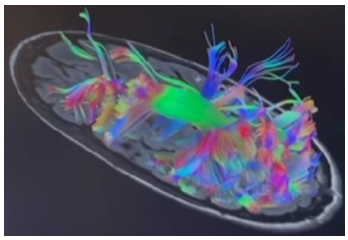
Open the Doors, Shine the Lights

We can now walk through doors that most of us never access as patients. A one-hour tour hosted by Dr. Paul Gardner, Dr. Carl Snyderman, Dr. Eric Wang, and Dr. Georgios Zenonos welcomes us into the offices and laboratories of UPMC professionals who spend their days working on behalf of the UPMC Center for Cranial Base Surgery to improve the care of patients.

People you will meet on the tour include Sameer Agnihotri PhD, molecular genetrics, rare tumor research; Luke Henry PhD, Neurocognitive Research; Benita Valappil, Clinical Research Director; along with several patients, anatomy research fellows, skull base residents, engineering students, and the Center's educational website manager.

What takes place in the labs and offices of the people we are not likely to meet face to face during medical appointments can seem veiled and mysterious. Behind these doors, professionals are shedding light on the mysteries of tumors and tumor behavior. As the team from the Center for Skull Base Surgery continues to refine treatment methods for patients, their aspirations extend well beyond that. They want to travel to the origin—the point at which tumors begin to form, to understand what feeds a tumor to allow it to grow and take hold, with the goal that they could eventually halt or slow tumor proliferation and possibly treat it before there is a need for surgery. These professionals stand at the forefront of transformational medicine that looks at tumors across biology, genetics, neurology, and biomedical engineering. They exemplify the definition of "cutting edge."



But there is a dilemma with "cutting edge" in terms of advancements to transform medicine. Dr. Gardner explains, "The transformation of medicine is dependent upon research. I want to have patients undergo less surgery, apply surgery where necessary, while advancing other treatment options. To do that, we need to study genetics of each individual tumor, go forward with individualized care, not only for a specific tumor, but for each specific patient with that tumor. The NIH awards grants but requires proof of concept before they provide funding. Proof of concept demands evidence through research. Research requires a significant cost. You need money to get money from larger government grants. Donor-funded grants enable us to put in motion research to obtain scientific evidence that then enables us to make research advances that then paves the way for government funding."

Notes Dr. Snyderman, "Lab space, tumor specimens, data repositories, materials and supplies, and people to run the experiments are all necessary to move theories to practice. I want to understand how to make these complex skull base surgeries even safer for patients. For example, we are currently working with visual scientists to understand how surgeons process visual information during procedures to enable better training and technology. Ultimately, all our skull base research is to achieve our purpose to provide each patient optimal quality of life throughout their medical journey."

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Take the video tour on YouTube! Skull Base Surgery: Cutting Edge Research and Results

Open the Doors . . . continued

Donations large and small contribute to molecular genetics, tumor tissue banking, multi-institutional studies, cognitive brain function assessment, surgical instrumentation engineering and device development, neuroanatomy studies, education, and patient quality of life studies.

One patient comments, "Please *pay it forward*. To have my tumor removed by the Skull Base Center surgeons to enable me to live my life fully is a gift beyond words. This gift of my life prompted me to donate to the Center, with the intention that future patients with tumors will likewise benefit from medical and surgical advances."

There is much more to this story. We will continue to share the work of the Center, including the establishment of a Chair devoted to Skull Base Surgery and what that means for patients, physicians, and researchers working with skull base tumors. We will introduce you to the original UPMC innovators who, against the common medical wisdom of their time, had the courage of their conviction and their experience to proceed with a new, less invasive surgery that is now practiced around the world. In the meantime, we hope you will take the time to watch at least some of this video: https://www.youtube.com/watch?v=fpkE_dYmMeA&t=331s

S. Tonya Stefko MD

It's a fair question – *how is an oculoplastic surgeon involved with neurosurgical skull base surgery*?

Dr. Tonya Stefko, Associate Professor at the University of Pittsburgh and Director of the Oculoplastic, Aesthetic and Reconstructive Surgery Service at UPMC Eye Center, elucidates the connection, "With head and neck tumors, preserving patient *life* is first priority. Preserving patient *vision* is very high priority after that."

Personifying the teacher that she is, Stefko launches into a lesson on surgical anatomy of the eye, "The orbit of the eye is like a shot glass turned on its side. The things that go around the eye, that touch the sides of it, are important real estate. Directly above and behind is the brain. To the side is a corridor to the brain. Sinuses and nose are in the middle and below the orbit; all affect the ability of the eye to move and to see. There are the muscles that move the eye and lids, there are tear glands and fat. The eyelids are very delicate soft tissue structures. Getting a starting point is crucial in planning the surgery– how bad is the patient's vision, how misaligned is the eye as a result of the tumor. You don't want to involve important orbital structures if you can avoid it. If a tumor doesn't extend into the orbit, we investigate whether access to the tumor is possible through the orbit without damaging vision."

> *"Eye surgery . . . It was one of the prettiest things I had ever seen."*
>
> *Tonya Stefko, MD*

Dr. Stefko arrived at her involvement with skull base tumors from the departure point of her lifelong fundamental interest in "doing" and "making" things. She observed retinal surgery early in her medical studies. "It was one of the prettiest things I had ever seen," she says. The surgeon she observed, Dr. Andrew Eller, instructed her to do a plastic surgery rotation before starting her ophthalmology residency, and she discovered she was good at it. When she realized she could combine ophthalmology and plastic surgery, that decided her path. "In general," says Stefko, "a lot of surgeons don't like working with the eye. Eyeballs are squishy and highly mobile and, during surgery, the eyeball is sometimes exposed as though 'looking at the surgeon' – this unnerves some surgeons. I find the eye fascinating and the work exquisitely precise."

Upon her return to Pittsburgh following her residency and fellowship at the Wilmer Eye Institute at Johns Hopkins, she stepped in when there was a need for a neuro-ophthalmologist, which was the beginning of her involvement with neurosurgery. As Dr. Stefko began doing surgeries with neurosurgeons, together, they pushed the boundaries of less invasive brain surgery performed through eyebrow, eyelid, and lateral canthal ("crow's foot") approaches.

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S. Tonya Stefko MD . . continued

"Leaders such as Dr. Gardner, Dr. Snyderman, Dr. Wang, and Dr. Zenonos are good at bringing orbital surgeons into the fold. The surgical team flows with give-and-take, yielding the benefit of someone on the team having seen a similar situation before. We pick up the phone or walk to one another's clinics and *talk* to each other, sometimes a 3-way or 4-way conversation, to analyze the patient's condition and come to an agreement for the best way to do something. We check one another's thinking, and the result is that we educate one another and decrease barriers to asking questions to arrive at the best thing to do for a patient."

Tonya Stefko MD with the Skull Base Center Team

Dr. Stefko considers the future of skull base surgery in terms of her specialty. "I think of potential approaches - what surgeries can be done through the brow or other eye anatomy for best patient outcome? How can we retain maximal function for the patient? In terms of surgical instrumentation, often it's a matter of just adapting instruments from other services rather than designing something new. For example, the SPIWay device created for use in the nasal cavity by UPMC surgeons works beautifully in the orbit due to its shape and compressibility. Simply sharing our methods, tools, and approaches results in outcomes that benefit the patient."

Dr. Stefko teaches medical students, residents, and fellows, having five times been awarded a University of Pittsburgh, Department of Ophthalmology Award for Dedication in Resident Education. Stefko concludes that her own teaching style evolved from rigorous rational thought that she herself was trained to master. "Gentle," "Kind," and "Humble" are characteristics she ascribes to her fellowship director and mentor, Dr. Nicholas Iliff. "He taught me to take a moment to think about things creatively, think about what the *whole person* needs as they face their medical issue. I teach my students to *question everything* - avoid jumping to conclusions too quickly, why do the surgery this way, what are options, what does the patient need?

Stefko was the chair of the Orbital Education Day at the annual meeting of the North American Skull Base Society. "Right now, only a few major medical centers use surgical teams combining skull base and oculoplastic surgeons. Only a few dozen orbital surgeons are involved with skull base surgeries and only a few surgeons do a lot of it. We at UPMC remain at the forefront in including all appropriate specialists for consultation and involvement in a patient's care."

This high-energy, highly focused surgeon has, as her hobby, training high-energy, high-maintenance puppies (Viszla and Doberman). "My equally high-energy 12-year-old and 16-year-old kids do a good job of preparing me daily." You can hear more about Dr. Stefko's family in a video interview that she did for the UPMC Eye & Ear Institute: http://ophthalmology.pitt.edu/people/s-tonya-stefko-md.

Zenonos, Abou-Al-Shaar Win Top Prize Research Grant

Georgios Zenonos MD and Hussam Abou-Al-Shaar, MD brought home the top prize research grant for their project, "The Clinical Application of High-Definition Fiber Tractography in Detecting Vision Recovery following Skull Base Surgery." They were awarded the prestigious grant from the North American Skull Base Society (NASBS) at the Annual Meeting in February 2022.


Georgios Zenonos MD and Hussam Abou-Al-Shaar MD

Says Dr. Zenonos, "With this grant, we can expand our research into patient vision following skull base surgery. The NASBS, by awarding us this top prize research grant, has sanctioned the importance of our work using this 3D imaging to detect vision loss following surgery. With early intervention, any vision loss experienced by patients with certain tumors is only temporary."

Where Are They Now?: Dr. Debraj Mukherjee

Dr. Debraj Mukherjee, former UPMC Skull Base Surgery Fellow, is currently is Director of Neurosurgical Oncology at Johns Hopkins Bayview Medical Center, Assistant Professor of Neurosurgery at Johns Hopkins Hospital, and Director of the Johns Hopkins Neuro-Oncology Surgical Outcomes Laboratory.

Dr. Mukherjee received his medical degree from Dartmouth Medical School and completed his neurosurgical residency at Cedars-Sinai Medical Center. He received his master's degree from Johns Hopkins Bloomberg School of Public Health.

"The Masters in Public Health (MPH) degree is a signal to the medical community that you are interested in population health or data science. It's a broad degree; you can do a lot with it," says Mukherjee when asked about the relationship of data science to skull base surgery. "Surgeons who have an MPH tend to be interested in developing clinical trials, building tumor/disease registries, and performing predictive analytics for patients. Rather than focusing on lab experiments, they instead study clinical outcomes, quality metrics, and patient safety. It is the work I undertook in my public health studies that gave me a window into the field of skull base surgery." Says Mukherjee, "Surgeons with a driven personality tend to gravitate toward skull base surgery because the anatomy is complex and beautiful and the stakes are high, with procedures often involving manipulation of important nerves and arteries essential for functioning in life."

> *"Skull base surgery. . Anatomy is complex and beautiful and the stakes are high . ."*
>
> *Debraj Mukherjee, MD, MPH*

"Survival was originally the benchmark for skull base tumors in the 1980s and beforehand," recounts Mukherjee, "but since then, approaches to tumors have become more tailored with an awareness of the patient's quality of life following surgery beyond merely surviving. Now we focus on tumor control and keeping people alive with a high quality of life."

Dr. Mukherjee completed a Fellowship in Skull Base Surgery at UPMC in 2018. "I felt like I was with an 'All Stars' team during my skull base fellowship at UPMC," he says. I was taught by neurosurgeons **Dr. Paul Gardner** and **Dr. Juan Fernandez-Miranda**. I worked with **Dr. Georgios Zenonos**, who was Chief Resident at that time. I also worked with **Dr. Eze Goldschmidt**. Each of these teachers and colleagues gave me autonomy to learn, practice, observe, and figure out how to be a good surgeon and teacher on my own. "From my time in Pittsburgh, I learned how the team at UPMC pushes the limits of skull base surgery and leads the charge for how aggressive you can be with surgically managing complex tumors in a thoughtful and careful way. UPMC illuminates the field as to what is possible in skull base surgery."

During his UPMC fellowship, Dr. Mukherjee continued his patient-centered research, developing a national registry for patients with brain tumors and creating a disease-specific quality of life (QOL) instrument for patients with skull base meningiomas. "I worked with **Dr. Carl Snyderman** and **Dr. Eric Wang** on QOL outcomes and I'm a member of the Skull Base Think Tank, comprising surgeons from leading skull base centers across the country. I'm currently developing additional patient-reported outcome instruments for skull base tumors including craniopharyngiomas and chordomas."

Mukherjee further credits the mentorship of Dr. Mustafa Baskaya at the University of Wisconsin for establishing the basis for his own approach to teaching. "Dr. Baskaya focused students and trainees on the *practice* required to become a Master surgeon. He would say, 'Performing this complex surgery is not a special talent, and it's not an innate ability you either have or don't have. Developing the necessary skills takes time, effort, and practice-practice-practice.'" From that foundation, Dr. Mukherjee now imparts to his students the essential requirement to practice and master techniques along with gaining strong familiarity with anatomy. "I remember going from seeing brain anatomy that appeared to me as a complex tangle of shapes to recognizing each and every one of those shapes, how they are interconnected, and their function. From being "blind" to "seeing" and understanding. From no clarity to complete mastery through discipline and practice."

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Dr. Debraj Mukherjee . . continued

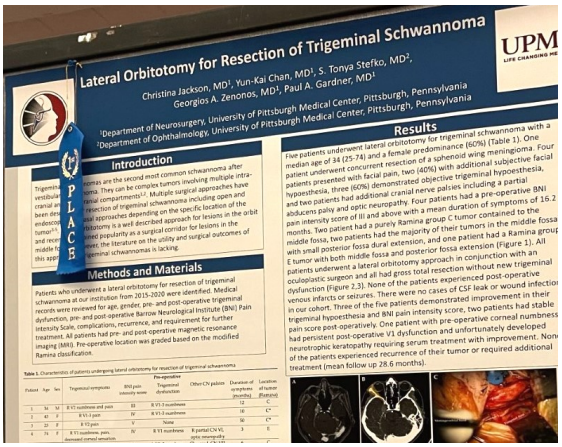
"You know," says Dr. Mukherjee, "People often misinterpret the word '*Guru*,' which comes from the Sanskrit words '*Gu*,' meaning 'darkness,' and '*Ru*,' meaning 'light.' It expresses going from darkness to light, from ignorance to knowledge. When you examine a mountain, visualizing the individual steps necessary to complete the climb helps make it possible. Gurus take the seemingly impossible, the "mountain," and make it relatively straightforward as they become familiar with their practice and gain mastery. As one gains mastery, you look at things strategically; you can accomplish a very big, complicated task or surgery by strategizing each of the steps along the way."

If we want to know about Dr. Mukherjee's life outside of medicine, perhaps we should take a hint from a certain long weekend in April during his UPMC fellowship when he got married, telling no one until afterwards. "My unannounced wedding weekend became a running gag among colleagues about how I tend to keep even huge life moments outside of the hospital close to the vest!" He has been married since 2018 to his wife Alicia; they have a 5-month-old son Kiran (Hindi for "Light"), a fitting name indeed from a guru of brain surgery.

For more on Dr. Raj Mukherjee: https://www.youtube.com/watch?v=zBaU_WvD3qY; https://pituitary.org/news-latest-news-and-articles/pna-spotlight-dr-debraj-mukherjee; https://www.youtube.com/watch?v=NtOThwlJpJY; www.jhuneurolab.com

Skull Base Fellow Christina Jackson First Place Winner

Dr. Christina Jackson, skull base fellow, and her team from UPMC won first place poster award at the North American Skull Base Society Annual Meeting 2022 for their research on "Lateral Orbitotomy for Resection of Trigeminal Schwannoma."



Dr. Jackson researched patient outcomes following use of the lateral orbitectomy surgical approach. "We were encouraged by our findings that none of the patients we studied had a recurring tumor. One patient did require additional medical treatment following their procedure but, at 2-year followup, none required additional treatment. This provides impetus for us to continue utilizing and refining this procedure for patients with trigeminal schwannoma as we concurrently monitor patient outcomes."

"I am very appreciative for the 1st place poster award from the NASBS on our work on this research," says Dr. Jackson, "and grateful for the mentorship from Dr. Paul Gardner and Dr. Tonya Stefko."

In this collection of stories from the UPMC Skull Base Center, a theme emerged of "*Darkness to Light*," fitting for this season as we move into longer days of Summer and fitting for the work of the physicians of this Center who every day and every season endeavor to improve life for patients who come for help.

You have the power to bring light to their research and clinical work through your donations to the UPMC Center for Skull Base Surgery. *Thank you*.

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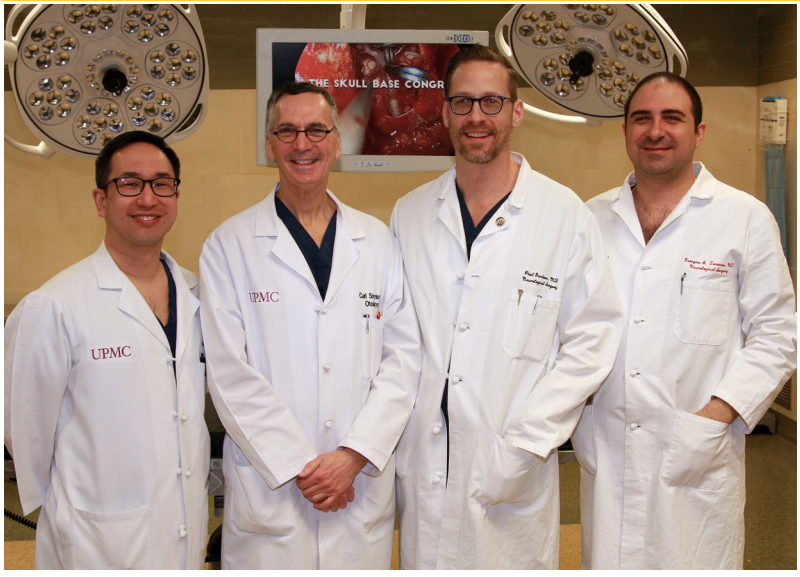

The University of Pittsburgh Skull Base Team is pictured above:
Dr. Eric Wang, Dr. Carl Snyderman, Dr. Paul Gardner, Dr. George Zenonos.

Additional information about the educational and clinical work of the Surgeons of the Center for Skull Base Surgery is found at: **UPMC.com/skullbasesurgery**

In future newsletters, you will learn more about new clinical, research, and educational projects initiated at the Center for Skull Base Surgery.

Your support is essential.

If you would like to learn more about our activities or sponsor a project, please contact the Eye & Ear Foundation.* To support the Center for Skull Base Surgery visit eyeandear.org. If sending a check, please make payable to the Eye & Ear Foundation.

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