UCSF Brain Tumor Center

Fall 2024

Precision Medicine for Meningioma

A Meningioma Organoid Platform for Drug Screening

New Faculty Expand Specialized Care

Gene Therapy is Halting Cancer. Can It Work Against Brain Tumors?

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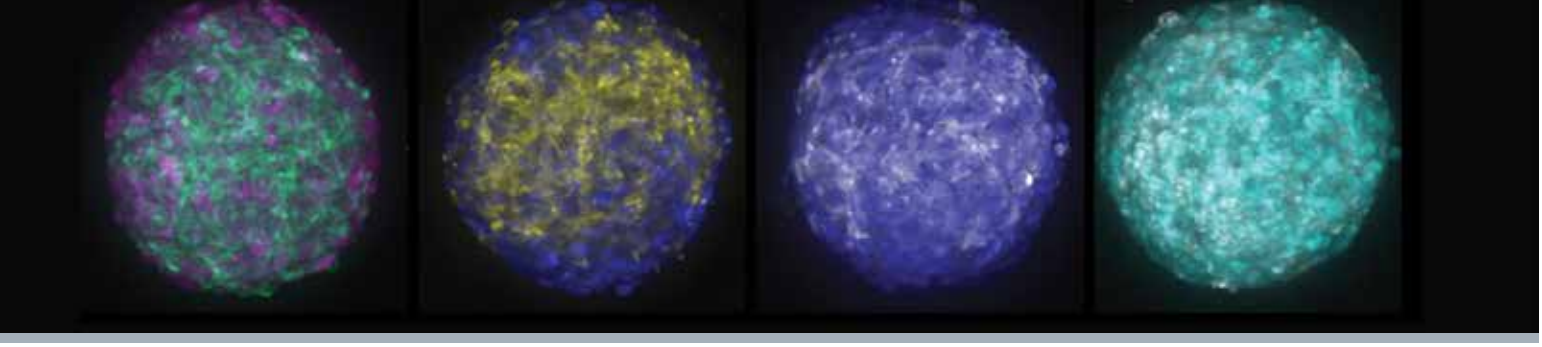


Meninigioma organoids made up of different tumor cell populations. *Image by the Raleigh lab.*

A Meningioma Organoid Platform for Drug Screening

By Alejandra Canales

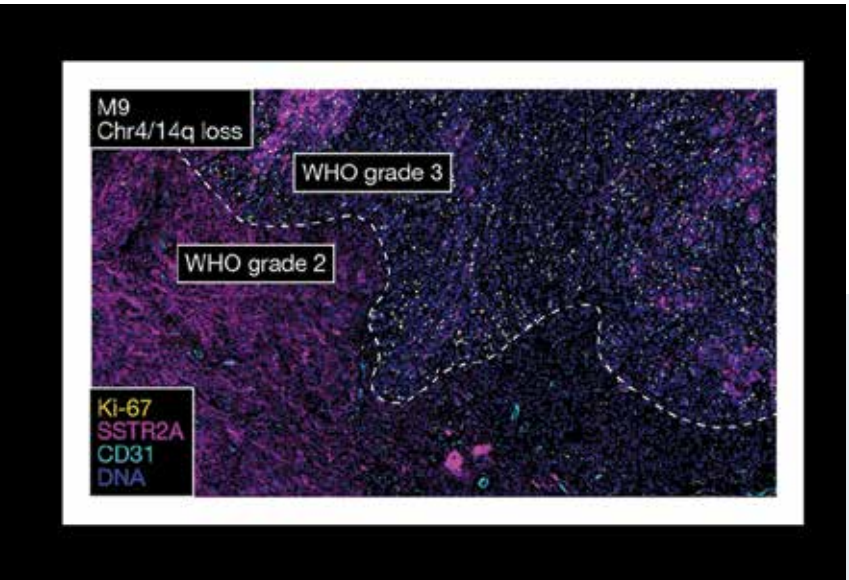
Researchers at UC San Francisco have now identified mechanisms high-grade meningiomas use to evade treatments. The findings, published in *Nature Genetics,* helped them develop a cell culture model for studying the way these tumors grow and for screening different drugs in the lab.

“The tumor cells all contribute something different — with some becoming more important than others as the tumor grows and responds to treatment,” said UCSF physician-scientist and the study’s senior author David Raleigh, MD, PhD. “We need to identify those reservoirs of recurrence and target those cells to alter the trajectory of a tumor’s lifespan.”

The World Health Organization classifies high-grade meningiomas based on what they look like under the microscope as well as the presence of a handful of genetic mutations that drive tumor formation.

Raleigh and his colleagues suspected that grouping tumors with these mutations together might be masking important distinctions in their biology and, by extension, potential therapeutic vulnerabilities.

High-grade meningiomas have distinct gene and protein expression patterns compared to lower grade meningiomas. *Image by the Raleigh lab.*



Conventional techniques for studying how genetic mutations in tumors then affect gene expression and protein levels in cells offer aggregate measures of the abundance of all the genes and proteins present in the tumor. But these approaches are divorced from the specifics of which cells have which molecular features.

“We’re very good at tracking the DNA mutations in tumors, but the biochemical and cellular consequences of those mutations are often complex and very context dependent,” Raleigh, who is also the Robert and Ruth Halperin Endowed Chair in Meningioma Research, said.

To better understand the impact of the different mutations driving tumor growth, the scientists turned to new technology that enabled them to visualize differences in gene expression across 16 tissues samples from 10 meningiomas.

With the help of collaborators at Northwestern University, Raleigh and his team were also able to see how those alterations in the genomic and transcriptomic architecture of the tumor cells then influence protein levels and protein signaling events.

“One of the things that was really fun about this study was that it gave us the opportunity to use some really interesting and innovative technology on a really old problem,” he said. “It’s nice to be able to integrate all this information about the genomic architecture, single cell sequencing, and protein expression patterns in the context of the cells as they are found within the tumor.”

Lucas CG et al. (2024) Spatial genomic, biochemical and cellular mechanisms underlying meningioma heterogeneity and evolution. Nat Genet. 56(6):1121-1133.

UCSF physician-scientist David Raleigh, MD, PhD

These newer spatial approaches for looking at meningiomas helped the researchers learn about the variation within the tumors and their response to therapy in unprecedented detail.

For example, by analyzing paired tissue samples from meningioma patients at initial diagnosis and at recurrence, the scientists found that new genetic mutations weren't necessarily what was causing the tumor to grow back. Instead, the tumor cells turn on a series of cellular signaling pathways, and the new technology allowed the researchers to identify conserved themes among the newly activated genes and proteins.

The scientists also confirmed their hypothesis that high-grade meningiomas with different driver mutations have different gene and protein expression patterns. These results suggest the current WHO classification scheme may need to be updated to stratify patients more accurately for clinical trials.

"We treat all these tumors the same way in currently available clinical trials, but that's probably not the way we want to do these things moving forward," Raleigh said.

The scientists then wanted to apply this newfound knowledge about high-grade meningiomas to test possible strategies to overcome treatment resistance.

Raleigh's lab used a method called CRISPR interference to turn off different genes in meningioma cells grown in the lab. They modeled the tumors to represent different molecular groups of meningiomas they had previously identified. Each tumor cell population also had its own fluorescent marker so that the researchers could easily track how the different cells within the organoid were responding to various drugs.

"We now have these 'meninge-oids' with genetically predefined and genetically different cellular components that can serve as a platform for pharmacologic screening," Raleigh said.

The most exciting results, he says, were when drug combinations specifically targeting each tumor cell population worked in tandem to block or even reverse the growth of the meningioma organoids.

He and his colleagues are now interested in using this system to develop models for each individual patient's tumor. "It would allow us to pick the exact right combination of therapies," he said.

Living with Meningioma Study

Calling all neuro-oncologists! UCSF researchers are conducting a longitudinal study to better understand the challenges and symptoms meningioma survivors live with. Participants will complete a short online survey once a year for five years. Tell your patients to sign up.

Precision Medicine Approaches to Treating Meningiomas

By Alejandra Canales

Maria Arvizu had noticed that she was feeling dizzy and forgetting things more often. She was also getting headaches more frequently, which she thought were just migraines. But the pain would not respond to medication.

Then one day she spiked a high fever and had to be taken to the emergency room. An MRI revealed that she had a meningioma, the most common type of brain tumor.

She underwent surgery to remove most of the tumor and started getting MRI scans every six months to monitor for disease progression. But, three years later in 2017, she was told that she needed to have another surgery because her tumor had grown back significantly.

"I was feeling desperate at the thought of another surgery, but I thought 'Hopefully, this will be the last time!'", she said, "but no, it happened again."

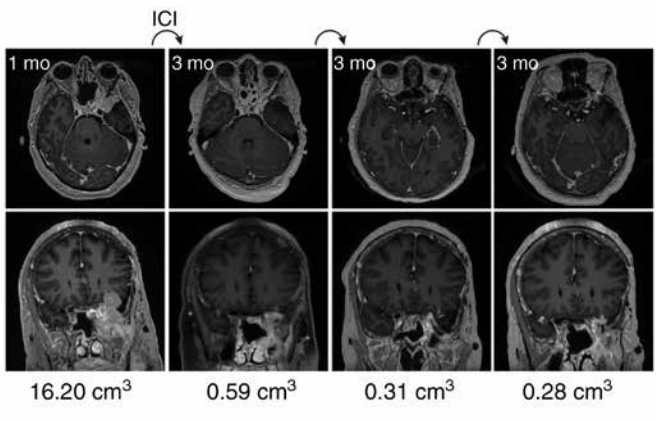
Over the next five years, Maria would face multiple recurrences before a new approach brought a chance for remission.

Approximately 42,000 Americans are diagnosed with meningiomas every year. Most of these are slow-growing tumors and because they respond well to the currently available treatments of surgery and radiation therapy, physicians consider these "low-risk" meningiomas.

But recent UCSF-led studies analyzing the patterns of gene expression in meningiomas show that about 20 percent of grade 1 tumors like Maria's recur. These investigations suggest that integrating more of the genomic features of these tumors into the current World Health Organization classification scheme could improve how the disease is managed.

Recurrences are also more likely to be more aggressive. In Maria's case, her third recurrence – eight years after her initial diagnosis in 2014 – had progressed to a grade 2 atypical meningioma based on what it looked like under a microscope.

Sequencing with the UCSF500 Cancer Gene Panel revealed that the tumor had a high number of mutations, indicating that it might be more likely to respond to immunotherapy.



Serial MRI scans monitoring disease progression after initiating treatment with the immune checkpoint inhibitor pembrolizumab. Image adapted from: Nguyen MP et al. Response to immune checkpoint inhibition in a meningioma with DNA mismatch repair deficiency. Neurooncol Adv. 2024 Jun 8;6(1):vdae092.

This is because hypermutated tumors often have more immune cells in their microenvironment that can be activated by treatments like immune checkpoint inhibitors.

"The tumor was indeed chockfull of immune cells, which was very much in contrast to normal meningiomas," said UCSF physician-scientist David Raleigh, MD, PhD.

Despite another surgery, the tumor still grew back within four months, requiring a fifth operation. Another sequencing test showed it remained a grade 2 atypical meningioma with a similar genomic profile.

By that point, her neuro-oncologist Nancy Ann Oberheim Bush, MD, PhD, had launched a phase II clinical trial for patients with recurrent meningioma, and Maria was able to enroll. She received stereotactic radiosurgery as well as three infusions of the immune checkpoint inhibitor pembrolizumab.

The medication made her feel dizzy, but the tumor finally responded to this combination therapy. The residual tumor left after surgery was significantly smaller three months after starting the immunotherapy and continued to shrink over the following three months.

Oberheim Bush says that Maria continues to be doing well. Now more than a year out from the treatment, the tumor is no longer detectable on her routine MRI scans.

"These are not always benign tumors, but it's difficult to predict which ones will be resistant to standard treatments," she said. "Understanding their genomic features is helping us stratify patients into more accurate prognostic groups and revealing new vulnerabilities that we can target."

The complete response of Maria's tumor to the immunotherapy was likely due to its unique molecular features.

"While this is a very small percentage of the pie – perhaps 2 percent of meningiomas – it's still very encouraging for a tumor with no effective medical therapies," Raleigh said.

Her case was recently published in *Neuro-Oncology Advances* and underscores the importance of using genomics to inform treatment plans tailored to each individual patient.

At UCSF, all patients with meningioma now have their tumor sequenced after surgery. A multidisciplinary team of physicians and nurses then convene a "tumor board" meeting to review all the information about each patient's tumor and determine the most appropriate treatment options.

As for Maria, she's glad to be back to having a more active lifestyle, doing the things she enjoys. She goes shopping and for walks at a small park near her home in the East Bay.

"I feel like a weight has been lifted off me now that I feel better," she said.

Clinical Trials

The UCSF Brain Tumor Center has one of the largest clinical trials portfolios in the nation and is part of several national clinical trials consortia. Our involvement in national cooperative clinical trials ensures that our patients have access to the latest techniques and the newest concepts for treatment of brain tumors.

Select Adult Trials

NCT06186401	Anti-EGFRvIII synNotch receptor induced anti-EphA2/IL-13Ralpha2 CAR (E-SYNC) T cells
NCT04656535	A multi-center phase 0/I trial of anti-TIGIT antibody AB154 in combination with anti-PD1 antibody AB122 for recurrent glioblastoma
NCT05557292	A phase I/Ib, open-label, dose-escalation study of RMC-5552 monotherapy in adult subjects with recurrent glioblastoma
NCT05383872	Blood-brain barrier disruption for liquid biopsy in subjects with glioblastoma
NCT05503797	A study to assess the safety and efficacy of FORE8394 in participants with cancer harboring a BRAF mutation
NCT04135807	A pilot study of an implantable microdevice for in situ evaluation of drug response in patients with primary brain tumors
NCT05580562	ONC201 for the treatment of newly diagnosed H3 K27M-mutant diffuse glioma following completion of radiotherapy
NCT04659811	A phase II study of stereotactic radiosurgery in conjunction with the PD-1 inhibitor, pembrolizumab for the treatment of recurrent meningioma
NCT05753007	A randomized, double-blind clinical trial of a hemp-derived, high cannabidiol product for anxiety in glioblastoma patients
NCT05708352	A randomized controlled phase II study of the ketogenic diet versus standard dietary guidance for patients with newly diagnosed glioblastoma in combination with standard-of-care treatment
NCT05484622	A study of vorasidenib and pembrolizumab combination in recurrent or progressive enhancing IDH-1 mutant astrocytomas

Select Trials for Children

NCT05169944	Magrolimab in children and adults with recurrent or progressive malignant brain tumors (PNOC025)
NCT05057702	Individualized treatment plan in children and young adults with relapsed medulloblastoma (PNOC027)
NCT05465174	Nivolumab and DAY101 for the treatment of newly diagnosed or recurrent craniopharyngioma in children and young adults (PNOC029)
NCT04732065	ONC206 for treatment of newly diagnosed or recurrent diffuse midline gliomas, and other recurrent malignant brain tumors (PNOC023)
NCT05887882	A phase I study of intra-tumoral injections of ex vivo expanded natural killer cells in children and young adults with recurrent or progressive supratentorial malignant brain tumors (PNOC028)
	A registry study for children with atypical teratoid rhabdoid tumor (PNOC030)

Browse the full list of clinical trials, and sign up to have the list delivered to your inbox at braintumorcenter.ucsf.edu/clinicaltrials

Gene Therapy Is Halting Cancer. Can It Work Against Brain Tumors?

By Suzanne Leigh

A type of gene therapy called CAR-T that has extended survival for thousands of patients with leukemia and other blood cancers is being adapted at UC San Francisco to treat people with glioblastoma, the most common and deadly adult brain tumor.

This new, more powerful version of CAR-T employs a novel technology developed at UCSF called synthetic notch (synNotch) that both protects healthy tissue from damage and enables the treatment to work more effectively.

UCSF opened enrollment for a clinical trial that is using the technology for the first time in people in the spring. A second trial, also at UCSF, is slated for 2025.

Approximately 12,000 Americans are diagnosed each year with glioblastoma. Patients survive on average for just 15 months after their diagnosis, and new treatments are urgently needed.

“This project is a prime example of bench-to-bed translation within UCSF, representing the strengths in basic and clinical science,” said Hideho Okada, MD, PhD, a physician-scientist and director of the UCSF Brain Tumor Immunotherapy Center. “We have a truly home-grown project here.”

Okada has received up to $11 million for the first trial from the California Institute for Regenerative Medicine (CIRM), which funds stem cell and gene therapy research for incurable diseases and disorders through all stages of clinical trial development.

Initial funding for the second trial is provided by the National Cancer Institute Specialized Programs of Research Excellence (NCI SPORE).

“We hope that the treatment will prolong lives for patients with glioblastoma,” said Okada, who is a professor of neurosurgery at UCSF and a member of the UCSF Weill Institute for Neurosciences. “However, the primary goal of the current phase 1 study is to ensure safety and characterize any toxicities.”

When tested in mice, the therapy provided a “robust and long-lasting result” that Okada said was more remarkable than anything he had encountered during 30 years of brain tumor research.

The CIRM-funded trial will be led by principal investigator Jennifer Clarke, MD, MPH. It is open to patients with newly diagnosed glioblastoma who have completed standard-of-care treatment. Tumors must have a mutation found in approximately 20% of glioblastomas, and that can be identified by the UCSF500 cancer gene panel test.

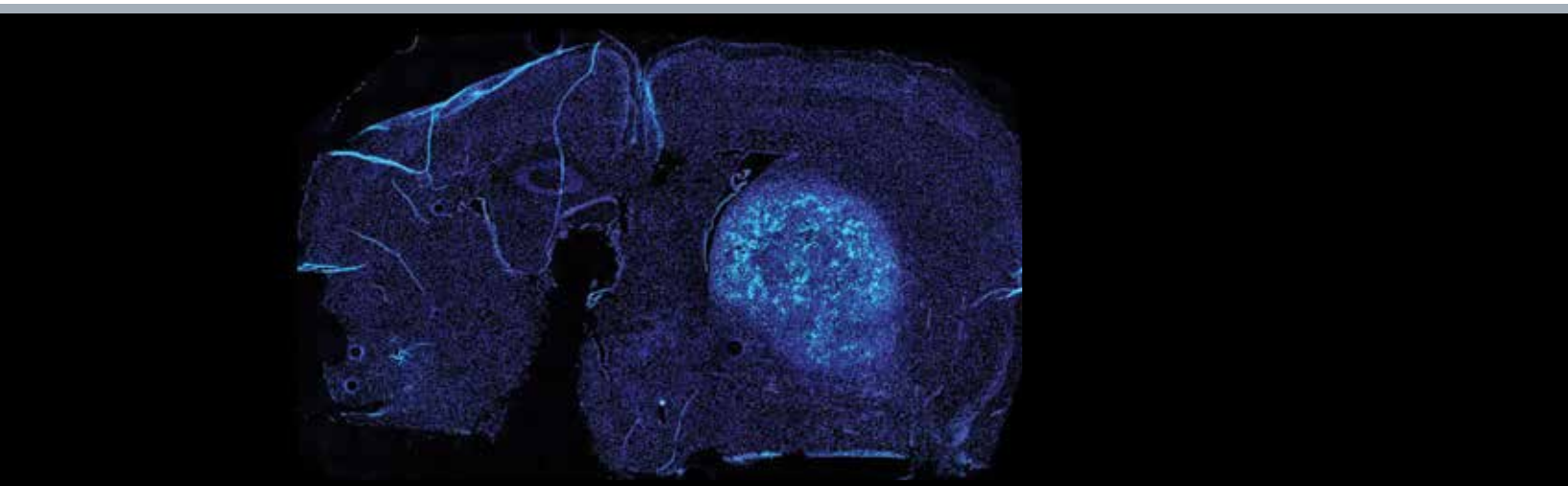
CAR-T refers to chimeric antigen receptor T-cells, which are cancer-killing immune cells that have been extracted from the patient and genetically modified to recognize and destroy antigens that appear on the surface of cancer cells. These supercharged CAR-T cells are then infused back into the body to attack tumor cells.

For many patients with leukemia and other blood cancers, CAR-T has demonstrated long-term remission, but the approach hasn’t worked against brain tumors. Glioblastoma cells are more diverse than blood cancer cells, and they can evade CAR-T. Many of the antigens made by the tumors are also found in healthy tissue, leaving them open to attack.

To overcome these obstacles, Okada drew from the synNotch system developed by Wendell Lim, PhD, director of the UCSF Cell Design Institute and professor in the UCSF Department of Cellular and Molecular Pharmacology.

The technology allowed scientists to program CAR-T cells to target specific antigens on tumor cells, without touching those found in healthy tissue. They also do not succumb to T-cell exhaustion, a common problem with CAR-T therapies, because they are more metabolically stable and use less energy to fight cancer longer.

“We’ve created a system that is flexible and thorough and addresses the major concerns we’ve had about using CAR-T cells against solid tumors,” Lim said. “These cells act like computers: integrating multiple units of information and making complex decisions.”



Engineered T-cells designed to attack glioblastoma.
Image by Payal Watchmaker.

Brian Na, MD, PhD

Specialties: neurofibromatosis, pediatric-type brain tumors

Brian Na, MD, PhD earned his medical degree from Drexel University and completed his residency in pediatrics at UH Rainbow Babies & Children's Hospital in Cleveland, OH. He then finished both a fellowship in pediatric oncology and a PhD in Molecular and Medical Pharmacology at UCLA. His clinical practice focuses on treating patients with neurofibromatosis (NF), a rare genetic condition that causes tumors to develop along nerves throughout the body, and schwannomatosis, a nervous system disorder characterized by painful and tingling noncancerous tumors. He also sees adult patients with brain tumors like ependymoma and medulloblastoma – which are more commonly seen in children.

Building a Multidisciplinary Adult Neurofibromatosis Clinic

We already have a very robust pediatric NF program at UCSF led by Dr. Alyssa Reddy, but patients with NF and those with schwannomatosis live through their childhood and into adulthood. There's a real need to able to provide comprehensive NF care across the lifespan here in Northern California.

My main impetus for pursuing an adult neuro-oncology fellowship, which was very unusual for a pediatrician, was because of the NF patients I was seeing who were already adults and really couldn't transition their care and the adolescent young adult patients with brain and spinal cord tumors who did not fit into traditional pediatric or adult categories.

Working with neurosurgeon Dr. Line Jacques, I'm now spearheading the adult NF program and creating a multidisciplinary service line with radiologists, pathologists, neurosurgeons, ENT surgeons, and everyone else who might be involved in the care for these patients.

Long-Term Survivorship for Pediatric Patients

A lot of caring for patients with NF is anticipatory guidance as we like to say in pediatrics – surveillance and letting our patients know the treatment options for different tumor manifestations that can happen as they get older. There's not really a standard of care, so it's really a conversation between us and a family or a patient. It ends up being about a lot about symptom management and really trying to find what patients want for themselves. One drug might be a good option but may have some side effects that could intrude on quality of life. With the explosion of new therapies, we don't know yet what the effects may be as they get older.

And with NF, where you have this chronic condition across the lifespan, you really do need a holistic approach to care that involves family members and partners.

Treatment Advances for NF

For our NF patients, the MEK inhibitors are a class of medications that have been really promising. There's also been a huge push to develop immunotherapies in the brain tumor space and really in many other tumor contexts. Finally, we know that NF is a genetic condition, and although it's very early in the development pipeline, another promising approach would be gene therapy. If we were able to fix the genetic issue causing the NF, then that would be a cure. We're still very far from that, but there's been a big push within our NF community for that type of treatment modality.

The Best Part of Being at UCSF

What really attracted me to UCSF was the fact that we have such a robust pediatric and adult brain tumor program. Not many programs are like that in the country. We have the Brain Tumor SPORE, which really is only given to programs with a track record of interdisciplinary research between clinicians and scientists. Then, Dr. Kevin Shannon, a renowned UCSF physician-scientist in NF1, co-leads an NF SPORE with Indiana University called the DHART SPORE.

We also have the clinical trials infrastructure in place to bring the latest treatments to our patients. We have a lot of clinical trials for children with NF1 mutations though the Pediatric Neuro-Oncology Consortium, and now, with our acceptance into the NF Clinical Trials Consortium, we can start bringing more innovative and needed clinical trials to the Bay Area.

Jacob Young, MD

Specialties: adult brain tumor surgery; gliomas; brain mapping

Jacob Young, MD, earned his medical degree from the University of Chicago, where he became interested in translational neuro-oncology working in the lab of Matt Lesniak, MD. He completed neurosurgical residency at UCSF, where he built on his interest in brain tumors and was trained in brain mapping techniques and tumor resection in eloquent cortex by Mitchel Berger, MD, and Shawn Hervey-Jumper, MD.

A Map for Success

In residency, I participated in nearly 100 awake craniotomies and saw the benefit of maximal resections and pushing the limits, but also never compromising safety and patients' function. That's really the model that I inspire to in my own practice, where every patient is treated like family, and we are constantly striving to be aggressive but appropriate in the care that we deliver.

Training at UCSF, I gained tremendous experience in unique mapping cases such as bilingual cases that require mapping in English and a second language, as well as mapping for patients with singular needs such as patients who are pregnant or who are deaf. These experiences prepared me to integrate advanced cognitive tests, language tests, and motor tests, tailoring what is most critical for each individual patient.

Impact Outside the Operating Room

My care philosophy as a surgeon is compassionate, excellent care must begin before and extend long after leaving the confines of the operating room. Patients often arrive with a limited understanding of their condition and what might happen, and they are understandably frightened. There can be palpable anxiety when I walk in the room, but after an hour of me introducing myself, getting to know them, going through the scans, examining them, answering their questions, I can appreciate this change that's taken place well before providing safe, technically sound surgical care.

Developing a strong relationship with the patient and their family, affirming your commitment to them as a provider, is critical before you can even think about the impact that you get to make in the operating room. Neurosurgical care really spans everywhere that healthcare may need to be delivered – a clinic, an intensive care unit, an emergency room, and, of course, an operating room. So even though my practice is very focused in the type of patients and specific pathologies I see, I enjoy the significant diversity in the care we provide.

Favorite Procedure

Insular glioma resections, particularly in the dominant hemisphere, are a standout because they're so challenging, and it's very rewarding when you can tackle a tumor that's located in this complex and deep region of the brain while retaining a patient's quality of life.

Community-based Care

I believe my patients are best served when they have more opportunities to connect with their entire healthcare team, and that doesn't usually happen in a silo at our institution. I value having bi-directional communication with both primary providers and specialists in the surrounding community because we are all working together to get patients the care that they need. Sometimes that requires coming to an institution like UCSF, but often care can be managed more locally, whether it's adjuvant treatments, imaging follow-up, or medical management with local primary care physicians.

Overcoming the Hostile Tumor Environment to Identify Better Treatments

My laboratory focuses on the glioblastoma microenvironment and how it responds to either targeted therapies or immunotherapies. Interestingly, the majority of cells within a brain tumor are not the cancer cells themselves but immune cells recruited by the tumor, and these cells create this really hostile environment for any therapy to work in. I'm interested in how we can better understand how the immune environment evolves as we treat patients so we can ultimately overcome resistance or understand biomarkers of treatment response.

The Next Big Thing

I think major advancements over the next decade in neurosurgical oncology will involve using the operating room as an opportunity to not only remove the tumor, but also deliver a therapeutic agent or augment the delivery of a drug. For example, using focused ultrasound to disrupt the blood-brain barrier is exciting technology to increase the amount of drug that can reach the tumor – but of course better treatment agents are needed too!

Thomas Nelson, MD

Specialties: adult brain and spinal tumors

Thomas Nelson, MD, earned his medical degree from the University of Kansas Medical Center and completed his residency in neurology at Cedars-Sinai Medical Center in Los Angeles, CA. He then pursued a neuro-oncology fellowship at the combined Dana-Farber Cancer Institute/ Mass General Brigham Program in Boston, MA, where a K12 Career Development Award supported his research in cancer neuroscience. He is a member of the Institute for Electrical and Electronics Engineers, participating in two working groups that are developing international standards for machine learning enabled medical devices and cancer data repositories.

Choosing Neuro-Oncology

My undergraduate training is actually in electrical engineering, so I was a software engineer in New York City for a while after I graduated. I always enjoyed problem solving – the complex mathematics and the applications of physics and chemistry. But I really wanted to have an opportunity to have a more direct, positive impact on people's lives, so I went back where I'm from in the Midwest for medical school. There, I found a passion for neurology and oncology. In neurology, I felt like I could bring a problem-solving approach to the concerns that patients were expressing. And in oncology, I felt that sharing these really difficult moments in people's lives with them was an incredibly unique experience.

The Promise in Cancer Neuroscience

First and foremost, I'm a clinician, and my goal is to make every patient I meet feel better and do better for as long as we can.

The recent development of some of these specifically targeted IDH inhibitors will really revolutionize how we treat patients with IDH-mutant gliomas. But for some of the more aggressive and more common brain tumors, unfortunately the outcomes remain pretty poor.

Cancer neuroscience uses fundamental neuroscience techniques to address questions in oncology. We see that gliomas cause changes to the surrounding tissue that drive the growth of the tumor, so neuromodulation techniques in combination with other therapies could potentially quiet the neural activity that's feeding into the tumor to slow, or perhaps even stop, the progression.

Existing medications and treatments like responsive nerve stimulation, deep brain stimulation and vagal nerve stimulation are already used to manage epilepsy. But folks with brain tumors have not often been considered for some of these treatments. The fact that we consider these exclusive patient populations is something that I want to change. My hope is that we can capitalize on existing as well as novel treatments to control more aspects of tumor biology.

Frontiers in Artificial Intelligence in Neuro-Oncology

Something I like to emphasize when I talk to people is that these types of machine learning algorithms have existed for a long time. I do think that what we're seeing right now is the boom of AI, but we will probably come to use these tools in every component of clinical practice.

During my research fellowship, I became interested in using AI to evaluate tumor progression and response to therapy from imaging. It's a whole field in and of itself but gaining as much information as possible from MRI scans is a very valuable area of research for neuro-oncologists using these images every day.

Standardizing that clinical decision-making with AI algorithms may also be a smart application. There will always be a role for physician oversight though. And if all you're providing to the algorithm or the model is objective information about the patient, then you're missing how have they been doing and how they been feeling in ways that aren't easily captured by information in the medical record.

The Best Part of Being at UCSF

When I was looking at positions as I was transitioning out of my fellowship, I was looking for a nucleus of really smart people and a center that had an infrastructure conducive to my interests in tech and medicine. The UCSF Brain Tumor Center supports and encourages researchers and clinicians working closely together to advance patient care, and the people here are also very kind.

This is also such a culturally vibrant area with amazing nature around the campus. I do urban hikes around the city, and as a hiker, it's so incredible to have nine national parks within the state.

Ramin Morshed, MD

Specialties: skull base tumors, meningiomas, vestibular schwannomas, pituitary tumors, brain metastases, gliomas

Ramin Morshed, MD, attended Pritzker School of Medicine at the University of Chicago and completed neurosurgical residency at UCSF, where he developed a clinical and research interest in treating brain tumors. He also completed a skull base oncology fellowship at Mayo Clinic, where he received extensive training with open and endoscopic surgical techniques.

Specializing in Brain Tumor Surgery

During residency, I trained with Michael McDermott and Philip Theodosopoulos and found I really enjoyed performing skull base surgery. Following the rise of endoscopic surgery, we had more minimally invasive techniques, like keyhole eyebrow craniotomies and other smaller approaches, for skull base lesions. I wanted to implement these new techniques and be able to offer that to patients, in addition to the more traditional, transcranial approaches when needed. It's a field in which you can make a significant impact on someone's function for the rest of their life.

But I also provide care for other types of brain tumors, and I find that as a complex cranial tumor neurosurgeon who is able to do both skull base and intra-axial tumor surgery, I can be a little bit more comprehensive in what I can offer patients.

Multidisciplinary Management

Having trained at UCSF and Mayo Clinic, I developed a good understanding of the multidisciplinary care that's needed to treat patients with complex tumors. The appropriate treatment of these patients involves collaboration and discussion with radiation oncology, neuro-oncology and OHNS – that's really a cornerstone of skull base patient care. Making decisions in a vacuum, only from a surgical perspective, is not in the best interest of the patient.

That's why it's also critical for us to have good communication with the providers we partner with in the community. It's often in the patient's best interest to receive part of their care locally, so I want referring doctors to feel comfortable reaching out to me by phone or email when a patient returns to their healthcare system. I'm always available to answer questions or provide input on management and remain involved in the patient's care.

A New Meningioma Clinic

For meningioma patients specifically, we have a new specialized clinic that tailors care for these patients and a multidisciplinary tumor board to review cases. Each patient has their tumor sequenced, and there is a lot of exciting work being done to stratify patients based on the genomics of their tumor, as well as several new clinical trials in development.

Favorite Procedure

Endoscopic surgery for a variety of anterior skull base lesions.

Understanding the Genomics of Brain Metastases

During residency, I developed an interest in studying brain metastases and correlating their genomic changes with clinical outcomes after surgery. It is an especially important topic as precision medicine becomes more of a reality. Patients may get a systemic chemotherapy for their primary cancer that targets a specific receptor, but then the receptor is not there in the brain metastasis, or vice versa. For example, the primary tumor may not have an EGFR mutation, but then all of a sudden it pops up in the brain metastasis. This may mean that they're eligible for a therapy that they weren't eligible for before.

I think in the next 10 years our understanding of the genomic changes that occur in tumors will be a cornerstone of how we stratify patient risk. The next big hurdle will be to identify imaging biomarkers that correlate with these genetic findings. We could then use these imaging biomarkers to predict what kind of genomic changes are present to help guide decision-making even before proceeding with surgery.

The Best Part of UCSF

The people. Everyone here is very excited about taking care of patients and providing the best care that they can.

Celebrating Faculty Awards

UCSF neuro-oncologist Nancy Ann Oberheim Bush, MD, PhD, (pictured with neurology department chair S. Andrew Josephson, MD, and neurosurgery department chair Edward Chang, MD) was honored with the Wendy Olson Wood-Smith Endowed Professorship.

UCSF Brain Tumor Center director Mitchel Berger, MD, received the 2024 Cushing Award for Technical Excellence and Innovation from the American Association of Neurological Surgeons at this year's annual meeting held in Chicago, IL. The award recognizes the incredible contributions Berger has made to the field of neurosurgical oncology over his career. His research demonstrated the importance of maximizing the extent of tumor resection in improving outcomes for patients with glioma.

Susan Chang, MD, was named a Fellow of the American Society for Clinical Oncology (ASCO). This distinction is in recognition of her dedication to volunteer service efforts benefiting ASCO and the field of oncology as well as patients and their families.

UCSF Brain Tumor Center principal investigator Stephen S. Francis, PhD, was appointed vice president of the Brain Tumor Epidemiology Consortium. The consortium promotes collaborations between scientists studying what causes brain tumors and the factors that improve survival outcomes for patients.

Winson Ho, MD, has been appointed to the Corey Raffel, MD, PhD, Endowed Professorship in Pediatric Neurosurgery. Established by Raffel, an emeritus neurosurgery professor at UCSF and retired pediatric neurosurgeon, this appointment supports Ho's research studying pediatric brain cancers.

Neuroscientist Tomasz Nowakowski, PhD, was one of this year's recipients of the Vilcek Prize for Creative Promise in Biomedical Science. This award recognizes his lab's pioneering work developing new technologies to study the human brain.

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