Auditory research takes big step forward

New building houses auditory regeneration and deafness research

Pursuing novel treatments and restorative solutions for hearing loss requires committed scientists and physicians. It also requires dedicated space where they can explore new ideas and push the boundaries of medical science.

The John and Mary Pappajohn Biomedical Discovery Building on the University of Iowa campus celebrated its opening last fall. Within the new 256,000-square-foot facility are teams of investigators conducting innovative and collaborative research focused on specific areas that pose major problems in medicine. Among these areas is the University of Iowa auditory research program.

The Iowa Center for Auditory Regeneration and Deafness is a new initiative designed to create and develop novel strategies to treat persons with hearing loss. Housed on the building’s fifth floor, the center brings together investigators from the UI Colleges of Engineering, Liberal Arts and Sciences, and Medicine. Professors of otolaryngology Richard Smith, MD, and Bruce Gantz, MD, co-direct a team of basic scientists and clinical investigators who are studying the fundamental mechanisms underlying hearing and translating this knowledge to improve clinical management of hearing loss.

Hearing loss is a health concern with newborns and especially among the aging population. It is the most common sensory

“The new university building provides an unsurpassed opportunity for interdisciplinary groups of investigators to integrate expertise and skill sets to address, synergistically, questions of fundamental biologic importance.”

—Jean Robillard, MD, UI Vice President for Medical Affairs

The University of Iowa is one of the world’s foremost institutions for research on cochlear implants — the first and most successful neural prosthesis — and is developing gene therapy as a treatment for hearing loss.
Treatment and services are available for:

- Otolaryngology (General)
- Otolaryngology (Pediatric)
- Acoustic Neuroma
- Balance Disorders
- Cleft Palate (Pediatric)
- Cochlear Implants
- Diagnostic Audiology
- Head and Neck Cancer
- Hearing Aids
- Nasal and Sinus Conditions
- Otology/Neurotology
- Plastic Surgery and Cosmetic Services - Facial
- Skull Base Surgery
- Speech and Swallowing
- Tinnitus

Contact Us

Department of Otolaryngology—Head and Neck Surgery
200 Hawkins Drive, 21201 PFP
Iowa City, IA 52242

Department general information:
319-356-3574
iowaoto@uiowa.edu
uihealthcare.org/oto

Appointment scheduling: 319-356-2201

UI Health Access for the general public:
800-777-8442

UI Consult for referring providers:
800-332-8442

Continuing education information:
medicine.uiowa.edu/oto/courses

Department events, news, and information:
medicine.uiowa.edu/oto

Inspired by her care

Following a frightening playground accident, then 10-year-old Maree Scholl (above) was airlifted to University of Iowa Children’s Hospital where a team of specialists, including pediatric head and neck surgeon Marlan Hansen, MD, treated her. Hansen performed reconstructive surgery on Maree’s ear canal and she now has near-normal hearing.

Maree was selected as a University of Iowa Children’s Hospital Kid Captain last November and is back to being her energetic and active self. Her experiences also spurred an interest in becoming an ear, nose, and throat doctor when she’s older.

Read and watch Maree’s story at uichildrens.org/2014-maree/

Allergic to something in the air?

We are expanding our nasal and sinus health offerings with a new allergy service at our UI Health Care – Iowa River Landing clinic in Coralville.

Adults and children receive comprehensive testing and personalized treatment for seasonal allergies (excludes food allergy testing) in a convenient office setting.

Find out what is causing the sneezing, runny nose, and itchy eyes. To schedule an appointment with Douglas Van Daele, MD, or Jose Manaligod, MD, call 319-356-2201.
To be like others: 
The story of a cochlear implant recipient

Erik Ozeroff always wanted to be like others - to fit in. Diagnosed as deaf at 8-months-old, doctors in his home state of California recommended hearing aids. While these would improve his ability to hear, doctors were not confident Erik would ever speak or surpass a third grade education.

Erik’s mom, Miriam, wanted the best for her son and decided to seek other options. She searched the Internet, and a suggestion from a hearing aid company led Miriam to information about a cochlear implant clinical trial that was starting at the University of Iowa. Erik was selected as one of 50 participants in the five-year trial. Miriam and her family were committed to Erik’s treatment and after a year of traveling to Iowa City for his care, they boldly decided to move from California so he could continue in the trial.

As he grew up, Erik strived to do well in everything he attempted. He was not going to let his hearing impairment hold him back. Reflecting on his childhood with a cochlear implant, he says, “I was fortunate to obtain one and hear just like others. I met many people as I grew up that helped me overcome my challenges and obstacles. I’m still thankful to my parents who always wanted the best for me.”

Growing up in Iowa City, Erik had a passion for reading and history. Years later he joined the United States Naval Sea Cadet Corps, an experience that allowed him to travel and planted a seed for adventure. He received his bachelor’s degree in liberal arts from the University of Iowa and is pursuing teaching as a profession. His interests in travel and different cultures have taken him to Seoul, Korea, where he teaches English to elementary and middle-school children. Miriam recalls, “Erik was very outgoing as a child and I think his personality has helped his success.”

Over the years, Erik’s implant has required some modifications and periodic upgrades, but it has allowed him to live a normal, successful life in a hearing world.

“Having a cochlear implant has allowed me to live life. I went to school just like everyone else, worked at different jobs, traveled around the U.S. and some other countries, and worry about the future. It allowed me to live my life with no problem.”

– Erik Ozeroff

“Cochlear implant” continues on page 4
The genetic cause for Erik’s hearing loss was determined using genetic testing technology developed at the University of Iowa by Richard Smith, MD. Researchers found that Connexin 26, a protein found on the GJB2 gene, was responsible for Erik’s hearing loss.

Connexin 26 is the most common cause of congenital sensorineural hearing loss and is responsible for at least 20 percent of all genetic hearing loss. Both of Erik’s parents, as well as his two brothers, carry the gene.

The Ozeroff family’s journey to UI Hospitals and Clinics provided another twist of fate. Miriam (left) proved to be a passionate advocate for cochlear implants and was hired by Dr. Bruce Gantz as the Cochlear Implant Research Center’s first patient coordinator. She states, “I loved being able to share my experiences with other families. People here were very caring to me and Erik and I wanted to do the same for others. It was a way that I could try to give back.”

Iowa resident receives research award

Resident physician Kristy Truong, MD, was awarded the Wiley H. Harrison Memorial Research Award from the American Hearing Research Foundation. The grant supports clinical research projects in otology and neurotology designed to increase understanding of hearing disorders.

Truong’s research proposal, entitled “Biochemical and Physical Guidance of Spiral Ganglion Neurite (SGN) Growth on Methacrylate Polymers,” investigates ways to improve cochlear implant performance by optimizing the ability of micropatterned biochemical and topographical guidance cues to direct SGN neurite growth to improve the neural-prosthetic interface.

She and collaborators in the UI Department of Chemical and Biochemical Engineering are using microcontact printing to study the hierarchical interactions of topographic and chemical cues in SGN neurite pathfinding on methacrylate polymers. Data collected so far suggests that varying the chemical patterns on topographic surfaces may improve or disrupt neurite alignment depending on the localization of the chemical pattern. Arranging these cues onto the grooves of microtopographical surfaces results in the best alignment of SGN neurites, while microprinting growth-promoting biochemical cues on the ridges disrupts alignment.

“The AHRF award is an honor to receive. This has allowed me to continue pursuing more creative ideas to further understand how to not only stimulate neurite growth, but also guide it to precise locations. We aim to translate our findings into clinical practices and ultimately improve the quality of life for patients with cochlear implants.”

— Kristy Truong, MD
Developing new models of tongue cancer

Mouse models of cancer provide valuable insights into tumor biology that can be difficult to extract from patient-based samples. This contributes to a demand for novel models of head and neck cancer that accurately depict human disease.

Second-year resident Marisa Buchakjian, MD, PhD, is tackling this issue with her research involving inducible mouse models of tongue cancer based on viral-mediated, site-specific loss of tumor suppressor genes TP53 and PTEN. Her research was recently recognized by the American Academy of Otolaryngology – Head and Neck Surgery Foundation (AAO-HNSF) when she received the AAO-HNSF Resident Research Grant for her proposal entitled, “Developing a Conditional TP53/PTEN Knockout Mouse Model of Tongue Cancer.”

Buchakjian is using a specifically engineered virus to promote gene knockout in the basal epithelial cell layer of tongue mucosa. In her studies, she has demonstrated that loss of TP53 and PTEN promotes primary tumor growth in the tongue, and is able to monitor this growth using sensitive in vivo imaging. Her goal is to successfully develop an innovative model of tongue cancer that will allow researchers to ask questions about tumor biology, metastatic behavior, and response to treatment. Ultimately, the model may lead to a better understanding of cancer initiation and tumor progression.

Funding from the AAO-HNSF has been instrumental to Buchakjian building an independent head and neck cancer project. She comments, “With support provided by the Resident Research Grant, I was able to clone and produce a novel viral vector that will improve my model in an effort to more closely mimic human disease. I am using grant funds to expand my pilot model cohort and analyze existing tumors using immunohistochemistry.”

“Without the generosity of the AAO-HNSF, this work would be unfunded and these studies would not be possible.”

—Marisa Buchakjian, MD, PhD

Buchakjian stands beside the IVIS bioluminescence imager, used to obtain real-time, in vivo measurements of tumor growth in her mouse model.

DID YOU KNOW?

Deafness is a condition that can affect anyone. One in 500 children are born with hearing loss, making it one of the most common sensory deficits affecting our population.

Genetic testing to uncover the causes of deafness can lead to clinical answers for patients and advanced research toward cures. The University of Iowa has the world’s most extensive genetic testing platform for deafness. The OtoSCOPE® technology is featured in a Big Ten Network (BTN) LiveBIG segment.

deficit in octogenarians, half of whom need auditory amplification for effective communication. To restore hearing and prevent its loss, UI scientists are pursuing investigations of cochlear neural elements and synapses, the genetics of hearing impairment, and mechanisms of noise-induced hearing loss. Bioinformatics-based approaches to understanding hearing and deafness are also being developed and implemented.

The center’s overall goal is to prevent and/or restore hearing with areas of focus including:

- preventing hearing loss in persons genetically predisposed to hearing loss
- restoring hearing in persons who are deaf (irrespective of cause)
- optimizing cochlear implant function
- defining the causes of age-related hearing loss and mechanisms behind noise-induced hearing loss
- developing novel and effective preventative strategies for hearing loss

For more information, visit medicine.uiowa.edu/auditoryregeneration

Information about the University of Iowa Pappajohn Biomedical Institute can be found at healthcare.uiowa.edu/PBI

“The opening of the Pappajohn Biomedical Discovery Building represents an exciting milestone in our department’s research program. This new space allows us to ramp up our collaborative efforts, not only across disciplines at the University of Iowa, but also with other auditory scientists who share in our desire to prevent, treat, and cure hearing loss.”

- Richard Smith, MD

Senator Tom Harkin (D-IA, 1985-2014) visited the University of Iowa medical campus last fall. He toured the new Pappajohn Biomedical Discovery Building with Debra Schwinn, MD, dean of the UI Carver College of Medicine. Their tour included a stop in the new space dedicated to auditory research.

Image courtesy of Tom Jorgensen, University of Iowa

Marlan Hansen, MD, (right) is collaborating with Professors Amy Lee, PhD, and Steven Green, PhD, on a Department of Defense-funded project looking at how noise affects hearing loss, even in those who have received cochlear implants. Research is taking place in the new Pappajohn Biomedical Discovery Building.

Image courtesy of Susan McClellen, UI Health Care
Iowa’s residency program receives high marks

The University of Iowa continues to rank high among the top medical residency programs for otolaryngology. Rankings are based upon peer nominations in Doximity.com, a professional networking website for physicians.

“We focus on teaching the latest clinical and surgical skills necessary to succeed in private practice or academic medicine. Our faculty and residents are constantly seeking ways to improve the training experience and it’s reassuring to see that peers recognize our program’s efforts,” says residency program director Kristi Chang, MD.

Doximity allows physicians to connect with colleagues and residency classmates. It also surveys members on behalf of U.S. News & World Report for the annual “Best Hospitals” survey. More than 50 percent of U.S. physicians have joined the website’s professional network.

Head and neck website reaches milestone

Since its modest beginning as a printed course book, *Iowa Head and Neck Protocols* has evolved into a valuable source of information for physicians, nurses, speech pathologists, and patients alike. Print content and course work migrated online to reach a larger audience and eventually became a Wiki-based website in 2009, where it has grown into a worldwide resource.

In January, the site reached a milestone when it surpassed 2 million page visits since 2009. Nearly one-third of the site visits come from individuals outside the United States, and global interest is expected to grow. Editors are exploring the addition of more content for Chinese and other Asian audiences. Content will also become even more comprehensive with additional resources for ear, nose, and throat nurses and technicians.

“We are thrilled about the steady growth of the website and the opportunity to reach new audiences. Our team continually looks to implement advancing digital technology and to provide contemporary content relevant to those interested in disorders of the head and neck,” states Henry Hoffman, MD, professor of otolaryngology and editor of the website.

*Iowa Head and Neck Protocols* provides diagnostic and management preferences, surgical techniques, and protocols for head and neck diseases. Photo illustrations, videos, and care plans are also available. Content is updated daily by health care providers and reviewed by a committee of specialists to ensure accuracy. In addition, residents, fellows, and medical students contribute and edit content as a way of enhancing their training experience.

Support for *Iowa Head and Neck Protocols* comes from institutional grants and donations from individuals who share the goal in improving the care of the patients we serve.

Learn more by visiting https://wiki.uiowa.edu/display/protocols

“Our team continually looks to implement advancing digital technology and to provide contemporary content relevant to those interested in disorders of the head and neck.”

– Henry Hoffman, MD
Hughlett Morris knows a thing or two about the field of speech-language pathology. He came to the University of Iowa to study speech therapy in 1948 and received his PhD in speech pathology and audiology in 1960. After joining the faculty, Morris proceeded to spend almost 40 years contributing to the field at the same institution. During that time, he led a multimillion-dollar research program and enjoyed a distinguished career that included a stint as chair of the department in which he trained. He also inspired a legacy of research by mentoring postdoctoral students and faculty colleagues whose interests ranged from treatments of hearing loss to the genetic causes of craniofacial anomalies.

One of those former students is associate professor of otolaryngology Michael Karnell, PhD, who fondly recalls his early mentor: “Hugh has always had extraordinary vision. He has been an insightful mentor and a dear friend.”

Today, Karnell is part of an interdisciplinary care team in the Craniofacial and Cleft Palate Clinic. The team assesses and identifies speech, language, hearing, and dental concerns related to cleft palate or craniofacial abnormalities in children from across Iowa and the Midwest. Treatment ranges from speech therapy to surgery with many children requiring a combination of both. Knowing which treatment is likely to produce a better outcome, however, is an area for additional research.

There are many ways to make a difference through charitable donations. To learn more about how philanthropic support helps advance the important work of the UI Department of Otolaryngology—Head and Neck Surgery, please contact:

Sean Matthys
Associate Director of Development
University of Iowa Foundation
319-467-3649
or 800-648-6973
sean-matthys@uiowa.edu

The UI acknowledges the UI Foundation as the preferred channel for private contributions that benefit all areas of the university. For more information or to make a donation, visit the UI Foundation’s secure website at givetoiowa.org/OTO
With special interest in cleft palate and swallowing disorders, Karnell’s research is focused on normal and disordered laryngeal physiology and voice production, velopharyngeal physiology, and resonance disorders. He is collaborating with engineers and specialists in other medical fields to develop new diagnostic techniques and tools that are less invasive and even more precise.

“We are the only group actively developing a photosensor approach to endoscopic measurement of cleft palate speech. Our goal is to enable surgeons and speech pathologists to objectively identify which patients have speech disorders that require surgery and which patients will benefit from speech therapy without surgery,” states Karnell.

The approach and innovative technology being developed caught the attention of Karnell’s mentor and friend. Although Morris is retired from practice and teaching, he remains interested in research with the potential for better patient outcomes. He has kept in touch with Karnell over the years and decided to establish a speech and swallowing research fund to support the work being done at his alma mater.

“Dr. Karnell has special insight and expertise in contemporary technology, which is sorely needed at the current levels of understanding of the problem. That’s why I give to support his work. The outcome will be better and more efficient treatment for patients,” explains Morris.

Learn about opportunities to support the Department of Otolaryngology – Head and Neck Surgery at givetoiowa.org/OTO

“A model of the velopharyngeal port (VP) shows the space between the nose and mouth that enables us to breathe through our nose with our mouths closed. When we speak, we close the space for most speech sounds. Some children with cleft palate and other disorders are unable to close the space adequately during speech. When that happens, the child’s speech may sound too nasal, a problem called velopharyngeal inadequacy or VPI.

Children with VPI may also have difficulty learning the many speech sounds that require increases in air pressure within the mouth. Due to VPI, air escapes through the nose and speech may be very difficult to understand.

Researchers at the University of Iowa are investigating less invasive and more precise ways of measuring the space to improve diagnosis and treatment of VPI.

Hughlett Morris, PhD (’57MA, ’60PhD), (left) spent nearly 40 years as a member of the faculty at the University of Iowa. He remains connected to the university through his philanthropy and ties with former colleagues such as Michael Karnell, PhD (right).
Lee recognized as a 2014 Woman of Innovation

Amy Lee, PhD, associate professor of molecular physiology and biophysics and otolaryngology, received a 2014 Women of Innovation Award from the Technology Association of Iowa. The annual awards recognize, honor, and promote the outstanding contributions Iowa women make to the technological communities. Winners also are honored for their commitment to supporting and mentoring other women and girls throughout the state.

Lee was one of eight professional women to receive the award this year. She was honored for research innovation and leadership. Her research on the role of calcium channel signaling in hearing, vision, and heart and brain function has been published in top-tier scientific publications. She currently is principal or co-investigator on three grants from the National Institutes of Health and one from the U.S. Department of Defense.

The awards are sponsored by Innovation Iowa, DuPont Pioneer, John Deere, and The Principal Financial Group and recognize professional women who are innovators, role models, and leaders in the STEM (science, technology, engineering, and mathematics) fields.

Lee was also recently appointed assistant dean for scientific affairs at the University of Iowa Carver College of Medicine.

Faculty departure

Assistant professor Eugene Chang, MD (‘09R), left University of Iowa Hospitals and Clinics to join the newly formed Department of Otolaryngology – Head and Neck Surgery at the University of Arizona College of Medicine – Tucson as associate professor. Good luck, Dr. Chang.
ENT specialists and alumni from across the country gathered this past July for a unique education and travel experience. The group met in Alaska for a multiple-day continuing education meeting.

The department plans to partner with Alaska Professional Seminars again in August 2016. Save the date for your Alaska adventure now!

Iowa Alumni Reception

Friends and alumni gathered at Ocean Prime Orlando for an evening of wonderful food and drink during the 2014 AAO-HNSF Annual Meeting.

The next annual meeting will be in Dallas in September. Watch for details about this year’s alumni reception – we look forward to seeing you there!

“The Alaska meeting through the University of Iowa and Dan and Dave Jorgensen was a great success. It was a natural draw for me since I have interests in Alaska, fishing, otolaryngology, and friends. The setting was super. This event was appropriate for the entire family and it should definitely be a repeated event.”

—Thomas F. Viner, MD (73MD, 79R)
LOUD&CLEAR EVENTS

Mark your calendars

May 15–16  Functional Endoscopic Sinus Course, Iowa City
May 18–22  48th Head and Neck Cancer Reconstructive Surgery Course, Iowa City
June 12–13  23rd Annual Management of the Tinnitus Patient Conference, Iowa City
June 12–13  UI Carver College of Medicine Alumni Reunion (Classes of ’45, ’50, ’55, ’60, ’65, ’70, and ’75), Iowa City
June 27  Research Day and Resident/Fellow Graduation, Iowa City
July 1–Aug 7  Basic Science Course, Iowa City
Sep 27–30  AAO-HNSF Annual Meeting & OTO EXPO and Iowa Alumni Reception, Dallas, Tex.
Oct 8–10  UI Homecoming Reunion Weekend (Classes of ’80, ’85, ’90, ’95, and ’05), Iowa City

Updated event information with dates and details can be found at medicine.uiowa.edu/oto/courses