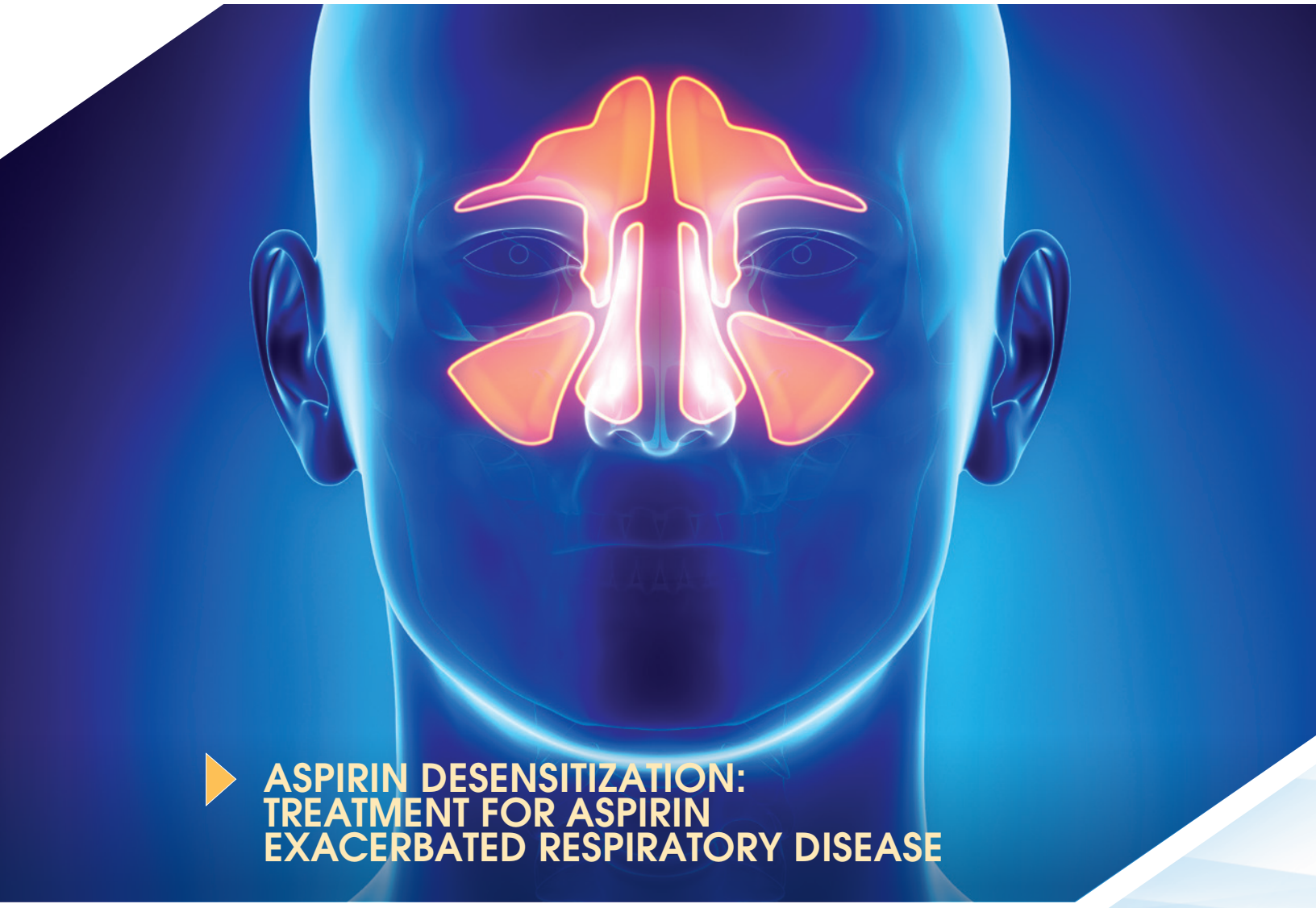
Penn Medicine

2017

PENN OTORHINOLARYNGOLOGY
HEAD AND NECK SURGERY



ASPIRIN DESENSITIZATION: TREATMENT FOR ASPIRIN EXACERBATED RESPIRATORY DISEASE

INSIDE

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LETTER FROM THE CHAIR

Bert W. O'Malley, Jr., MD
Gabriel Tucker Professor and Chair
Department of Otorhinolaryngology - Head and Neck Surgery
Associate Vice President, University of Pennsylvania Health System
Director, Physician Network Development

Top Ten in the Nation

Penn Otorhinolaryngology – Head and Neck Surgery at the hospitals of the University of Pennsylvania – Penn Presbyterian is **ranked among the top** Ear, Nose, and Throat departments in the nation by *U.S. News & World Report* for 2016.

EXCELLENCE IN PATIENT CARE, EDUCATION AND RESEARCH SINCE 1870

Dear Colleagues,

I'm very proud to introduce this edition of the Penn Otorhinolaryngology – Head and Neck Surgery Newsletter. This latest issue provides insight into three incredible clinical advances. At the new Penn Aspirin Exacerbated Respiratory Disease Center, a multidisciplinary team of allergists and surgeons are providing coordinated care for patients suffering from this condition. For patients with obstructive sleep apnea, Penn has added a new treatment option for the many patients who have trouble using a CPAP machine. Identifying a concern for those with hearing loss, Penn audiologists have adjusted Cochlear implant testing criteria to ensure that patients who can greatly benefit from these devices would no longer be ineligible for them because of antiquated coverage criteria. All three of these advancements serve to greatly increase our patient's quality of life.

This issue also includes a highlight on ground breaking research, the largest of its kind, into identifying viruses and bacteria that could be drivers of head and neck cancer. The results of this research could spawn a host of new options for both treatment and prevention of these cancers.

As a department, extending access for care of complex patients to our community has been a driving force. We are proud to share that Penn's Ear, Nose, and Throat Network, an exclusive group of preferred independent ENT Practices, has grown significantly in 2016 — including the expansion to practices beyond the Philadelphia region. Additionally, Gregory S. Weinstein, MD, FACS, Vice Chairman of Department of Otorhinolaryngology - Head and Neck Surgery, has been appointed to the head and neck cancer program leadership board at Lancaster General Health where he will serve in addition to his work in Penn Otorhinolaryngology.

I trust you will find this issue engaging and I look forward to meeting or hearing from you, our partners in care.

Regards,

Bert W. O'Malley, Jr., MD
Gabriel Tucker Professor and Chair, Department of Otorhinolaryngology - Head and Neck Surgery
Associate Vice President, University of Pennsylvania Health System
Director, Physician Network Development

ASPIRIN DESENSITIZATION at the PENN ASPIRIN EXACERBATED RESPIRATORY DISEASE CENTER

What is Aspirin Exacerbated Respiratory Disease (AERD)?

Formally referred to as Samter's triad, AERD is an aggressive form of chronic eosinophilic rhinosinusitis with nasal polyps (CRSwNP) and asthma. AERD may affect as many as 10% of all asthmatics and up to 40% of asthmatics with nasal polyps. The main distinguishing characteristic of this condition is the development of asthma or rhinitis attacks when patients ingest aspirin or other non-steroidal anti-inflammatory drugs (NSAIDs). The mean age of onset for AERD is typically 30 – 35 years old. It is extremely rare to occur before puberty.

Individuals who are diagnosed with AERD will often describe initial symptoms consistent with a severe cold or flu that never goes away and gradually develops into CRSwNP. As time goes by, they develop asthma and a sensitivity to aspirin and NSAIDs. Because AERD is a very aggressive inflammatory disease, these individuals have had numerous sinus surgeries and have been treated with high doses of inhaled and/or oral glucocorticosteroids .

According to John V. Bosso, MD, Director of the Penn Otorhinolaryngology Allergy Clinic and Medical Director of the Penn AERD Center, AERD patients undergo ten times as many sinus surgeries compared to other CRS patients who don't have the condition, their polyps have the highest eosinophil densities of the eosinophilic sinus diseases, and they generally have the worst CT scan scores.

John V. Bosso, MD

Nithin D. Adappa, MD

The History of AERD Treatment

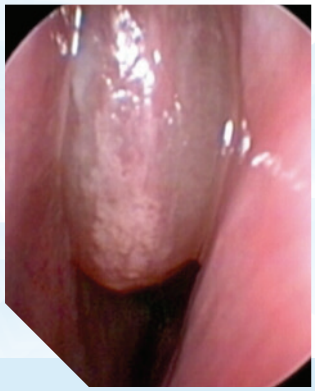
Aspirin desensitization for AERD was developed in 1979 by Scripp's Clinic's Dr. Donald Stevenson who trained Penn Medicine's Dr. Bosso. Initially, Dr. Stevenson was asked to desensitize AERD patients who needed to take aspirin for other conditions. The first AERD patient he desensitized and treated with aspirin had rheumatoid arthritis. Dr. Stevenson gave this patient increasing doses of aspirin over several days and managed any allergic reactions. Over time, the patient developed a tolerance and was also showing improvements in his sinus disease and asthma. This case and the patient's significant improvements in function and quality of life led Dr. Stevenson to expand treatment to additional patients suffering from AERD.

Diagnosing AERD

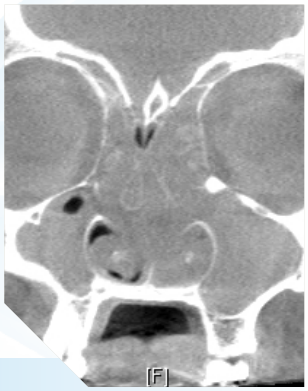
Even with traditional therapies including surgery, the disease is often sub-optimally controlled — with rapidly recurring polyps and frequent asthma exacerbations. The diagnosis of AERD is often overlooked by clinicians, particularly providers without specialization in allergy or otorhinolaryngology.

Most physicians will diagnose patients with AERD based on clinical history. If the patient has asthma, nasal polyps, and a history of adverse reaction to NSAIDs or aspirin, he/she may be diagnosed with AERD. However, although the majority of aspirin-sensitive patients have a convincing history of adverse reactions, confirmation by a controlled diagnostic aspirin challenge may be necessary. During a diagnostic aspirin challenge, patients ingest a very small dose of aspirin while being carefully observed for any signs of an allergy. At Penn, the challenge is performed in a controlled environment by an allergist and staff who are trained to handle any potential adverse reactions.

The American Academy of Allergy, Asthma and Immunology (AAAAI) notes that the rate of AERD prevalence in individuals with severe asthma is high enough that doctors should investigate those patients' experience with taking aspirin at every new consultation. In addition, all patients with CRSwNP should be asked about their history related to aspirin and NSAIDs.



AERD related nasal polyp, endoscopic view



AERD related nasal polyp, CT scan

Penn's Multidisciplinary Strategy for treating AERD

AERD is a disease that requires a continuous multidisciplinary strategy as provided by the experts at Penn. That's why the Penn AERD Center has a multidisciplinary team of allergists, as well as otorhinolaryngologists that subspecialize in sinus surgery to clinically evaluate and treat patients with AERD and determine the optimal treatment plan for each individual.

Penn's multidisciplinary AERD Center is led by Dr. Bosso, a graduate of the allergy/immunology fellowship at Scripps Clinic where the aspirin desensitization procedure was initiated and perfected, and one of the first trainees to learn the technique. Dr. Bosso has over 28 years of experience with AERD and has desensitized over 1,000 patients in his career—more than any physician on the East Coast.

If sinus surgery is required, Penn's Internationally Acclaimed Rhinology Program is uniquely equipped to treat even the most complex cases. Nithin D. Adappa, MD, a highly accomplished Penn sinus surgeon, is the Surgical Director of the Penn AERD Center. The center's "complete" AERD surgery approach has been shown to be the most effective first step in preparing patients for subsequent aspirin desensitization. Aspirin desensitization followed by long-term aspirin therapy is the most effective way to prevent new inflammatory polyp disease from re-forming, thereby preserving the benefits of the surgery.

A regularly held team conference reviews cases and determines the best candidates for surgery and aspirin desensitization, as well as the best way to manage any co-morbidities and develop a tailored treatment plan to decrease symptoms of AERD.

The Desensitization Process and Results

Desensitization for most patients takes two days to complete, and is performed in the state-of-the-art Surgery Center at Penn's Perelman Center for Advanced Medicine. The procedure integrates a nasal form of an NSAID which is introduced before oral aspirin. Aspirin doses start very low and gradually rise throughout the protocol. If necessary, medications will be administered to help with symptoms developed while undergoing desensitization. Patients are intensely monitored throughout the procedure. Post desensitization aspirin treatment then begins with a minimum dose of 325mg a day to a maximum of 650 mg twice a day. The dosing is individualized and depends on the patient's tolerance. As long as patients keep taking their aspirin dose, they will stay desensitized. If they stop aspirin for more than 48-72 hours, they will start becoming sensitive again. Overall, 85-90% of patients undergoing aspirin desensitization respond well and show significant improvement within three months.

Most AERD patients qualify for aspirin desensitization; however, there are two contraindications for aspirin therapy: history of gastrointestinal bleeding, and pregnancy. After successful aspirin desensitization, patients show significant improvements such as less regrowth of polyps, decreased need for prednisone, improved sense of smell, decreased episodes of infectious sinusitis, fewer asthma incidents and fewer emergency room visits due to asthma. ▲

AERD RESEARCH PROGRAM: PAVING THE WAY

At Penn, Noam Cohen, MD, PhD, Director of Rhinology Research, is leading the path into new AERD horizons. Working with Dr. Bosso, Dr Adappa and the Penn AERD Center team, Dr. Cohen will be conducting several studies including AERD and a possible viral correlation, and the role of the microbiome in AERD. The team will also be investigating causes of AERD, alcohol intolerance in AERD, and new pharmacological treatment modalities.

HYPOGLOSSAL NERVE STIMULATION
NEW TREATMENT FOR THOSE UNABLE TO TOLERATE CPAP

With more than 18 million people experiencing obstructive sleep apnea (OSA), it has become one of the most common sleep disorders in the United States. Multiple factors contribute to the development of OSA including anatomic, mechanical, neurologic, and inflammatory changes in the pharynx. If left untreated, OSA can lead to a wide range of health complications including cardiovascular and neurocognitive morbidities.

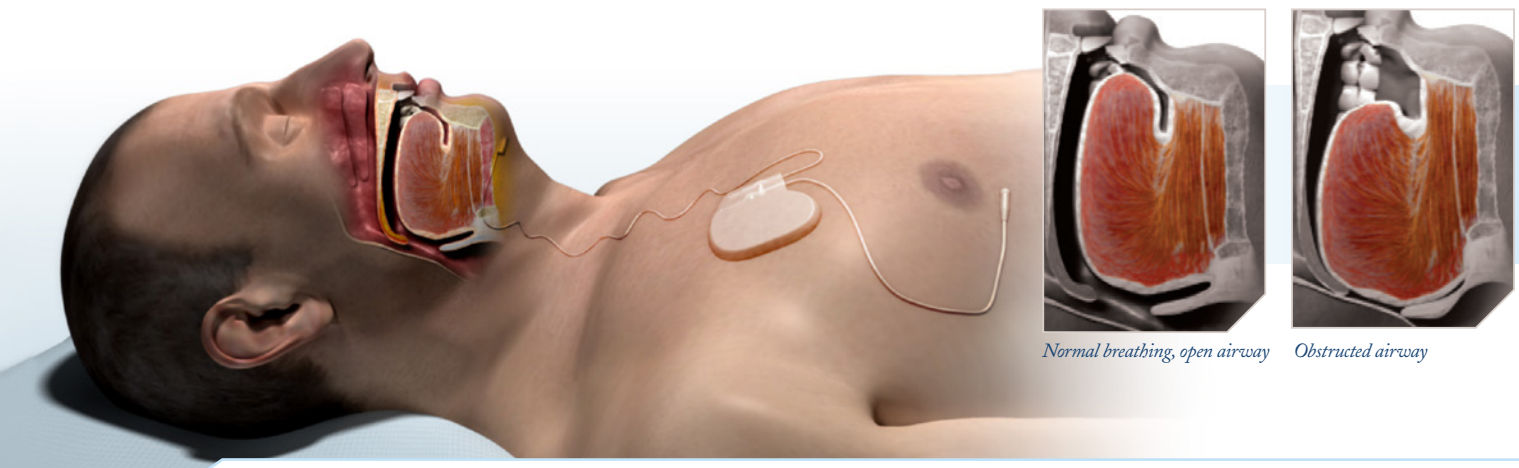
Up until now, treatment for OSA has included first line options like oral appliances and weight loss, to more advanced solutions like continuous positive airway pressure (CPAP)—considered the gold standard treatment. Should these treatment options not be successful, ablative surgery to remove or alter pharyngeal tissue has been the second line treatment. Now, Penn otorhinolaryngologists Erica R. Thaler, MD, and James J. Kearney, MD, alongside Penn sleep specialist Richard J. Schwab, MD, DABSM are evaluating a new treatment to help patients with sleep apnea and improve their quality of life. Exciting results from a recently FDA-approved implantable device called hypoglossal nerve stimulation (HGNS) offers promise for patients who cannot tolerate CPAP due to discomfort and/or the lack of desire to be tethered to a CPAP machine.

What is Hypoglossal Nerve Stimulation?

Hypoglossal nerve stimulation (HGNS) or INSPIRE Upper Airway Stimulation therapy is a new implantable pacemaker-like device that is surgically placed under the collarbone. It contains three parts: a pulse generator, a stimulation lead, and a sensing lead. The stimulation lead is connected to the hypoglossal nerve (the nerve that innervates the tongue) and the sensing lead is placed against the rib cage to monitor the patient's effort to breathe. At this point, the pulse generator sends an electrical signal to the stimulation lead attached to the hypoglossal nerve and stimulates the tongue to move forward towards the lips to open the upper airway for breathing.

The device is surgically implanted during a two-hour outpatient procedure. Patients generally tolerate the surgery well and there is minimal bleeding with only small incisions in the neck and chest. After surgery, the implanted device is not activated for a month to allow for healing and the patient is instructed to avoid strenuous activity. At one month, the patient returns and the system is activated at a low setting. After a couple of weeks, the patient undergoes a titration sleep study at Penn to determine the target settings (optimal voltage) for the system. Settings are gradually adjusted for the patient to achieve optimal results. The device comes with a remote control and is turned on before the patient sleeps, and turned off in the morning.

One drawback of a hypoglossal nerve stimulator implant is its incompatibility with MRIs. However, it is compatible with other imaging modalities and a second generation of device is under development (should be available in 2017) that will allow for MRI's.



Normal breathing, open airway

Obstructed airway

Who Qualifies?

For the right candidates, the INSPIRE Upper Airway Stimulation device has a high probability of success. But not every OSA patient qualifies for hypoglossal nerve stimulation. Patients must pass a clinical screening to qualify for the device. This screening includes a sleep study and a sleep endoscopy.

At Penn, patients undergo a sleep study to determine their apnea hypopnea index (AHI) which measures severity of sleep apnea by counting the number of pauses in breathing during sleep. In the original New England Journal of Medicine Stimulation Therapy for Apnea Reduction (STAR) study in 2014, the AHI criteria was 20 – 50 events/hour for patients who were included in the study. Penn, however, has treated patients who had an AHI as high as 90 events/hour. Patients also cannot be obese, and must have a BMI less than 40 kg/m2 (ideally patients should have a BMI < 35 kg/ m2). They must have a BMI less than 40 kg/m2 (ideally patients should have a BMI < 35 kg/m2). Patients are then scheduled for a sleep endoscopy that allows the surgeon to determine how the patient's airway collapses.

Patients who have concentric collapse (as in a circle collapses on itself), rather than anterior or posterior collapse of the retropalatal airway, are disqualified for the implant. Finally, once the patient has passed the screening and met the criteria, Penn works with their insurance companies to determine coverage.

New England Journal of Medicine and Penn Medicine Studies

In the original STAR clinical trial, patients implanted with the INSPIRE Upper Airway Stimulation device showed a 78 percent reduction in AHI and 80 percent fewer oxygen desaturation events with the implant. Showing that the device is a viable long term solution for OSA, these results were sustained three years after the device was implanted. The STAR trial began in 2010 and led to the device's FDA approval in April 2014.

The STAR trial was conducted under a controlled research protocol with strictly defined criteria for patients. However, researchers at Penn Otorhinolaryngology – Head and Neck Surgery have conducted a subsequent study on the outcomes of hypoglossal nerve stimulation for the treatment of an expanded group of patients (those with higher AHI and BMI than in the STAR trial) with sleep apnea. The Penn study takes the next step by examining outcomes in post-approval clinical use. By replicating the success of the STAR clinical trial, the findings show that the device is as successful in the general clinical population (including patients with higher AHI and BMI than in the STAR trial) as it was in participants that met the STAR clinical trial criteria.

Erica R. Thaler, MD

James J. Kearney, MD

Richard J. Schwab, MD, DABSM

Penn Patient Results

In the ongoing Penn study, 20 implants were completed at Penn between January 2015 and March 2016. All patients had a baseline polysomnography (PSG) recording prior to HGNS implant, as well as a post PSG approximately two months after HGNS, to assess the severity of their apnea and any change after treatment. Those who received the implant were typically overweight, middle aged, and had severe OSA—a slight expansion from the STAR criteria.

The study showed significant improvement with the AHI for all patients, decreasing by an average of 35 events per hour after the device was planted — an average reduction of 84 percent. Additionally, the lowest oxygen level measured in the blood during the night significantly improved by 11 percentage points, from 79 percent to 90 percent. Penn's study shows that the HGNS device can benefit an even greater patient population range. Providers with patients who are having trouble with OSA treatments, especially with CPAP, should consider hypoglossal nerve stimulation as a treatment option. ▲

OSA RESEACH AT PENN: HGNS AND BEYOND

The Penn Sleep Center is one of only three sleep centers in the United States designated by the National Institutes of Health as a specialized center for sleep research and has performed over 55 HGNS implants to date since it became FDA-approved.

EXPANDING COVERAGE FOR COCHLEAR IMPLANTS

HOW PENN IS RESETTING CRITERIA FOR HEARING LOSS

Forty eight million Americans report some degree of hearing loss. Many of these individuals can be successfully fitted with a traditional hearing aid. However, there is still a large number of patients who do not receive benefit from hearing aids. These individuals often feel isolated and withdraw from their world. Cochlear implantation offers an option for treating these patients. Hearing is the only sense we can restore. Unless there are severe medical contraindications such as advanced dementia, or severe heart disease, there are really few patients that cannot be helped with currently available implantable hearing devices. The team of neuro-otologists and audiologists at Penn Otorhinolaryngology – Head and Neck Surgery implant and program over 100 new adult patients with cochlear implants each year.

Current Criteria: A Barrier for Many

Once a patient has been identified as a candidate for implantation, the process of obtaining insurance approval for the procedure begins. The criteria insurance companies use to approve or deny a procedure can be a significant barrier for patients who would be unable to afford treatment otherwise. The most stringent criteria for coverage is Medicare's, whose candidacy criterion for cochlear implants has not changed in over thirty years. This stringent criteria leaves a gap in care for a large group of individuals. These patients have too much hearing for a cochlear implant but not enough hearing to benefit from traditional hearing aids. They are left in silent limbo while they wait for their hearing to deteriorate enough that they can finally meet these strict criteria and receive a cochlear implant.

Current criteria is based on performing a functional hearing test which gauges the patient's sentence recognition in the "best-aided condition," meaning with his/her own hearing aids or clinic-provided hearing aids, and typically the use of both ears together. The current criteria dictates that an individual must score 40% or lower in the best aided condition on sentence testing to qualify for cochlear implantation. Private insurance candidacy criteria for sentence recognition is 50% in the ear to be implanted and 60% in the opposite ear or the best-aided condition.

Testing for cochlear implantation is completed in a sound treated test booth. This quiet, controlled setting is unlike the real world conditions most of these patients face every day. As a result, even patients with a severe degree of hearing loss may score above 40% and be ineligible for treatment. We at Penn Otorhinolaryngology are trying to address this gap in coverage which is leaving too many patients behind.

Adjusting the Criteria Candidacy for Traditional Cochlear Implants

Medicare has no specific requirements with regard to testing in quiet or in noise. Traditionally testing has been completed in quiet conditions, however real-life conditions always involve some level of significant background noise. For perspective, a typical classroom setting is a -6 S/N, meaning the background noise is six decibels louder than the teacher speaking. As a result, the implantable device team at Penn has adjusted our test protocol to better determine a patient's real-life communication experience and impairment. Sentence testing is now completed with a minimal amount of background noise present with the goal being a more "real world" listening experience. This better identifies those patients who are not able to benefit from hearing aids.

Penn has conducted testing under this adjusted candidacy criteria for several months and based on a host of data accumulated, patients that previously would not have met criteria are now able to receive a cochlear implant. By and large, these patients are performing at a much higher level than they were with traditional hearing aids.

There are two signal-to-noise level ratios that have been accepted for this updated testing protocol:

- *+10 S/N – sentence is being introduced at 10 decibels louder than the background-currently used at Penn.*
- *+5 S/N – sentence is being introduced at 5 decibels louder than the background*

Providing Proof for Change

Penn is currently participating with a multi-center research study initiated in an attempt to expand Medicare criteria to match that of private insurance coverage. This study will capture those patients scoring 40 to 60% that are currently excluded from implantation. The study, "A Proposal to Evaluate Revised Indications for Cochlear Implantation in the Adult CMS Population" will build the case for this underserved group of hearing impaired individuals. Patients involved in the study will be followed for one year. The goal is to compel Medicare to update their criteria, enabling more patients to have access to these life altering treatments.

Hybrid/Electric-Acoustic Stimulation Cochlear Implants: New Technology

The introduction of the hybrid or Electric-Acoustic Stimulation cochlear implant has created the need for a different set of candidacy criteria. Penn has been implanting FDA approved hybrid devices since March of 2014. Prior to that we participated in a manufacturer sponsored study that validated the effectiveness of the hybrid cochlear implant. Hybrid devices combine the benefits of a cochlear implant and a hearing aid. Traditional hearing aids benefit patient hearing in the low and mid frequencies but they are much less effective at delivering amplification in the higher frequencies. This means the high frequency consonant information is lost and speech clarity decreases. The concept of a hybrid cochlear implant expands the patient population who could benefit from acoustic stimulation in the low frequencies with the hearing aid component and electrical stimulation in the mid to high frequencies with the cochlear implant component. The combination of acoustic and electrical stimulation offers improved clarity of sound by providing more high frequency information while preserving the quality or richness of the sound from the low frequencies.

Hybrid Cochlear Implants Candidacy Criteria

Despite the first hybrid device being approved by the FDA nearly three years ago, many private insurance companies still view this device as experimental. Current hybrid candidacy criteria for one of the FDA approved devices includes normal or audible low frequency hearing with a severe to profound sensorineural hearing loss in the mid to high frequencies. Traditional implantation criteria relies on how a patient performs on sentence testing. This criteria is not appropriate for hybrid candidates as they are able to use contextual cues to determine the meaning of the test sentence. Open-set word recognition testing is now being looked at rather than sentence recognition testing as the best way to gauge the patient's need for the device. Instead of repeating sentences, patients are asked to repeat a random word in isolation with no context.

Per one manufacturer, candidacy requires that a patient have documented severe to profound high-frequency sensorineural hearing loss in both ears and receive limited benefit from hearing aids. Scores on open-set word recognition testing must be between 10% and 60% in the ear to be implanted and up to 80% in the opposite ear. A second manufacturer suggests that open-set word recognition must be 60% or poorer in each ear.

When the existing Medicare guidelines are considered, it's nearly impossible for a Medicare patient to qualify for this hybrid device as they have not created separate criteria for the new device and still use the stringent 40% rule with sentence testing criteria.

In Summary

The impact of profound hearing loss can result in reduced vocational options, feelings of social isolation, and often depression. Expanding candidacy criteria for treatment has led to an increased number of those affected receiving cochlear implants — both traditional cochlear implants as well as cochlear hybrid devices. Penn Medicine's modifications to the testing parameters have allowed patients who were previously excluded to now be eligible for these life-changing devices. ▲

Traditional cochlear implant

Electric-Acoustic Stimulation

PENN RESEARCH LAB LEADING STUDIES
OF HEAD AND NECK CANCER & MICROBIOME

Researchers have estimated that about 20% of cancers may be linked to infectious diseases, and according to Erle Robertson, PhD, Director of the Tumor Virology Program of the Abramson Cancer Center, this number may actually be higher. Studies have shown that there is a strong correlation between certain viral infections and cancer, such as the human papilloma virus and head and neck cancer. But what are microbes doing to drive the oncogenic process for head and neck cancers?

Erle Robertson, PhD

At the Robertson Research Lab of the University of Pennsylvania, researchers are working to understand the mechanisms of oncogenesis driven by viruses, bacteria, and other infectious agents with a focus on the development of curative and preventative therapeutics. By combining different technological approaches such as biochemistry, genetics, molecular biology, cell biology, microbiology, genomics, bioinformatics, proteomics, and biostatistics, the lab is leading innovative research for novel health applications.

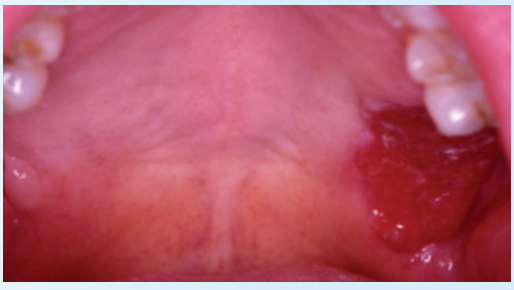
Results from the Lab

Dr. Robertson and his team have published results on their work with Epstein-Barr Virus (EBV) and Kaposi's Sarcoma herpesvirus (KSHV). In addition his group is also working on Hepatitis C Virus (HCV) and the infectious etiology of gastric cancer and ocular surface squamous cell neoplasia (OSSN). These viruses are capable of causing the development of human cancers as frank drivers of the cancers or enhancing the carcinogenic process. The results of these studies have led to several advances towards more effective treatment and therapeutics.

The most recent publication, a new study from the Perelman School of Medicine at the University of Pennsylvania, led by Dr. Robertson and colleague James C. Alwine, PhD, from Cancer Biology identified, for the first time, an association between two microbial signatures and triple negative breast cancer (TNBC), the most aggressive form of the disease. The team found a distinct microbial signature distinguishing TNBC tissue from normal samples, which could be further delineated into two broad clusters, one predominantly viral and the other predominantly bacterial, with some fungi and parasites. Dr. Robertson hopes to use these studies to develop a more broad based therapeutic approach for treating cancers with associated microbiome as well as potential for development as a diagnostic strategy which could curb the incidence of long-term disease.

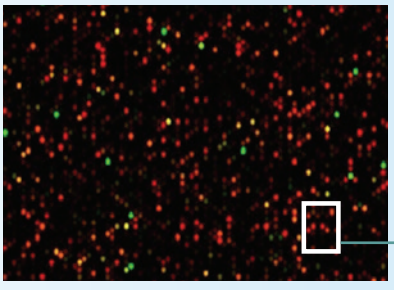
IDENTIFING DRIVERS OF DISEASE IN MICROBIOME

Head and Neck Cancer Sample



Research starts with a head and neck cancer sample. In this example, the sample is head and neck squamous cell carcinoma (HNSCC).

Metagenomic Array



Identifying the associated microbial signatures of HNSCC is approached by utilizing a unique metagenomic approach referred to as PathoChIP. Virus, bacteria, fungi, parasites can be identified using this chip combined with next gen sequencing.

Head and Neck Cancer and the Microbiome

The Lab's most recent study is focused towards understanding the role of the microbiome (all of the body's microbes' genes) and its contribution to head and neck cancers. The human body contains about ten times more microbes than cells. By examining the full microbiome to determine the potential connection to any of a wide array of cancers, rather than studying only select microbe genes and select cancers, this most recent study is one of the largest and most comprehensive of its kind.

Upon infection, in order for a virus or bacteria to survive, it uses the human body as a host and in some cases is able to integrate its signature within the cell's DNA to elicit changes that may lead to cancer. The Lab is looking for that potential DNA fingerprint that is associated with head and neck cancer. Does this type of dysregulation lead to further association with more pathogenic organisms? By studying the connection between cancers and viruses and bacteria, the Robertson Lab is searching for a general microbial fingerprint or signature, different fingerprints in different cancers, and the possibility of a unique set of organisms that may be found to be related in all cancers. The results of this groundbreaking research are currently being reviewed for publication.

The Robertson Lab and colleagues at Penn have developed a pathogen identification technology which allows researchers to identify all known viruses, as well as pathogenic bacteria, fungi, and parasites. By studying head and neck and oral cancer with this technology, we can identify organisms associated with these types of cancer. The lab will continue to identify genetic signatures that could give us clues to the contribution of identified organisms for different types of cancer and use that to develop targeted therapies or prevention.

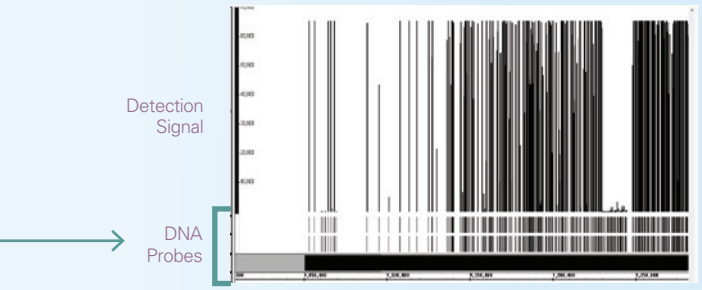
Advancing New Therapeutics and Treatment

The Robertson Lab's pioneering work is increasingly important as we expand our understanding of the balance between viruses, bacteria, and fungi and how they inhabit our bodies. The detection of distinct microbial signatures and the other pathogens does not necessarily mean that they actually cause cancer. However, by identifying the specific cancer signature, researchers can figure out ways to treat, control, or modify the cancer or treat the tumor-associated microbes to prevent malignancies. The focus on what these organisms are actually doing will be an important key to developing a larger opportunity for treatment and saving lives.

By understanding how pathogens evolve abilities to use cells to facilitate their survival, we may begin to understand how to develop preventative measures such as vaccines to minimize risk. Such is the case for Gardasil, or recombinant human papillomavirus vaccine for use in the prevention of certain strains of human papillomavirus, specifically HPV types 6, 11, 16, and 18. Previous studies suggest a strong association of 25 to 50% of HPV association with head and neck cancer, with a much higher incidence for oropharyngeal squamous cell carcinomas.

Identifying microorganisms associated with certain cancers gives us insight into whether or not we can link their epidemiological strengths, and if prevented, might reduce the possibility of developing these cancers. For example, identifying these microorganisms could lead to a targeted therapeutic vaccine strategy. Soon, there may be enough data to warrant a vaccine for the prevention of head and neck cancers. ▲

Agent Identification



Conserved (similar or identical sequences) and unique genomes of associated agents including viral agents can be identified through this PathoChIP technology.

Clinical Impact

The identification of these associated infectious agents can then be translated to new targeted therapeutics for treatment of HNSCCs.

Penn Medicine
3600 Market Street | Suite 210
Philadelphia, PA 19104

PENN OTORHINOLARYNGOLOGY – HEAD AND NECK SURGERY

Founded in 1870, Penn Otorhinolaryngology – Head and Neck Surgery is one of the oldest departments and residency programs in the country. The legacy and tradition of excellence in patient care, education, and research continues to grow and flourish today.

Penn's multidisciplinary team of board-certified otorhinolaryngologists specializes in the evaluation, diagnosis and treatment of a spectrum of ear, nose and throat disorders, as well as areas within the head and neck.

SERVICES INCLUDE:

- Audiology
- Balance Center
- Center for Head and Neck Cancer
- Center for Implantable Hearing Devices
- Cranial Base Surgery/ Skull Base Surgery
- Facial Plastic and Reconstructive Surgery
- General Otolaryngology
- Head and Neck Surgery
- Hearing Aid Dispensing
- Otology/Neurotology
- Rhinology
- Smell and Taste Center
- Speech-Language Pathology and Rehabilitation
- Thyroid Program
- Tinnitus
- TransOral Robotic Surgery (TORS)
- Voice, Speech and Swallowing Disorders

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- Emergent and non-urgent transfers to Penn Medicine
- Physician consults and referrals
- Information about medical education and clinical programs

Physician Liaison Services:

Penn Medicine physician liaisons will facilitate meetings between and among referring physicians and Penn providers for Grand Rounds, CME and education programs and other professional meetings.

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