

# HeadWay

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

## A Mind Shift in Brain Tumor Treatment

Changing the gold standard treatment for any disease is rarely a straightforward matter, especially when it runs counter to conventional wisdom. Just ask the folks who figured out that ulcers are caused by bacteria rather than spicy foods. Despite their evidence, it took nearly a decade for most physicians to alter their approach. Neurotologist **Howard Francis** and several of his colleagues hope their research into the best ways to treat acoustic neuromas won't take nearly as long to gain widespread acceptance.

Francis' paper, published in July in *The Laryngoscope*, looked at how a type of acoustic neuroma known as vestibular schwannomas were treated at

**"WE ARE SEEING HOW NEW INFORMATION, TECHNOLOGY AND ATTITUDES ARE RESHAPING THE GOLD STANDARD FOR THE BENEFIT OF OUR PATIENTS."**

Hopkins between 1997 and 2007. The traditional treatment approach, first developed at Hopkins in the 1920s by pioneering surgeons Harvey Cushing and Walter Dandy, had always been

to excise the tumor.

"As clinicians, we often acquire and become attached to a particular 'filter' through which we see a disease and its management," says Francis. "My filter led me and others to believe that surgery was the only methodology with which to address acoustic neuromas. We held on to that belief even in the face of growing information suggesting that this benign, slow-growing tumor could, in many instances, be monitored and not treated at all. There was also emerging evidence that stereotactic radiation therapy could play a role in treating some patients."

More recently, patients have begun acting as a counterbalance, especially older patients who demand that doctors offer less invasive procedures or monitoring options in lieu of surgery.

It appears the surgeons are yielding. Francis' study of 805 cases found that, over the study period, the proportion of cases managed initially by surgery dropped from 89.5 percent to 68 percent, while monitoring patients with follow-up scanning nearly tripled (from 10.5 percent to 28 percent). Recommendations for radiation, which never occurred at the beginning of the study, jumped to 4 percent by study's end. Francis says the inescapable conclusion, at least at Hopkins, is "a significant shift in management of vestibular

schwannomas over the last decade."

He sees the trend away from surgery and toward radiation and observation continuing, noting that, from a collaborative viewpoint, nationwide there's "less emotional schism now between surgeons and radiation therapists." Using himself as an example, Francis has joined a growing number of skull base surgeons partnering with radiation oncologists to expand the spectrum of therapy available to patients. Surgery continues to be the firstline approach for large tumors and in individuals who desire aggressive management. Stereotactic radiation using the gamma knife "doesn't eliminate or shrink the tumor, but it slows overall growth," notes Francis. "It is therefore necessary to monitor the tumor to document growth before administering this treatment. If it isn't growing, there's no point in radiating." Whereas one approach provides a cure, the other offers tumor control, which may be appropriate for smaller growing tumors in older patients.

The study's findings confirm what Francis called "his hunch."



**Neurotologist Howard Francis is researching the best ways to treat acoustic neuromas.**

He had sensed in his own practice a mental shift, where surgery was no longer the automatic "go to" option for small acoustic neuromas. Now with another paper in the works that will look at how long physicians observe vestibular schwannomas before moving on—if at all—to treatment, Francis says, "we are seeing how new information, technology and attitudes are reshaping the gold standard for the benefit of our patients." ■

To refer a patient: 410-955-1640

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## A Proud Moment

When Johns Hopkins University President Ron Daniels selected Lloyd Minor to serve as the institution's 13th provost and senior vice president of academic affairs, it was a



proud moment for the Department of Otolaryngology–Head and Neck Surgery. Rarely does a departmental chair ascend to such an important position at such an early career stage.

But the quality of Lloyd's work and leadership had become well known. He expanded virtually every aspect of the department, strengthening our clinical, scientific and educational missions. Building on a foundation constructed by past leaders and faculty who expected excellence of themselves for over a century, Lloyd created an environment that empowered our physicians and trainees to more effectively treat our patients through discovery and innovation.

It is now my privilege to serve as the interim department director. It is not every day that a physician is offered the chance to lead a department that is not only thriving in its clinical and scientific programs, but also repeatedly finds new ways to solve challenges. The determination, dedication and brilliance of our physicians and faculty have been energizing as I pursue a steep learning curve. Already I see a team in action that leaves me profoundly impressed.

Though we miss his presence as a scientist, clinician, friend and mentor, we find comfort in knowing that Dr. Minor remains close to our department and our hearts. Most importantly, we celebrate his leadership by continuing to pursue excellence in the care we provide, the innovation our patients need and deserve, and the lessons we offer to those who carry on the Hopkins tradition. ■

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**Doug Reh** hopes that by studying CSF leaks and working with neurologists and neurosurgeons, physicians can better treat the condition.

## A Spontaneous Plan

Johns Hopkins Sinus Center surgeons believe there's nothing "spontaneous" about so-called spontaneous cerebrospinal fluid (CSF) leaks, where fluid seeps from the brain for no apparent reason. Such leaks put patients at risk for severe headaches and meningitis. Physicians have long known that rising intracranial pressure may help create leaks. Now, a multidisciplinary team is developing protocols to better monitor rising pressures, especially in postsurgical patients.

"Historically, repairs for spontaneous CSF leaks have had a worse track record than leaks caused by accident or trauma. The problem could be high intracranial pressure. Perhaps this puts them at higher risk for the surgical repair to fail," says **Doug Reh**, medical director of Otolaryngology–Head and Neck Surgery at Johns Hopkins Health Care & Surgery Center at Green Spring Station.

The few previous studies measuring CSF pressure in leak patients used static measurements such as lumbar punctures. But Reh want-

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ed to use and study continuous monitoring, because pressures constantly change throughout the day, affected by everything from a sneeze to sitting up in a hospital bed.

Reh was introduced by Sinus Center Director **Andrew Lane** to two colleagues already working on the problem, and who had come up with a constant monitoring technique that Lane used with his postoperative CSF leak patients. **David Solomon** and **Abhay Moghekar**, co-directors

of the Center for Cerebrospinal Fluid Disorders, developed in 2007 a method for monitoring CSF levels in patients with pseudotumor cerebri, a disorder marked by increased CSF pressures that can, unchecked, rob vision. Their technique, which involves a catheter threaded into the spine and an external pressure monitor, has yielded more accurate readings and more effective treatments. "We're guided now to a great degree by the information we get from our pressure monitoring," says Solomon, adding that, in some cases of consistently high readings, medications or shunts to lower CSF levels can save vision.

With patients taking part in the team's study of intracranial pressures in spontaneous CSF leak repair outcomes, Solomon begins monitoring them the night before surgery to establish a baseline. The catheter stays in until three days after surgery, then a follow-up reading is taken (CSF pressures are lowered by allowing CSF drainage via the lumbar drain for the first few days after surgery in order to allow the leak repair to seal).

"If I see transient elevations in their intracranial pressure that might interfere with my repair, we can work with our neurologists and neurosurgeons to treat this and give them a better chance of success," says Reh, a sinusitis expert and surgeon who teams with neurosurgeon **Gary Gallia** on spontaneous CSF cases.

With additional study patients coming from Lane, **Howard Francis**, **Masaru Ishii** and others, Reh says they're amassing data on physical issues that may correlate with higher CSF pressure levels. Gallia notes the study "will really give us data identifying patients at risk for a recurrent leak down the road." Obesity is one potential factor; others such as sleep apnea are also being studied. "We're also looking at variables such as oxygen saturation and respiratory variations," says Reh. ■

To refer a patient: 410-955-2307

# In the Eye of the Beholder

Some face paralysis. Others, serious tumors both benign and malignant. And yet incredibly, when **Kofi Boahene** sits down to speak of facial surgery with many of his patients, the first concerns they often express aren't about cures or amelioration of their afflictions.

"People always ask, How am I going to look?" says Boahene, who with fellow facial plastic and reconstructive surgeons **Patrick Byrne** and **Lisa Ishii**, is helping to define what society considers a "normal look" (see sidebar) and adjusting facial reanimation procedures to max out their physiological and cosmetic benefits. It's not a question of vanity that drives patient's fear, says Byrne, but their experiences, real or imagined, of being ostracized or stared at as they go about their lives.

The idea of reanimating the face—energizing nerves that, due to injury, disease or surgery, no longer function properly—is enormously complicated, says Byrne, noting the Division of Facial Plastic and Reconstructive Surgery handles some 100 facial reanimation cases per year, among the most in the nation. "There are 39 muscles that coordinate bilaterally to express the whole of human emo-



When he discusses facial surgery with patients, Boahene finds their appearance is a top concern.

## “PEOPLE ALWAYS ASK, HOW AM I GOING TO LOOK?”

tion,” says Byrne. “Trying to coax out of someone’s injured face the ability to integrate fairly well into social situations is difficult.”

Difficult, but not impossible. The goal for patients is to retain symmetry after surgery, because asymmetry is what draws unwanted attention. In fact, people shown

altered photos of patients with facial paralysis—where the undamaged side of the face is replaced with a mirror image of the paralyzed side—often detect nothing wrong with the person’s features. To that end, the goal of facial reanimation becomes threefold: Use surgery to solve the underlying medical issue while generating as much nerve conductivity and fine muscle movement as possible, and combine that with physical therapy and training of the unaffected side of the face so that movements—smiles, frowns and the like—appear to match.

Some of the work is incredibly creative, drawing on the brain’s plasticity to overcome seemingly unconquerable dilemmas. Boahene recalls a case where one side of a young boy’s face had been paralyzed for two years be-

cause of a tumor. It was successfully removed through a tiny incision, and the nerve, though not functioning, was rerouted and reconnected to retain muscle tone.

Adults in similar situations learn how to move their tongues inside their mouths to create facial movement, but Boahene figured a 3-year-old couldn’t learn those things until he was older. Not long after, he received an emotional, grateful call from the boy’s father. “He said ‘My son can smile! My son can smile!’” recalls Boahene. “I was teary eyed. No joking. This kid figured how to wink, how to smile, how to move one side of his face, with no one teaching him. He has a nearly perfect smile.” ■

To refer a patient: 410-955-4985

## RESEARCH

# Perception ... By the Numbers

It’s one thing to tell patients they’ll look better after reconstructive facial surgery, but how do you actually prove it? “People have perceptions about how they’re perceived by others,” says facial plastic surgeon **Lisa Ishii**, “but we don’t have objective evidence of how people really are perceived.”

Ishii is generating needed data by studying how people scan faces. “We spend the vast majority of time looking at the eyes and the nose,” says Ishii. “What I’m interested in is the deviation from that norm.”

The study of so-called scan paths isn’t exactly new. Psychiatrists working with autistic patients have used them to determine the effectiveness of

medications. One hallmark of autism is missing social cues, and researchers have noted that people with autism look at the periphery of the face. “But when they’re adequately medicated,” says Ishii, “they’ll go back to a normal scan path.”

Ishii’s work, supported by an NIH grant, is among the first to focus on the viewer instead of the person being viewed. While showing an observer a picture, Ishii uses a remote camera that detects eye movements within half a degree. The camera registers the viewer’s scan path as it moves across different quadrants of the face and how long the eye spends in each area.

“When our surgeons do a procedure for facial

nerve paralysis, we think that if they can restore symmetry, that face will be considered ‘normal’ for all intents and purposes,” says Ishii. “Our hope is that when we show pictures of the patient to other people after the procedure, it will be viewed using the scan path technique in a manner more similar to normal.” Ishii believes the data she’s amassing could affect the calculus of which procedures a surgeon chooses.

“If the scan path normalizes when we do procedures X versus Y,” she says, “we could develop an algorithm for which to do first. The goal is to establish the best procedure to restore symmetry.” ■

To refer a patient: 410-550-0460

# The Beauty and the Biology of the Inner Ear

**W**hen researcher **Paul Fuchs** talks about the cochlea, you can almost hear him sigh. “Once I began working in the inner ear, and saw how extraordinarily beautiful it is, the detail, the anatomy, the differentiation on a functional level, the biophysics... it’s this amazingly sophisticated, elegant biological mechanism that I decided was where I was going to work.”

It’s this passion that’s helped Fuchs uncover the neurochemistry of hearing, the actual molecules that carry electrical signals from the cochlea’s hair cells to the brain for processing. While some deafness and hearing loss can be treated with mechanical aids such as cochlear implants, Fuchs’ work might someday yield drug or gene therapies that get at the root causes of hearing deficits.

Because the cochlear is so difficult to work with—its tissues and cells are encased in the body’s hardest bone, existing in separate compartments each with its own special fluid balance and gradients—it’s been harder to define the biochemical mechanisms of hearing versus other bodily senses such as sight or smell. Fuchs and fellow researcher **Elisabeth Glowatzki** have spent years mapping these pathways. Recently, they’ve both used mouse models to determine how the hair cell’s chemistry might be affected.

Glowatzki looks specifically at glutamate, the chemical released when a hair cell sends its electrical signal upstream. Her previous work found that the cells packaged glutamate in tiny vesicles: These cluster together at micron-sized ribbons similar to those used by photoreceptor cells in the eye. Like a raft full of passengers, the ribbons dock opposite

the contact of a nearby auditory neuron that passes the glutamate signal along. Glowatzki proved that connection was vital in a recent paper in the journal *Neuron*, which showed that mice lacking the ability to release glutamate were profoundly deaf. She says proving that the deafness came from a deficiency in glutamate release and not the auditory nerve could have implications in humans. “If you can test for a gene that shows the absence of glutamate with a given deafness, we can say, Well, the nerve fibers are still intact, so a cochlear implant would help.”

Meanwhile, Fuchs is studying the brain’s feedback mechanism in the cochlea’s outer hair cells, which he says are designed to amplify the incoming sound waves. Thus, the brain operates like a soundman at a concert, modulating the volume and frequencies amplified by those outer hair cells at the source so that what we hear isn’t a cacophony, but a symphony. He and his colleagues recently created mice with a single mutation that altered the chemistry at a nicotinic receptor between the brain and the hair cells. By

doing this, the brain exerted a stronger feedback effect that protected the mice against noise-induced hearing loss.

Fuchs says while nicotinic receptors are common throughout the body, “the one in the ear is genetically and pharmacologically distinct from others. So, it should be possible to find chemicals that act specifically in the ear and not in the brain or muscles that have other nicotinic receptors. That’s great because we could discover ear-specific drugs to take on noise-induced hearing loss.” ■

For ore information: 410-955-6311



**Paul Fuchs and Elisabeth Glowatzki have spent years mapping the pathways of bodily senses like sight and smell.**

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