

UNC

DEPARTMENT OF OTOLARYNGOLOGY/
HEAD AND NECK SURGERY





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A MESSAGE FROM THE CHAIR



This year's annual report highlights the progress that we have made in teaching, research, and patient care over the last twelve months. Our faculty has grown and we have further specialized in areas where we perceived there were opportunities for growth. The addition of Dr. Peter Chikes, Dr. Andrea Jarchow, and Brien Pace, our new nurse practitioner, have allowed us the opportunity to meet the needs of our patients in General Otolaryngology, Facial Plastic Surgery, and Head and Neck Oncology to a greater extent than we were previously able to accomplish. All of these individuals have been busy from the start and further exemplify the service we provide to individuals within North Carolina who have specialty needs in our area.

We are about to open a new Skull Base Surgery Lab in collaboration with Neurosurgery and Ophthalmology which will significantly increase our educational capacity in the region for both our residents and our colleagues in the state. We anticipate giving regional as well as national courses in Rhinology, Temporal Bone Surgery, and Skull Base Surgery to educate otolaryngologists in areas such as sialodendoscopy advanced Rhinology, skull base surgery and advanced temporal bone procedures. In addition, we will be able to accomplish Anterior Skull Base, Lateral Skull Base, and Spine Surgery with the neurosurgeons. The ophthalmologists will use the lab for intricate eye procedures as well as oculoplastic procedures.

Our research program has made significant advances this year with the attainment of sufficient RO1s for a CORE grant. We are very proud of our research team for doing a wonderful job in both forging new frontiers as well as educating our residents and students in the latest research techniques. The list of presentations and publications at the end of this report is a tremendous testimony to our accomplishments in both the research and educational arena.

I am also very proud of our Development Leader, Leslie Nelson, who has helped us to develop the most recent of our eight endowed professorships. Leslie is a tireless worker who looks out for the best interests of our department and has really projected the message of the importance of philanthropy during these moments where the financial viability of our mission is in jeopardy.

One of our challenges in terms of our clinical business model is to optimize productivity and minimize expenses. As you can see from the tables in the beginning of the report, we have increased faculty and increased patients, and decreased clinic expenses. This has been a difficult transition, but it is nonetheless a vital part of our strategy to preserve our capacity to achieve our mission in the future.

I am confident that we will do well in the coming years because of the tremendous team spirit that we have here at UNC and our commitment to do what is best for our department, the medical school, the university, and the people in the State of North Carolina. We invite anyone who receives this report to visit us at UNC and witness firsthand the progress we have made in Otolaryngology/Head and Neck Surgery.

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

MISSION & OBJECTIVES

MISSION

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 applications.

OBJECTIVES

To provide excellent otolaryngologic/head and neck surgical patient care that can serve as a national model.

To provide outstanding undergraduate and postgraduate education that disseminates otolaryngology/head and neck surgery knowledge and facilitates more contributions to the knowledge base.

To carry out basic science, clinical, and health services research that advance the field of otolaryngology/head and neck surgery.

A MESSAGE FROM THE DEAN



As UNC Hospitals celebrates its 60th anniversary this year, we also celebrate the successful six decades of our four-year medical school. Because of our state's willingness to invest in the health of North Carolinians in the 1950s, we are able to better train the next generation of physicians and live out our values of leading, teaching and caring.

I am proud that our School continues to be recognized as one of the best medical schools in the country thanks to the hard work of our faculty, staff and students. Additionally, I am pleased that our Ear, Nose and Throat Department has once again earned a place in the 2012-2013 [U.S. News & World Report Best Hospitals](#) rankings.

Together, the UNC Health Care System and the School of Medicine are able to serve patients from all 100 counties, regardless of their ability to pay. The partnership between the School and our System will be important as our state's population continues to grow. By working together to improve access to quality health care for all North Carolinians, we can mitigate the challenges of the future and improve the overall health of our communities.

As the health care landscape changes, we continue to strive to meet the needs of our state. Thank you for your service to our students and each patient who walks through our doors. Because of you, we continue to improve the practice of medicine and delivery of care.

A handwritten signature in black ink that reads "William L. Roper".

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

THE UNC SCHOOL OF MEDICINE

OUR VISION

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

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 under served 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.

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.

OUR MISSION

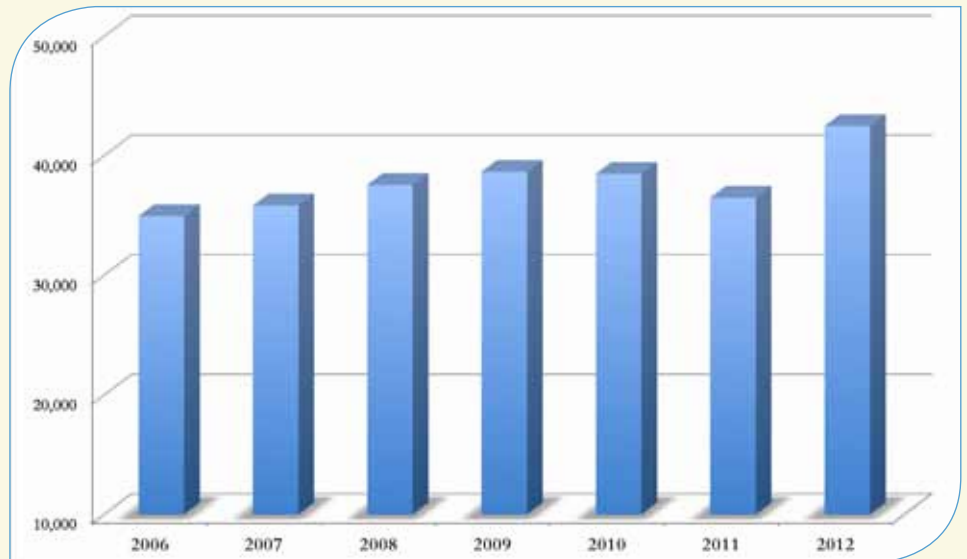
Our mission is to improve the health of North Carolinians and others whom we serve. We will accomplish this by achieving excellence and providing leadership in the interrelated areas of patient care, education, and research.

Education

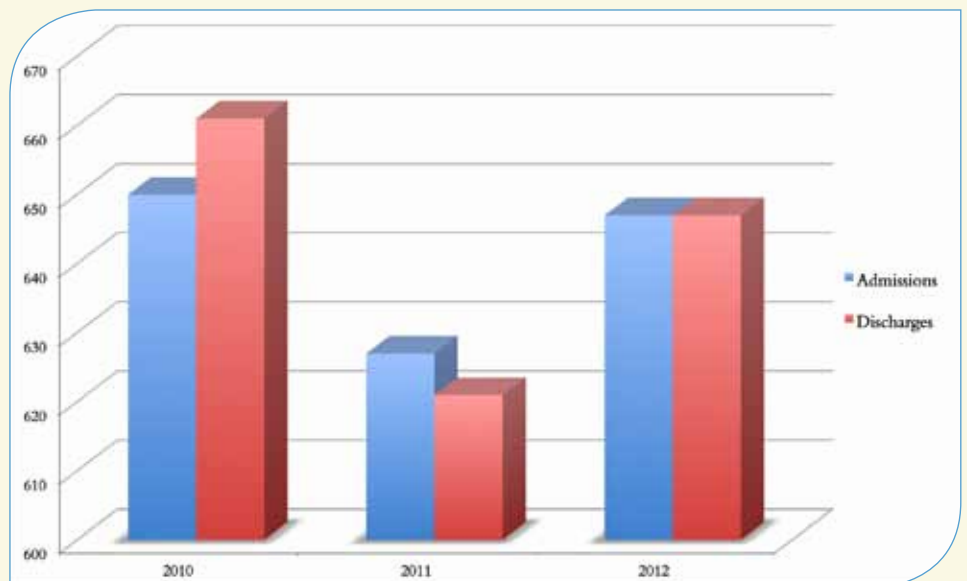
We will achieve excellence in educating tomorrow's health care professionals and biomedical researchers by providing exceptional support for outstanding teaching and research faculty. We will offer an innovative and integrated curriculum in state-of-the-art facilities. The School will attract the very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

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

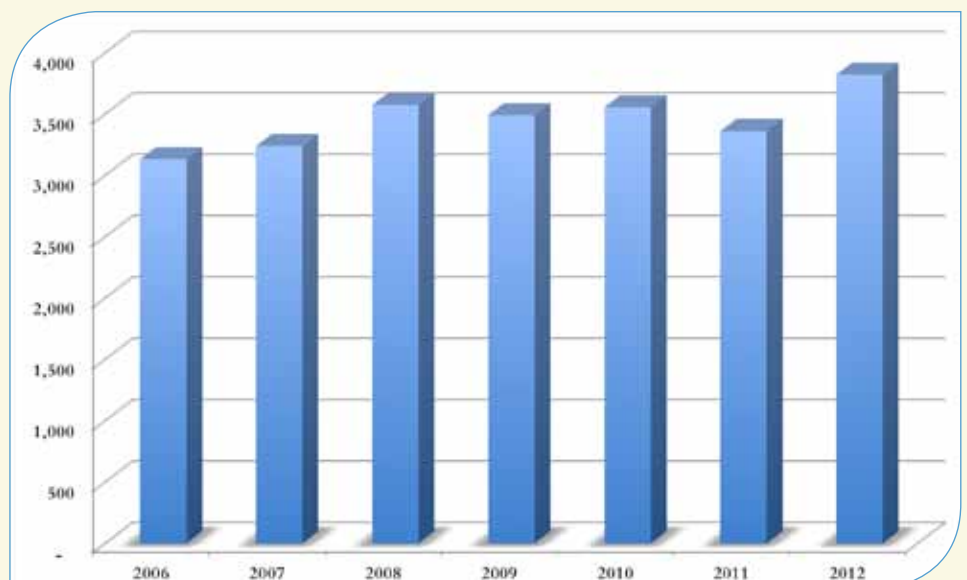
OUTPATIENT VISITS



INPATIENT ADMISSIONS & DISCHARGES

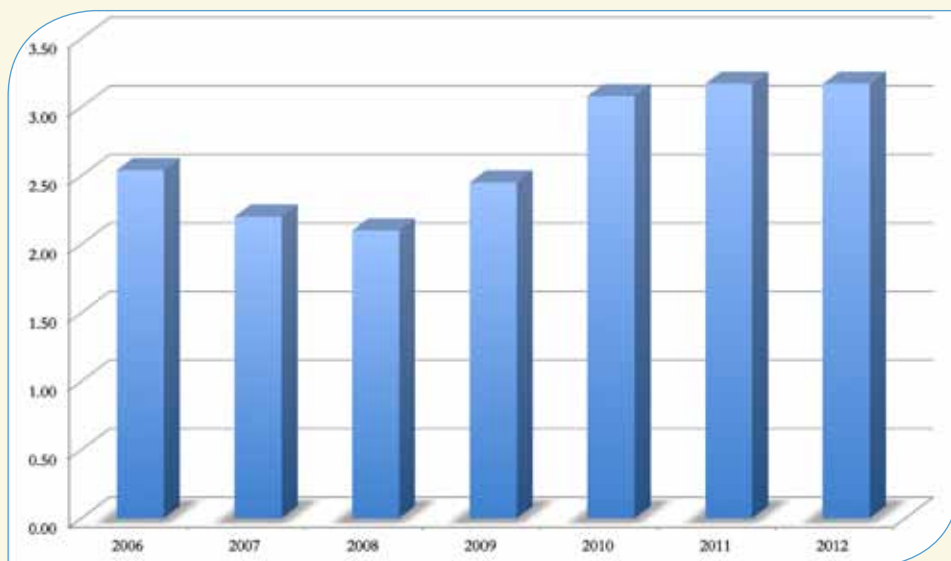


OR CASES

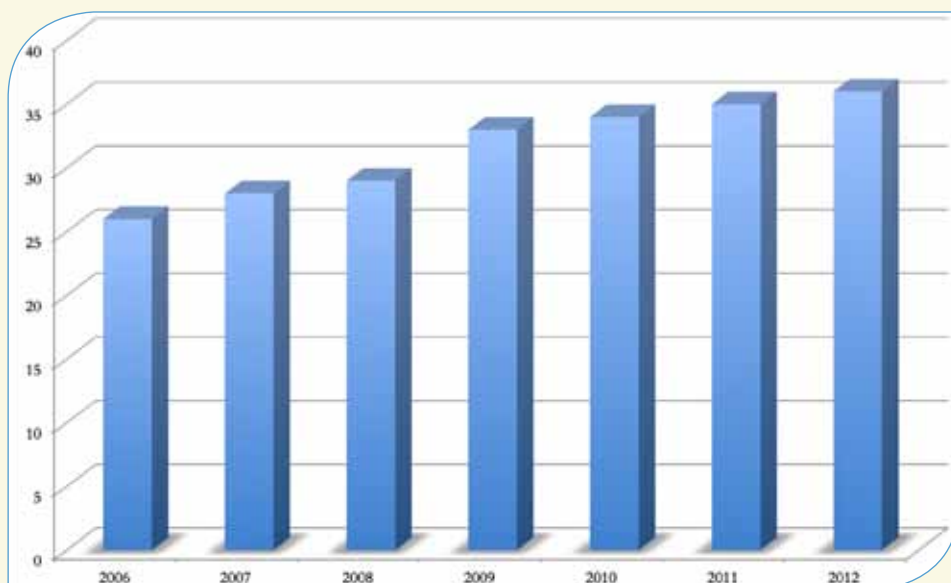


GRANT FUNDING

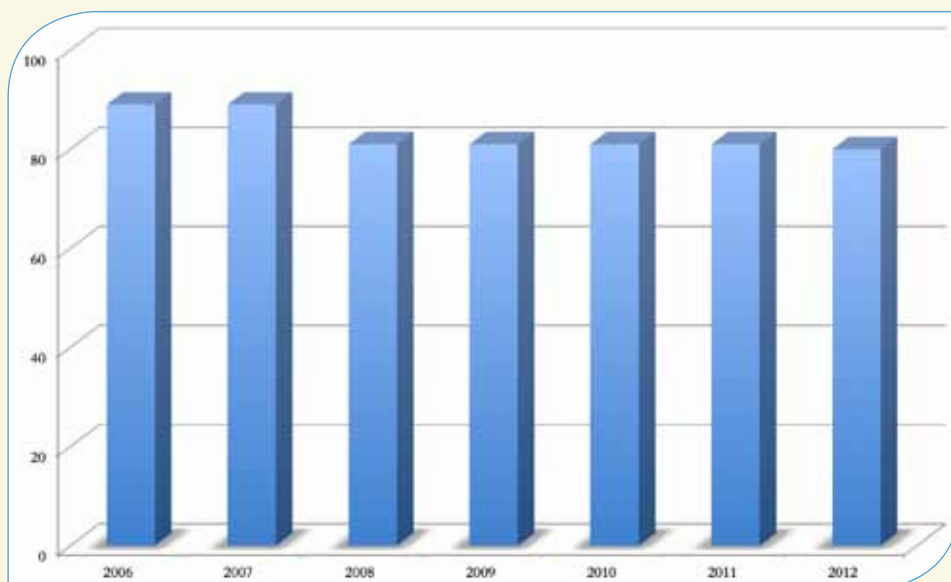
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FACULTY

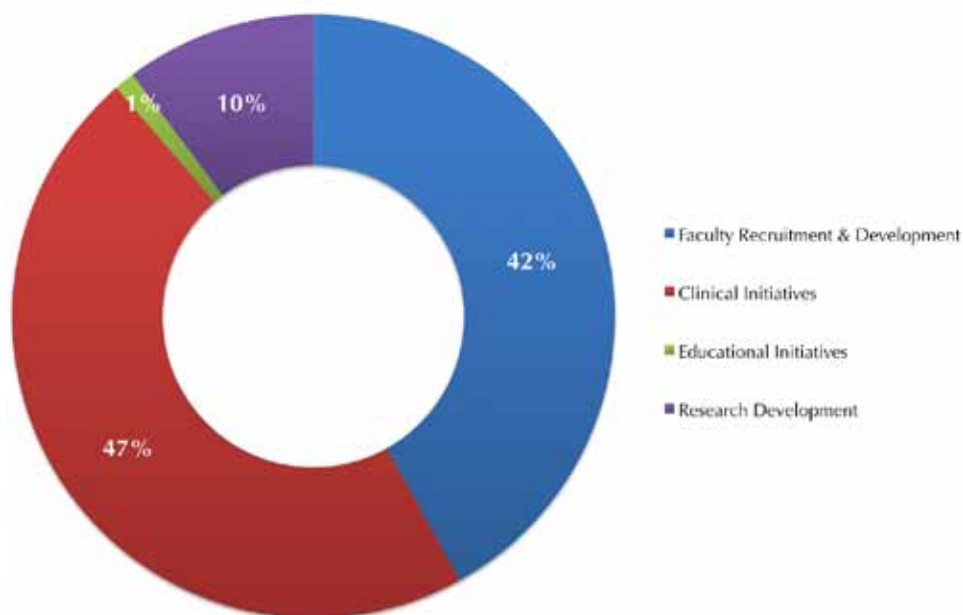


STAFF



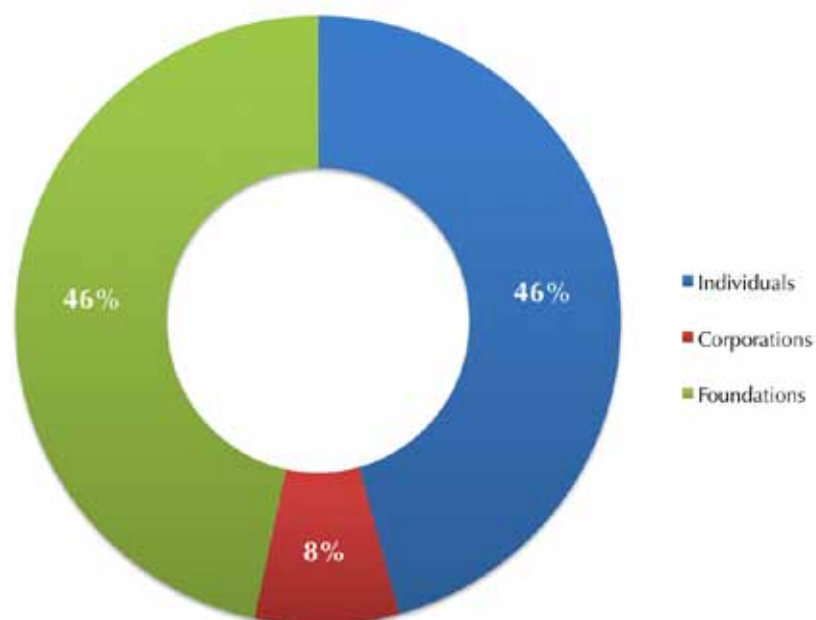
2011-2012 GIVING BY GIFT TYPE

Faculty Recruitment & Development	\$222,373
Clinical Initiatives	\$245,116
Educational Initiatives	\$5,850
Research Development	\$54,340
TOTAL	\$527,679



2011-2012 GIVING BY DONOR TYPE

Individuals	\$241,019
Corporations	\$40,660
Foundations	\$246,000
TOTAL	\$527,679



During 2011–2012, more than 200 individuals, corporations and foundations contributed over \$525,000 to help the Department of Otolaryngology/Head and Neck Surgery provide world-class patient care while simultaneously achieving significant accomplishments in education, research, and outreach across North Carolina and beyond. Particularly in tough economic times we are extremely grateful for the private support that we have received.

Abilitations Children's Therapy	Mrs. Nancy S. Cohn	Mr. and Mrs. J. Rich Haley II
Ms. Elisa Ackerman	Dr. and Mrs. Peter D. Costantino	Dr. and Mrs. Michael S. Hanemann
Addison's Aid Inc.	Mr. Thomas T. Covington	Drs. Stuart M. and Marie N. Hardy
Dr. and Mrs. Oliver Adunka	Dr. and Mrs. Stanley C. Cox III	Mr. James E. Harlee
Alamance Ear, Nose & Throat, LLP	Ms. Sheila D. Creth	Ms. and Mr. Joan S. Haskin
Dr. Joni Y. Alberg	Ms. Melissa J. Deans	Ms. Cindy W. Haskin
Dr. and Mrs. John W. Alldredge	Mr. and Mrs. Richard L. Deselm	Dr. and Mrs. Alexander C. Hattaway III
Anonymous	Dr. and Mrs. Brian W. Downs	Dr. and Mrs. S. Brett Heavner
Dr. and Mrs. Edward Attarian	Mr. and Mrs. Alan P. Dozier	Dr. and Mrs. Timothy Heffron
Mr. and Mrs. Robert A. Baillie	Mrs. Emily L. Drab	Ms. Kristina Helms
Ballet School of Chapel Hill	Dr. and Mrs. Marc G. Dubin	Dr. and Mrs. Douglas E. Henrich
Mr. Eric Barber	Mrs. Betty C. Edge	Mrs. Kelly R. Hernandez
Mr. and Mrs. Charles Bare	Mr. Edgar Edge	Mr. and Mrs. William T. Herring
Tom Barnhardt Family Foundation Inc.	Edge Family Foundation	Hog Slat, Inc.
Mr. Owen Barrow	Mr. and Mrs. William D. England	Mr. and Mrs. Perry C. Hinkle
Ms. Ginger Blakeley	Ms. Hannah R. Eskridge	Ms. Joan M. Holland
The Nickolas Bunn Boddie, Sr. & Lucy Mayo Boddie Foundation	Mr. and Mrs. William W. Eskridge	Mrs. Denise W. Horn
Ms. Sarah Boudreau	Ms. Maegan K. Evans	Mr. Henry C. House III
Mr. Edward N. Bowman	Mrs. Ruth A. Everett	Dr. and Mrs. N. Neil Howell
Mrs. Ana Brady	Dr. and Mrs. William L. Fan	Ms. Melissa B. Hudgens
Ms. Erin Branch	Mrs. June M. Ficklen	Mr. and Mrs. Manfred H. Huebner
Dr. and Mrs. George M. Brinson	Mr. Chris FitzSimons IV	Mrs. Beth H. Isenhour
Dr. and Mrs. Alan Brookhart	Ms. Janet L. Flowers	Mr. and Mrs. John M. Iwasiw
Dr. Susan E. Brown	Ms. Lela Ward Floyd	Ms. Shannon Jesinkey
Dr. and Mrs. Craig A. Buchman	Ms. Gail Frye	Ms. Sandra K. Johnson
Ms. Anne M. Cabell	Mr. and Mrs. E. Paul Gardner	Ms. Melcheemoco T. Johnson
Mrs. Deborah P. Calhoun	Mr. and Mrs. Stephen B. Getz	Drs. Janine and Raleigh Jones
Mr. James B. Callanan	Mr. and Mrs. Gordon Gold	Mrs. Jennifer L. Jones
Ms. Mildred S. Campbell	Dr. and Mrs. M. Miles Goldsmith	Mr. and Mrs. Kamnik Kamo
Mr. John R. Carlson and Ms. Caitlyn Fenhagen	Drs. Karen and Charles Goss	Mr. Jamie W. Katzberg
Mr. Charles B. Carver	Mr. and Mrs. Jamey Gray	Mr. and Mrs. David B. Keim
Chelsea Theater, Inc.	Ms. Roslyn G. Greenspon and Mr. Martin E. Birnbaum	Kids 'N Community Foundation
Mr. Zhao Cheng	Dr. Laurel B. Gropper and Mr. Carl R. Stice	Ms. Kay Kim
Ms. Manisha Chopra	Mr. and Mrs. Michael T. Hale	Mr. Ross C. Kirkman
Dr. and Mrs. Joseph Madison Clark II		Dr. Michelle M. Kiser

Mr. and Mrs. Tadeusz Kleindienst	Mrs. Leslie H. Nelson	Mrs. Georganna G. Simpson
Ms. Naomi Kojima	Dr. and Mrs. Daniel K. Nelson	Mr. and Mrs. David N. Skergan
Dr. and Mrs. Robert F. Labadie	Mr. Glen Newsome	Mr. W. P. Sommerfeld
Dr. and Mrs. Jeffrey B. LaCour	Dr. and Mrs. James S. Noblitt	J. C. Steele & Sons, Inc.
Mr. and Mrs. Nicholas J. LaMagna	Oaktree Products, Inc.	Mr. and Mrs. Bruce H. Stone
Mr. Lawrence A. Larsen	Oberkotter Foundation	Street Scene Teen Center, Inc.
Mrs. Barbara B. Lee	Mr. and Mrs. J. Delos O'Daniel	Mrs. Alicia L. Strein
Ms. Clara N. Lee and Mr. William C. Miller	Oticon, Inc.	Dr. Colin G. Thomas, Jr.
Dr. and Mrs. Thomas B. Logan	Owen, Gleaton, Egan, Jones & Sweeney, LLP	Mr. Jared A. Tomlinson
Dr. and Mrs. Thomas C. Logan	Mr. and Mrs. Tracy G. Peck	Triangle Community Foundation, Inc.
Mr. and Mrs. Matthew Maciejewski	Ms. Gabriele L. Pelli	Ms. Melissa Trofi
Ms. Jane C. MacNeela	Mr. and Mrs. Melvin L. Perry	Mr. and Mrs. Timothy G. Turkington
Drs. Bharat B. and Ragini T. Madan	Dr. Mary T. Pettiette	Ms. Sandra Usrey
Mr. and Mrs. Kevin W. Maddox	Mr. and Mrs. Terry Pils	Dr. and Mr. Courtney H. Van Houtven
Dr. Amritpal K. Manes and Mr. Dilbag S. Gill	Mr. and Mrs. Michael B. Poythress	Mrs. Sherri D. Vernelson
Ms. Patricia M. Manser	Mr. and Mrs. John D. Pridgen	Dr. and Mrs. Glenn W. Walters
Marian Lane Interiors	Mr. John T. Purves	Mr. and Mrs. Bobby Ward
Mr. and Mrs. Ashok Mathur	Ms. Javeria S. Qureshi	Ms. Mollie M. Ward
Ms. Catherine J. Maxwell and Mr. Richard B. Fewel	Ms. Caroline W. Raby	Ms. Laura G. Ward
The John P. McConnell Foundation	W. Trent Ragland, Jr. Foundation	Mr. and Mrs. Robert P. Weaver
Mr. and Mrs. Michael J. McCrain	Mr. and Mrs. Philip A. Rees	Dr. and Mrs. Morris Weinberger
Ms. Shearin B. McGee	Mr. Chad Resnik	Dr. and Mrs. Tracey G. Wellendorf
Drs. Shannon and Chapman McQueen	Ms. Franziska S. Rokoske	Wells Fargo
MED-EL Corporation	Mr. Thomas L. Rominger	Mrs. and Mr. Lori J. Wilding
Ms. Kathleen L. Medlin	Dr. Austin S. Rose	Ms. Kathryn Wilson
Mr. and Mrs. David M. Meiburg	Ms. Nancy Rosebaugh and Mr. Charles Nordan	Mr. Thomas R. Winton
Mrs. Peggy Mielke	Drs. Patricia and Jackson Roush	Ms. Jane Y. Woodbury
Dr. and Mrs. John Migaly	Mrs. Melody H. Savage	Drs. Jonathan R. Workman and Vanessa Albernaz
Millennium Charter Academy	Mr. John E. Scarborough	Ms. Elizabeth M. Yancy
Mrs. Susan Moody	Dr. and Mrs. Brent A. Senior	Dr. and Mrs. Wendell G. Yarbrough
Ms. Cathy Lynn Moore and Mr. Stephen T. Gheen	Mr. and Mrs. Daniel J. Shannon	Lawrence J. Yenni, M.D., PLLC
Mr. and Mrs. Donald E. Moore	Dr. James D. Sidman	Mr. and Mrs. Charles M. Young
Mr. and Mrs. Sean C. Munday	Mr. Yujun Shao	Young Moore and Henderson P.A.
Mr. and Mrs. Steven M. Murphy	Mr. and Mrs. Mark L. Shapiro	Dr. and Mrs. Carlton J. Zdanski
The NCFI\Barnhardt Foundation	Mrs. S. R. Sherali	
	Dr. Carol G. Shores	
	Mr. Parker Shoun	
	Ms. Luella A. Simopoulos	

DISTINGUISHED PROFESSORSHIPS

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.

The son of a Chatham County farmer, Dark was born in 1894. A member of the class of 1925, Dark studied in the University's School of Commerce — now the Kenan-Flagler Business School — and caught the attention and admiration of then-Dean Dudley DeWitt Carroll and John Sprunt Hill of Durham, who built and gave The Carolina Inn to the University. Dark handled John Hill's business correspondence relating to the construction of the inn and, upon its completion, was kept on for another year as social manager.

After receiving a Certificate of Commerce from the University in 1925, 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. Then Carroll

recommended him for 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. When he became president, the company had 18 employees with varying levels of expertise in manufacturing small precision metal parts for cigarette lighters, toys, mining lamps and hardware. During World War II, under Dark's leadership, this small, obscure firm expanded, filling U.S. Army, Navy and Army Air Corps contracts for precision parts used in ordnance, radar and communications equipment for

fighter and bomber planes. At this time, Dark 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 activities 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, Ph.D. 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.



*Thomas J. Dark Research Professor:
Paul B. Manis, PhD (2011-present)*



*Thomas J. Dark Professor:
Harold C. Pillsbury III MD
(1991-present)*

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 Riddle.

Riddle was born in 1921 in Fayetteville. 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 Riddle began as a mail carrier. In 1952, Riddle, with the help of his father-in-law, 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. In addition, Riddle purchased and developed the 600-acres Cross Creek Mall area to transform his hometown into a major retail shopping center.

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 member of the

School of Medicine's Co-Founders Club and 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 the professorship, Riddle contributed funds to the Division of Cardiology in the Department of Medicine for research associates and specialized scientific equipment. 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.

Riddle's continued interest and support of medical programs at the University resulted in a substantial gift to the UNC-CH Lineberger Comprehensive Cancer Research Center. 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, had 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 Distinguished Professorship

The Newton D. Fischer Distinguished Professorship was established in 1993 to honor 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 held for more than 30 years. He was among the first doctors to receive an otolaryngology training grant from the National Institutes of Health. In 1977, Fischer was named the Thomas J. Dark Distinguished Professor of Surgery, the chair he held until 1991.

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. Among the many residents Fischer trained is Harold C. Pillsbury III, who said of Fischer, "The loving care of a man of this depth is the sort of support an individual needs to really accomplish his best work."

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. Janet J. Fischer died after a courageous fight with breast cancer on February 24, 2007. At her memorial service, she was described by her grandson as "a remarkable woman who lived an extraordinary life."

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.

James Skinner Ficklen, Jr., 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



*Joseph Palmer Riddle Professor:
Mark C. Weissler, MD
(2000-present)*



*Newton D. Fischer Professor:
Amelia F. Drake, MD
(1998-present)*



*James S. and June M. Ficklen
Professor: Joseph W. Hall, III,
PhD (2011-present)*

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 E. 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. Harris, Crouch, Long, Scott & Miller provides its clients with innovative and creative insurance solutions that help to assist businesses and maintain family wealth.



Nathaniel T. and Sheila E. Harris Professor: Brent A. Senior, MD (2011-present)

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 Medical Foundation of North Carolina Board, the Lineberger Comprehensive Cancer Center Board of Visitors and is a past member of the UNC Board of Visitors. Mr. Harris enjoys bird hunting with friends throughout the US, Central America, South America, Africa and Europe. He is also an avid saltwater fly fisherman and has fished in Australia, Mexico, Guatemala, Costa Rica, Panama and Venezuela.

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 4 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 11 years. He is Chief of the Division of Rhinology, Allergy, and Endoscopic Skull Base Surgery and Vice Chair for Academic Affairs for the Department. He has a strong national and international reputation in the fields of Rhinology and Endoscopic Sinus Surgery, having served as President of the American Rhinologic Society and on the Board of Directors of the International Rhinologic Society. He has an unwavering commitment to education, having received numerous teaching accolades while also serving as immediate past chair of the Rhinology and Allergy Education Committee for the American Academy of Otolaryngology/Head and Neck Surgery. He also serves as Associate Editor for the International Forum of Allergy and Rhinology and on the Editorial Boards of numerous national and international otolaryngologic journals. His commitment to humanitarian efforts is well known through his work around the world and, specifically, for the last 15 years, in Vietnam where he has received the Peoples Medal for his work there as well as the Medal of Honor from City of Ho Chi Minh City. He received the Humanitarian of the Year Award from the American Academy of Otolaryngology in 2005.

The W. Paul Biggers 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.

Paul 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 completed his internship and residency also 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 lifetime interest in speech and language and served on the Board of Examiners for Speech and Language Pathologists and Audiology. Through tireless efforts, he ensured that the state legislature establish and continue a program designed to aid children with speech and hearing disorders. This program has already benefitted thousands of children within the State of North Carolina. For these efforts, he was presented the Service to Mankind Award and was honored with the H. Fleming Fuller Award as the outstanding clinician at the UNC Hospitals.

Established in 1992, the Carolina Children's Communicative Disorders Program (CCCDP) was made possible by Dr. Biggers' insight, perseverance, and generosity of spirit. This program is funded by the State of North Carolina and aids children with speech and hearing disorders. To honor him, the name was changed to the W. Paul Biggers, MD, Carolina Children's Communicative Disorders Program. Outside of the Division of Otolaryngology/Head and Neck Surgery, 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. These



W. Paul Biggers Professor:
William W. Shockley, MD
(2005-present)

accomplishments only begin to describe the service that Dr. Biggers provided to the State, the University, and to Otolaryngology/Head and Neck Surgery at UNC.

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. On July 1, 2005, William W. Shockley, MD, was named the W. Paul Biggers Distinguished Professor

of Otolaryngology/Head and Neck Surgery, to continue the tradition of excellence in patient care, compassion, teaching, and service that Dr. Biggers exemplified.

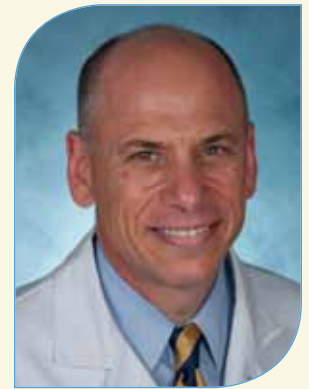
The Harold C. Pillsbury III MD Distinguished Professorship

We are pleased to announce that we are in the final phase of fundraising for the Harold C. Pillsbury III MD Professorship in Otolaryngology/Head and Neck Surgery 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 and has served as Chair of the Department since.

Dr. Pillsbury has completed an eighteen year term on the American Board of Otolaryngology where he served as 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.



Harold C. Pillsbury Professor:
Craig A. Buchman, MD, FACS
(2012-present)

The inaugural Harold C. Pillsbury III MD Professorship has been awarded to Craig A. Buchman, MD, FACS.

Dr. Buchman has been at UNC for over 11 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.

Thanks to the leadership and generosity of professorship campaign co-chairs Dr. Doug Henrich (R-97) and Dr. Tom Logan (R-97) and many, many of our former residents, we have made significant progress toward fully financing this professorship. Gifts already total well over \$600,000. We hope with your generous contributions we can meet our ultimate goal of \$667,000 which would qualify for State of North Carolina matching funds of \$333,000 to achieve a \$1 million endowment.

If you have not already done so, please consider making a gift in support of the Harold C. Pillsbury Professorship today by calling or emailing our Director of Development, Leslie Nelson. She can be reached at 919-843-5734 & leslie_nelson@med.unc.edu

Administration

Harold C. Pillsbury III MD, FACS (Department Chair)
 Craig A. Buchman, MD, FACS (Vice Chair for Clinical Affairs)
 Brent A. Senior, MD, FACS, FARS (Vice Chair for Academic Affairs)
 Carolyn H. Hamby (Clinical Academic Department Administrator)

Division of Otolaryngology & Skull Base Surgery The UNC Ear & Hearing Center

Craig A. Buchman, MD, FACS (Division Chief, Center Director)
 Harold C. Pillsbury III MD, FACS
 Oliver F. Adunka, MD

UNC Skull Base Center

Oliver F. Adunka, MD, FACS (Director)
 Harold C. Pillsbury III MD, FACS Brent A. Senior, MD, FACS, FARS
 Craig A. Buchman, MD, FACS Adam M. Zanation, MD
 William W. Shockley, MD, FACS Charles S. Ebert, MD, MPH

Division of Pediatric Otolaryngology

Carlton J. Zdanski, MD, FACS, FAAP (Chief)
 Amelia F. Drake, MD, FACS (Executive Associate Dean of Academic Programs)
 Austin S. Rose, MD (Fellowship Director)
 Lorien M. Paulson, MD (Fellow, 2012-2013)

Division of Facial Plastic & Reconstructive Surgery

William W. Shockley, MD, FACS (Chief)
 Andrea Jarchow-Garcia, MD

Division of Rhinology, Allergy & Endoscopic Skull Base Surgery

Brent A. Senior, MD, FACS, FARS (Chief)
 Harold C. Pillsbury, MD, FACS Peter G. Chikes, MD, FACS
 Adam M. Zanation, MD Brett E. Dorfman, MD (WakeMed)
 Charles S. Ebert, Jr., MD, MPH Michael O. Ferguson, MD (WakeMed)
 Julia S. Kimbell, PhD Esa A. Bloedon, MD (WakeMed)
 Austin S. Rose, MD Allen F. Marshall, MD (WakeMed)

W. Paul Biggers Carolina Children's Communicative Disorders Program

Craig A. Buchman, MD, FACS (Medical Administrative Director)
 Harold C. Pillsbury, MD, FACS (Executive Director)
 Carlton J. Zdanski, MD, FACS | Oliver F. Adunka, MD
 Holly F.B. Teagle, AuD, CCC-A (Program Director)
 Hannah R. Eskridge, MSP, CCC-SLP (CASTLE Director)

The Adult Cochlear Implant Program

Marcia Clark Adunka, AuD, CCC-A (Director)
 English R. King, AuD, CCC-A (Clinical Audiologist)
 Ellen Pearce, AuD, CCC-A (Clinical Audiologist)
 Margaret T. Dillon, AuD, CCC-A (Cochlear Implant Research Audiologist)

Sleep & Snoring Surgery

Brent A. Senior, MD, FACS, FARS

Division of Head and Neck Oncology/ Head & Neck Cancer Research

Mark C. Weissler, MD, FACS (Chief)
 William W. Shockley, MD, FACS Andrew F. Olshan, PhD
 Carol G. Shores, MD, PhD, FACS D. Neil Hayes, MD, MPH
 Brian Kanapkey, MA Brien R. Pace, ACNP-BC
 Adam M. Zanation, MD Sean Gallagher, RN
 Trevor G. Hackman, MD, FACS Nancy Jensen, RN

Division of Voice and Swallowing Disorders / The UNC Voice Center

Robert A. Buckmire, MD (Division Chief, Center Director)
 Mark C. Weissler, MD, FACS
 Ellen S. Markus, MA, CCC-SLP, DMA
 Elizabeth Ramsey, MS, CCC-SLP

UNC Head & Neck Robotic Surgery Program

Adam M. Zanation, MD (Director)
 Charles S. Ebert, MD, MPH
 Trevor G. Hackman, MD, FACS

Division of Auditory Research

Joseph W. Hall, PhD (Chief)
 Paul B. Manis, PhD Douglas C. Fitzpatrick, PhD
 John H. Grose, PhD Patricia A. Roush, AuD
 Emily Buss, PhD Margaret T. Dillon, AuD, CCC-A
 Shuman He, MD, PhD

Division of Research Training & Education

Paul B. Manis, PhD (Chief)
 Joseph W. Hall, PhD Julia S. Kimbell, PhD
 John H. Grose, PhD D. Neil Hayes, MD, MPH
 Emily Buss, PhD Shuman He, MD, PhD
 Douglas C. Fitzpatrick, PhD

WakeMed Faculty Physicians

Michael O. Ferguson, MD (Chief)
 Brett E. Dorfman, MD
 Esa A. Bloedon, MD
 Allen F. Marshall, MD

Fellowship Program Directors

Pediatric Otolaryngology
 Austin S. Rose, MD

Advanced Head and Neck Oncology
 Adam M. Zanation, MD
 Trevor G. Hackman, MD

Rhinology and Skull Base Surgery
 Charles S. Ebert, MD, MPH;
 Adam M. Zanation, MD

Neurotology
 Oliver F. Adunka, MD

NEW FACULTY APPOINTMENTS



Peter G. Chikes, MD, FACS

On April 2, 2012, Dr. Chikes joined the UNC Department of Otolaryngology/Head and Neck Surgery as an Assistant Professor. Dr. Chikes graduated from Duke University and the University of North Carolina at Chapel Hill School of Medicine. He served in the Army and received the Army Commendation Medal for his service. He opened a practice in ENT in Concord, NC thirty-three years ago.

Dr. Chikes is a fellow in the American Academy of Otolaryngology - Head and Neck Surgery, the American Academy of Otolaryngic Allergy and The American College of Surgeons. He will continue to see patients of otolaryngic allergy and provide insights on the private practice of medicine and medical school education.



Andrea M. Jarchow-Garcia, MD

On January 1st, 2012, Dr. Jarchow-Garcia joined the UNC Department of Otolaryngology as an Assistant Professor. Dr. Jarchow-Garcia is a Facial Plastic and Reconstructive Surgeon. After graduating from Davidson College, she obtained her M.D. degree from Brody School of Medicine at East Carolina University. She subsequently completed an Otolaryngology/Head and Neck Surgery residency at Case Western Reserve in Cleveland, Ohio. Following residency, Dr. Jarchow-Garcia was selected as an accredited fellow for the American Academy of Facial Plastic and Reconstructive Surgery. She spent her fellowship year under the mentorship of Dr. Calvin Johnson in New Orleans, Louisiana. Her fellowship training included surgery for the aging face, facial rejuvenation with injectables and fillers, and rhinoplasty.

Her practice is dedicated to surgical treatment of the aging face including browlifts, upper and lower blepharoplasty, and facelifts. She also has special surgical interest in cosmetic and traumatic rhinoplasty. She offers a full-range of office procedures with emphasis on injectables and fillers for facial rhytids. Dr. Jarchow-Garcia adheres to the principle of restoring a natural facial appearance to her patients.



Brien R. Pace, RN, RNFA, ACNP-BC

On April 2, 2012 Brien joined the UNC Department of Otolaryngology/Head and Neck Surgery as clinical faculty. Brien Pace graduated from Duke University School of Nursing with a Master's Degree in Nursing as an Acute Care Nurse Practitioner with specialties in Acute Care, Cardiology and Oncology in 2009. Brien is board certified in these areas by the (ANCC) American Nursing Credentialing Center. Brien has been a nurse for the past 17 years and worked in critical care ICU areas as well as the operating room. Brien has also managed a cardiac catheterization lab at the Medical University of South Carolina. Brien's most recent work was here at the Durham North Carolina Veterans Hospital as an Acute Care Nurse Practitioner in Neurosurgery before joining the Department of Otolaryngology at UNC.

Brien is part of the Head and Neck cancer group at UNC Otolaryngology, and continues to care for patients in Otolaryngology Head and Neck cancer. He assists the group in the operating room as well.



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

Professor

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 and skull base surgery, lateral skull base surgery, acoustic tumors, cochlear implants, hearing preservation.



Brent A. Senior, MD, FACS, FARS

Professor

Nathaniel T. and Sheila E. Harris Distinguished 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

Assistant 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

Professor
Director, UNC OHNS 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

Associate 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

Professor
 Newton D. Fischer Distinguished Professor
 Associate Program Director, UNC OHNS 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

Professor

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

Professor

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.



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

Professor
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

Associate 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

Professor
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

Assistant Professor
Director, UNC OHNS 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.



Four physicians who hold faculty appointments in the UNC Department of Otolaryngology/Head and Neck Surgery practice in Wake County at WakeMed Health and Hospitals. They are Drs. Esa Bloedon, Brett Dorfman, Michael Ferguson (Director and Chief) and Allen Marshall. All four members are board certified and all practice across the spectrum of otolaryngology.

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 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 and Knightdale. Call the numbers below to make an appointment.

ENT-NORTH HEALTHPLEX
10000 Falls of Neuse Rd
Suite 205
Raleigh, NC 27614
919-350-1630

ENT KNIGHTDALE
6905 Knightdale Blvd
Suite 102
Knightdale, NC 27545
919-350-5755

WAKEMED RALEIGH
3000 New Bern Ave
Andrews Bldg
Raleigh, NC 27610
919-350-7856



ENT Support Clinic Staff from left to right: Patient Business Associates (PBA), Alison Turner, and Wendy Boyd; Diane Burden, CNA; Head Nurse, BJ Squires, RN; Associate Chair for Administration, Carolyn Hamby; Patient Business Associate Supervisor, Anna Bradshaw; Ivy Carroll, RN; PBA, Earlene Howze; and PBA's, Sabrina Harris, and Kieli Werr.

Carolyn Hamby, Clinical Academic Departmental Administrator
Leslie Nelson, Director of Development

Administrative Academic Affairs

Jonna Apple
Kathy Bogie
Nicolette DeGroot
Ellen Douth
Cheryl Goodrich
Kelly Hair
Kathy Harris
Dawn Wilson
Donna Woodard

Research Affairs

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Shana Jacobs, AuD
Heather O'Donohue
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Tara Steplowski

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Clara Frye | Karen Offutt

UNC P&A (UNC Healthcare)

Jason Shropshire

Surgery Schedulers

Anna Bradshaw (Supervisor)
Katherine Eng
Patricia Longest
Phyllis Dixon
Ali Turner
Michelle Handy

Nursing Staff (UNC Healthcare)

Diane Burden, CNA
Ivy Carroll, LPN
Brittany Cline, CMA
Robin Gunter, RN
Kristen Jewell, RN
Jo Ann Kelly, RN
Lynda Lucas, RN
Ashley Lynch, CMA
Joanne McClain, LPN
Teresa McInerney, RN
Pat Perry, CNA
SoonYoung Rondinelli, RN
Katherine Sams, RN
BJ Squires, RN
Regina Stoffel, RN
Jennifer Tapia, CNA
Kathy Tommerdahl, RN
Linnea VanPelt, RN
Samylia Alston, CNA

CCCCP

Erika Beals
Deb Hatch
Robert Humphreys
Lisa Park
Jennifer Woodard
Velma Grose

CASTLE

Maegan Evans
Sandra Hancock
Lillian Henderson
Lori Parker
Erin Thompson
Chrissy Kramer

Patient Business Associates

Anna Bradshaw (Supervisor)
Angel Jeffries
Paige McDaniel
Earlene Howze
Tery Armstrong
Wendy Boyd
Melodie Pellot-Hernandez
Julia McGuire
Sabrina Harris
Kieli Werr



Administrative Academic Affairs Staff, left to right: Nicolette DeGroot (Director of Communications), Ellen Doult (Residency Program Coordinator and Administrative Assistant to Drs. Drake and Ebert), Kathy Bogie (Administrative Assistant to Drs. Senior and Buckmire), Kathy Harris (Executive Assistant to Dr. Pillsbury), Jonna Apple (Administrative Assistant to Drs. Shockley, Shores, and Hackman), Cheryl Goodrich (Human Resources Manager), Dawn Wilson (Administrative Assistant to Drs. Zdanski, Rose, and Zanation), and Donna Woodard (Administrative Assistant to Drs. Weissler, Buchman, and Adunka).

As our department continues to grow, I am amazed at how our staff embraces every day with their absolute best to make ONHS one of the premier clinics at UNC. We have many new faces in our clinic with growth and with senior staff retiring. It is very comforting to know the quality of our nursing staff and know they always keep patient care first on their agenda. With every new addition to our department, we are fortunate to learn from their expertise. These new staff members have brought some of the best ideas to help our clinic which has helped us open up to change which is not always easy. Dr. Buchman, our clinical director, has helped greatly by starting a monthly meeting with different staff members. This has helped morale by allowing all groups of the clinic to brainstorm to come up with the best practice policies for our department. This has made a huge difference to our staff. They feel empowered, and it allows all areas from the physicians to the front desk to have input. But what is so beneficial about this group, is having a physician who can take back what is important to the staff who pitch in, to the physicians who may never have been aware if it was not brought to their attention. Yes, I am biased to our physicians, but one thing I know, they all want the same result of having staff happy about their work home. Yes, there are things that fall through the cracks, and days that are not perfect, but for the most part, we work together to assure patients get the best care possible, but have a good time while we are working. I love working with each of the staff in our department and we could not deliver the exceptional care we do if it were not for each of you.

*Carolyn H. Hamby, CADA
Associate Chair for Administration*



Kathy Bogie and Donna Woodard reached their 10-year mark with UNC, and each received a certificate and pin. Donna: "I have worked for UNC for 10 years, the whole time with ENT. I have three great docs for whom I do work. My favorite part of working in ENT are the people. We are like family."



UNC Health Care recognized Gina Stoffel, RN among the Winter 2012 Plus People.

FAREWELL TO ELAINE HINKLE, RN

On January 31, 2012, Elaine Hinkle, RN retired after 37 years of state service. Elaine began working at UNC in 1975 as a nurse in cardiothoracic surgery and renal transplant. She enjoyed working with inpatients, but had trouble sleeping during the day. As a result, she transferred to the outpatient surgery clinics in 1977. She worked there until 1984, when the head nurse in ENT, Trish Reilly, asked her if she would like to work at Franklin Square.

Elaine believes that she was meant to work with ENT because she had been considering changing careers. She had taken some career planning tests and had just received her test results the day Trish called. Coincidentally, the results said she would be a good nurse, speech pathologist audiologist or teacher. She decided to give the Franklin Square opportunity a try.



Soon Young Rondinelli, RN and Elaine

and feels fortunate to have had the privilege to work with such great leaders.

A normal day for nursing evolved over the years. At Franklin Square, Elaine would work with ENT, Plastic Surgery, Vascular Surgery, Urology and Ophthalmology. Feeling the tug of ENT, as soon as the practice moved to the Ambulatory Care Center, Elaine followed. She became a staff clinic nurse, helping all the doctors. In 1995, the nurse and doctor teams were established, and Elaine became the nurse for Dr. William Shockley. She proudly says that working with Dr. Shockley has been one of the most rewarding experiences of her nursing career: "He is such an outstanding surgeon and teacher, and is so kind to his patients. It has been a true pleasure to work with him and his patients all of these years." Elaine also spent many years as head nurse/nurse educator. She enjoyed working with all the faculty, residents and nurses and always wanted to make sure that our clinic provided excellent nursing care.



Dr. Pillsbury presenting Elaine with her retirement gifts.

Elaine found it really hard to make the decision to retire, but she needed to spend more time with her mother. She has enjoyed working with everyone in the department, and she never dreamed that when she left the small farm she grew up on in rural North Carolina for nursing school at UNC, that she would have the honor of working with the best doctors and staff in the United States. Elaine now spends lots of time with her husband and family, and finds she has extra time for church meetings. She took a jewelry-making class, something she had always wanted to do. She cooks, and frequents the gym. However, finding out that she still wants to contribute to the department she loves so much, Elaine returned to assist ENT for two days a week in mid-September of 2012. We look forward to seeing Elaine around the department again!



Elaine and Dr. William Shockley

THE CHIEFS: REFLECTIONS ON THE PROGRAM



Dr. Surowitz with Dr. Drake

Joshua Surowitz, MD: It is hard to believe that five years has come and gone; how quickly the time has passed. And what an experience! It seems as though just yesterday I was a first year medical student asking Dr. Pillsbury and Dr. Buchman about summer research opportunities. It has been an absolute honor and a privilege to train at UNC. Thank you to Dr. Pillsbury and our entire faculty for bestowing me this honor. To our faculty, thank you for imparting your wisdom, knowledge, and clinical judgment. Your mentorship has truly shaped me into the surgeon I have become. To our administrative, clinic, and nursing staff, thank you for your tireless help in the care of our patients; you are the backbone of our clinic. To my fellow residents, you are the finest group of people I have ever known. I thank you for your friendship and the incredible collegiality we have shared. It has been a phenomenal five years and I reflect so fondly on my time at UNC. You have all truly become like family and I will miss you greatly. As I head to Palo Alto, California for a one-year fellowship in Facial Plastic and Reconstructive Surgery, I do so knowing that my time at UNC has prepared me well for this next step.

Rupali Shah, MD: It has been an absolute privilege to be a part of the UNC Department of Otolaryngology-Head & Neck Surgery. I remember my interview day like it was yesterday. I was nervous, anxious and excited all at the same time. What an incredible place! Professional, prestigious, ambitious, warm, and well-rounded, UNC was everything that I wanted to be a part of. While excited for the opportunity to be a part of a premier program, I had no idea how much its people would affect me as a person and physician.

To the nurses and staff in the clinic and operating room, you have all contributed to my development as a caregiver. To the entire faculty, I am forever indebted to you for your guidance, friendship, discipline, and love. It has been an honor to share in the care of your patients. Dr. Pillsbury, your dedication to the residency program, education, and advancement in the field is sincerely appreciated and inspiring. To my fellow residents, my family away from home, I deeply respect and admire each of you. It has been an unforgettable five years; I will miss you all. Thanks to the support and encouragement of this department, I look forward to the big apple, where I will pursue a Laryngology Fellowship at Mount Sinai Hospital.



Dr. Shah with Dr. Ferguson

Maher Younes, MD: Five years can really go by pretty fast. I still remember the day when Dr. P called me and told me that I matched at UNC. It feels like yesterday when I met my co-residents for the very first time for orientation. I can say for a fact that it has been nothing short of an amazing ride. It has been a true privilege and a great honor to have been part of this program and to have been mentored by the likes of Dr. Pillsbury, Shockley, Weissler and Buchman. It is also a great responsibility to uphold such an honor in the future as I move on with my career. The enormous guidance and support that I received through out the years is something that I will cherish for the rest of my life. It is a blessing to be around a group of people who genuinely care for you and do their utmost to help further your career. As I move on with my life, I will miss you all for you have become not just friends or colleagues but close family.



Dr. Mitch Gore with Dr. Younes

Rose Eapen, MD: As my time at UNC draws to a close and I reflect on my seven years spent training at UNC-Chapel Hill, I am amazed by the opportunities I have had and the experience I gained. I feel incredibly grateful to the faculty and my fellow residents that have shared this journey with me. Among my distinguished colleagues, I have found both personal and professional role models who I hope to emulate. I have already found myself in the position of seeking advice and I will continue to nurture and place the highest value in these relationships.

I must offer my heartfelt thanks to the faculty that have taken time to teach me in the clinic and the operating room. They have taught me not only how to perform procedures and diagnose problems but how to treat my patients with dignity and serve them with honor. I will carry these lessons with

me and use them to guide my own practice. The residents of this program have strengthened and supported me in so many ways. I have known how to work hard, but over the years I watched my senior residents and learned how to work smart. I have also learned through trial and error how to be a teacher. For this gift I consider myself indebted to my junior residents and medical students. I can say that I count my fellow residents as my friends. UNC-Chapel Hill is an amazing hospital. The nurses and staff in the clinic feel like family. The operating room staff and nurses have made the days seem to go by like lightning with their humor and grace. I could not have completed the work expected of me if not for our floor nurses and staff. I feel wonder at the gift you all have bestowed upon my over the past seven years and I will always carry this place with me as I embark on my next adventure as a pediatric otolaryngologist at Duke.



Dr. Eapen

THE JUNIOR RESIDENTS



Aaron D. Baugh, MD

(PGY-1, 2019)
University of Toledo
College of Medicine, MD, 2012
University of Texas Medical School, 2010
University of Michigan, BS Brain,
Behavior & Cognitive Science, 2008



Nathan H. Calloway, MD

(PGY-1, 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-2, 2016)
UNC School of Medicine, MD, 2011
Vanderbilt University,
BS Communication Studies, 2006
University of Florence,
Italian Language & History, 2004



Baishakhi Choudhury, MD

(PGY-2, 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



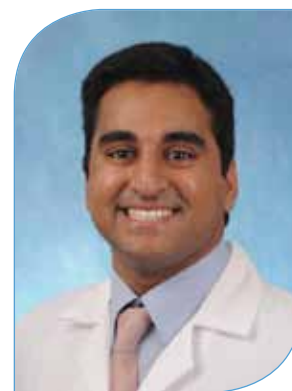
John P. Dahl, MD, PhD, MBA

(PGY-4, 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-2, 2016)
 Univ of Pittsburgh Med Ctr,
 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-3, 2015)
 George Washington University,
 BA Biology/MD Seven-Year Program, 2010



Alexander A. Farag, MD

(PGY-4, 2014)
 The University of Toledo
 College of Medicine, MD, 2009
 The College of Wooster, BA Chemistry, 2004



Lauren W. Fedore, MD

(PGY-1, 2015)
 Tufts University School of Medicine, MD, 2012
 Tufts University, BS Biological Sciences, 2008



Anna X. Hang, MD

(PGY-3, 2015)
 Uniformed Services University of the Health
 Sciences, MD, 2010
 University of Illinois at Urbana-Champaign,
 BS Chemistry, 2006



Grace G. Kim, MD

(PGY-3, Research Track, 2017)
 University of Medicine and Dentistry of
 New Jersey, Robert Wood Johnson
 Medical School, MD, 2010
 University of Pennsylvania, Post-BS, 2006
 Carnegie Mellon University, BS Biology, 2003



Adam J. Kimple, MD, PhD

(PGY-1, 2016)
 UNC School of Medicine, MD/PhD, 2012
 Michigan State University,
 MS Computational Chemistry and
 BS Chemistry, 2003



Cristine N. Klatt-Cromwell, MD

(PGY-2, 2016)
 University of Oklahoma
 College of Medicine, MD, 2011
 University of Oklahoma, BS Biochemistry/
 Spanish, Medical Humanities, 2007



Gitanjali Madan, MD

(PGY-2, 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-5, Research Track, 2016)
 University of Pennsylvania, MD, 2008
 Stanford University, BA Human Biology/Spanish, 2001



Mihir R. Patel, MD

(PGY-7, Research Track, 2013)
 UNC School of Medicine, MD, 2006
 Duke University, BA Chemistry/Philosophy, 1997



Joseph P. Roche, MD

(PGY-6, Research Track, 2014)
 Medical College of Wisconsin, MD, 2007
 St. Mary's University of Minnesota,
 BS Biology, 2002



Scott Shadfar, MD

(PGY-5, 2013)
 University of Oklahoma
 College of Medicine, MD, 2008
 Oklahoma City University,
 BS Biochemistry/Chemistry, 2003



Keimun A. Slaughter, MD

(PGY-3, 2015)
 Duke University Medical Center, General
 Surgery Residency, 2011
 Morehouse School of Medicine, MD, 2009
 University of Georgia,
 BS Biology/Pre-Med, 2004



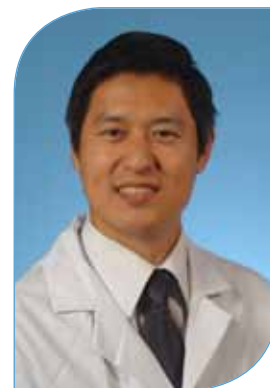
Brian D. Thorp, MD

(PGY-4, 2014)
 Eastern Virginia Medical School, MD, 2009
 James Madison University, BS Biology 2005



Jessica K. Smyth, MD

(PGY-5, 2013)
 Aerospace Medicine, Kuwait and Pope AFB, Physician, 2008
 San Antonio Uniformed Services Health Education
 Consortium, General Surgery Residency, 2005
 Uniformed Services University of Health Sciences, MD, 2004
 US Military Academy, BS Chemistry, 2000



Yu-Tung Wong, MD

(PGY-5, 2013)
 Case Western Reserve University School of
 Medicine, MS Applied Anatomy/MD, 2008
 University of California-Irvine, Pre-Med, 2004
 Harvey Mudd College, MS Engineering, 1997
 Harvey Mudd College, BS Engineering, 1996

EDUCATIONAL PROGRAMS

MEDICAL STUDENTS

Dr. 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 anatomical 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.



Medical Students: Matthew Wofford, Emily Cohn, Mathieu Forgues, and Robert John Taylor

During the second year of medical school, the Special Senses Course 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. Additionally, second-year medical students participate in physical diagnosis sessions in the OHNS Clinic over an eight-week period.

During this time, the faculty and residents teach the basics of the physical examination of the head and neck.

Third year medical students rotate on the OHNS service. 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, with the involvement of all the housestaff and attending faculty.

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.

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 Associate Program 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, one of which does seven years on the NIH T32 Training Grant. 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. Most 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 OHNS 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 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 prosection 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.



2012 Interns: Drs. Adam Kimble, Nathan Calloway, Lauren Fedore and Aaron Baugh

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.

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.

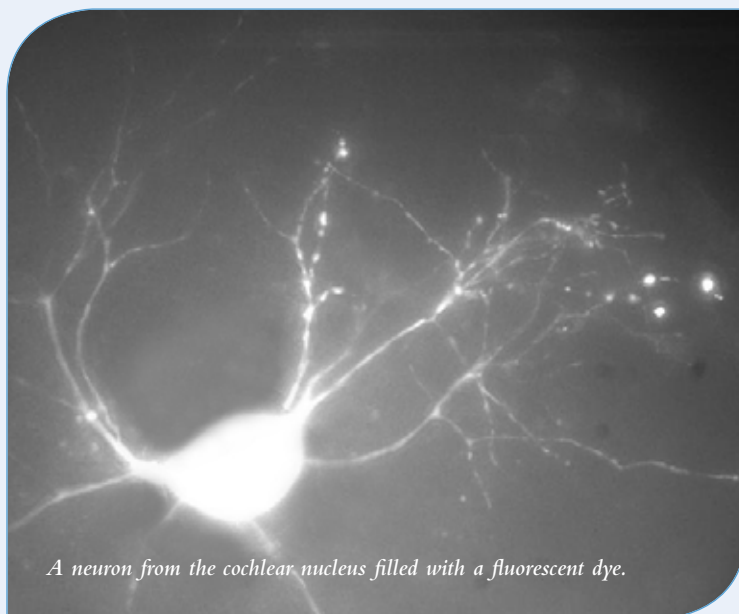
NIH TRAINING GRANT

The Department has a training grant from the National Institutes on Deafness and Other Communication Disorders (NIDCD) for research training in Otolaryngology/Head and Neck Surgery. With the inception of this training grant in 2001, 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 for research training each year. We are currently in our second 5-year cycle of this grant, and Dr. Paul Manis is the PI.

This past year, we supported two medical students in the summer training program. [Askia Dunnon](#) (MS1) and [Heather Koehn](#) (MS1) worked as a team with Doug Fitzpatrick. They studied the electrical signals at the round window of the gerbil cochlea to identify features of the signals that can be used in clinical recordings to understand the residual hearing functions in patients undergoing cochlear implants. In normal hearing gerbils, they recorded the two cochlear potentials, cochlear microphonic (CM) and compound action potential (CAP) to acoustic stimuli as an electrode was inserted through the scala tympani. The CM is the electrical potential generated in the hair cells in response to acoustic stimulation, and the CAP is the synchronous response of auditory nerve fibers. They then used bandpass noise to try to mask different regions of the cochlea to understand where the potentials were being generated in the cochlea in response to different sounds. The results of these experiments can help interpret which aspects of cochlear potentials are important to monitor and preserve during cochlear implant surgery when inserting electrodes that permit combined electrical and acoustic stimulation in the same ear.

[Maxwell Pike](#) (MS3) returned to Dr. Fitzpatrick's lab for a 1-year research experience. Pike's main project was focused on evaluating hearing status during cochlear implant surgery, using a gerbil model. Cochlear implants are increasingly being provided to patients that have some residual hearing but poor speech understanding. However, intracochlear damage during cochlear implantation can reduce the preservation of residual hearing. Pike's project focused on identifying the long-term outcome of acutely irreversible damage caused by trauma from cochlear implantation. A rigid platinum-iridium electrode was used to measure reductions in the cochlear microphonic (CM) and compound action potential (CAP) that occur as a result of trauma during electrode insertion in both normal and noise-exposed animals (to mimic hearing loss in patients). Measurements were made before and immediately after insertion of the electrode, and follow-up measurements were made after a 4-week survival period. The acute CM and CAP reductions induced by mechanical trauma correlated with the 4-week loss of CM and CAP in the same frequency regions. Interestingly, there also seemed to be a loss of CAP in the apical cochlear region after the survival period, despite a lack of trauma in that area. The physiological loss of response was correlated with a distinct area of damage to the basilar membrane when the cochlea is examined histologically. These results indicate that reductions in the CM and CAP can be used as physiological markers for interaction of an implant electrode with cochlear structures and can predict long-term hearing outcomes. Mr. Pike presented this research at the 2012 Combined Otolaryngology Spring meeting in April (San Diego, CA), and was first author on a poster presented at the 2012 Midwinter ARO meeting in San Diego, CA.

Pike also participated in a behavioral study of sensitivity to voice onset time (VOT) in rabbits. Because animal studies of



A neuron from the cochlear nucleus filled with a fluorescent dye.

VOT have been done in few species, the question of whether there is a common acoustic boundary across species is not clear. The results indicate that discrimination is possible for any standard VOT, although discrimination is best near the phonetic boundary. The thresholds for detecting a difference was 10 ms rather than 40 ms, which has been found in chinchillas under similar conditions. Human listeners in the same paradigm also had 10 ms thresholds. These results measure thresholds for discrimination of VOTs rather than indicate categorical boundaries.

Matthew Woffard (MS3) is currently working with Dr. Julia Kimbell. He is using computational fluid dynamics (CFD) techniques to simulate nasal drug delivery and to test the effects of different FESS techniques on delivery of topical medication to target sites within the sinuses. A number of validated CFD studies of nasal spray deposition have been conducted in the past, indicating that these methods can be used to make reliable predictions. However, the specific information in these studies is of limited use for chronic rhinosinusitis patients because to date the analysis has been based on single, healthy individuals, and very few simulated spray particle deposition in the paranasal sinuses. Woffard's project utilizes pre- and post-surgery CT scans already collected from an ongoing study of FESS patients at UNC to construct CFD models to quantify particle transport into the paranasal sinuses. Specifically he will investigate the effects of several different anastomosis sizes and positions on particle deposition in the maxillary sinuses to gain a better understanding of drug delivery to this site.

The crown jewel of the training grant is the 2-year research program for selected residents. **Baishakhi Choudhury, MD** just completed her research experience working in Dr. Doug Fitzpatrick's laboratory. She is also working with Drs. Oliver Adunka, and Carlos Ebert. She participated in several projects:

Effects of remote intracochlear damage on residual hearing of a noise induced hearing loss (NIHL) gerbil model:

Clinical evidence suggests that intracochlear damage during cochlear implantation negatively affects residual hearing. The goal of this project is to examine the feasibility of using acoustically evoked intracochlear recordings in the setting of NIHL to detect intracochlear trauma due to electrode placement. Gerbils undergo noise exposure to produce sloping hearing loss similar to that found in electro-acoustic stimulation implant candidates. After exposure and one-month recovery, each animal's thresholds are recorded via far field ABRs and baseline near-field recordings are obtained at the round window. Subsequently, electrode insertions are performed to produce basal trauma while acoustically generated cochlear microphonic (CM) and compound action potentials (CAPs) were recorded

after stepwise electrode advancement. Once electrophysiological patterns suggest damage, the animal is sacrificed and histologically processed. Hair cell counts as well as mechanical intracochlear damage are correlated with physiological changes. We have demonstrated electrophysiologic and histologic patterns consistent with the degree of noise exposure. As in normal-hearing animals, electrophysiologic markers remain suitable as indices of intracochlear trauma. Remote trauma in the basal cochlea shows a decline in residual hearing. This project was presented at CI 2011 and Dr. Choudhury was first author on a publication of this work in *Otol. Neurotol.* Parts of this work were also presented in an invited talk at the Hearing Preservation Workshop, London, UK Oct. 2011.

Detection of intracochlear damage during cochlear implant

electrode insertion: The aim of this study was to assess the feasibility of using extracochlear recording sites to monitor acoustically evoked responses from surviving hair cells and neural elements during implantation in an animal model. We found that the impact of electrodes on cochlear structures affecting cochlear performance could be detected from several extracochlear sites. A lock-in amplifier demonstrated greater sensitivity and resistance to noise when compared to the fast Fourier transform recording paradigm. Dr. Choudhury was a coauthor on a publication of this work in *Laryngoscope*.

Detection of intracochlear damage with cochlear

implantation in a gerbil model of hearing loss: We tested the idea that cochlear trauma due to electrode insertion can be detected in acoustic responses to low frequencies in an animal model with a hearing condition similar to patients using electroacoustic stimulation. The results indicated that a recording algorithm based on physiological markers to low-frequency acoustic stimuli can identify cochlear trauma during implantation. Future work will focus on translating these results for use with current cochlear implant technology in humans. Dr. Choudhury was first author on a publication of this work in *Otology Neurology*.

Electrophysiological properties of cochlear implantation

in the gerbil using a flexible array: Cochlear implants (CI) perform especially well if residual acoustic hearing is retained and combined with the CI in the same ear (also termed hybrid or electric-acoustic stimulation). However, in most CI patients, residual hearing is at least partially compromised during surgery, and in some it is lost completely. In this study, an animal model was used to assist in determining physiological markers for cochlear damage using a flexible electrode similar to human surgery. We found that the CM provides a more sensitive indication of cochlear trauma than does the CAP. Also, stable or steady increases in the CM are a physiological

marker for unimpeded travel through the scala tympani as the electrode approaches responding hair cells. Abrupt reductions in the CM across frequency are a physiological marker of contact with cochlear structures. Overall, the results indicate that recordings during cochlear implantation can provide valuable feedback to the surgeon regarding electrode position and the integrity of surviving hair cells. Dr. Choudhury was a coauthor on a publication of this work in *Ear and Hearing*

The use of probiotics in the treatment of allergy induced eustachian tube dysfunction (ETD) in the rat model:

Dr. Choudhury wrote and received a \$6000 grant from the American Academy of Otolaryngologic Allergy (AAOA) to fund this project (Dr. Ebert is the PI). Influencing the makeup of the gut flora with probiotics has been under investigation for the prevention and treatment of allergic conditions with some promising results, and further study is necessary to clarify specific strains and dosages of probiotics that would be most efficacious. The goal of this project is to determine whether administration of probiotics orally has a role in prevention and/or treatment of allergic eustachian tube dysfunction (ETD) in the rat model. Dr. Choudhury used a well-established model of allergic eustachian tube dysfunction in the Brown Norway rat for this study. A group of rats was provided probiotics treated water for a period of 30 days after which they underwent OVA sensitization (subcutaneous) and transtympanic OVA challenge. Subsequently, objective measurements of ET dysfunction were made and compared to allergic and non-allergic controls. Another group of rats was provided probiotics treated water after OVA sensitization and transtympanic OVA challenge, for a period of 30 days, then received a second transtympanic OVA challenge. A subsequent objective measurement of ETD was performed. It is predicted that there would be an attenuated allergy induced ETD in both the prevention and treatment groups. The preliminary analysis of the results indicates that successful induction of allergy induced ETD, however there was no significant change with 30 days of oral probiotics treatment either prior to sensitization or post allergy induction. The results of this work will be submitted for presentation at the AAOA annual meeting in 2012 and a manuscript will be submitted to *IFAR*.

Intra and post operative measures of auditory function: The combined electric acoustic stimulation of the auditory system allows simultaneous, ipsilateral, combination of cochlear implant and hearing aid. This method has been shown to increase speech perception scores after cochlear implantation, particularly in situations with background noise. Candidates for the electric acoustic stimulation should have significant residual hearing, especially in the low-frequency regions of the apical cochlea; basal cochlear regions (high frequencies) typically show profound hearing impairment. This combination of relatively good hearing

in low frequency regions of the cochlea and profound hearing loss in the high frequency regions usually accounts for very poor speech understanding and limited help with conventional hearing aids. However, the combination of electric (cochlear implant) and acoustic (hearing aid) information on the same ears leads to markedly improved speech understanding as with either device alone. Naturally, this mode of stimulation relies on successful hearing preservation during intracochlear electrode placement. The purpose of this project was to employ accepted intraoperative clinical measures of electrophysiologic tests during cochlear implantation and to gain insight into the mechanisms of hearing loss and the time-line of surgery-related hearing loss. This work has been submitted to *Otology and Neurotology*, and Dr. Choudhury presented this work at COSM 2012.

The treatment of otitis media with effusion using CpG oligodeoxynucleotides:

Dr. Choudhury received a CORE grant from the American Academy of Otolaryngology (Resident Research Award) for funding for this project. A candidate for a non-antibiotic therapy is a class of compounds known as CpG oligodeoxynucleotides (CpG ODNs). CpG ODNs modulate immune responses that result in inflammation by modifying naive T-lymphocyte differentiation. They have a potent effect on early and late phase allergic airway responses. The first aim of this project was to establish both allergic and infectious ETD and OME in the rat model and measure the ability of CpG ODNs to modulate the products of the immune response in the middle ear. The second aim was to measure dynamic ET function using the same model and methods. An allergy-induced eustachian tube dysfunction is created, and an infectious component was also introduced by administering transtympanic LPS during OVA challenge. After inducing a combined allergic and infectious eustachian tube dysfunction by previously established methods of subcutaneous OVA sensitization and transtympanic OVA challenge and LPS, this will create a treatment group of rats that receive transtympanic CpG ODNs. Measurements include products of the immune response in the middle ear such as IL4, IL5, IgE, IgG, and IL12 by ELISA in both treatment and control groups as well as measure dynamic ET function. The prediction is that there will be an attenuated Eustachian tube dysfunction in the treatment group as well as a biased Th1 immune response in the middle ear in the treatment group. This work is about half-way completed.

Grace Kim, MD is currently in her 3rd residency year, and in 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.

This year, Grace also received a 2012 Clinical/Translational Developmental Research Award in

the amount of \$40,000 from the UNC Lineberger Comprehensive Cancer Center to support her research.



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. 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 will be accomplished by isolating MDSCs from prospectively collected fresh blood and tissue specimens, then performing effector functional studies including the mixed-lymphocyte response test and measuring reactive oxygen species (ROS) and nitric oxide synthase (iNOS) by flow cytometry. Comparisons will be 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.

First-year progress on this project to date: Peripheral blood and primary tumor of HPV-positive and HPV-negative patients with SCCHN with and without previous radiation treatment, as well as peripheral blood and normal uvula/tonsil tissue from normal controls have been collected. Successful measurements and immunophenotypes have been made of T-cell subsets, including T-regulatory cells (CD4+CD25+) and MDSCs (CD14-CD33+CD11b+) in both peripheral blood and tissue specimens by flow cytometry. The preliminary data demonstrate successful isolation and characterization of MDSCs, which is critical for the completion of Specific Aim I and IIa. Tumor-infiltrating leukocytes and MDSCs have also been isolated, to be utilized for effector function testing proposed in Specific Aim IIb.

Gita Madan Fleischman, MD started July 1 as our newest resident on the research track, and will be working in the lab of Drs. Adam Zanation and Julia Kimbell, on a project aimed at developing a virtual surgery model of Function Endoscopic Sinus Surgery (FESS). Chronic Rhinosinusitis (CRS) is a disease that affects over 30 million Americans, and patients who fail maximal medical management often require FESS for relief of sinonasal obstruction. Sinonasal anatomy is exceedingly complex, and there is great variability in the surgical approaches, as well as the outcomes of FESS.

Gita's project involves using pre- and post- FESS CT scans to create anatomically accurate 3-Dimensional models of sinonasal passages of patients with CRS. These computational models are then digitally modified to simulate known surgical techniques. Surgical outcomes are then calculated using Computational Fluid Dynamics (CFD), a technique that provides highly detailed predictions of variables such as nasal airflow, drug deposition, heat-flux, and wall shear. By simulating various

different surgical approaches, CFD helps to quantify clinical outcomes of FESS, and may in the future, allow surgeons to pre-operatively assess the candidacy of an individual patient and tailor surgical approaches

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

Every year the Department invites guest lecturers from across the United States and abroad to present a wide range of both clinical and research interest. These visiting professors also participate in our conferences during their visits. This year we welcomed five exceptional speakers.

Lisa Buckmiller, MD

Associate Professor
Director, Vascular Anomalies Team
Director, Cleft Lip/Palate Team
Benjamin & Milton Waner Endowed Chair in Pediatric Facial Plastic & Reconstructive Surgery
Department of Otolaryngology, University of Arkansas
Little Rock, Arkansas
March 20–21, 2012

Vascular Anomalies Enigma

ENT Cleft Surgery

Richard Harvey, MD

Clinical Associate Professor
Department of Otolaryngology/Head and Neck Surgery
Rhinothology Skull Base Surgery
Australian School of Advanced Medicine
Macquarie University, Sydney Australia
February 1, 2012

Outside-In Approach to Endoscopic Lothrop

Raymond Sacks, MD

Associate and Head
Department of Otolaryngology/Head and Neck Surgery
Macquarie University, Sydney Australia

Clinical Associate Professor
University of Sydney
Sydney, Australia
January 31, 2012

Contemporary Management of the Watery Eye- The Rhinological Approach



Drs. Harvey, Senior, Sacks and Pillsbury

Sugki Choi, MD

Professor
Departments of Surgery and Pediatrics
George Washington University School of Medicine

Vice Chief, Department of Pediatric Otolaryngology
Children's National Medical Center
Washington, District of Columbia
July 19–20, 2011

Intubation Injury

Pediatric Airway Reconstruction

Rowan Valentine, MD

Department of Otolaryngology/Head and Neck Surgery
The Queen Elizabeth Hospital
University of Adelaide
Adelaide, Australia
September 6–7, 2011

3D Endoscopic Anatomy of the Skull Base

Controlling Bleeding in Skull Base Surgery



3D glasses worn by attendees for Rowan Valentine, MD's talk.

NEWTON D. FISCHER SOCIETY MEETING & NC ENT EXPO 2012

The great tradition of the Department's Newton D. Fischer Society Meeting continued this year on Saturday, June 2nd 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 in to a fully CME accredited and sponsored annual meeting. This year's accompanying exhibit, newly dubbed the NC ENT EXPO featured representatives from Acclarent, Alcon, Gyrus/Olympus, Medtronic, Stryker and 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 a prize drawing of a new Apple iPad 3 – and the lucky winner was one of our chief residents, Dr. Rose Eapen, who has since completed her training at UNC and joined the faculty in the Division of Otolaryngology – Head & Neck Surgery at Duke.

The 2012 program included a number of excellent presentations in the field of Rhinology and Skull-Base Surgery, including a keynote lecture from Dr. David Kennedy of the University of Pennsylvania on the Evolution of Skull Base Surgery. In addition to Dr. Kennedy, a number of other leaders in the field of Rhinology & Sinus Surgery spoke, including Drs. Christopher Melroy and Frederick Kuhn of the Georgia Nasal & Sinus Institute, Dr. Andrew Lane of Johns Hopkins University and Dr. Subinoy Das from The Ohio State University. All of these prominent surgeons and educators participated as well, along with Drs. Charles Ebert, Brent Senior and Adam Zanation from UNC, in the well-received Rhinology and Skull-Base Panel that concluded the meeting.

The annual Newton D. Fischer Society Meeting along with the accompanying Chief Residents Banquet has really become one of the Department's most exciting annual events for our physicians, nurses, staff, families and alumni. A real surprise this year, was the unprecedented return of recent alumni to Chapel Hill for the meeting – a trend we hope will continue to grow 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 1st, 2013** – so save the date!

2012 Oral presentations included

Office-based laryngoscopy: initial experiences
Paul C. Bryson, MD

Laryngology update 2012
Rupali N. Shah, MD and Robert A. Buckmire, MD

Perioperative care of children with chronic rhinosinusitis
James M. Ruda, MD, Charles S. Ebert, Jr., MD, MPH and Austin S. Rose, MD

Skull-base surgery outcomes and evidence based review
Adam M. Zanation, MD

Balloon controversies in the surgical treatment of chronic rhinosinusitis
Christopher T. Melroy, MD

Basic Science of chronic rhinosinusitis
Andrew P. Lane, MD

Intra-operative round window recordings from cochlear implant patients
Baishakhi Choudhury, MD

Advances in understanding in innate immunity and implications for future sinusitis care
Subinoy Das, MD

Using computational models to quantify the effects of nasal cycling in nasal airway obstruction
Dennis Frank, PhD and Julia Kimbell, PhD.

An integrated approach to the frontal sinus
Frederick A. Kuhn, MD

Evolution of skull base surgery
David W. Kennedy, MD

Evaluation of post-operative nasal irrigations with Budesonide for patients with polyposis: a blinded, randomized controlled trial
Rounak B. Rawal, BA

Rhinology and Skull-Base Panel
Charles S. Ebert, Jr., MD, MPH (moderator), Adam M. Zanation (moderator), MD, Brent A. Senior, MD, Andrew P. Lane, MD, Frederick A. Kuhn, MD, David W. Kennedy, MD, and Yvonne R. Chan, MD

2012 Newton D. Fischer
Society Meeting &
Chief Resident Banquet



PEDIATRIC OTOLARYNGOLOGY FELLOWSHIP PROGRAM

As the Division of Pediatric Otolaryngology grows, there has clearly developed an excellent opportunity for training at the fellow level. Dr. Austin Rose serves as founder and Director of the Pediatric Otolaryngology Fellowship Program, which began in 2009 with Dr. Laura Rosenthal as our first fellow. She earned her MD from the University of Illinois, followed by residency training in Otolaryngology-Head & Neck Surgery at the Henry Ford Hospital in Detroit. She is interested in all aspects of pediatric otolaryngology, but has particular interests in the management of patients with craniofacial anomalies, such as cleft lip and palate. After a very successful year, Dr. Rosenthal completed her fellowship here at UNC on July 1, 2010 and went on to Chicago where she joined the faculty as an Assistant Professor at Loyola University.

After graduating from our residency program, Dr. Alisha West followed Dr. Rosenthal as the next fellow in July of 2010. We knew Alisha well from her great work as a resident here at UNC, and were thrilled at the opportunity to continue working with her during her training at the fellowship level. Upon completion of her fellowship here at UNC, Dr. West was appointed to the faculty at the University of California – Los Angeles.

Most recently, Dr. James Ruda from the Cleveland Clinic completed his fellowship and returned to Ohio to join the faculty in Pediatric Otolaryngology at The Ohio State University. During his year, Jim authored an excellent chapter entitled “A Review of the Evaluation and Management of Velopharyngeal Insufficiency in Children”, which was published in the June, 2012 issue of *Otolaryngologic Clinics of North America – Pediatric Otolaryngology: Challenges in Multi-System Disease*.

On July 1st, 2012 we were privileged to welcome Dr. Lorien Paulson to the fellowship program. She joined us here at UNC, having just completed her residency at the prestigious Oregon Health & Science University in Portland, Oregon. She looks forward to a broad experience in Pediatric ENT including several week-long rotations with our colleagues in Pediatric Plastic & Reconstructive Surgery for added experience with cleft lip and palate patients.

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



Lorien Paulson, MD

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 fellowship offers a great deal of clinical and operative experience.

NEUROTOLOGY FELLOWSHIP

The Division of Otolaryngology/Neurotology of the Department of Otolaryngology/Head and Neck Surgery has opened and filled the position of a Neurotology Fellow. Dr. Oliver Adunka will serve as the fellowship director. The fellowship will provide the unique opportunity to train with the Department's busy neurotologists, Drs. Buchman, Adunka, and Pillsbury. We are very fortunate that we were able to attract Benjamin Wei, MD, PhD, FRACS from Melbourne, Australia, who started this position in April 2011, and concluded in June 2012. Dr. Wei has established a mouse model to study the effects of cochlear implantation on patient's susceptibility to acquire meningitis. His work was pivotal in our understanding of meningitis development.

RHINOLOGY AND SKULL BASE SURGERY FELLOWSHIP



Kenneth Rodriguez, MD

The 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, and Julie Kimbell comprise the remaining faculty. Our 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. Emphasis is also placed on research that ranges from basic science translational work to clinical trials. Our goal is to provide the highest-quality, broad-based training that will impart 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. Dr. Kenneth Rodriguez, who received residency training at the University of Pittsburgh, began his fellowship in July of 2012.

ADVANCED HEAD AND NECK ONCOLOGY



Travis Newberry, MD

The Department of Otolaryngology/Head and Neck Surgery opened an Advanced Head and Neck Oncology Fellowship on July 1, 2012, with Travis Newberry, 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. David Ludlow, MD will begin his fellowship in July 2013.

THE JUDITH GRAVEL FELLOWSHIP IN PEDIATRIC AUDIOLOGY

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 2012-13 academic year is Mallory Baker, a 4th year AuD student at UNC who did her undergraduate work at the University of Washington in Seattle. Judith Gravel Fellows from previous years are: Ashley Timboe from the University of Washington, now working at Seattle Children's Hospital as a pediatric audiologist and Nicole Duncan now working in Bangor, Maine with Penobscot Community Health Care (PCHC) as a pediatric audiologist. Applications are being reviewed for 2013-2014.

VIETNAM

Dr. Brent Senior and Dana Senior led the fifteenth humanitarian trip to Vietnam this February. The team was made up of thirteen members, including UNC resident, Rupali Shah, residents from Texas and Canada, and practitioners from all over. The team is assembled through the not-for-profit organization, Resource Exchange International, Inc, whose mission is “building people to build nations.” Our goal was to encourage, equip, and educate Vietnamese who will, in turn, strengthen their otolaryngologic care.



Our team worked in six hospitals in Ho Chi Minh City and Hanoi. We performed several procedures alongside Vietnamese Otolaryngologists. For the first time, we forged relationships with the medical school and engaged in discussion regarding improvement in education at all levels. Team members participated in continuing medical education seminars for local physicians by giving several hours of fully translated lectures. In addition, the residents participated in a round table discussion with Vietnamese residents to share information regarding training and career development.

The relationships go beyond what is accomplished in a few weeks in Vietnam. Several Vietnamese ENT doctors have been sponsored for REI fellowships, many who have gained experience here at UNC. Some of these physicians have now assumed top leadership roles in Vietnam.

Serving in this capacity was an extremely enriching experience. We were able to experience the beauty of the country of Vietnam and its people. It was a privilege to work beside their surgeons and an honor to participate in the exchange of information.

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 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, became the Chairman of the Department of Surgery in June 2012, and joins our residency director, Dr. Leonard Banza.

Tiyamike Chilunjike has passed her College of Surgeons of Southern, Eastern and Central Africa (COSECSA) Membership exams and is looking forward to her fellowship exams in 2 years. Six residents, Gift Mulima, Chifundo Kajombo, Enock Ludzu Judith Mkwaila, Boston Munthali and Kumbukani Manda, took the written MCS exams in September 2012.

Drs. Carol Shores and Anthony Charles attended the COSECSA annual meeting in Lusaka Zambia in December 2011, and Dr. Shores gave a well received presentation entitled “Establishing a Collaborative Academic Surgical Program.” Dr. Shores will be inducted as a COSECSA Fellow at the Annual meeting in Addis Ababa, Ethiopia in December 2012.



Dr. Charles Mabedi KCH PGY2, rotated through the UNC Head & Neck Service in July 2012, supported by the Malawi Surgical Initiative. Dr. Mabedi focused on learning how to diagnose and stage head and neck cancers, in anticipation of a research project in Malawi.

FREE ORAL, HEAD & NECK CANCER SCREENING AT UNC

The Multidisciplinary Head & Neck Oncology Program at UNC Health Care participated in the annual Oral, Head & Neck Cancer Awareness Week April 22-28, 2012 sponsored by the Head and Neck Cancer Alliance. Free head & neck cancer screenings were provided in the ENT Clinic at UNC Hospitals on Wednesday April 24, 2012 from 1-4pm, without an appointment. The screenings were provided by Drs. Mark Weissler, Carol Shores, Trevor Hackman, and the residents of the Department of Otolaryngology. In the lobby of UNC Hospitals, staff of the multidisciplinary team provided information about Head and Neck cancer, including smoking cessation and nutrition.

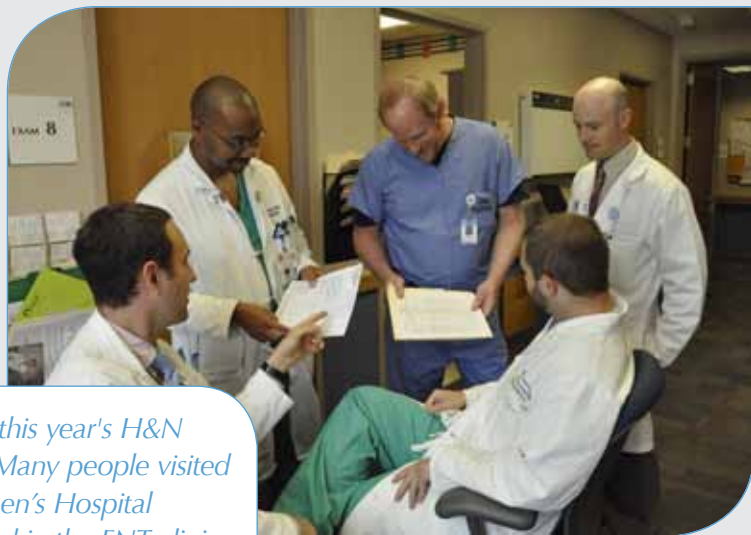
40,000 Americans will develop an oral, head and neck cancer this year. Warning signs and symptoms for oral, head and neck cancer include ulcers in the mouth that will not heal, a lump in the neck, difficulty swallowing, or a change in voice. Risk factors include smoking or chewing tobacco, alcohol consumption, and a history of cancer in the affected area.

"In this era of emphasis on cost effective medicine, it is increasingly important for people to take responsibility for their own health through healthy living and the avoidance of tobacco and excessive alcohol," says Dr. Weissler.

Screening clinics such as this, are one way to increase awareness and to educate people about healthy living.

Thank you to everyone who made this year's H&N Cancer Screening Event a success! Many people visited the information booths in the Women's Hospital Lobby and 63 people were screened in the ENT clinic for H&N cancer.

**- Sean Gallagher, Nurse Navigator,
Multidisciplinary Head & Neck Oncology**



PEDIATRIC OTOLARYNGOLOGY

The Division of Pediatric Otolaryngology includes three fellowship-trained pediatric Otolaryngologists: Amelia F. Drake, MD; Carlton J. Zdanski, MD; and Austin S. Rose, MD. Together, they care for both 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 new UNC Ear, Nose & Throat Clinic at Carolina Crossing.



Drs. Amelia Drake and Jim Ruda

Many children presenting to UNC have complicated medical problems and multi-system diseases that require the careful coordination of physicians and specialists in different disciplines. For this reason, our 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. 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 throughout the Southeastern United States since 1963. The Division's commitment to the care of children with complex and multi-system disease was demonstrated this year in particular, through several chapters contributed to the recent Otolaryngologic Clinics of North America – Pediatric Otolaryngology: Challenges in Multi-

System Disease, guest edited by Dr. Rose. Articles from UNC included "Otolaryngologic manifestations of craniofacial syndromes", "Allergic fungal sinusitis in children", "A review of the evaluation and management of velopharyngeal insufficiency in children" and "Endoscopic Skull Base Techniques for Juvenile Nasopharyngeal Angiofibroma."

In addition to their clinical work, the faculty of the Division of Pediatric Otolaryngology dedicates significant time to both teaching and research responsibilities. Dr. Drake serves as the Department's Residency Program Associate Director and both Drs. Rose and Zdanski serve on the American Board of Otolaryngology's Task Force for New Materials. In addition, Dr. Rose is Co-Director of the annual Newton D. Fischer Society Scientific Meeting and Director of the Division's Pediatric Otolaryngology Fellowship Program.

Recent publications have included research in the areas of pediatric airway modeling, noise-induced hearing loss, the radiographic appearance of esophageal foreign bodies and the use of high-resolution ultrasound in the diagnosis of pediatric recurrent respiratory papillomatosis. In addition to work recognized both locally and nationally, faculty members have participated in a number of recent 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.

THE 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 8th in the nation among children's hospitals caring for children with respiratory disorders by US News & World Report in their 2012 issue of America's Best Children's Hospitals. 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 Healthcare 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 healthcare 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."



Dr. Carlton Zdanski, Stephanie Davis and Richard Superfine work on computer models evaluating surgical options for children with obstructed airways.

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 have been protocols established for the evaluation of children with airway problems, and several collaborative research projects have been established and grants awarded with multiple presentations at national, state, and local level given. 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 the 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 (currently 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.

The North Carolina Children's Airway Center provides an individualized, coordinated approach to each patient and the full range 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.

FACIAL PLASTIC AND RECONSTRUCTIVE SURGERY

The Division of Facial Plastic and Reconstructive Surgery offers services for patients with reconstructive and cosmetic problems related to the face, ears and neck. Resident education is a top priority, focusing on the principles of soft tissue surgery, facial plastic surgical techniques and the management of patients with these special needs.

It is with great pleasure and pride that we announce the addition of Dr. Andrea Jarchow as assistant professor in the Division of Facial Plastic and Reconstructive Surgery. After graduating from Davidson College, she obtained her MD degree from Brody School of Medicine at East Carolina University. She subsequently completed a residency in Otolaryngology/Head and Neck Surgery at Case Western Reserve in Cleveland, Ohio. Following residency, Dr. Jarchow was selected as an accredited fellow for the American Academy of Facial Plastic and Reconstructive Surgery. She spent her fellowship year under the mentorship of Dr. Calvin Johnson in New Orleans. Her practice at UNC is dedicated to the surgical treatment of the aging face including brow lifts, upper and lower blepharoplasty,



Drs. Andrea Jarchow-Garcia and William Shockley

and face lifts. She also has a special interest in cosmetic and traumatic rhinoplasty. Dr. Jarchow adheres to the principles of restoring a natural facial appearance to her patients.

Rhinoplasty Clinic

In recent years we have 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 large 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. 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 critical 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 hearing on the opposite 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 now 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 early success of this program and are grateful to our referring physicians.

Facial Plastic Surgery Clinic

COSMETIC CONSULTATION

With the addition of Dr. Jarchow, we now offer comprehensive facial aesthetic care. Consultations place emphasis on rejuvenating the effects of 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.

Resident Education

Resident education remains one of the primary goals of the Division of Facial Plastic and Reconstructive Surgery. We are blessed to have many physicians involved with the education of our residents. In addition to the lectures and discussions provided by Dr. Shockley and Dr. Jarchow, we also have many others who contribute each year. Special recognition goes to Dr. Madison Clark who comes three to four times a year from his practice at Alamance Regional Hospital, providing superb presentations relating to the many facets of facial plastic surgery. Other practitioners who contribute on a regular basis include Dr. Cynthia Gregg (Cary), Dr. Charles Finn (Chapel Hill), and Dr. Brian Downs (Morganton).

In 2012 we began carrying out a new concept for the UNC curriculum. This is a subject-based format. For example, we might spend an entire week on rhinoplasty. This would include reading chapters, journal articles, lectures, and case discussions.

We typically provide a Review Course in Facial Plastic Surgery in the spring. This is done in conjunction with Dr. Neal Goldman at Wake Forest University School of Medicine. The course is open to Otolaryngology residents and Plastic Surgery residents, as well as fellows in Plastic Surgery and Ophthalmic Plastic and Reconstructive Surgery.

RHINOLOGY, ALLERGY AND SINUS 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, Immediate 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, current President of the American Academy of Otolaryngic Allergy. 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.



Draf 3 Frontal Sinusotomy used to treat complicated chronic frontal sinusitis.



Drs. Adam Zanation, Charles Ebert, Brent Senior, Fred Kuhn (Georgia Sinus and Nasal Institute) and David Kennedy (University of Pennsylvania)

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.

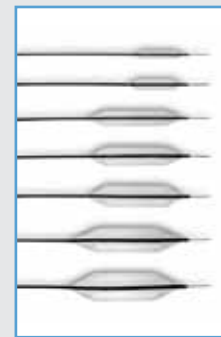
UNC physicians in the Division of Rhinology, Allergy, and Endoscopic Skull Base Surgery are also pioneers in the use of in-office minimally invasive surgical treatments for sinusitis. One such technology is balloon catheter dilation of the sinus openings. This technology allows for a thin balloon catheter (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.

Gina Stoffel, RN and Robin Gunter, RN at our new Carolina Crossing Otolaryngology Clinic 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.



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 eighth 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 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 2-4, 2013; more information on this annual course can be found at www.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.

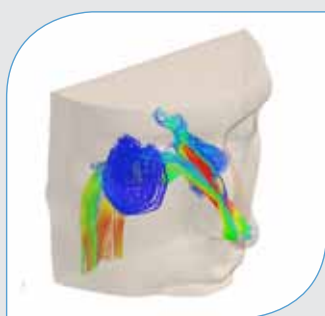


The new home of this course is the Harold C. Pillsbury Sinus, Skull Base and Temporal Bone Lab NC Eye Bank Multidisciplinary Surgical Skills Laboratory campus, an exciting new addition to the division that opened in 2012. Offering the latest in endoscopic technology and videoconferencing technology, this 3600 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, in addition to other courses throughout the year.

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 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. While, 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.

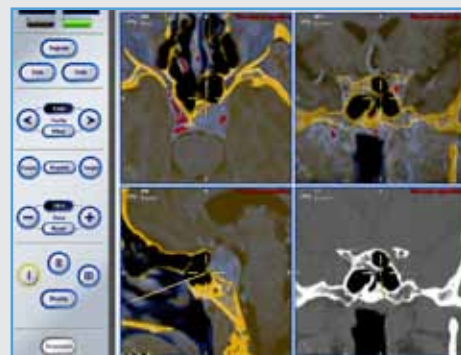
Pioneering Minimally Invasive Skull Base Tumor Treatments: Minimally Invasive Pituitary Surgery and Expanded Endoscopic Approaches to the Skull Base

ENDOSCOPIC SKULL BASE SURGERY

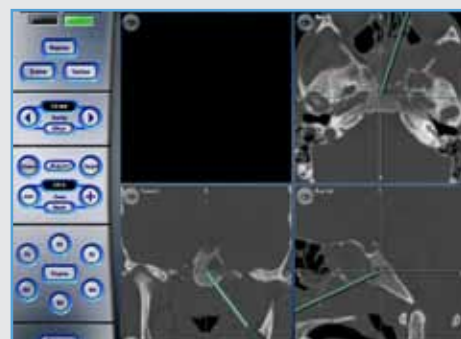
In March 2000, Brent Senior, MD, along with Matthew Ewend, MD of the Department of Neurosurgery, became the first team in North Carolina to perform Minimally Invasive Pituitary Surgery (MIPS) using an endoscopic approach entirely through the nose to treat pituitary adenomas. In contrast to traditional 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.



Fusion of MRI and CT and MRA being used to assist in removal of pituitary adenoma.



Computerized image guidance being used to remove Juvenile Nasopharyngeal Angiofibroma invading the clivus and skull base.



Hydroscopic view of the Pituitary gland--technique developed at UNC

“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. Today, Drs. Senior, Zanation, and Ebert along with our colleagues in Neurosurgery have performed over 800 of these procedures, placing the University of North Carolina at Chapel Hill at the forefront of minimally invasive approaches to skull base tumors.

In 2008, Dr. Adam Zanation joined the Division of Rhinology, Allergy, and Endoscopic Skull Base Surgery 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. 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. Senior, Zanation, and Ebert, along with Otolaryngologists from the Division of Pediatric Otolaryngology, Drs. Rose and Zdanski have successfully performed numerous pediatric skull base surgeries together.

Dr. Zanation and colleagues recently published on endoscopic pediatric skull base surgery and reconstruction in 2009, illustrating the hurdles and offering solutions in a variety of pediatric skull base surgery scenarios. Two additional manuscripts in this area are in press. Our experience has shown the importance of a multidisciplinary team in order to provide the most advanced pediatric tumor care as well as to advance research in pediatric skull base tumor surgery.

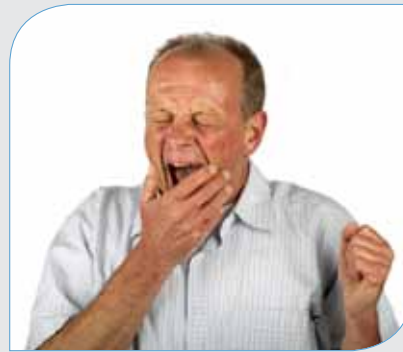
Treatment of Snoring and Obstructive

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



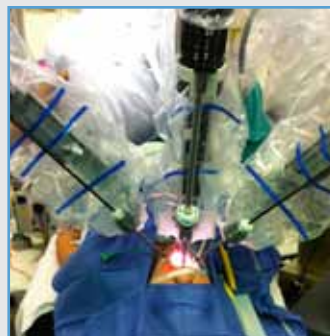
Genioglossus advancement surgery for treatment of Obstructive Sleep Apnea

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.

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.



Back Row: Laura Lyndon Miller, Dr. Mark Weissler (Radiation Oncology), Dale Flowers, RN, OCN, Glenda Blackwood, (Program Assistant Head & Neck/ Medical Oncology), Dr. D. Neil Hayes, Bishamjit Chera (Radiation Oncology), Dr. William W. Shockley. Front Row: Drs. Adam M. Zanation, Travis R. Newberry, and Carol G. Shores; Dr. Junecko Grilley-Olson (Medical Oncology), Lauren Patton, (Dental), Valerie Jewells, DO (Neuro Radiology), and Brien R. Pace, ACNP-BC.

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. Bishamjit Chera is the H&N radiation oncologist and Drs. David Neil Hayes, MPH, MD; Junecko Grilley-Olson, MD and Jared Weiss, MD serve as the H&N medical oncologists. Robert 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 Head & Neck physicians elsewhere can participate directly and discuss their patients. Patients from Wake Med 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 2011, 833 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 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.

Sean Gallagher, RN, MA 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.

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

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.

OPEN

- OSI 3602s: Phase II study of erlotinib, cisplatin and radiotherapy versus cisplatin and radiotherapy in patients with Stage III and IV SCCHN. First line trial
- NCI 8070: Phase II Randomized Trial of the Combination of Cetuximab and Sorafenib or Cetuximab alone in Patients with Refractory, Recurrent and/or Metastatic Squamous Cell Carcinoma of the Head and Neck.
- NCI 8271: Phase II Trial of Dasatinib (BMS 354825) for Recurrent or metastatic c-KIT expressing Adenoid Cystic carcinoma and for Non-Adenoid Cystic Malignant salivary Tumors.
- I4E-MC-JXBA: Phase II 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
- RTOG 1008: A Randomized Phase II Study of Adjuvant Concurrent Radiation and Chemotherapy versus Radiation Alone in Resected High-Risk Malignant Salivary Gland Tumors
- UPCC15309: A Phase II Study of Capecitabine and Lapatinib in Squamous Cell Carcinoma of the Head and Neck

PENDING

- 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)
- NCI 8317: Phase II trial of Cediranib alone or Cediranib and Lenalidomide in iodine 131-refractory differentiated thyroid cancer
- LCCC 1103: A Phase II study of carboplatin, nab-paclitaxel and cetuximab for induction chemotherapy for locally advanced squamous cell carcinoma of the head and neck

- 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
- TOP 0901: Identification of a Gene Expression Signature Profile for Panitumumab Sensitivity in Untreated Locally Advanced Squamous Cell Cancer of the Head and Neck (SCCHN)
- LCCC 1017: Selective IMRT for Locally Advanced Head and Neck Carcinoma, with Concurrent Panitumumab

THE UNC ROBOTIC HEAD AND 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.



Drs. Adam Zanation and Carlton Zdanski

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. Zonation have been working together on pediatric Transoral Robotic Surgeries. They performed the first 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 7 pediatric TORS procedures without a complication. By combining the expertise in pediatric otolaryngology and TORS/head and neck surgery, Drs. Zonation and Zdanski are hoping to advance the care of children that need minimally invasive surgery.

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.

SPEECH PATHOLOGY: THE HEAD AND NECK CANCER 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.

In October, 2011, Shannon Aumer joined the Head and Neck Cancer Clinic Speech Pathology Team. She 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.

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 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.



Leslie Johnson, Brian Kanapkey, and Shannon Aumer

The latest in technology for swallowing therapy, such as surface electromyography for biofeedback and VitalStim electrical stimulation is used here at UNC. There is also a new unit, known as Experia, that combines the feedback element and stimulation into one. 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 has become 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. Kanapkey and Kubik are currently working on a project that will bring another product to market over the next 1-2 years. The product is very useful for head and neck cancer patients and may have even more of a broad-based use.

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 being patented and prototyped by a national company. The company plans to market the device internationally after patenting and 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 was developed by Brian Kanapkey using silicone for creation of extended tracheoesophageal flanges to stop around the prosthesis leakage. This process reduces pulmonary aspiration and risk of aspiration pneumonia from around the prosthesis leaks. Brian was asked to speak on this subject at a conference for the Advanced Clinician in Milwaukee in October, 2011. He was also a member of a panel on the subject of TEP problems with other head and neck professionals from University of Iowa, Mass Eye and Ear, and M.D. Anderson Center in Houston, TX. The Symposium was well attended and is annual.

The ENT and head and neck cancer clinic hosted the International Association of Laryngectomees (IAL) in 2012. This was a hands-on clinic and was organized and supervised by Brian Kanapkey, Shannon Aumer and Dr. Trevor Hackman. The clinic hosted 300 professional clinicians from around the United States and International clinics. Kanapkey worked in conjunction with Dr. Phil Doyle of the University of Western Ontario, London, Ontario, Canada to provide the best learning experience for attending clinicians. The clinic

received very high praise by all who attended. Kanapkey has been asked to provide lecture and aid in planning the next IAL conference to be held in Seattle, Washington.

THE UNC 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 is also available. Available voice and speech services include behavioral assessment, videolaryngostroboscopy, acoustic and aerodynamic measurements, assessment of vocal ergonomics, and spirometric evaluation.

Beyond 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.



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

Diagnostic voice evaluations are performed at The UNC Hearing and Voice Center at Carolina Pointe, which celebrated its fourth anniversary in April this year, and is conveniently located at 5915 Farrington Road adjacent to the intersection of Highway 54 and Interstate 40. The Voice Center expanded its presence at Carolina Pointe 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). In celebration of our recent move, The Voice Center sponsored an Open House on in 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.

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

Elizabeth Ramsey recently joined the Voice Center team. She holds a Master's Degree in Speech Pathology, and has a background in voice disorders, swallowing disorders, and head & neck cancer. She will be specializing in voice disorders of various natures and also working with the pediatric voice population.

THE UNC HOSPITALS HEARING AND VOICE CENTER AT CAROLINA POINTE

The UNC Hospitals Hearing and Voice Center at Carolina Pointe is a community-based Audiology and Speech Pathology clinic. Our location is one of true convenience as we are situated at the intersection of Highway 54 and Interstate 40 at 5915 Farrington Road.

As a result of our ever-expanding patient population, we are once again planning an expansion of the Hearing and Voice Center, alongside the Department of Otolaryngology/Head and Neck Surgery, with a new building construction project, scheduled to open in late fall 2012. Our new space, will include 5 sound suites for comprehensive audiometric testing, facilities for hearing aid dispensing, using state of the art fitting tools, four independent cochlear implant programming stations, and patient resources for aural rehabilitation training as well as a patient workstation for demoing patient driven rehabilitation tools. This brand new location is at exit 273 off interstate 40 and highway 54 West into the city of Chapel Hill.



Drs. Ellen Pearce, Marcia Clark Adunka, Meg Dillon, and English King

In addition to the voice program, which is comprised of two full time speech pathologists with special interests in the diagnosis and treatment of voice disorders as well as vocal development of both the professional and amateur singer, the audiology team at the UNC Hospitals Hearing and Voice Center provides comprehensive diagnostic and therapeutic audiology services for both pediatric and adult populations. Along with behavioral audiometry, a full compliment of other assessment modalities is available including, tympanometry, acoustic reflexes, and otoacoustic emissions. From a

therapeutic perspective, the audiology team provides auditory intervention and support to patients in the form of traditional amplification, Bone Anchored Hearing Aids (BAHAs), Vibrant Soundbridge middle ear implants, and cochlear implants.

Over the past six years, the audiology program at the UNC Hospitals Hearing and Voice Center has experienced consistent growth and development in the forms of new service offerings as well as with the addition of new clinical staff. The team of participating audiologists includes Drs. Marcia Clark-Adunka, English King, Jill Ritch., Angela Byrd and Ellen Pearce.

Dr. Ritch is a pediatric audiologist, who offers clinical support in the area of pediatric diagnosis and management of children with hearing loss. She specializes in the fitting and application of hearing aids and assistive listening devices for pediatric patients. Similarly, Drs. Clark-Adunka and King 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. Dr. Angela Byrd contributes her clinical skills in the fitting of state of the art hearing aid technology for the adult patient population. She commits her time to the growth and development of the adult hearing aid dispensing program. Dr. Pearce's clinical contributions are recognized throughout all service areas, including diagnostic audiology of both adult and pediatric patients, hearing aid consultations, and the evaluation and programming of adult cochlear implant recipients.

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 Hearing and Voice Center at Carolina Pointe has been voted as a Top Five Clinic of UNC Healthcare by its patients in the surrounding community, and we would be pleased to offer our services to you.

THE UNC ADULT COCHLEAR IMPLANT PROGRAM

The Adult Cochlear Implant Program at the University of North Carolina at Chapel Hill in collaboration with UNC Healthcare represents the largest cochlear implant center in North Carolina and is among the nations 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.



Dr. Oliver Adunka shakes hands with patient, Dac Carpenter

The number of adult cochlear implant patients evaluated and treated at UNC Hospitals 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 healthcare, and we are routinely offering this technology to patients with more 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 adult cochlear implant population at UNC Health Care, the program expanded its

clinical workspace in fall of 2009 to include treatment facilities at the UNC Hearing and Voice Center at Carolina Pointe. The traditional patient care associated with cochlear implants, including hearing evaluations via speech perception testing as well as mapping and programming of external hardware, are routinely performed at our satellite location, while new candidate evaluations and intraoperative monitoring of cochlear implant surgeries remain closely tied to 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.

As a result of our ever-expanding patient population, we are once again planning an expansion of the Hearing and Voice Center, alongside the Department of Otolaryngology/Head and Neck Surgery, with a new building construction project, scheduled to open in late fall 2012. Our new space, will include 5 sound suites for comprehensive audiometric testing, facilities for hearing aid dispensing, using state of the art fitting tools, four independent cochlear implant programming stations, and patient resources for aural rehabilitation training as well as a patient workstation for demoing patient driven rehabilitation tools. This brand new location is at exit 273 off interstate 40 and highway 54 west into the city of Chapel Hill.

As a research hospital, we not only aim to provide quality clinical services but also to participate in cutting-edge research. In January 2007, UNC embarked on a new clinical trial sponsored by MED-EL Corporation, entitled Electric Acoustic Stimulation (EAS). This study incorporates a hybrid cochlear implant system; a partially inserted cochlear implant array to stimulate the high frequency region of hearing within the cochlea and an acoustic hearing aid to maximize hearing in the low frequencies. The UNC Adult Cochlear Implant program continues to lead the U.S. commitment to this clinical trial via patient enrollment and monitoring of patient outcomes as defined by the study protocol. The outcomes have been robust for all study participants; demonstrating improved hearing in noise performance as well as improvements in music appreciation.

An extension to the current EAS protocol was made available in March 2010, to include patients with normal to near normal low frequency hearing out to 1500 Hz, sloping to severe and profound sensorineural hearing loss. The second arm of this clinical trial signifies growth in the area of cochlear implantation and a more defined bridge between the technologies associated with traditional amplification and electrical implants. With our dedicated group of researchers

and practicing clinicians, we completed the initial enrollment allowance of 10 subjects. Recently, we petitioned the research sponsor as well as our facility Internal Review Board for the allocation of 10 more subjects. UNC was granted this allowance, and we are continuing our active participation in Arm 2 of the clinical trial, in pursuit of 10 more participants. By pursuing these research avenues and being dedicated to new advances in science, we are better able to serve our patients and their families. As hearing care professionals of UNC, this remains our primary mission. If you would like to receive information regarding our EAS investigational trial or other clinical trials associated with hearing, please contact the clinic at 919-966-5251 or 919-490-3716.

One of the primary goals of the UNC Adult Cochlear Implant team is to provide community education regarding developments in cochlear implantation as well as to participate in the exchange of knowledge with peers and colleagues in the field. Our team members have been active participants in a number of hearing and cochlear implant conferences in both national and international locations. We have been able to share our current research outcomes in a number of these venues, including CI 2012 in Baltimore, Maryland. Oral as well as written poster presentations, entitled *Sensitivity to Binaural Beats in Bilateral Cochlear Implant Recipients*, *Electric-Acoustic Stimulation: Speech Perception in Noise*, *UNC Cochlear Implant Subjective Questionnaire*, *Impact of age on outcome in adult electric-acoustic stimulation (EAS) patients*, *Speech performance outcomes in elderly patients (>80 years) with a MED-EL cochlear implant device*, *Subjective benefit of electric acoustic stimulation (EAS)*, were submitted for this year's annual meeting. All of our contributions were well received, and UNC will plan to participate at the next annual cochlear implant conference.

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, bilateral cochlear implantation, stressed listening paradigms to evaluate real world listening with a cochlear implant, and subjective benefits of CI recipients as measured by patient satisfaction questionnaires. 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.

THE UNC EAR AND HEARING CENTER

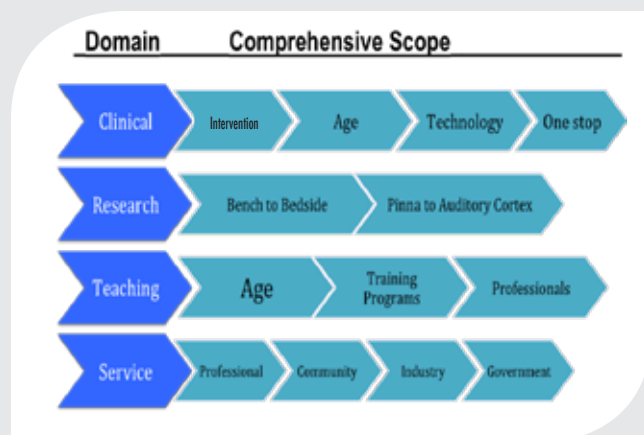
The UNC Ear and Hearing Center, directed by Dr. Craig Buchman, is an organization with a shared mission:

To preserve and/or restore the hearing of all individuals through high-quality patient care, research, teaching, and service.

Moreover, the organization is intended to be a *fully-integrated center* that provides an interactive and comprehensive scope of effort across all domains of academic health center mission.

Fully Integrated Program

WHAT IS A FULLY-INTEGRATED HEARING PROGRAM?



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. Professionals trained in every 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. 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.

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.

In the last year, the Ear & Hearing Center at UNC has been very busy locally, nationally, and internationally. Clinically, our team of professionals evaluated more than 400 children with newly identified hearing losses from around the Southeastern United States and abroad. Given our extensive experience and unique multidisciplinary approach, we continue to see a



UNC Pediatric CI Team from left to right: Laura Fleenor McCall, Mallory Baker, Sarah Martinho, Nissele Franco, Pat Roush, Craig Buchman, Kristen Jewell, Oliver Adunka, BJ Squires, Corinne Macpherson, Lisa Park, Lillian Henderson, Erika Beals, and Maegan Evans. Not pictured: Holly Teagle, Carlton Zdanski, Jennifer Woodard, and Deb Hatch.

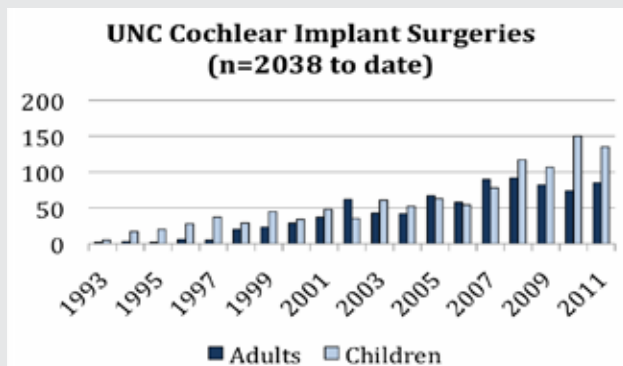
number of tertiary referrals for the diagnosis and management of challenging pediatric hearing loss cases. Last year alone, over 100 new hearing aid fittings and 120 cochlear implants were performed in the pediatric population alone. It has not been unusual for amplification to be undertaken before 3 months of age at UNC and cochlear implantation to occur before 12 months. Professionals from the Ear & Hearing Center continue to collaborate closely with professionals from around the state to provide additional services for these children.

The UNC Ear & Hearing Center commonly provides care to children with a variety of hearing disorders. In addition to common hearing loss etiologies, our group is following exceedingly large cohorts of children with hearing loss related to auditory neuropathy spectrum disorder (>200) and developmental inner ear malformations (>200). Moreover, in collaboration with the UNC Craniofacial Center, children with microtia and external auditory canal atresia are comprehensively evaluated and managed.

The Ear & Hearing Center also evaluated more than 300 new adult patients with hearing loss for possible cochlear implantation last year, implanting nearly 100 new patients.

Hearing Preservation Cochlear Implantation at UNC

Recent advances in surgical techniques and device technology has allowed surgeons at UNC to place cochlear implants in to patients with more residual hearing than ever before. Patients with hearing loss no longer need to be deaf before considering cochlear implantation. Surgeons have begun to test the effects of combining hearing-preserving cochlear implantation with amplification (also called Electro-acoustic stimulation or EAS) in an effort to serve a greater number of patients with sensorineural hearing loss. UNC has performed more than half of total EAS surgeries carried out in the US to date. Preliminary

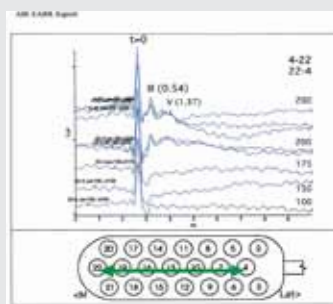


results from these studies are very encouraging. Many of these patients have significant improvements for hearing in noise when compared to their performance with their hearing aid alone.

Another area of interest is bilateral cochlear implantation. Drs. Buchman and Pillsbury have been actively involved in bilateral implantation in selected patients more than 8 years. In their early studies, bilateral implants showed a distinct advantage for both hearing in noise and sound localization abilities. While not for all patients, bilateral implantation is more common than ever, now being extended to the pediatric population as well. Today, more than 200 patients have received bilateral implants at UNC. Many of our previously implanted recipients are requesting second side implantation with the hope of improvements in sound localization and hearing in noise. Our research clearly demonstrates that bilateral implantation improves hearing-in-noise and these gains can continue as long as 4 years following implantation.

Acoustic Neuroma and Lateral Skull Base Tumor

More than 100 patients with acoustic neuroma and other skull base tumors were also evaluated last year (See Skull Base Surgery Center). Hearing preservation and restoration for these patients has become commonplace using a variety of innovative techniques that include observation with periodic imaging, middle fossa surgical excision, Cyberknife stereotactic radiosurgery, cochlear implantation, osseointegrated implantation, active middle ear implantation as well as brainstem implantation. Combining these modalities for the patients benefit is of critical importance to our group of professionals and those that we serve.



Auditory Brainstem Implantation at UNC

While cochlear implants are useful for most patients with severe to profound sensorineural hearing loss, occasionally patients may not benefit from implantation because of disorders related to the cochlear nerve or cochlea. In such cases, direct brainstem stimulation may provide improvements in communication abilities. Such brainstem stimulation is being used at UNC for patients with tumors resulting from neurofibromatosis type II of the brainstem. More recently, Dr. Buchman together

with Dr. Matthew Ewend from the UNC's Department of Neurosurgery has applied this technology to a non-tumor patient. The figure above demonstrates an intraoperative photo (left) and the electrophysiological responses (right) from an ABI placed in the lateral recess of the 4th ventricle of the brainstem in a patient deafened from meningitis and unable to hear with a cochlear implant. This patient has now been using his device for more than 4 years with significant demonstrated benefits. For this patient, the brainstem implant has provided dramatic improvements in sound awareness and enhanced lip-reading abilities, thereby improving quality of life substantially. From these experiences, we are working towards providing this technology for deaf children born without cochlear nerve or cochleas in an attempt to restore their sound awareness, and improve their communication abilities. We have recently been awarded an Investigational device exemption (IDE) from the US Food and Drug Administration to begin studying the use of the ABI in children. This exciting clinical trial will hopefully provide a useful communication adjunct for children that are unable to benefit from cochlear implants.

In another related area, Drs. Adunka and Buchman have been participating in a clinical trial to provide patients with persistent conductive or mixed hearing loss that is not amenable to conventional surgical treatment or amplification with a device that can directly stimulate the fluids of the inner ear through the round window. This approach bypasses the ear canal and hearing bones (ossicular chain). Through a surgical approach that is similar to the cochlear implant, the device is placed directly on the round window membrane of the inner ear. The patient wears an external, quarter size, processor that drives the internal device. Nine patients have been implanted thus far at UNC. These patients have noticed significant gains in their hearing. Three individuals that previously had no ear canal since birth are now able to hear with their affected ear. While this technology remains experimental, the potential future applications are very exciting.

The UNC Ear & Hearing Center professionals have also been very active in local, regional, national, and international professional educational programs and awareness initiatives for patients with hearing loss. UNC is a world leader in this arena. As an example, at the recent Cochlear Implants in Children Meeting (CI2012) held in Baltimore this summer, UNC had more presentations and was more widely represented than any other institution from around the world. Similarly, our professionals are commonly invited as lecturers on a wide variety of clinical and basic science topics that include newborn infant hearing screening programs, pediatric hearing loss, amplification, cochlear implantation, electrophysiological assessment of hearing in children, auditory neuropathy spectrum

disorder (ANSD), inner ear malformations, electrical stimulation of the auditory system, and psychoacoustics among others.

THE UNC 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 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. We have compiled all relevant data and patient information on our skull base website, which can be accessed through the department's internet presence (med.unc.edu/ent).

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.



Skull Base Team: Drs. Matthew Ewend (Neurosurgery) Charles Ebert, Jr. Craig Buchman, Brent Senior and Oliver Adunka (Skull Base Team Director)

Both Neurosurgery and Otolaryngology-Head & 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.

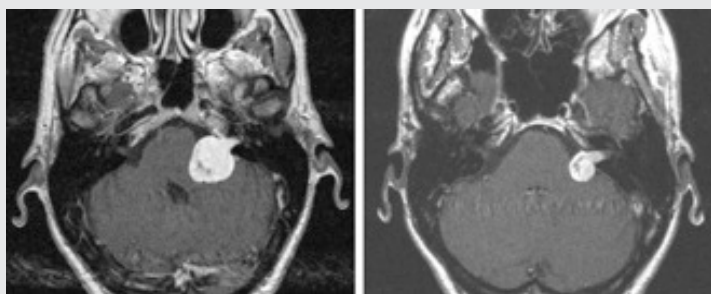
Other UNC disciplines involved in the Skull base center include Drs. Matthew Ewend and Deanna Sasaki-Adams from the Department of Neurosurgery, Dr. Julie Sharpless from Endocrinology, Dr. Jonathan Dutton from the Department of Ophthalmology, Drs. Mauricio Castillo, Benjamin Huang, Valerie Jewells, Keith 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.

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.

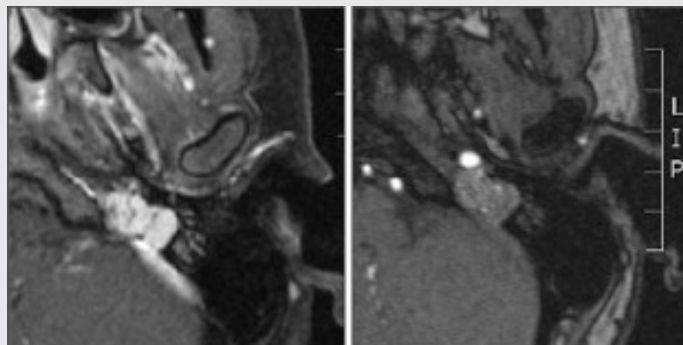
A main emphasis of the UNC Skull Base Center is to offer hearing restoration via both cochlear and brainstem implantation in selected patients. Specifically, we have developed an FDA approved clinical protocol that will allow us to pursue auditory brainstem implantation (ABI) in children with cochlear 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.



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.

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.



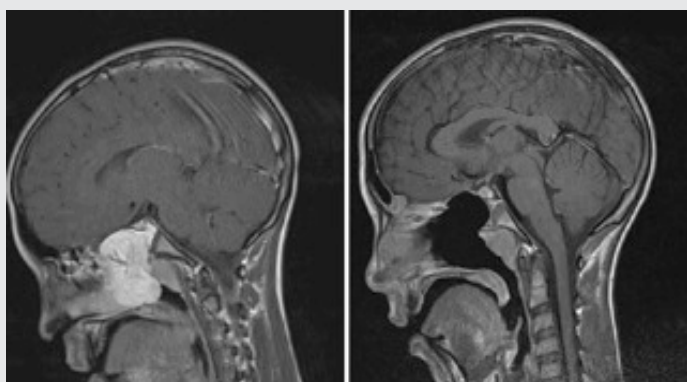
MRI of a glomus jugulare paraganglioma originating from the jugular foramen and extending into the middle ear. A multi-modal management approach using planned subtotal resection of the middle ear content with subsequent stereotactic radiation has been chosen.

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 "surgery-centric" or "radiosurgery-centric" model depending on the institution's expertise and interest. However, this institutional bias might not serve the patients' 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 that serves the patient's best interests. 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 healthcare 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.



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).

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.

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.

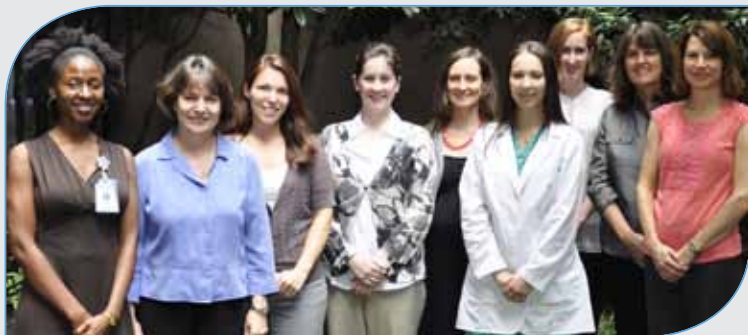
Also, it was noted that there is likely a long-term learning curve associated with endoscopic skull base reconstructions. If one compares the first 25 nasoseptal flaps ever published upon and the first 150 patients and the most recent 150 patients from our institution, there is a significant improvement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

PEDIATRIC AUDIOLOGY

The UNC Pediatric Audiology Program, under the direction of Patricia A. Roush, AuD, is committed to providing 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 that includes Nissele Franco, AuD, Corinne Macpherson, AuD, Sarah Martinho, Laura Fleenor McCall, AuD and Jill Ritch, AuD. In addition, audiologist Patricia Reitz, M.S. conducts newborn hearing screening and arranges follow up for infants in the neonatal intensive care nursery. At UNC, screening coordinator, Chris Ryan, RN, oversees hearing screening performed by nursing staff in the well baby nursery. The UNC Pediatric Audiology team is also fortunate to have two talented 4th year AuD students working in our program this year: Ms. Melissa Aldana and Ms. Mallory Baker, both graduate students in UNC's Doctor of Audiology program.

Infants who do not pass the hearing screening at UNC and many from other birthing hospitals throughout the state are seen by UNC's pediatric audiology team for comprehensive diagnostic hearing assessment using auditory brainstem response evaluation (ABR), otoacoustic emissions (OAE), and other measures. Using a battery of physiologic tests, our audiologists are able to obtain the information needed to initiate hearing aid fitting. The goal is to complete the fitting as soon as possible following confirmation of hearing loss. For infants with uncomplicated birth histories, our audiologists are able to move from diagnosis to hearing aid fitting in less than three weeks. Most of the infants seen at UNC following referral from

newborn hearing screening are fitted with hearing aids by 2-3 months of age. This is in contrast to the situation that existed prior to universal newborn hearing screening when, only a few years ago; the average age of diagnosis was over 18 months. Infants born with permanent hearing loss now have the benefit of auditory stimulation within weeks of birth. Infants with severe or profound hearing loss who are unable to receive benefit from hearing aids are referred to the UNC Pediatric Cochlear Implant team for cochlear implant evaluation and follow up.



UNC Pediatric Audiology Team: Shana Jacobs, Pat Roush, Melissa Aldana and Mallor Baker, Laura Fleenor McCall, Nissele Franco, Corinne Macpherson, Patty Reitz, and Sarah Martinho. Not pictured: Jill Ritch

The number of children with hearing loss followed by the UNC team continues to grow each year. We currently follow over 1000 children who wear hearing aids and receive care by the pediatric audiology team while several hundred children with cochlear implants are followed by UNC's pediatric cochlear implant team. In addition to the children with 'typical' sensorineural hearing loss, UNC's pediatric audiology team, working in collaboration with UNC's 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. In ANSD outer hair cell function is spared but but neural transmission in the auditory pathway is disordered. Although this not a new condition, test procedures developed in recent years have made it possible to diagnosis ANSD at an early age. This disorder presents new challenges in management for pediatric audiologists and the other professionals who serve them. UNC's pediatric audiology team, in collaboration with UNC otolaryngologists, has developed an evidence-based protocol for evaluation and management so that infants diagnosed with this disorder have early and effective treatment. Prospective longitudinal research with these patients will help us refine future management protocols.

The UNC team is also collaborating with Mission Children's Hospital in Asheville, NC to establish the first comprehensive pediatric audiology program in western North Carolina. This is an important initiative as families from western N.C. often travel 3-4 hours to UNC for pediatric audiology services.

Earlier this year, Dr. Roush along with Drs. Harold Pillsbury, Craig Buchman and Jackson Roush travelled to Asheville to meet with members of the Mission Hospital administration to discuss ways the UNC program could support the development and implementation of Mission's pediatric audiology program. Over the ensuing months the program has been approved, space has been developed, equipment purchased, and a search is currently underway for a pediatric audiologist. UNC will provide ongoing training and technical support.

In addition to providing direct service to patients, the UNC program is contributing to the education of other professionals. In June of this year, the UNC Pediatric Audiology team hosted two visiting audiologists from the Dominican Republic. Audiologists Donna Carkeet and Miguel Angel Evangelista spent a week with Dr. Roush and other UNC pediatric audiologists observing diagnostic auditory brainstem response evaluations, behavioral hearing evaluations on infants and young children and hearing aid fitting as well as learning about the UNC protocols for management of hearing loss in infants. Ms. Carkeet received a grant from the Hear the World Foundation to provide funding for this training. Ms. Carkeet who is from Melbourne, Australia is employed by Ears, Inc. a non-demonational Christian organization that is dedicated to the training and equipping of local health workers in developing countries, for the rehabilitation of the hearing impaired. She went to the Dominican Republic in 2005 to assist with the establishment of a high quality hearing clinic and the founding of a two year Audiometric Technician's course and a four year Bachelor's degree in Audiometry.

During the past year, Dr. Roush also gave several invited presentations on topics related to hearing loss in infants. In September, she participated in a panel on the topic of newborn hearing screening organized by Dr. Craig Buchman at the American Academy of Otolaryngology Annual Meeting in San Francisco. In November 2011, Dr. Roush travelled to Istanbul, Turkey to give an invited presentation entitled "Clinic Issues in Assessment and Management of Auditory Neuropathy Spectrum Disorder" at the Fourth European Pediatric Amplification Conference. In March 2012, Dr. Roush and then 3rd year UNC AuD student Mallory Baker were pleased to win First Place for Scientific Merit for a poster presentation on the topic of auditory neuropathy at the 11th Annual Early Hearing Detection and Intervention Conference in St. Louis. In May 2012, Drs. Roush and Teagle gave a presentation for parents of children with hearing loss that provided them with an update on new hearing technologies at Camp Cheerio.

Members of the team are also engaged in a number of research projects. In August 2008, UNC, in collaboration with the

University of Iowa and Boys Town National Research Hospital in Nebraska, began a five-year study entitled “Moderators of Functional Outcomes in Children with Mild to Severe Hearing Loss. Dr. Patricia Roush and her colleague, Dr. Melody Harrison, a speech-language pathologist in the Division of Speech and Hearing Sciences, Department of Allied Health Sciences, are directing the UNC component. The primary aim of the study is 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. The study, funded by an \$8.9 million grant from the National Institute on Deafness and Other Communication Disorders, NIH, differs from most other research on childhood hearing loss by focusing on children with milder degrees of hearing loss who use amplification. The project is now in year four and across the three sites, over 300 children with mild to severe hearing loss and 100 children with normal hearing have been enrolled. UNC research assistants, Shana Jacobs, AuD, audiologist and Thomas Page, M.S., speech language pathologist test the UNC participants and manage the data collection.

Work also 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 colleagues Dr. Lori Leibold and Dr. Andrea-Hillock Dunn from the Division of Speech and Hearing Sciences.

The UNC Pediatric Audiology Team takes great pride in providing excellent clinical care to infants and young children with hearing loss and their families and look forward to an exciting new academic year with continued excellence in patient care and clinical research.

THE W. PAUL BIGGERS, MD CAROLINA CHILDREN'S COMMUNICATIVE DISORDERS PROGRAM

The Pediatric Cochlear Implant Program, the Carolyn J. Brown Center for the Acquisition of Spoken Language through Listening Enrichment (CASTLE), and the CCCDP Financial

Assistance Program are all part of The W. Paul Biggers, MD Carolina Children's Communicative Disorders Program (CCCDP). 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 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 funded by the Oberkotter Foundation, the Barnhardt Family Foundation, Terry & Mickey Pils Chartable Lead Annuity Trust, W. Trent Ragland Foundation, Kids N Community Foundation, Wal-Mart Foundation, private family contributions and the State of North Carolina. 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 first annual CASTLE Breakfast in May. Hosted at the Rizzo Center, invitations to the CASTLE breakfast were extended through CASTLE board members and friends of the program and over \$25,000 in support was generated towards a matching grant from the Oberkotter Foundation. And last but not least, the 2011 CCCDP/CASTLE Summer Fun and Fundraiser held in August was a great success. In 2012 this ever-popular and growing event is planned for October and will mark the 20th anniversary of the CCCDP, the 10th anniversary of CASTLE, and the 50th anniversary of the Nomads Band, led by staff member Robert Humphreys. CCCDP and CASTLE staff and patients always contribute their musical talents as well. This feel-good event, which includes a silent auction, has been a successful fund and awareness raiser for the program for three years running.

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, 2011 and June 30, 2012, 110 surgeries were performed. These included children receiving their first or second side devices, and 13 revision surgeries. As in previous years, many other children transferred into the programs that were implanted elsewhere. The program is providing ongoing support for children who live in North Carolina, Virginia, and South Carolina.

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. CASTLE teaches children who are deaf to listen and talk, and trains school professionals and early intervention educators to support the success of such children in age-appropriate mainstream classrooms.

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 implant patients, to supporting a team approach, and to assuring that the technology is used



CCCDP/CASTLE Team: Velma Grose, Lisa Park, Lori Parker, Deb Hatch, Sandra Onisk, Holly Teagle, Erika Beals, Robert Humphries, Hannah Eskridge, Jennifer Woodard, Lillian Henderson, Erin Thompson, and Maegan Evans

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 teachers and speech-language pathologists: Maegan Evans, Ph.D, CCC-SLP, LSLS Cert AVEd., Sandra Hancock, MS, CCC-SLP, LSLS Cert AVT, Lillian Henderson, MSP, CCC-SLP, LSLS Cert AVT, Francisca Casillas Hernandez, MA, Chrissy Krammer, MS, CCC-SLP, Sindy Poole, BS, 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, and Lori Parker, Receptionist and Scheduling Assistant. Both Robert 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 (ANSD), 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. With the addition of Dr. Shuman He's research lab at the CCCDP and CASTLE offices, we have been able to enroll many patients in various research projects that include electrophysiological measures. Studies that compare these objective measures to the behavioral data being collected in the clinic have proven to be enlightening.

Funded research includes a multi-centered NIH-sponsored project, Childhood Development after Cochlear Implantation, which is in its ninth year. This landmark study will impact the direction of future cochlear implant patient management. 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.

Planning is underway to begin a clinical study 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. The Pediatric cochlear implant team will collaborate with Dr. Matt Ewend of the Department of Neurosurgery and Dr. John Grose and Dr. Shuman He for this project.

Research affiliations with the manufacturers of cochlear implants have resulted in a project with MedEl Corporation to norm test materials, a post-market performance study with Cochlear Corporation, and a bilateral cochlear implant study with Advanced Bionic Corporation. Our program is widely recognized for its depth of experience and expertise, not only among patients and professionals, but across the industry.

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 auditory-based early 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.

This summer, CASTLE launched the UNC REACH program which provides tele-therapy and tele-training throughout the state. Through a grant from the Kids 'N Community Foundation, CASTLE is able to launch the pilot program to provide therapy to children ages birth to three with a listening and spoken language professional no matter where they live. 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.

The several facets of CASTLE include the following:

- [Speech/language diagnostic evaluations determine need and eligibility for a variety of available programs.](#)
- [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 an auditory-based 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

In addition to these aspects of the program, other projects have been developed or expanded 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 20 one- and two-day workshops this past year. As part of this consortium, a training protocol called “Recognition of Achievement for Best Practices in teaching Spoken Language to Children who are Deaf or Hard of Hearing” has been developed. This protocol requires participation in workshops and modules focused on the development of listening and spoken language skills as well as an intensive mentoring experience provided by CASTLE staff or staff from the Department of Public Instruction.

The 15th annual Carolina Summer Institute was a resounding success. With special fundraising, CASTLE was able to provide \$13,000 in scholarship aid, and the two week Institute again had full enrollment. Thirty-seven participants came this year from North Carolina, Florida, South Carolina, Georgia, Virginia, Tennessee, Texas, Illinois, Bermuda, Canada and Saudi Arabia.

This year the annual CCCDP Fall Conference, co-sponsored by the North Carolina A.G. Bell Association, featured Beth Walker Wooten, M.Ed., CED and Kathryn Wilson, MA, CCC-SLP, LSLS Cert AVT, presenting on the Late Starter. The Conference was attended by 117 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, provides 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. It continues to respond to rapidly growing demands from across North Carolina. Financial assistance is provided for certain equipment and devices to qualifying children from birth to age 21. It funds such technologies as frequency transposition hearing aids, digital programmable hearing aids, cochlear implant equipment, assistive listening devices, and UNC-provided diagnostic services for children whose families need financial support to meet their children’s special needs. The CCCDP financial assistance program helps families with the substantial costs of hearing related accessories, loss and damage coverage on external equipment, as well as UNC-provided cochlear implant programming and speech therapy.

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 1,507 children from 92 North Carolina counties. From June 1, 2011 to May 31, 2012, 65 children were enrolled for the first time. A total of 481 children were enrolled at some point during this period.

Of the 65 new children accepted into the CCCDP Financial Assistance Program between June 1, 2011 and May 31, 2012, 40 were cochlear implant patients or candidates. Nineteen of the new children have received cochlear implants since June 1, 2010, with a total of forty cochlear implant surgeries being provided for enrolled children this year. There are also children enrolled in the program who received their cochlear implant surgeries at other implant centers prior to being enrolled. The CCCDP accepts these children into the Financial Assistance Program to help their families with the substantial costs of accessories, loss and damage coverage on external equipment, as well as UNC-provided cochlear implant programming and speech therapy. Insurance companies, and even Medicaid, often will not cover these items or services.

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 who have hearing loss. The collaboration between UNC Healthcare, 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 and support, a venue for conducting important research, and the financial assistance needed by so many families.

Oliver Adunka, MD

Dr. Adunka has continued his research efforts focusing on the mechanisms of inner ear hearing loss in various clinical settings. These issues seem especially important since the inception of electric acoustic stimulation (EAS) of the auditory system, a paradigm that combines electric stimulation via a cochlear implant (CI) with acoustic stimulation via conventional hearing aids. Mostly, this new stimulation mode can be achieved through hearing preservation measure taken during cochlear implantation. In other words, despite the surgical insertion of a cochlear implant electrode into the cochlea, its function can be preserved and combined with the implant.

Dr. Adunka helped to bring this paradigm to UNC and he has been the principal investigator of the electric-acoustic stimulation (EAS) clinical trial; a multi-center North American trial in which UNC performed the first surgeries and is leading enrollment with 30 subjects. In an ongoing collaboration with MED-EL North America, UNC has completed the first arm (20) of the study and has also completed initial enrollment of the second arm (10), which includes subjects with greater levels of residual hearing. Preliminary results have been able to demonstrate the safety and effectiveness of this new stimulation paradigm and the UNC has just received approval for another 10 subjects for Arm 2 of the protocol.

EAS continues to be a hot topic in cochlear implantation and many UNC research endeavors focus on the detailed evaluation of these subjects. Margaret T. Dillon, AuD, and has been busy obtaining data from clinical trial patients. The researchers have been able to gain insights into the clinical factors that might influence the postoperative outcome in EAS patients. Currently, a biostatistician, Dr. Truong, has provided assistance via a critical multivariate analysis that will likely help to shed light on the relationship of the various variables involved.

The experiences gained from this clinical trial have also helped to shape some of the animal research performed at UNC. Specifically, in an ongoing collaboration with Drs. Fitzpatrick and Buchman, Dr. Adunka has continued to work on experiments using Mongolian gerbils focusing on the effects of intracochlear trauma and the patterns observed during electrode insertion. Specifically, this research utilizes early auditory potentials, which include cochlear microphonics (CMs) from hair cells and compound action potentials (CAPs) as well as the auditory nerve neurophonic (ANN) from the spiral ganglion. The animal experiments have helped the researchers identify electrophysiologic patterns

during intracochlear electrode implantation that might indicate cochlear health and electrode insertion properties.

As such, previous data revealed peculiar configurations of electrophysiologic markers so that intracochlear electrode positioning can be determined in real-time during surgery. The researchers have taken this data to the human stage and more recent advances demonstrate the feasibility and the potential utility of this principle when used intraoperatively. Future studies are ongoing and investigate the details of the electrophysiologic patterns observed. Also, in a close collaboration with cochlear implant manufacturers, these data will be used to implement this technology into future devices.



Dr. Adunka has been heading the histological temporal bone laboratory at UNC. A special sawing, grinding, polishing system allows sectioning of non-decalcified bone and hard materials such as electrode contacts but also prosthetic implants commonly used in dentistry or orthopedic surgery. Last year's efforts have focused on the evaluation of recent electrode prototypes that allow for less traumatic insertions into the cochlea. This lab has moved to a temporary space in Thurston Bowles and will be part of the multidisciplinary surgical skills laboratory, scheduled to open in late 2012.

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. Clinical research has been focusing mainly on diagnostic algorithms. Also, recent work has focused on collecting imaging and clinical

data on several types of inner ear malformations. This data has been recently published. Further analyses are ongoing.

During his research efforts, Dr. Adunka has mentored medical students including John Maxwell Pike, MS III, who has completed a research year between his 3rd and 4th year of medical school. In this year, Maxwell has been extremely productive helping mainly with animal experiments detailed above. Also, Omar Anwar, MS III, has also completed one dedicated research year. His main project has been the implementation of the recording algorithms into current cochlear implant technology. Also, Omar has been involved in a clinical research project on pediatric cochlear implantation and auditory neuropathy spectrum disorder (ANSD).

Over the past 4 years, Dr. Adunka has developed a multi-client 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 2,600 pediatric patients with all types of hearing loss and assistive devices have been entered. This includes more than 700 children with cochlear implants. Also, this database has been integrated into the clinical algorithm and data entry and analysis has become part of the clinical routine.

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 is actively studying topics such as cochlear nerve deficiency, auditory neuropathy spectrum disorder (ANSD), CMV-related hearing loss, inner ear malformations, and a number of hearing restorative device-related topics. In the field of cochlear implantation, Dr. Buchman and colleagues continue to study 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. Also, ongoing investigations continue into the safety and efficacy of bilateral cochlear implants as well as the reliability of a variety of cochlear implant devices in both adults and children. Newer areas of study include a clinical trial for auditory brainstem implants (ABI) in adults without NF2 and use of the round window membrane for implantation of the Vibrant MedEl device for conductive and mixed hearing losses. The team at UNC was just approved to commence a clinical trial in to the safety and effectiveness of ABI in children without NF2.

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 200 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 hearing restorative interventions. 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 tests 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 have also begun collaborations with other institutions to develop a multi-site investigation in this population of children. Preliminary results from the studies appear very promising.

Congenital inner ear malformations are very common among children with hearing loss. At UNC, we are following more than 200 children with inner ear deformities. Unique to this group of children is the fact that many have an increased risk for progressive or profound hearing loss and cochlear implantation can be significantly more challenging when compared to children with normal inner ear anatomy. We are actively trying to identify those children with inner ear malformations that are best served with cochlear implants and those that might be better served with other communicative assistance such as a brainstem implant or manual modes of communication.

Dr. Buchman continues to collaborate with audiologists at UNC, Boystown and the University of Iowa in an NIH funded study of children with less than severe hearing loss. The OCHL (Outcomes of Children with Hearing Loss) Study, lead by Patricia Roush locally, is charged with identifying factors that predict success for young children with hearing loss. Dr. Buchman is specifically studying the influence of medical factors on outcomes in this group of 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.

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 has recently been published in the *Laryngoscope* journal, 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 will form the basis of Dr. Buckmire's Triological thesis. 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.

In work with Bioptogen, an RTP start-up company, optical coherence tomography (OCT) is being utilized to acquire real-time 2D and 3D images to aid in tumor border detection and to assess subepithelial anatomic detail. Projects determining the role for quantitative laryngeal electromyography (LEMG) 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.

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.

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.

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, subjective assessment, hearing preservation and subsequent programming of combined electric and acoustic stimulation in ipsilateral

listening conditions.



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 center's findings at state, national and international meetings.

EAS utilizes a shorter, more flexible electrode array in attempt 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. Enrollment initiated in 2007 under the Arm 1 candidacy criteria. In 2010 the inclusion criteria expanded to include a second cohort (Arm 2), offering enrollment to patients with greater amounts of residual hearing. 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 review the influence of preserved residual hearing on speech perception abilities by comparing EAS subjects to conventional cochlear implant recipients. Further, this protocol assesses abilities with the use of the contralateral hearing aid, to ultimately improve our understanding of the best treatment options and listening configurations for patients with severe-profound high-frequency hearing loss.

Recently, the FDA approved the second round of enrollment in the VSB clinical trial. The VSB converts the acoustic signal into controlled, amplified oscillations to deliver 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) of the Vibrating Ossicular Prosthesis (VORP) near the round window in patients with conductive or mixed hearing loss who are unsuccessful users of traditional amplification. We are continuing to assess the longitudinal outcomes of the four subjects in the first cohort (completed in 2009). Our center reached maximum enrollment in the second cohort, and this population is currently undergoing implantation and postoperative subjective and objective assessment.

The adult cochlear implant team is also investigating the impact of electrode array length on ease of insertion during implantation and on postoperative measures. The speech perception, musical discrimination, and subjective report are assessed for patients receiving a medium (24 mm) versus a standard (31 mm) electrode array. Findings from this research may provide insight to the benefits of electrical stimulation of the apex, the rate at which cochlear implant recipients reach asymptotic performance, and the impact of resistance experienced during electrode insertion on postoperative outcomes.

Additional topics currently under investigation include: optimization ipsilateral electric and acoustic stimulation, signal coding outcomes, temporal processing in cochlear implant recipients, and subjective benefits of cochlear implantation.

Though EAS recipients have shown significant gains in speech perception abilities in quiet and noise as compared to their preoperative listening condition, we are conducting further assessment of ways to optimize the programming of the external device to further improve speech understanding in challenging noise conditions. In conventional cochlear implant recipients, we have initiated a test protocol reviewing outcomes with two different signal coding strategies. In a pilot study, we are reviewing whether bilateral cochlear implant recipients can discriminate fine structure information provided by a signal coding strategy. Finally, we are continuing to collect data towards the development of a subjective questionnaire specific to the cochlear implant patient experience.

Amelia F. Drake, MD, FACS

Dr. Drake serves as director of the UNC Craniofacial Center in the School of Dentistry. She currently serves as the PI of a subcontract on the study of hearing and neurodevelopment of toddlers with craniofacial microsomia. The study follows children with this condition to better understand what to predict for their families and educators. Prior work in describing the condition and an enhanced understanding of the phenotypic variation in this condition has permitted the study to question the unique issues relating to congenital absence of the ear unilaterally, or the abnormality of the unilateral mandible. Current collaboration on the CFM Planning Grant (RC1 DE 020270) has enabled the development of the Facial Asymmetry Collaborative for Interdisciplinary Assessment and Learning (FACIAL) network.

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 Madan, 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 Rhino 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 funding for this project through the

North Carolina Translational and Clinical Sciences Institute funded through Clinical and Translational Science Awards. Other research interests include: 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, examine the use of specific strains of probiotics in the prevention and treatment of allergy-induced Eustachian tube dysfunction in the rat model, and the treatment of otitis media with effusion using CpG oligodeoxynucleotides in an allergic rat model. Dr. Ebert is also the co-director for the Rhinology and Endoscopic Skull Base surgery fellowship and is the Associate Residency Program Director.

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

Hannah is the current CASTLE Director. 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 as well as coordinates staff and various other programs at CASTLE. Hannah also conducts Auditory Verbal parent sessions. Hannah earned her Master's Degree from the University of South Carolina. She currently serves on the AG Bell Academy Certification Committee and is the chair of the OPTION SCHOOLS Strategic Planning Committee.

Douglas C. Fitzpatrick, PhD

Dr. Fitzpatrick and his colleagues study the physiology and anatomy of hearing using animal models and human subjects. A project begun this year was to obtain intraoperative electrocochleography (ECoG) recordings from patients receiving cochlear implants. This project marks the culmination of several years of animal studies leading to new ways to collect and interpret ECoG potentials. Dr. Fitzpatrick also obtained a new 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 our 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 outcome should depend in part on whether and 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. This work has been pioneered by Baishakhi Choudhury in her second year in the lab supported by the NIH T32 grant.

In the animal studies, we investigated if trauma in the cochlea extends beyond the time immediately surrounding the insertion. We measured ECoG responses at the round window before and after cochlea trauma was produced, and after an additional month of survival. We found that loss of cochlear responses were relatively small at the time of surgery compared to a month later. This result indicates that the trauma measured with ECoG recordings at the time of surgery will underestimate the ultimate degree of hearing loss. This work has been carried out by J. Maxwell Pike, an MS4 who spent a year in the lab.

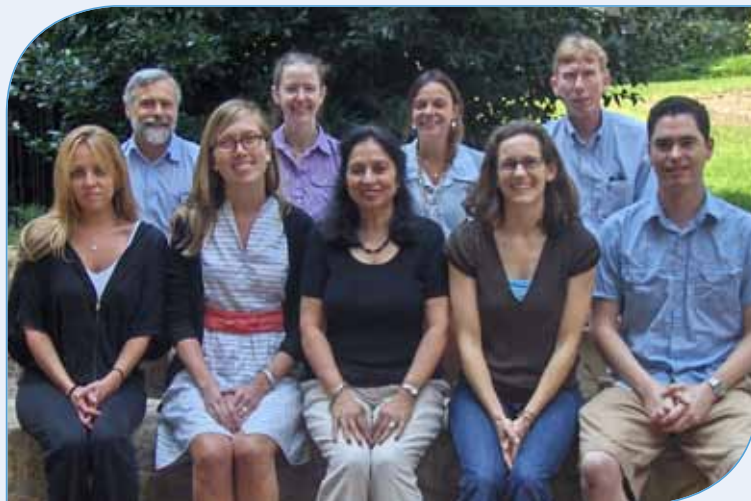
In both human OR recordings and in animal studies we have continued to implement recordings through the implants themselves using hardware and software provided by cochlear implant manufacturers (Cochlear Corp, Advanced Bionics, Inc, and MED-EL Corp). Considerable progress was made by Omar Awan, an MS4 who also spent a year in the lab.

As always, Stephen Pulver has provided superb technical assistance throughout the year.

John H. Grose, PhD

Dr. Grose has focused his research interests on why hearing difficulties increase as we grow older. Part of this difficulty is associated with the inability to hear soft sounds (the hearing loss that results from the accumulating failure of the inner ear), but part of the difficulty is also due to a reduction in sound fidelity along the entire hearing pathway up to the brain. For example, older listeners who are still very good at hearing quiet sounds nevertheless tend to have trouble hearing in competitive listening situations such as following a conversation when other background sounds are present. Dr. Grose is the Principal Investigator on an NIH-funded project that examines such complex sound processing in normal and impaired auditory systems. It seeks to tease apart hearing loss effects from aging effects. One thread in this project has focused on the phenomenon of binaural beats – the sensation of fluctuations within the head that occurs when sounds of different frequencies are presented to the two ears. These internal beating sensations are due to interactions between the two ears and provide insights into how timing information is encoded in the auditory system. The most recent publication in this sequence demonstrated that the perceptual salience of binaural beats tends to be weak, but that their behavior shares commonalities with other types of modulation such as amplitude modulation [Grose, J.H., Buss,

E., and Hall, J.W. III (2012). “Binaural beat salience,” *Hearing Research*, 285, 40–45. PMC3299837]. Another experiment in this series that has recently been completed examines age effects in the processing of a related stimulus: frequency modulated tones that differ across the two ears. This study, currently under review with the journal *Hearing Research*, demonstrates that the detection of frequency modulation in just one ear is sufficient to separate the performance of older listeners from that of younger listeners, but that all age groups benefit from having different modulations presented to the two ears. The latter presentation mode is also better able to differentiate the performance of middle-aged listeners from both younger and older listeners.



Psychoacoustics Lab: Bottom row from left: Tara Steplowski, Heather Porter, Madhu Dev, Sara Mamo, Erol Ozmeral Top row from left: John, Emily, Silvana Maria Griz, and Dr. Joseph Hall. Silvana Maria Griz is a professor of audiology at the Federal University of Pernambuco, Brazil, and works with Dr. Grose on a joint project until early 2013.

The overall pattern of results suggests that a binaural frequency modulation detection task has advantages over a monaural task in terms of identifying age-related temporal processing deficits.

This year also marks the fruition of a long-standing effort to establish a research collaboration with the Universidade Federal de Pernambuco (UFPE: Federal University of Pernambuco) in Recife, Brazil. In June, 2011, Dr. Grose was awarded an R03 from the Fogarty International Center of the NIH to establish a joint research project with colleagues at UFPE. However, the award remained restricted "frozen" until the project also received approval from the Brazilian government. This proved to be a long process that took over a year to complete, but all approvals are finally in place and the project is moving forward. The project also has a focus on hearing difficulties associated with aging, and a centerpiece is the assessment of speech perception in both American English and Brazilian Portuguese in a variety of contexts.

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

The main experiment in this project is investigating the effect of sensorineural hearing loss on the development of hearing in children. The aim is to examine the ability of these children to obtain benefit for speech perception in noise for noise that has spectral dips, temporal dips, or both spectral and temporal dips. The ability to benefit from such spectro-temporal dips probably accounts for the relatively good ability of listeners with normal hearing to understand speech in noisy environments. It is important to assess the effect of hearing loss on these abilities, particularly in children, where experience with speech/language cues is relatively limited. The project is also investigating normal development of the ability to integrate fragments of speech in noisy backgrounds where the signal-to-noise ratio is low.

A second experiment in this NIH grant is investigating the development of auditory temporal processing in normal-hearing children. The specific focus is on the ability to use very brief temporal cues and to separate these cues from other temporally proximal acoustical information. The results of this study should aid the understanding of the ability to understand speech in difficult listening situations. The lead investigator on this project is Shuman He.

A third study in this NIH grant is a basic science project investigating the frequency selective nature of binaural hearing. It has long been known that the frequency region responsible for binaural masking is wider than that associated with monaural (single-ear) masking. This project examines the basis for this finding and is specifically testing the hypothesis that the dynamics of the temporal envelope of the masking noise play a crucial role.

This grant has recently been approved for refunding, and begins a new five years of support on September 1, 2012. New initiatives will further explore how an early history of conductive hearing loss affects the development of hearing.

SPECTRO-TEMPORAL PROCESSING IN NORMAL AND IMPAIRED EARS

A basic science study in Dr. Hall's second 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.

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 comparing electrocochleography (ECochG) recordings obtained simultaneously at the round window and tympanic membrane in patients with ANSD undergoing cochlear implant surgery. Recent studies suggest that measuring ECochG might further refine site of lesion identification and thereby be useful in predicting outcomes in ANSD children. However, these studies used trans-tympanic methods to record from the cochlear promontory or round window and were, therefore, necessarily invasive. In contrast, extra-tympanic ECochG, with electrodes placed proximal to, or in contact with, the TM is less invasive and might lend itself to a more generalizable testing paradigm if responses remain sufficient.

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 are selected in the future.

Grace Kim, MD

Dr. Kim continues to be active in clinical and translational research projects in Otolaryngology/Head and Neck Surgery. Supported by the NIH T32 training research grant, she is able to pursue her research interest in mechanisms of tumor escape in head and neck cancers. With mentorship from Drs. Harold Pillsbury, Adam Zanation, Jon Serody, and Carol Shores, her translational research project is in studying the role of myeloid-derived suppressor cell population in patients with HPV+ squamous cell cancer and patients with obstructive sleep apnea.



This past year, Dr. Kim was awarded a second year of NIH Loan Repayment Program support (\$35,000) by the National Cancer Institute for Clinical Research Distinction in Research Program and the UNC Lineberger Comprehensive Cancer Center Clinical/Translational Developmental Research

Award (\$40,000) for her project “The Role of Myeloid-Derived Suppressor Cells in Head and Neck Cancer.” This study allows a unique opportunity for collaboration between the Otolaryngology/Head and Neck Surgery, Hematology/Oncology, and Surgical Pathology departments.

In addition to translational research studies, Dr. Kim remains active in a variety of 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 7 refereed manuscripts and has made numerous oral and poster presentations on local and national levels. Dr. Kim is a highly motivated to continue her research projects and plans to pursue an academic career.

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 the deposition of particles in the primate airways, and the use of combined nose-and-lung models of the respiratory tract to compare inhaled dose in rats and humans. They also recently used their human CFD models to study objective ways to measure and predict improvements in patients’ symptoms when surgical interventions are used to treat nasal airway obstruction, and how surgery may affect the distribution of sprayed medication in the nasal passages of patients being treated for nasal airway obstruction or 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 subcontract with Medical College of Wisconsin (MCW), 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). She 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, and Dr. William Shockley and Dr. Scott Shadfar on CFD modeling of rhinoplasty effects on nasal airflow. Dr. Kimbell also works with her postdoctoral fellow, Dennis Frank, PhD along with Dr. Rhee and other colleagues at MCW 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 3D reconstructions from imaging data.

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. Dr. Manis' work is currently supported by 3 NIH R01 grants.

In the first project, Drs. Manis and Mancilla, along with Heather O'Donohue, are studying the physiology of the dorsal cochlear nucleus. The dorsal cochlear nucleus (DCN) is a site for rapid and early processing of spectrally complex acoustic stimuli, and is the first point in the auditory system where auditory and non-auditory information converges. Changes in the DCN following hearing loss has been associated with central tinnitus, which is a perception of a phantom sound. We have built on our existing data on electrical excitability and synaptic function to create a biologically accurate circuit model of the DCN. We will use this model to test predictions about how changes in synaptic function associated with hearing loss can affect the output of the nucleus. We have found that this model predicts that synchronized firing of the output cells depends on the details of

interactions between the cartwheel cells. This synchrony could be a dysfunctional activity pattern that leads to tinnitus. We are also testing whether noise-induced central tinnitus is associated with decreases in inhibitory synaptic strength, or with increased intrinsic electrical excitability. Ms. Heather O'Donohue has found that the spontaneous activity of DCN cells, as measured by an optical method of calcium imaging, is greatly disrupted in noise-exposed mice. This suggests that noise exposure alters the circuitry and intrinsic properties of cells in the DCN. Tinnitus is a phenomenon that affects nearly 20% of people in the U.S., and which is debilitating to nearly 2 million citizens. There is a significant unmet need for effective treatments. Our experiments will directly evaluate specific synaptic systems and receptors that can be targeted for pharmacological intervention for treatment and cure of this persistent problem. This project is funded by the NIH through 2012.

In a second 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



Manis Research Lab: ZuYing Zhang, Jaime Mancilla, PhD (Post-Doctoral Research Associate); Luke Campagnola (Graduate Student); Paul Manis, PhD; Heather O'Donohue (Research Technical II); and Ruili Xie, PhD (Post-Doctoral Research Associate). Not shown: Megan Kratz

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 have 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. 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. We are also studying the effects of aging and hearing loss on synaptic transmission from the auditory nerve to the VCN. This project is funded by the NIH through 2014.

The third project is supported by a new research grant from the 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 the 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 Neurobiology graduate student. She 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 to examine the spatial and functional organization of inhibitory networks using laser-guided photostimulation of a specific set of cells expressing channelrhodopsins. This work is revealing changes in inhibitory connections in prefrontal cortex in a mouse model of schizophrenia. This work is supported through the UNC Conte Center (Dr. John Gilmore, PI).

Andrew F. Olshan, PhD and Mark C. Weissler, MD

Drs. Olshan and Weissler were funded in July of 2001 by the National Cancer Institute to conduct a study (The CHANCE study) in 46 counties in North Carolina to comprehensively evaluate the role of genetic susceptibility factors in the etiology of squamous cell carcinoma of the head and neck. The population-based, case-control study, funded by the National Cancer Institute, included 1,300 cases and 1,300 controls and constituted the largest population-based study of head and neck cancer ever conducted in the United States. Polymorphisms of genes representing metabolism (activation and detoxification) of carcinogens and nutrients, mediators of oxidative stress, DNA repair, and other pathways are being investigated using a 1,536 single nucleotide polymorphism (SNP) array. The size and population-based design should allow the investigators to more confidently confirm or reject associations raised in previous studies. In addition, with the collection of treatment and survival data the study can also examine genetic and other predictors of survival. The study collected tumor blocks for future studies of “downstream” somatic alterations of tumor suppressor genes and oncogenes. The stored tumor sections are now being used to detect HPV in a subcohort of CHANCE patients. The study is part of an international project to conduct a genome-wide association study to evaluate over 500,000 genetic markers in relation to head and neck cancer risk. A paper reporting the top GWAS hits has recently been published in PLoS Genetics. CHANCE papers on black-white differences in smoking and on dietary patterns and the risk of head and neck cancer have just been published. A CHANCE report describing the association between polymorphisms of alcohol-metabolizing genes and the risk of SCCHN has been published in Cancer Epidemiology, Biomarkers & Prevention. A companion paper on survival is being prepared. Analysis of genes related to smoking-related behavior and damage are underway. Tumors from the CHANCE study are also being used to evaluate the role of p16 in survival; this collaboration with Dr. Neil Hayes has led to a recent publication in the British Journal of Cancer. CHANCE tumors are also being assayed for HPV.

Drs. Olshan and Weissler have also conducted research to evaluate survivorship factors, including quality of life, among cases in the

CHANCE study. This work has been extended through funding by the Lance Armstrong Foundation and has collected data on quality of life among African-American head and neck cancer survivors. The project is examining the influence of social, clinical, access to care, and behavioral factors on quality of life, especially among African-Americans for which there is little available quality of life information. Patient information was collected one year after diagnosis and three years after diagnosis. Information on quality of life has been obtained from over 500 head and neck cancer survivors. An initial manuscript on one-year QOL has been accepted for publication in *Head and Neck*.

Carol G. Shores, MD, PhD

Claire Kendig UNC MS4, returned to Malawi this year with Dr. Charles Mabedi and they will work on a project to better characterize Head & Neck Cancer at Kamuzu Central Hospital. They will attempt to diagnose and stage all patients who present with head and neck tumors. Squamous cell carcinomas will be analyzed for the presence of Human Papilloma Virus, which is associated with oropharyngeal cancers in high-income countries.

Lindsey Wolf MS4, a Doris Duke Fellow, published "Esophagogastroduodenoscopy in a public referral hospital in Lilongwe, Malawi: spectrum of disease and associated risk factors in the *World J Surgery*. This study provided preliminary data to support a study by Gift Mulima KCH PGY 3 and Javeria Qureshi UNC PGY4 to continue to collect prospective data for a study of patients with upper GI bleeds who present to KCH. This study is ongoing, and should be ready for data analysis by October 2012. Salim Tamimi MS3 and Helena Klackenberg MS3 from the Karolinska Institute in Sweden assisted in a retrospective review of UGI bleed patients during a 4-month rotation at KCH.

Dr. Shores and Ms. Wolf presented a review of cancer cases at KCH at the African Organization for Research and Training in Cancer (AORTIC) meeting in Cairo in December 2011. The KCH Cancer Database has ongoing data entry, and is being used as a basis for cancer research in several areas.

Holly FB Teagle, AuD

Dr. Teagle 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 which has been renewed for a second 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. Planning is underway to begin a clinical study 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.

Carlton J. Zdanski, MD

Dr. Zdanski describes his role as researcher in a variety of settings. 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 Healthcare 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." Enrollment of patients is at pace as is the development of new computational fluid dynamic modeling techniques and new research and hopefully clinical tools such as quantitative bronchoscopy and anatomic optical coherence tomography.

Additional invited publications include Cochlear Implantation in Unique Pediatric Populations in Current Opinion in Otolaryngology, Child with Drooling for the Patient of the Month Program, and Pediatric Airway Abnormalities: Diagnosis and Treatment in Oral Maxillofacial Surgery Clinics of North America.

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 year the course will go to bi-annual and be hosted both at the University of North Carolina and the Medical University of South Carolina and participants will include faculty and residents from Duke University, Wake Forest/Bowman Gray School of Medicine, Emory, the Medical College of Georgia, Eastern Virginia Medical School and Vanderbilt University. The course continues to grow in content and scale.

Dr. Zdanski again traveled to Malawi this year to engage in the training of surgical residents at Kamuzu Central Hospital in Lilongwe. This endeavor involved teaching residents and clinical officers there pediatric airway endoscopy. Accompanying Dr. Z on this trip was another former UNC resident and now plastic surgeon Dr. Krishna Patel. Together, many cleft lips and palates were repaired and the Malawian residents were trained in aspects of cleft care and surgery. Additional surgeries were performed for airway stenosis and other head and neck problems in adults and children. Overall, it was a very valuable experience and we look forward to

providing a continuing educational and surgical presence there.

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, 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 M. Zanation, MD

Since his return to UNC, Dr. Zanation has wasted no time in initiating cutting-edge research in the area of Skull Base Surgery and Oncology and Clinical Quality of Life and Functional Outcomes Research. 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 involved residents, Drs. Mihir Patel, Rupali Shah, Mitchell Gore, Trinitia Cannon, Josh Surowitz, Kibwei McKinney, Michael Stadler, Alex Farag, Brian Thorp, Grace Kim, Jessica Smyth, Gita Madan, Adam Kimple and Deepak Dugar, in several studies investigating novel techniques and patient outcomes in the fields of Head and Neck Oncology, Skull Base Surgery and Rhinology. The lab has also mentored ten UNC medical students on projects related to Dr. Zanation's practice. Projects involve 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 69 pubmed indexed publications and since arriving back to UNC in 2008, his lab has published 52 pubmed indexed citations. The research team has presented over 20 abstracts this past year and published 22 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, were awarded a recent CTSA grant on the Genomics of Allergic Fungal Sinusitis. 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.

GRANTS

Description	Principal Investigator	Sponsor	Duration	Amount
Auditory Cortex: Synaptic organization and plasticity	Paul Manis, PhD (35% effort)	NIDCD	03/01/2011 - 02/28/2016	\$365,147 Year 1, Total Direct Costs
Cellular Mechanisms of Auditory Information Processing	Paul Manis, PhD (45% effort)	NIDCD	04/01/2009 - 03/31/2014	\$1,250,000 Total Direct Costs
Research Training in Otolaryngology	Paul Manis, PhD	NIDCD	07/01/2003 - 06/30/2013	\$154,122
Mapping the Connectivity of Cochlea Nucleus Bushy Cells	Paul Manis, PhD	NIDCD	09/01/2010 - 08/31/2012	\$31,744
Prospective Studies of the Pathogenesis of Schizophrenia	PI: Dr. John Gilmore (Psychiatry) Co-Investigator: Paul Manis, PhD (7.5% effort)	NIMH	08/01/2008 - 07/31/2012	\$2,195,152
AHRQ Systematic Review of OME	Austin Rose, MD	RTI/UNC	2011 - 2012	\$40,000
Cortical Auditory Evoked Potentials in Bilateral Cochlear implant users and in Listeners with Bimodal Hearing	PI: Shuman He, PhD Co-Investigator: Craig A. Buchman, MD, FACS	MedEL Corporation	07/01/2011 - 06/30/2013	\$218,910
Cochlear Implant Design Testing	Craig A. Buchman, MD, FACS	Cochlear Corporation	04/01/2011 - 07/31/2012	\$96,200
Acoustic Cues in Auditory Pattern Analysis	PI: Emily Buss, PhD Co-Investigator: Craig A. Buchman, MD, FACS	NIH/NIDCD	04/01/2011 - 03/31/2016	\$1,480,000
Cortical Potentials and Speech Perception in Children with Auditory Neuropathy	Craig A. Buchman, MD, FACS	NIH/NIDCD	07/05/2011 - 06/30/2013	\$407,000
Examine The Use Of Specific Strains Of Probiotics In The Prevention And Treatment Of Allergy-Induced Et Dysfunction	Charles S. Ebert, Jr., MD, MPH	American Academy of Otolaryngic Allergy	04/01/2011 - 03/31/2012	\$6,000
The Treatment Of Otitis Media With Effusion Using Cpg Oligodeoxynucleotides In An Allergic Rat Model	Charles S. Ebert, Jr., MD, MPH	Centralized Otolaryngology Research Efforts	07/01/2011 - 07/02/2012	\$10,000
Vibrant Sound Bridge Clinical Trial	Craig A. Buchman, MD, FACS	MedEL Corporation	06/01/2011 - 11/30/2012	\$78,939
Spectral Profile Cues And Synthetic Listening	Emily Buss, PhD	NIH/NIDCD	04/01/2005 - 03/31/2016	\$170,000 Present year
Development And Plasticity In Normal And Impaired Ears	Co-PI: Emily Buss, PhD	NIH/NIDCD	09/01/1986 - 08/31/2012	\$206,903 Present year
Spectro-Temporal Analysis In Normal And Impaired Ears	Co-PI: Emily Buss, PhD	NIH/NIDCD	09/01/1986 - 08/31/2012	\$210,375 Present year
Complex Sound Analysis In Normal And Impaired Ears	Co-PI: Emily Buss, PhD	NIH/NIDCD	12/01/1992 - 08/31/2013	\$211,782 Present year
Susceptibility To And Release From Masking In Infancy And Childhood	Co-PI: Emily Buss, PhD	NIH/NIDCD	03/01/2011 - 02/28/2016	\$250,000 Present year
Prospective, Longitudinal, MultiCenter, Descriptive Registry of Patients Receiving Therapy Other Than Surgical Resection	D. Neil Hayes, MD, MPH	Imclone Systems	07/06/2006 - 07/05/2012	\$106,300
A Genomic Analysis & Visualization Pipeline Based on an Enterprise Data Warehouse	D. Neil Hayes, MD, MPH (20% effort)	NIH	09/01/2009 - 08/31/2014	\$15,000,000

Integrated Analysis of Chromatin Structure and Gene Expression Patterns in Human Tumors	D. Neil Hayes, MD, MPH (5% effort)	National Cancer Institute	09/29/2009 – 07/31/2014	\$3,699,542
Flexible Statistical Machine Learning Techniques For Cancer-Related Data	Co-PI: D. Neil Hayes, MD, MPH (5% effort)	NIH	04/01/2010 – 03/31/2015	\$285,568
Various Studies to Advance the Science and Understanding of Hearing Loss and Intervention	PI: Oliver F. Adunka, MD Co-PI: Douglas C. Fitzpatrick, PhD, and Craig A. Buchman, MD, FACS	Med-El Corporation	12/01/2008 – 12/01/2013	\$300,000
Complex Sound Analysis in Normal and Impaired Listeners	John H. Grose, PhD	NIH/NIDCD	12/01/1992 – 08/31/2013	\$212,500 Present year
Intraoperative Measures Of Hearing Preservation	PI: Oliver F. Adunka, MD, FACS Co-PI: Douglas C. Fitzpatrick, PhD	North Carolina Translational & Clinical Sciences Institute (NCTraCS)	2012-2013	\$32,500
Temporal Masking and Speech Recognition in the Aging Auditory System: US-Brazil	John H. Grose, PhD	NIDCD	07/01/2011 – 06/30/2013	\$58,335
Development And Plasticity In Normal And Impaired Hearing	Joseph W. Hall, PhD	NIH/NIDCD	09/01/1986 – 08/31/2012	Direct costs \$200,996/year Indirect costs \$92,458
The Effect Of Cochlear Hearing Loss On Across-Frequency Spectro-Temporal Analysis	Joseph W. Hall, PhD	NIH/NIDCD	09/01/1986 – 07/31/2014	Present year direct costs \$203,643 Indirect costs \$97,749
Spectro-Temporal Analysis in Normal and Impaired Ears	Joseph W. Hall, PhD	NIDCD	09/01/1986 – 07/31/2014	\$301,392
The Treatment of Otitis Media with Effusion Using CpG Oligodeoxynucleotides	Baishakhi Choudry, MD	AAOHNS	07/01/2011 – 06/30/2012	\$10,000
The Role Of Probiotics In Prevention And Treatment Of Otitis Media With Effusion	Baishakhi Choudry, MD	AAOA	06/2011- 05/2012	\$6,000
Cortical Auditory Evoked Potentials in Bilateral Cochlear Implant Users	Shuman He, PhD	NIH/NIDCD	2012-2015 [Pending]	Direct costs 300,000 Indirect costs \$144, 000
Cortical Potentials and Speech Perception in Children with Auditory Neuropathy	Co-PI: Shuman He, PhD	NIH-NIDCD	2011-2013	Direct costs \$274,982. Indirect costs \$132,000
Cortical Auditory Evoked Potentials in Bilateral Cochlear Implant Users and Listeners with Bimodal Hearing	Shuman He, PhD	MED-EL Hearing Solutions	2011-2013	Direct costs \$140,384 Indirect costs \$31,495
Rapid Case Ascertainment Core	Co-PI: Andrew F. Olshan, PhD	Cancer Center Core Support	1999 – 2015	\$18,239,570
Quality of Life Among African-American Head and Neck Cancer Survivors	Andrew F. Olshan, PhD	Lance Armstrong Foundation	2007 – 2012	\$225,000
North Carolina Center for Birth Defects Research and Prevention	Andrew F. Olshan, PhD	CDC	2002- 2013	\$900,000 annually
Genetic Susceptibility Factors in the Etiology of Neuroblastoma	Andrew F. Olshan, PhD	NCI	2008 – 2013	\$2,891,925
Training Program in Reproductive, Perinatal, and Pediatric Epidemiology	Co-PI: Andrew F. Olshan, PhD	NICHD	2008 – 2013	\$1,430,220
Moderators of Functional Outcomes in Children with Mild to Severe Hearing Loss	UNC Co-PI: Patricia Roush, AuD (15% effort)	NIH/NIDCD	08/01/2008 – 07/31/2013	Direct costs \$1,031,736 Totalling \$1,506,334
Predictive Modeling for Treatment of Upper Airway Obstruction in Young Children	Carlton J. Zdanski, MD, FACS, FAAP	NIH	2010 – 2014	\$3,600,000

Computer Modeling of Surgical Outcomes for Nasal Airway Obstruction	Co-Investigator: Julia S. Kimbell, PhD	Medical College of Wisconsin	04/01/2009 – 03/31/2013	Direct costs \$87,000/year
Computer Modeling of Surgical Outcomes for Nasal Airway Obstruction (ARRA Supplement)	Co-Investigator: Julia S. Kimbell, PhD	Medical College of Wisconsin	09/01/2009 – 08/31/2012	Direct costs \$55,837/year
Predictive Modeling for Treatment of Upper Airway Obstruction in Young Children	Co-Investigator: Julia S. Kimbell, PhD	NIH/NHLBI	09/17/2010 – 08/31/2014	Direct costs \$649,137
Modeling the Pediatric Upper Airway Using A-OCT and DNS CFD	Co-Investigator: Julia S. Kimbell, PhD	NIH/NHLBI	09/17/2010 – 08/31/2014	Direct costs \$31,952
Towards Small Molecule Modulators Of Rgs Proteins	Adam J. Kimple, MD	NIMH	2011 – 2012	\$32,894
Improving Surgical Education of Otolaryngology Residents in Endoscopic Sinus Surgery	Brent A. Senior, MD	AOE Innovative Grants Committee	2011 – 2012	\$2,420

HONORS, AWARDS, AND ACHIEVEMENTS

Drs. Carlton Zdanski, Brent Senior, Harold Pillsbury, William Shockley, Mark Weissler, Oliver Adunka, Craig Buchman, and Amelia Drake were selected as 2011–2012 Best Doctors in America.

Dr. Oliver Adunka was inducted as a "Fellow of the American College of Surgeons."

Dr. Oliver Adunka was elected as a "Corresponding Member" of the Austrian Society of Otolaryngology/Head and Neck Surgery. Dr. Adunka received this honor at the 55th Austrian ENT Conference in Vienna, Austria, September 14–17, 2011.

Dr. Adam Zanation was honored as a "Health Care Hero" at the 2012 Triangle Business Journal Health Care Hero Awards. He was recommended by the



UNC Healthcare News Office for his work in advancing robotic Head and Neck surgery. The event was held March 22nd, and included an interactive expo and celebration banquet. The "Rising Star Hero Award" is a recent graduate or new hire that shows real promise in the fields of scientific research or in the practice of medicine. Dr. Zanation is pictured with the other UNC Health Care Hero Awardees (Dr. Cohen and Dr. Sharpless).

Dr. Carol Shores was nominated to the WHO Global Initiative for Emergency and Essential Surgical Care (GIEESC) Surgical Mission & Partnerships Coordinating Committee. UNC Health Care recognized Gina Stoffel, RN among the Winter 2012 Plus People.

Dr. Carol Shores received a \$5,000 grant from the University Research Co. for a project that Gift Mulima, a Malawi PGY3 general surgery resident, and Javeria Qureshi, a UNC general surgery resident, are collaborating on. The funds will be used to hire a clerk to collect prospective data on patients who present to Kamuzu Central Hospital with upper GI bleeds.

MED-EL Hearing Solutions (MHS) selected Shuman He, MD, PhD to be one of three investigators to receive a grant for the basic sciences in hearing on March 14th. The award was for her work on Cortical Auditory Evoked Potentials In Bilateral Cochlear Implant Users And Listeners With Bimodal Hearing.

High Five for the Top Five! CCCDP/CASTLE was recognized as one of the TOP FIVE ambulatory clinics as determined by the latest release of the Patient Satisfaction scores. Shown left to right are Lisa Park, Melchee Johnson, Holly Teagle, Program Director, Jennifer Woodard, Francisca Hernandez-Casillas, Maegan Evans, Lori Parker, Dr. Spencer, Lillian Henderson, Erin Thompson, David Bauer and Deb Hatch.



Joseph W. Hall, PhD, Professor and Chief of the Division of Auditory Research, was

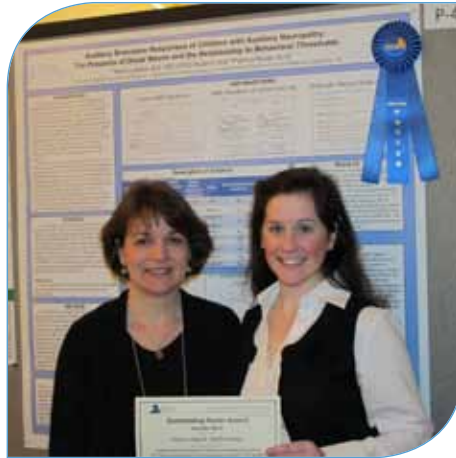
honored by UNC's Division of Speech and Hearing Sciences in May as its first Distinguished Alumnus. Internationally acclaimed for his contributions in psychoacoustics and hearing science, Dr. Hall is also known for his collegiality and generosity of spirit. Assistant Professor Lori Leibold notes "Dr. Hall is always willing to share his time and knowledge in ways that bring out the best in others; he is loyal, supportive, and treats everyone with respect and dignity." Dr. Jack Roush, Professor and Director of the Division of Speech and Hearing Sciences in UNC's Department of Allied Health Sciences notes that "choosing our first distinguished alumnus was an easy decision for our faculty. Dr. Hall has been an inspiring mentor and role model for students and faculty at UNC for over 25 years. We are proud to claim him as a graduate and look forward to our continued collaboration." Hall, who earned his MS degree in Audiology at UNC in 1980, was honored at the Division's graduation ceremony on May 12, where he delivered the commencement address to over 350 friends and family members gathered in celebration of the Class of 2012. Shown left-right, Dr. Lori Leibold, Dr. Joseph Hall, and Dr. Jack Roush.



Jennifer Woodard was selected as Preceptor of the Year by the UNC Division of Speech and Hearing Science. The graduation ceremony was in May 2012.

A scientific poster presented by Associate Professor Patricia Roush, AuD (left)

and UNC audiology student Mallory Baker (right) won first prize for scientific merit at the 12th Annual Early Hearing Detection and Intervention Conference in St. Louis, MO, March 5-6, 2012. The poster was entitled: Auditory Brainstem Responses in Auditory Neuropathy: The Presence of Distal Waves and the Relationship to Behavioral Thresholds.



Dr. Harold Pillsbury was honored at a UNC Women's Basketball game on February 26, 2012. Noted UNC basketball forward, Jessica Breland, was diagnosed by Dr. Pillsbury as having Hodgkin's lymphoma in May 2009. Jessica's cancer is now in remission. In gratitude, Jessica asked coach Sylvia Hatchell to present her jersey to Dr. Pillsbury.

On April 6, 2012, Craig Buchman, MD performed the first Nucleus CI422 device placement surgery in the United States at UNC Women's and Children's Hospital. This device, recently FDA approved, is designed with a new slim electrode array that is especially atraumatic to the normal cochlear structures. Preclinical studies at the UNC temporal bone lab by Drs. Benjamin Wei, Oliver Adunka, and Buchman have shown this new device to be less traumatic than precurved arrays, thereby offering hope for preservation of residual hearing. Our group at UNC are leaders in the

field of hearing preservation cochlear implantation and have extensively studied the benefits of this approach as a method of improving cochlear implant performance. The CI422 device offers another technical advancement in the surgical armamentarium of the hearing preservation, cochlear implant surgeon.

UNC was well represented at the Medical University of South Carolina's 3rd Annual Pediatric Audiology Conference which focused on the diagnosis and management of auditory neuropathy spectrum disorder. Coordinated by Meredith Holcomb (AuD Class of 2006), the symposium featured presentations by UNC Associate Professor Patricia Roush, AuD, and former resident David White, MD, who completed his ENT residency at UNC in 2003 and is now Associate Professor of Otolaryngology – Head and Neck Surgery at MUSC. Shown from left to right, Pat Roush, Meredith Holcomb, David White, and Betsy Poth (UNC Audiology MS Class of 1992).



The Department's Director of Communications, Nicolette DeGroot, won two awards for her overall design of the 2011 OHNS annual report. Nicolette snagged the prestigious Gold Award of Excellence from the Communicator Awards, and American InHouse Design Award from Graphic Design USA.

The collaborative work of Drs. Meg Dillon, English King, Marcia Adunka,

Emily Buss, Harold Pillsbury, Craig Buchman, and Oliver Adunka on "Objective and Subjective Benefits of Electric-Acoustic Stimulation: 12 month data," placed 3rd at the poster presentation of the UNC Commitment to Caring Quality Expo on October 25-26, 2011.

Resident Adam Kimple, MD was the named Alexander Scholar for 2012, and received the Isaac Hall Manning Award for 2012.

Drs. Craig Buchman and Oliver Adunka received Red Ribbon Poster Presentation for Effect Of An Intraoperative Perilymph Gusher On Cochlear Implant Performance In Children With Labyrinthine Malformations. Triological Society Sectional Meeting, Miami, FL January 25-27, 2012.

Dr. Meg Dillon received Best Poster Award for "Objective and Subjective Benefits of Electric-Acoustic Stimulation: 12-Month Data," at the UNC Commitment to Caring Quality Expo, Chapel Hill, NC, October 2011.

Dr. Trevor Hackman completed his 20th Trans Oral Robotic Surgery, and is the first head and neck surgeon in the Carolinas to have accomplished this honor. He is now a listed surgeon on the da Vinci Robotics website.



Dr. Julia Kimbell placed first for a poster award in Rhinology and Allergy (Vishal Dhandha, first author), Triologic Society

meeting at the Combined Otolaryngology Spring Meetings, April 2012.

Dr. Harold Pillsbury was granted the Presidential Citation Award. Given annually by the American Broncho-Esophagological Association in recognition of one's significant service and accomplishments. American Broncho-Esophagological Association meeting, Combined Otolaryngology Spring Meetings (COSM), San Diego, CA, April 18, 2012.

Dr. Amelia Drake was presented with the Vice Presidential Citation at the Southern Section of the Triologic Society in January 2012.



Dr. Drake has been a Senior Associate Fellow of the UNC School of Medicine Academy of Educators, 2008-2013.

Dr. Pillsbury was also the Guest of Honor, Southern Section Meeting, American Laryngological, Rhinological, and Otological Society (The Triological Society), Miami, FL, January 26, 2012.

Fellow Lorien M. Paulson, MD placed for "Best Resident Clinical Paper," American Head and Neck Society, 2011. Paulson et. Al.: "The Role of Molecular Markers and Tumor Histology in Central Lymph Node Metastasis of Papillary Thyroid Carcinoma."

Dr. Paulson also placed first for the Resident Clinical Research Award 2011. OHSU Dept of Otolaryngology Resident Research Symposium. "Speech Outcomes after Tonsillectomy in Patients with Known Velopharyngeal Insufficiency."

Drs. Carlton Zdanski and Adam Zanation performed a robotic pediatric airways surgery using the da Vinci Robot on the world's youngest baby in December 2011.

CCCDP and CASTLE participated in Durham's Great Human Race on March 24th. A major fundraiser, the race helps greatly in reaching funding goals for the 2012 year. Total raised was \$2,148.



CCCDP and CASTLE held its inaugural CASTLE Breakfast on May 2, 2012 at the Rizzo Conference Center in Chapel Hill. Over \$26,000 was raised in support of children who are deaf or hard of hearing and their families. These funds were matched by a grant from the Oberkotter Foundation bringing the total raised to nearly \$80,000.

PRESENTATIONS

Adunka O, Gstoettner W, Stammberger H, Matula C, Braun H, Mokry M. *Surgery of the skull base*. Round table, panellists: 55th Austrian ENT Conference, Vienna, Austria, September 14-17, 2011

Buckmire R, Markus E. *Taking Care of Your Voice" Community Chorus Project*. Chapel Hill, NC. March 10, 2012

Buckmire R, Markus E. *Taking Care of Your Voice" AL Stanbach Middle School*. Chapel Hill, NC February 10, 2012

Shah R, Slaughter K, Huang B, Deal A, Buckmire R. *Comparative Sivalloving Outcomes of Zenker's Diverticulectomy: Size Doesn't Matter*. (poster presentation) Triological 2012 Combined Sections Meeting, Miami, FL. January 27, 2012

Buckmire R. *Endoscopic Management of Glottic Stenosis*. Carolinas Pediatric Airway Course, Charleston, SC, October 21, 2011

Buckmire R, Markus E. *Taking Care of Your Voice*. University of North Carolina Music Department, Chapel Hill, NC. October 1, 2011

Ahmad FI, Choudhury B, DeMason CE, Buchman CA, Adunka OA, Fitzpatrick DC. *Electrophysiological Recording During Cochlear Implantation: Results in Animals and Humans*. Poster Presentation. Conference on Implantable Auditory Prostheses, July 24th - 29th 2011, Pacific Grove, CA

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

Dillon MT, Adunka MC, King ER, Adunka OF, Buchman CA. *UNC Vibrant Soundbridge experience*. TUUCAN Vibratory Symposium, Halifax, Nova Scotia, July 12-14th 2012

Dillon MT, Adunka MC. *Outcomes with Vibrant Soundbridge (VSB) middle ear device*. Hearing Loss Association

of America Convention 2012, Providence, RI, June 21-24, 2012.

Adunka MC, Dillon MT. *Long-term results of electric-acoustic stimulation*. Hearing Loss Association of America Convention 2012, Providence, RI, June 21-24, 2012

Dillon MT, Grose JH, Buss E. *Sensitivity to Binaural Beats in Bilateral Cochlear Implant Recipients*. Poster presentation abstract #8. 12th International Conference on Cochlear Implants and Other Implantable Auditory Technologies, Baltimore, MD, May 3-5 2012

Dillon MT, Adunka MC, King ER, Buss E, Pillsbury HC, Adunka OF, Buchman CA. *Electric-Acoustic Stimulation: Speech Perception in Noise*. Poster presentation & abstract #85. 12th International Conference on Cochlear Implants and Other Implantable Auditory Technologies, Baltimore, MD, May 3-5, 2012

Dillon MT, Adunka MC, Buss E. *UNC Cochlear Implant Subjective Questionnaire*. Poster presentation abstract #54. 12th International Conference on Cochlear Implants and Other Implantable Auditory Technologies, Baltimore, MD, May 3-5, 2012

Awan O, Choudhury B, Adunka AF, Wei BP, Buchman CA, Dillon MT, He S, Fitzpatrick DC. *An intraoperative test of residual auditory nerve function of cochlear implant recipients using auditory stimuli*. Oral presentation abstract #33. 12th International Conference on Cochlear Implants and Other Implantable Auditory Technologies, Baltimore, MD, May 3-5, 2012

Buchman CA, Adunka OF, Dillon MT, Adunka MC, King ER, Pillsbury HC. *Impact of age on outcome in adult electric-acoustic stimulation (EAS) patients*. Oral presentation abstract #85. 12th International Conference on Cochlear Implants and Other Implantable Auditory Technologies, Baltimore, MD, May 3-5, 2012

Pearce E, King ER, Adunka MC, Dillon MT, Adunka OF, Buchman CA, Pillsbury HC. *Speech performance outcomes in elderly patients (>80 years) with a MED-EL cochlear implant device*. Poster presentation abstract #62. 12th International Conference on Cochlear Implants and Other Implantable Auditory Technologies, Baltimore, MD, May 3-5, 2012

King ER, Dillon MT, Adunka MC, Pillsbury HC, Buchman CA, Adunka OF. *Subjective*

benefit of electric acoustic stimulation (EAS). Poster presentation abstract #87. 12th International Conference on Cochlear Implants and Other Implantable Auditory Technologies, Baltimore, MD, May 3-5, 2012

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*. Oral presentation abstract page 22. 115th Annual Meeting of the Triological Society, San Diego, CA, April 20-21, 2012

Dillon MT. *What the Apex Provides*. Oral presentation abstract. Joint Defense Veterans Audiology Conference, Dallas, TX, March 19-21, 2012.

Dillon MT, King ER, Adunka MC, Buss E, Pillsbury HC, Adunka OF, Buchman CA. *Investigation of the Electric-Acoustic Stimulation (EAS) Cochlear Implant Alone Listening Condition and Speech Perception in Noise*. Poster presentation abstract #D6. Conference on Implantable Auditory Prostheses, Asilomar, CA, July 24-29, 2011

Dillon MT, King ER, Adunka MC, Buss E, Pillsbury HC, Adunka OF, Buchman CA. *Hearing Preservation in EAS Recipients: Cochleostomy versus Round Window Surgical Approaches*. Poster presentation abstract #128. 13th Symposium on Cochlear Implants in Children. Chicago, IL, July 14-16, 2011

Dillon MT, King ER, Adunka MC, Buss E, Pillsbury HC, Adunka OF, Buchman CA. *Analysis of the CI Alone Listening Condition and Speech Performance in Noise by EAS Subjects*. Poster presentation abstract #155. 13th Symposium on Cochlear Implants in Children, Chicago, IL, July 14-16, 2011

Dillon MT, King ER, Adunka MC, Buss E, Pillsbury HC, Buchman CA, Adunka OF. *Objective and Subjective Benefits of Electric-Acoustic Stimulation: 12-Month Data*. Poster presentation abstract #156. 13th Symposium on Cochlear Implants in Children, Chicago, IL, July 14-16, 2011

Adunka MC, Pillsbury HC, Dillon MT, King ER, Adunka OF, Buchman CA. *Long-term results of electric-acoustic stimulation*. Oral presentation abstract #16. 13th Symposium on Cochlear Implants in

Children, Chicago, IL, July 14–16, 2011

Eskridge H, Roush P. *ASHA Sig 9 Ask the Expert: Auditory Neuropathy*. Online Course. January 2012

King ER, Adunka MC, Dillon MT, Pillsbury HC, Adunka OF, Buchman CA. *Objective and subjective benefits of the Vibrant Soundbridge as a treatment for recipients with conductive and mixed hearing loss*. Poster presentation abstract #149. 13th Symposium on Cochlear Implants in Children, Chicago, IL, July 14–16, 2011

Hultman CS, Connolly A, Halvorson EG, Rowland P, Meyers MO, Sheldon GF, Drake AF, Meyer AA. *Get On Your Boots: Preparing Fourth Year Medical Students For A Career In Surgery, Using A Competency-Based Curriculum To Teach Professionalism*. Presented at 7th Annual American Surgical Congress, February 2012

Drake AF. *The Multidisciplinary Approach to Pediatric Airways*. Distinguished Lambertson Lecture, Ann Arbor, MI, Sep 16, 2011

Drake AF, Zdanski CJ, Davis S, Vaughn B. *The Multi-disciplinary Approach to Challenging Pediatric Airways*. South Carolina & North Carolina Otolaryngology Assembly, Charleston, SC, July 2011

Fitzpatrick DC, Choudhury B, Buchman CA, Wei B, Adunka OF. *Electrophysiological Recording During Cochlear Implantation for Hearing Preservation: An Animal Model and Translation to Patients*. Oral Podium Presentation. MedEl Hearing Preservation Workshop. London, UK. October 13th – 16th 2011

Hackman, TG. *The Sinus Forum 2011*. Waldorf Astoria, New York. Office-based ultrasonography (hands-on course), Instructor – July 2011

Awan O, Pike JM, Choudhury B, Fitzpatrick DC. *Sensitivity to Voice-Onset Time in Rabbits*. Poster Presentation. Association for Research in Otolaryngology Midwinter Meeting. San Diego, CA. Feb 25th – 29th 2012.

Pike JM, Choudhury B, Awan O, Adunka OF, Buchman CA, Fitzpatrick DC. *Identifying Cochlear Trauma During a Simulated Cochlear Implantation in Gerbils with a Sloping Noise-Induced Hearing Loss*. Poster Presentation. Association for Research in Otolaryngology Midwinter

Meeting. San Diego, CA. Feb 25th – 29th 2012.

Choudhury B, Adunka OF, Buchman CA, He S, Dillon M, Wei BP, Fitzpatrick DC. *Human Intraoperative Acoustically Evoked Intracochlear Potential Recordings from the Round Window Pre and Post Cochlear Implantation*. Poster Presentation. Association for Research in Otolaryngology Midwinter Meeting. San Diego, CA. Feb 25th – 29th 2012

Choudhury B, Fitzpatrick DC, Buchman CA, Wei BP, Dillon MT, He S, Adunka OF. *Intraoperative Round Window Recordings to Acoustic Stimuli from Cochlear Implant Patients*. Oral Podium Presentation. Combined Otolaryngology Spring Meeting. San Diego, CA. April 18th – Apr 22nd 2012

Wei BP, Choudhury B, Adunka OF, Buchman CA, Dillon MT, He S, Fitzpatrick DC. *Intraoperative Intracochlear Recordings During Pediatric Cochlear Implantation*. Poster Presentation. Combined Otolaryngology Spring Meeting. San Diego, CA. April 18th – Apr 22nd 2012,

Awan O, Choudhury B, Fitzpatrick DC, Buchman CA, Wei BP, Dillon MT, He S, Adunka OF. *An Intraoperative Test of Residual Auditory Nerve Function of Cochlear Implant Recipients Using Auditory Stimuli*. Oral Podium Presentation – Presenter Omar Awan. Baltimore, MD. 12th International Conference on Cochlear Implants and Other Implantable Auditory Technologies. May 3rd – 5th 2012

He S, Grose JH, Teagle FBH, Buchman CA. *Electrically-evoked auditory change complex in children with auditory neuropathy spectrum disorder*. [Oral Presentation] 7th International Symposium on Objective Measures in Auditory, Amsterdam, Netherland

He S, Grose JH, Buchman CA. *The binaural interaction component of the cortical auditory evoked potential in children*. 7th International Symposium on Objective Measures in Auditory, Amsterdam, Netherland. [Poster]

Buchman CA, He S. *Cochlear implant-evoked cortical activation in children with cochlear nerve deficiency*. Triological Society 115th Annual Meeting at COSM, San Diego, CA. [Oral Presentation]

He S, Grose JH, Teagle HFB, Buchman

CA. *Electrically-evoked auditory change complex in children with auditory neuropathy spectrum disorder*. The 12th International Conference on Cochlear Implants and Other Implantable Auditory Technologies, Baltimore, MD. [Poster]

He S, Grose JH, Buchman CA. *Effects of interaural electrode channel offset on the binaural interaction component of the electrically evoked cortical auditory potential*. 15th Conference on Implantable Auditory Prostheses, Asilomar, CA. [Poster]

He S, Strader H, Grose JH, Buchman CA. *Electrocochleography in patients with auditory neuropathy spectrum disorder: comparison of round window and tympanic membrane recordings*. 13th Symposium on Cochlear Implants in Children, Chicago, IL. [Poster]

Buchman CA, He S, Kimbell JS, Teagle HFB, Roush P, Adunka OF. *Cochlear implantation in children with cochlear nerve deficiency*. 13th Symposium on Cochlear Implants in Children, Chicago, IL. [Oral presentation]

Maria LD, Finley C, He S, Teagle HFB, and Buchman CA. *Soft failure, revision, and subsequent lack of neural response in a pediatric bilateral recipient*. 13th Symposium on Cochlear Implants in Children, Chicago, IL. [Oral presentation]

Ebert CS Jr, Zanian AM. *Rhinology Panel: Clinical Conundrum*. Newton D. Fischer Society Annual Meeting. Chapel Hill, NC. June 2, 2012

Rawal RB, Deal A, Ebert CS, et al. *Evaluation of post-operative irrigations with budesonide for patients with nasal polyps: a blinded, randomized controlled trial*. Newton D. Fischer Society Annual Meeting. Chapel Hill, NC. June 2, 2012

Ruda JM, Ebert CS Jr, Rose AS. *Perioperative Care of Pediatric Patient with CRS*. Newton D. Fischer Society Annual Meeting. Chapel Hill, NC. June 2, 2012

Rawal RB, Dugar DR, Ebert CS, Senior BA, Zanian AM. *Management of anterior skull base encephaloceles: an eleven-year experience*. Combined Otolaryngology Spring Meetings. San Diego, CA. April 19, 2012

Mitchell CA, Ebert CS Jr, Buchman CA, Zanian AM. *Not your average EU-tube link: A novel multidisciplinary treatment of*

inverted papilloma within the middle ear and Eustachian tube. Combined Otolaryngology Section Meeting. San Diego, CA. April 19, 2012

Dugar DR, Rawal R, Senior BA, Zanation AM, Ebert CS Jr. *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 Jr, Zanation AM. *Endoscopic Approach to Lateral Encephaloceles Originating in Sternberg's Canal.* North American Skull Base Society Meeting. Las Vegas, NV. February 18, 2012

Mitchell C, Oosmanally N, Paul JE, Zanation AM, Ewend MG, Senior BA, Ebert CS Jr. *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

Farang AF, Rawal R, Senior BA, Zanation AM, Ebert CS Jr. *Effect of Surfactant Irrigations versus Hypertonic Saline Irrigation on Olfaction following Endoscopic, Endonasal Surger*. Triological Combined Sections Meeting. Miami, FL. January 2012

Ebert, CS Jr. *Medical Education: Effective and Efficient Strategies to Provide Feedback.* ENT Grand Rounds. December 14, 2011

Ebert CS Jr. *Diagnosis and Management of Otolaryngic Allergy.* Invited Speaker for Society of Otolaryngology-Head and Neck Surgery Nurses. Chapel Hill, NC. November 5, 2011

Ebert CS Jr, Little RM, Deal AM, Zanation AM, McKinney KA, Senior BA. *Occupational Hazards of Endoscopic Endonasal Surgery.* Oral Presentation. American Rhinologic Society 2011 Annual Meeting, San Francisco, CA. September 2011

Farang 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. Oral Presentation. American Rhinologic Society 2011 Annual Meeting, San Francisco, CA. September 2011

Rose AS. *Pediatric tracheotomy site complications.* Slide presentation at the NC/SC Otolaryngology and Head & Neck Surgery Assembly, Asheville, NC, August 2012

Rose AS. *Treatment of chronic sialorrhea.* South East AHEC Grand Rounds, Department of Pediatrics – New Hanover Regional Medical Center, Wilmington, NC. June 5, 2012

Ruda JM, Ebert CS, Rose AS. *Perioperative care of pediatric patients with chronic rhinosinusitis.* Slide presentation at the Annual Newton D. Fischer Society Meeting, Chapel Hill, NC. June 2, 2012

Rose AS, Ruda JM. *Management of complex pediatric neck masses.* South East AHEC Grand Rounds, Department of Pediatrics – New Hanover Regional Medical Center, Wilmington, NC. March 20, 2012

Ruda JM, Rose AS. *Evaluation and diagnosis of pediatric neck masses.* South East AHEC Grand Rounds, Department of Pediatrics – New Hanover Regional Medical Center, Wilmington, NC, March 20, 2012

Rose AS. *Comprehensive treatment of pediatric sinusitis.* Resident lecture – University of North Carolina, Chapel Hill, NC, December 7, 2011

Rose AS. *Mock oral boards: Juvenile nasopharyngeal angiofibroma and piriform fossa sinus tract.* University of Texas Medical Branch at Galveston – Galveston, TX, September, 30, 2011

Rose AS, Ebert CS. *Pediatric chronic rhinosinusitis.* University of Texas Medical Branch at Galveston – Galveston, TX, September, 30, 2011

McKinney KA, Zanation AM, Thorp BD, Rose AR, Rawal R, 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.

Wei BP, Pulver S, Adunka O, Treaba C, Buchman CA. *Insertion considerations with a slim electrode design.* 12th International Conference on Cochlear Implants and other Implantable Auditory Technologies. May 3-5, Baltimore, MD. Oral presentation abstract #75.

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, 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.

Thorp BD, Weissler MC, Ebert CS, Zanation AM. *Critical Care for the Otolaryngologist.* Grand Rounds, Department of Otolaryngology/Head and Neck Surgery, University of North Carolina – Chapel Hill. September 2011

Thorp BD, Deal AM, Shockley WW. *Full Thickness Skin Grafting in Nasal Reconstruction.* Newton D. Fischer Society Meeting. Chapel Hill, NC. June 2011

Thorp BD, Farang A, McKinney KA, Ebert CS, Germanwala A, Zanation AM. *Endoscopic Endonasal Transclival Approach to the Basilar Artery: An Anatomic Study.* American Rhinologic Society 57th Annual Meeting. September 2011

Adunka OF. *Active middle ear implants.* South Carolina & North Carolina Otolaryngology, Head & Neck Surgery Assembly, Asheville, NC, August 3-5, 2012.

Buchman CA, Adunka OF, Dillon M, Adunka MC, King ER, Pillsbury HC. *Impact on age on outcome in adult electric-acoustic stimulation (EAS) patients.* 12th International Conference on Cochlear Implants and other Implantable Auditory Technologies. May 3-5, Baltimore, MD. Oral presentation abstract #85.

Awan O, Choudhury B, Adunka OF, Wei BP, Buchman CA, Dillon MT, He S, Fitzpatrick DC. *An intraoperative test of residual auditory nerve function of cochlear implant recipients using auditory stimuli.* 12th

International Conference on Cochlear Implants and other Implantable Auditory Technologies. May 3-5, Baltimore, MD. Oral presentation abstract #33.

Pearce E, King ER, Adunka MC, Dillon MT, Adunka OF, Buchman CA, Pillsbury HC. *Speech performance outcomes in elderly patients (>80 years) with a MED-EL cochlear implant device*. 12th International Conference on Cochlear Implants and other Implantable Auditory Technologies. May 3-5, Baltimore, MD. Poster presentation abstract #62.

Dillon MT, Adunka MC, King ER, Buss E, Pillsbury HC, Buchman CA, Adunka OF. *Electric acoustic stimulation: speech perception in noise*. 12th International Conference on Cochlear Implants and other Implantable Auditory Technologies. May 3-5, Baltimore, MD. Poster presentation abstract #85.

King ER, Dillon MT, Adunka MC, Pillsbury HC, Buchman CA, Adunka OF. *Subjective benefit of electric acoustic (EAS) stimulation*. 12th International Conference on Cochlear Implants and other Implantable Auditory Technologies. May 3-5, Baltimore, MD. Oral presentation abstract #87.

Adunka OF, Teagle HFB, Zdanski CJ, Buchman CA. *Influence of an intraoperative perilymph fluid gusher on cochlear implant performance in children with labyrinthine malformations*. 47th Annual Spring Meeting of the American Neurotology Society, San Diego, CA, April 21-22, 2012.

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*. 115th Annual Meeting of the Triological Society, San Diego, CA, April 20-21, 2012, Abstract book page 22.

Pike JM, Choudhury B, Awan O, Adunka OF, Buchman CA, Fitzpatrick DC. *Effects of intracochlear trauma on long-term hearing outcomes in normal hearing gerbils*. 2012 Annual Spring Meeting of the American Otological Society, San Diego, CA, April 21-22, 2012.

Choudhury B, Fitzpatrick DC, Buchman CA, Wei B, Dillon MT, He S, Adunka OF. *Intraoperative round window recordings to acoustic stimuli from cochlear implant patients*. 47th Annual Spring Meeting of the

American Neurotology Society, San Diego, CA, April 21-22, 2012.

Bosch, D. B., Sammond, D. W., Kimple, A. J., Machius, M., Kuhlman, B., Siderovski, D. P. *Designing a G -Goloco Motif Interaction*. American Society for Pharmacology and Experimental Therapeutics, Washington DC, April 2011

Kimple, A. J., Eliades, S. J., Richmon J. D., Transoral Robotic Surgery (TORS) for Resection of a Lingual Thyroglossal Duct Cyst (TGDC). The Triological Society - Combined Sections Meeting, Miami FL, Jan 2012.

Kimple, A. J., Loyo, M., Jason Y. K. C., Young, K., A Case Report of Invasive Squamous Cell Carcinoma (SCC) Arising in a Verrucous Carcinoma (VC). The Triological Society - Combined Sections Meeting, Miami FL, Jan 2012.

Kim, G. G., Shah, R. N., Kimple, A. J., Zanation, A. M., Funkhouser, W. K., Shockley, W. W. *Polymorphous Low-Grade Adenocarcinoma of the Head and Neck: How aggressive is it?* The Triological Society Annual Meeting, San Diego, CA, April 2012

Rawal, R. B., Kimple, A. J., Dugar, D. R., Zanation, A. M., Minimizing Sinonasal Morbidity During Endoscopic Pituitary and Rathke's Cleft Cyst Surgery: Clinical outcomes of the novel nasoseptal rescue flap technique. The Triological Society Annual Meeting, San Diego, CA, April 2012

Kimple, A. J., Ebert, C. S., Senior, B. A., Zanation, A. M., Techniques and Limitations for Reducing Nasoseptal Flap Donor Site Morbidity Following Endoscopic Skull Base Surgery. American Rhinologic Society Annual Meeting, San Diego, CA, April 2012

Pike JM, Choudhury B, Awan O, Ahmad FI, DeMason CE, Falk K, Hasnain H, Adunka OF, Fitzpatrick DC. *Identifying cochlear trauma during a simulated cochlear implantation in gerbils with a sloping noise-induced hearing loss*. 35th Annual Midwinter Meeting of the Association for Research in Otolaryngology, San Diego, CA, February 25-29, 2012. Abstract book page 104, Abstract #713.

Hall JW, Buss E, Grose JH. *Wideband monaural envelope correlation perception*. The 16th International Symposium on Hearing, Cambridge, UK, July 2012.

Ozmeral EJ, Buss E, Hall JW. *Asynchronous glimpsing of speech with real and simulated hearing loss*. Gordon Research Conference: Auditory System, Lewiston, ME, July 2012.

Dillon MT, Adunka MC, Buss E. *Cochlear implant subjective questionnaire*. The 12th International Symposium on Cochlear Implants and Other Implantable Auditory Technologies, Baltimore, MD, May 2012.

Dillon MT, Grose JH, Buss E. *Sensitivity to binaural beats in bilateral cochlear implant recipients*. The 12th International Symposium on Cochlear Implants and Other Implantable Auditory Technologies, Baltimore, MD, May 2012.

Hillock-Dunn A, Duncan N, Leibold LJ, Buss E. *The effect of nonlinear frequency compression on speech perception in pediatric hearing aid users*. American Auditory Society, Scottsdale, AZ, March 2012.

Hall JW, Buss E, Ozmeral E, Grose JH. *Gap Detection and Noise Fluctuation in Normal and Impaired Hearing*. The 35 th Midwinter Research Meeting of the Association for Research in Otolaryngology, San Diego, CA, Feb 2012.

Bennett A, Bonino, AY, Leibold, LJ, Buss E. *Ability to use a carrier phrase to improve speech perception for children with hearing loss*. 2011 Fall Conference of the North Carolina Chapter of the American Academy of Audiology, Wilmington, NC, September 2011.

Choudhury B, Adunka OF, Buchman CA, He S, Dillon M, Wei BP, Fitzpatrick DC. *Human intraoperative acoustically evoked intracochlear potential recordings from the round window pre and post cochlear implantation*. 35th Annual Midwinter Meeting of the Association for Research in Otolaryngology, San Diego, CA, February 25-29, 2012. Abstract book page 26, Abstract #177.

Adunka OF, Teagle HFB, Zdanski C, Buchman CA. *Effect of an intraoperative perilymph gusher on cochlear implant performance in children with labyrinthine malformations*. Triological Society Combined Sections Meeting, Miami Beach, FL, January 26-28, 2012, Abstract book page 90, Poster S131.

Adunka OF, Fitzpatrick DC. *Direktes Feedback während der Kochelea Implantat Elektrodeninsertion*. 55th Austrian ENT

Conference, Vienna, Austria, September 14-17, 2011. Abstract book page 5.

Adunka OF. *Modern neurotology and lateral skull base surgery.* South Carolina & North Carolina Otolaryngology, Head & Neck Surgery Assembly, Charleston, SC, July 7-10, 2011.

Frank DO. *Quantification of Airflow into the Maxillary Sinuses Before and After Functional Endoscopic Sinus Surgery.* 58th Annual Meeting of the American Rhinologic Society (ARS), Washington, D.C., September 8, 2012. (Joint work with AM Zanaan, V.H Dhandha, KA McKinney, CS Ebert Jr, BA Senior and JS Kimbell).

Frank DO. *Using Computational Models to Quantify the Effects of Nasal Cycling in Nasal Airway Obstruction.* Newton D. Fischer Society Meeting & NC ENT EXPO 2012, Chapel Hill, NC, June 2, 2012. (Joint work with J.S. Kimbell and J.S. Rhee).

Frank DO. *Computed Intranasal Spray Penetration: Comparisons Before and After Nasal Surgery.* Combined Otolaryngology Spring Meetings, American Rhinologic Society (ARS) session, San Diego, CA, April 18-20, 2012. (Joint work with J.S. Kimbell, D.E Cannon and J.S. Rhee).

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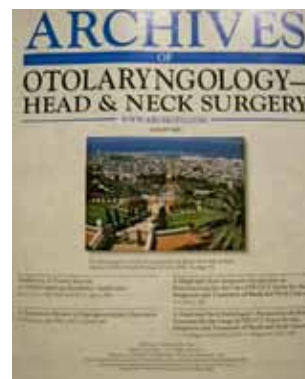
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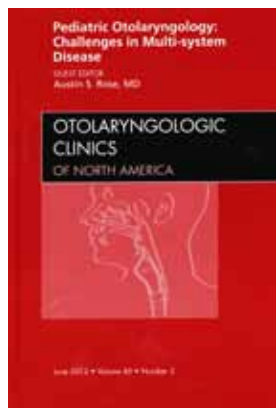
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2012 Annual Report

Produced by UNC-CH OHNS

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Address:

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170 Manning Drive, CB 7070
Chapel Hill, NC, 27599

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Contributors: Faculty and residents of the UNC-Chapel Hill Department of OHNS

Design: Nicolette DeGroot

Photography: Nicolette DeGroot, Brian Strickland, Lisa Park, Erin Thompson, Paul Braly and faculty, staff and residents of Dept of OHNS.

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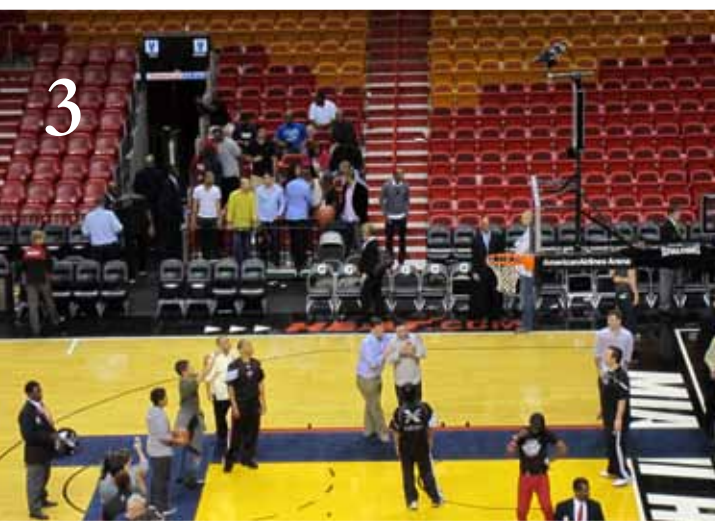
WHAT ELSE DO WE DO?



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1. Drs. Adam Zanation, Carlton Zdanski, Anna Hang, Grace Kim, Jennifer Stegall-Zanation and Deepak Dugar take time out of busy schedules at 2012 AAOHNS in Asheville, NC for white water rafting at Nantahala.
2. ENT Faculty, residents and medical students take their families to catch a Durham Bulls game, August 24, 2012.
3. Yu-Tung Wong, MD making free throw shots at the Miami Heat court at after taking a break from the 2012 Triological Society.
4. Hannah Eskridge and family in Ethiopia, September 2011.
5. Residents Grace Kim and Deepak Dugar attended the 2012 Board of Governors Spring meeting and Otolaryngology Advocacy Summit. They visited all 15 NC House and Senate offices on Capitol Hill including 10 scheduled meetings. The group lobbied for a clean vote on IPAB repeal, against SGR, for more funding for GME, in favor of the truth and transparency in advertising bill, and support for the Congressional Hearing Healthy Caucus.
6. Drs. Brent Senior, Cristine Klatt-Cromwell, Grace Kim, Madison Clark (Alamance ENT), Adam Campbell, Gita Madan, and Harold Pillsbury pose in front of Thomas the Tiger at the Conservator's Center in Mebane, NC. ENT specialists were called in to diagnose a troublesome earache for Thomas.
7. Dr. Trevor Hackman dressed as Toy Story's Woody for Halloween, 2011.
8. Kelly Hair watches on as Dr. Andrea Jarchow-Garcia displays a baby doctor's outfit gift at Andrea's baby shower.



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9. Soonyoung Rondinelli, RN, Surgery Scheduler, Katherine Eng and PBA Supervisor, Anna Bradshaw participated in the Susan G. Komen Race for the Cure on the campus of Meredith College in Raleigh, June 9, 2012. It was the first 5K that Soonyoung or Anna had ever done.

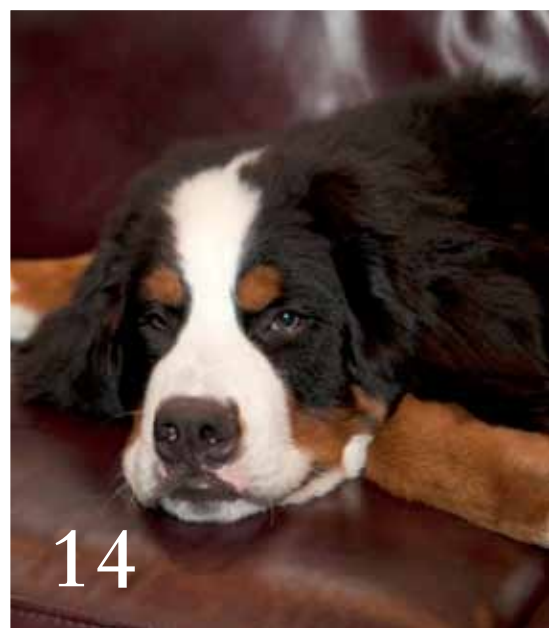
10. The entire clinic CCCDP & CASTLE staff at a Challenge Ropes Course. The team worked hard but had fun for three days at the Caraway Conference Center in Asheboro in preparation and execution of their 18th Annual Hear 'N' Now Conference in November, 2011.

11. Drs. Zanation, Smyth, former ENT resident Robert Cullen, and Buchman took a break from the annual ARS and AAOHNSF meetings in Washington, DC to compete in the 7th Annual Nation's Triathlon to Benefit The Leukemia & Lymphoma Society, September 9, 2012.

12. Drs. Shah, Ebert and McKinney proudly display the score of the ENT Basketball team's first victory.

13. Alex Elkins, Ted Elkins, Dr. Pillsbury, and son Tom Pillsbury celebrate UNC's defeat over NC State January 26, 2012 at the Dean Dome.

14. Dr. Pillsbury adopted two Bernese Mountain dogs from a breeder in Atlanta this year, and learned the breeder had a puppy born with a cleft lip. Dr. P reached out to Dr. John van Aalst in UNC's Pediatric Craniofacial Division. Dr. van Aalst teamed up with NC State's Vet School and performed the surgery there. The vet school will use the surgery as a teachable moment.



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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 Pointe 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.

UNC OHNS at UNC Hospitals

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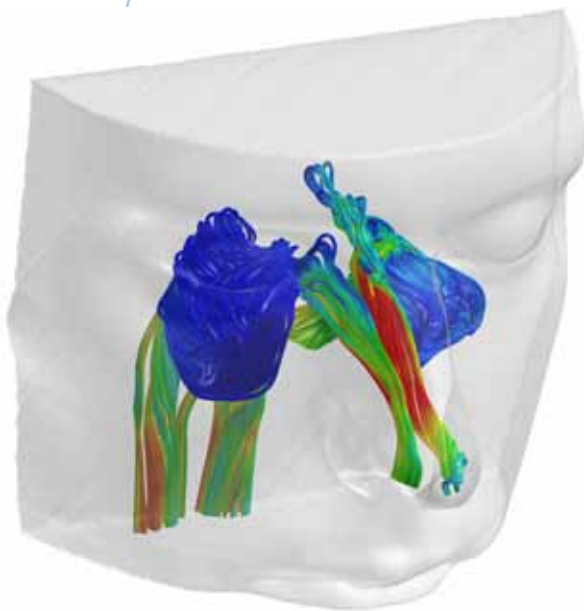
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ABOUT THE COVER



This illustration shows simulated streamlines of inspiratory airflow passing through the sinonasal passages of a patient after functional endoscopic sinus surgery. Air flows from both nostrils at the right side of the image, through the nasal cavity and maxillary sinuses to the nasopharynx at the back and left side of the image. Color indicates the speed of flow: red is fast, blue is slow. Simulations like these help improve our understanding of how surgery affects nasal airflow and the sinuses, allowing us to estimate aeration, drainage, and drug delivery throughout the nasal cavity. In addition to functional endoscopic sinus surgery, we are applying these computational fluid dynamics techniques to study the aerodynamic effects of rhinoplasty, septoplasty, turbinate surgery, and procedures to treat pediatric airway obstruction. Several teams of surgeons, mathematicians, residents, and medical students in our department are contributing to these efforts and include [Drs. Senior, Zanation, Ebert, Shockley, Jarchow](#), and [Zdanski](#), rhinology fellow [Dr. Rodriguez](#), mathematician [Dr. Kimbell](#) with postdoctoral fellow [Dr. Dennis Frank](#), residents [Drs. McKinney, Madan](#), and [Shadfar](#), and students [Vishal Dhanda](#), [Hollin Calloway](#), [Matthew Wofford](#), [Emily Cohn](#), and [Robert Taylor](#).

The simulation in this image was created in the UNC Department of Otolaryngology's Computational and Clinical Research Laboratory. First, software called Mimics™ (Materialise, Inc.) was used to make a three-dimensional reconstruction of a patient's nasal airways from a CT scan taken after the patient underwent functional endoscopic sinus surgery. Next, grid generation software (ICEM-CFD™, ANSYS, Inc.) and the computational fluid dynamics software Fluent™ (ANSYS) were used to simulate the flow of air from the nostrils through the nasal cavity. Then, post-processing software called Fieldview™ (Intelligent Light, Inc.) was used to visualize the model's nasal geometry and calculate flow trajectories from simulated velocity vectors to produce the image in the illustration.

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Residents who graduated from our program in 2012: Rose Eapen, MD; Joshua Surowitz, MD; Rupali Shah, MD; and Maher Younes, MD