In this issue of PROfiles we highlight our multidisciplinary MD Anderson Skull Base Tumor Program. With the approach to the surgical treatment of head and neck tumors moving from large open access, open field surgery to minimal access surgery, it has been the vision of the Department of Head and Neck Surgery at The University of Texas MD Anderson Cancer Center to develop a cutting-edge program that provides advanced, yet safe, minimal access surgery for patients with tumors of the skull base.

In order to build a program that encompasses the new approaches of this advanced and complex surgery it was fundamental to create a foundation built on skill, expertise and innovative technology. Development of a comprehensive multidisciplinary skull base program was accomplished by recruiting a neurosurgeon, Shaan Raza, MD adept at both open and endoscopic surgery, partnership with well-trained and experienced head and neck endoscopic surgeons who are well versed in the oncologic principles of cancer management, and incorporating advanced technology in image guidance capabilities.

The result is our state of the art Skull Base Tumor Program codirected by Ehab Y. Hanna, MD, FACS, an internationally recognized skull base surgeon in both open techniques and minimal access approaches and Franco DeMonte, MD, FACS, professor of neurosurgery at MD Anderson. Dr. Hanna is supported by a skilled team of endoscopic surgeons including, Michael E. Kupferman, MD FACS, who specializes in both open and endoscopic approaches to tumors of the skull base, with a focus in minimally invasive techniques, Shirley Y. Su, MD, FRACS, from the Royal Australasian College of Surgeons, who completed our Head and Neck Surgery Fellowship and obtained additional training in the newest techniques in endoscopic skull base surgery at the University of Pittsburgh and Paul Gidley, MD, FACS, who specializes in hearing loss, lateral skull base tumors, temporal bone cancers and acoustic neuromas.

In parallel with our clinical expertise, the MD Anderson Proton Therapy Center—with the introduction of intensity modulated proton therapy (IMPT)—provides some significant treatment advantages over
conventional proton beam therapy, especially for treating skull base tumors. The skull base region is one of the ideal sites for IMPT because it delivers a precise dose of radiation to the tumor, thereby avoiding excessive dose to vital structures such as the optic nerve, the carotid artery, and the brain.

The components are fully integrated to make it possible for us to provide the safest, most progressive treatment for our patients with tumors of the skull base. The goal, of course, is to achieve the best possibility of cure, minimize the likelihood of significant complications and hopefully return the patients to their activities of life and daily living.

Recent recruitments
We have successfully recruited several new faculty who bring expertise in transoral robotic surgery, skull base surgery, oral oncology, ophthalmology and research.

Neil Gross, MD, joined the faculty as associate professor. He has significant experience in head and neck ablative surgery, endocrine surgery of the head and neck, and trans-oral surgery of the larynx and oropharynx via a robotic approach.

Shirley Y. Su, MBBS, FRACS, was appointed assistant professor. She has formal training in oncological surgery as well as open and expanded endoscopic skull base procedures. She is involved in building a head and neck tertiary referral practice at our MD Anderson Clear Lake Regional Care Center and participates in oversight of our Survivorship Program at the main campus.

Alex Won, DDS, was appointed assistant professor in the Section of Oral Oncology and Maxillofacial Prosthodontics. He was accepted in the Oral Oncology and Maxillofacial Prosthodontics Fellowship Program at MD Anderson in 2014, spending his year in clinical instruction. His research is focused on the area of oral outcomes and performance measures.

Cynthia Tung, MD, was appointed assistant professor, in the Section of Ophthalmology. She is an outstanding clinician with a long-standing interest in dry eye and ocular surface disease. She received her undergraduate degree in Biological Sciences at Cornell University in Ithaca, New York and her medical degree at the University of Rochester School of Medicine. Her research is directed toward objectively quantifying the tear film dimensions in patients with chronic and acute graft vs. host disease.

Curtis Pickering, PhD, was appointed assistant professor, serving as a full-time laboratory researcher. He came to MD Anderson as the first fellow in a new post-doctoral fellowship training program, the TRIUMPH Program in Translational Research, where he helped lead an ambitious head and neck cancer genomics project. His expertise in translational genomics makes him a critical part of the Department of Head and Neck Surgery as we move into the era of cancer genomics and personalized medicine.

Accomplishments and upcoming events
We are hosting the second bi-annual “Value Based Head and Neck Cancer Care Symposium” in November 2016. In conjunction with the symposium, the department will host Current Concepts in Head and Neck Surgery, in partnership with the University of Toronto and Memorial Sloan-Kettering Cancer Center.
Nine fellows are participating in the multiple fellowship opportunities offered by the Department of Head and Neck Surgery for the 2015-2016 academic year. The fellowships provide advanced training in both clinical practice and translational and basic science research, preparing participants to meet challenges and opportunities alike in the years to come.

The Advanced Head and Neck Surgical Oncology Fellowship one-year clinical tract has two new fellows, Harold Heah, MBBS and Vlad Sandulache, MD, PhD. Both Drs. Heah and Sandulache will be spending this strictly clinical year in Head and Neck Surgery. Dr. Heah is also a fellow candidate from Singapore whom we are excited to have joining us outside of the AHNS match.

We currently have two fellows, Sun “Jamie” Ahn, MD and Steven B. Chinn, MD, in the Advanced Head and Neck Surgical Oncology and Reconstruction Fellowship, which is offered jointly by the Departments of Head and Neck Surgery and Plastic Surgery. Dr. Ahn is beginning her first year in Head and Neck Surgery while Dr. Chinn will be spending his second year of the program with the Department of Plastic Surgery.

Ryan Goepfert, MD and Natalie Silver, MD are both in the two-year combined research and clinical HNS tract of the Advanced Head and Neck Surgical Oncology Fellowship. Dr. Goepfert will dedicate this entire first year to clinical research with Katherine Hutcheson, PhD. Dr. Silver is beginning the second half of her fellowship with a clinical year in Head and Neck Surgery.

Participating in the Maxillofacial Prosthetics and Oncologic Dentistry Fellowship are Alicia Estrella, DMD; Byung Joo Lee, DDS and Angela Wong, DMD.
Blazing the Trail through No-Man’s Land
MD Anderson’s Skull Base Tumor Program

By Joanne Salt

Deep within the skull between the base of the brain and the upper neck lies the skull base, an area once considered inaccessible to surgeons. Benign and malignant tumors found in this “no-man’s land”, as it was commonly called, were considered unreachable with little hope for a cure. Since the advent of the first Skull Base Society in 1990, formed by collaboration between head and neck surgeons and neurosurgeons, great strides in this relatively new surgical specialty have been made. The result has been a remarkable change in outcomes – 60 years ago the five-year survival rate for skull base cancer patients was less than 30% – today a remarkable 70% of patients are surviving five years or more.

Disease that invades this complex area of the skull has the potential to threaten such critical functions as cognitive ability, seeing, hearing, breathing, swallowing and speaking, and demands a far-reaching treatment approach. The University of Texas MD Anderson Cancer Center has answered this demand with its multidisciplinary Skull Base Tumor Program. The program, which has tripled in size over the last decade, is a pioneer in the field of skull base surgery offering expert surgical techniques, tailor-made treatment options, state of the art technology, and unparalleled research.

Multidisciplinary team

At the core of the MD Anderson Skull Base Tumor Program is the multidisciplinary team of head and neck surgeons, neurosurgeons, neuro-otologists, plastic surgeons, radiation oncologists, medical oncologists, pathologists, diagnostic radiologists and rehabilitation specialists. This multidimensional group of specialists works in tandem to provide the best possible outcomes for patients who are diagnosed with the rare and complex tumors of the skull base.

“We want people to be able to function normally after this surgery – speak normally, hear normally, see normally, eat normally – this is vital. In order to accomplish this our team of surgeons, including neurosurgeons, reconstructive vascular plastic surgeons and neuro-otologists, work meticulously to ensure the optimal functional outcome is met so that the quality of life for our patients is not comprised,” said Dr. Ehab Y Hanna, MD, FACS, program co-director.

“These are very important aspects of our program.”

Comprehensive treatment options

There are many different types of tumors that occur in the skull base region including chordomas (cancerous bone tumors at the base of the skull), meningiomas (aggressive tumors that originate in the lining of the brain and are usually benign) and acoustic neuromas (noncancerous tumors that develop on the nerve that connects the inner ear with the brain). More commonly, tumors extend to the skull base from nearby sites such as the nasal cavity, sinuses, orbit, or salivary glands.

Due to the complexity of these tumors and the areas affected within the skull base, it is extremely important that treatment options are specifically tailored to the individual.

“Individualizing care can only happen if you have the full menu of options available to you. The old saying is that if you only have a hammer in your hand then everything looks like a nail,” said Hanna. “We use a multitude of approaches in dealing with tumors of the skull base including open and endoscopic surgery, intensity modulated proton therapy (IMPT), stereotactic radiation and other non-surgical techniques. Because of the comprehensive menu of treatment options available to us, we can pick and choose the treatment for each individual patient. It is not just which treatments they receive, but how they are sequenced that is so important. “

Endoscopic, or minimally invasive, surgical techniques to remove cancerous and benign tumors of the skull base have increased over the last decade. The tumor is accessed through the nasal cavity, minimizing the trauma associated with the open approach and providing surgeons the ability to perform complex procedures with fewer complications, decreased rehabilitation and lower morbidity.

MD Anderson is leading the way in this arena having reported the largest number of malignant skull base tumors treated with the minimally invasive approach to date in North America.

“One advantage of the endoscopic treatment of skull base tumors is that we are able to reach a lot of hard to reach areas through the nose. This means that patients can have biopsies of suspicious lesions much more easily, giving us an opportunity to operate on a higher amount of benign tumors, thus decreasing the morbidity,” said Shirley Y. Su, MD, FRACS, assistant professor of head and neck surgery.

While there are definitive advantages to using minimally invasive techniques
to treat skull base tumors, it is not a one-size-fits-all surgical solution.

“Minimal access surgery is definitely an option for some patients, however it might not always be the answer for all, due to the size or location of the tumor,” said Hanna. “While we are always trying to minimize the intensity, toxicity and side effects of treatment, we cannot compromise the cure rates, the cure possibilities or the potential for cure. For some patients the decision to go with an open approach is the best approach for them.”

Targeted technology

Another important aspect of the program is the medical and radiation oncology components that offer highly innovative drug therapy and targeted radiation to treat skull base tumors. One element of this arsenal is intensity modulated proton therapy (IMPT), a targeted radiation treatment that delivers precise, conformal radiation to the tumor. This requires adequately dosing the tumor, while simultaneously sparing the surrounding healthy tissue – a feat that requires specialty training and skill.

“The area of the skull base has a lot of high-stakes real estate including the brain, the optic nerve and the cranial nerves,” said Hanna. “Radiation damage to these areas causes cognitive problems, blindness, and brain problems. It is important to target the radiation. This target, or sweet spot, is accessed by accurate planning and advanced technology, but most importantly it is targeted by the expert – it is not the IMPT machine, it is the man or the woman behind the machine. Our experts specialize in head and neck tumors, they know the anatomy, they know what to avoid, and they know what and how much to dose. That is what sets us apart.”

Research

The basic and translational research component of the program is focused on reaching a better understanding of the biology of these tumors through continued genomic research. By integrating technology through the use of robotics, precise radiation and new active drugs in a multidisciplinary fashion MD Anderson aims to improve the outcome, minimize the morbidity and tailor the treatment for skull base tumors based on genomic characteristics.

Great strides have been made in this area including the isolation of the first-ever cell line of Sinonasal Undifferentiated Carcinoma (SNUC), one of the most deadly types of skull base tumors. This discovery has unlocked the future study of SNUC in the laboratory and in animal models.

MD Anderson researchers have also designed the first-ever mouse model of skull base tumors which has opened the door to studying skull base tumors in vivo to explore new treatment options.

The MD Anderson Skull Base Tumor Program is a comprehensive, multidisciplinary program dedicated to the treatment of all skull base tumors, from the benign to the malignant, dwelling in the anterior, middle and posterior of the skull base in both pediatric and adult patients via open, endoscopic surgical and non-surgical approaches. It has tripled in faculty as well as in number of procedures performed over the last 7 years, with 200 skull base cases a year in 2007 to over 700 in 2014, with 30% of those done via minimal access. Six surgeons make up the surgical team dedicated to skull base tumors – program co-directors, Ehab Y Hanna, MD, FACS, and Franco DeMonte, MD, FACS; and faculty consisting of Paul Gidley, MD, FACS, Michael E. Kupferman, MD, FACS, Shaan Raza, MD, and Shirley Y. Su, MD, FRACS.
Yunyun Chen, PhD, joined our faculty in November 2013 as an instructor. Dr. Chen’s expertise is in the areas of cell biology, molecular biology, pharmacology and animal model techniques.

Dr. Chen received her doctoral degree from the Tsinghua University Department of Biological Sciences and Biotechnology in Beijing, China, in 2007. She served as a postdoctoral fellow in the Department of Neurology at University of Texas Medical Branch and then transferred to MD Anderson as a postdoctoral fellow in the Department of Neurosurgery, transferring to the Department of Head and Neck Surgery in 2009. Dr. Chen has been critical in the establishment of both an oral tongue and thyroid orthotopic xenograft mouse model as preclinical platforms for assessment of targeted therapeutic agents. She has continued to evaluate other targeted therapy agents, including a microRNA that specifically targets EGFR, AKT1 and mTOR in head and neck squamous cell carcinoma.

Shirley Y. Su, MBBS, FRACS joined our faculty in October 2013 as an assistant professor. Dr. Su was awarded her medical degree from Monash University, Melbourne, Victoria, Australia. She received her residency training and board certification in otolaryngology from the Royal Australasian College of Surgeons. She completed a clinical fellowship in head and neck oncological surgery at MD Anderson followed by an additional one year fellowship in open and minimally invasive endoscopic skull base surgery at the University of Pittsburgh Medical Center, a leader and pioneer in this field.

Dr. Su has formal training in oncologic surgery as well as open and expanded endoscopic skull base procedures. Dr. Su is a member of the American Head and Neck Society and the North American Skull Base Society. She has received several awards during her career and authored multiple peer-reviewed publications. She is dedicated to providing the highest quality care to patients with head and neck tumors and skull base disorders. Her research interests include minimally invasive surgery, cancers of the nose, sinuses and cranial base.

Dr. Su is involved in building a head and neck tertiary referral practice at our MD Anderson Clear Lake Regional Care Center and participates in oversight of our Survivorship Program at the main campus.

Yoko Takahashi, PhD, research instructor, joined our faculty in February 2014. Dr. Takahashi served as a senior research assistant in the Department of Head and Neck Surgery, focusing on basic and translational research for understanding and characterizing the molecular characteristics of sinonasal and skull base cancers. Dr. Takahashi established the first-ever cell line for a patient with sinonasal undifferentiated carcinoma. This novel cell line allowed our laboratory to characterize molecular markers and biological behaviors of this very aggressive tumor. This undoubtedly will open much needed and anticipated translational research for these deadly tumors that until now could not be studied in the laboratory. This is a significant milestone which has been recognized worldwide.

Dr. Ruth Aponte-Wesson, DDS, MS, joined our faculty in February 2014 as associate professor in the Section of Oral Oncology and Maxillofacial Prosthodontics. Dr. Aponte-Wesson obtained her undergraduate degree from La Presentación, Mérida, Venezuela, where she graduated with a Bachelor of Science in Biological Sciences. She graduated from the Universito of Los Andes Mérida, Venezuela, where she earned a Doctórate of Dental Sugerí. She received her postgraduate training in advanced prostodontics at the University of Alabama (UAB) School of Dentistry, where she subsequently completed her maxillofacial prosthodontics training and obtained her Master of Science in Maxillofacial Biotechnology. She served as the director of the Maxillofacial Prosthetics Program at UAB from 2010 to 2013 and is board certified by the American Board of Prosthodontics.

Dr. Aponte Wesson has extensive interest in the promotion of the oral oncology specialty and maxillofacial engineering through the advancement of academic and clinical excellence in patient care, education, and evidence-based medicine.

Curtis Pickering, PhD, joined the department in April 2014 as an assistant professor, serving as a full-time laboratory researcher.

He completed his graduate school training at the University of California at San Francisco. He came to MD Anderson as the first fellow in a new post-doctoral fellowship training program, the TRIUMPH Program in Translational Research, where he helped lead an ambitious head and
neck cancer genomics project. His expertise in translational genomics makes him a critical member of the Department of Head and Neck Surgery Basic and Translational Research Program as we move into the era of cancer genomics and personalized medicine.

Nikhil Chari, PhD, joined our faculty in April 2014 as an instructor. He brings his expertise in the molecular biology of cancer, specifically in the area of epithelial biology, to our Head and Neck Cancer Pre-clinical Research Program.

Dr. Chari obtained his doctoral degree from The University of Texas Health Science Center at Houston and MD Anderson, Graduate School of Biomedical Sciences.

He is conducting research on the role of microRNA regulation in head and neck squamous cell carcinomas (HNSCC). His expertise is in signal transduction, transcriptional regulatory systems and tumor biology. His research identified novel interactions between the hedgehog family and the TP63/TP53 network that have potential roles in cancer progression.

Kristina R. Dahlstrom, PhD, joined our faculty in June 2014 as an instructor to support the MD Anderson Oropharynx Program, funded through the $10 million gift from Charles and Daneen Stiefel to the MD Anderson Head and Neck Cancer Program. Dr. Dahlstrom will support Erich M. Sturgis, MD, MPH, Oropharynx Program director and leader of the program’s Public Advocacy and Prevention Section.

Dr. Dahlstrom will help to develop a collaborative framework to increase HPV vaccination rates in the Houston metropolitan area and statewide. Additionally, she will have responsibility for demographic and epidemiologic studies of HPV-related oropharyngeal cancer.

Dr. Dahlstrom completed her postdoctoral fellowship at McGill University. She has many years of training and work experience at MD Anderson and The University of Texas School of Public Health. Her interests are to reduce the burden of HPV on society and promote this area of research.

Neil Gross, MD, joined our faculty in September 2014 as an associate professor. Dr. Gross received his undergraduate degree in Biology, with honors, from Washington University in Saint Louis, followed by his medical degree at Oregon Health and Science University (OHSU) in 1998. Following his internship he was a resident in otolaryngology at OHSU. He went on to a fellowship in head and neck surgery and oncology at Memorial Sloan-Kettering Cancer Center from 2003-2005. A portion of his fellowship was devoted to training in research. He is board certified in otolaryngology. In 2006 Dr. Gross was appointed as assistant professor in the Department of Otolaryngology Head and Neck Surgery at OHSU and in 2011 he was promoted to associate professor.

Dr. Gross has significant experience in head and neck ablative surgery, endocrine surgery of the head and neck, and transoral surgery of the larynx and oropharynx via a robotic approach. During his fellowship at Memorial Sloan-Kettering Cancer Center he participated in a number of clinical trials in collaboration with radiation oncology and the division of gastroenterology department of medicine. He conducted an important study on venous thromboembolism incidence and prevention at OHSU which has important implications for preventing this serious complication in surgical patients.

Alexander Won, DDS, joined our faculty in July 2015 as an assistant professor in the Section of Oral Oncology and Maxillofacial Prosthodontics. Dr. Won obtained his degree in dentistry from Meharry Medical College in Nashville, followed by a degree in prosthodontics at the University of California San Francisco. He was accepted in the Oral Oncology and Maxillofacial Prosthodontics Fellowship Program at MD Anderson in 2014, spending his year in clinical instruction.

He was the recipient of the 2009 American College of Prosthodontics Achievement Award and the 2009 Hanau Best of the Best Award for Excellence Prosthodontics. Dr. Won’s research interest is the area of oral outcomes and performance measures.

Cynthia Tung, MD joined our faculty in August 2015 as an assistant professor, in the Section of Ophthalmology. She received her undergraduate degree in Biological Sciences at Cornell University in Ithaca, New York and her medical degree at the University of Rochester School of Medicine. Dr. Tung is an outstanding clinician with a long-standing interest in dry eye and ocular surface disease.

Her research is directed toward defining the characteristics of the tear film and ocular surface in patients with acute and chronic graft versus host disease.


Myers JN, Kies Me; Chemotherapy and Targeted Biologic Agents for Head and Neck Squamous Cell Carcinoma Cummings Otolaryngology; Head & Neck Surgery; Volume/Issue Number 6.

Pickering CR, Ow TJ, Myers, JN; Sequencing HNC Emergence of Notch Signaling; Molecular Determinants of Head and Neck Cancer.

Monroe MM, Myers JN; Targeted Therapy in Head and Neck Squamous Cell Carcinoma; Targeted Therapy in Translational Cancer Research.


Promotions

Carlos Caulin, PhD was promoted to associate professor.

Abdullah Osman, PhD was promoted to assistant professor.

Accolades

The Department of Head and Neck Surgery was ranked by U.S. News & World Report as fifth in the nation out of 738 hospitals for ear, nose & throat. This ranking reflects the strength and excellence of our patient care, educational programs, and research.

Charles and Daneen Stiefel, of Raleigh, N.C., pledged $10 million to the Head and Neck Cancer Center at The University of Texas MD Anderson Cancer Center. In honor of their generosity, the head and neck center is named the Charles and Daneen Stiefel Center for Head and Neck Cancer.

Hats Off

Theresa Hofstede DDS, associate professor of oral oncology, was the recipient of the Young Alumni Award of Distinction from the Schulich School of Medicine and Dentistry Western University, London, Ontario, Canada.

Dan Gombos, MD, professor and chief of Ophthalmology Section, received the Senior Achievement Award from the American Academy of Ophthalmology Society. He has been appointed to the Board of Directors of the American Association of Ocular Oncology and Pathology.

Erich Sturgis, MD, received endowed position: the Christopher and Susan Damico Chair for Viral Associated Malignancies.

Randal Weber, MD, was elected as president of the American Board of Otolaryngology.

Mark Chambers, DMD, MS, was elected president of the American Academy of Maxillofacial Prosthetics.

Mark Zafereo, MD, was elected president of the Houston Society of Otolaryngology — Head and Neck Surgery.

Ehab Hanna, MD, served as the president of the North American Skull Base Society 2013-2014. It is the mission of the NASBS to support, coordinate, and enhance efforts to generate scientific information useful to specialists in the care of diseases of the skull base.

Gary Clayman, MD, was the winner of the 2014 Cattlemen for Cancer Research Hero Award. The Hero Award honors an MD Anderson clinician or researcher for outstanding contributions to the care of patients from Central Texas.

Charlie Schreiner, APN, received the 2014 Excellence in Advance Practice Nursing Award from the MD Anderson Cancer Center.
Faculty and Areas of Interest

Randal S. Weber, MD, Chairman
Skin cancer, salivary gland tumors, thyroid, parathyroid

Ruth Aponte-Wesson, DDS
Oral and facial rehabilitation

Richard C. Cardoso, DDS, MS
Oral morbidities of cancer therapy

Carlos Caulin, PhD
Molecular mechanisms of and genetic alterations in head and neck cancer

Mark S. Chambers, DMD, MS
Xerostomia, osteoradionecrosis, mucositis

Gary L. Clayman, DMD, MD
Thyroid, parathyroid

Mitchell J. Frederick, PhD
Antigenesis, chemotaxis, transcription factors, proteinase inhibitors

Paul W. Gidley, MD
Ear, temporal bone, lateral and posterior skull base

Ann M. Gillenwater, MD
Oral cavity, thyroid, salivary gland, skin

Dan Gombos, MD
Ocular oncology

Neil Gross, MD
Robotic surgery (TORS), oropharynx cancer, skin cancer

Ehab Y. Hanna, MD
Skull base, orbit, thyroid, salivary glands

Amy C. Hessel, MD
Oral cavity, larynx, pharynx, salivary gland, thyroid

Theresa M. Hofstede, DDS
Maxillofacial prosthodontics, implant rehabilitation, radiation-induced xerostomia

Katherine A. Hutcheson, PhD
Swallowing, late effects, survivorship, alaryngeal voice restoration

Michael E. Kupferman, MD
Skull base, thyroid, skin, salivary glands

Stephen Y. Lai, MD, PhD
Salivary gland, larynx, thyroid/parathyroid, oral cavity

Jan S. Lewin, PhD
Voice and swallowing rehabilitation/restoration

Carol M. Lewis, MD, MPH
Skin cancer and melanoma, cancer of the oral cavity, pharynx and larynx, thyroid

Guojun Li, MD, PhD, MSc
Molecular and clinical epidemiology

Jack W. Martin, DDS, MS
Oral rehabilitation/restoration, oral premalignant lesions

Jeffery N. Myers, MD, PhD
Oral cavity, melanoma

Kristen B. Pytynia, MD, MPH
Thyroid, epidemiology

Erich M. Sturgis, MD
Head and neck sarcomas

Shirley Y. Su, MD
Skull base, skin, thyroid, salivary gland

Cynthia Tung, MD
Ocular oncology

Mark Zafereo, MD
Salivary gland tumors, melanoma, thyroid and parathyroid

Ge Zhou, PhD, MS