From the USC BTC Directors: WE GO GRAY IN MAY!

May is Brain Tumor Awareness Month and at the USC Brain Tumor Center we always Go Gray in May! In this Spring Issue of the USC Brain Tumor Center Newsletter, we want to emphasize the importance of collaboration and promoting awareness about brain tumors and why it is vital to everyone in the healthcare and brain tumor community.

Increasing awareness and research funding is vital to improve diagnostic techniques, develop more effective treatments and ultimately increase survival rates for patients affected by a brain tumor diagnosis. The USC Brain Tumor Center is always working on advancing research on behalf of our brain tumor community.

In this issue of the USC BTC Newsletter, we would like to highlight one of our most distinguished colleagues, Dr. Thomas Chen, who has been in the Department of Neurological Surgery since 1997. He is the Director of the Glioma Research Group, a translational research group focused on novel ways of delivering drugs to brain tumors and developing new drugs with novel mechanisms of action. The USC Brain Tumor Center offers patients two current investigator-initiated clinical trials that have emerged from his research.

Providing unsurpassed care for our patients is part of the mission of the USC BTC. In this issue we want to take a moment and share a wonderful patient story that highlights the importance of our collaborative work at the USC Brain Tumor Center. We offer translational medicine or what we call “bench to bedside” medicine. We want to share with you how we are advancing precision oncology by integrating drug screening and genomic profiling to rapidly advance personalized brain tumor treatment.

It is with great excitement that we announce the date of the 2nd Annual Southern California Brain Tumor Conference, hosted at the USC Health Science Campus and the Keck School of Medicine of USC. Save the date for December 6, 2024 and join eight prominent Southern California institutions who will come together to discuss the latest advancements and breakthroughs in brain tumor research and care.

The USC Brain Tumor Center offers access to clinical trials and is constantly working to further strengthen and expand our portfolio. We care deeply for our patients and their caregivers. Our patient’s caregiver support group is offered via Zoom monthly and we remain committed to providing the best possible care for our patients.

But we can’t do it alone. Brain Tumor Awareness Month is an opportunity for all of us to come together to raise awareness about this devastating disease. Whether it’s through sharing our patients’ stories, participating in a fundraising event, or simply talking to your friends and family about the importance of brain cancer research, every effort counts. We are grateful to our donors and to our community partners for bringing attention to the critical need to find and provide effective brain tumor treatment options for those impacted by a brain tumor diagnosis.

Thank you for your continued support of the USC Brain Tumor Center, and let’s work together to make a difference in the fight against brain cancer.

 Fight on!

David D. Tran, MD, PhD
Co-Director, USC Brain Tumor Center

Gabriel Zada, MD, MS, FAANS, FACS
Co-Director, USC Brain Tumor Center

Josh Neman, PhD
Scientific Director, USC Brain Tumor Center

Meet Dr. Thomas Chen

Dr. Thomas Chen is a tenured professor of neurosurgery, orthopedics surgery, and pathology. He has been with the Department of Neurological Surgery since 1997.

He operates and treats patients with central nervous system (CNS) malignancies (both brain and spine). He is the Director of the Glioma Research Group, a translational research group focused on novel ways of delivering drugs to brain tumors, and developing new drugs with novel mechanisms of action. The novel ways of delivering drugs include nasal brain delivery, and disrupting the blood brain barrier directly via direct intra-arterial disruption of the blood brain barrier. The research has resulted in 135 new patents that are filed through USC.

Dr. Chen’s goal is to develop USC specific trials that can benefit patients with malignant brain and spine tumors. He has four current trials that have been approved by the FDA for IND testing (2 Phase II, 2 Phase I). The two Phase II trials are using NEO100 for intranasal delivery for patients with Grade III or IV recurrent IDH1 mutant gliomas, and for using NEO100 for intranasal delivery for malignant or atypical meningiomas. The two Phase I trials include NEO212, a temozolomide conjugate, for primary and metastatic brain cancer; and NEO100 for pediatric brain cancers.

Dr. Chen is currently funded by the NIH for a R21, STR grant; Department of Defense, and CIRM grant for a replication competent retrovirus.
**When Gabriel Zada, MD, performed brain surgery on Felicitas Gonzales, no one expected that, eight days later, Dr. Zada would be operating on her daughter Margarita as well.**

By Candace Pearson

Neurosurgeon Gabriel Zada, MD, entered the operating room at Keck Hospital of USC on June 22, 2023, prepared to remove a noncancerous pituitary tumor from his 64-year-old patient, Felicitas Gonzales. An expert in brain, skull base and pituitary tumor surgery, Dr. Zada had performed such a procedure many times before. He knew Felicitas’ daughters, Margarita, 37, and Betsy, 27, and other relatives were waiting to hear the outcome. What he couldn’t know was he would be performing a different brain surgery on Margarita only eight days later.

The unusual occurrence marked the first time Dr. Zada, director of the USC Brain Tumor Center, part of Keck Medicine of USC, has operated on two such close relatives. It brought him the thanks of a whole family.

“Undergoing a neurosurgical operation can be one of the most frightening and life-changing experiences a person will ever have,” Dr. Zada says. “I was very privileged and honored they entrusted me with both of their lives.”

This extraordinary family story will be included in the spring issue of USC Health magazine. Visit www.keckmedicine.org/magazine in mid-May to read the full story.
Brain Tumor Awareness Month

Brain Tumor Awareness Month is nationally recognized in the United States during the month of May. At the USC Brain Tumor Center raising awareness about brain tumors/brain cancer is our mission year-round. Almost everyone knows someone who has been affected by a brain tumor either directly or as a caregiver.

"Increasing awareness and research funding is vital to improve diagnostic techniques, develop more effective treatments and ultimately increase survival rates for those affected by a brain tumor diagnosis" says Dr. Gabriel Zada (Surgical Director, USC Brain Tumor Center).

At the USC Brain Tumor Center our staff understands the worries that brain tumor patients and their families often face. To help make the journey easier, we focus on care for the whole patient - not just their diagnosis. It is our mission to provide unsurpassed clinical care to patients from all over the world.

The USC Brain Tumor Center raises awareness throughout the year in various ways:

- We publish a quarterly newsletter for our community, physicians and partners that provides a summary of the latest for brain tumor care.
- We will host the Second Annual Southern California Brain Tumor Conference on December 6th, 2024, in collaboration with top 8 institutions in Southern California.
- We are supported by an Advisory Council that is comprised of dedicated individuals whose primary goal is to support advancing the established goals of the Center.
- We publish a quarterly newsletter for our community, physicians and partners that provides a summary of the latest for brain tumor care.
- We will host the Second Annual Southern California Brain Tumor Conference on December 6th, 2024, in collaboration with top 8 institutions in Southern California.
- We are supported by an Advisory Council that is comprised of dedicated individuals whose primary goal is to support advancing the established goals of the Center.

We partner with businesses in the community that provide support toward our mission of finding a cure while promoting our cause.

The USC Brain Tumor Center is extremely grateful to the Smith Brothers Restaurants (Parkway Grill, Arroyo Chop House, Smithy’s) for their commitment to supporting the USC Brain Tumor Center during the month of May. Their support during Brain Tumor Aware-ness month promotes awareness and supports crucial cutting-edge clinical, research and educational efforts of the USC BTC. “The partnership with Smith Brothers is extremely meaningful. They are a great example of what it means to give back to important causes in the community.

Learn more at: BTC.keckmedicine.org
Save the Date!

2nd Annual Southern California Brain Tumor Conference

Friday, December 6, 2024
HSC Conference Center, USC Health Sciences Campus

Hosted by Keck Medicine of USC
Perillyl alcohol for the treatment of temozolomide-resistant gliomas.


Perillyl alcohol (POH) is a monoterpene that has been used orally for the treatment of systemic cancer. However, when used orally significant gastrointestinal side effects and lack of overall efficacy were documented. Recently, in a phase II trial in Brazil for the treatment of temozolomide (TMZ)-resistant malignant gliomas, POH was well tolerated when administered intranasally. The present study explores the effects and mechanisms of POH on TMZ-sensitive and TMZ-resistant glioma cells. To show whether intranasal delivery of POH was effective for the treatment of TMZ-resistant gliomas, animals bearing intracranial tumors were given POH intranasally. Animals treated through intranasal administration of POH exhibited a decrease in tumor growth and an increase in survival. Our data show that POH is an effective anti-glioma cytotoxic agent for TMZ-resistant gliomas when administered intranasally.

NEO212, temozolomide conjugated to perillyl alcohol, is a novel drug for effective treatment of a broad range of temozolomide-resistant gliomas.


Patients with glioblastoma multiforme (GBM), a malignant primary brain tumor, inevitably develop resistance to standard-of-care chemotherapy, temozolomide. This study explores the effects of the novel agent NEO212, a conjugate of temozolomide to perillyl alcohol, on temozolomide-resistant gliomas. NEO212 was tested for cytotoxic activity on three human temozolomide-resistant glioma cell lines, which were resistant to temozolomide based on overexpression of the base excision repair (BER) pathway, mismatch repair (MMR) deficiency, or overexpression of O(6) methylguanine-DNA methyltransferase (MGMT). BER expression was evaluated by Western blotting and PARP activity. MMR deficiency was determined by Western blotting and microsatellite instability. MGMT overexpression was evaluated by Western blotting and O(6)-benzylguanine (O(6)BG) inhibition. For in vivo evaluation of NEO212, temozolomide-resistant glioma cells were implanted into immune-incompetent mice, and NEO212 was administered. NEO212, at equimolar concentrations of temozolomide, was more cytotoxic to temozolomide-resistant than temozolomide and not toxic to normal cells. NEO212-induced cell death in temozolomide-resistant glioma cells was independent of such mechanisms of resistance as high levels of MGMT, MMR deficiencies, or overexpression of BER proteins. NEO212 functions as a DNA alkylating agent, similar to temozolomide; however, this novel conjugate is unique for it may induce endoplasmic reticulum (ER) stress and inhibits autophagy. In vivo studies show that NEO212 reduces intracranial tumor growth and increases animal survival without significant toxicity. These results demonstrate that NEO212 is an effective drug against malignant gliomas that can be used for a broad range of newly diagnosed and temozolomide-resistant gliomas.

NEO212 Inhibits Migration and Invasion of Glioma Stem Cells. Marin-Ramos NI, Thein TZ, Cho HY, Swenson SD, Wang W, Schönthal AH, Chen TC, Hofman FM.


Glioblastoma multiforme is a malignant brain tumor noted for its extensive vascularity, aggressiveness, and highly invasive nature, suggesting that cell migration plays an important role in tumor progression. The poor prognosis in GBM is associated with a high rate of tumor recurrence, and resistance to the standard of care chemotherapy, temozolomide (TMZ). The novel compound NEO212, a conjugate of TMZ and perillyl alcohol (POH), has proven to be 10-fold more cytotoxic to glioma stem cells (GSC) than TMZ, and is active against TMZ-resistant tumor cells. In this study, we show that NEO212 decreases migration and invasion of primary cultures of patient-derived GSCs, in both mesenchymal USC02 and proneural USC04 populations. Furthermore, in an in vivo orthotopic glioma model, NEO212 decreases tumor progression by reducing invasion of GSCs, thereby increasing survival time of mice. These studies indicate that NEO212, in addition to cytotoxicity, can effectively reduce migration and invasion in GSCs, thus exhibiting significant clinical value in the reduction of invasion and malignant glioma progression.
CLINICAL TRIALS: Now Enrolling at the USC Brain Tumor Center

Have you or someone you know recently been diagnosed with a brain tumor? Choosing the right treatment can be challenging. To find out more about our breakthrough treatments, contact our specialized brain tumor team at (844) 33-BRAIN (844-332-7246) or email frances.chow@med.usc.edu.

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Newly Open: USC partners with TVax Biomedical to open the TVI-Brain-1 cancer vaccine

The USC Brain Tumor Center is now recruiting patients to a phase 2b personalized vaccine-based immunotherapy trial for newly diagnosed glioblastoma. TVI-Brain-1 (TVax Biomedical) is a treatment that uses each patient’s own cancer cells collected during surgery to create a cancer-targeting vaccine. When the body is exposed to the vaccine, it stimulates T cells, which are harvested from the blood and are subsequently stimulated, expanded, and infused back to the patient. ClinicalTrials.gov identifier NCT05685004.
At the USC Brain Tumor Center, our mission is to provide exceptional, comprehensive and innovative concierge-style treatment plans for adults and children with all types of brain tumors and related conditions. Giveto.USC.edu

We Are the USC Brain Tumor Center

NEUROSURGERY
- Gabriel Zada, MD, MS
- Thomas Chen, MD, PhD
- Josh Neman, PhD
- Frank Attenello, MD, MS
- Cheng Yu, PhD
- Oscar Aurelio, PhD
- Camelia Danilov, PhD
- Steve Swenson, PhD
- WeiJun Wang, MD

NEUROLOGY
- Helena Chui, MD

NEURO-ONCOLOGY
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- Frances Chow, MD
- James Hu, MD
- Tania Vartanians, MS, PA-C

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- Mark Shiroishi, MD

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- Anna Mathew, MD
- Michael Selsted, MD, PhD

NORRIS CANCER CENTER
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- Caryn Lerman, PhD

NEURO-OPHTHALMOLOGY
- Kimberly Gokoffski, MD, PhD

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- Arthur Toga, PhD
- Paul Thompson, PhD
- Danny Wang, PhD

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- David Craig, PhD
- Bodour Salihia, PhD
- Daniel Weisenberger, PhD

CLINICAL TRIALS
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- Sandy Leong, BSN, RN, CCRP
- Aida Lozada, MA

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- Saman Sedighi, MD
- Jean Chen Shih, PhD
- Anna Wu, PhD
- Min Yu, PhD
- Benislav Zlokovic, PhD

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- Roberta Mckean-Cowdin, PhD
- Kimberly Siegmund, PhD
- Joseph Wiemels, PhD

CHLA
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- Jaclyn Beigel, PhD
- Peter Chiarelli, MD, PhD
- Jason Chu, MD, MSc
- Tom Davidson, MD
- Susan Durham, MD, MS
- Anat Epstein-Erdich, MD, PhD
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- C. Jason Liu, MD, PhD
- Ashley Margol, MD, MS
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- Rebekah Ghazaryan, RN
- Erika Gonzales, RN
- Tania Vartanians MS, PA-C

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ADMINISTRATIVE
- Nikos Carli
- Rodrigo Faccio
- Richard Hagy, PhD
- Jerry Moses

For more information about brain tumor clinical trials, please contact Aida Lozada, Clinical Trials Manager, at Aida.Lozada@med.usc.edu

Please email us with your questions at BTC@med.usc.edu

Learn more at: BTC.keckmedicine.org