Next-Generation Surgical Care for Head & Neck and Thyroid Cancers

IN THE DEPARTMENT OF OTOLARYNGOLOGY – HEAD & NECK SURGERY

Stanford | MEDICINE

"Function is a really, really important consideration in everything we do as surgeons. We're trying to treat the cancer and achieve long-term survival, but at the same time with less damage and with more preservation of function."

John Sunwoo, MD
Professor of Otolaryngology (Head and Neck Surgery)

Sitting across the table from a friend with almost any type of cancer, it's likely you wouldn't know it. Your friend could have had a minor operation, or a major treatment, but chances are you couldn't tell by looking at them.

With head and neck cancers, that's not the case.

Because head and neck cancers affect how we present ourselves to the world—through our face and facial movements, through speech or swallowing—this is a very personal disease. Head and neck cancers affect the way we look and how we express emotions.

And it's not just the disease that can significantly impact function, it's also the treatment. Surgery, chemotherapy, and radiation all carry the risk of damage to the delicate structures of the face and neck, which could leave patients with facial paralysis, decreased hearing, or difficulties with speech or swallowing.

With 50,000 new cases of head and neck cancer now being diagnosed in this country each year, 1 out of every 100 people will be diagnosed at some point in their lifetime with this devastating disease. Unfortunately, the current standard of care leaves too many patients burdened with severe complications as a result of the treatment that saved their life.

At Stanford, we have a plan to change that.

HEAD AND NECK CANCER SURGERY AT STANFORD

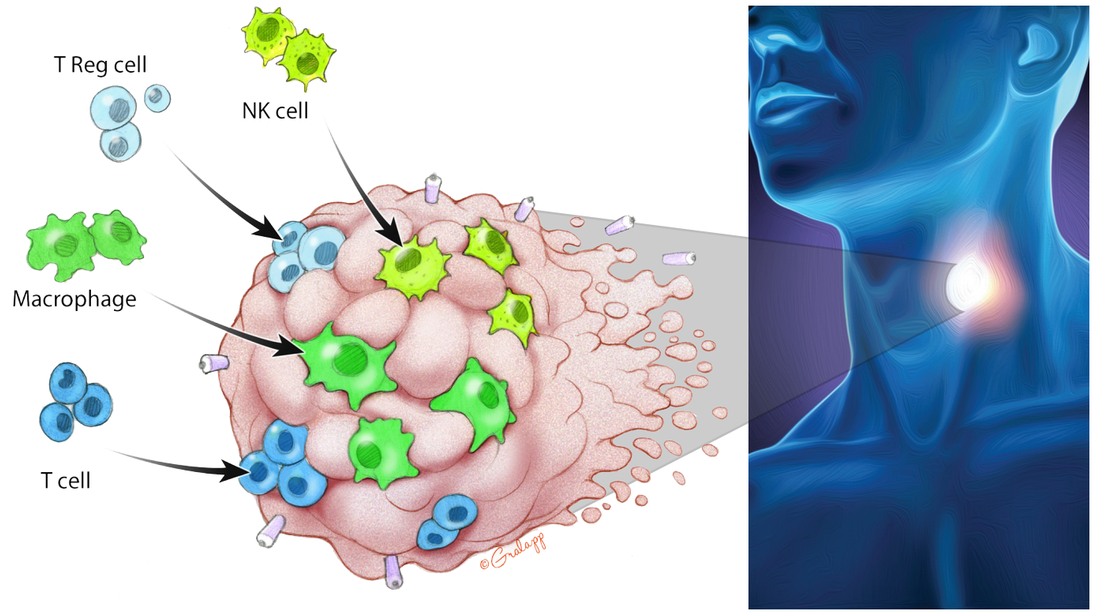
At Stanford's Division of Head and Neck Surgery, we aim to invent and deliver curative treatments that minimize harmful side effects and preserve critical functions such as speech and swallowing.

Our multidisciplinary team works closely with doctors in medical oncology and radiation oncology to maintain the best quality of life possible for patients.

Our highest goal is to preserve the uniqueness that makes you "you."

We are pioneering novel surgical technologies, such as next-generation robotic surgery and imaging tools that light up tumor cells to make it easier for surgeons to find them.

Our research is also yielding new ways to personalize treatment by using genetic analysis to identify different tumor subtypes. For instance, most patients with squamous cell carcinoma have received the same treatment, traditionally involving some combination of surgery, radiation, and chemotherapy. Thanks to our team's research, we now understand that there is considerable variation in the biology of this cancer. The most effective treatment for patients with one subtype may be different from that of other subtypes. This insight allows us to offer therapies that are most likely to result in a cure and avoid those that will only cause more toxicity.



Constantly traveling throughout the body, T cells are immune cells that protect healthy cells and destroy diseased cells. Cancer immunotherapy—the science of using the body's own immune system to attack cancer cells—offers great hope to dramatically change outcomes in the future.

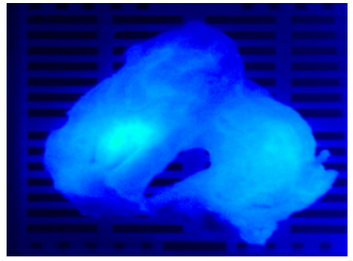
In another collaboration, researchers are working with the Pathology Department to identify genomic signatures of nasopharyngeal cancer, a form of cancer that originates in the nasal passages above the back of the throat, to guide therapy.

Additionally, using novel technology developed at Stanford, we are investigating how to harness the body's immune system to treat cancer and prevent it from coming back. Promising responses to immune modulator drugs have foreshadowed a new era of therapy that will lead to cures that have been unachievable in the past.

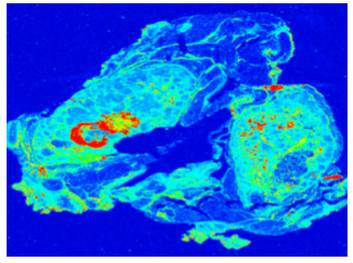
QUALITY OF LIFE

While the number-one goal of treatment is to treat the cancer, we also focus on choices that are the most personal and the most important to the patient. For some patients, if they must prioritize, preserving maximum function in their voice is more important than swallowing. For others, swallowing is more important.

We work hard to discover what each patient wants. We focus on tailored reconstruction using minimally invasive surgery to preserve communication and the individuality that makes every patient special. In giving our patients options, we strive to help them reach the highest quality of life.



Diseased tissue without fluorescence



The same diseased tissue with fluorescence

By tagging tumor cells, fluorescent antibody images are used to mark the margins of cells to make them more visible to the surgeon. Soon, Stanford researchers hope to have the hardware and fluorescent probes that will allow surgeons to see deeper into tissues and detect only a few hundred cells.

DIAGNOSTICS AND IMAGING

Thanks to exciting new tools, we are making great strides in better understanding and diagnosing head and neck cancer. Surgical ultrasound, sentinel lymph node biopsy, and PET scans have now become standard. Imaging and genomics are now dictating treatment, bringing a new level of precision to our practice.

Stanford researchers are conducting clinical trials that may enable surgeons to see microscopic fragments of tumors for the first time. This new discovery holds the promise of improving survival rates while minimizing damage to healthy tissues and dramatically enhancing the effectiveness of cancer surgery.

Using innovative "Cancer Vision" technology, a process of injecting dye into patients, we have found a way to make tumors glow. Early clinical data shows that this will enable doctors to more accurately see tumor cells in the clinic, on the operating table, and even after tumor removal when assessing surgical margins, by illuminating tiny clusters of cancer cells left in the lymph nodes.

We are now working to expand research to tumor-targeting probes that reveal cancers of the head and neck, skin, breast, brain, and other areas. A team of researchers is investigating the role of this technology to guide tumor removal and identify positive margins during specimen examination by the surgeon.

T CELLS AND IMMUNOTHERAPY

We all have T cells in our blood—circulating immune system soldiers that protect healthy cells and destroy diseased ones. T cells constantly travel through the body looking for protein fragments from diseased cells, while also making proteins that attach to healthy cells, telling the immune system to leave the healthy cells alone.

Cancer cells, however, often evade the immune system because they deceptively produce the same protective, "keep your hands off" proteins that healthy cells do. Stanford researchers collaborated on the development of drugs now used in head and neck cancer as well as other cancers that block this masquerading signal protein, leaving the cancer cells open for attack.

Cancer immunotherapy—the science of using the body's own immune system to attack cancer cells—offers great hope to dramatically change outcomes in the future. Recognizing that the immune system is the cornerstone of health, Stanford investigators are pursuing some of the most compelling new approaches to cancer immunotherapy in the world today.

Physicians using immunotherapy drugs to treat cancer patients want to be able to predict which patients will respond best to them. Stanford researchers are now testing novel imaging technology that may be a way to find out if the T cells are being activated and are infiltrating the tumor. We have developed a tracer that enables a PET scan to show the presence of activated T cells—with the potential to monitor immune response and transform how we treat patients.

BREAKTHROUGH: OPERATING IN SMALL SPACES

Until recently, surgeons treating cancerous tumors of the throat, tongue, or tonsils could only offer their patients invasive operations requiring large incisions, long hospital stays, and extensive rehabilitation.

Today, advances in transoral robotic surgery (TORS) are making it possible to remove these tumors through minimally invasive techniques that were not even dreamed of a decade ago. This transformative technology scales and translates the movements of the surgeon's fingers to robotic arms that manipulate miniature surgical tools, allowing surgeons to perform complex tasks in small spaces.

Starting in 2011, Stanford spearheaded a large study of patients treated with TORS, spanning 11 medical centers. The results were published in 2015, demonstrating high rates of disease control and few complications.

Today, TORS has become essential in the treatment of throat cancers—especially with the increasing incidence of tumors associated with the human papilloma virus.

In our robotics lab, Stanford surgeons are developing a next-generation, single-arm flexible robotic system. The new system may enable several conceptual advances: smaller instruments, a first-of-a-kind flexible camera, and better ergonomics to facilitate more precise and delicate surgery in the confined space of the head and neck.

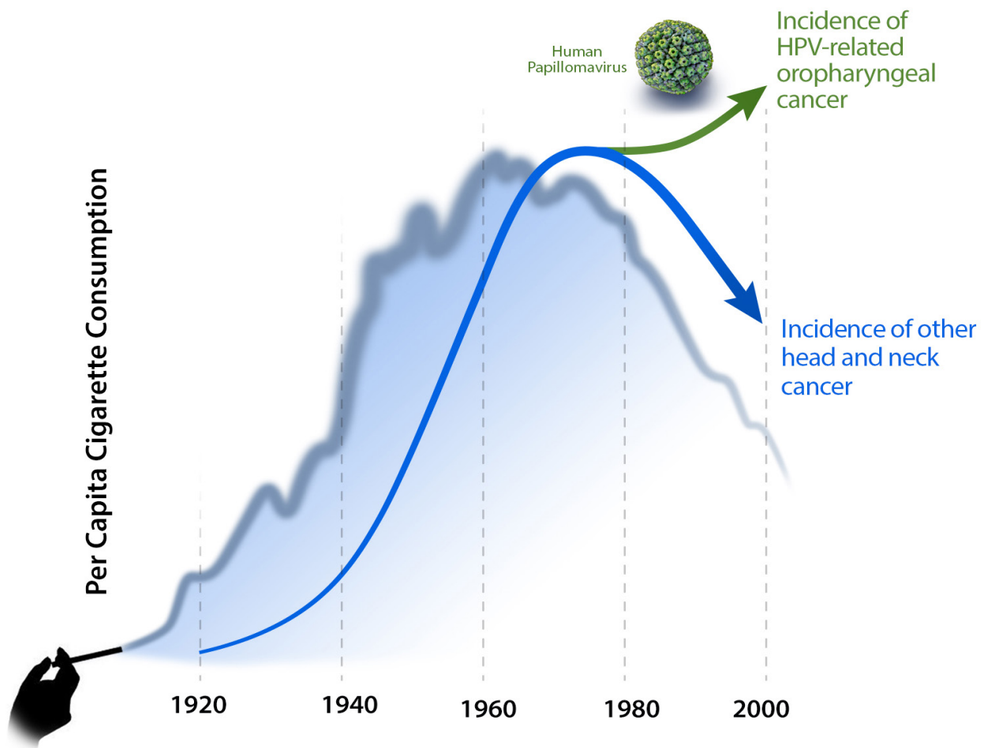
PREDICTIVE MRI

In a highly promising advance, computer learning and artificial intelligence are being used to identify biological characteristics of tumors. Stanford researchers are beginning to use a large database of CT and MRI images to determine if a tumor is responding to immunotherapy.

Investigators here are looking at the molecular data of five different subgroups of head and neck tumors. They are on the verge of predicting with a high degree of accuracy how an individual tumor fits into a specific category, based on biology. This approach could determine how that tumor will behave and how it should be treated—a superb example of precision medicine.

"The vast majority of cancer is treated with surgery, and yet surgeons cannot see cancer. The first thing that many patients ask after surgery is, 'Did you get all the cancer?' I respond, 'I removed everything I could see.'"

Eben Rosenthal, MD
Professor of Otolaryngology (Head and Neck Surgery)



The traditional cause of oropharyngeal cancer—cigarette smoke—is now declining. An increasing incidence of these tumors is now associated with the human papilloma virus (HPV), the most common sexually transmitted virus in the United States.

POPULATION HEALTH SCIENCE

Population health science is an emerging field that not only draws information from large populations to improve the health of groups but also uses that information to help individual patients and to make basic research discoveries. This is especially important in head and neck cancer research today. There is an urgent need to understand the rising rates of HPV-positive tumors of the head and neck, a rate that will soon surpass that of HPV-positive cervical cancer.

By studying the data on clusters of disease manifestations, we may be able to uncover patterns that were not previously recognized. Vigilant to new groups that are emerging and trying to find patterns and markers, population health sciences aims to exploit the growing knowledge of how life affects health in order to be predictive.

For example, Stanford researchers have identified a new subgroup of oral cancer patients who do not have the traditional risk factors, such as alcohol use and smoking, and whose tumors are not associated with HPV. This type of tumor appears to be affecting more females than males, and it appears to be on the rise. It could, in fact, be a different disease based on the genomic profiling of this subgroup. Uncovering previously unknown patterns in the epidemiology of these cancers is a crucial first step to developing effective, targeted treatments.

THYROID CANCER: A UNIQUE DISEASE

Thyroid cancer rates are increasing faster than any other type of cancer. Arising in one of the most vital hormone-producing glands, thyroid cancer differs from other head and neck cancers in several important ways. First, chemotherapy and radiation are not typically part of the treatment, placing the surgeon in an especially prominent role. Second, thyroid cancer has a reputation for being less lethal than other cancers, making survivorship particularly important. However, there is a spectrum of malignancy: the disease can be aggressive and deadly. For this reason, our team is now collaborating with colleagues in the Department of Genetics to identify signatures of papillary thyroid cancer that can predict behavior. This goal of customization guides our entire approach. For example, Stanford is one of the few centers in the world in which surgeon-performed office-based ultrasound is part of every thyroid cancer patient's evaluation. This provides a powerful feedback loop that enables individually tailored treatments that minimize side effects and maximize outcomes.

Our investigators are also pursuing a variety of research projects that aim to advance our ability to provide precision treatment. These include multi-institutional partnerships studying risk factors in large populations and comparing the results of active surveillance versus immediate intervention; studying the feasibility of regenerating parathyroid tissue to restore function that has been lost; and researching the effects of thyroid cancer on vocal function and quality of life.

A MULTIDISCIPLINARY TEAM OF FACULTY

THE DIVISION OF HEAD AND NECK CANCER IN THE DEPARTMENT OF OTOLARYNGOLOGY – HEAD AND NECK SURGERY

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John and Ann Doerr Medical Director, Stanford Cancer Center

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John B. Sunwoo, MD
Professor of Otolaryngology – Head and Neck Surgery and, by courtesy, of Dermatology

IN GREAT HANDS

Chuck Hooper is a 73-year-old business consultant and trainer.

"When I was diagnosed with throat cancer, the 'cancer' part did not worry me as much as how it might impact my schedule and my voice," he says. "My local doctor said I was a candidate for robotic surgery and referred me to Stanford."

"Their first questions were about me, my needs, and my goals. When we got to discussing the cancer, I knew I was in great hands. They answered my questions and were able to keep me confident I would be OK after this blip in my schedule."

Initially, Chuck was told to expect 8 to 10 days in the hospital after surgery. But he was out in three-and-a-half days. Twelve days later he presented a 50-minute keynote speech.

"Dr. Holsinger and team are magicians! I wanted to give them a special thank you.

"When I learned the robotic training program needed funds, I became a donor. Not just as a 'thank you,' but because their teaching and research program is making the world a better place.

"Please consider joining me in giving to this program. You, too, can help make the world a better place!"

Chuck Hooper with his newest grandchild

JOIN US

We invite you to learn more about our ambitious vision for precise, tailored treatments for head and neck cancer and to join us in our quest to achieve better survival with fewer side effects while minimizing the impact on quality of life.

Reaching our goals will only be possible through partnerships with visionary donors. We invite you to join other like-minded philanthropists by making an investment in the next generation of cancer surgery research.

OPPORTUNITIES TO INVEST IN HEAD AND NECK CANCER RESEARCH

Seed Grant Funds | These internal grant funds fuel pilot projects that can prove our innovative approaches. Gifts for seed grants can be leveraged to garner long-term federal grant support.

Technology and Laboratory Funds | Access to the highest quality equipment expedites our research and enables our scientists to pursue the most creative experiments.

Faculty Support | Endowed or expendable gifts to individual faculty labs allow scientists to focus their time on high-risk, high-reward research—rather than grant writing.

Trainee Support | These funds provide specialized multiyear training in the field of cancer research, creating the next generation of world-class scientists.

CONTACT US

For further information about making a gift, please contact:

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