dr. Zanation has mentored several medical students, residents and fellows per year. Dr. Zanation is an active mentor in both the Holderness and Doris Duke Medical Scholars Programs. As such, Dr. Zanation was selected as a member of the Academy of Educators in 2013. Projects involved everything from the basic science of thyroid and skull base tumor molecular biology to radioanatomic studies in pediatric skull base surgery to clinical outcomes projects in head and neck oncology and endoscopic skull base surgery. Dr. Zanation has 85 PubMed indexed publications and over 150 presentations. The research team has presented over 20 abstracts this past year and published over 15 papers in last year. The lab has won multiple awards including the Harrell Resident Research Award from the Triological Society, the North American Skull Base Society Research Award, the Triological Society Head and Neck Best Poster Award and many others. In May of 2010, Dr. Zanation was awarded a Triological Society

Career Development Grant to support a clinical trial entitled "Phase II Quality of Life and Neurocognitive Outcomes Trial in Skull Base Tumor Surgery."

Dr. Zanation partners with Dr. Charles Ebert on research in the areas of sinonasal quality of life, cost outcomes and genomics of sinusitis. Dr. Charles Ebert and Dr. Zanation, completed a CTSA grant on the Genomics of Allergic Fungal Sinusitis and were refunded to continue this program through the AAOA. Lastly with the addition of Dr. Julie Kimbell, the lab is now in the midst of multiple prospective computation fluid dynamic outcomes clinical trials and hopes to fulfill the goal of obtaining NIH funding in this area soon. Lastly, this past year Dr. Zanation was awarded the 2013 Mosher Award from the Triological Society for his Thesis on the Treatment Impact of the Head and Neck Multidisciplinary Tumor Board.

### Amelia F. Drake, MD, FACS

Dr. Drake serves as director of the UNC Craniofacial Center in the School of Dentistry. Over the past 2 years, she served as the PI of a subcontract on the study of phenotypic variations of patients with craniofacial microsomia. The study provides a description of the condition and an enhanced understanding of the variation in this diagnosis. Collaboration in the CFM Planning Grant (RC1 DE 020270) has enabled the development of the Facial Asymmetry Collaborative for Interdisciplinary Assessment and Learning (FACIAL) network. As a sub-awardee of another NIH grant ("CFM: Longitudinal Outcomes in Children pre-Kindergarten (CLOCK)," R01 DE 022438 (Heike/



Speltz, PIs), which will be conducted through the FACIAL network, the collaborators plan to perform a longitudinal cohort study of 125 infants with craniofacial microsomia (CFM) and controls to assess neurodevelopmental and social communication outcomes over the next 5 years.

### Carol G. Shores, MD, PhD, FACS

Malawi update: Claire Kendig, UNC MS4 returned to Malawi with Dr. Charles Mabedi and they will work on a project to better characterize Head & Neck Cancer at Kamuzu Central Hospital. Surprisingly, head and neck squamous cell carcinoma in Malawi appears to have a low rate of HPV involvement, as demonstrated by low levels of p16 expression. Immunohistochemistry for this study was performed at the KCH Pathology lab. Claire and Charles have submitted 6 papers involving studies at KCH, including study of the HIV infection rate in surgical patients, surgical cancer care, incidence of cervical adenopathy and a review of head and neck cancers in sub-Saharan Africa. Claire has returned to UNC and plans to pursue a career in OB/GYN.

Dan Olson's paper Phase I clinical trial of valacyclovir and standard of care cyclophosphamide in children with endemic Burkitt lymphoma in Malawi. Was published in the Clinical Lymphoma Myeloma and Leukemia. This is the first phase I cancer trial to be completed in Malawi. Dan is currently a pediatric infectious disease fellow in Colorado.

Gift Mulima KCH PGY4 and Javeria Qureshi UNC PGY4 have collected prospective data on 300 patients with upper GI bleeds who present to KCH. Data analysis is ongoing and should be ready for submission for publication by the end of 2013.

### Oliver F. Adunka, MD, FACS

#### *Experimental/Translational Projects*

Currently, electrode insertions during cochlear implantation are performed as a blind procedure without real-time feedback to the surgeon. Consequently, many insertion parameters cannot

be controlled for and final electrode positions are often times hard to predict. Also, intracochlear damage has been linked to hearing preservation and the successful implementation of electric acoustic stimulation (EAS) of the auditory system. As such, damage appears to interfere with our ability to conserve hearing remnants and thus utilize them at a later point in conjunction with the cochlear implant. Such a combined stimulation has been demonstrated to result in superior speech perception outcomes.

Thus, the current clinical practice of blind electrode implantations may not be contemporary. Instead, Dr. Adunka together with Drs. Fitzpatrick and Buchman, has established an animal model simulating the effects of electrode insertion on cochlear health. This effort was first taken on in 2006 and has since developed into a larger project. First, the feasibility of recording acoustically evoked early auditory potentials had to be confirmed via normal hearing gerbils. Then, the presence of these potentials had to be confirmed in animals with severe-to-profound sensorineural hearing loss. These projects were completed in 2007 and 2008. Subsequent studies utilized various electrodes and different insertion scenarios. These demonstrated the potential applicability of real-time feedback during the insertion process. Also, a microendoscope was introduced to confirm findings from the electrophysiologic recordings. Histology was used to further strengthen these results. Experiments performed in 2009 and 2010 utilized soft cochlear implant electrodes that closely mimic clinically utilized human devices. The results of these experiments were encouraging and suggested that acoustically evoked early auditory potentials will likely be able to be used during human cochlear implantation.

Therefore, current efforts focus on detailing our knowledge base via further experiments in the animal. More importantly, however, we have been able to port our findings to the operating room. Specifically, recordings during human cochlear

implantation have been started in 2011 and are ongoing. The results so far are very exciting and essentially confirm our findings obtained from our animal experiments. First, we have been able to obtain meaningful measurements during human cochlear implantation. Thus, despite the severe-to-profound sensorineural hearing loss typically present in both adult and pediatric cochlear implant candidates, acoustically evoked potentials remained very strong in this setting using an electrode close to or within the cochlea.

Furthermore, these potentials did not correlate well with the patient's audiogram but instead correlated strongly with postoperative speech

perception performance using the implant. Thus, it appears that a very good measure of cochlear health has been identified; one that may be superior to conventional audiometry and other biographical markers. Currently ongoing projects further investigate this relationship and explore potential clinical applications.

### *Clinical Trials/Projects*

Dr. Adunka has helped to establish cochlear implantation with hearing preservation at UNC. He is the principal investigator of the electric-acoustic stimulation (EAS) clinical trial; a multi-center North American trial in which UNC performed the first surgeries (in 2007) and is leading enrollment with over 30 subjects. In an ongoing collaboration with MED-EL North America, UNC has completed the first arm of the study and has also completed initial enrollment of the second arm, which includes subjects with greater levels of residual hearing. Preliminary results have been able to demonstrate

the safety and effectiveness of this stimulation paradigm and the UNC has just received approval for another 10 subjects for Arm 2 of the protocol. Subjects implanted with this new system typically demonstrate substantial benefits especially with background noise. The ongoing animal projects and translational research efforts (see above) also aim to optimize hearing preservation and electrode placement critical for EAS.



Other clinical research endeavors include various topics in pediatric and adult cochlear implantation such as ongoing research on cochlear nerve deficiency and

auditory neuropathy in collaboration with Dr. Craig Buchman. Of note, UNC has identified and enrolled more subjects with absent or small cochlear nerves than any other center worldwide. Correspondingly, Dr. Buchman has initiated an FDA approved clinical trial on pediatric auditory brainstem implantation. Dr. Adunka's has helped to develop diagnostic algorithms incorporating CT and MRI imaging as well as certain audiometric data. This algorithm is the basis for selecting candidates for the clinical trial. Further analyses are ongoing especially evaluating the role of unilateral cochlear nerve deficiency.

Over the past 5 years, Dr. Adunka has developed a multi-client relational pediatric hearing loss database. Data have been collected from the CCCDP, the CASTLE, and the pediatric hearing aid group at UNC Hospitals. Currently, more than 2,800 pediatric patients with all types and severities of hearing loss and assistive devices have been entered. This includes more than 900 children

with cochlear implants. Also, this database has been integrated into the clinical algorithm and data entry and various analyses have become part of the clinical routine and quality control.

During his research efforts, Dr. Adunka has mentored medical students including Mathieu Forgues MS IV, who has now completed a full year of research and is currently applying for otolaryngology residency. During this year, Matt has been extremely productive helping mainly with animal experiments detailed above. Current students in the lab are Eric Formeister MS III, Joe McClellan MS III, and William Merwin MS III.

### *Other Research*

Dr. Adunka has been named the director of the NC Eyebank Surgical Skills Laboratory. This new lab space is a collaborative effort between Ophthalmology, Neurosurgery, and Otolaryngology/Head & Neck Surgery and features 16 surgical simulation stations to practice open, endoscopic, and microscopic procedures. This space also includes a histology lab to process various specimens including non-decalcified bones. Currently, the histology portion of the lab is being installed. Planned projects include the collaborative development of next generation cochlear implant electrodes and the assessment of various insertion parameters on cochlear morphology.

### *Austin S. Rose, MD*

Dr. Rose has several ongoing clinical and basic science research projects, primarily in the areas of sinonasal disease in children and new technologies in ENT. In the past year he, along with Dr. Douglas Fitzpatrick, PhD and Andrew Wyker from North Carolina State University, have collaborated to develop an animal model for sinus mucosal transplantation. In cases of severe pulmonary disease such as cystic fibrosis (CF), certain patients may undergo lung transplantation, though generally still suffer from significant sinonasal disease. It may be that certain patients

would benefit from simultaneous sinus mucosal transplantation, with decreased sinonasal symptoms and disease postoperatively. It is our hope that this model will help to demonstrate the feasibility of sinus mucosal transplantation as a potential treatment of chronic rhinosinusitis (CRS) in CF.

Another new area of research in pediatric rhinology is our effort to decrease the amount of radiation exposure from repeated CT scans in children followed for chronic and recurrent sinonasal disease. While CT-image guidance in the operating room is an important tool in the safe surgical treatment of such children, it may be that the number of such scans can be reduced in certain young patients requiring revision sinus procedures for conditions such as CRS, cystic fibrosis and allergic fungal



sinusitis. Dr. Rose has partnered with the Brainlab corporation to study the accuracy of older scans in children undergoing additional surgery, based on their age, size and time elapsed from the original CT scan. The hope is to produce data that might inform future recommendations and guidelines in the area of CT imaging of the paranasal sinuses in children.

Lastly, Dr. Rose and his colleagues in the Division of Rhinology, Allergy and Sinus Surgery continue an ongoing effort to evaluate the potential benefits of balloon catheter sinuplasty in children. Though controversy exists regarding its usefulness in CRS in general, and for pediatric patients in particular,



some initial studies have suggested the potential for symptomatic improvement both when used alone or in conjunction with adenoidectomy.

Ostium of the maxillary sinus in a child following balloon catheter sinuplasty.

### Robert A. Buckmire, MD

Dr. Buckmire has several ongoing clinical and research projects involving voice and swallowing. The Voice center currently partners with both academic departments and local industry on research projects. In a collaborative effort with the Department of Biomedical Engineering (UNC/NC State), Joe Giallo II, was granted a Doctor of Philosophy degree in November 2008 for a project and thesis entitled: "A Medical Robotic System for Laser Phonomicrosurgery." The resultant novel laser control device became the subject of Dr. Yu-Tung Wong's resident research. This work was published in the Laryngoscope journal in 2011, entitled: "Novel CO(2) laser robotic controller outperforms experienced laser operators in tasks of accuracy and performance repeatability." This project has established the superiority of the robotic controller in laser guidance accuracy and repeatability over expert human



laser operators. The operative accuracy and depth consistency of the device has now been rigorously compared to the performance of the industry standard micromanipulator in a simulated operative environment, guided by surgeons of varying experience. These data are quite intriguing and form

the core of Dr. Buckmire's ongoing Triological thesis project.

Other current research studies are investigating relative swallowing outcomes of laser and stapler assisted diverticulotomy as well as open diverticulectomy for the treatment of Zenkers diverticulum. Other work investigates the medium and long-term voice outcomes for patients undergoing goretex medialization thyroplasty for non-paralytic glottis incompetence. This work was recently published in the July 2013 edition of the Laryngoscope entitled: "Multidimensional voice outcomes after type I gore-tex thyroplasty in patients with nonparalytic glottic incompetence: a subgroup analysis."

Projects determining the role for quantitative laryngeal electromyography (LEMG) and its role in laryngeal reinnervation patients continue being conducted by Dr. Robert Buckmire and Dr. James Howard, who staffs the LEMG clinic, as a joint effort between the Department of Neurology and the Department of Otolaryngology.

### Holly FB Teagle, AuD

As CCCDP Director, Holly FB Teagle, AuD collaborates with other faculty and staff on clinical research projects related to outcomes related to pediatric cochlear implantation. She is the primary investigator for an NIH-funded study called Childhood Development after Cochlear Implantation (CDaCI) and works closely with Jennifer Woodard, AuD and Hannah Eskridge, MSP, to collect data for this long term multi-center study. Cochlear implantation provides deaf children with access to sound, which is the first step in overcoming significant delays in receptive and expressive language development and the resultant cognitive and academic deficits. Psycho-social aspects of child development, including parent-child interactions and social development are also strongly influenced by significant hearing loss. The effects of deafness and the subsequent acquisition of sound through cochlear implantation on the whole child has been the focus

of this multicenter study in which has been renewed for a third five year term. Drs. Pillsbury, Buchman, and Zdanski are the surgeons for the project.

Collaboration with Hannah Eskridge and other CASTLE staff to develop the Reaching Educators to Access best practice for Children with Hearing loss (REACH) has been ongoing in the past year. Distance video-conferencing technology has been purchased and is being used to connect with therapists who work with children with hearing loss around the state in a mentoring and training mission. Research to identify the effectiveness and efficiency of this form of tele-practice could guide future development and use of this technology.

Other research projects underway at the CCCDP include ongoing study of the benefits of cochlear implantation in special populations of children, such as those with Auditory Neuropathy Spectrum Disorder and children with Cochlear Malformations. Collaboration with Dr. Buchman and Dr. Shuman He to examine speech perception and electrophysiological results in these special populations has been very productive. A feasibility study is currently underway with children who do not benefit from cochlear implantation and may be candidates for Auditory Brainstem Implants (ABI). This is an exciting opportunity to extend the benefits of technology to a patient population that has had limited remedial options in the past. We also continue to collect clinical outcome results for children who have undergone cochlear implant revision surgery, children who are using bimodal technology: a hearing aid in one ear and a cochlear implant in the other, and children who have bilateral cochlear implants. New cochlear implant technology becomes available on a regular basis from the 3 manufacturers. Because of our large and diverse patient population and our depth of experience, the CCCDP is often asked to participate in clinical trials with all three cochlear implant manufacturers to evaluate new cochlear implant system features, evaluation materials, or participate in post-market approval studies.

### Shuman He, PhD

Dr. He is conducting several research projects focusing on objective measures in hearing impaired children. The long-term goal of these projects is to develop objective tools that can be used in clinical settings to select appropriate candidates, to assess the impact, and to assist with the programming process of cochlear implantation in patients who are unable to reliably participate in behavioral tasks.

In one program of research, Dr. He, together with Dr. Buchman and Dr. Grose, are assessing the utility of objective measures to select early – and optimal – intervention for individual patients with auditory neuropathy spectrum disorder (ANSD). In one project, we are investigating the feasibility of using the cortical auditory evoked potential to estimate hearing thresholds in ANSD children. In the second project, we are evaluating the association between acoustically/electrically evoked cortical event-related potentials and speech perception performance in ANSD children who use hearing aids or cochlear implants. In the third project, we are investigating the possibility of using objective measures to assess the degree to which neural synchronization can be restored by electrical stimulation in ANSD patients. In the fourth project, we are exploring the feasibility of using the electrically evoked cortical event-related potentials to program and estimate benefits of the auditory brainstem implant in children with ANSD.

Dr. He is also investigating the feasibility of using the binaural interaction component (BIC) of the electrically evoked cortical event-related potential to 1) assist in programming bilateral CIs; 2) evaluate the benefits of bilateral cochlear implantation; and 3) assess effects of bilateral cochlear implantation on binaural hearing. Results of this project could potentially improve the way candidates for bilateral implantation is selected in the future.

### Emily Buss, PhD

Dr. Buss is an auditory researcher involved in a wide range of projects investigating the perception of sound in human listeners. Many of these

projects are clinically focused, including adults and children with sensorineural hearing loss; some of these listeners make use of hearing aids or cochlear implants. Other projects focus on normal-hearing adults and children, with the goal of constructing normative models of auditory processing and development. Experimental methods used in these studies include traditional psychophysical paradigms based on behavioral responses, such as the detection or discrimination of simple sounds, as well as masked speech recognition. In many cases the resulting data can be incorporated into computer-based models that formally characterize different stages of auditory processing. These models address an important gap in the existing knowledge base and could be used to improve the delivery of acoustic signals and/or electric stimulation.

Dr. Buss is currently working on a research initiative sponsored by the National Institutes of Health aimed at understanding effects of level fluctuation on the encoding of spectral cues, such as the spectral cues underlying good speech perception. Level fluctuation can have a marked effect on auditory processing, degrading sensitivity in some conditions and improving it in others. The overarching goal of this work is to identify and characterize the auditory processes that limit detection and spectral discrimination of stimuli that vary in level for normal-hearing, hearing-impaired, and cochlear-implanted listeners. Parallel experiments in psychoacoustics and speech perception paradigms are expected to result in a greater understanding of basic auditory processes. Results of this work could have implications for the clinical evaluation of speech perception.

Another project examines the importance of highly redundant temporal cues in speech understanding, particularly when the signal is highly masked or degraded. This work is relevant to public health in that it provides a theoretical framework for understanding how hearing loss and limited language experience impact speech perception, particularly in complex background maskers. To that end,

psychoacoustic methods are being constructed for differentiating between the effects of hearing impairment and more central auditory processing limitations, and for evaluating listening effort under complex listening conditions. It is anticipated that the results of this work will advance our basic understanding of the role of auditory cue redundancy in speech perception and guide the development of clinical tools for better diagnosis and treatment of hearing impairment. Recent collaborations with Dr. Lauren Callandruccio, in the Division of Speech and Hearing, have expanded the scope of this project to include adult non-native speakers of English. Understanding the perception of English test materials in this group is of both basic science and clinical significance, as more non-native speakers are projected to require audiological services in the coming decades.

Dr. Buss has considerable expertise and a long-standing interest in the normal development of hearing. Recently this interest has focused on establishing a model of the development of auditory processing based on internal noise. A primary goal of this work is to provide a uniform metric for comparing performance across a wide range of auditory tasks in school-aged children. Another goal is to identify the mechanisms responsible for reduced auditory sensitivity in these tasks. Collaboration with Dr. Lori Leibold, in the Division of Speech and Hearing, focuses on better understanding susceptibility to and release from masking in infancy and childhood as well as the consequences of sensorineural hearing loss on auditory development.

In addition to this laboratory work, Dr. Buss maintains an ongoing involvement in a number of clinically based cochlear implant and hearing aid investigations, for which she provides support in experimental design and analysis. One such project evaluates performance of hearing-impaired children fitted with frequency compression hearing aids. This project relies on collaboration with colleagues in UNC's Division of Speech and Hearing, the Department of Otolaryngology, and the



CCCDP. Another project, carried out in conjunction with Dr. Craig Buchman and Dr. Margaret Dillon, examines the ability of patients with conductive or mixed hearing loss to benefit from a bone conduction hearing aid. These clinically focused projects represent an important step in applying basic-science research to real-world problems.

### Julia S. Kimbell, PhD

Dr. Kimbell is a Research Associate Professor. She is an applied mathematician, currently conducting research on applications of computational fluid dynamics (CFD) to studies of nasal airflow, gas uptake, and particle deposition. This research focuses mainly on medicine and therapeutics in which CFD models are used to predict surgical effects on nasal function as well as more effective ways of delivering topical nasal medications. Dr. Kimbell also uses



CFD models of the nasal passages of laboratory animals to test hypotheses about the role of dose in respiratory tract responses to inhaled materials, and to support risk assessments in which animal responses are extrapolated to humans on the basis of dose predictions in the respiratory tract.

In her research, Dr. Kimbell uses CT or MRI scans or cross-sectional images of tissue specimens to build three-dimensional, anatomically-accurate CFD models of the nasal passages of laboratory mice, rats, primates, and humans. Dr. Kimbell and her collaborators have recently completed studies using these models on respiratory tract uptake of several fragrance compounds in rats and humans and ozone in infant primates. They also recently used human CFD models to predict how surgical changes to address nasal obstruction affect nasal

airflow, resistance, heat exchange, and spray particle deposition. They are currently using CFD models to study objective ways to measure and predict improvements in patients' symptoms after surgery to treat nasal airway obstruction, chronic rhinosinusitis, and craniofacial cancers, to gain a quantitative understanding of intervention effects on children being treated for airway collapse and cystic fibrosis, and to study the delivery of nebulized and sprayed medication in the nasal passages of patients being treated for chronic rhinosinusitis.

Dr. Kimbell is currently funded to conduct research using nasal CFD models to (1) study possible

associations of patient-reported symptoms with specific variables computed from three-dimensional CFD models of the patients' nasal passages based on CT scans taken both before and after surgery, and the effects

of surgery on the distribution of nasal sprays inside the nasal cavity (NIH/NIBIB via Medical College of Wisconsin, PI: Dr. John Rhee), (2) gain a quantitative understanding of intervention effects on children being treated for airway collapse (NIH/NHLBI, PIs: Drs. Stephanie Davis, Rich Superfine, and Carlton Zdanski, and NIH/NHLBI via University of California at Irvine, PI: Dr. Brian Wong), and (3) examine the role of viral infections in the pathogenesis of infant cystic fibrosis using information from bronchoalveolar lavage combined with computerized x-ray tomographic (CT) imaging, infant pulmonary function measurements, and airway and vascular modeling techniques (NIH/NHLBI via Indiana University, PI: Dr. Stephanie Davis). Dr. Kimbell also collaborates with Dr. Brent Senior, Dr. Adam Zanation, Dr. Charles Ebert, Dr. Kibwei McKinney, and Dr. Gita Madan on CFD modeling of sinus

surgery effects on nasal airflow and topical drug delivery, Dr. Lauren Fedore and Dr. Zanation on CFD modeling of airflow and heat and humidity exchange in craniofacial resection patients, and Dr. William Shockley, Dr. Scott Shadfar, and Dr. Anand Dugar on CFD modeling of rhinoplasty effects on nasal airflow. Dr. Kimbell also works with her postdoctoral fellow, Dr. Dennis Frank, PhD along with Dr. Rhee and other colleagues at Medical College of Wisconsin on the simulation of airflow, heat and water vapor transport, and nasal spray distribution in normal and diseased nasal passages. The department's Otolaryngology/Head and Neck Surgery Computing and Clinical Research Lab, run by Drs. Kimbell and Zanation, provides a resource for conducting this research as well as increasing departmental access to high-performance computer workstations and software to create and run computer simulations in 3D models created from imaging data.

### Margaret Dillon, AuD

Dr. Dillon is a clinical research audiologist on the adult cochlear implant team. She conducts projects evaluating cochlear implant signal processing outcomes, middle ear implantation, hearing preservation, and the programming and associated outcomes of combined electric and acoustic stimulation.

This year a localization array was installed in the clinical research lab at Carolina Crossing. This was made possible by the generous contributions from HEARRING, an international network of hearing centers that facilitates research. The 11-speaker arc opens up a wide range of future research projects on speech perception in spatially separated noise and localization abilities of patients listening with various implantable hearing technologies. The knowledge gained in the course of these experiments will provide researchers and clinicians with a greater understanding of the abilities of patients with hearing loss in realistic environments, and will give us powerful tools for evaluating patient performance. Further, the arc itself is a re-purposed trampoline supporting a green initiative while still

colored Carolina Blue. The design and installation of the arc was led by Drs. Hall, Grose and Buss.

The UNC cochlear implant research team is continuing to participate in two multi-center FDA controlled clinical trials: Electric-Acoustic Stimulation (EAS) of the auditory system and utilization of the Vibrant Soundbridge (VSB) for conductive and mixed hearing losses. UNC continues to lead the US in enrollment for both clinical trials, and investigators have given multiple presentations on our team's findings at state, national and international meetings.

This year UNC reached maximum enrollment for the VSB clinical trial. The VSB converts the acoustic signal into controlled, amplified oscillations which are then



delivered to the cochlea. Currently, the device is approved in the US for patients with sensorineural hearing loss. The VSB clinical trial investigates the safety and efficacy of placement of the Floating Mass Transducer (FMT) on the round window in patients with conductive and mixed hearing loss who are unsuccessful users of traditional amplification. We are continuing to evaluate postoperative objective and subjective benefits in this cohort.

EAS utilizes a relatively short, flexible electrode array designed to preserve residual hearing during cochlear implantation in patients with substantial low-to-mid-frequency hearing remnants. In an ipsilateral listening condition, the high-frequency information is presented via electrical stimulation, while the

low-frequency input is delivered by a hearing aid. Since enrollment initiated in 2007, over 32 subjects have participated in the clinical trial at our center. Drs. Pillsbury, Buchman, and Adunka continue to receive referrals from centers in North Carolina and across the country. Additionally, our team is completing further testing in this patient population after 12 months of listening experience with the external speech processor. The goal of this single-site test protocol is to document the influence of preserved ipsilateral residual hearing on speech perception and localization abilities, with additional consideration of benefits conferred by the use of a contralateral hearing aid in patients with contralateral residual hearing.

Collaborations with the clinical audiology team (Drs. Clark Adunka, King, and Pearce) include studies investigating signal coding strategies, programming of combined electric and acoustic stimulation, and the influence of different speech processor configurations. The aims of these projects are to gain a better understanding of speech perception outcomes associated with specific signal coding strategies and mapping parameters, and to determine the best programming methods in patients who make use of hearing aids.

Ongoing collaborations with senior researchers (Drs. Buss, Grose, and Hall) include speech perception in spatially separated noise and localization abilities of subjects with various implantable technologies, the effect of providing fine-structure cues via a cochlear implant, and telephone use of cochlear implant recipients. These projects will allow for a greater understanding of the abilities of cochlear implant recipients beyond what is currently assessed with the clinical test battery.

### Heather Porter, AuD, PhD

Dr. Porter is the Research Audiologist in the Hearing Research Lab, and she contributes a clinical perspective to the on-going research projects. Her primary role has been to work with Dr. John Grose on studies examining temporal processing in adult

listeners with cochlear hearing loss and elderly listeners with normal hearing. In addition, she has been working with Drs. Joe Hall and Emily Buss on studies of auditory development in children.

Recently, Dr. Porter was awarded a grant from the National Organization for Hearing Research to establish an objective technique to characterize auditory temporal processing abilities in children. The goal of this project is to develop an electrophysiological analog of the psychophysical test known as the masking period pattern (MPP). This test assesses sensitivity to a signal as a function of its temporal position within a fluctuating masker. Dr. Porter will measure cortical potentials evoked by the signal as a means of objectively gauging how robustly the signal is represented in the auditory neural pathway. The long-term objective of this research is to identify factors responsible for apparent immaturities in the auditory temporal behaviors of children, evidence that is essential for differentiating between the sensory coding of auditory information vs. age-dependent changes at higher levels of auditory processing (e.g., signal detection strategies).

### John H. Grose, PhD

Dr. Grose continues his investigations into age-related changes in hearing. A highlight of this year has been the successful renewal of his NIH-funded R01 award focused on this issue. The investigations will move into several new areas: (1) psychophysical and electrophysiological studies designed to probe whether neural loss in the presence of a relatively uncompromised cochlea accounts for some of the hearing difficulties experienced by older listeners with 'normal' audiograms; (2) speech studies designed to determine how aging affects the ability of listeners to piece together snippets of speech that 'pop out' in a fluctuating noise background; and (3) studies of the auditory brainstem response that are evoked by complex sounds.

The past year has also seen the completion of other on-going experiments. A study looking at the



association between two auditory processes that rely on the comparison of stimulus envelopes distributed across frequency was recently published in the *Journal of the Acoustical Society of America*. An extension of this work is now looking at how cochlear hearing loss affects this association. Dr. Heather Porter – a member of the lab team – presented the current findings at the Acoustical Society Meeting in Montreal in June, 2013. Dr. Sara Mamo, currently undertaking her Ph.D. work in the lab, has also been studying age-related effects on auditory processing using a combination of psychophysical and electrophysiological approaches. In addition to presenting her work at the Montreal meeting, she was the invited speaker at the Speech and Hearing Colloquium series at Dalhousie University, Halifax.

Dr. Grose's other line of funded research involves a research collaboration with the Universidade Federal de Pernambuco (UFPE: Federal University of

Pernambuco) in Recife, Brazil. In May, he was able to spend a week there setting up equipment and protocols to run experiments in parallel with studies in his lab at UNC. Two doctoral students at UFPE are involved in data collection, and a number of interesting findings related to the Brazilian Portuguese version of the Hearing In Noise Test have emerged. One of the colleagues there, Dr. Silvana Griz, spent a few months in Dr. Grose's lab as a Fulbright Scholar. Plans are underway for the other colleague, Dr. Denise Menezes, to spend her sabbatical at UNC in the coming year.

### Joseph W. Hall, PhD

Dr. Hall is presently the principal investigator on two R01 NIH research grants, both

funded by the National Institute of Deafness and other Communication Disorders.

### *Development and Plasticity in Normal and Impaired Hearing*

NIH awarded a new five-year extension of this grant this past year. One of the sub-projects in this grant is investigating the ability of children to hear complex signals like speech in background noise. The sub-project was developed, in part, to begin to better understand why hearing-impaired children have particular trouble understanding speech when background noise is present. This sub-project will also provide us with a better idea of how normally-hearing children piece together fragments of speech

that arise above the level of background noise, and also how the normal auditory system develops over time.

A second sub-project in this grant will explore the development of hearing in children who have unilateral conductive hearing

loss. In this type of hearing loss, one ear has normal hearing, but the other ear has significantly reduced hearing due to a failure of sound to be efficiently transmitted from the air to the inner ear. This sub-project will not only tell more about hearing loss, but will also provide new information about how the development of auditory perception is affected by the patterns of sound reaching the ear.

A third sub-project in this grant will further explore how hearing loss may affect the development of hearing. Part of the rationale for this sub-project is related to the idea that the brain may be able to develop very efficient ways to process the reduced or partial information it receives from an impaired ear. Even though the auditory information received



by the central auditory system is impoverished due to the hearing loss, the brain may be able to develop the means to “get the most” out of the abnormal signal it is presented with. If this is true, then normal-hearing listeners presented with sounds that simulate the impoverished signal perceived by a hearing-impaired listener may actually perform more poorly than the hearing-impaired listener. This will be investigated in children with conductive hearing losses and in adults and children with sensori-neural hearing losses.

### *Spectro-temporal Processing in Normal and Impaired Ears*

One of the subprojects in this NIH NIDCD grant is examining the sensitivity of listeners to across-frequency coherence of temporal envelope. A novel feature of the study is that it uses noise bandwidths that are considerably wider than the width of the normal auditory filter. Therefore, in order to perform well on the task, the listener would have to be able to “reconstruct” the stimulus temporal envelope by combining the outputs of multiple peripheral auditory filters. A related possibility is that listeners perform many narrowband analyses of the information and then combine the cues extracted from the analysis.

A second study in this project is examining whether sensorineural hearing loss can sometimes facilitate the encoding of some temporal auditory cues. A classic notion is that hearing-impaired listeners may be able to benefit from improved temporal envelope detail at the outputs of relatively wide auditory filters. However, most studies on temporal processing have shown either similar performance between normal and impaired ears, or slightly poorer performance by hearing-impaired listeners. One important reason that could account for the general failure to find better temporal processing in impaired listeners with poor frequency selectivity than in normal-hearing listeners with good frequency selectivity is that normal-hearing listeners appear to be very adept at combining information across multiple, relatively narrow auditory filters. Thus any advantage that reduced

frequency selectivity might provide to a hearing-impaired listener in simple temporal processing paradigms may be matched by the advantage available to a normal-hearing listener due to the combination of information across multiple, peripheral auditory filters. The hypothesis we are investigating is that hearing-impaired listeners will show temporal processing that is better than normal under conditions where it is more advantageous to base performance on the output of a single, broad auditory filter than to combine information across multiple, narrow auditory filters. The information obtained should result in a better understanding of the factors that govern the perception of complex sounds in hearing-impaired patients.

A third study in this project is investigating the ability of listeners to integrate speech information across frequency and time. Results indicate that this ability can be quite robust in people with normal hearing. However, patients with hearing loss may be relatively poor at this kind of integration, perhaps limiting their ability to hearing well in noisy backgrounds. One thread of this research, led by PhD student Erol Ozmeral, is investigating whether there may be ways of reducing the disadvantage experienced by patients with hearing loss.

### *D. Neil Hayes, MD, MPH*

Dr. Hayes of the Division of Hematology and Oncology, Department of Medicine, was given a joint appointment with the Department of Otolaryngology/Head and Neck Surgery in 2009. He has been collaborating with our head and neck oncologists on projects for many years.

The Hayes Lab endeavors to bring together a collection of researchers with intersecting interests in multidisciplinary clinical cancer care, clinical trials, translational cancer research, and model systems of cancer with a focus on aerodigestive tumors.

### *Clinical Practice and Clinical Trials*

In the clinic we provide multidisciplinary care across a spectrum of aerodigestive tumors. Our primary

focus is on lung tumors and epithelial tumors of the head and neck (mouth, throat, larynx, sinuses, and salivary glands). All patient care is delivered by a full services tertiary and quaternary care facility with rich compliment of oncology care. In this context, we have endeavored to develop a palate of clinical trials serving the spectrum of disease we treat, including focused trials appropriate to every patient stage and function. The breadth and depth of our practice leads us to an expertise in rare tumors of the head, neck, and lung as well, and the treatment of these tumors.

### *Translational cancer research and model systems*

Progress in two key areas of science has provided the foundation for the work in our group. First, the advent of personal computers along with associated progress in the field of statistical computing greatly accelerated the development of data-rich models of human disease behavior. Second, collaborative efforts across the biomedical science have made available the building blocks of normal (i. e. The Human Genome Project) and adherent genomes (i. e. The Cancer Genome Atlas). To leverage the power of computers to assess alterations in the genome associated with cancer a host of molecular technologies has become commercially available in recent years. The primary targets of these assays have been nucleic acids (DNA and RNA), although a limited number of protein assays are also included. The technologies allow labs such as ours to make broad and inclusive measurements in samples of alterations in gene expression (RNA), gene dosage (DNA amplification and deletions), gene structure (normal population variants, mutations, alternate splices, fusion genes, epigenetic modifications), protein abundance and other events such as presence of a pathogen. Primary technologies in use in our lab include array based approaches (gene expression arrays, methylation profiling, SNP chips, CGH, miRNA arrays), sequencing (targeted and deep sequencing/NextGen), and immunohistochemistry (including tissue microarrays).

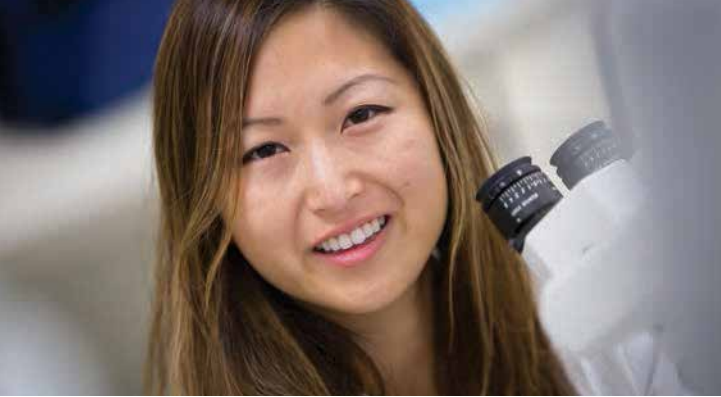
Our lab is intimately connected with the practice of clinical medicine, and as such, our interest is not simply the detection of alterations such as those described above. All alterations are placed in their clinical context, including the frequency of the event and any relevant association with cancer outcome. To accomplish these goals, our lab works equally hard to capture both clinical and molecular data for any samples we evaluate. The hypothesis of our research is that tumor-specific predictors based on high throughput nucleic acid and protein assays will offer significant advances.

Early work by Dr. Hayes, performed in collaboration with his mentor Dr. Matthew Meyerson, included a meta-analysis of approximately 500 human lung adenocarcinoma expression arrays generated by the National Cancer Institute's Director's Challenge Program. We successfully reconciled discordant previous reports by demonstrating three reproducible molecular tumor subtypes of lung adenocarcinoma that are otherwise indistinguishable by routine clinical evaluation. The subtypes have statistically significant survival differences, independent of disease stage and are comprised of tumors with differing underlying rates of mutations in key lung cancer genes including KRAS and EGFR. Similar reports for squamous cell carcinoma of the lung are forthcoming, as are reports of clinically applicable diagnostic tests. More recently, in collaboration with Kwok Wong and Ned Sharpless we have documented the frequent mutation of the gene STK11/LKB1 in human lung cancers, including squamous cell carcinoma. Numerous follow up reports of the clinical importance of these findings are forthcoming.

### *Statistical Collaborations*

Data analysis of the type we routinely perform requires a strong set of statistical collaborators since standard methods are frequently lacking. In this way, we have been fortunate to build ties with numerous local and national statisticians, computer scientists, biostatisticians, and epidemiologists.





### Grace Kim Austin, MD

Dr. Austin has been active in clinical and translational research projects in Otolaryngology/Head and Neck Surgery. Supported by the NIH T32 training research grant, NIH Loan Repayment Program, and the UNC Lineberger Comprehensive Cancer Center Clinical/Translational Developmental Research Award, she has been able to study tumor biology and mechanisms of tumor escape in head and neck cancer.

Her main project, "The Role of Myeloid-Derived Suppressor Cells in Head and Neck Cancer," is near completion with over 120 patients enrolled. This research investigates the role of myeloid-derived suppressor cells in immune suppression or tumor progression in the setting of squamous cell carcinoma of the head and neck. Preliminary findings have been presented at the 2013 American Society of Clinical Oncology conference.

In addition to translational research studies, Dr. Austin remains active in clinical research projects ranging from transoral robotic surgery applications in the skull base to different reconstructive options for head and neck defects. To date, she has published 10 refereed manuscripts and has made numerous oral and poster presentations on local and national levels. Dr. Austin is highly motivated to continue her research projects and pursue an academic career.

### Dennis Frank, PhD

Dr. Frank was a postdoctoral fellow under the mentorship of Dr. Julia Kimbell. His translational research involved modeling the effects of nasal anatomy and sinonasal conditions on respiratory

airflow patterns, resistance, air conditioning, deposition of inhaled gases, and particle transport (topical drug delivery) using computational fluid dynamics (CFD). In collaboration with some of the clinical faculty (Drs. Senior, Ebert and Zanation), medical residents (Drs. McKinney and Fleischman) and medical students in the department, and at Medical College of Wisconsin, Milwaukee, WI (Drs. Rhee, Garcia, Cannon and Pawar), Dr. Frank has published a number of peer-reviewed papers in clinical (Rhinology) journals.

In a recently published study by our computational and clinical research group, CFD was used to quantify the effects of functional endoscopic sinus surgery on airflow entering the maxillary sinuses in patients with chronic rhinosinusitis as well as compared flow into the maxillary sinuses with patient-reported outcome measures. Other projects have focused on investigating the effects of nasal anatomic deformity, aerosolized particle size, and delivery device on topical medication; modeling changes in nasal physiology due to locations of septal perforation; evaluating whether computational models based on pre-operative computed tomography scans are predictive of post-surgery nasal physiology; identify CFD derived variables that have the ability to detect surgical changes and predict patient-reported symptom relief for nasal airway obstruction surgeries such as correction of septal deviation.

Dr. Frank will continue his research in CFD modeling of the human airway as a research faculty in the Division of Otolaryngology/Head and Neck Surgery at Duke University Medical Center. He will continue to collaborate with Dr. Kimbell and the department's Rhinology clinical faculty members.

# UNC School of Medicine Receives Gift

By Stephanie Crayton, MS  
Media Relations/Broadcast Manager, UNC Health Care

The University of North Carolina School of Medicine received a \$1 million gift from The North Carolina Eye Bank (NCEB) to establish a unique and innovative multidisciplinary surgical skills lab.

The gift to the Department of Ophthalmology will be shared among three neurosciences departments: Ophthalmology, Neurosurgery, and Otolaryngology/Head and Neck Surgery. The newly created laboratory, the only of its kind in the region, provides state-of-the-art surgical training opportunities to medical students, residents, fellows and physicians across the state.

"Training future generations of eye surgeons to serve the people of North Carolina is one of our top priorities at UNC Eye," said Donald L. Budenz, MD, MPH, Professor and Chair of Ophthalmology. "The new surgical training center will greatly enhance our educational mission by providing our residents with a state of the art facility where they can practice and learn from our world-class surgeons."

On January 16, 2013, chairs of the departments officially opened The North Carolina Eye Bank Multidisciplinary Surgical Skills Laboratory at UNC with a ribbon-cutting ceremony. "This

laboratory is dedicated to the thousands of North Carolinians who unselfishly provided the gift of sight that others may see again. We are proud to partner with The University of North Carolina School of Medicine in this endeavor," said Dean Vavra, MS, CEBS, Executive Director of The North Carolina Eye Bank, Inc.

The multidisciplinary surgical skills and biometrics laboratory, located on the UNC campus, occupies 3,500 square feet with 19 stations; a 50-person conference room; and an 800-square foot simulation lab with access to high fidelity simulators such as robotic stations and anatomic computer based simulators. The simulators allow controlled proctoring and progressive educational scoring of surgical skills.

"The extremely generous gift from the North Carolina Eye Bank to fund the laboratory is a huge shot in the arm for the UNC Health Care System," said Harold C. Pillsbury III, MD, Thomas J. Dark Distinguished Professor and Chair of the Department of Otolaryngology/Head and Neck Surgery. "The opportunity to educate residents, faculty, and community physicians in this facility will create a state of the art opportunity for all students and physicians in North Carolina."

The lab also houses three full body surgical stations and 16 cadaveric head or skull surgical stations that will allow didactic, simulation and cadaveric based surgical education in eye, ear and neurosurgery. "This (gift) is a transformative investment in the training of ophthalmologists, neurosurgeons, and ENT surgeons," said Matthew Ewend, MD, Van L. Weatherspoon, Jr. Eminent Distinguished Professor and Chair of the UNC Department of Neurosurgery. "Patients can expect that the physicians of North Carolina who take advantage of this training lab will be armed with the best and newest techniques. Surgeons-in-training can expect to practice and master their crafts in the lab prior to entering the operating room. This lab is the future of ophthalmologic and surgical training."

The entire facility is wired for telecommunications with both high definition video and audio, operative microscopes, powered instrumentation, operating rooms and distance education and web-based sources. This telecommunication will provide both distance based and surgical simulation based learning to medical students, residents, fellows and current physicians of North Carolina.



NOW OPEN: UNC Health Care Dean, William Roper, MD; UNC Ophthalmology Chair, Donald Budenz, MD; UNC Neurosurgery Chair, Matthew Ewend, MD; UNC Otolaryngology Chair, Harold Pillsbury, MD; UNC Ophthalmology Associate Professor, Craig Fowler, MD; NC Eye Bank Board Chairman, Bailey Liipfert, JD; and NC Eye Bank Executive Director, Dean Vavra, MS, CEBS.



# Presentations & Publications



# Presentations

**Adunka OF.** *Active middle ear implants.* South Carolina & North Carolina Otolaryngology, Head & Neck Surgery Assembly, Asheville, NC, August 3-5, 2012.

Coehlo D (Moderator), Babu S, **Buchman CA**, Kesser B, Papsin B, Roland JT. *Hearing 2013: Expanded Technology, Expanded Criteria.* Accepted for presentation at the Annual Meeting of the American Academy of Otolaryngology-Head and Neck Surgery, Vancouver, CA, Sept 2013.

**He S, Grose JH, Teagle HFB, Buchman CA.** *Temporal Response Properties of the Auditory Nerve in Children with Auditory Neuropathy Spectrum Disorder.* Conference on Implantable Auditory Prostheses (CIAP) 2013, Lake Tahoe, CA, July 14-19, 2013.



**He S, Grose JH, Teagle HFB, Buchman CA.** *The binaural interaction component of the cortical auditory evoked potential in children.* Conference on Implantable Auditory Prostheses (CIAP) 2013, Lake Tahoe, CA, July 14-19, 2013.

**Buchman CA.** *Cochlear Implantation: Surgical Aspects.* Department of Otolaryngology-Head and Neck Surgery, Eastern Virginia Medical School, Norfolk VA, May 16, 2013.

**Buchman CA.** *Chronic Ear Surgery: Are we doing it all wrong?* Tidewater Otolaryngology Society, Norfolk, VA, May 16, 2013.

**Buchman CA.** *Conductive Hearing Loss.* Department of Otolaryngology-Head and Neck Surgery, University of North Carolina at Chapel Hill, Chapel Hill, NC, May 29, 2013.

**Buchman CA.** *Safety and Efficacy of the Cochlear Nucleus 422 Cochlear Implant in Adults.* Clinical trial session. Cochlear Corp. Denver, CO May 3-4, 2013.

**Choudhury B, Awan O, Pike JM, Buchman CA, Fitzpatrick DC, Adunka OF.** *Physiologic*

*consequences of electrode insertion in to a gerbil model of cochlear implantation featuring noise induced hearing loss.* 146th Annual Meeting of the American Otological Society, Orlando, FL, April 13, 2013.

**Roche J, Adunka OA, Pillsbury HC, Buchman CA.** *The cost of cholesteatoma care at a tertiary medical center.* 146th Annual Meeting of the American Otological Society, Orlando, FL, April 13, 2013.

Beatty CW (Moderator), Balkany TJ, **Buchman CA**, Gantz B, Roland P. *"Cochlear Implants---Which Device?"* Triological Society's 116th Annual Meeting, Orlando, FL April 12, 2013.

Verrilli DM, **He S, Teagle HFB, Roush P, Grose JH, Buchman CA.** *Objective Threshold Determination in Children with Auditory Neuropathy Spectrum Disorder.* 40th Annual AAS Scientific and Technology Conference of the American Auditory Society, Scottsdale, AZ, March 7-9, 2013.

**Buchman CA.** *Emerging trends in implantable auditory devices.* Semana de Otologia, Bogota, Colombia, Mar 11, 2013.

**Buchman CA.** *Chronic Ear Surgery: Are we doing it all wrong?* Semana de Otologia, Bogota, Colombia, Mar 11, 2013.

**Buchman CA,** Lin J, Uhler K, Yoshinaga-Itano C, Zeitler D. *Cochlear*

*Implantation-Panel.* Ultimate Colorado Midwinter Meeting, University of Colorado, Vail, CO, Feb 5, 2013.

**Buchman CA.** *Decision making in auditory neuropathy spectrum disorder.* Ultimate Colorado Midwinter Meeting, University of Colorado, Vail, CO, Feb 5, 2013.

**Buchman CA.** *Chronic Ear Surgery: Are we doing it all wrong?* Ultimate Colorado Midwinter Meeting, University of Colorado, Vail, CO, Feb 5, 2013.

**Buchman CA.** *Emerging trends in implantable auditory devices.* Department of Otorhinolaryngology, University of Pennsylvania, Philadelphia, PA Nov 29, 2012.

**Buchman CA.** *Chronic Ear Surgery: Are we doing it all wrong?* Department of Otolaryngology, University of Virginia, Charlottesville, VA, Nov 16, 2012.

**Buchman CA.** *Auditory Neuropathy Spectrum Disorder.* Department of Otolaryngology, University of Virginia, Charlottesville, VA, Nov 15, 2012.

**Buchman CA.** *Comprehensive Assessment and Management of Congenital Hearing Loss: An Otolologist's Perspective.* CCCDP & NC AG Bell Annual Fall Conference, Asheville, NC, Nov 8, 2012.

**Buchman CA, Dillon M, Clark-Adunka MS, King E, Pillsbury HC, Adunka OF.** *Electroacoustic Stimulation: Results of the US Clinical Trial at UNC.* Hearing Preservation Workshop. Toronto, CA October 20, 2012.

**Adunka OF, Buchman CA, Fitzpatrick D.** *Monitoring electrode insertion properties during cochlear implantation.* Hearing Preservation Workshop. Toronto, CA October 20, 2012.

**Buchman CA.** *Kent Wilson Lecture: Failed newborn hearing screening: What's Next.* Pediatric Grand Rounds: Children Hospital of Minnesota, St. Paul, MN, Oct 11, 2012.

**Buchman CA.** *Failed newborn hearing screening: What's Next.* Pediatric Grand Rounds: Presbyterian Hospital, Charlotte, NC, Sept 27, 2012.

Driscoll CLW (moderator), **Buchman CA,** Gifford R, Lustig LR. *Panel: Preserving Residual Hearing with Conventional Cochlear Implants: Technique and Implications.* American Neurotology Society Fall Scientific Program. Washington DC, Sept 8, 2012.

**Hang AV, He S, Buchman CA.** *Extra-tympanic electrocochleography in auditory neuropathy spectrum disorder.* Poster presentation at the Annual Meeting of the American Academy of Otolaryngology-Head and Neck Surgery, Sept 2012.

Calandruccio, L, Gomez, B, **Buss, E, and Leibold, LJ.** *Speech-on-speech masking for children and adults: Effects of target/masker language mismatch.* ASHA Annual Convention, Chicago, IL, November 2013.

Leibold, LJ, Taylor, CN, Hillock-Dunn, A, and **Buss, E.** *Effect of talker sex on infants' detection of spondee words in a two-talker or a speech-shaped noise masker.* The 165th Meeting of the Acoustical Society of America, Montreal, Quebec, Canada, June 2013.

**Porter, HL, Grose, JH, Hall, JW, and Buss, E.** *Comodulation masking release and monaural envelope correlation perception in listeners with cochlear hearing loss.* The 165th Meeting of the Acoustical Society of America, Montreal, Quebec, Canada, June 2013.

Taylor, CN, **Buss, E, and Leibold, LJ.** *Factors affecting frequency discrimination in school-aged children and adults.* The 165th Meeting of the Acoustical Society of America, Montreal, Quebec, Canada, June 2013.

Calandruccio, L, **Buss, E, and Leibold, LJ.** *Speech-on-speech masking for children: male vs. female talkers.* American Auditory Society, Scottsdale, AZ, March 2013.

Leibold, LJ, Bonino, AY, and Buss, E. *Masked speech detection in infants, children and adults*. American Auditory Society, Scottsdale, AZ, March 2013.

Gomez, B, Calandruccio, L, Buss, E, and Leibold, LJ. *Energetic and informational masking of speech for Spanish/English bilingual children*. American Auditory Society, Scottsdale, AZ, March 2013.

Buss, E, Hall, JW, and Grose, JH. *Temporal integration for detection of a tonal signal in a comodulated masker: Effects related to signal-to-noise ratio*. The 36th Midwinter Research Meeting of the Association for Research in Otolaryngology, Baltimore, MD, Feb 2013.

Dillon, MT, Adunka, MC, King, ER, Buss, E, Pillsbury, HC, Craig Buchman, CA, and Adunka, OF. *Electric-acoustic stimulation (EAS): Speech perception in fluctuating noise*. American Academy of Audiology, NC Fall Conference, Asheville, NC, September 2012.

Hall, JW, Buss, E, and Grose, JH. *Wideband monaural envelope correlation perception*. The 16th International Symposium on Hearing, Cambridge, UK, July 2012.

Ozmeral, EJ, Buss, E, and Hall, JW. *Asynchronous glimpsing of speech with real and simulated hearing loss*. Gordon Research Conference: Auditory System, Lewiston, ME, July 2012.

Leibold, LJ, Taylor, CN, Hillock-Dunn, A, and Buss, E. *Effect of talker sex on infants' detection of spondee words in a two-talker or a speech-shaped noise masker*. The 165th Meeting of the Acoustical Society of America, Montreal, Quebec, Canada, June 2013.

Porter, HL, Grose, JH, Hall, JW, and Buss, E. *Comodulation masking release and monaural envelope correlation perception in listeners with cochlear hearing loss*. The 165th Meeting of the Acoustical Society of America, Montreal, Quebec, Canada, June 2013.

Taylor, CN, Buss, E, and Leibold, LJ. *Factors affecting frequency discrimination in school-aged children and adults*. The 165th Meeting of the Acoustical Society of America, Montreal, Quebec, Canada, June 2013.

Calandruccio, L, Buss, E, and Leibold, LJ. *Speech-on-speech masking for children: male vs female talkers*. American Auditory Society, Scottsdale, AZ, March 2013.

Leibold, LJ, Bonino, AY, and Buss, E. *Masked speech detection in infants, children and adults*. American Auditory Society, Scottsdale, AZ, March 2013.

Gomez, B, Calandruccio, L, Buss, E, and Leibold, LJ. *Energetic and informational masking of speech for Spanish/English bilingual children*. American Auditory Society, Scottsdale, AZ, March 2013.

Buss, E, Hall, JW, and Grose, JH. *Temporal integration for detection of a tonal signal in a comodulated masker: Effects related to signal-to-noise ratio*. The 36th Midwinter Research Meeting of the Association for Research in Otolaryngology, Baltimore, MD, Feb 2013.

Dillon, MT, Adunka, MC, King, ER, Buss, E, Pillsbury, HC, Buchman, CA, and Adunka, OF. *Electric-acoustic stimulation (EAS): Speech perception in fluctuating noise*. American Academy of Audiology, NC Fall Conference, Asheville, NC, September 2012.

Hall, JW, Buss, E, and Grose, JH. *Wideband monaural envelope correlation perception*. The 16th International Symposium on Hearing, Cambridge, UK, July 2012.

Ozmeral, EJ, Buss, E, and Hall, JW. *Asynchronous glimpsing of speech with real and simulated hearing loss*. Gordon Research Conference: Auditory System, Lewiston, ME, July 2012.

Dahl, JP. *Sleep Medicine for the Otolaryngologist*. Grand Rounds, Department of Otolaryngology: Head and Neck Surgery, University of North Carolina at Chapel Hill.

Dillon MT, Adunka MC, King ER, Pillsbury HC, Adunka OF, Buchman CA. *Apical versus non-apical electric stimulation of the cochlea*. 2013 Conference on Implantable Auditory Prosthesis, Lake Tahoe, CA, July 14-19th 2013. Poster presentation abstract page 214.

Dillon MT, Adunka MC. *Implantable treatments for different types of hearing loss*. Hearing Loss Association of America Convention 2013, Portland, Oregon, June 27-30th 2013. Oral presentation abstract page 48.

Dillon MT, Adunka OF. *Pediatric bilateral atresia: audiologic outcomes with VSB*. 11th European Symposium on Paediatric Cochlear Implantation, Istanbul, Turkey, May 23-26th 2013. Oral presentation abstract page 69.

Anderson MA, Dillon MT, Adunka MC, Pillsbury HC, Buchman CA, Adunka OF. *Single-site objective and subjective outcomes of Electric-Acoustic Stimulation (EAS)*. AudiologyNOW, Anaheim, CA, April 3-6th 2013. Poster presentation abstract page 182.

Dillon M. *Music perception in cochlear implantation*. The realLIFE meeting: current status and future options for providing best benefit with hearing implants, Rome, Italy, November 8-11th 2012. Oral presentation abstract page 12.

Buchman CA, Adunka OF, Dillon M, King E, Adunka MC, Pillsbury HC. *Electroacoustic stimulation (EAS) trial at UNC*. 11th Hearing Preservation Workshop, Toronto, Canada, October 18-21st 2012. Oral presentation abstract page 32.

Dillon MT, Buss E, Adunka MC, King ER, Pillsbury HC, Buchman CA, Adunka OF. *Electric-Acoustic Stimulation (EAS): Speech perception in fluctuating noise*. American Academy of Audiology – North Carolina Fall Conference, Asheville, NC, September 21-22nd 2012. Poster presentation abstract page 16.

Anderson M, Dillon MT. *Long-term outcomes of Electric-Acoustic Stimulation (EAS)*. American Academy of Audiology – North Carolina Fall Conference, Asheville, NC, September 21-22nd 2012. Poster presentation abstract page 15.

Dillon MT, Adunka MC, King ER, Adunka OF, Buchman CA. *UNC Vibrant Soundbridge experience: Round Window stimulation for conductive or mixed hearing loss using Vibrant Soundbridge in adults*. TUUCAN Vibratory Symposium, Halifax, Nova Scotia, July 12-14th 2012. Keynote speech abstract page 42.

Dillon MT, Adunka MC, King ER, Adunka OF, Buchman CA. *UNC Vibrant Soundbridge experience*. TUUCAN Vibratory Symposium, Halifax, Nova Scotia, July 12-14th 2012. Oral presentation abstract page 15.

Drake AF. *The Role of Polysomnography in Assessing Readiness for Decannulation in Patients with Craniofacial Anomalies With Tracheotomies*. 12th International Cleft Congress, Orlando, May 2013.

Miller JD, Fleischman GM, Austin GK, Zanation AM, Ebert CS Jr. *"Hybrid Balloon Frontal Sinus Surgery in the Endoscopic Treatment of CRS with Variant Frontal Sinus Anatomy"*. NC/SC Society of Otolaryngology- Head and Neck Surgery Annual Meeting. Myrtle Beach, SC. August 2, 2013.

Ebert CS Jr. *"The Etiology of Pediatric Chronic Rhinosinusitis"*. Invited Oral Presentation. American Rhinologic Society Summer Sinus Symposium. Chicago, IL. July 20, 2013

Zanation AM, Wofford MR, Fleischman GM, Frank DO, Senior BA, Ebert CS, Kimbell JS. *"Post Operative Topical Medications for CRS: Current Knowledge and Future Exploration"*. Invited Oral Presentation. American Rhinologic Society Summer Sinus Symposium. Chicago, IL. July 20, 2013.

Ebert CS Jr. *"Management and Prevention of Complications During Functional Endoscopic Sinus Surgery"*. Chapel Hill, NC. Newton D. Fischer Society Meeting June, 2013.

Ebert CS Jr. *ENT Grand Rounds. "Otolaryngic Allergy and the Otolaryngologists' Practice"*. February, 2013.

Fleischman GM, Kim GG, Ebert CS Jr, Zanation AM. *"Hybrid Balloon Frontal Sinus Surgery in the Endoscopic Treatment of CRS with Variant Frontal Sinus Anatomy"*. Triological Combined Sections Meeting. Phoenix, AZ. January 2013. Poster Presentation.

McKinney KA, Zanation AM, Thorp BD, Rose AS, Rawal RB, Ebert CS Jr. "A Gene Pathway Analysis of Differential Expression in AFRS. American Rhinologic Society 2012 Annual Meeting, Washington, DC. September 2012. Oral Presentation.

Rawal RB, Deal AM, Ebert CS Jr, Gore MR, Senior BA, Zanation AM. "Evaluation of Post-operative Nasal Irrigations with Budesonide for Patients with Polyposis: A blinded Randomized Controlled Trial. American Rhinologic Society 2012 Annual Meeting, Washington, DC. September 2012. Oral Presentation.

Frank DO, Zanation AM, Dhandha VH, Ebert CS Jr, Senior BA, Kimbell JS. "Quantification of Airflow into the Maxillary Sinuses Before and After Functional Endoscopic Sinus Surgery. American Rhinologic Society 2012 Annual Meeting, Washington, DC. September 2012. Oral Presentation.

Choudhury B, Awan O, Pike JM, Zdanski C, Prazma J, Ebert CS Jr. "Oral Probiotics in the Prevention and Treatment of Allergy Induced Eustachian Tube Dysfunction Model. American Academy of Otolaryngic Allergy Annual Meeting, Washington, DC. September 2012. Oral Presentation.

Ebert CS Jr. Clinical case conundrums: A plan for managing common and severe surgical complications. The Open Forum. New York, New York. July 2012. Oral Presentation.

Ebert CS Jr. Panel: Care of Pediatric Patients after Endoscopic Sinus Surgery. American Rhinologic Society Summer Sinus Symposium. Chicago, IL. July 2012. Invited Panelist.

Eskridge, H, Henderson, L. The Development of Auditory Memory. Burlington, NC.

Eskridge, H, Henderson, L. Listening and Spoken Language for Children with Hearing Loss, Ho Chi Minh City, VN.

Eskridge, H. Workshop for Educating Hearing-Impaired Children to Listen and Speak. Hanoi, VN.

Eskridge, H, Roush, P. Collaborative Management of Auditory Neuropathy Spectrum Disorder. ASHA, Atlanta, GA.

Mamo, SK, Grose, JH. Detection of mistuning in a complex of unresolved harmonics: Effects of age. Research poster presentation at the 165th Meeting of the Acoustical Society of America, Montreal, QC, Canada.

Mamo, SK, Grose, JH. Speech-evoked ABR: Periodicity coding of a temporally jittered stimulus. Research poster presentation at the annual meeting of the American Auditory Society, Scottsdale, AZ.

Hayes DN, Grandis J, El-Naggar AK. Comprehensive genomic characterization of

squamous cell carcinoma of the head and neck in the Cancer Genome Atlas. American Association for Cancer Research Annual Meeting. Washington, D.C. April 6-10, 2013.

He, S, Grose, J H, Teagle, HF, Buchman, CAB. Neural adaptation patterns of the auditory nerve in children with auditory neuropathy spectrum disorder. 20th World Congress of the International Federation of Oto-Rhino-Laryngological Societies, Seoul, Korea [Invited Speaker].

He, S, Grose, JH, Teagle, HFB, Roush, P, Buchman, CA. Acoustically-Evoked Auditory Change Complex in Children with Auditory Neuropathy Spectrum Disorder: A Potential Objective Tool for Identifying Cochlear Implant Candidates. The 36th Annual MidWinter Meeting of Association of Research in Otolaryngology, Baltimore, MD. [Poster].

Kim GG, Zanation AM, Taylor N, Scanga LR, Shores CG, McKinnon KP, Serody JS. Significance of myeloid-derived suppressor cells in squamous cell carcinoma of the head and neck. 2013 American Society of Clinical Oncology Annual Meeting. Chicago, IL. May 31-June 4, 2013. Abst #6070.

Kim GG, Zdanski CJ, Cohn EE, Vaughn B, Drake AF. The evolving utility of polysomnography in the management of tracheostomies for pediatric patients with craniofacial anomalies. 116th Annual Meeting at Combined Otolaryngological Spring Meetings, Orlando, FL. April 11-14, 2013. Abst #274.

Kim GG, Klatt-Cromwell CN, Shah RN, Buckmire RA. Assessment of dysphagia after surgical treatment of Zenker's diverticulum using the Eating Assessment Tool. 116th Annual Meeting at Combined Otolaryngological Spring Meetings, Orlando, FL. April 11-14, 2013. Abst #366.

Klatt-Cromwell CN, Kim GG, Shah RN, Buckmire RA. Longitudinal assessment of voice outcome measures following Gore-Tex medialization thyroplasty. 116th Annual Meeting at Combined Otolaryngological Spring Meetings, Orlando, FL. April 11-14, 2013. Abst #239.

Kim GG, Zanation AM, Shores CG, McKinnon KP, Moore DT, Serody JS. Identification of myeloid-derived suppressor cells in squamous cell cancer of the head and neck. Triological Society Combined Sections Meeting, Scottsdale, AZ. January 24-26, 2013. Abst #190.

Fleischman GM, Kim GG, Ebert C, Zanation AM. Hybrid balloon frontal sinus surgery in the endoscopic treatment of CRS with variant frontal sinus anatomy. Triological Society Combined Sections Meeting, Scottsdale, AZ. January 24-26, 2013. Abst #185.

Kimbell JS. Uses of Upper Respiratory Tract Modeling in Risk Assessment and

Medicine. Inhalation Toxicity: Pathways to Better Methods Workshop, Institute for In Vitro Sciences, Gaithersburg, MD, May 1, 2013; Department of Mathematics, Virginia Commonwealth University, Richmond, VA, April 19, 2013; Biomathematics Program, Department of Statistics, North Carolina State University, Raleigh, NC, March 21, 2013.

Ludlow, D. Predicting post-treatment feeding tube and tracheostomy dependence in chemoradiated laryngeal cancer patients. 16th Annual Ray A. Barlow Symposium, January 2012. Poster Presentation.

Pillsbury HC. How Obamacare Will Affect Your Practice: The Academic Health care Perspective. Visiting Professor, Otolaryngology/Head and Neck Surgery, Yale University, New Haven, CT, May 31, 2013.

Pillsbury HC. New Technologies in Otolaryngology: How Images Enhance Education, Connecticut Ear, Nose, & Throat Society, Plantsville, CT, May 30, 2013.

Pillsbury HC. Tinnitus, Visiting Professorship, Department of Otolaryngology/Head and Neck Surgery, Georgia Health Sciences University, Augusta, GA, December 5, 2012.

Pillsbury HC. How Obamacare Will Affect You, Visiting Professorship, Department of Otolaryngology/Head and Neck Surgery, Georgia Healthy Sciences University, Augusta, GA, December 4, 2012.

Pillsbury HC, Semaan M, Megerian C, Carter J, Kinney S. Vertigo – Case Discussion, 10th Annual Temporal Bone Surgical Course, University Hospitals Case Medical Center, Cleveland, OH, October 20, 2012.

Pillsbury HC. Techniques of Hearing Preservation in Cochlear Implant Surgery: Role of Electric Acoustic Stimulation. 10th Annual Temporal Bone Surgical Course, University Hospitals Case Medical Center, Cleveland, OH, October 19, 2012.

Pillsbury HC, Kaylie D, Oliver E, Buchman C, McElveen Jr J. Adunka O, Moderator. Panel Discussion: Otolaryngology/Neuro-Otology, NC/SC OHNS 2012 Assembly, August 3, 2012.

Rose AS. Mock oral boards: Pediatric congenital neck masses. University of Texas Medical Branch at Galveston – Galveston, TX, April 26, 2013.

Rose AS and Ebert CS. Evolution in the management of chronic sialorrhea. University of Texas Medical Branch at Galveston – Galveston, TX, April 26, 2013.

Rose AS. Pediatric sinonasal masses: a case-based approach. Department of Otolaryngology – Head & Neck Surgery – University of North Carolina, Chapel Hill, NC, December 4, 2012.



**Rose AS.** *Congenital pediatric neck masses: a case-based approach.* Department of Otolaryngology – Head & Neck Surgery – University of North Carolina, Chapel Hill, NC, December 5, 2012.

**Rose AS.** *Inservic on image capture and use of the Brainlab Digital Lightbox.* Department of Otolaryngology – Head & Neck Surgery – University of North Carolina, Chapel Hill, NC, November 15, 2012.

**Rose AS.** *Challenging cases in pediatric otolaryngology (Panel presentation with Drs. Harold S. Pine and Arie Gordin).* Rambam Health Care Campus, Haifa, Israel, November 6, 2012.

**Rose AS.** *Current treatment for chronic sialorrhea.* Slide presentation at the Annual Newton D. Fischer Society Meeting, Chapel Hill, NC, June 2013.

**Mckinney KA, Zanation AM, Thorp BD, Rose AS, Rawal R, Ebert CS.** *Paired matched analysis of gene expression profiles in unilateral allergic fungal rhinosinusitis.* Annual Meeting of the American Rhinologic Society, Washington, DC, September, 2012.

**Rose AS.** *Pediatric tracheotomy site complications.* Slide presentation at the NC/SC Otolaryngology and Head & Neck Surgery Assembly, Asheville, NC, August 2012.

**Roush, P and Teagle, HFB.** *Audiologic Management of Progressive Hearing Loss in Children.* Invited presentation, Frontier's in Hearing Symposium, Vail Colorado, July 12, 2013.

**Roush, P.** *Audiological Management of Auditory Neuropathy Spectrum Disorder.* Invited presentation, Frontier's in Hearing Symposium, Vail Colorado, July 11, 2013.

**Roush, P and Eskridge, H.** *Collaborative Management of Auditory Neuropathy Spectrum Disorder.* Invited presentation, American Speech, Language and Hearing Association Annual Convention, Atlanta, GA, November 16, 2012.

**Roush, P.** *Diagnosis and Management of Auditory Neuropathy.* Invited presentation, Third Latin American Pediatric Audiology Conference, Buenos Aires, Argentina, October 12-13, 2012.

**Roush, P, and Teagle, HFB.** *Auditory Neuropathy Spectrum Disorder.* Invited presentation, Language and Literacy Workshop, September 11, 2012.

**O'Neil, JT.** *Grand Rounds, Over the Counter ENT and Alternative Otolaryngology.* Wake Forest Department of Otolaryngology, 1/2013

**O'Neil, JT.** *Resident Research Day, Pediatric Pharyngeal Abscess Associated with Clival Defect: A Case Series, Poster Presentation,*

Wake Forest School of Medicine Division of Surgery, Winston Salem, NC 11/2012

**O'Neil, JT.** *Teaching Session Presenter, Simulation Potpourri from the Cutting Edge, AAO Annual Meeting, Washington DC, 9/2012*

**Senior BA.** *Functional Endoscopic Sinus Surgery (FESS) and Nebulized Particle Delivery to the Maxillary Sinus: A Computational Fluid Dynamics Study, Newton Fischer Meeting, Chapel Hill, NC, June 1, 2013*

**Senior BA.** *Moderator – Panel: Stump the experts – Bring your most challenging case, 2013 Southern States Rhinology Course Program, Kiawah, SC, May 3, 2013*

**Senior BA.** *ESS for Neoplasms, 2013 Southern States Rhinology Course Program, Kiawah, SC, May 3, 2013*

**Senior BA.** *Moderator – Panel: Frontal Sinus Cases, 2013 Southern States Rhinology Course Program, Kiawah, SC, May 3, 2013*

**Senior BA.** *Panelist – ESS failures and how to salvage, 2013 Southern States Rhinology Course Program, Kiawah, SC, May 3, 2013*

**Senior BA.** *Coding Update, 2013 Southern States Rhinology Course Program, Kiawah, SC, May 2, 2013*

**Senior BA.** *Panelist – Balloons, Stents & Emerging Technologies, 2013 Southern States Rhinology Course Program, Kiawah, SC, May 2, 2013*

**Senior BA.** *Panelist – Management of Nasal Obstruction, 2013 Southern States Rhinology Course Program, Kiawah, SC, May 2, 2013*

**Senior BA.** *Sinus Anatomy, 2013 Southern States Rhinology Course Program, Kiawah, SC, May 2, 2013*

**Senior BA.** *Medical Management of CRS: Pathophysiology of CRS, 2013 Southern States Rhinology Course Program, Kiawah, SC, May 2, 2013*

**Senior BA.** *Panelist: Coding Controversies in Rhinology, 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 28, 2013*

**Senior BA.** *Future Directions of the American Rhinologic Society, 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 28, 2013*

**Senior BA.** *Endoscopic Management of Pituitary Tumors, 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 28, 2013*

**Senior BA.** *Management of FESS Complications, 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 28, 2013*

**Senior BA.** *Instructor: Cadaver dissection laboratory (fresh frozen cadavers with image-guidance), 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 27, 2013*

**Senior BA.** *Dissector: Cadaver dissection demonstration: Complete FESS, balloon dilatation, sphenopalatine artery ligation, orbital decompression, lateral canthotomy/cantholysis, 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 27, 2013*



**Senior BA.** *Panelist - Case Studies in Fungal Rhinosinusitis, 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 27, 2013*

**Senior BA.** *Rhinogenic Headaches, 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 26, 2013*

**Senior BA.** *Panelist - Case Studies, 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 26, 2013*

**Senior BA.** *Endoscopic Frontal Sinusotomy, 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 26, 2013*

**Senior BA.** *Mastering Safe Ethmoidectomy, 2013 Lone Star Rhinology Course, UT Southwestern Medical Center, Dallas, TX, April 26, 2013*

**Senior BA.** *Moderator - Fundamental Concepts and Basic FESS Technique, 2013 Lone Star Rhinology Course, UT Southwestern Medical*

Center, Dallas, TX, April 26, 2013

**Senior BA.** Extent of Sinus Surgery: Evidence Review of How Much We Should Do, 2012 New York Advanced Rhinology and Sinus Surgery Course, Weill Cornell Medical Center, New York, NY, November 10, 2012. Guest of Honor three consecutive times.

**Anand, Lebowitz, Schaberg, Senior, Jacobs.** Panelist - Management of CSF Leaks, 2012 New York Advanced Rhinology and Sinus Surgery Course, Weill Cornell Medical Center, New York, NY, November 10, 2012

**Senior BA.** Antibiotics in Chronic Rhinosinusitis – What's the Evidence? 2012 New York Advanced Rhinology and Sinus Surgery Course, Weill Cornell Medical Center, New York, NY, November 9, 2012

**Anand, Fried, Setzen, Senior.** Case Presentations: Expert Management, Simple to Complex, 2012 New York Advanced Rhinology and Sinus Surgery Course, Weill Cornell Medical Center, New York, NY, November 9, 2012

**Stewart, Jackman, Senior, Lebowitz.** Panelist - Defining CRS in 2012, 2012 New York Advanced Rhinology and Sinus Surgery Course, Weill Cornell Medical Center, New York, NY, November 9, 2012

**Senior BA.** Future Directions of the American Rhinology Society, Advanced Techniques in Endoscopic Management of Sinonasal Disorders, Univ. of South Florida, St. Petersburg, FL, November 3, 2012

**Senior BA.** Moderator – Panel: Controversies in Procedure Based Therapy of Headache Contact Points, Trigger Points, Migraine Surgery, Advanced Techniques in Endoscopic Management of Sinonasal Disorders, Univ. of South Florida, St. Petersburg, FL, November 3, 2012

**Senior BA.** CSF Leaks & Their Repair, Advanced Techniques in Endoscopic Management of Sinonasal Disorders, Univ. of South Florida, St. Petersburg, FL, November 1, 2012

**Stammberger H, Senior B.** Demonstration Dissection: Endoscopic Sinus Surgery – FESS Technique 2012/CSF Leak Repair, Advanced Techniques in Endoscopic Management of Sinonasal Disorders, Univ. of South Florida, St. Petersburg, FL, November 2, 2012

**Senior BA.** Pituitary Adenoma, Advanced Techniques in Endoscopic Management of Sinonasal Disorders, Univ. of South Florida, St. Petersburg, FL, November 1, 2012

**Senior BA.** Endoscopic Balloon Dilation of the Frontal Recess, Advanced Techniques in Endoscopic Management of Sinonasal Disorders, Univ. of South Florida, St. Petersburg, FL, November 1, 2012

**Senior BA.** Head and Neck Manifestations of Vasculitis, Genentech Educational Seminar, UNC Chapel Hill, NC, October 17, 2012

**Senior BA.** Expanding Into Skull Base Surgery, ARS Summer Sinus Symposium, Chicago, IL, July 14, 2012

**Senior BA.** Moderator - Management of Benign Skull Base Tumors, ARS Summer Sinus Symposium, Chicago, IL, July 14, 2012

**Senior BA.** Management of Bleeding in Skull Base Surgery, ARS Summer Sinus Symposium, Chicago, IL, July 14, 2012

**Senior BA.** Evidence for Extent of Surgery, ARS Summer Sinus Symposium, Chicago, IL, July 14, 2012

**Senior BA.** Keynote Address - Rhinology through the Ages, ARS Summer Sinus Symposium, Chicago, IL, July 13, 2012. Guest of Honor and Keynote speaker.

**Senior BA.** Minimally Invasive Pituitary Surgery, ERS-ISIAN 2012, Toulouse, France, June 17-21, 2012

**Kennedy DW, Stammberger H, Senior B, Simmen D, Carrau R, Stamm A.** Endoscopic Skull Base and Intracranial Surgery: How Far We Should Go?, ERS-ISIAN 2012, Toulouse, France, June 17-21, 2012

**Setzen M, Jacobs J, Senior B, Kennedy DW, Kern R, Fried M, Palmer J.** Controversies in Rhinology-Pearls We Have Learned, ERS-ISIAN 2012, Toulouse, France, June 17-21, 2012

**Senior BA.** Panel – Consult the Experts – Bring Your Most Challenging Case, 2012 Southern States Rhinology Program, Kiawah Island, SC, May 4, 2012

**Senior BA.** ESS for Neoplasms, 2012 Southern States Rhinology Program, Kiawah Island, SC, May 4, 2012

**Senior BA.** Panel – Primary ESS for CRS: When and How Much? 2012 Southern States Rhinology Program, Kiawah Island, SC, May 3, 2012

**Senior BA.** Sinus Anatomy, 2012 Southern States Rhinology Program, Kiawah Island, SC, May 3, 2012

**Senior BA.** Panel – Primary CRSsNP & CRSwNP Workup and Medical Rx, 2012 Southern States Rhinology Program, Kiawah Island, SC, May 3, 2012

**Senior BA.** Pathophysiology of CRSI, 2012 Southern States Rhinology Program, Kiawah Island, SC, May 3, 2012

**Senior BA.** Panel – Sleep and the Nose, ARS/COSM, San Diego, CA, April 18-22, 2012

**Senior BA.** Panel – Endoscopic Skull Base Surgery: Where Do We Stand? ARS/COSM, San

Diego, CA, April 18-22, 2012

**Senior BA.** Live Surgery, 7th Semarang Basic FESS Workshop, Semarang, Indonesia, March 7, 2012.

**Senior BA.** Skull Base Reconstruction, 7th Semarang Basic FESS Workshop, Semarang, Indonesia, March 7, 2012.

**Senior BA.** Lab Instructor and Prosector, 8th Jakarta International Functional Endoscopic Sinus Surgery Course, Jakarta, Indonesia, March 3-5, 2012.

**Senior BA.** Rhinogenic Headache, 8th Jakarta International Functional Endoscopic Sinus Surgery Course, Jakarta, Indonesia, March 3-5, 2012.

**Senior BA.** Avoiding Complication in Frontal Sinus Surgery, 8th Jakarta International Functional Endoscopic Sinus Surgery Course, Jakarta, Indonesia, March 3-5, 2012. Guest of Honor.

**Senior BA.** Life Experience as an Endoscopic Skull Base Surgeon, 8th Jakarta International Functional Endoscopic Sinus Surgery Course, Jakarta, Indonesia, March 3-5, 2012.

**Senior BA.** Lab Instructor: Indications and Limitations of Endoscopic Skull Base Surgery, North American Skull Base Society Meeting, Las Vegas, NV, February 17, 2012.

**Senior BA.** Making Sense of Sinusitis: Evidence for Extent of Surgery, Triologic Combined Sections Meeting, Miami, FL, January 27, 2012.

**Senior BA.** Quiz Bowl, Faculty Team, Triologic Combined Sections Meeting, Miami, FL, January 27, 2012.

**Senior BA.** Minimally Invasive Pituitary Surgery, Triologic Combined Sections Meeting, Miami, FL, January 26, 2012.

**Fleischman G, Kimbell J, Frank D, Wofford M, Ebert C, Senior B, Zanation A.** Poster – Sinonasal Computational Fluid Dynamics Airflow Patterns in Actual and Virtual Surgery for Chronic Rhinosinusitis, COSM, Orlando, FL, April 9-13

**Senior B.** Panel Discussion – Evidence-Based Rhinology: How has the Evidence Changed my Treatment of Sinonasal Disease? COSM, American Rhinology Society, Orlando, FL, April 13, 2013

**Senior B.** Panel Discussion – Advances in in Office-Based CT Scanning – Diagnostic and Therapeutic Procedures, COSM, Triological Meeting, Orlando, FL, April 12, 2013

**Senior B.** Surgical Anatomy of the Paranasal Sinuses, AAO-HNSF Annual Meeting, Washington, DC, September 9-12, 2012

**Senior B, Ewend M.** Minimally Invasive Pituitary Surgery, AAO-HNSF Annual Meeting,

Washington, DC, September 9-12, 2012

Rawal R, Deal A, Ebert C, Gore M, Senior B, Zanation A. Evaluation of Post-Operative Nasal Irrigations with Budesonide for Patients with Polyposis: A Blinded Randomized Controlled Trial, ARS Annual Meeting, Washington, DC, September 8, 2012

Frank D, Zanation A, Dhandha V, Ebert C, Senior B, Kimbell J. Quantification of Airflow into the Maxillary Sinuses Before and After Functional Endoscopic Sinus Surgery, ARS Annual Meeting, Washington, DC, September 8, 2012

Batra P, Lee J, Barnett S, Senior B, Setzen M, Kraus D. Poster – Endoscopic Skull Base Surgery Practice Patterns: Survey of the North American Skull Base Society, ARS Annual Meeting, Washington, DC, September 8, 2012



Kimple AJ, Ebert CS, Senior BA, Zanation AM. Techniques and Limitations for Reducing Nasoseptal Flap Donor Site Morbidity Following Endoscopic Skull Base Surgery, ARS/COSM, San Diego, CA, April 18-22, 2012

Dugar DR, Rawal R, Senior BA, Zanation AM, Ebert CS. Pediatric Allergic Fungal Sinusitis (AFS): Is It a More Severe Disease than Adult AFS? Combined Otolaryngology Section Meeting, San Diego, CA, April 19, 2012.

Dugar DR, Rawal R, Senior BA, Ebert CS, Zanation AM. Endoscopic Approach to Lateral Encephaloceles Originating in Sternberg's Canal, North American Skull Base Society Meeting, Las Vegas, NV, February 2012.

Mitchell C, Oosmanally N, Paul JE, Zanation AM, Ewend MG, Senior BA, Ebert CS. Comparative Analysis of Cost of Minimally Invasive and Sublabial-Transseptal Approaches to the Pituitary, North American Skull Base Society Meeting, Las Vegas, NV, February 17, 2012.

Rawal R, Suberman TA, Zanation AM, Ewend MG, Senior BA, Ebert CS. Quality-of-Life before and after Minimally Invasive Pituitary Surgery, North American Skull Base Society Meeting, Las Vegas, NV, February 17, 2012.

Farag AF, Rawal R, Senior BA, Zanation AM, Ebert CS. Effect of Surfactant Irrigations versus Hypertonic Saline Irrigation on Olfaction following Endoscopic, Endonasal Surgery, Triologic Combined Sections Meeting, Miami, FL, January 2012.

Shockley WW. Moderator for Panel on Multi-Disciplinary Management of Skin Cancer, American College of Surgeons. Chicago, IL October 2, 2012.

Shockley WW. Nasal Reconstruction in 2012; Where Do We Stand? Panel on Multi-Disciplinary Management of Skin Cancer, American College of Surgeons. Chicago, IL October 2, 2012.

Thorp BD, Deal AM, Shockley WW. Full Thickness Skin Grafts for Nasal Reconstruction: Analysis of Aesthetic Results using a Novel Grading System. American Academy of Facial Plastic and Reconstruction Surgery. Washington, DC, September 7, 2012.

Shockley WW. Saddle Nose Deformity: Options in Surgical Management. North Carolina/South Carolina Otolaryngology - Head and Neck Surgery Assembly. Asheville, NC, August 5, 2012.

Shockley WW. Perspectives in Nasal Reconstruction. Plastic and Reconstructive Surgery Grand Rounds. University of North Carolina. Chapel Hill, NC, May 23, 2012.

Shockley WW. Reconstruction of Cutaneous Nasal Defects With a Full Thickness Skin Graft. Panel on Cutaneous Malignancies and Local Flap Reconstruction. Combined Sections Meeting of the Triological Society. Miami, FL, January 27, 2012.

Eight others and Shores, C. Phase I clinical trial of valacyclovir and standard of care cyclophosphamide in children with endemic Burkitt lymphoma in Malawi. American Head and Neck Society International meeting, Toronto, Canada July 2012

Shah RN, Altman KW, Woo P. "The Answer to Bilateral Vocal Fold Immobility...Don't Hold Your Breath. Grand Rounds, Icahn School of Medicine at Mount Sinai Department of Otolaryngology. June 19, 2013, New York, NY.

Shah RN, Del Signore AG, Altman KW, Woo P. "Laryngeal sarcoidosis: proposal for clinical classification and treatment. Oral presentation, American Laryngological Association annual meeting. April 2013. Orlando, FL.

Del Signore AG, Shah RN, Gupta N, Altman KW, Woo P. "Complications and failures of office based endoscopic applications of angiotyctic lasers. Oral presentation, American Broncho-

Esophagological Association annual meeting. April 2013. Orlando, FL.

Shah RN, Altman KW, Woo P. "Discrepancies in laryngeal diagnoses between otolaryngologists: a descriptive review. First Place Poster Presentation Laryngology/ Bronchoesophagology, Triological Society Combined Sections meeting. January 2013. Scottsdale, AZ.

Shah RN, Woo P. "Bilateral Vocal Fold Immobility...Don't Hold Your Breath. Grand Rounds, University of North Carolina Department of Otolaryngology-Head & Neck Surgery. December 12, 2012, Chapel Hill, NC.

Shah RN, Deal AM, Buckmire RA. "Multi-dimensional Voice Outcomes after Type I Gore-Tex Thyroplasty in Patients with Mobile Vocal Folds: a Subgroup Analysis. Oral presentation, Fall Voice Conference. October 2012, New York, NY.

Shah RN, Buckmire RA. "Laryngology Update 2012. Oral presentation, Newton D. Fischer Society meeting. June 2012, Chapel Hill, NC.

Teagle, HFB. Managing patients with ANSD and progressive hearing loss. Frontiers in Hearing, Symposium, Vail, CO.

Teagle, HFB & Roush, PA. Auditory Neuropathy Spectrum Disorder. Language and Literacy Workshop, Greensboro, NC.

Teagle, HFB. Grand Rounds: Cochlear Implants for Children with ANSD: what are we learning? Audiology OnLine Webinar. October 16th 2012

Thorp BD and Ebert CS Jr. Clinical Conundrums: Rhinology Panel. Newton D. Fischer Society Meeting. Chapel Hill, NC. June 2013.

Thorp BD and Zanation AM. The Vidian Nerve: nothing to sniffle about. Grand Rounds, Department of Otolaryngology/Head and Neck Surgery, University of North Carolina – Chapel Hill. January 2013.

McKinney KA, Zanation AM, Thorp BD, Rose AR, Rawal R, and Ebert CS Jr. Paired, matched analysis of gene expression profiles in unilateral allergic fungal rhinosinusitis. Annual Meeting of the American Rhinologic Society. Washington, DC. September 8, 2012. Presented by Dr. Kibwei McKinney.

Thorp BD, Deal AM, and Shockley WW. Full Thickness Skin Grafts for Nasal Reconstruction: Analysis of Aesthetic Results Using a Novel Grading System. Fall Meeting of the American Academy of Facial Plastic and Reconstructive Surgery. Washington, DC. September 5-8, 2012.

Thorp BD, Lam C, and Hackman TG. Retrospective Review of Oropharynx Cancer: Prognostic Factors and Failure Patterns. 8th International Conference on Head and Neck Cancer. Toronto, Ontario. July 20 – 25, 2012.

Klatt-Cromwell CN, Newberry T, Ewend M,



Sasaki-Adams D, Ebert C, Senior B, Zanation AM. *Evaluation of Skull Base Reconstruction and Sinonasal Disease Following Endoscopic Surgery and Radiation Therapy*. American Rhinologic Society at Combined Otolaryngology Sections Meeting, April 2013, Orlando, FL.

Fleischman GM, Kimbell JS, Frank DO, Wofford M, Ebert CS, Senior BA, Zanation AM. *Sinonasal Computational Fluid Dynamics Airflow Patterns in Actual and Virtual Surgery for Chronic Rhinosinusitis*. Combined Otolaryngology Spring Meetings, April 10-14, 2013, Orlando, FL.

Klatt-Cromwell CN, Ewent M, Sasaki-Adams D, Jewells V, Zanation AM. *Post Operative Magnetic Resonance Imaging Characteristics of Vascularized Nasoseptal Flap Skull Base Reconstructions*. Triological Society Meeting at Combined Otolaryngology Sections Meeting, April 12, 2013, Orlando, FL.

Zanation AM. *How Does Coordinated Multidisciplinary Care Impact Head and Neck Tumor Treatment Planning*. Triological Society Annual Meeting, COSM, April 12, 2013, Orlando, FL. Winner of the 2013 Mosher Award.

Rawal RB, Zanation AM. *Otolaryngology Faculty and Residents' Attitudes Towards the Pharmaceutical Industry*. Triological Combined Sections Meeting, April 12, 2013, Orlando, FL.

Zanation AM, Cohn E, Wheless S, McKinney K, Deal A. *Prospective Study of Head and Neck Quality of Life in a Comprehensive Skull Base Surgical Practice*. American Head and Neck Society Annual Meeting, April 11, 2013, Orlando, FL.

Patel MR, Taylor R, Hackman TG, Sasaki-Adams DM, Ewend MG, Zanation AM. *Beyond the Nasoseptal Flap: Outcomes and Pearls with Secondary Vascular Flaps in Skull Base Reconstruction*. North American Skull Base Society Annual Meeting, February 15-17, 2013, Miami, FL.

Cohn EE, Newberry TR, Rodriguez KD, Sasaki-Adams DM, Zanation AM. *Management of Invasive Fungal Sinusitis with Intracranial Involvement*. North American Skull Base Society Annual Meeting, February 15-17, 2013, Miami, FL.

Dhandha VH, Zanation AM. *Time to Esthesioneuroblastoma Recurrence: A Meta Analysis*. North American Skull Base Society Annual Meeting, February 15-17, 2013, Miami, FL.

Zanation AM. *Invited Panelist*. Chordomas: Has Endoscopic Approaches for Patients with Chordoma Improved Outcomes? North American Skull Base Society Annual Meeting, February 15-17, 2013, Miami, FL.

Kim GG, McKinney KA, Ebert CS, Zanation AM. *Computed Tomography Image-Guided Robotic Surgery: A Preclinical Feasibility Study*. North American Skull Base Society Annual Meeting, February 15-17, 2013, Miami, FL.

Fleischman GM, Zanation AM, Cohn EE, Ebert CS, Senior BA. *Obstructive Sleep Apnea in Patients Undergoing Endoscopic Surgical Repair of Cerebrospinal Fluid Rhinorrhea*. North American Skull Base Society Annual Meeting, February 15-17, 2013, Miami, FL.

Klatt-Cromwell CN, Ewend M, Sasaki-Adams D, Zanation AM. *Magnetic Resonance Imaging Confirms Vascularity of Nasoseptal Flaps in the Late Post-Operative Period*. North American Skull Base Society Annual Meeting, February 15-17, 2013, Miami, FL.

Fleischman GM, Kim GG, Ebert CS, Zanation AM. *Hybrid Balloon Frontal Sinus Surgery in the Endoscopic Treatment of CRS with Variant Frontal Sinus Anatomy*. Combined Sections Meeting, January 24-26, 2013, Scottsdale, AZ.

Kim GG, Zanation AM, Shores CG, McKinnon KP, Moore DT, Serody JS. *Poster Presentation*. Identification of Myeloid Derived Suppressor Cells in Squamous Cell Cancer of the Head and Neck. Combined Sections Meeting, January 24-26, 2013, Scottsdale, AZ.

Zanation AM. *Invited Speaker*. How I Do It: Not When and Why, Just How – Nasoseptal Flap for Endoscopic Skull Base Surgery. Combined Sections Meeting, January 24-26, 2013, Scottsdale, AZ.

Zanation AM. *Invited Panelist*. Sinonasal Malignancies: State of the Art in Management. Combined Sections Meeting, January 24-26, 2013, Scottsdale, AZ.

Zanation AM. *Invited Faculty*. UPMC Center for Cranial Base Surgery, November 17, 2012, Pittsburgh, PA.

Zanation AM. *Skull Base Surgical Outcomes, Anatomy and Diseases of the Infratemporal Fossa and Academic Career Development*. NYU Department of Otolaryngology Grand Rounds and Resident Didactics, (Invited Visiting Professor) October 3, 2012, New York, NY.

McKinney KA, Zanation AM, Thorp BD, Rose AS, Rawal RB, Ebert CS. *A Gene Pathway Analysis of Differential Expression in AFRS*. American Rhinologic Society Meeting, September 8, 2012, Washington, DC.

Rawal RB, Deal AM, Ebert CS, Gore MR, Senior BA, Zanation AM. *Evaluation of Post-Operative Nasal Irrigations with Budesonide for Patients with Polyposis: A Blinded Randomized Controlled Trial*. American Rhinologic Society Meeting, September 8, 2012, Washington, DC.

Zanation AM. *Complex Frontal Sinus Disease: Current Concepts*. NC/SC Otolaryngology and Head and Neck Surgery Meeting, (Invited Faculty) August 3-5-2012, Asheville, NC.

Zanation AM. *Invited Faculty, Demonstration Prosector*. North American Skull Base Surgery Meeting, July 28, 2012, New Orleans, LA.

Zanation AM. *Invited Faculty, Extended Orbits – Zygomatic Approach to Skull Base*. North American Skull Base Surgery Meeting, July 28, 2012, New Orleans, LA.

Zanation AM. *New York Open Forum Meeting 2012, Office-Based Ultrasonography: Making Optimal Use of What is Known*, July 27-28, 2012, New York, New York.

Zanation AM. *Anterior Skull Base Surgery*. Kansas University Medical Center Meeting, (Invited Visiting Professor), July 16, 2012, Kansas City, MO.

Fleischman GM, Kimbell JS, Davis S, Superfine R, Zdanski C. *Effect of Laryngotracheal Reconstruction on Airflow Patterns: A Pilot Computational Fluid Dynamics Study in a Child with Subglottic Stenosis (Poster)*. COSM/Triological Society, Orlando, FL, April 10 – 14, 2013.

Kim GG, Zdanski CJ, Cohn E, Vaughn B, Drake AF. *The Evolving Utility of Polysomnography in the Management of Tracheostomies for Pediatric Patients with Craniofacial Anomalies (Poster)*. COSM/Triological Society, Orlando, FL, April 10 – 14, 2013.

Zdanski CJ. *Innovations in Pediatric Otolaryngology: A Video Forum Pediatric Otolaryngology*. AAO-HNS Pediatric Otolaryngology Committee and the American Society of Pediatric Otolaryngology Meetings; Washington, DC, September 12, 2012.

Zdanski CJ. *Invited Speaker, Pediatric Voice Disorders: Medical/Surgical Management; Tools for Children's Voice Disorders*. Chapel Hill, NC, August 24, 2012.

# Publications

## Books/Chapters

**Buchman CA.** *Implantable Devices in Otorhinolaryngology*. In: *Current Otorhinolaryngology Reports*. Springer Health Care, PA, 2013.

**Iseli C, Adunka OF, Buchman CA.** *Cochlear implants in children with cochlear nerve deficiency*. In: *Cochlear Implants in Children: Learning and the Brain*, Young N & Kirk K (eds). Springer Publishing, Philadelphia, PA, (in preparation).

**Adunka OF, Buchman CA.** *Cochlear implants and other auditory prostheses*. In: *Johnson's Head and Neck Surgery-Otolaryngology* (5th edition). Johnson JT (ed), Lippincott, Williams & Wilkins, Philadelphia, PA, (75 pages-in press).

**Cullen RF, Buchman CA.** *Device reliability and reimplantation*. In: *Cochlear Implants and Other Implantable Hearing Devices*. Ruckenstein M (ed). Plural Publishing, 2012, San Diego, CA, Chapter 17: pp: 303-16.

**Buss, E, Hall, JW, and Grose, JH.** "Development of auditory coding as reflected in psychophysical performance, in L. Werner, R.R. Fay and A.N. Popper (Eds) *Human Auditory Development*, Springer.

**Dahl, JP and Zdanski CJ.** *Sialadenitis*. *Pediatric Otolaryngology – Head and Neck Surgery, A Clinical Reference Guide*.

**Dahl, JP and Zdanski CJ.** *Salivary Gland Tumors*. *Pediatric Otolaryngology – Head and Neck Surgery, A Clinical Reference Guide*.

**Dahl, JP and Rose AS.** *Salivary Glands and Sialorrhea*. *Pediatric Otolaryngology – Head and Neck Surgery, A Clinical Reference Guide*.

**Campbell A, Dillon MT, Buchman CA, Adunka OF.** *Hearing preservation cochlear implantation*. In CA Buchman (Ed.), *Current Otorhinolaryngol Rep, Implantable Devices in Otorhinolaryngology* (vol 1, issue 2, 69-79). New York, NY: Springer.

**Adunka OF, Dillon MT, Buchman CA.** *Auditory outcomes in the adult population*. In Susan Waltzman, & J. Thomas Roland (Eds.), *Cochlear Implants* (3rd edition), New York, NY: Thieme.

**Rosenthal, LHS, Caballero, N, Drake, AF.** *Otolaryngologic Manifestations of Craniofacial Syndromes*. *Otolaryngologic Clinics of North America*, 45 (2012), 557-577.

**Shadfar, S, Drake AF, Vaughn, BV, Zdanski, CJ.** *Pediatric Airway Abnormalities, Oral and Maxillofacial Surgery Clinics*, 24(2012), 325-336.

**Walter V, Nobel AB, Hayes DN, Wright FA.** *Identification of Recurrent DNA Copy Number Aberrations in Tumors*. *Statistical Diagnostics*

*for Cancer: Analyzing High-Dimensional Data*. Weinheim, Germany: Wiley-Blackwell Press. 241-260. 2013.

**Kim GG, Zdanski C.** *Neck Syndromes*. *Pediatric Otolaryngology-Head and Neck Surgery – A Clinical Reference*. Plural Publishing. [submitted February 28, 2013].

**Kim GG, Hang AX, Mitchell CA, Zanation AM.** *Pedicled Extranasal Flaps in Skull Base Reconstruction*. *Advances in Oto-Rhino-Laryngology- Comprehensive Techniques in CSF Leak and Skull Base Reconstruction*. (Bleier BS (ed), vol 74, page 71-80) Switzerland: S. Karger AG- Medical and Scientific Publishers.

**Brownell, WE, Manis, PB.** *Structures, Mechanisms, and Energetics in Temporal Processing*. In: *SHAR Perspectives*, Popper, A., and Fay, R. Eds., *Springer Handbook of Auditory Research*, Vol. 50, 2013 (In Press).

**Rose AS.** *Nose and sinus*. In: *Color Handbook of Otolaryngology*. Devon, United Kingdom: Manson Publishing. In press, 2013.

**Gore MR, Senior BA.** *Minimally Invasive Pituitary Surgery, in: Online Encyclopedia of Otolaryngology*. Kountakis S et al (eds). 2013 In Press.

**Senior BA.** *Image Guidance in Endoscopic Sinus Surgery and Skull Base Surgery*, Chin J. Clinicians (Electronic Edition), June 15, 2012, vol 6, No 12, 3157-3164

**Senior BA.** *Endoscopic Resection of Pituitary Adenomas*, Thieme, Kennedy DW & Hwang P (eds), 2012

**Bednarski K, Senior BA.** *Advanced Frontal Surgery Techniques in Rhinology: Diseases of the Nose Sinuses, and Skull Base*, Thieme, Kennedy DW & Hwang P (eds), 2012

**Shadfar S, Shockley WW.** *Management of Facial Soft Tissue Trauma in Head and Neck Surgery-Otolaryngology*. 5th Ed. Lippincott, Williams and Wilkins (publication pending)

**Thorp BD, Rodriguez KD, and Senior BA.** *The Nose and Paranasal Sinuses: Benign Neoplasm* (2014). In Sataloff R (Ed.), *Sataloff's Textbook of Otolaryngology*. Philadelphia, PA: Jaypee Brothers Medical Publishers (Anticipated publication 2014).

**Zanation AM, Smyth J.** *K.J. Lee's Essential Otolaryngology Tenth Edition. Tumors of the Paranasal Sinuses*. McGraw Hill Medical 2012, Chapter 30:669-680.

**Shadfar S, Drake A, Vaughn B, Zdanski C.** *Pediatric Airway Anomalies: Evaluation and*

*Management*. *Oral and Maxillofacial Surgery Clinics of North America: Pediatric Maxillofacial Surgery*. Elsevier Publishers, Volume 24, Issue 3, August 2012, Pages 325-336.

## Refereed Journals

**Ahmad FI, Demason CE, Teagle H, Henderson L, Adunka OF, Buchman CA.** *Cochlear implantation in postlingually hearing impaired children*. *Laryngoscope*, accepted for publication.

**Ahmad FI, Demason CE, Choudhury B, Adunka OF, Finley CC, Fitzpatrick DC.** *Detection of intracochlear damage during cochlear implant electrode insertion using extracochlear measurements in the gerbil*. *Laryngoscope* 2012; 122:636-44.

**Dillon M, Adunka OF, Hillman T, Chen DA, Buchman CA.** *Round window stimulation for conductive and mixed hearing loss*. *Otol Neurotol* 2013 (in preparation).



**Forgues M, Koehn HA, Dunnon AK, Pulver SH, Buchman CA, Adunka OF, Fitzpatrick DC.** *Hair cell and neural potentials recorded at the round window in gerbils*. *J Neurophysiol* 2013 (submitted).

**He S, Grose JH, Teagle HFB, Buchman CA.** *Objective measures of electrode discrimination with electrically-evoked auditory change complex and speech perception abilities in children with auditory neuropathy spectrum disorder*. *Ear Hear* 2013 (submitted).

**Hatch DR, Teagle HFB, Park L, Woodard J, Buchman CA.** *The impact of cochlear implant revision surgery on speech perception performance in children*. *JAAA* 2013 (submitted).

**Park LR, Henderson L, Teagle HFB, He S, Evans M, Buchman CA.** *Language and audition outcomes in children with auditory neuropathy spectrum disorder using cochlear implants*. *J Speech Lang Res* 2013 (submitted).

**Van de Heyning P, Adunka O, Buchman C, Pillsbury H and many others.** *Standards of*

practice in the field of hearing implants. *Cochlear Implants Int.* 2013 Jun;14 Suppl 2:1-5. doi: 10.1179/1467010013Z.00000000093. PubMed PMID: 23764325.

Fitzpatrick, DC, Campbell AP, Choudhury B, Dillon MT, Forgues M, Buchman CA, Adunka OF. Round window electrocochleography just prior to cochlear implantation: Relationship to word recognition outcomes in adults. *Otol Neurotol* 2013 (in press).

He S, Grose JH, Teagle HF, Woodard J, Park LR, Hatch DR, Buchman CA. Gap detection measured with electrically evoked auditory event-related potentials and speech-perception abilities in children with auditory neuropathy spectrum disorder. *Ear Hear* 2013 May 29. [Epub ahead of print] PubMed PMID: 23722354.

Choudhury B, Adunka OF, Awan O, Pike JM, Buchman CA, Fitzpatrick DC. Electrophysiologic consequences of flexible electrode insertions in gerbils with noise induced hearing loss. *Otol Neurotol* (in press).

Roche JP, Adunka OF, Pillsbury HC, Buchman CA. Cost of cholesteatoma care at a tertiary medical center. *Otol Neurotol* 2013 (in press).

CDaCI Investigative Team. Age-Dependent Cost-Utility of Pediatric Cochlear Implantation. *Ear Hear.* 2013 July/August;34(4):402-412. PubMed PMID: 23558665.

He S, Teagle HF, Roush P, Grose JH, Buchman CA. Objective hearing threshold estimation in children with auditory neuropathy spectrum disorder. *Laryngoscope* 2013 Apr 25. doi: 10.1002/lary.24137. [Epub ahead of print] PubMed PMID: 23620187.

Buchman, CA and many others. Identification of effective strategies to promote language in deaf children with cochlear implants. *Child Dev.* 2013 Mar-Apr;84(2):543-59. doi: 10.1111/j.1467-8624.2012.01863.x. Epub 2012 Sep 24. PubMed PMID: 23002910; PubMed Central PMCID: PMC3530629.

Buchman, CA and many others. Supplement to the JCIH 2007 Position Statement: Principles and Guidelines for Early Intervention After Confirmation That a Child Is Deaf or Hard of Hearing. *Pediatrics.* 2013 Apr;131(4):e1324-49. doi: 10.1542/peds.2013-0008. Epub 2013 Mar 25. PMID: 23530178

Buchman, CA and many others. Influence of implantation age on school-age language performance in pediatric cochlear implant users. *Int J Audiol.* 2013 Apr;52(4):219-29. doi:10.3109/14992027.2012.759666. Epub 2013 Feb 28. PubMed PMID: 23448124.

Gifford RH, Dorman MF, Skarzyski H, Lorens A, Polak M, Driscoll CL, Roland P, Buchman CA. Cochlear implantation with hearing preservation yields significant benefit for speech recognition in complex listening environments. *Ear Hear* 2013 Feb 26. [Epub ahead of print] PubMed PMID: 23446225.

Dillon MT, Buss E, Adunka MC, King ER, Pillsbury HC 3rd, Adunka OF, Buchman CA. Long-term speech perception in elderly cochlear implant users. *JAMA Otolaryngol Head Neck Surg.* 2013 Mar;139(3):279-83. PubMed PMID: 23657352.

Buchman, CA and many others. Effects of maternal sensitivity and cognitive and linguistic stimulation on cochlear implant users' language development over four years. *J Pediatr* 2013 Feb;162(2):343-8.e3. doi:10.1016/j.jpeds.2012.08.003. Epub 2012 Sep 14. PubMed PMID: 22985723.

He S, Grose JH, Buchman CA. Auditory discrimination: The relationship between psychophysical and electrophysiological measures. *Int J Audiol.* 2012 Oct; 51(10):771-82. PubMed PMID: 22998415.

Adunka OF, Teagle HF, Zdanski CJ, Buchman CA. Influence of an intraoperative perilymph gusher on cochlear implant performance in children with labyrinthine malformations. *Otol Neurotol.* 2012 Dec; 33(9):1489-96.

He S, Grose J, Hang AX, Buchman CA. Cochlear implant-evoked cortical activation in children with cochlear nerve deficiency. *Otol Neurotol.* 2012 Sep;33(7):1188-96.

Mitchell CA, Ebert CS, Buchman CA, Zanation AM. Combined transnasal/trans temporal management of the eustachian tube for middle ear inverted papilloma. *Laryngoscope.* 2012 Aug;122(8):1674-8.

Ahmad FI, Demason CE, Teagle HF, Henderson L, Adunka OF, Buchman CA. Cochlear implantation in children with postlingual hearing loss. *Laryngoscope.* 2012 Aug;122(8):1852-7.

Demason C, Choudhury B, Ahmad F, Fitzpatrick DC, Wang J, Buchman CA, Adunka OF. Electrophysiological properties of cochlear implantation in the gerbil using a flexible array. *Ear Hear.* 2012 Jul;33(4):534-42.

Buchman, CA and many others. Language and behavioral outcomes in children with developmental disabilities using cochlear implants. *Otol Neurotol.* 2012 Jul;33(5):751-60.

Park LR, Teagle HF, Buss E, Roush PA, Buchman CA. Effects of frequency compression hearing AIDS for unilaterally implanted children with acoustically amplified residual hearing in the nonimplanted ear. *Ear Hear.* 2012 Jul;33(4):e1-e12.

Buchman, CA and many others. Timing of cochlear implantation and parents' global ratings of children's health and development. *Otol Neurotol.* 2012 Jun;33(4):545-52.

Buchman, CA and many others. Pearls and pitfalls in cochlear implantation. *Int J Otolaryngol.* 2012;438696.

Dillon, M, Buss, E, Adunka, MC, King, ER, Pillsbury, HC, Adunka, OF, and Buchman, C A. Long-term speech perception in elderly cochlear

implant users. *Archives of Otolaryngology – Head & Neck Surgery.* 139, 279-283.

Leibold, LJ, Hillock-Dunn, A, Duncan, N, Roush, PA, and Buss, E. Influence of hearing loss on children's identification of spondee words in a speech-shaped noise or a two-talker masker. *Ear and Hearing* [Epub ahead of print].

Buss, E., He, S., Grose, J.H., and Hall, J.W. III (2013) "The monaural temporal window based on masking period pattern data in school-aged children and adults, *Journal of the Acoustical Society of America*, 133, 1586-1597.

Buss, E., Grose, J.H., and Hall, J.W. III (2013) "Factors affecting the processing of intensity in school-aged children, *Journal of Speech, Language and Hearing Research*, 56, 71-80.



Buss, E., Hall, J. W., and Grose, J. H. (2013) "Effects of masker envelope irregularities on tone detection in narrowband and broadband maskers, *Hearing Research*, 294, 73-81.

Bonino, AY, Leibold, L J, and Buss, E. Release from perceptual masking for children and adults: Benefit of a carrier phrase. *Ear and Hearing*, 34, 3-14.

Buss, E, Hall, JW, and Grose, JH. Monaural envelope correlation perception and stimulus bandwidth. *Journal of the Acoustical Society of America*, 133, 405-416.

Ozmeral, E, Buss, E, and Hall, JW. Asynchronous glimpsing of speech: The roles of upward spread of masking and task set-size, *Journal of the Acoustical Society of America*, 132, 1152-1164.

Park, LR, Teagle, HFB, Buss, E, Roush, PA, and Buchman, CA. Effects of frequency compression hearing aids for unilaterally implanted children with acoustically amplified residual hearing in the non-implanted ear. *Ear and Hearing*, 33, e1-e12.



Hall, JW III, Buss, E, Grose, JH, and Roush, PA. *Effects of age and hearing loss on the ability to benefit from temporal and spectral modulation.* Ear and Hearing, 33, 340-348.

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Grose, JH, Buss, E, and Hall, JW. *Binaural beat salience.* Hearing Research, 285, 40-45.

Pappa, AK, Caballero, M, Dennis, RG, Boehm, R, Dahl, JP, Narayan, RJ, Skancke, MD, and JA van Aalst. *Biochemical Properties of Tissue Engineered Cartilage.* In Press, Journal of Craniofacial Surgery,

Pappa, AK, Caballero, M, Dennis, RG, Boehm, R, Dahl, JP, Narayan, RJ, Skancke, MD, and JA van Aalst. *Biophysical Properties of Tissue Engineered Cartilage: Replicating Endogenous Cartilage.*

Dillon, MT, Buss E, Pillsbury HC, Adunka OF, Buchman CA, Adunka MC. *Effects of hearing aid settings for Electric-Acoustic Stimulation.* [accepted, JAAA].

Adunka OF, Dillon MT, Adunka MC, King ER, Pillsbury HC, Buchman CA. *Hearing preservation and speech perception outcomes with electric-acoustic stimulation after 12 months of listening experience.* [accepted, Laryngoscope]

Dillon MT, Buss E, Adunka MC, King ER, Pillsbury HC, Adunka OF, Buchman CA. *Long-term speech perception in elderly cochlear implant users.* JAMA Otolaryngol Head Neck Surg, 139(3):279-283.

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Heike, CL, Stueckle, LP, Hing, Pimenta, LA, Drake, AF, Sie, KY, Luquetti, D. *Advancement of clinical research and health care for children with craniofacial microsomia,* American Journal of Medical Genetics. Submitted, May 2013.

Farag AA, Deal AM, McKinney KA, Thorp BD, Senior BA, Ebert CS Jr, Zanation AM. *"Single-blind randomized controlled trial of surfactant versus hypertonic saline irrigation following endoscopic endonasal surgery in the early post-operative period".* Int Forum Allergy Rhinol. 2013. Apr;3(4):276-280.

Gore MR, Ebert CS Jr, Zanation AM, Senior BA. *"Beyond the "central sinus": radiographic findings in patients undergoing revision functional endoscopic sinus surgery.* Int Forum Allergy Rhinol. 2013. Feb;3(2):139-146.

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# Where to Find Us

In addition to the Department of Otolaryngology/Head and Neck Surgery's main clinic in the UNC Hospital in Chapel Hill, the Department has a clinic at Carolina Crossing in Chapel Hill, and sponsors the W. Paul Biggers, MD Carolina Children's Communicative Disorders Program (CCCDP), and the Center for Acquisition of Spoken language Through Listening Enrichment (CASTLE), located in Durham. In addition, the department has a general ENT presence at Chatham Hospital in Siler City, North Carolina.

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## 2013 Annual Report

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Contributors: Faculty and residents of  
UNC-Chapel Hill Department of OHNS.

Design: Nicolette DeGroot

Photography: Paul Braly, Nicolette DeGroot, Tom Fuldner, Lisa Park, Brian Strickland, Erin Thompson, and faculty, staff and residents of Dept of OHNS.

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ESKRIDGE FAMILY VISITS BEACH



RUBY (D. NEIL) HAYES (6/10/13)



UNC STUDENTS PROMOTE EAS



DR. KIM AUSTIN GOLFS WITH PROS



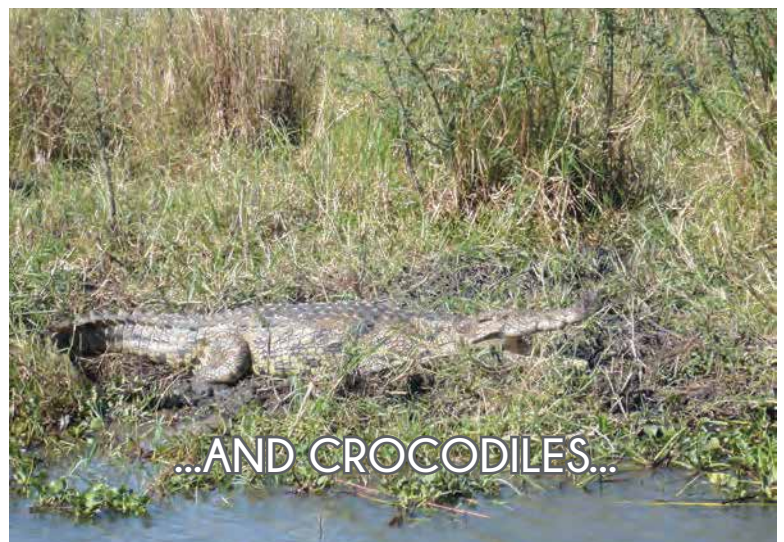
DR. ROSE PLAYS ICE HOCKEY



DR. FARAG RECEIVES VIETNAM GIFTS



DR. SHORES SPOTS ELEPHANTS...



...AND CROCODILES...





R. PILLSBURY GOLFS FOR THE KIDS

# What Else Do We Do?



ROBERT PLAYS WITH NOMADS BAND



ORGANIZE THE SUPPLY CLOSET



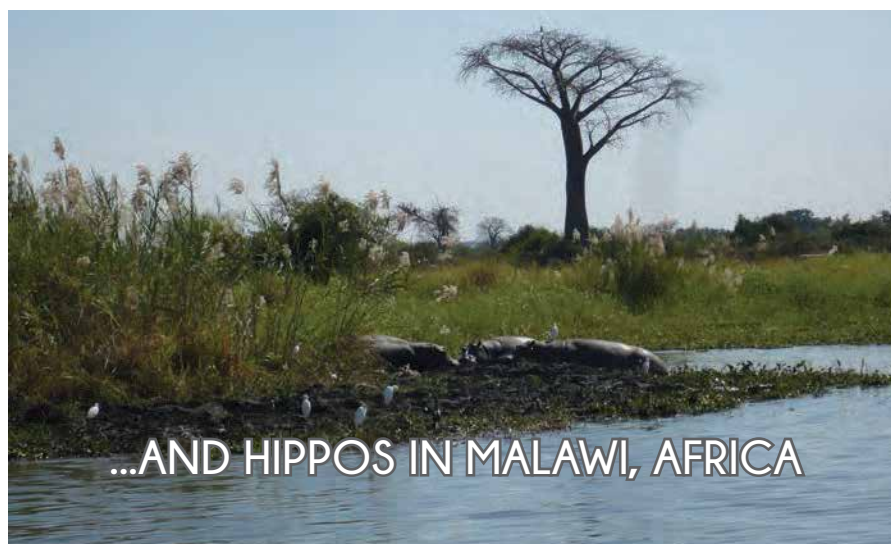
SIPPING TEA IN HO CHI MINH CITY



CELEBRATE ANNUAL COCHLEAR PICNIC



...AND GAZELLES...



...AND HIPPOS IN MALAWI, AFRICA





2013 OHNS resident graduate,  
Yu-Tung Wong, honed his skills this  
year in the new Temporal Bone Lab and  
Simulation Center in Thurston Bowles.







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HEAD AND NECK SURGERY

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