Better Connections *(continued from front cover)*

Previous research has suggested that with age, inner hair cells in mice and humans experience a decrease in outgoing neuron connections, while incoming neuron connections increase. To find out if the new connections worked — or worked normally— Zachary painstakingly recorded electrical signals from within the inner hair cells of young and old mice. He found that the incoming neurons were indeed active and that their activity levels correlated with the animals' hearing abilities: The higher an animal's measured hearing loss, the higher the activity of its incoming neurons.

"These nerve cell connections seem to be reverting back to the way they worked during early development before the animals' sense of hearing was operating," says Fuchs. "We don't know why the new connections form, but it might be as simple as a lack of competition for space once the outgoing nerve cells have retracted."

If the same phenomenon is occurring in human ears, Fuchs and his team say there may be ways of preventing the incoming neurons from forming new connections with inner hair cells, a technique that could help maintain normal hearing through old age. ■

For information: 410-955-6311

ICD-10 Is Here

Please make sure to include ICD-10 codes when referring your patients to Johns Hopkins Medicine.

Explore Our Online Resource for Physicians: Clinical Connection

Connect with Johns Hopkins health care professionals sharing insights on the latest clinical innovations and advances in patient care.

Scan the QR code or visit www.hopkinsmedicine.org/clinicalconnection.

While you're there, sign up for the Clinical Connection e-newsletter.

HeadWay

Johns Hopkins Medicine
901 S. Bond St., Suite 550
Baltimore, Maryland 21231

This newsletter is published for the Department of Otolaryngology–Head and Neck Surgery by Johns Hopkins Medicine Marketing and Communications.

Department of Otolaryngology–Head and Neck Surgery
David W. Eisele, M.D., F.A.C.S., Andelot Professor and Director

Marketing and Communications
Dalal Haldeman, Ph.D., M.B.A., senior vice president
Justin Kovalsky, managing editor
Christen Brownlee, writer
Lori Kirkpatrick, designer
Keith Weller, photographer

For questions or comments, contact:
jkovals1@jhmi.edu or 410-614-5044

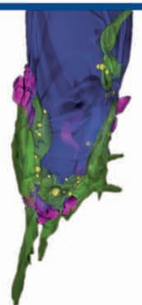
Non-Profit Org
U.S. Postage
PAID
Permit No. 5415
Baltimore, MD

HeadWay

NEWS FOR PHYSICIANS FROM JOHNS HOPKINS OTOLARYNGOLOGY–HEAD AND NECK SURGERY

JOHNS HOPKINS MEDICINE

Inside



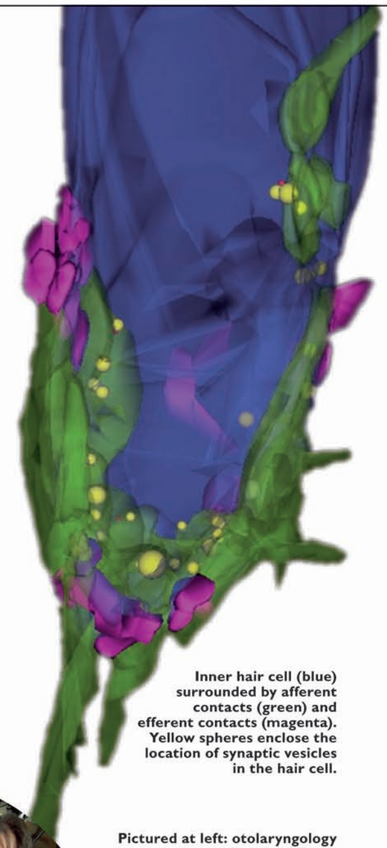
JOHNS HOPKINS MEDICINE

HeadWay

SPRING 2016

NEWS FOR PHYSICIANS FROM JOHNS HOPKINS OTOLARYNGOLOGY–HEAD AND NECK SURGERY

Better Connections, Worse Hearing?



Inner hair cell (blue) surrounded by afferent contacts (green) and efferent contacts (magenta). Yellow spheres enclose the location of synaptic vesicles in the hair cell.

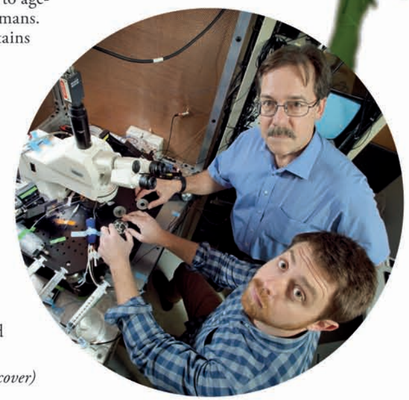
Research suggests that increased connections between hair cells and neurons may degrade hearing.

Conventional wisdom has long blamed age-related hearing loss almost entirely on the death of sensory hair cells in the inner ear. However, recent work by otolaryngology researcher **Paul Fuchs** and graduate student Stephen Zachary suggests another story. Their studies in mice have verified an increased number of connections between certain hair cells and neurons in the inner ear of aging mice. Because these connections normally tamp down hearing when an animal is exposed to high volumes, the scientists think these new connections could also be contributing to age-related hearing loss in these animals, and possibly in humans.

Researchers have long known that the inner ear contains two sets of hair cells, an inner tier closest to the brain and an outer tier. The outer hair cells have a secondary function: to amplify the sound waves within the inner ear. Not surprisingly, Fuchs notes, a loss of outer hair cells closely correlates with a loss of hearing. But studies over the last decade have suggested that changes over time also occur in the connections between hair cells and the neurons to which they are attached.

Each of those neurons acts as a one-way street, Fuchs says, taking signals either from the ear to the brain or vice versa. The neurons that take signals to the ear are known to turn down the amplification provided by outer hair cells when an animal is, for example, exposed to a noisy environment for an extended period of time.

(continued on back cover)



Pictured at left: otolaryngology researcher Paul Fuchs (above right) and graduate student Stephen Zachary

"THESE CELL CONNECTIONS SEEM TO REVERT TO THE WAY THEY WORKED IN EARLY DEVELOPMENT.

—PAUL FUCHS

Personality Traits and **Successful Residency**

It's no secret that residency, introduced to the U.S. at Johns Hopkins in the late 19th century, is a vital part of a physician's medical training. But what makes a particular resident successful enough to attain competency over time is more of a mystery. For surgical fields, such as otolaryngology-head and neck surgery, being able to attain competency involves having the aptitude to learn intricate surgical maneuvers and attaining a base knowledge of the field, among other skills. But it's much more than that, say **EunMi Park** and **Young Kim**.

To help figure out why some residents more readily attain competency while others struggle, the researchers and their colleagues recently performed a study to examine whether personal characteristics might predict competency improvement.

After recruiting a longitudinal cohort of 16 residents spanning the spectrum of first to seventh year, the study team had each take two different questionnaires: one designed to measure trait emotional intelligence (which assessed factors including well-being, self-control, emotionality, and sociability), and the other to measure learner autonomy (which assessed the profile of learning desire, resourcefulness, initiative, and persistence). For the next year, the study team monitored changes in the residents' competency scores every three months, assessed by faculty mentors.

When the researchers analyzed the data, they found a striking correlation between certain personal characteristics of the residents and their likelihood of achieving competency improvement. Those who demonstrated larger improvement of competency also had higher scores in their learner autonomy profile as well as in their emotionality score, one of factors in trait emotional intelligence.

"There's more to learning to be a good surgeon than just reading more books and taking care of more patients," says otolaryngologist-head and neck surgeon Kim. "There's something to be said for coming prepared to learn and having the right mindset."

In order to increase the chances that all residents could succeed in attaining competency, the research team suggests offering self-assessments and targeted coaching that emphasizes residents' learner autonomy and emotionality.

"I believe it's possible to change, although some might need less or more willful efforts for making a difference in their personal habits," Park says. Nevertheless, she says, such efforts are critical for residents as they complete their training and practice medicine elsewhere.

"Our residents not only serve patients at Johns Hopkins but will serve patients throughout the world," she says. "We owe it to them and future patients to do everything we can do to have them receive the best possible experiences for learning and improvement." ■

EunMi Park (left) and Young Kim

"THERE'S MORE TO LEARNING TO BE A GOOD SURGEON THAN READING MORE BOOKS AND TAKING CARE OF MORE PATIENTS."

—YOUNG KIM

Making a 'Big Bang' with Medialization Laryngoplasty

Complication from treatments for Joe Steiger's muscular dystrophy had left him with bilateral vocal cord paresis since the age of 10. In an effort to return his voice, Steiger, now 28, had multiple surgeries over seven years—the last a medialization laryngoplasty at age 17. However, when the procedure didn't have the desired effect due to underlying respiratory muscle weakness, surgeons removed the implants. Steiger soon noticed an unexpected and extremely undesirable consequence: without the implants, he readily aspirated while eating.

He became steadily dependent on a bilevel positive airway pressure (BIPAP) machine and suction to clear his lungs during every meal, leaving him increasingly homebound. After nine years of suffering, a frightening choking incident spurred him to seek help. In 2013, he found himself in laryngeal surgeon **Simon Best**'s office, discussing options to solve this problem.

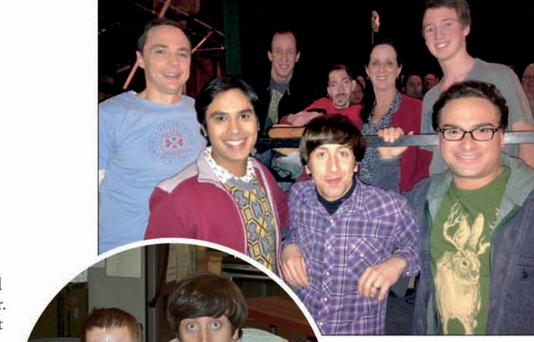
After a full workup, including videostroboscopy to test Steiger's vocal cord function, Best suggested possible remedies. Injections of a filling agent might thicken the vocal cords enough to help prevent aspiration, but it wouldn't be a permanent fix. A total laryngectomy would permanently prevent aspiration from eating, but it would also be a radical and life-changing surgery, altering Steiger's physical appearance, manner of breathing, and even his sense of smell. A third option was to perform another medialization laryngoplasty, returning the implants that had previously pushed Steiger's vocal folds together.

"I was confident that the implants would return eating to normal," remembers Steiger. But it wasn't an easy decision. After difficult recoveries from several previous surgeries to treat various conditions associated with his muscular dystrophy, he was hesitant to move ahead.

Best was also concerned that another medialization laryngoplasty might not have the results that Steiger was looking for—after all, the procedure is usually used for voice problems, not swallowing issues. "I wasn't sure of his chances of success," Best says. "But with few good options, and based on his previous history of better swallowing when these implants were in place, I trusted that this procedure would help him."

In November 2013, Steiger underwent the two-hour surgery, which is typically performed awake to help surgeons fine-tune the implants' placement based on the patient's use of their voice. Although Steiger can't phonate very well because of his muscular dystrophy, the movement of his vocal cords was still helpful for positioning the implants.

Within days after surgery, it was clear that the procedure was a success. Steiger was able to eat without aspiration for the first time in nearly a decade, which opened up a myriad of possibilities that wouldn't have existed otherwise. Now able to confidently eat outside his home, he was able to travel. In January 2015, he achieved his longtime dream of traveling from his home in Sykesville, Md.



Following medialization laryngoplasty, patient Joe Steiger was able to eat without aspiration for the first time in nearly ten years. After the surgery, he travelled to meet the cast of his favorite show *The Big Bang Theory*.

to Burbank, Calif., to attend a filming of his favorite show, "The Big Bang Theory," and meet cast members.

"That trip was and will be the most memorable thing I ever do," says Steiger, "it was all possible from successful surgery and never giving up on your dreams." ■

To refer a patient, call 443-997-6467

Treatment with TORS, Less Radiation

In 2013, commercial realtor Henry Hanna, 69, noticed a small lump under the right side of his jaw. The pea-sized mass was barely noticeable, completely invisible underneath his full beard. But despite its unobtrusive nature, the lump would be life-changing—a needle biopsy performed by his local otolaryngologist-head and neck surgeon showed that it was HPV-related squamous cell carcinoma. He suggested that Hanna go to Johns Hopkins otolaryngologist-head and neck surgeon **Christine Gourin** for definitive care.

Although Hanna presented with a neck mass, the location of his primary tumor was unclear. Most HPV-related oropharyngeal cancers arise from small primary tumors buried within the tonsils. But Hanna had his tonsils removed as a child. The best site to search, Gourin reasoned, were the lingual tonsils, located behind the tongue base. However, reaching the lingual tonsils would be a challenge with traditional surgery—nearly impossible through a transoral route and leading to significant morbidity when performed through the neck.

That's why Gourin recommended transoral robotic surgery (TORS). "With TORS, the robot allows you to see and operate around corners," she says. "It's perfectly designed for the base of the tongue and lingual tonsils."

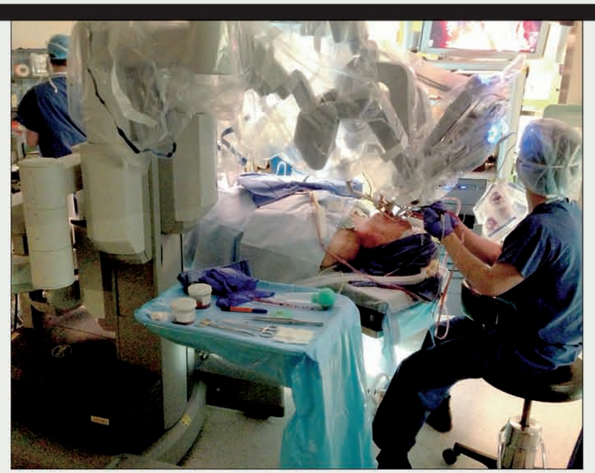
Soon before Christmas that year, Gourin and her colleagues used TORS to resect Hanna's lingual tonsils as well as traditional surgery to remove lymph nodes in his neck. The lingual tonsil tissue appeared normal, so the primary site remained a mystery. However, because that tissue had been successfully removed with TORS, Hanna was now a candidate to receive a lower dose of radiation than he would have needed had his lingual tonsil tissue remained in place.

Being able to deliver less radiation is a game changer for relatively young, active patients such as Hanna, Gourin explains. "We know that a lower dose of radiation reduces the risk of long-term swallowing trouble, dental issues, and thyroid problems," she says. "The effects of treatment have become increasingly important because patients with a good prognosis, like Mr. Hanna, are likely to live long enough to experience sequelae from treatment."

To further combat sequelae, Hanna, like other Johns Hopkins patients who receive oropharyngeal radiation, received speech and swallowing therapy. In his regular follow-up appointments, Gourin continues to recommend daily exercises to prevent future issues.

"I believe that you can never fully discharge from care patients who have had oropharyngeal cancers," she says. "The risk of developing late swallowing problems never goes away."

More than two years out from his cancer diagnosis, Hanna continues to thrive and now counsels other men with the same diagnosis. "I have more enthusiasm for my life and work than before my diagnosis," he says. "I'm not looking to slow down." ■



With transoral robotic surgery, the robot allows the surgeon to operate around corners. "It's perfectly designed to for the base of the tongue and lingual tonsils, says head and neck surgeon Christine Gourin.

To refer a patient, call 443-997-6467

The Johns Hopkins Head and Neck Cancer centers offers multidisciplinary excellence in patient care, research and training. To see a video about the center, please visit **bit.ly/Head_Neck_Center**

To Refer Urgent Oto Patients

Please email **urgentaccessoto@jhmi.edu**. Urgent patients are those who need to be seen within the next five days due to medical condition. Our call center and clinic managers check this email several times a day.

Please include the following patient information:

- Name
- Date of birth
- Medical problem
- Patient's contact information
- Physician office contact information