



FOSTERING INTERDISCIPLINARY, PATIENT-CENTERED CARE

INCORPORATING THE LATEST TECHNOLOGY, RESEARCH, AND INTEGRATED CARE, THE DEPT. OF ORAL & MAXILLOFACIAL SURGERY IS MAKING PATIENTS WHOLE AGAIN

ORAL AND MAXILLOFACIAL surgeons, by the very nature of their specialty, often work with colleagues across many disciplines to achieve optimal outcomes for patients. Think about it – a patient being treated for a tumor in her jaw might require a team that includes radiation and medical oncologists, pathologists, oral medicine specialists, prosthodontists, endodontists, speech therapists, dietitians and social workers, just to name some of those who may be involved in this patient’s care.

The importance of this interdisciplinary, collaborative approach is evident in the Department of Oral & Maxillofacial Surgery/Pharmacology at Penn Dental Medicine, where many faculty members have both dental and medical degrees and hold joint appointments at Penn Dental Medicine and Penn Medicine to further facilitate a high

level of interaction with other specialists. In fact, this year marks a milestone exemplary of these interprofessional ties: the 25th year of establishing a Department of Oral & Maxillofacial Surgery at the Hospital of the University of Pennsylvania (HUP) (see sidebar, p. 19).

Now, under the leadership of Chair Dr. Anh Le, Norman Vine Endowed Professor of Oral Rehabilitation, the School’s Department of Oral & Maxillofacial/Pharmacology is carrying out an ambitious plan to incorporate the latest research, technology, and integrated initiatives in academics, research, and clinical care, Dr. Le says, “expanding each component to elevate and grow the department and to provide a world-class clinical experience to our patients at Penn.”

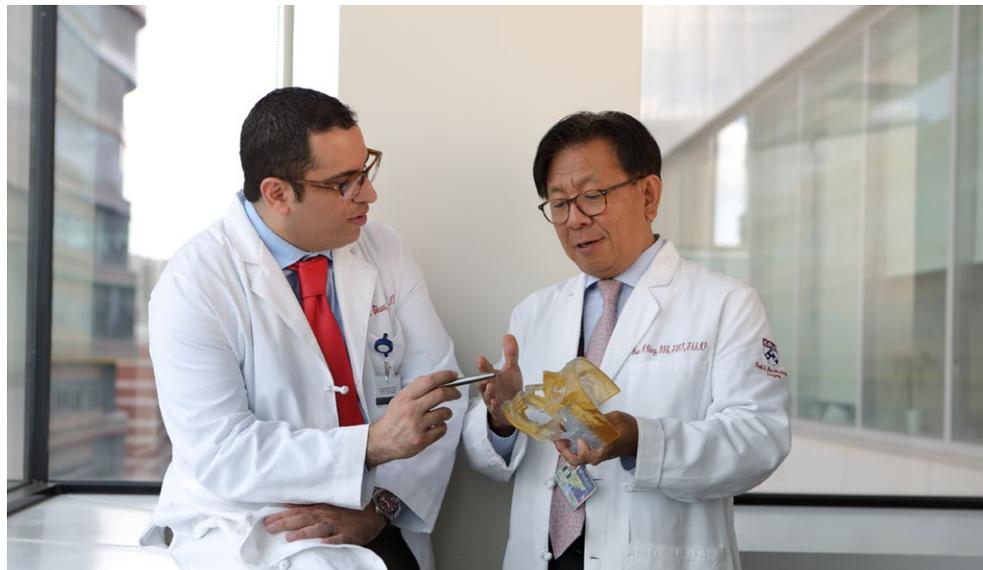
On the clinical side, one major way Dr. Le is fostering this approach is through the development of “centers” or clusters of patient

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ABOVE: Pre-operative and post-operative 3D-stereolithographic models of a patient with a benign tumor of the right mandible. Faculty of the Department of Oral & Maxillofacial Surgery/Pharmacology use such models for patient education in advance of a surgery, as well as for pre-surgical treatment planning and as an adjunct during surgery to aid in decision-making.

care in specialized areas. She explains that the goal is to provide safer, more precise, personalized therapies that will result in faster function recovery, improved esthetics and health, and overall, a better quality of life. In the last few years, Dr. Le has established three such centers: one focused on temporomandibular joint disorders, headed by Dr. Eric Granquist, Assistant Professor of Oral & Maxillofacial Surgery/Pharmacology; another on orthognathic and corrective surgery, led by Dr. Lee Carrasco, Clinical Associate Professor of Oral Maxillofacial Surgery/Pharmacology; and a third center addressing trauma and reconstructive surgery, headed by Dr. Neeraj Panchal and Dr. Steven Wang, both Instructors of Oral & Maxillofacial Surgery/Pharmacology.

Now, the newest center for patient care is targeting oral and dental rehabilitation for head and neck cancer patients, anchored by the expertise of the department's newest members — oral maxillofacial surgeon Dr. Rabie Shanti, who specializes in tumor resection and reconstruction, and maxillofacial prosthodontist Dr. Brian Chang, whose work includes restoring missing teeth, facial tissue, and eye sockets for patients impacted by these cancers.

This new center, Dr. Le says, “will provide comprehensive patient care with a multidisciplinary, highly experienced team of dentists and surgeons to work on preservation, maintenance, and restoration of oral health for tumor resection.”



INNOVATIVE TECHNOLOGY TO AID SURGICAL PRECISION

These clinical efforts are further supported by a departmental focus on utilizing the most advanced technology available, including state-of-the-art 3D printing and digital scanning and incorporating digital tools to exactly plan and carry out these complex surgical procedures with the greatest degree of precision and efficiency. In collaboration with several Penn Medicine departments, Dr. Le notes that they hope to bring 3D printing and digital scanning capabilities on site in 2018; presently, while these technologies are used in patient care within the department, the 3D printing and scanning are contracted with an external lab.

By using virtual surgery planning, Dr. Shanti says, “I can get on a computer with images of the patient, design the surgery, simulate it, and identify where I’m going to make the cuts, how the tumor is going to come out, and how I’m going to rebuild the jaw.” This technology allows for the fabrication of customized materials — cutting guides and plates specific to each patient. “It not only helps increase the precision and accuracy of the surgery,” he says, “but it also minimizes the time we spend in the operating room.”

One recent patient was a 59-year-old with an ameloblastoma that involved three quarters of her upper jaw and her entire hard palate, as well as the sinuses and inner nose. “Removing large tumors of the maxilla and palate requires consideration of the nose, eye socket, sinuses, and the skull base,” Dr. Shanti says. “Therefore, this technology allows me to consider every millimeter of the surgery in preparing for where I am going to make my bony cuts in order to remove the tumor safely and without compromising clearance of the tumor.”

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ABOVE: Dr. Rabie Shanti (left) and Dr. Brian Chang (right) are leading the Department’s oral and dental rehabilitation center for head and neck cancer patients.

LEFT: Dr. Lee Carrasco, GD’02, (left) heads the Department’s patient care centered on orthognathic and corrective surgery, with Dr. Eric Granquist, M’07, GD’10, RES’10, (right) focuses on temporomandibular joint disorders.



INTERDISCIPLINARY CARE

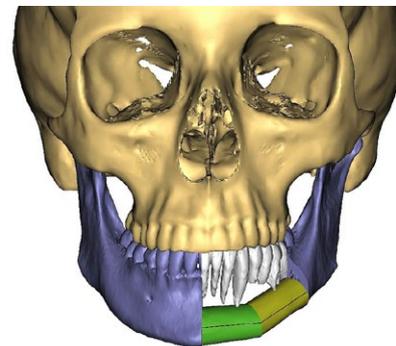
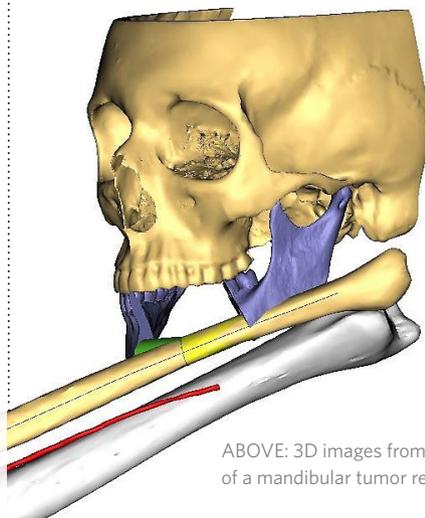
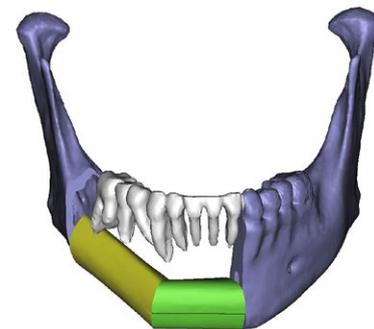
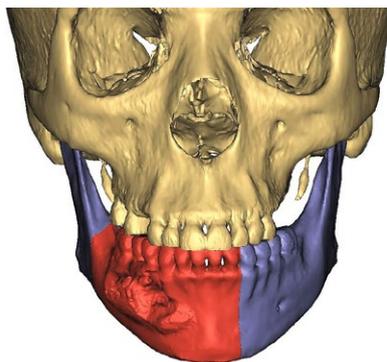
During the same operation, the patient had her upper jaw defect reconstructed with bone, muscle, and skin tissue from her forearm. Within a week, she had left the hospital, was eating fairly normally, and moving toward having a denture fabricated with the long-term goal of having dental implants.

Although relatively rare — only one case in two million people — ameloblastomas are the most common benign tumors of the jaw and Dr. Shanti sees a significant number of cases. “We know very little about this tumor,” he says.

Thus, developing better options to treat the destruction caused by these benign tumors, which don’t respond to chemotherapy and often require major surgery to remove and rebuild the jaw, is of particular interest to him. And in the Oral and Maxillofacial Surgery lab, Dr. Shanti is working to better understand what drives ameloblastomas. His long-term goal is to develop non-surgical treatment options and to design new structures through tissue engineering that will more effectively replace the tissues his patients lose during surgery, whether due to tumors, trauma, or other medical conditions. He’s aiming to find a better option — for instance, by helping patients regrow their own tissue rather than harvesting part of a patient’s own body for reconstruction.

“[This technology] not only helps increase the precision and accuracy of the surgery, but it also minimizes the time we spend in the operating room.”

— DR. RABIE SHANTI



ABOVE: 3D images from virtual surgical planning (VSP) sessions, showing the planning of a mandibular tumor resection while also incorporating fibula free flap reconstruction.

“I think we’re on the cusp with tissue engineering and using engineered stem cell-based constructs to reconstruct tissues of the head and neck,” he says. “I think that’s going to be a really significant advancement in reconstructive surgery that I hope to be a part of.”

Dr. Shanti, assistant professor at both Penn Dental Medicine and the Department of Otorhinolaryngology/Head and Neck Surgery at Penn Medicine, has brought deep interdisciplinary expertise to Penn. He attended dental school at Harvard University, spending two years as a Howard Hughes Medical Institute research scholar working in an orthopedics laboratory at the NIH’s National Institute for Arthritis and Musculoskeletal and Skin Diseases, where he focused on tissue engineering and designing new materials to regrow muscle and bone.

He then pursued his MD and residency in oral and maxillofacial surgery at Rutgers University, followed by a two-year fellowship at Louisiana State University, where he gained considerable experience in microvascular reconstruction surgery — taking tissues and blood vessels from one part of the body and connecting them as living tissue in another part of the body. The opportunity to work in a comprehensive and collaborative clinical and research environment that is patient-focused brought him to Penn in 2016.

“There is no area of medicine as multidisciplinary as caring for a patient with oral cancer,” Dr. Shanti says. “In one patient, 15 specialists can be involved, and we go over each case together,” he notes. “For a patient with oral cancer, the diagnosis is already overwhelming, and we provide a patient-centered rather than practitioner-centered approach.”

PROVIDING PROSTHETIC RECONSTRUCTION FOR PATIENTS

Co-leading this new center is Dr. Chang, associate professor and Director of Maxillofacial Prosthodontics, who has joint appointments in both the Dept. of Oral & Maxillofacial Surgery/Pharmacology and Dept. of Preventive and Restorative Sciences at Penn Dental Medicine. He also holds an appointment at Penn Medicine.

Since coming to Penn earlier this year, Dr. Chang has been teaching in Penn Dental Medicine's new residency program in prosthodontics and sees patients at the Clinical Practice of the University of Pennsylvania Dept. of Oral & Maxillofacial Surgery at HUP.

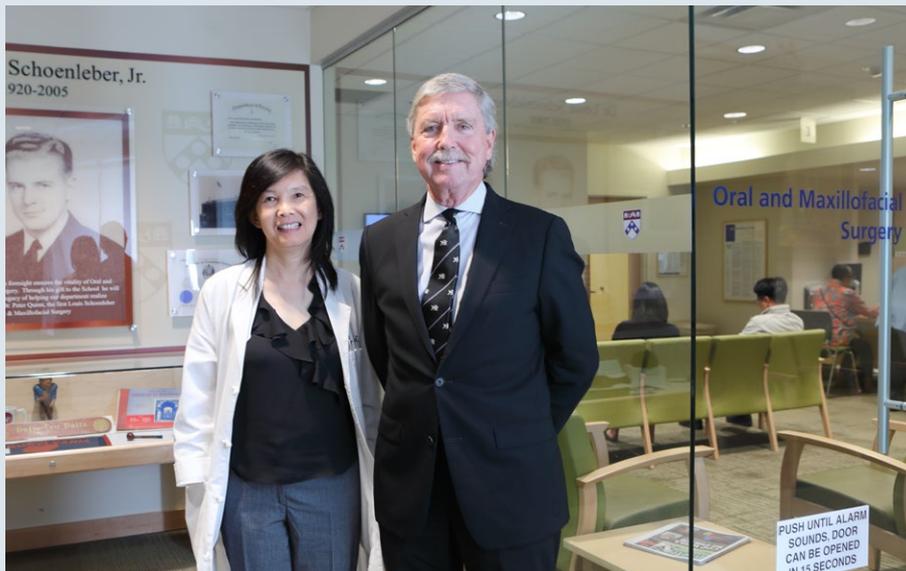
Spanning these roles, his responsibilities include the care of medically compromised patients who need prosthetic reconstruction due to disease or trauma, organization of the maxillofacial prosthodontic clinic, resident education, and research. He also consults as part of the head and neck cancer team and works with colleagues across a variety of medical and dental specialties.

Prior to joining Penn, Dr. Chang was head of the Section of Maxillofacial Prosthodontics at the Cleveland Clinic and director of predoctoral prosthodontics at Harvard's School of Dental Medicine. He did a residency in prosthodontics at Northwestern University and a fellowship in maxillofacial prosthodontics at Columbia University.

His research interests include the clinical outcomes of dental implants for head and neck cancer patients and the application of novel 3D technologies for surgical and prosthetic reconstruction for patients with head or neck cancer or craniofacial anomalies. He also has a particular interest in curriculum development.

"Research of head and neck cancer and craniofacial anomalies has been rapidly growing through the interactions between clinician-oncologists, basic scientists, speech and language pathologists and engineers," Dr. Chang says. "I have also been working on outcome assessments of quality of life and physiologic functions, such as speech, deglutition, and swallowing, for patients with head and neck cancer or craniofacial anomalies."

25 Years within HUP



THIS YEAR MARKS a milestone exemplary of the interprofessional ties of the School's Department of Oral & Maxillofacial Surgery/Pharmacology — the 25th anniversary of establishing a Department of Oral and Maxillofacial Surgery at the Hospital of the University of Pennsylvania (HUP).

In 1992, Dr. Peter Quinn, then Chair of Penn Dental Medicine's Department of Oral and Maxillofacial Surgery/Pharmacology, was also named Chair of the newly created Department of Oral and Maxillofacial Surgery and Hospital Dentistry at HUP. This independent departmental status facilitated the growth and integration of the oral and maxillofacial surgery and oral medicine faculty across Penn Medicine.

It paved the way for an "ambitious renovation and expansion of the program," Dr. Quinn says, further shoring its reputation as a "premier program for education, research, and patient care." Dr. Quinn, who remained Chair of the department until 2008, is presently Schoenleber Professor of Oral & Maxillofacial Surgery/Pharmacology; Vice Dean for Professional Services, Perelman School of Medicine; and Senior Vice President for the University of Pennsylvania Health System.

Growth was evident with the number of full-time Department faculty increasing from four in 1994 to 15 today. The Department at HUP was located within the hospital's White Building until 2012, when it moved to its current home within the Perelman Center for Advanced Medicine.

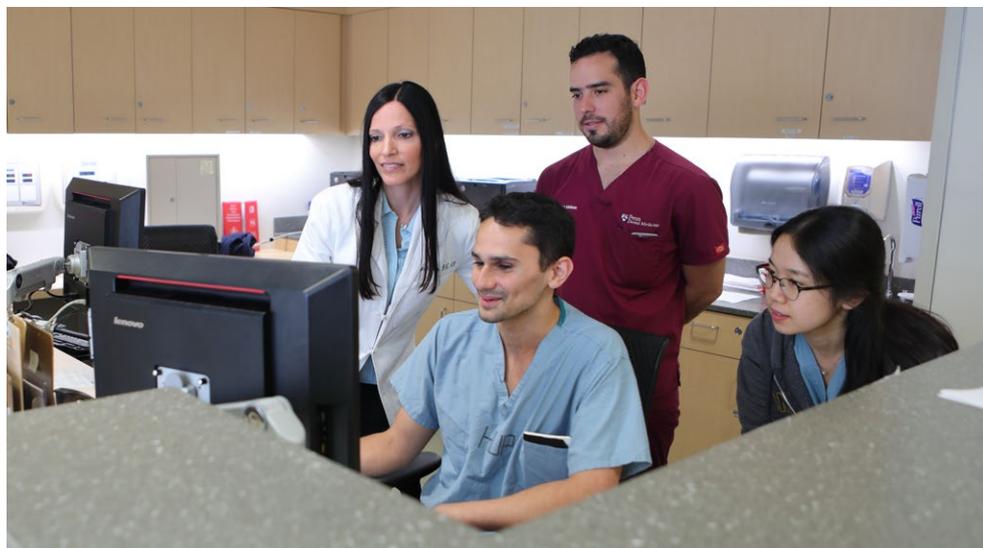
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ABOVE: Dr. Anh Le, Chair, Dept. of Oral & Maxillofacial Surgery/Pharmacology, with Dr. Peter Quinn, Schoenleber Professor, who was Chair when an Oral & Maxillofacial Surgery Department was first established at HUP 25 years ago.

Establishing the department at HUP reflected a general trend of addressing more complex medical cases in a hospital setting, facilitating collaboration with other specialists. "We are a very interprofessional group," Dr. Quinn says of oral surgeons. "Most of us have medical and dental degrees; we straddle two professions and have always had a presence in both the dental school and hospital."

A highlight during this time was Dr. Quinn's work on the Zimmer-Biomet Temporomandibular Joint (TMJ) Replacement System, which received FDA clearance in 2005 and is still the only FDA-approved stock prosthesis in the U.S. "It took six years to develop, followed by a 10-year clinical trial," he says. "You need to be in a place like Penn, that can draw enough patients to power the study and has the research infrastructure" to bring about such advances.

Now, with the help of computer-guided surgery and 3D-printing technology Dr. Quinn expects more opportunity to create custom TMJ prostheses for patients.

But, he predicts that future advances in the field are likely to come from the innovative research being done in the Department today under the leadership of the current Chair, Dr. Anh Le. "There has been an explosion both in basic science and on the translational side in the last 25 years," Dr. Quinn says. Rather than looking at ways to make better prostheses, he says, leading-edge research is focused on engineering a patient's own tissue to genetically replace what they lose. "That's the next frontier," he says.



NEW RESEARCH-FOCUSED RESIDENCY OPTION

In addition to establishing these clinical centers of expertise, the department also recently received approval to expand the department’s residency program, directed by Dr. Helen Giannakopoulos, Associate Professor (above, left). There are currently three residents per year in the six-year, dual-degree Oral and Maxillofacial Surgery/MD program, who receive a medical degree from Penn Medicine, a two-year certificate in general surgery and certificate in oral and maxillofacial surgery. Starting next year, a fourth resident will be added along with the option for residents to additionally pursue a Doctor of Science degree, taking about two years longer to complete this research-focused degree. The intention Dr. Le says, “is to teach future generations of surgeons who can integrate more evidence-based, innovative scientific findings into their practice.”

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— DR. ANH LE

In the realm of research, among the areas of particular focus within the department is regenerative medicine. Since coming to Penn Dental Medicine in 2012 from the University of Southern California’s Ostrow School of Dentistry, Dr. Le has continued her research on mesenchymal stem cells from adult oral gingival tissues (also known as GMSC), and how they might aid in wound healing and regenerating of lost tissues from either trauma or pathologies. She is also studying their potential for use in nerve and tissue regeneration, which could help, for instance, a patient who has had partial tongue removal due to cancer or injury.

“The Oral and Maxillofacial Surgery lab is focused on translational/clinical research in regenerative medicine of the orofacial structure. An active project is to develop a neural construct using GMSCs, looking at nerve regeneration, nerve injury pathology, trauma, and tumor resection,” says Dr. Le. Although she says clinical human trials are at least a decade away, this research holds promise for head and neck cancer patients in need of reconstructive surgery following tumor resection with resulting nerve injury.

These promising areas of research, along with new initiatives in education and clinical care, are all intended to support the department’s overarching goal, Dr. Le says, of providing a “comprehensive and integrated approach to delivering the highest quality and personalized care to patients.” ■

— By Debbie Goldberg

Department Faculty

Chairman

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Brian Ford, DMD, MD, *Instructor*

Helen Giannakopoulos, DDS, MD, *Associate Professor; Director, Postdoctoral Oral & Maxillofacial Surgery Residency Program*

Eric J. Granquist, DMD, MD, *Assistant Professor*

Barry H. Hendler, DDS, MD, *Associate Professor*

Elliot V. Hersh, DMD, MS, PhD, *Professor*

Neeraj Panchal, DDS, MD, MA, *Instructor*

Peter D. Quinn, DMD, MD, *Schoenleber Professor; Vice Dean for Professional Services, Perelman School of Medicine; Senior Vice President for CPUP, University of Pennsylvania Health System*

Rabie Shanti, DMD, MD, *Assistant Professor*

David C. Stanton, DMD, MD, FACS, *Associate Professor*

Steven Wang, DMD, MD, MPH, *Instructor*

Part-Time Faculty

Alexandre Balaci, DMD, *Clinical Associate*

Sung-Kiang Chuang, DMD, MD, DMSc, *Clinical Professor*

Bruce J. Cutilli, DMD, MD, *Clinical Assistant Professor*

Douglas Ditty, DMD, MD, *Clinical Assistant Professor*

Brad Hersh, DMD, *Clinical Associate*

Anna Kornbrot, DMD, *Clinical Assistant Professor*

Dominic Poyle Lu, DDS, *Clinical Professor*

John W. Mooney, DDS, *Clinical Associate Professor*

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