FISCAL YEAR 2023 STEWARDSHIP REPORT

Ivy Brain Tumor Center | Barrow Neurological Foundation

DISCOVERING HOPE. EVERY DAY.

Thanks to the generosity of Barrow Neurological Foundation donors, we have engaged more than 3,500 patients with incurable brain tumors in the past five years, breaking scientific boundaries and reshaping the global approach to brain tumor drug development. Every member of our multidisciplinary team—from our surgeons and scientists to our oncologists and nurses—is focused on finding a cure for brain cancer.

Patients come to us from around the world to gain access to our array of clinical trials, finding treatment options when they have been told there are none.

15
Phase 0 clinical trials opened

3,500+
Patients screened for clinical trials

500
Patients enrolled in clinical trials

12+
Countries from which our patients have traveled to participate

CREATIVE SCIENTIFIC

STRATEGIES

The Ivy Brain Tumor Center is committed to pushing the boundaries of brain cancer research. As the foremost hub for brain tumor drug development, we are spearheading groundbreaking, early-phase clinical trials aimed at discovering innovative therapies that can save lives.

The blood-brain barrier is the brain's built-in defense mechanism. It forms a tight seal to protect the brain from potentially harmful toxins, but it also prevents most drugs from getting in. For patients with deadly forms of brain cancer, this severely limits the effectiveness of treatments.

We are developing a breakthrough drug-delivery method that can bypass the blood-brain barrier called superselective intra-arterial infusion, or SSIAI. This novel technique can deliver a highly concentrated dose of experimental drug directly to the brain tumor while minimizing systemic side effects. With SSIAI, a surgeon threads a tiny catheter through an artery in the patient's wrist that runs directly to the tumor. An infusion of the study drug is released directly into the blood vessels feeding the tumor. Simultaneously, another drug known to open the blood-brain barrier is given to make way for the study drug to attack tumor cells. Because of Barrow Neurological Foundation donors, Ivy Center patients can participate in this novel treatment trial.

"For us, this is an exciting new chapter. It is the first time in brain tumor patients that such a protocol has been pursued, and it could be opening the door to an entirely new method of getting difficult-to-penetrate drugs into the patients who need them."

Nader Sanai, MD
Director, Ivy Brain Tumor Center

SUPERSELECTIVE INTRA-ARTERIAL INFUSION

Watch a video demonstrating how this breakthrough direct-to-tumor drug delivery method works:

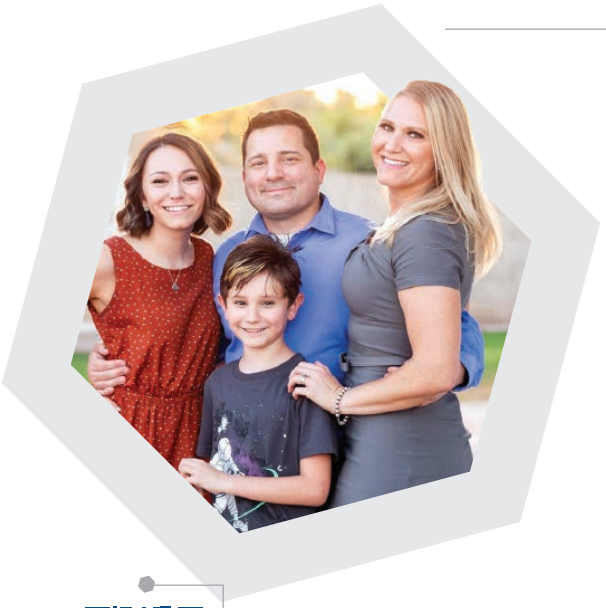
IvyBrainTumorCenter.org/SSIAI

CULTIVATING A CULTURE

OF HOPE

At the Ivy Brain Tumor Center, our goal is to live at the forefront of scientific discovery and innovation, but our patients come first. A culture of hope fuels our team and aims to sustain patients, caregivers and families as they face devastating diseases and unimaginable challenges. Each Ivy Center patient has an incredible and inspiring story.

For **Christi Endicott**, it all started with relentless headaches, then episodes of heat and nausea, sometimes 13 in one day. The cause was a grape-sized tumor behind her right eye. During an 11-hour surgery, Dr. Sanai, Christi's neurosurgeon, removed the bone that forms the eye socket and cheek to reach the tumor. After surgery, she had double vision and temporary numbness on the left side of her body. Christi overcame those challenges, returned to health and began training for the highly coveted Boston Marathon. She qualified and ran the race this year. Completing the marathon, she said, was a celebration of life.



Jenn Ortiz is in the fight of her life and she's determined to win. When faced with two glioblastoma brain tumors, Jenn refused to be defeated by the tumors. She enrolled in a clinical trial testing an experimental drug genetically matched to her specific tumor type. Today, she's celebrating more than three years since her diagnosis. She's committed to helping find a cure, for herself and everyone after her.

"When given an opportunity to participate in a clinical trial at the Ivy Brain Tumor Center – take it! Experimental clinical trials provide information that will eventually lead to a cure, and most importantly, they give HOPE."

Jenn Ortiz
Patient, Ivy Brain Tumor Center

IVY NEWSROOM

To stay up to date on the latest news and announcements from the Ivy Center, check out our newsroom:

IvyBrainTumorCenter.org/About/Newsroom

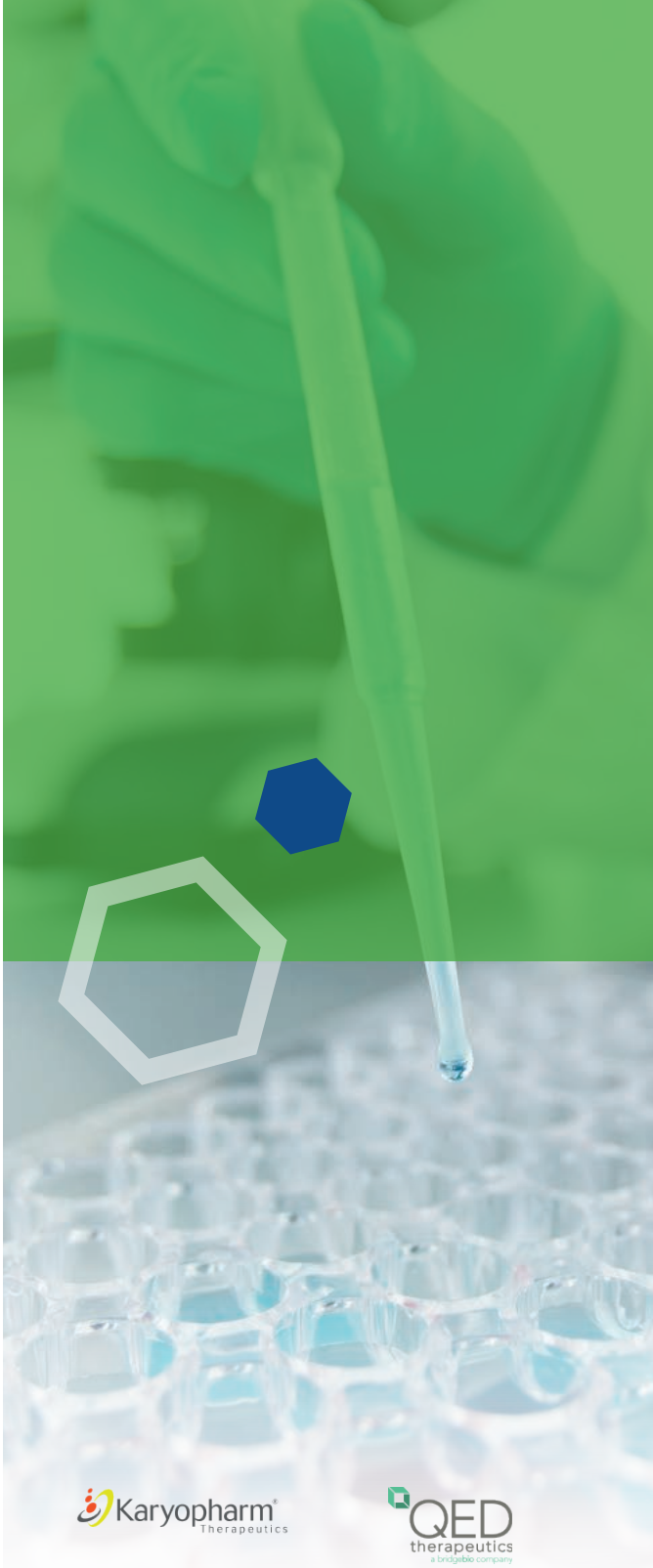
BIOTECH AND BIOPHARMA INDUSTRY

PARTNERSHIPS

The Ivy Brain Tumor Center's paradigm-shifting, industry-engagement model has allowed us to partner with more than 25 biopharmaceutical companies in just five years. Companies large and small know that when they partner with us, they are partnering with the nation's largest operative brain tumor program that's employing a bold, early-phase clinical trials strategy to rapidly identify new therapies. Moreover, we pay for all laboratory and clinical trial expenses and convey all related intellectual property to our partners. In turn, we get exclusive access to first-in-class drugs, with no restrictions on our ability to share our findings with the greater scientific community.

Promising findings were recently announced from a collaborative Phase 0/2 study, supported by GSK, of an investigational drug for newly diagnosed glioblastoma with unmethylated MGMT, an important molecular marker. Patients treated with the study drug, niraparib, achieved a median progression-free survival of 11.7 months, comparing favorably to the 5.3 months historically reported with the standard-of-care chemotherapy drug. "This clinical trial identifies niraparib as highly brain penetrant and raises the possibility that PARP inhibition in combination with radiotherapy may be effective for the two-thirds of newly diagnosed glioblastoma patients who are MGMT-unmethylated and insensitive to the standard of care (temozolomide)," says Dr. Sanai.

Based on encouraging pharmacokinetic signals coupled with the pharmacodynamic and survival data from this study, GSK and the Ivy Center will soon announce a global, randomized Phase 3 clinical trial for niraparib in more than 100 medical centers, across 15 countries around the world. This is a validation of our founding thesis and the effectiveness of our Phase 0 program, and more importantly, it's an opportunity to provide the first life-prolonging drug for glioblastoma patients in nearly 20 years.



MENTORING SCIENTISTS AND CLINICIANS

THE NEXT GENERATION

The Ivy Brain Tumor Center is committed to providing education and training opportunities at every level, from high school and undergraduate students to neurosurgical trainees and postdoctoral fellows. Our world-class research environment and culture of excellence introduce aspiring young investigators to innovative ideas and cutting-edge neuroscience, paving the way for the next generation of brain cancer specialists.

Undergraduate students who intern at the Ivy Center work shoulder-to-shoulder with our senior investigators on groundbreaking brain tumor research, fueling their ambition to pursue a career in science and medicine.

WILLIAM KNIGHT

William has quickly become one of the Ivy Center Pharmacokinetic Lab's most valuable team members. He began as a research technician and is now continuing his academic career as a PhD student. In the lab, William focuses on performing novel procedures, assay developments and validations. He's made significant contributions to several preclinical and clinical projects and has co-authored abstracts for annual meetings, such as the Society for Neuro-Oncology and the American Association for Cancer Research. He has consistently demonstrated the ability to deliver high-quality research results.

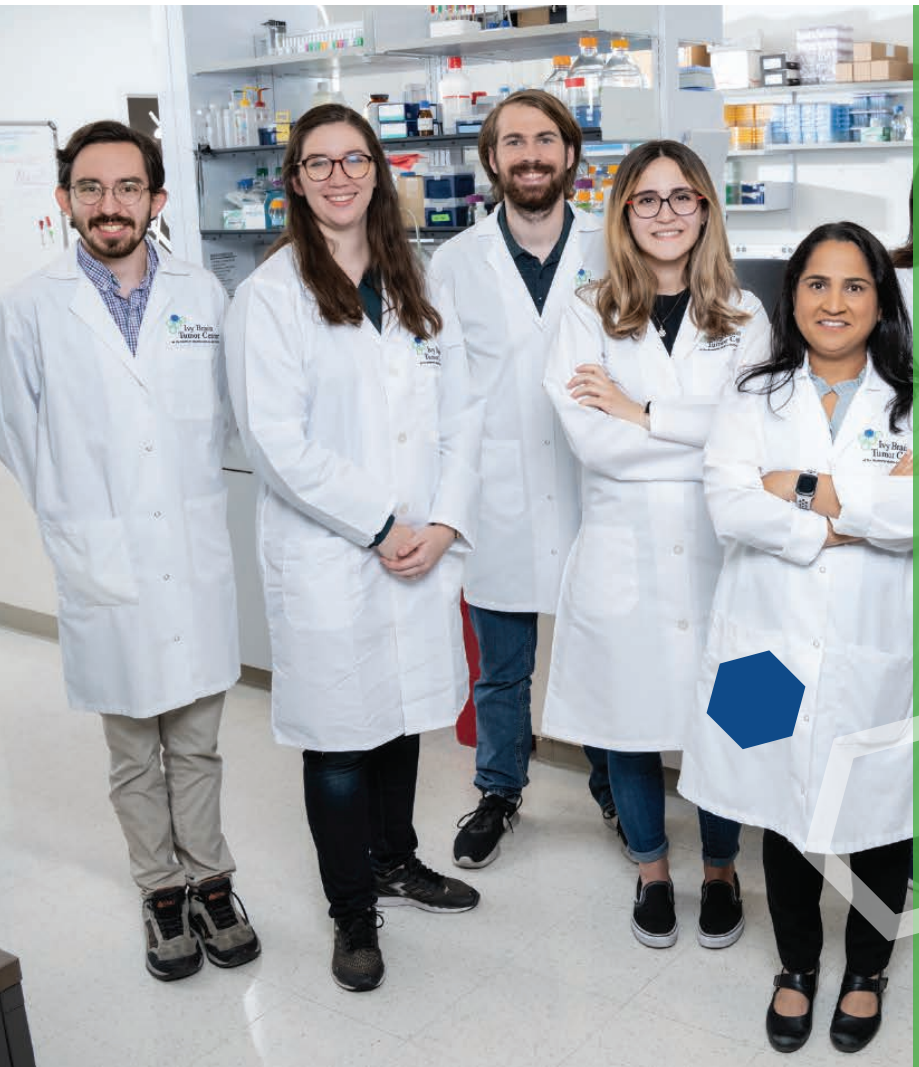
DR. CHARUTA FUREY

Barrow neurosurgery residents have special access to advanced training opportunities at the Ivy Center. Sixth-year neurosurgery resident Dr. Charuta Furey is a trailblazer in her field, and an inspiration to women, who make up only six percent of practicing neurosurgeons. Dr. Furey is an investigator in the Ivy Center's liquid biopsy program, which aims to obtain real-time insights into how a patient's brain tumor is responding to experimental treatment. For this initiative, she safely extracts a small quantity of cerebrospinal fluid (CSF) from a hidden reservoir under a patient's scalp and our team then analyzes tumor-specific genetic material from the CSF to identify potential mechanisms of drug resistance. Dr. Furey recently received a Neurosurgery Research and Education Foundation (NREF) Research Fellowship Grant for her project utilizing this new liquid biopsy method to characterize glioma evolution in a Phase 0/2 clinical trial of niraparib for newly diagnosed glioblastoma. She was one of only two recipients of this prestigious grant awarded on behalf of the American Association of Neurological Surgeons.

DR. NASSER YAGHI

Dr. Yaghi is the Ivy Center's 2023 neurosurgical oncology fellow. He is a graduate of Baylor College of Medicine and completed his neurosurgical training at Oregon Health Sciences University. Dr. Yaghi quickly made a name for himself as an acclaimed neurosurgical trainee, completing numerous clinical and basic science research projects, including a research fellowship at the neuro-oncology branch of the National Cancer Institute. As a fellow at the Ivy Center, Dr. Yaghi has the opportunity to focus on developing his expertise in brain tumor surgery amongst our leading neurosurgeons, as well as preparing for his career as a clinical trials specialist in neuro-oncology. Funds from the Francis and Dionne Najafi Endowed Chair for Neurosurgical Oncology were used to support this important fellowship.

The Ivy Center team currently includes 12 postdoctoral fellows and 15 research technicians. In addition, 59 percent of these young scholars are women, bolstering and encouraging the underrepresented proportions of women in science and medicine.



"We are committed to preparing the next generation of bioscience leaders. Our culture of excellence introduces young, bright minds to innovative ideas and provides opportunities for professional and personal growth."

Shwetal Mehta, PhD
Deputy Director,
Ivy Brain Tumor Center

SCIENTIFIC COMMUNITY

ENGAGEMENT

The Ivy Brain Tumor Center routinely leads new presentations of our progress at national and international conferences. The greater scientific community and global brain tumor patient population benefit from our innovative scientific and clinical approaches, learning from us which drugs hold the greatest promise.

Chicago, Illinois

The Ivy Center joined more than 40,000 investigators at the American Society for Clinical Oncology, the largest clinical cancer meeting in the world. Here, we announced the results of our Phase 0 clinical trial of the PARP1/2 inhibitor niraparib, plus fractionated radiotherapy, in newly diagnosed glioblastoma patients. Initial results saw all patients achieve high drug levels in tumor tissue. This supports accelerated clinical development of niraparib in newly diagnosed glioblastoma patients. We also announced results of a Phase 0 clinical trial of infigratinib in high-grade gliomas. A recent Phase 2 study of infigratinib showed no survival benefit, and our Phase 0 study suggests this inefficacy was driven by limited levels of tumor penetration and poor target modulation. Results from both studies underscore the critical importance of Phase 0 clinical trials in brain cancer.

Madrid, Spain

The European Society for Medical Oncology is the largest and most influential cancer research meeting for Europe, Asia, and the Middle East, convening more than 33,000 investigators from 155 countries. In a crowded auditorium, Ivy Center investigators announced the initial results of our Phase 0/1 clinical trial of the Ataxia telangiectasia mutated (ATM) kinase inhibitor AZD1390 in combination with radiation therapy in recurrent glioblastoma. This novel Phase 0/1 study demonstrated, for the first time in humans, that AZD1390 may be a potent radiosensitizer in patients with glioblastoma. Thanks to Barrow Neurological Foundation donors, the Ivy Center was able to underwrite the research efforts needed for our patients to be the first-ever recipients of this promising drug.

Vancouver, Canada

The Society for Neuro-Oncology Annual Meeting is the world's largest neuro-oncology conference, attracting more than 2,600 researchers and clinicians from more than 40 countries. At the 2023 conference, Ivy Center scientists and investigators presented five oral abstracts and five posters, representing a broad portfolio of pharmacodynamic and pharmacokinetic-driven clinical trials. Dr. Sanai announced groundbreaking results from a Phase 0/2 trial of niraparib in patients with newly diagnosed glioblastoma with unmethylated MGMT. In the Phase 2 component of the study, patients treated with niraparib achieved a median progression-free survival of twice that of patients treated with the standard treatment of temozolomide. Based on these results, all Phase 0 study patients with unmethylated MGMT promoter tumor status qualified for the Phase 2 component of the study.

RESEARCH AND CLINICAL CARE

INTEGRATION

Dr. Yoshie Umemura was recently appointed as Chief Medical Officer of the Ivy Brain Tumor Center and Chief of Neuro-Oncology and the William and Joan Shapiro Chair of Neuro-Oncology at Barrow Neurological Institute. A luminary in the field of neuro-oncology, she will build on the Ivy Center's robust clinical trials program and translate those findings directly into patient care.

Dr. Umemura's professional path has been forged by a focus on research projects that advance the care of, and quality of life in, patients with brain tumors. She is deeply invested in translational brain tumor research—specifically gliomas and glioblastoma—and she plans to participate in a variety of clinical trial developments. "Our main research focus is translational clinical research and we are working closely with scientists within and outside of our institution to bring exciting bench science to the bedside," she says.

Dr. Umemura also is dedicated to personalized, precision medicine, where the molecular underpinnings of each unique patient dictate their course of treatment. With research interests in experimental therapies for brain cancer patients, Dr. Umemura is uniquely suited for the Ivy Center's cutting-edge clinical trials program. "Dr. Umemura is an expert in Phase 0 clinical trials," says Dr. Sanai. "She comes to us as one of the few neuro-oncologists with prior experience undertaking the full scope of these protocols, and she is part of a new generation of neuro-oncologists focused on drug development using the operating room as an accelerator."

Dr. Umemura completed her residency at Dartmouth-Hitchcock Medical Center and a clinical fellowship at Memorial Sloan Kettering Cancer Center. She comes to the Ivy Center and Barrow from the University of Michigan, where she served as Michigan Medicine's Director of Neuro-Oncology.

"I'm looking forward to combining clinical care and research care and making that bridge more seamless because that is what's going to expedite clinical research that translates to improving the standard of care for brain tumor patients."

Yoshie Umemura, MD
Ivy Brain Tumor Center

NEW GLOBAL HEADQUARTERS

Experience a virtual fly-through preview of the new global headquarters at:

IvyBrainTumorCenter.org/New-Global-Headquarters

THANK YOU
FOR YOUR SUPPORT

The Ivy Brain Tumor Center is a pioneering institution, rewriting the narrative of brain cancer research and treatment on a global scale. In 2024, we will open the doors to our new global headquarters. This state-of-the-art 75,000-square-foot facility, spanning five floors, will host more than 50 scientists, investigators, and operational staff. Its transparent design offers solace to patients and their families, allowing them to witness the dedicated efforts of laboratory teams working diligently to find a cure.

None of this progress would be possible without generous support from our community. Your role in achieving these ambitious goals cannot be emphasized enough. The Ivy Center relies solely on dedicated donors like you to expand its reach to brain cancer patients worldwide.

On behalf of our entire team, we thank you for your support and for helping us get closer to our goal of finding a cure for brain cancer.

With Gratitude,

Nader Sanai, MD
Director, Ivy Brain Tumor Center

NADER SANAI, MD

Dr. Sanai, director of the Ivy Brain Tumor Center, is an internationally-recognized neurosurgical oncologist with clinical and research expertise in the treatment of all brain tumors.

Barrow Neurological Foundation

Barrow Neurological Foundation
2910 N. Third Ave., Ste. 450, Phoenix, AZ 85013
www.SupportBarrow.org