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2024 NEUROSURGERY RESIDENCY AT BRIGHAM AND WOMEN'S HOSPITAL, BOSTON CHILDREN HOSPITAL, AND HARVARD MEDICAL SCHOOL



Mass General Brigham



Boston  
Children's  
Hospital



HARVARD  
MEDICAL SCHOOL

## NEUROSURGERY RESIDENCY

ALUMNI 2004-2024  
FACULTY RESEARCH &  
PUBLICATIONS 2020- 2024

## INTRODUCTION



Thank you for your interest in the Neurosurgery Residency Program of Brigham and Women's Hospital, Boston Children's Hospital and Harvard Medical School. In our program, trainees are exposed to a wealth of neurosurgical pathology. Residents learn the fundamentals of surgical skills, the care of critically ill patients, and the principles of neurologic evaluation, differential diagnosis and interpretation of neuro-imaging. These goals are facilitated by clinical rotations on ancillary services and in the various neurosurgery hospital services. A rich and graduated neurosurgical experience and close mentorship by the thirty-nine clinical faculty allow the development and maturation of outstanding operating skills. Technical and clinical experiences are complemented by emphasis on clinical judgment, evidence-based outcome assessment, and thoughtful analysis of morbidity. These and core neuroscience educational objectives are covered at scheduled weekly conferences, in bedside teaching and in the operating room. Brigham and Women's Neurosurgery Residency Program is committed to providing two years of basic or clinical research time to enhance your development

as future academic neurosurgeons. We encourage participation at national meetings and have numerous visiting professors come to Boston to interface with our trainees.

### WE ARE COMMITTED TO ADDING VALUE TO EVERY FACET OF YOUR TRAINING.

On behalf of each faculty member of the Department of Neurosurgery and our team of residents, we can affirm that we have no mission more sacred than that of training the next generation of neurosurgeons. Specific educational curriculum objectives shall guide your development at every stage. You shall be taught and individually mentored, and critiqued, but also asked to evaluate us and help the Program integrate numerous educational and clinical innovations. Most of all, you will grow into a surgically skilled and academically-oriented neurosurgeon, positioned to be a future leader in the world of neurosurgery.

While a student clerkship experience in our Department is not required for application, it is highly recommended, as it will allow us to get better acquainted. Rotations can be arranged at any time during the junior or senior medical student years. Visit [www.brighamandwomens.org/nsresidency](http://www.brighamandwomens.org/nsresidency) to learn more about our program. Please do not hesitate to contact us directly at any stage of the application and matching process if we can answer any of your questions about the BWH/BCH/HMS Residency Program.

Sincerely,

**G. REES COSGROVE, MD, FRCSC, FAANS**  
RESIDENCY PROGRAM DIRECTOR,  
BRIGHAM AND WOMEN'S HOSPITAL,  
BOSTON CHILDREN'S HOSPITAL,  
HARVARD MEDICAL SCHOOL

## PARTNERING INSTITUTIONS

### Mass General Brigham

Mass General Brigham is an integrated academic health care system dedicated to advancing patient care, research, and education. It connects a full continuum of care, including academic medical centers, community and specialty hospitals, physician networks, home care, and long-term care services. Committed to addressing the toughest challenges in medicine, Mass General Brigham is a nonprofit organization serving both local communities and global needs. As a leading biomedical research institution and principal teaching affiliate of Harvard Medical School, it brings together top minds to drive innovation and improve health outcomes.

### Boston Children's Hospital

Boston Children's Hospital has the largest training program for pediatricians and pediatric subspecialists in the country. Every year, 400 of the country's best and brightest medical and surgical trainees come to Boston Children's from around the world; more than half come from the top medical schools.

### HARVARD MEDICAL SCHOOL

Established in 1782, Harvard Medical School began with a handful of students and a faculty of three. The first classes were held in Harvard Hall in Cambridge, long before the school's iconic quadrangle was built in Boston. With each passing decade, the school's faculty and trainees amassed knowledge and influence, shaping medicine in the United States and beyond. Some community members -and their accomplishments- have assumed the status of legend. Today, the School continues to enhance its curriculum to meet the needs of 21st century medicine by integrating clinical and basic science across the curriculum, developing new models for clinical education and engaging students in an in-depth scholarly experience.

# In memory of R. Michael Scott, MD



February 19, 1941 – August 4, 2023



*This book is dedicated to Dr. R Michael Scott who passed away this past August. Dr. Scott was a brilliant neurosurgeon and researcher who greatly contributed to the study of vascular malformations of the brain in pediatric patients and neurosurgical treatment of stroke in children.*

*Dr. Scott was a known leader, teacher, and mentor across Boston Children's, Harvard Medical School, and Brigham and Women's. We thank him for his years of dedication to his patients, our team, and to the neurosurgery field as a whole.*

## OUR ALUMNI, 1913-2003

1913	Charles E. Dowman, Jr.	1923-1925	R. Glen Spurling	1927-1929	Ignaz Oljenick	1931-1932	Bronson Ray	1956-1959	Ernest Matthews	1979-1984	Robert M. Beatty
1913	Frederic Bremer	1923-1924	Tracy J. Putnam	1927-1928	Dmitri Bagdesar	1931-1932	Richard U. Light	1958-1960	Robert Shick	1980-1984	Stephen Ofori-Kwakye
1913	John J. Morton	1924	Geoffrey Jefferson	1927-1928	John F. Fulton	1932	Francis Murphey	1959-1962	John T. Garner	1981-1986	Gregory W. Hornig
1913-1914	Wilder Penfield	1924-1925	William P. Van Wagenen	1928-1929	W. Gayle Crutchfield	1932	C. C. Bishop	1960-1964	Francis X. Rockett	1982-1987	John R. Adler, Jr.
1918-1919		1925	Arthur van Dessel	1928-1929	Frederic Schreiber	1932	D. Vasiliu	1961	August W. Geise	1983-1985	Luis M. Zavala-Roman
1913-1914	Charles Bagley Jr.	1925	Boris M. Fried	1928-1929	Harold M. Teel	1932	Arsit A. Stender	1962-1963	Eric Wisiol	1984-1989	Richard Ellenbogen
1913-1914	Carl W. Rand	1925-1926	Jean Morelle	1928-1929	Richard C. Buckley	1932	Ferdinand Verbeek	1962-1963	David L. Kelly, Jr.	1985-1988	Robert Peterson
1914-1916	Gilbert Horrax	1925-1926	Leo M. Davidoff	1928-1929	Alan C. Gairdner	1932	F. N. Glenn	1962-1966	Larry K. Page	1986-1991	Clifford M. Gall
1919-1928		1925-1926	Francis C. Grant	1928-1929	Edwan M. Deery	1932	L. C. Kendall	1963	Ronald Birkenfeld	1987-1992	Matthew R. Moore
1928-1932		1925-1928	Franc D. Ingraham	1928-1934	Louise Eisenhardt	1932	Vittorio Putti	1963-1965	Michael J. Jerva	1988-1995	Sumeer Sathi
1914-1915	Edward B. Towne	1926	Walter Lehmann Gottingen	1929	A. Herbert Olivecrona	1932	Arthur L. D. Pattison	1963-1967	Edward L. Katz	1989-1995	Philip A. Starr
1914-1915	L.H. Weed	1926	Edgar J. Fincher, Jr.	1929	Attracta Halpenny	1932-1933	Lycergus Davey	1964-1968	Alan D. Rosenthal	1990-1992	Patrick A. Juneau III
1915-1918	Clifford B. Walker	1926	William J. German	1929	F. A. R. Stammers	1933	Edvard Busch	1964-1965	Donliin M. Long	1990-1996	Simcha J. Weller
1915-1917	Conrad Jacobson	1926-1928	Hugh W. B. Cairns	1929-1930	Gaston de Coppet	1939-1942	Eben Alexander, Jr.	1966-1970	Howard M. Eisenberg	1991-1995	P. Langham Gleason
1916-1917	Samuel C. Harvey	1926-1927	Georges Schaltenbrand	1930	Daniel Petit-Dutaillis	1946-1947	Donald Matson	1967-1968	John M. Tew	1991-1996	Faith Barnett
1917-1919	Henry R. Viets	1926-1927	Claude S. Beck	1930	Daniel C. Bell	1939-1943	Donald Matson	1967-1971	Edwin G. Fischer	1991-1997	Thomas Moriarty
1917-1920	J.J. Keegan	1927	Lawrence B. Kubie	1930-1931	William R. Henderson	1946-1947	Frank Nulsen	1968-1971	Robin Davidson	1992-1997	Marc. S. Schwartz
1919-1920	Howard Fleming	1927	Arthur J. McLean	1930-1931	Thomas I. Hoen	1941-1944	Griffith R. Harsh, III	1968-1969	A. Loren Amacher	1992-1998	John K. Park
1919	Percival Bailey	1927-1928	Trygve Gunderson	1930-1931	Francois Ody	1942-1944	John J. Lowrey	1968-1969	J. Gordon McComb	1992-1998	Craig van Horne
1922-1925		1927-1928	Cameron L. Haight	1930-1931	Thomas Hoen	1948-1949	Albert Farley	1970-1974	John W. Walsh	1993-1999	Subu N. Magge
1926-1928		1927-1928	Joseph Barr	1930-1931	Johannes Rives Tartu	1949-1950	Anthony Susen	1970-1975	James E. McLennan	1993-2000	Kai U. Frerichs
1920-1921	Charles E. Locke	1927-1928	Richard H. Meagher	1931-1932	Bronson Ray	1949-1953	Edgar Bering	1972-1978	Thomas Arkins	1995-2001	Adel Malek
1920	Charles P. Symonds	1927-1928	John G. Scarff	1931-1932	Carl F. List	1949-1952	Robert Mc Laurin	1972-1976	J. Parker Mickle	1996-2003	Peng Chen
1920	F. E. B. Foley	1927-1928	Cobb Pilcher	1931-1932	Abraham Kaplan	1950-1953	John Shillito, Jr.	1975-1977	Dennis L. Johnson	1996-2000	Claudia Martin
1921-1922	Daniel W. Wheeler	1927-1928	E. Jefferson Browder	1931-1932	Benno Schlesinger	1953-1957	E. Bruce Hendrick	1975-1979	Joseph Ordia	1999-2000	Steven P. Leon
1921-1922	Paul Martin	1927-1928	Cyril B. Courville	1931-1932	Robert A. Groff	1953-1959	Fred Fowler	1976-1980	David C. Y. Kung	2001-2002	Alexandra Golby
1923	J. Paterson Ross	1927-1928	Frederick E. Kredel	1931-1932	William (C. G.) de Gutierrez-Mahoney	1954-1956	Walt Cotter	1997-1980	Clarence S. Greene		
1923	Ferdinand C. Lee					1954-1961					
1923-1924	Norman M. Dott										
1929											

## CLASS OF 2004



### **KADIR ERKMEN, MD**

**MEDICAL SCHOOL**  
University of Maryland School of Medicine

**FELLOWSHIP**  
Skull Base Surgery, University of Arkansas  
Neuroendovascular Surgery, University of Texas

**SUBSEQUENT EMPLOYMENT**  
Faculty, Dartmouth Hitchcock Medical Center

**CURRENT EMPLOYMENT**  
Director of Cerebrovascular Neurosurgery  
& Neurosurgery Residency Program, Temple University



### **STEPHANIE GREENE, MD**

**MEDICAL SCHOOL**  
Albany Medical College

**FELLOWSHIP**  
Pediatric Neurosurgery,  
University of Washington Children's Hospital

**SUBSEQUENT EMPLOYMENT**  
Director of Pediatric  
Neurosurgery, Hasbro Children's Hospital

**CURRENT EMPLOYMENT**  
Faculty, University of Pittsburgh

## CLASS OF 2006



### **IAN JOHNSON, MD**

**MEDICAL SCHOOL**  
University of Kentucky School of Medicine

**FELLOWSHIP**  
Orthopedic Spine Surgery, New England Baptist Hospital  
Minimally Invasive Spine Surgery, Good Samaritan Hospital

**SUBSEQUENT EMPLOYMENT**  
Faculty, Neurological Surgery, The Medical University of South Carolina, North Broward Health Coral Springs Medical

**CURRENT EMPLOYMENT**  
Chief of Neurosurgery,  
University Neuroscience Institute, UCSF-Fresno



### **DEEPA SONI, MD**

**MEDICAL SCHOOL**  
Howard University

**FELLOWSHIP**  
Cerebrovascular, Macquarrie University

**SUBSEQUENT EMPLOYMENT**  
Faculty, Berkshire Medical Center

## CLASS OF 2005



### **CHIMA OHAEBULAM, MD**

**MEDICAL SCHOOL**  
University of Nigeria Medical School

**FELLOWSHIP**  
Spinal Neurosurgery, Brigham and Women's Hospital

**SUBSEQUENT EMPLOYMENT**  
Faculty, New England Baptist Hospital

## CLASS OF 2007



### **BRYAN FIGUEROA, MD**

**MEDICAL SCHOOL**  
University of Michigan

**FELLOWSHIP**  
Cerebrovascular Surgery,  
Indianapolis Neurosurgical Group

**SUBSEQUENT EMPLOYMENT**  
Staff, Spectrum Health



### **JONATHAN SLOTKIN, MD**

**MEDICAL SCHOOL**  
University of Maryland School of Medicine

**FELLOWSHIP**  
Spine Surgery, New England Baptist Hospital

**SUBSEQUENT EMPLOYMENT**  
The Washington Brain & Spine Institute

**CURRENT EMPLOYMENT**  
Chief of Spine Surgery and Spinal Cord Injury Research, Geisinger Medical Center

## CLASS OF 2008



### **SATHISH SUBBIAH, MD, MS**

**MEDICAL SCHOOL**  
Harvard Medical School

**GRADUATE**  
Yale University

**FELLOWSHIP**  
Endoscopic/Minimally Invasive Spine  
Surgery, Northwestern Memorial Hospital

**SUBSEQUENT EMPLOYMENT**  
Faculty, Mount Sinai School of Medicine  
Practice, Orthopedic Associates of Long Island

## CLASS OF 2010



### **LANCE GOVERNALE, MD**

**MEDICAL SCHOOL**  
Harvard Medical School

**FELLOWSHIP**  
Shillito Pediatric Fellow, Boston Children's Hospital

**SUBSEQUENT EMPLOYMENT**  
Faculty, Nationwide Children's Hospital, Ohio  
State

**CURRENT EMPLOYMENT**  
Chief of Pediatric Neurosurgery, University of  
Florida



### **ALBERT KIM, MD, PHD**

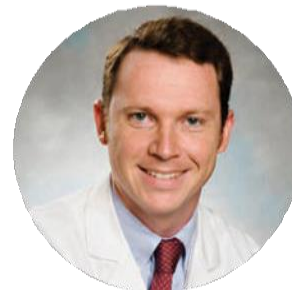
**MEDICAL SCHOOL**  
New York University

**GRADUATE/PHD**  
New York University

**FELLOWSHIP**  
Skull Base/Vascular, Jackson Memorial  
Hospital

**SUBSEQUENT EMPLOYMENT**  
Faculty, Washington University

## CLASS OF 2009



### **IAN DUNN, MD**

**MEDICAL SCHOOL**  
Harvard Medical School

**FELLOWSHIP**  
Skull Base Surgery, University of Arkansas

**SUBSEQUENT EMPLOYMENT**  
Faculty, Brigham and Women's Hospital

**CURRENT EMPLOYMENT**  
Wilkins Professor and Chair of the  
Department of Neurosurgery, University of  
Oklahoma



### **ALEX PAPANASTASSIOU, MD**

**MEDICAL SCHOOL**  
University of California, San Francisco

**FELLOWSHIP**  
Epilepsy, Yale University

**SUBSEQUENT EMPLOYMENT**  
Faculty, University of Texas

## CLASS OF 2011



### **KEVIN CAHILL, MD, PHD**

**MEDICAL SCHOOL**  
University of Florida

**GRADUATE/PHD**  
Harvard School of Public Health/University of  
Florida

**FELLOWSHIP**  
Spine, University of Miami

**SUBSEQUENT/CURRENT EMPLOYMENT**  
Private Practice, Carolina Neurosurgery & Spine



### **SUZANNE THARIN, MD, PHD**

**MEDICAL SCHOOL**  
Columbia University

**GRADUATE/PHD**  
University of Toronto, SUNY Stony Brook

**FELLOWSHIP**  
Spine, Cleveland Clinic

**SUBSEQUENT/CURRENT EMPLOYMENT**  
Faculty, Stanford University Medical Center

## CLASS OF 2012



### **SARAH JERNIGAN, MD**

**MEDICAL SCHOOL**  
University of Louisville

**GRADUATE/PHD**  
Tulane University

**FELLOWSHIP**  
Shillito Pediatric Fellow, Boston Children's Hospital

**SUBSEQUENT/CURRENT EMPLOYMENT**  
Private Practice, Carolina Neurosurgery & Spine



### **YI LU, MD, PHD**

**MEDICAL SCHOOL**  
Columbia University

**GRADUATE/PHD**  
Albert Einstein College of Medicine

**FELLOWSHIP**  
Deformity & Minimally Invasive Spine Surgery, University of Miami

**SUBSEQUENT/CURRENT EMPLOYMENT**  
Faculty, Brigham and Women's Hospital/Faulkner Hospital

## CLASS OF 2014



### **STEPHEN NALBACH, MD**

**MEDICAL SCHOOL**  
Temple University

**SUBSEQUENT/CURRENT EMPLOYMENT**  
Private Practice, Tyler Neurosurgical Associates, TX



### **ALEXANDER ROPPER, MD**

**MEDICAL SCHOOL**  
Tufts University

**FELLOWSHIP**  
Spine Fellowship, Barrow Neurological Institute

**CURRENT EMPLOYMENT**  
Director of Spine Surgery, Assistant Professor, Baylor College of Medicine, Texas



### **JUDITH WONG, MD, MPH**

**MEDICAL SCHOOL**  
University of California, San Francisco

**GRADUATE/MPH**  
Harvard School of Public Health

**FELLOWSHIP**  
Pediatric Fellowship, University of California Los Angeles

**CURRENT EMPLOYMENT**  
Private Practice, Kaiser Permanente, California

## CLASS OF 2013



### **NING LIN, MD**

**MEDICAL SCHOOL**  
Harvard Medical School

**FELLOWSHIP**  
Endovascular Neurosurgery, SUNY Buffalo, NY

**SUBSEQUENT EMPLOYMENT**  
Faculty, Well Cornell Medicine Brain and Spine Center, NY



### **URVASHI UPADHYAY, MD**

**MEDICAL SCHOOL**  
Johns Hopkins School of Medicine

**FELLOWSHIP**  
Skull Base Surgery, Brigham and Women's Hospital

**CURRENT EMPLOYMENT**  
Faculty, Boston Medical Center

## CLASS OF 2015



### **BRADLEY GROSS, MD**

**MEDICAL SCHOOL**  
Northwestern University

**FELLOWSHIP**  
Neuroendovascular  
Fellowship, Barrow  
Neurological Institute

**CURRENT EMPLOYMENT**  
Assistant Professor, University of  
Pittsburgh



### **PELEG HOROWITZ, MD, PHD**

**MEDICAL SCHOOL**  
Northwestern University

**FELLOWSHIP**  
Skull Base Neuro-Oncology  
Fellowship, MD Anderson Cancer  
Center

**CURRENT EMPLOYMENT**  
Assistant Professor, University of  
Chicago

## CLASS OF 2017



### **WENYA LINDA BI, MD, PHD**

**MEDICAL SCHOOL**  
Yale School of Medicine

**FELLOWSHIP**  
Skull Base Fellowship, Brigham and Women's  
Hospital

**CURRENT EMPLOYMENT**  
Faculty, Brigham and Women's Hospital



### **MATTHEW VESTAL, MD, MHS**

**MEDICAL SCHOOL**  
Yale School of Medicine

**POST-GRADUATE**  
Harvard Business School, MBA

**FELLOWSHIP**  
Shillito Pediatric Fellow, Boston Children's  
Hospital

**CURRENT EMPLOYMENT**  
Assistant Professor, Duke University Medical  
Center

## CLASS OF 2016



### **MUHAMMAD ABD-EL-BARR, MD, PHD**

**MEDICAL SCHOOL**  
Baylor College of Medicine

**FELLOWSHIP**  
Spine Fellowship, Brigham and Women's Hospital

**CURRENT EMPLOYMENT**  
Faculty, Duke University Medical Center



### **MICHAEL RABER, MD**

**MEDICAL SCHOOL**  
Wake Forest University School of Medicine

**FELLOWSHIP**  
Spine Fellowship, The Johns Hopkins  
University

**CURRENT EMPLOYMENT**  
Kootanai Clinic, Neurosurgery and  
Spine, Coeur d'Alene, Idaho

## CLASS OF 2018



### **HORMUZDIYAR DASENBROCK, MD**

**MEDICAL SCHOOL**  
Johns Hopkins University School of Medicine

**FELLOWSHIP**  
Endovascular Fellowship, Rush University  
Neuroendovascular Fellowship (enfolded), Brigham  
and Women's Hospital

**CURRENT EMPLOYMENT**  
Faculty, Boston Medical Center



### **VIREN VASUDEVA, MD**

**MEDICAL SCHOOL**  
Medical College of Georgia School of  
Medicine

**FELLOWSHIP**  
Spine Fellowship (enfolded), Brigham and  
Women's Hospital, MA

**CURRENT EMPLOYMENT**  
St. Mary's Healthcare System, Georgia  
Neurological Surgery and Comprehensive  
Spine, Athens, GA



## CLASS OF 2019



### VAMSIDHAR CHAVAKULA, MD

**MEDICAL SCHOOL**  
Harvard Medical School

**FELLOWSHIP**  
BWH Functional Attending, Fellowship  
Epilepsy Fellowship, Claudio Munari Epilepsy  
Center, Ospedale Niguarda, Milan, Italy

**CURRENT EMPLOYMENT**  
Faculty, Neurosurgical Medical Clinic, San Diego,  
California



### ZIEV MOSES, MD

**MEDICAL SCHOOL**  
Geisel School of Medicine at Dartmouth

**FELLOWSHIP**  
Spine Fellowship, Rush University

**CURRENT EMPLOYMENT**  
Faculty, Beth Israel Deaconess Medical Center,  
Boston



### POKMENG (ALFRED) SEE, MD

**MEDICAL SCHOOL**  
Johns Hopkins University

**FELLOWSHIP**  
Cerebrovascular Fellowship, University of Illinois at  
Chicago

Shillito Fellowship, Boston Children's Hospital

**CURRENT EMPLOYMENT**  
Faculty, Boston Children's Hospital

## CLASS OF 2020



### DUSTIN DONNELLY, MD

**MEDICAL SCHOOL**  
The Ohio State University College of  
Medicine

**FELLOWSHIP**  
Spine Fellowship, Duke University

**CURRENT EMPLOYMENT**  
Faculty, Case Western Reserve University



### DAVID PENN, MD

**MEDICAL SCHOOL**  
Sidney Kimmel Medical  
College, Thomas Jefferson  
University

**FELLOWSHIP**  
Skull Base/ Cerebrovascular  
Fellowship, Case Western Reserve  
University

**CURRENT EMPLOYMENT**  
Attending, Vassar Brothers Medical Center and  
Danbury Hospital, Nuance Health, Poughkeepsie  
NY



### CHRISTIAN STRONG, MD

**MEDICAL SCHOOL**  
Harvard Medical School

**FELLOWSHIP**  
Spine Fellowship, New England Baptist  
Hospital

**CURRENT EMPLOYMENT**  
Strong Neurosurgery Consulting, Atlanta, GA

## CLASS OF 2021



### **KEVIN TED HUANG, MD**

**MEDICAL SCHOOL**  
Duke University School of Medicine

**FELLOWSHIP**  
Complex Spine Fellowship, Cleveland Clinic

**SUBSEQUENT EMPLOYMENT**  
Faculty, Brigham and Women's Hospital



### **IAN JAMES TAFEL, MD**

**MEDICAL SCHOOL**  
Geisinger Commonwealth School of Medicine

**FELLOWSHIP**  
Spine Fellowship, University of Miami

**SUBSEQUENT EMPLOYMENT**  
Faculty, University of Florida Health



### **PABLO ANDRES VALDES QUEVEDO, MD, PHD**

**MEDICAL SCHOOL**  
Geisel School of Medicine at Dartmouth

**FELLOWSHIP**  
Neurosurgical Oncology and Functional Brain Mapping Fellowship, Montpellier, France

**SUBSEQUENT EMPLOYMENT**  
Assistant Professor, University of Texas Medical Branch

## CLASS OF 2022



### **YASSER JEELANI, MD**

**MEDICAL SCHOOL**  
University of Jammu, India

**FELLOWSHIP**  
Skull Base and Open CV Fellowship, Arkansas Neuroscience Institute

**CURRENT EMPLOYMENT**  
Hackensack Meridian Health, Edison, NJ



### **ROSALIND LAI, MD**

**MEDICAL SCHOOL**  
Harvard Medical School

**FELLOWSHIP**  
Cerebrovascular/Endovascular Fellowship, University at Buffalo, Neurosurgery (UBNS)

**SUBSEQUENT EMPLOYMENT**  
Faculty, University at Buffalo, Neurosurgery (UBNS)



### **KYLE WU, MD**

**MEDICAL SCHOOL**  
UMass Chan Medical School

**FELLOWSHIP**  
Skull Base & Minimally Invasive Cranial Surgery Fellowship, The Ohio State University Wexner Medical Center & James Cancer Institute, Ohio

**CURRENT EMPLOYMENT**  
Faculty, The Ohio State University, Wexner Medical Center

## CLASS OF 2023



### JOSEPH DRIVER, MD

**MEDICAL SCHOOL**  
Loyola University Chicago

**FELLOWSHIP**  
Complex Spine Fellowship, Cleveland Clinic

**CURRENT EMPLOYMENT**  
Logan Health, Kalispell, MT



### WALID IBN ESSAYED, MD

**MEDICAL SCHOOL**  
Medical Faculty of Tunis, Tunisia

**SUBSEQUENT EMPLOYMENT**  
UTHealth Neurosciences and McGovern Medical School Houston



### DAVID SEGAR, MD

**MEDICAL SCHOOL**  
Warren Alpert Medical School of Brown University

**FELLOWSHIP**  
Functional and Epilepsy Fellowship, University of California, San Francisco

**CURRENT EMPLOYMENT**  
Faculty, Albert Einstein College of Medicine

## CLASS OF 2024



### STANLEY BAZAREK, MD, PhD

**MEDICAL SCHOOL**  
Rosalind Franklin University, Chicago Medical School

**SUBSEQUENT EMPLOYMENT**  
Assistant Professor, Department of Neurological Surgery University Hospitals, Case Western Reserve University School of Medicine



### NEIL KLINGER, MD

**MEDICAL SCHOOL**  
Wayne State University School of Medicine

**SUBSEQUENT EMPLOYMENT**  
Faculty, Munson Neurosurgery, Munson Medical Center, Traverse City, MI



### MARTINA MUSTROPH, MD, PhD

**MEDICAL SCHOOL**  
University of Illinois College of Medicine at Urbana

**FELLOWSHIP**  
Stereotactic and Functional Neurosurgery Fellowship, Emory University



STIMULATED RAMAN SPECTROSCOPY IMAGE OF  
BRAIN TUMOR SECTION  
*Image courtesy of Golby Lab*

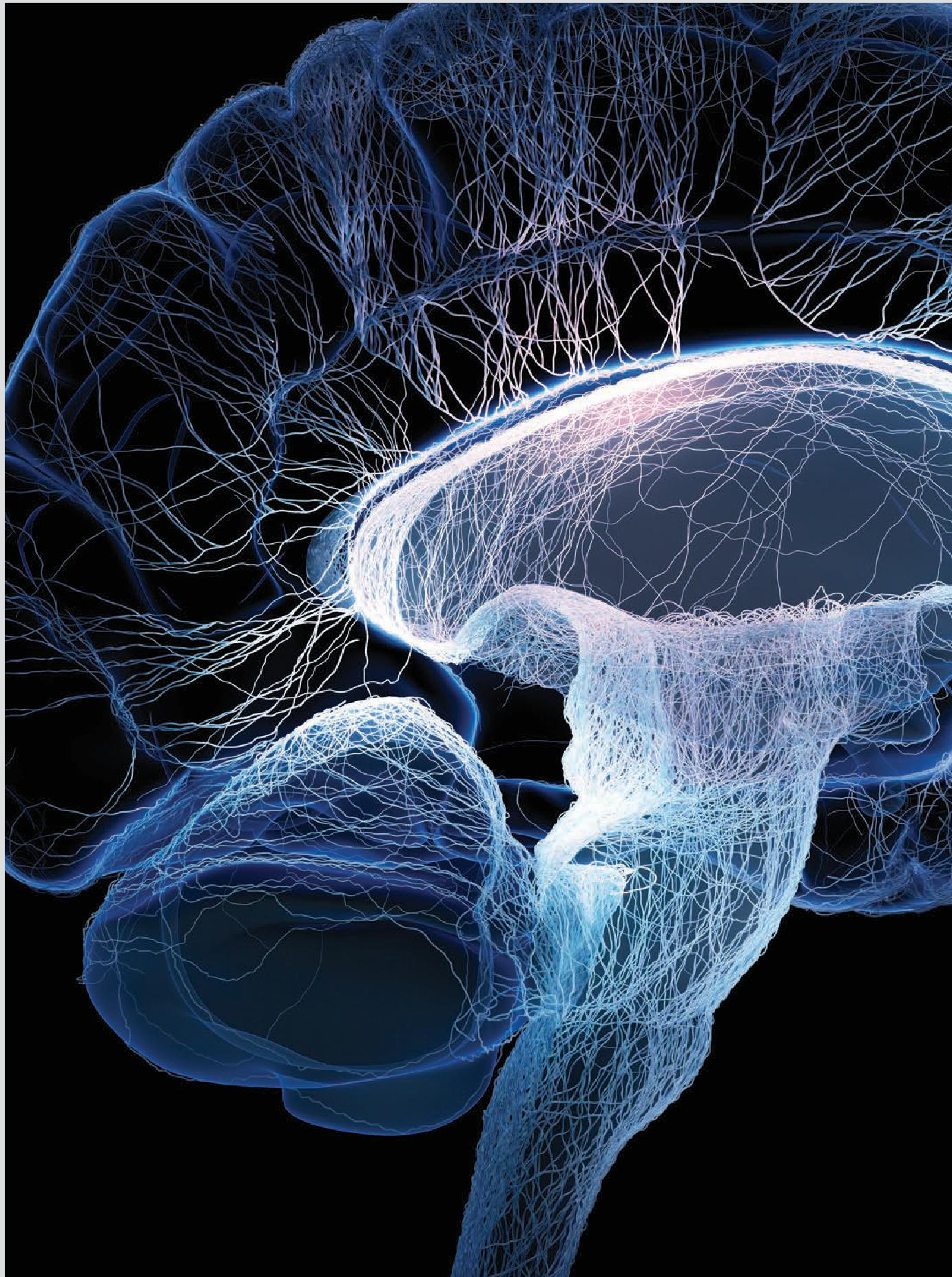
## CURRENT RESIDENTS AND FELLOWS

### RESIDENTS

Benjamin Johnston, MD, PhD	Chief Resident
Ari Kappel, MD	Chief Resident
Genaro Villa, MD, PhD	Chief Resident
Joshua Bernstock, MD, PhD	PGY-6
Melissa Chua, MD	PGY-6
Saksham Gupta, MD	PGY-6
Marcelle Altshuler, MD	PGY-5
Joshua Chalif, MD, PhD	PGY-5
Jason Chen, MD, PhD	PGY-5
Casey Jarvis, MD	PGY-4
Sean Lyne, MD	PGY-4
James Tanner McMahon, MD	PGY-4
Adam Glaser, MD	PGY-3
David Liu, MD	PGY-3
Gabrielle Luiselli, MD	PGY-3
Eric Chalif, MD	PGY-2
Ron Gadot, MD	PGY-2
Chibueze Nwagwu, MD	PGY-2
Sarah Blitz, MD	PGY-1
Alexander Yearley, MD	PGY-1
Eduardo Maury, MD, PhD	PGY-1

### FELLOWS

David Bass, MD, PhD	CV-EV Fellow
Sahin Hanalioglu, MD, PhD	CV-EV Fellow
Frederic Racicot, MD	Image Guided Surgery Fellow
Ryan Chrenek, MD	Pituitary Fellow
Anil Can, MD	Skull Base Fellow



## WEEKLY CONFERENCE SCHEDULE

### MONDAY

7:00am - 7:30am	Cushing Service Didactics	BWH
7:30am - 8:15am	Neuro-Oncology/Tumor Board Conference	BWH/Dana-Farber

### TUESDAY

7:00am - 7:30am	Dandy Service Didactics	BWH
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### WEDNESDAY

6:30am - 7:00am	Morbidity/Mortality Conference	BWH (every Wed except 1st)
7:00am - 8:00am	Combined QI Conference	BWH (1st Wed of each month)
7:00am - 8:00am	Neurosurgery Grand Rounds	BWH (every Wed except 1st)
7:00am - 9:00am	Skull Base Cadaver Lab	BWH (Quarterly)
8:00am - 9:00am	Neuroradiology Conference	BWH
4:00pm - 5:00pm	Movement Disorder Conference	BWH (1st & 3rd Wed of each month)

### THURSDAY

7:00am - 8:00am	Cerebrovascular/Endovascular Conference	BWH
7:00am - 8:00am	Skull Base Conference	BWH (every other Thurs)
9:30am - 10:30am	Pituitary Multidisciplinary Conference	BWH (monthly)
10:00am - 12:00pm	Resident Clinics (PGY 2 & 6s)	BCH
12:00pm - 1:00pm	Resident Core Curriculum Conference	BWH
1:00pm - 2:00pm	Epilepsy Conference	BWH
6:15pm - 7:15pm	Educational Conference	BWH

### FRIDAY

7:30am - 8:30am	Neuropathology/Brain cutting	BWH
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# GRAND ROUNDS SCHEDULE 2023-2024

7/12/23 Post-operative Pharmacology in the Neurosurgical Patient Michael J. Schontz, PharmD, BCPS, BCCCP	Strategies Martina Stippler, MD	2/14/24 Targeting CNS Neuroinflammation in Traumatic Brain Injury by Nasal Anti-CD3 Saef Izzy, MD, MBCHB	6/5/24 The Future of Neurosurgical Education is in YOUR HANDS! Matson Lecture H. Hunt Batjer, MD, FACS, FAANS
7/19/23 MRgFUS in Movement Disorder Surgery Dr. G. Rees Cosgrove	11/22/23 Brevican Targeting Peptide for Therapeutic Delivery to Malignant Brain Tumors Choi-Fong Cho, PhD	2/21/24 Application of Keyhole Approaches to Large and Complex Neurosurgical Pathology Professor Christos Profyris	6/26/24 Organization and Repair of Brain-spinal Connections Zhigang He, PhD, BM
7/26/23 Updates on Artificial Intelligence in Neurosurgery: Promises and Pitfalls Kevin Huang, MD	12/13/23 Resident Research Presentations: PGY-5 Residents: Joshua Bernstock, MD, PhD & Melissa Chua, MD PGY-4 Residents: Marcelle Altshuler, MD, Joshua Chalif, MD, PhD, & Jason Chen, MD, PhD	2/28/24 Disordered Learning as a Potential Roadmap for Studying Neuropsychiatric Disorders Emad Eskandar, MD MBA	7/10/24 From the Courtroom to the Operating Room – Interactive Insights into Neurosurgical Malpractice Omar Arnaout, MD
8/16/23 Harvey Cushing at the Brigham Dr. Edward Laws	12/20/23 Resident Research Presentations: PGY-5 Residents: Joshua Bernstock, MD, PhD, Melissa Chua, MD, & Saksham Gupta, MD PGY-4 Residents: Marcelle Altshuler, MD, Joshua Chalif, MD, PhD, & Jason Chen, MD, PhD	3/13/24 How Surgeons Learn Jacob R. Rachlin, MD, PhD	7/17/24 BWH Professionalism Experience and Resource Team Charles Morris, MD, MPH – Chief Medical Officer of Brigham and Women’s Hospital Julia Moretti – Director, Office of the CMO
8/23/23 Medical Innovation at Mass General Brigham Dr. William Gormley	1/10/24 1. Rescue of Traumatic Optic Neuropathy Following Repetitive Traumatic Brain Injury with Caveolin-1 and Related Functional Peptide 2. Discogenic Back Pain and Disc Degeneration: The Role of CSF1R Pathway in the Treatment and Prevention Yi Lu, MD, PhD	3/27/24 Embracing Change Mohammad Ali Aziz-Sultan, MD, MBA	7/24/24 Defining Possible Wenya Linda Bi, MD, PhD
9/13/23 Aerospace Medicine in Neurosurgery Marvin William Jackson, MD, MS, FABPM Acting Regional Flight Surgeon, Aerospace Medicine, New England	1/17/24 An Adventure in Neurosurgical Education, Research, and Practice Dr. Edward Laws	4/10/24 Moving Towards Conquering Pain Dr. Clifford J. Woolf	7/31/24 Cranial Reconstruction Timothy R. Smith, MD, PhD, MPH
9/27/23 Optimizing Mental Performance in Teams: The Role of Mental Skills to Enhance Self-Awareness and Communication Ari S. Miller, MA, CMPC	2/14/24 Targeting CNS Neuroinflammation in Traumatic Brain Injury by Nasal Anti-CD3 Saef Izzy, MD, MBCHB	4/17/24 Contemporary Management of Craniosynostosis Dr. Mark Proctor	8/14/24 Evolving as a Spine Surgeon in a Multidisciplinary System Ganesh M. Shankar, MD, PhD, FAANS
10/18/23 Neurosurgical Icons, Cushing’s Forefathers Dr. Edward Laws	2/14/24 Targeting CNS Neuroinflammation in Traumatic Brain Injury by Nasal Anti-CD3 Saef Izzy, MD, MBCHB	4/24/24 Discogenic Back Pain and Disc Degeneration: The Role of CSF1R Pathway in the Treatment and Prevention Yi Lu, MD, PhD	8/21/24 Preoperative versus Post-Operative Stereotactic Radiosurgery for Resected Brain Metastases: Review of a Novel Treatment Paradigm Anthony L. Asher, MD, FAANS, FACS
10/25/23 Current Concepts of Skull Base Surgery Dr. Nicholas Bambakidis	2/14/24 Targeting CNS Neuroinflammation in Traumatic Brain Injury by Nasal Anti-CD3 Saef Izzy, MD, MBCHB	5/8/24 Expanded Skull Base Approaches, Gene Therapy, Big Ten Research Consortium Kyle Wu, MD	8/28/24 Endovascular Transvenous Treatment of Communicating Hydrocephalus Using the Biomimetic eShunt Transdural Implant Adel M. Malek, MD, PhD, MBA, FAANS
11/15/23 Engage, Empower, Excel: Revolutionizing Your Teaching with Active Teaching		5/15/24 The Treatment of Posterior Fossa Ependymoma of Childhood- the State of the Art 2024 R. Michael Scott Day Mark D. Krieger, MD	

## RESEARCH STUDIES

THE DEPARTMENT OF NEUROSURGERY AT BRIGHAM AND WOMEN'S HOSPITAL IS A PIONEER IN NEUROSCIENCE AND IS DEDICATED TO THE RESEARCH OF NEUROLOGICAL DISORDERS INCLUDING TUMOR BIOLOGY, ANEURYSMS, STROKE, EPILEPSY, AND SPINAL DISORDERS.

Below are our current research studies and clinical trials. Please note that not all of the studies are human subject trials.

### BRAIN TUMOR RESEARCH

A Phase I Study of the Treatment of Recurrent Malignant Glioma with rQNestin34.5v.2, a Genetically Engineered HSV-1 Virus, and immunomodulation with Cyclophosphamide (Dana Farber Cancer Institute/ Brigham and Women's Hospital)

PI: E. Antonio Chiocca, MD, PhD

Medical Image Processing and Visualization User Evaluation and Survey

PI: Alexandra Golby, MD

Advanced Diffusion MR Imaging (dMRI) in Patients with Brain Lesions

PI: Alexandra Golby, MD

The Use of imaging for the Surgical Planning and Intraoperative Guidance of Neurosurgery Patients — A Survey Study

PI: Alexandra Golby, MD

Intraoperative Stereotactic Molecular Imaging of Brain Tumor Margins

PI: Alexandra Golby, MD

Brain Basis of Memory and Language Studied by fMRI and Intracranial EEG

PI: Alexandra Golby, MD

Image and Function Guided Surgery of Brain Lesions

PI: Alexandra Golby, MD

A Pilot Study of an Implantable Microdevice for In Situ Evaluation of Drug Response in Patients with Primary Brain Tumors

PI: Pier Paolo Peruzzi, MD, PhD

### SPINE RESEARCH

A Prospective, Concurrently Controlled, Multi-Center Study to Evaluate the Safety and Effectiveness of the Spinal Kinetics M6-C™ Artificial Cervical Disc Compared to Anterior Cervical Discectomy and Fusion (ACDF) for the Treatment of Contiguous Two-Level Symptomatic Cervical Radiculopathy

PI: John Chi, MD, MPH

A Clinical Study to Assess the Safety and Effectiveness of the Premia Spine TOPS System

PI: John Chi, MD, MPH

Pre-pilot Study of Spine Registration Using 3D Scanning

PI: Kevin T Huang, MD

SIJ Stabilization in Long Fusion to the Pelvis: Randomized Controlled Trial

PI: Yi Lu, MD, PhD

The coflexCOMMUNITY Study: An Observational Study of coflex Interlaminar Technology

PI: Yi Lu, MD, PhD

### FUNCTIONAL DISORDER CLINICAL TRIALS

A Pivotal Clinical Trial of the Management of the Medically-Refractory Dyskinesia Symptoms or Motor Fluctuations of Advanced Idiopathic Parkinson's Disease With Unilateral Lesioning of the Globus Pallidum Using the ExAblate Neuro System

PI: G. Rees Cosgrove, MD

A Phase 1 Clinical Trial of Autologous iPSC-Derived Dopamine Neuron Transplantation for Parkinson's disease

PI: John David Rolston, MD, PhD

### FUNCTIONAL DISORDER CLINICAL TRIALS (continued)

A Post-Approval Registry for Exablate 4000 Type 1.0 and Type 1.1 for Unilateral Thalamotomy for the Treatment of Medication-Refractory Tremor Dominant Idiopathic Parkinson's Disease

PI: John David Rolston, MD, PhD

### CEREBROVASCULAR CLINICAL TRIALS

CereVasc NPH CLIN-0016: US Pilot Study to Evaluate the Safety and Effectiveness of the CereVasc® eShunt® System in the Treatment of Normal Pressure Hydrocephalus

PI: M. Ali Aziz-Sultan, MD

7T MRI MRA and Vessel-Wall Imaging for Cerebrovascular Disorders

PI: M. Ali Aziz-Sultan, MD

RESTORE: REal-World Analyses of Stroke - Thrombus Occlusion Retrieval

PI: M. Ali Aziz-Sultan, MD

Automated Detection, Characterization, Triage, and Recruitment of ICH Subjects Using Artificial Intelligence in the ENRICH Trial

PI: M. Ali Aziz-Sultan, MD

Genomics of CNS vascular malformations

PI: Rose Du, MD, PhD

Biomarkers in stroke, intracerebral hemorrhage, and traumatic brain injury

PI: Rose Du, MD, PhD

Genetics of Intracranial Vessels

PI: Rose Du, MD, PhD

Gene Expression in Cerebral Aneurysms

PI: Rose Du, MD, PhD

### HUMANITARIAN USE DEVICE STUDIES

(Neva VS) Vesalio NeVa VS for the Treatment of Symptomatic Cerebral Vasospasm following Aneurysmal Subarachnoid Hemorrhage

PI: M. Ali Aziz-Sultan, MD

Wingspan Stent System with Gateway PTA Balloon Catheter for the Treatment of Symptomatic Intracranial Atherosclerotic Disease for Humanitarian Use

PI: Kai Freilichs, MD

Use of the Neuroform Atlas Stent System, a Humanitarian Use Device, for the Treatment of Wide-necked Cerebral Aneurysms

PI: Kai Freilichs, MD

### ADDITIONAL CLINICAL RESEARCH STUDIES

CereVasc NPH CLIN-0016: US Pilot Study to Evaluate the Safety and Effectiveness of the CereVasc® eShunt® System in the Treatment of Normal Pressure Hydrocephalus

PI: Tracy L. Ansary, MD

A Multicenter, Single-Blind, Prospective Randomized Post-Approval Study Comparing the Safety and Effectiveness of CraniSeal Dural Sealant to DuraSeal Dural Sealant for Dural Sealing in Elective Cranial Surgery

PI: Omar Arnaout, MD

Studying The Impact of Brain Relaxation on Brain Tumor Surgery

PI: Omar Arnaout, MD

OPTIMUM

PI: Elizabeth Claus, MD, PhD

Risk Factors and Outcomes for Glioma (GLIOGENE International Case/Control Study)

PI: Elizabeth Claus, MD, PhD

(continue)

## RESEARCH STUDIES (CONTINUED)

The GLIOGENE (Glioma Genetics) Study

*PI: Elizabeth Claus, MD, PhD*

"A Patient-Centered Wearable System to Enable Data-Driven Decisions in Neuromuscular Disorders"

*PI: William Gormley, MD, MPH, MBA*

Identification of delirium biomarkers using multimodal sensor data from the E4 wristband wearable device

*PI: William Gormley, MD, MPH, MBA*

Intraoperative Imaging of Central Nervous System Lesions with Optical Coherence Tomography

*PI: Michael Anthony Mooney, MD*

Immune escape mechanisms in brain tumors

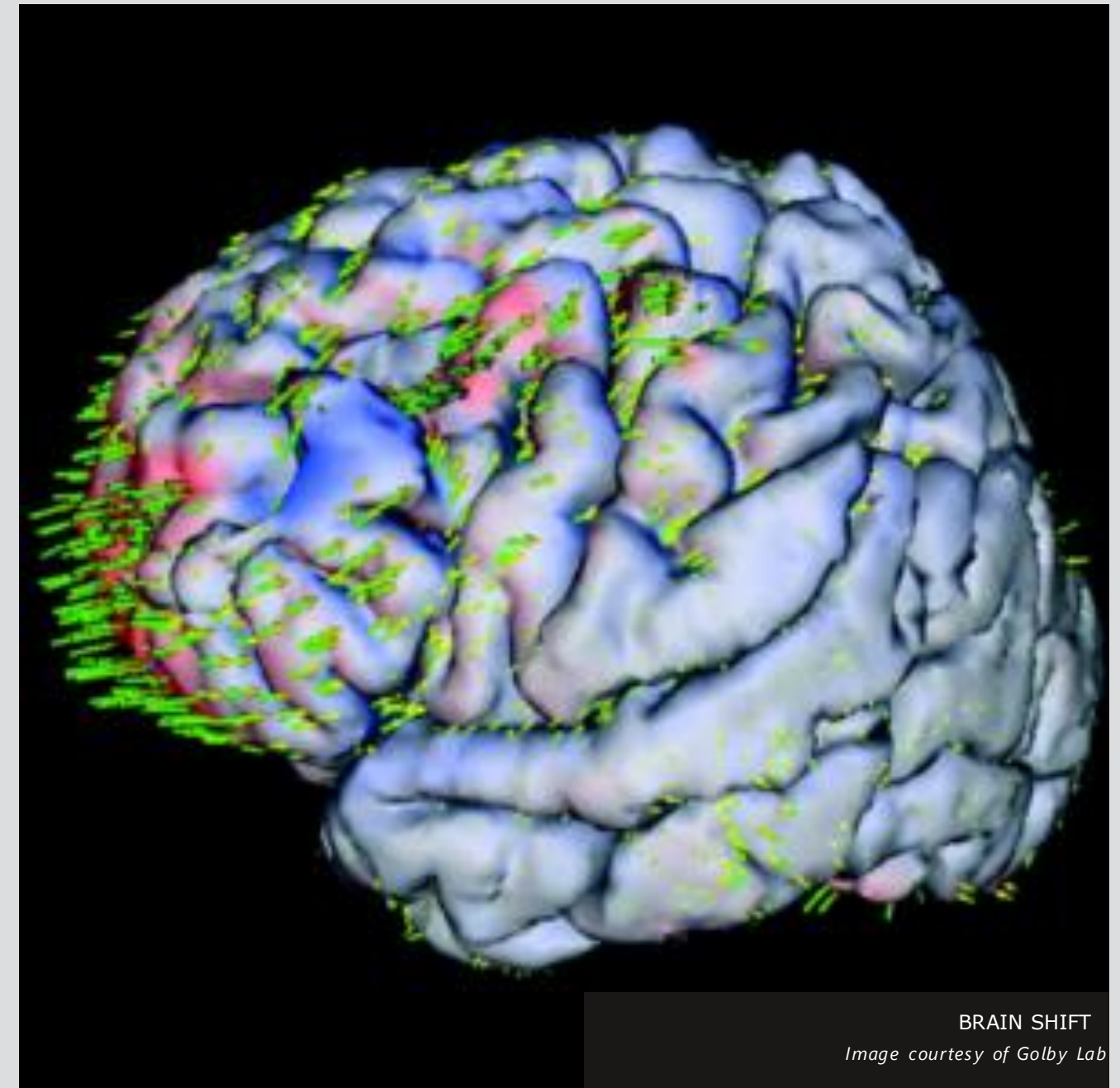
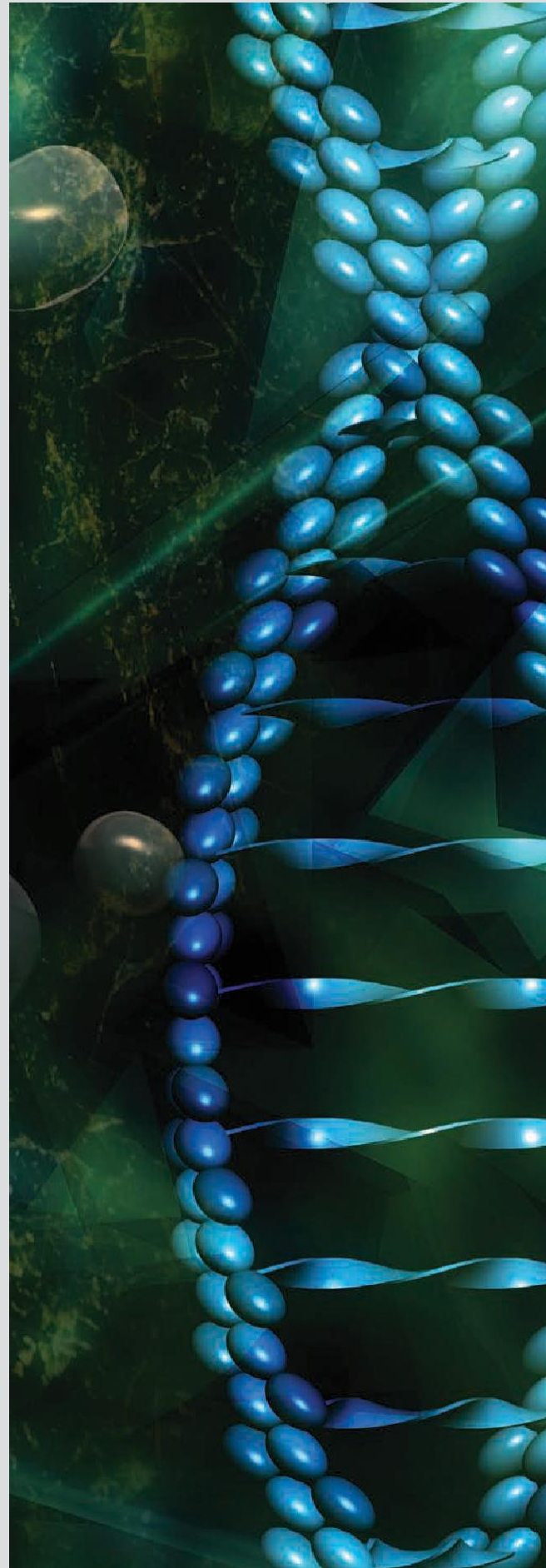
*PI: Hiroshi Nakashima, PhD*

Fetal Treatment of Galenic Malformation

*PI: Darren B. Orbach, MD, PhD*

A Pilot Clinical Study to Evidence Improved Cranial Flap Fixation with a Bioresorbable Bone Adhesive based on Imaging and Patient Reported Outcomes

*PI: Timothy R. Smith, MD, PhD, MPH*



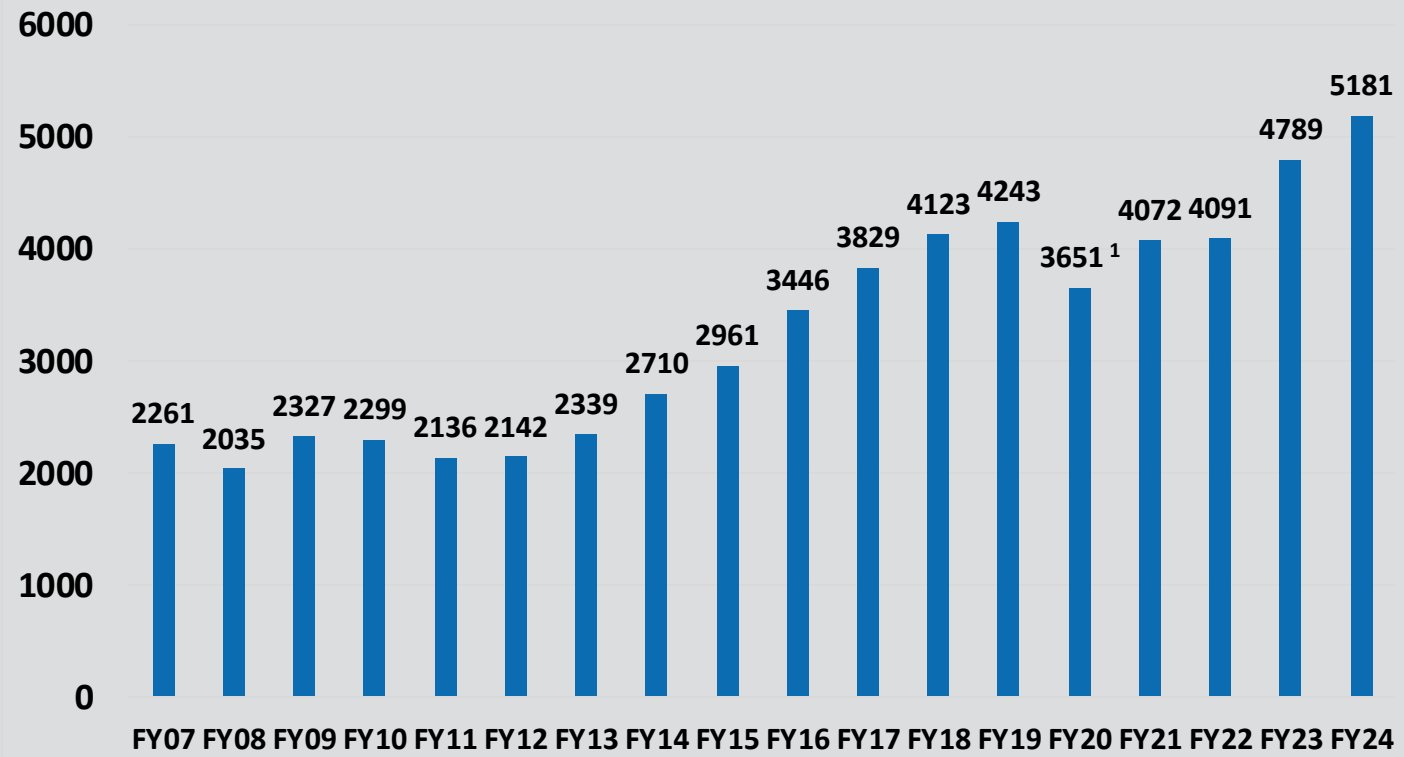
BRAIN SHIFT

*Image courtesy of Golby Lab*

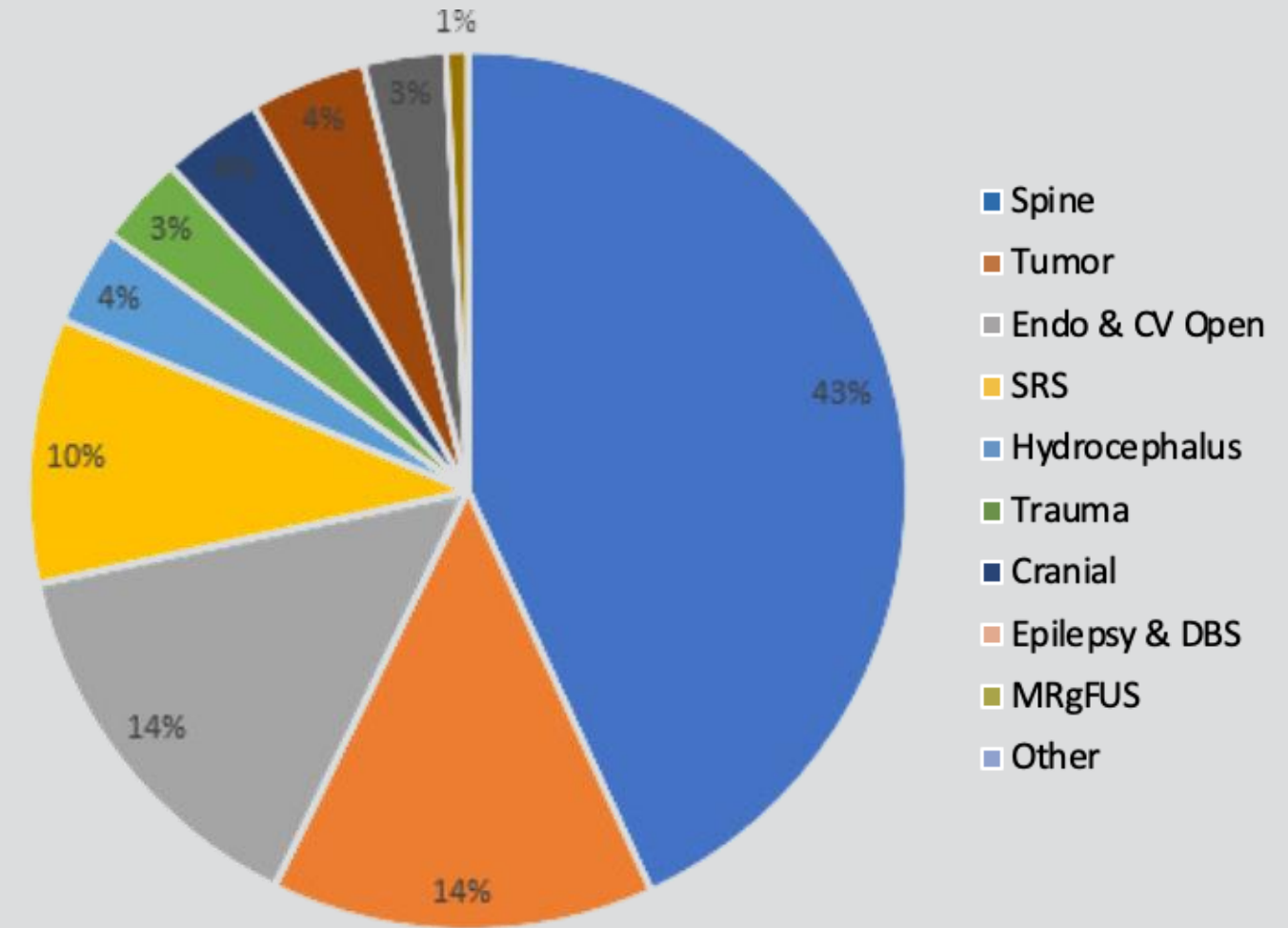


# NEUROSURGERY AT A GLANCE

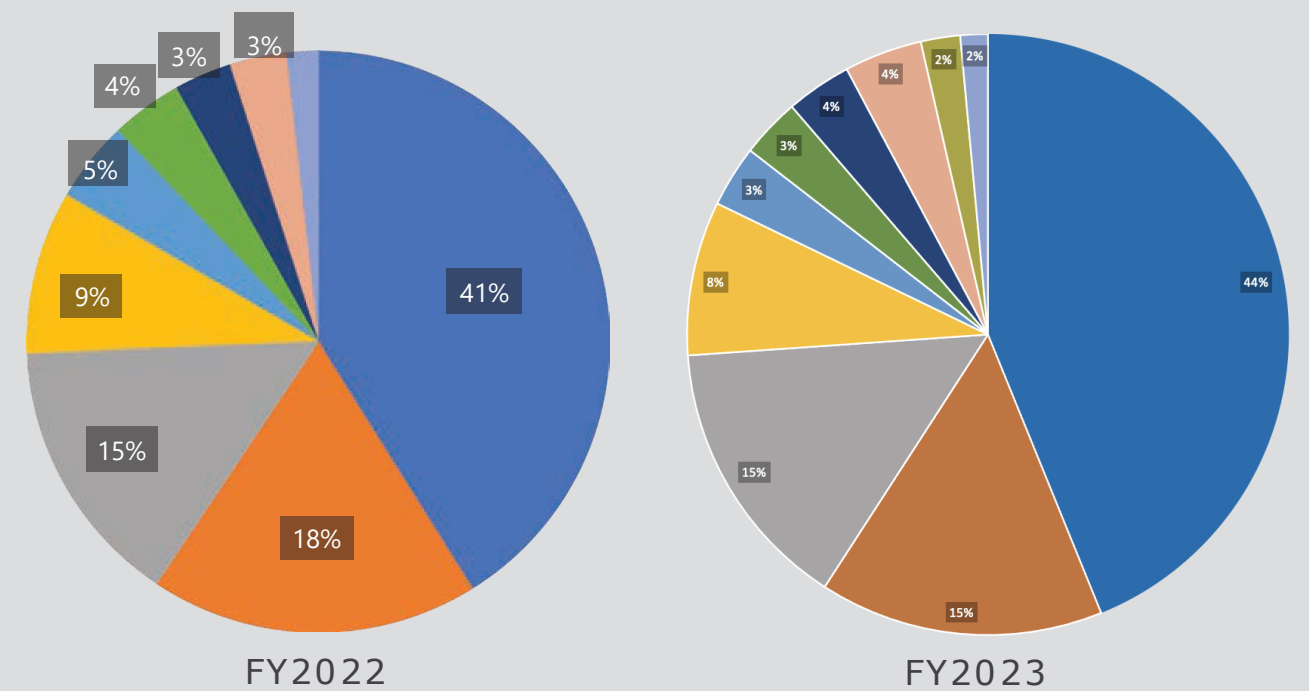
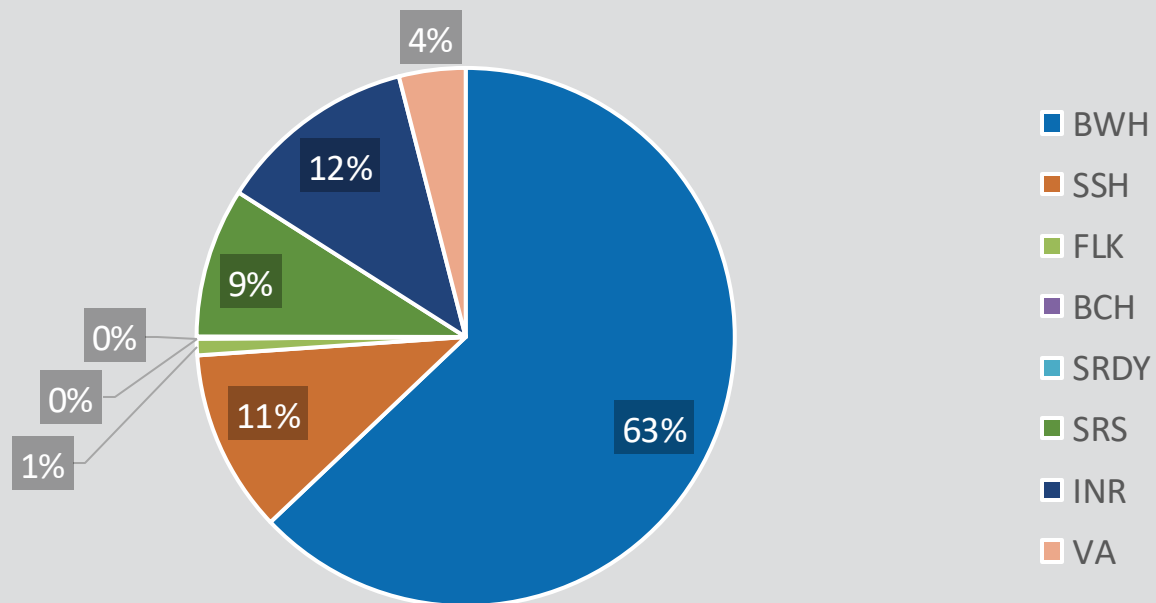
ANNUAL NEUROSURGICAL CASE VOLUME



FY24 CASE VOLUME BY SERVICE



FY24 CASE VOLUME BY LOCATION





## HALE BUILDING FOR TRANSFORMATIVE MEDICINE AT BRIGHAM AND WOMEN'S HOSPITAL

### OVERVIEW

Our new state-of-the-art Hale Building for Transformative Medicine (BTM), brings together the world's finest clinicians and scientists to accelerate breakthroughs and transform patient care in the neurosciences, orthopedics, rheumatology, immunology, and musculoskeletal health. Over one hundred years ago, the Peter Bent Brigham Hospital was erected behind Harvard Medical School so that its curious minds in science and medicine would never be too far from the laboratory bench. The BTM takes that idea and adapts it for 21st century medicine: bringing our clinicians and scientists together in one building to tackle the toughest dilemmas in healthcare.

This carefully constructed building located on the Brigham and Women's Hospital main campus is made of glass and steel, reaching 13 stories above ground and three below. The goal of the BTM is to promote collaboration and accelerate advancements in care for patients suffering from neurologic, orthopedic, and rheumatologic conditions such as Alzheimer's disease, Parkinson's disease, spinal disorders, brain tumors, multiple sclerosis and cerebrovascular disorders.

The BTM is home of the Neurosciences Center, which offers a multidisciplinary clinic where patients can receive a comprehensive evaluation and consensus opinion from several disciplines in one location. Traditionally, patients would have to visit separate clinics, which made

coordination of care difficult. With one Neurosciences Center, patients have a new experience with their treatment being led by highly skilled, collaborative teams. Patients are able to meet with top clinicians and specialists regarding the management and treatment of their condition.

In addition to these multidisciplinary centers, the facility also includes the following services and features:

- The Ann Romney Center for Neurologic Diseases
- Ambulatory Infusion Service
- Center for Alzheimer Research and Treatment (CART)
- Center for Brain Therapeutics
- Conference Center
- A cafe with a full-service menu for patients, visitors, and staff
- All Neurosurgical Laboratories (see page 36)
- Imaging services, including MRI, CT and X-Ray
- Innovation Hub
- Parking facility, including valet assistance
- Neuro-Procedural Suite for Diagnostics and Treatment, which includes EMG, EEG and TMS
- Neurosciences Center which includes, ophthalmology rooms, neuropsychiatry testing rooms, 28 exam rooms, 16 consult rooms and 2 procedure rooms.

## BUILDING ON EXCELLENCE

### CUTTING-EDGE TECHNOLOGIES AVAILABLE

NEUROSURGERY CLINICIANS AND RESEARCHERS HAVE ACCESS TO ADVANCED TOOLS AND OPPORTUNITIES TO COLLABORATE AND PUSH THE BOUNDARIES OF DISCOVERY IN WAYS THAT HAVE NEVER BEEN POSSIBLE BEFORE NOW.

#### MRI GUIDED FOCUSED-ULTRASOUND (MRGFUS)

Focused ultrasound treatments can be performed on an outpatient basis, require no incisions, and can result in minimal discomfort and few complications, allowing for rapid recovery. This technology is currently FDA approved for the treatment of essential tremor, and is currently being evaluated on its capability to treat parkinsonian tremor, blood brain barrier, and other neuro conditions via clinical trials here at Brigham and Women's Hospital.

#### 7 TESLA (7.0T MRI)

This device aids our clinicians and researchers to visualize critical structures and pathologies that, until now, were not visible through MRI. Seeing these structures and pathologies will help clinicians differentiate between diseases and conditions in which symptoms may be similar and, in turn, choose the best treatment option for patients.

#### ROSA™ ROBOTIC SURGICAL ASSISTANT

ROSA™ acts as an assistant in the operating room and provides a service to help navigate and map the brain, similar to a GPS. It can be used in any type of cranial or spinal procedure that requires surgical planning with preoperative data and precise position and handling of instruments.

#### ADVANCED MULTIMODALITY IMAGE GUIDED OPERATING (AMIGO) SUITE

A state-of-the-art medical and surgical research environment that houses a complete array of advanced imaging equipment and interventional surgical systems.

#### O-ARM®

The O-arm® and StealthStation® systems eliminate the need to wear lead protective apparel during the navigated steps of the procedure. The O-arm offers multiple image protocols allowing you the flexibility to minimize dose to your patient based on your individual clinical objectives.

#### HYBRID OR (OPERATING ROOM)

This system allows our staff to perform high-end diagnostic imaging and multiple surgical or non-surgical interventions for an individual patient without ever leaving the operating room.

#### INTERVENTIONAL NEURORADIOLOGY SUITE

Endovascular procedures are performed in the angiographic suite rather than the operating room. Fluoroscopy (x-rays), ultrasound (US), computed tomography (CT), and magnetic resonance imaging (MRI) are used to guide their way through the body without making a skin incision.



7 TESLA



INTERVENTIONAL NEURORADIOLOGY SUITE



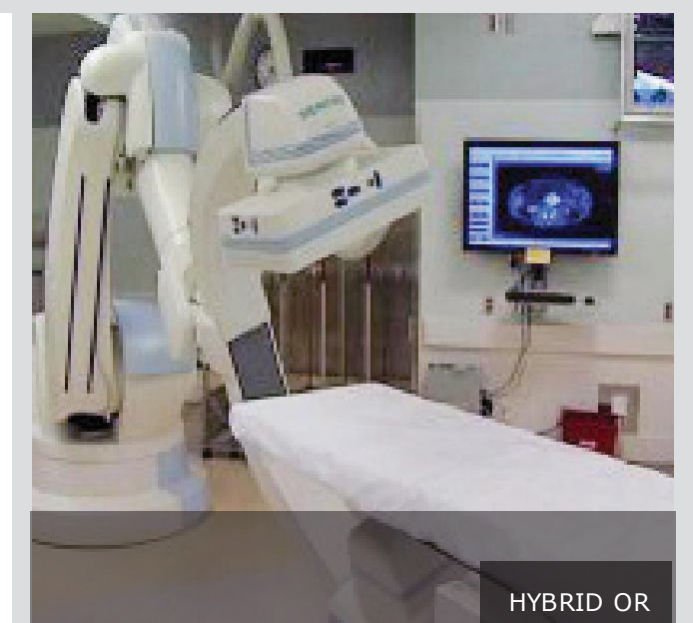
AMIGO SUITE



ROSA



O-ARM



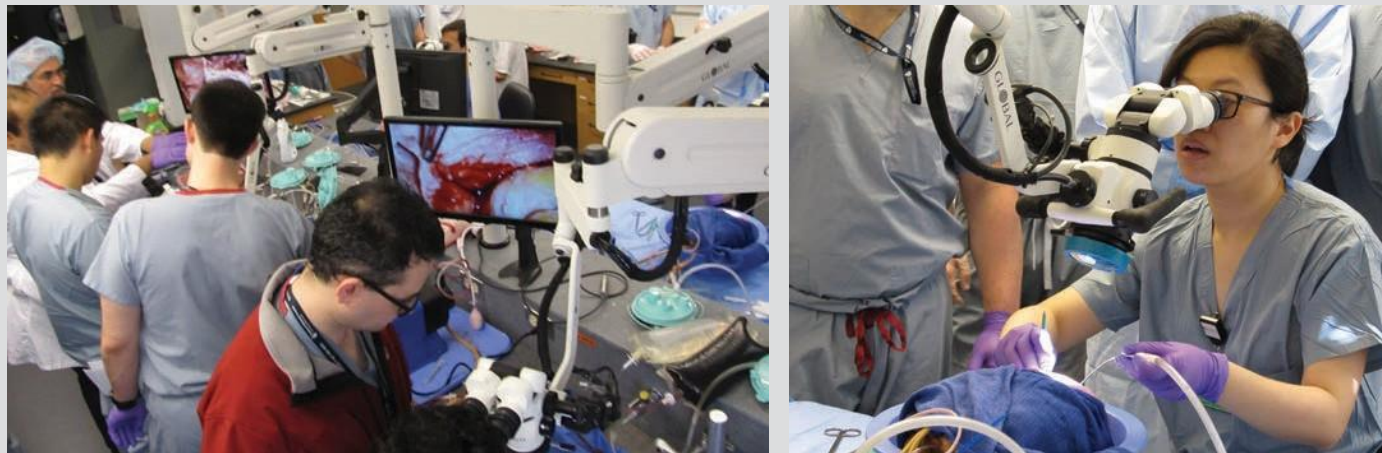
HYBRID OR

## EDUCATION

THE DEPARTMENT OF NEUROSURGERY AIMS TO UNDERTAKE RELEVANT RESEARCH AND PROVIDE ACCESS TO RESOURCES AND PROFESSIONAL DEVELOPMENT OPPORTUNITIES FOR ALL ESTABLISHED PHYSICIANS AND SURGEONS, AS WELL AS THE EDUCATION AND TRAINING OF RESIDENTS AND FELLOWS — THE NEXT GENERATION OF MEDICAL PROFESSIONALS.

### ANATOMICAL TRAINING LABORATORY

The Anatomical Training Laboratory (ATL) is a joint venture between neurosurgical departments at Boston Children's Hospital and Brigham and Women's Hospital to provide the Harvard medical community and other not for profit academic research institutions with training space, equipment and expert faculty resources to create the highest quality training environment for users to learn the latest neurosurgical techniques.



NEIL & ELISE WALLACE  
**BWH STRATUS**   
CENTER FOR MEDICAL SIMULATION

### STRATUS CENTER

The STRATUS Center for Medical Simulation is dedicated to advancing healthcare education, enhancing patient safety, and improving clinical outcomes. We leverage simulation's array of applications to support clinicians, researchers, industry, and other simulation centers. To learn more, visit [www.brighamandwomens.org/STRATUS](http://www.brighamandwomens.org/STRATUS)

OUR INTERDISCIPLINARY CENTER FOCUSES ON  
EDUCATION  
ASSESSMENT  
RESEARCH  
PROCESS IMPROVEMENT

To learn more, visit [www.brighamandwomens.org/STRATUS](http://www.brighamandwomens.org/STRATUS)



## FACULTY RESEARCH & PUBLICATIONS 2020-24

### OVERVIEW

Neurosurgery was founded by Dr. Harvey Cushing in 1913 at The Department of Neurosurgery at Brigham and Women's Hospital. Shortly after in 1929, Dr. Harvey Cushing's trainee, Dr. Franc D. Ingraham, created the pediatric neurosurgical service at Boston Children's Hospital. Today, these two institutions, along with Harvard Medical School, host a highly esteemed and fully integrated Neurosurgical Residency Program.

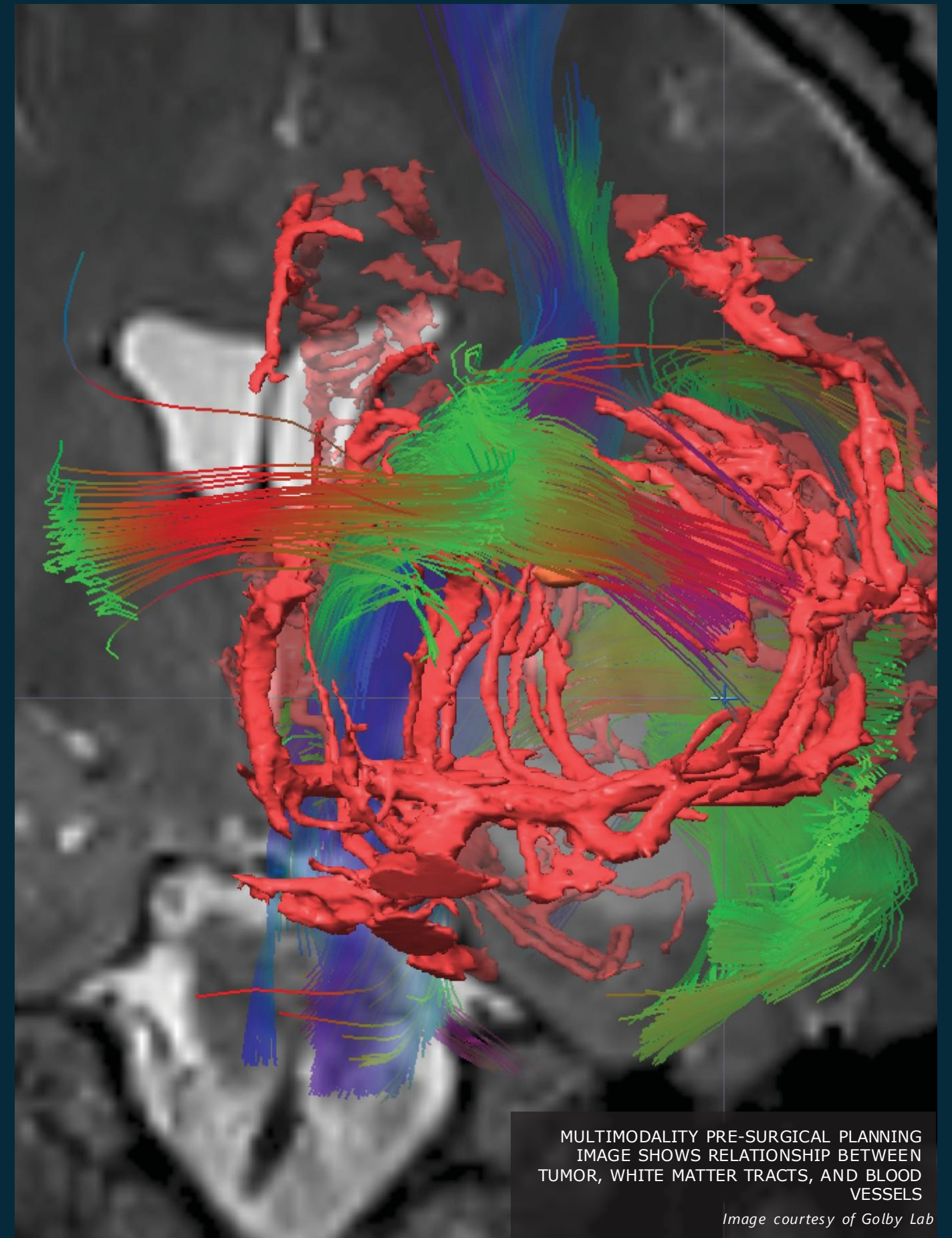
Today, the Departments of Neurosurgery at Boston Children's Hospital and Brigham and Women's Hospital are made up of 34 clinical faculty and over 100 department members devoted to the advancement of neurosurgical care, research, and education. Last year alone, the Department of Neurosurgery at Brigham and Women's Hospital offered 4,109 surgical treatments to patients from local, national, and international communities.

Our clinical faculty also conducts extensive scientific and clinical research to explore a range of complex neurological diseases, such as brain tumors, spinal disorders, stroke, and epilepsy. The aim of our research is to investigate the underlying risks, treatment strategies, and outcomes associated with these diseases and translate new findings to design and optimize neurosurgical treatments for each of our patients.

The Neurosurgery Residency Program of Brigham and Women's Hospital, Boston Children's Hospital and Harvard Medical School has a tradition of encouraging residents to participate in clinical and basic research studies with faculty, with exposure to emerging concepts and innovations.

### OUR CLINICAL FACULTY SET AN IMPRESSIVE EXAMPLE FOR PRESENTING RESEARCH STUDIES, PUBLISHING PEER-REVIEWED ARTICLES, TEXTBOOKS, ABSTRACTS AND PRESENTATIONS.

The following booklet contains a listing of the Brigham and Women's Hospital affiliated neurosurgical research laboratories, as well as the research publications authored by the 34 neurosurgical clinical faculty at BWH and BCH over the past six years. As you will see, the range and depth of neurosurgical topics covered is impressive, and a testament to both the knowledge of our faculty and the dedication we have to the advancement of neurosurgical treatment and care.



MULTIMODALITY PRE-SURGICAL PLANNING IMAGE SHOWS RELATIONSHIP BETWEEN TUMOR, WHITE MATTER TRACTS, AND BLOOD VESSELS

*Image courtesy of Golby Lab*

# BRIGHAM AND WOMEN'S HOSPITAL NEUROSURGICAL RESEARCH LABORATORIES

1

## BEI LABORATORY

**PRINCIPAL INVESTIGATOR:** Fengfeng Bei, PhD

**FOCUS:** Established at the end of 2016, the Bei laboratory seeks to understand why damaged brain circuits cannot regenerate their connection and repair themselves. The lab studies this broad question in a range of model systems, using standard molecular and histological tools, electrophysiological assessment, behavioral analysis, as well as novel gene therapy approaches and transplantation strategies. Current projects include attempts to repair the optic nerve axons to restore vision, to regenerate the brain-spinal cord projecting axons for treating.

2

## CENTER FOR STEM CELL THERAPEUTICS AND IMAGING (CSTI)

**PRINCIPAL INVESTIGATOR:** Khalid Shah, PhD

**FOCUS:** The overall goal of CSTI is to develop and test targeted cell-based therapies for cancer. The Center's theme is unique as it focuses on developing engineered cell-based therapies for cancer and integrates state of the art imaging techniques to assess the fate and therapeutic efficacy of such therapies in mouse tumor models that mimic clinical settings. Previously, the CSTI developed different mouse resection models of glioblastoma (GBM) utilizing image guided resection and followed recurrence non-invasively with optical and magnetic resonance (MR) imaging. As metastatic brain tumors are the most commonly observed intracranial tumors, the CSTI recently developed in vivo imageable mouse models of breast and melanoma to brain metastasis. These mouse models provide a unique and valuable platform to test novel therapeutic approaches for primary and metastatic tumor types. To develop novel biological therapies for cancer, the center engineered protein and oncolytic viral based cell surface receptor therapies that target cell death and proliferation pathways in tumor cells and tumor associated endothelial cells. Additionally, the CSTI pioneered two unique approaches that address the therapeutic delivery issues for the tumors

in the brain. Specifically, the center engineered stem cells that migrate to sites of primary tumors and micro-invasive tumor deposits and result in significant survival benefit in mice when placed in the biocompatible gels in the tumor resection cavity or injected via intracarotid artery in metastatic tumor bearing brains. Recently, the center has focused on targeting resistant tumors and developed stem cell deliverable bi-modal therapeutic molecules and immune-modulatory proteins and shown their efficacy in mouse models of brain tumors.

3

## CEREBROVASCULAR LABORATORY

**PRINCIPAL INVESTIGATOR:** Rose Du, MD, PhD

**FOCUS:** The Cerebrovascular Laboratory studies the genetics of cerebrovascular diseases including intracranial aneurysms and stroke.

4

## COMPUTATIONAL NEUROSCIENCE OUTCOMES CENTER (CNOC)

**PRINCIPAL INVESTIGATORS:** William B. Gormley, MD, MPH, MBA; Timothy R. Smith, MD, PhD, MPH; Omar Amaout, MD; Hasan A. Zaidi, MD

**FOCUS:** CNOC was developed by William Gormley, MD, MPH, MBA and Timothy R. Smith, MD, MPH, PhD in 2015. The center has grown out of the collaboration between leading healthcare organizations involved in the management and study of Neurosurgical disease. The center incorporates the clinical expertise of one of the leading Neurosurgical Centers in the world at Brigham and Women's Hospital in Boston Massachusetts, the resources and groundbreaking health care philosophy of Harvard Medical School. Along with the experience of two of the leading schools of Public Health in the United States; the Harvard T.H. Chan School of Public Health and the Yale School of Public Health. The academic and innovation skills of these institutions are brought together at the CNOC to expand knowledge and create and deliver improved patient centered outcomes in neurosurgery. The core values of the center include

research-based care, artificial intelligence (AI) analytics, patient-centered care, value-based care, clinical innovation, and global education.

5

## HARVEY CUSHING NEURO-ONCOLOGY LABORATORIES (HCNL)

**PRINCIPAL INVESTIGATOR:** E. Antonio Chiocca, MD, PhD

**FOCUS:** Named after the father of modern Neurosurgery, Harvey Cushing, the goal of the laboratory is to perform research to improve the outcomes of patients suffering from brain tumors. Under the direction of E. Antonio Chiocca (Director) and Sean Lawler (Managing Director), the HCNL studies mouse tumor models, in vitro systems, and state of the art cell and molecular biology to meet this challenge. Major areas of interest include oncolytic viruses, extracellular vesicles, tumor immunology, anti-invasive drugs, the role of CMV in cancer, the blood brain barrier and non-coding RNAs. The HCNL is comprised of seven distinct research lab groups: Chiocca, Bronisz, Cho, Godlewski, Lawler, Nakashima, and Peruzzi. In this highly collaborative environment, the HCNL is able to conduct cutting edge research that is being pushed forward into clinical trials, which will improve the basic understanding and ability to treat these challenging and devastating tumors.

## HCNL – CHIOCCA LABORATORY

**PRINCIPAL INVESTIGATOR:**

E. Antonio Chiocca, MD, PhD

**FOCUS:** The Chiocca lab focuses on developing therapies for brain tumors based on oncolytic viruses. The lab was involved in the first trials for locally delivered viral therapies for glioblastoma and has developed a number of novel, improved next generation viruses for tumor therapy and are engaged in numerous clinical trials in this area. The current focus is to determine how oncolytic viruses engage the immune system to promote sustained anti-tumor immunity, by acting as in situ vaccines.

## HCNL – CHO LABORATORY

**PRINCIPAL INVESTIGATOR:** Choi-Fong Cho, PhD

**FOCUS:** The Cho lab focuses on: developing peptide(s) that can specifically bind high-grade gliomas, generating novel peptide-based anti-glioma therapeutics that can specifically target brain tumor cells and cross the blood-brain-barrier, developing the blood-brain-barrier organoid model, and bio-printing the blood-brain-barrier model on a chip.

## HCNL – NAKASHIMA LABORATORY

**PRINCIPAL INVESTIGATOR:** Hiroshi Nakashima, PhD

**FOCUS:** The Nakashima lab focuses on the development of novel successful oncolytic virus (OVs) therapeutic approach for glioblastoma patients. The lab has committed to preclinical in vivo evaluation of promising OV in brain tumor models and reveal complex interplay of virus and immunosuppressive glioma microenvironments. Past work includes the study of virus and host relationships at the cellular level to improve the OV approach in glioma and generated preclinical and clinical strains of OVs. The team has been expanding this relationship at the host level, adaptive immunity, for the comprehensive therapeutic approach.

## HCNL – PERUZZI LABORATORY

**PRINCIPAL INVESTIGATOR:** Pier Paolo Peruzzi, MD, PhD **FOCUS:** The Peruzzi Lab investigates the role of non-coding RNAs in the biology and therapy of brain cancers. More specifically, the major goal is to define novel biological features of microRNAs in order to develop a new generation gene therapy application, based on multifactorial genetic interference of cancer cells and disruption of their epigenetic regulation.

6

### NEUROAPOPTOSIS DRUG DISCOVERY LABORATORY

**PRINCIPAL INVESTIGATOR:** Xin Wang, PhD

**FOCUS:** The Neuroapoptosis Drug Discovery Laboratory is primarily interested in translational neuroscience that uses novel approaches to identify candidate therapeutics and potential targets for therapeutic intervention in neurological disorders. This includes cerebral ischemia, neonatal brain injury, Amyotrophic Lateral Sclerosis, Huntington's disease, and Parkinson's disease as well as alcohol-induced neurotoxicity and organ injuries. To date, most of the lab's research has involved the identification of neuroprotective compounds like melatonin, dipyrone, nortriptyline, N-acetyl-tryptophan, N-acetyl-serotonin, minocycline, methazolamide and herbs like buckwheat alcoholic extract and others which slow down the progression of neurological disorders and neurotoxicity. The laboratory also focuses on the fundamental mechanisms of neurological disorders and neurotoxicity. The lab's research also focuses on stem cell therapy.

### NEURO-EPIDEMIOLOGY LABORATORY

**PRINCIPAL INVESTIGATOR:** Elizabeth Claus, MD, PhD

**FOCUS:** The Neuro-epidemiology Laboratory focuses on cancer and genetic epidemiology with an emphasis on the development of risk models for breast and brain tumors. Elizabeth Claud, MD, PhD is the overall PI of the Meningioma Consortium, the Meningioma Genome-Wide Association Study, and the Yale Acoustic Neuroma Study as well as a co-investigator of the GLOGENE (Genes for Glioma) and International Glioma Case/Control (GICC) projects in partnership with national patient brain tumor organizations including the American Brain Tumor Association (ABTA), the National Brain Tumor Society (NBTS) and the ANA. Dr. Claus works to develop cost- and time-efficient web- and smartphone- based recruitment strategies to be used in the study of brain tumors. She has developed such work in collaboration with the ANA and has funding from the ABTA/NBTS to develop a web-based registry for patients with low grade glioma to advance research efforts for this group of patients.

8

### SKULL BASE LABORATORY

**PRINCIPAL INVESTIGATOR:** Wenya Linda Bi, MD, PhD

**FOCUS:** The Skull Base Laboratory focuses on the translational biology of skull base tumors, including meningiomas, pituitary tumors, and vestibular schwannomas. The group applies genomic, immune, computational, and advanced microscopy imaging methodologies to define the biological landscape of skull base tumors, the mechanisms underlying their tumorigenesis, tumor evolution during recurrence, and treatment resistance for aggressive subtypes.

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### SPINAL CORD INJURY RESEARCH LABORATORY

**PRINCIPAL INVESTIGATOR:** Yi Lu, MD, PhD

**FOCUS:** The Spinal Cord Injury Research Laboratory focuses on research that has the potential to advance the clinical functional recovery in patients suffering from spinal cord injury and other traumatic neurological injuries. The main areas of interest include the mechanisms of axon regeneration with neurotrophic factors and integrins and the mechanisms of dormant pathway activation after incomplete injury leading to enhanced functional recovery.

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### SURGICAL BRAIN MAPPING LABORATORY (SBML)

**PRINCIPAL INVESTIGATOR:** Alexandra Golby, MD

**FOCUS:** The Surgical Brain Mapping Laboratory leads the Department's research in surgical brain mapping, intraoperative imaging, and image guided neurosurgery through the use of intra-operative imaging to guide neurosurgical interventions, development and validation of tissue markets to guide surgery for brain tumors, develop diffusion imaging as a tool for pre-surgical mapping of white mater, translation of fMRI from neuroscience applications towards a tool for pre-surgical brain mapping in patients, and clinical trial of MR guided focused ultrasound for targeted blood brain barrier opening in patients with brain tumors. Building on a long history of preclinical and clinical use of MRgFUS at BWH, the lab is working with the industry leader to use non-invasive FUS as an adjunct to the clinical standard of care with the Stupp protocol.

### SBML – TIE RESEARCH GROUP

**PRINCIPAL INVESTIGATOR:** Yanmei Tie, PhD

**FOCUS:** The Tie research group develops neuroimaging techniques, such as functional magnetic resonance imaging (fMRI) and diffusion MRI, to improve presurgical mapping of brain functions for neurosurgery planning and guidance. Additionally, the group combines brain functional and structural connectivity approaches to understand neural mechanism of disease pathophysiology, and to develop neuroimaging biomarkers for treatment-induced cognitive impairment in cancer patients. The goals are to inform therapeutic development and improve patients' overall well-being.

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### SURGICAL MOLECULAR IMAGING LABORATORY

**PRINCIPAL INVESTIGATOR:** Nathalie Agar, PhD

**FOCUS:** The Surgical Molecular Imaging Laboratory develops and implements mass spectrometry and optical imaging approaches for surgical pathology and oncology. The lab also develops, validates, and applies imaging approaches for drug development research and molecular classification of disease, and works toward translating methodologies for the practice of individualized medicine. More specifically, part of the research takes place in the AMIGO suite, standard operating rooms, and a state-of-the-art laboratory equipped for tissue culture and optical and mass spectrometry imaging. Since receiving the NIH Director's New Innovator Award in 2010 for the work on "Real-Time Stereotactic Mass Spectrometry Tissue Analysis for Intraoperative Neurosurgical Guidance", the lab has implemented mass spectrometry protocols in the operating room for brain and breast cancer surgery. The work on the real-time analysis of an onco-metabolite (2-HG) to support surgical decision making now constitutes the basis for the very first IRB-approved study to use mass spectrometry derived diagnostic information to support surgical decision making. The effort to improve the management of brain tumors also includes extensive imaging of targeted therapies that transit through the blood-brain barrier in pre-clinical animal models and clinical trial patients with correlation to non-invasive radiologic imaging and detailed pharmacodynamics. Using MALDI FTICR mass spectrometry imaging we can specifically image most drugs and spatially resolve their distribution as it relates to the vasculature by

simultaneously imaging heme as a natural biomarker of the vasculature. Using the same approach on stereotactic MRI-registered surgical samples from clinical trials for primary brain tumors and brain metastases, we further assess drug distribution in the 3D anatomy of the tumor and brain to account for the effect of brain anatomy and tumor heterogeneity on the permeability of blood-brain and blood-tumor barriers.



## OSSAMA AL-MEFTY, MD

DIRECTOR, SKULL BASE PROGRAM,  
BRIGHAM AND WOMEN'S HOSPITAL

### ACADEMIC TITLE

Lecturer, Harvard Medical School

### MEDICAL SCHOOL

Damascus University School of Medicine, 1972

### RESIDENCY

Medical College of Ohio at  
Toledo, General Surgery, 1974

West Virginia  
University,  
Neurosurgery, 1978

### CERTIFICATIONS

Neurosurgery, 1980

### CLINICAL INTERESTS

Acoustic neuroma, aneurysms, arteriovenous malformations, brain tumors, bypass, cavernomas, cavernous malformations, cerebral revascularization, craniopharyngioma, gliomas, glomus tumor, jugular foramen tumors, meningiomas, percutaneous radiofrequency, pineal region tumor, pituitary tumors, radiosurgery, skull base neurosurgery, skull base tumors, spinal cord tumors, trigeminal neuralgia

## PUBLICATIONS

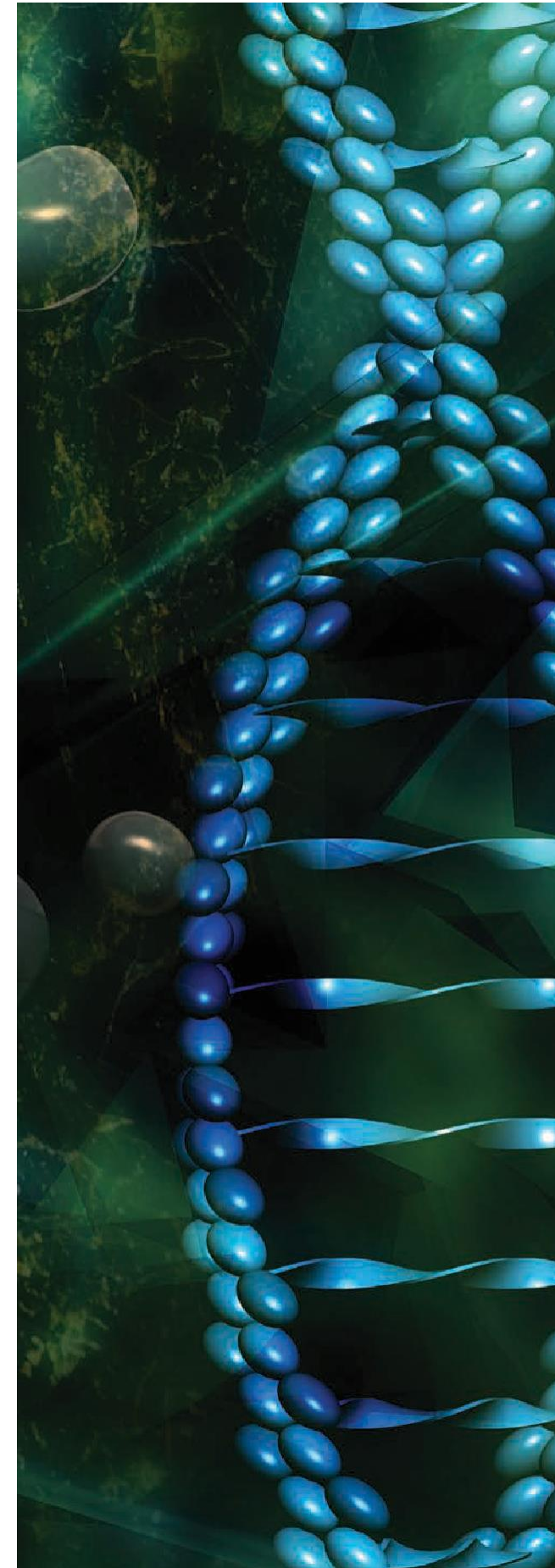
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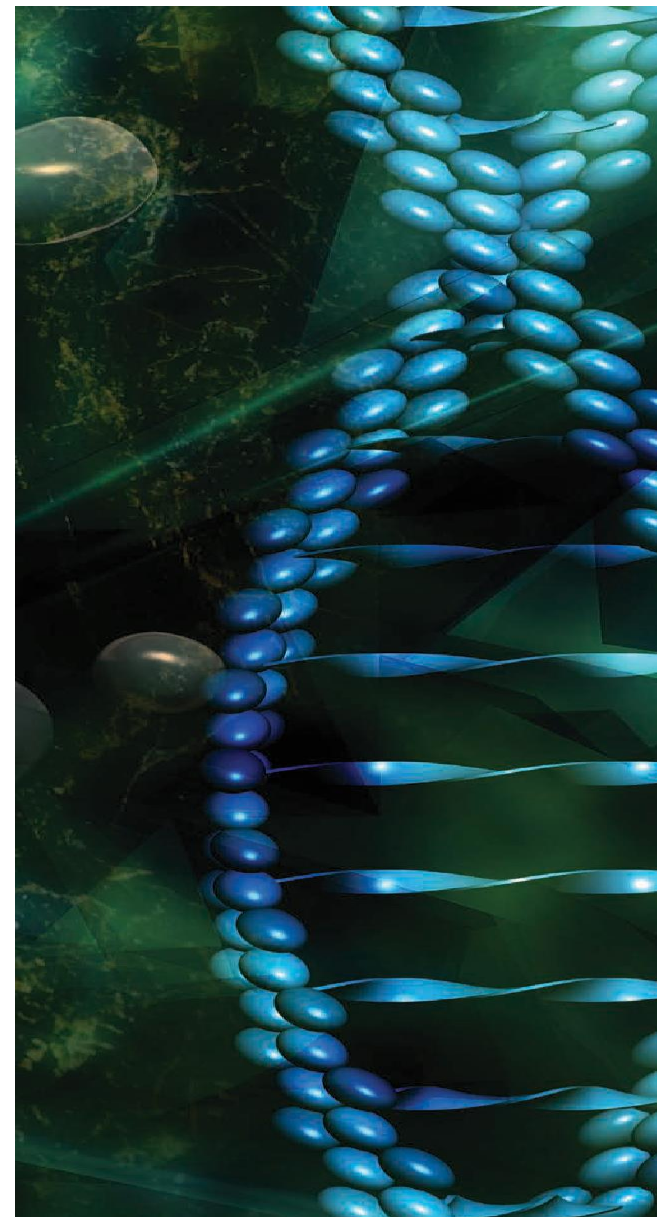
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PUBLICATIONS

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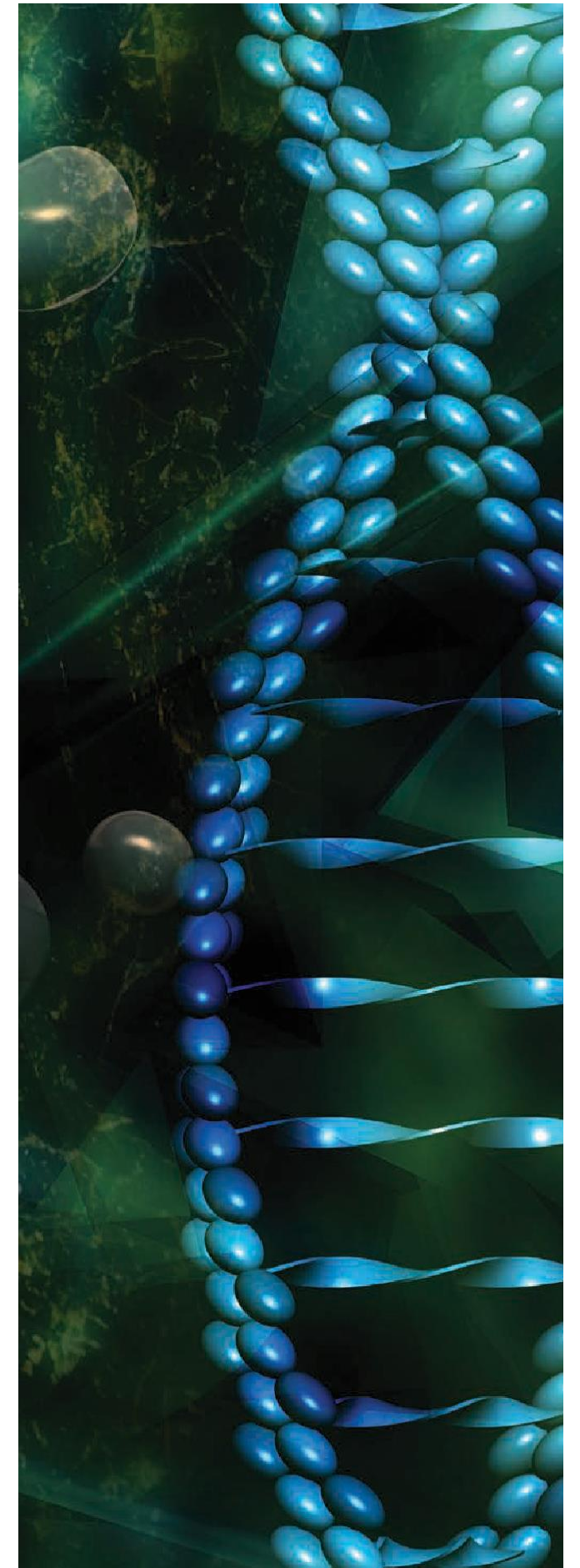
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### CLINICAL INTERESTS

Arthroplasty, artificial disc replacement, brachial plexus injury, brachial plexus tumor, carpal tunnel syndrome, cervical radiculopathy, cervical stenosis, Chiari malformation, chondrosarcoma, chordoma, claudication, cubital tunnel syndrome, degenerative disc disease, disc herniation, entrapment neuropathy, ependymoma, image-guided surgery, lumbar radiculopathy, lumbar stenosis, minimally invasive surgery, myelopathy, osteosarcoma, pain management, peripheral nerve disease, scoliosis, slipped disc, spinal cord tumors, spinal deformity, spinal disorders, spinal fusion, spine tumors, spondylolisthesis, thoracic outlet syndrome

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## PUBLICATIONS

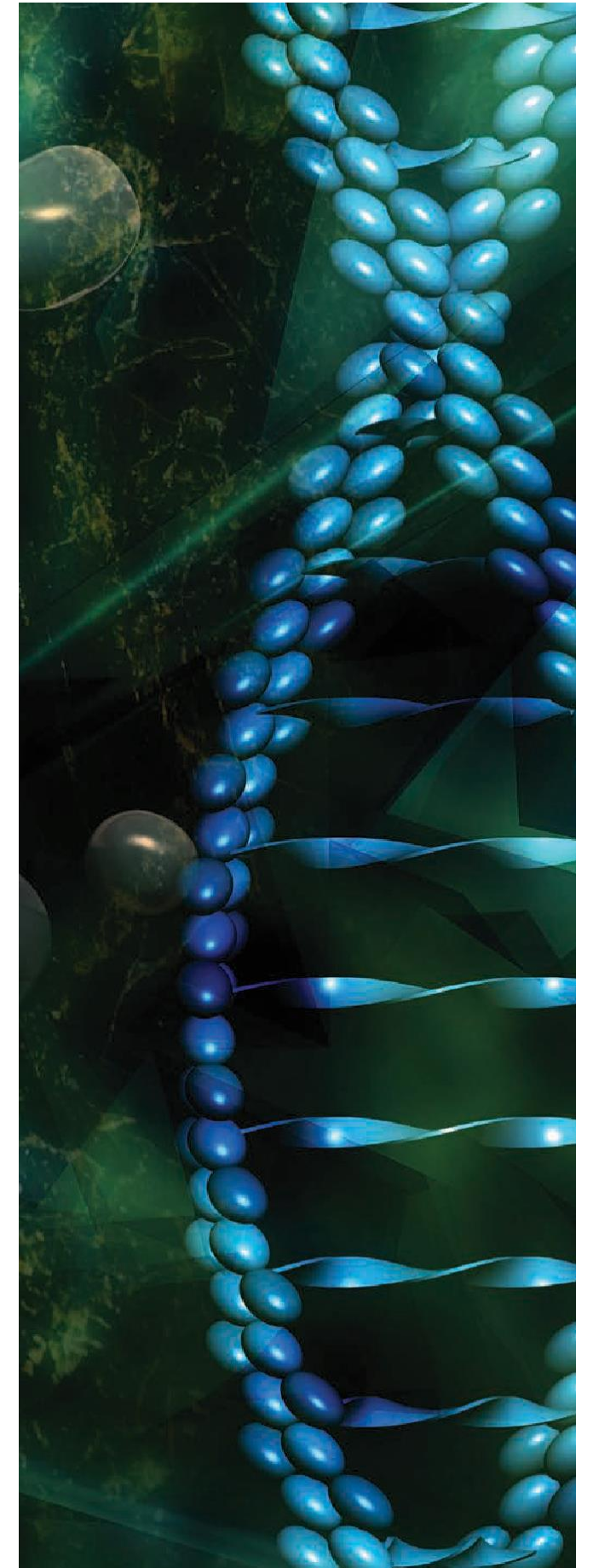
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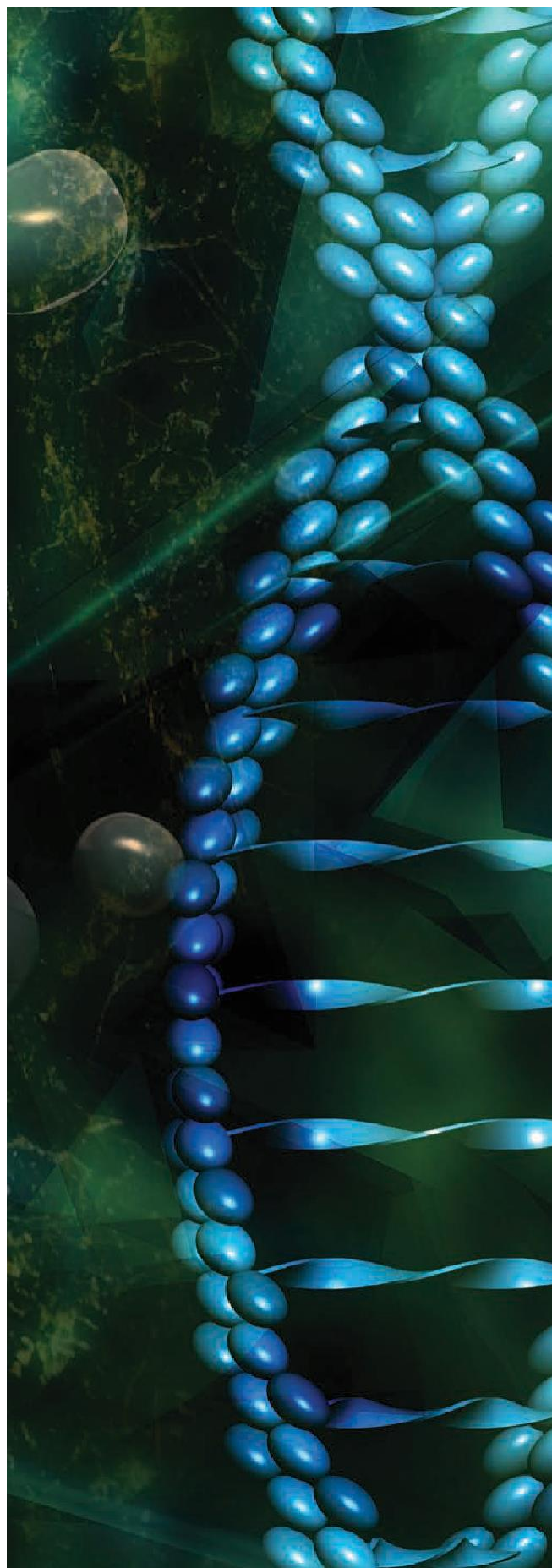
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University at Buffalo School of Medicine, 2020

### CLINICAL INTERESTS

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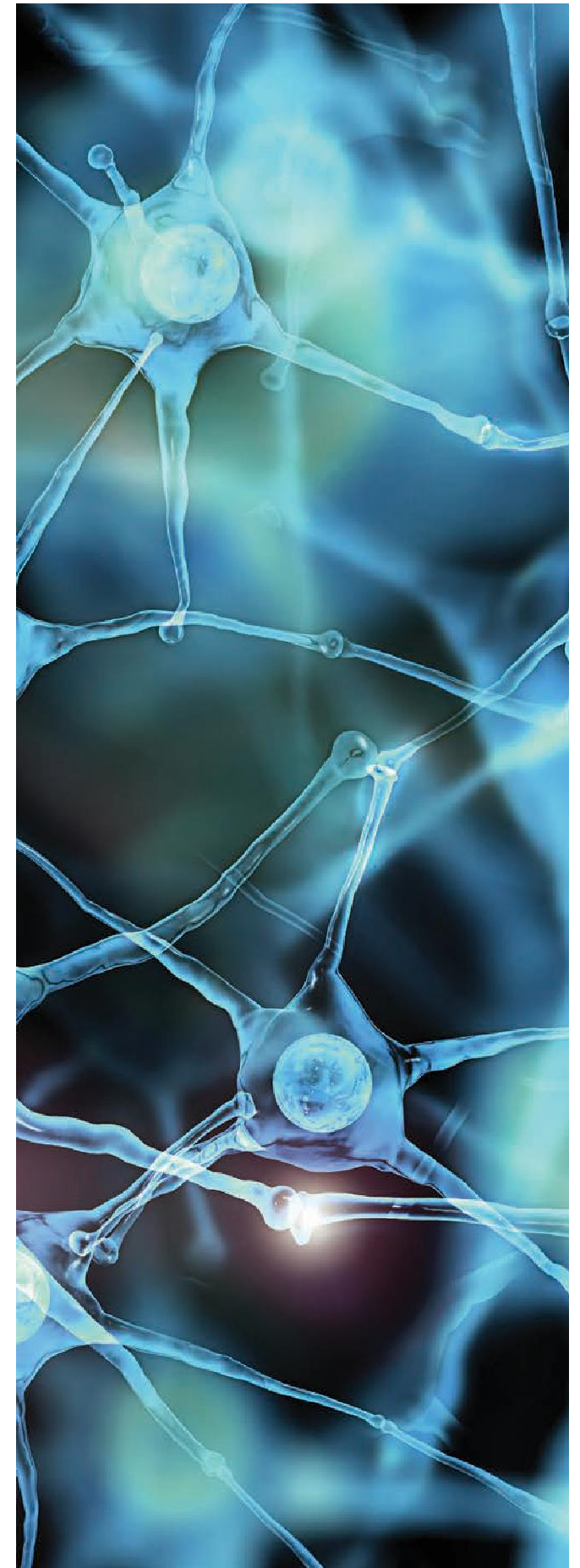
### CLINICAL INTERESTS

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## PUBLICATIONS

- Ostrom QT, Egan KM, Nabors LB, Gerke T, Thompson RC, Olson JJ, LaRocca R, Chowdhary S, Eckel-Passow JE, Armstrong G, Wiencke JK, Bernstein JL, Claus EB, Il'yasova D, Johansen C, Lachance DH, Lai RK, Merrell RT, Olson SH, Sadetzki S, Schildkraut JM, Shete S, Houlston RS, Jenkins RB, Wrensch MR, Melin B, Amos CI, Huse JT, Barnholtz-Sloan JS, Bondy ML. Glioma risk associated with extent of estimated European genetic ancestry in African Americans and Hispanics. *Int J Cancer*. 2020 Feb 1;146(3):739-748. doi: 10.1002/ijc.32318. PMID: 30963577; PMCID: PMC6785354.
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American University of the Caribbean, 2002

### RESIDENCY

Tulane University, Neurological Surgery, 2009

### FELLOWSHIPS

University of Washington, Harborview Medical Center Neurological Surgery, 2009

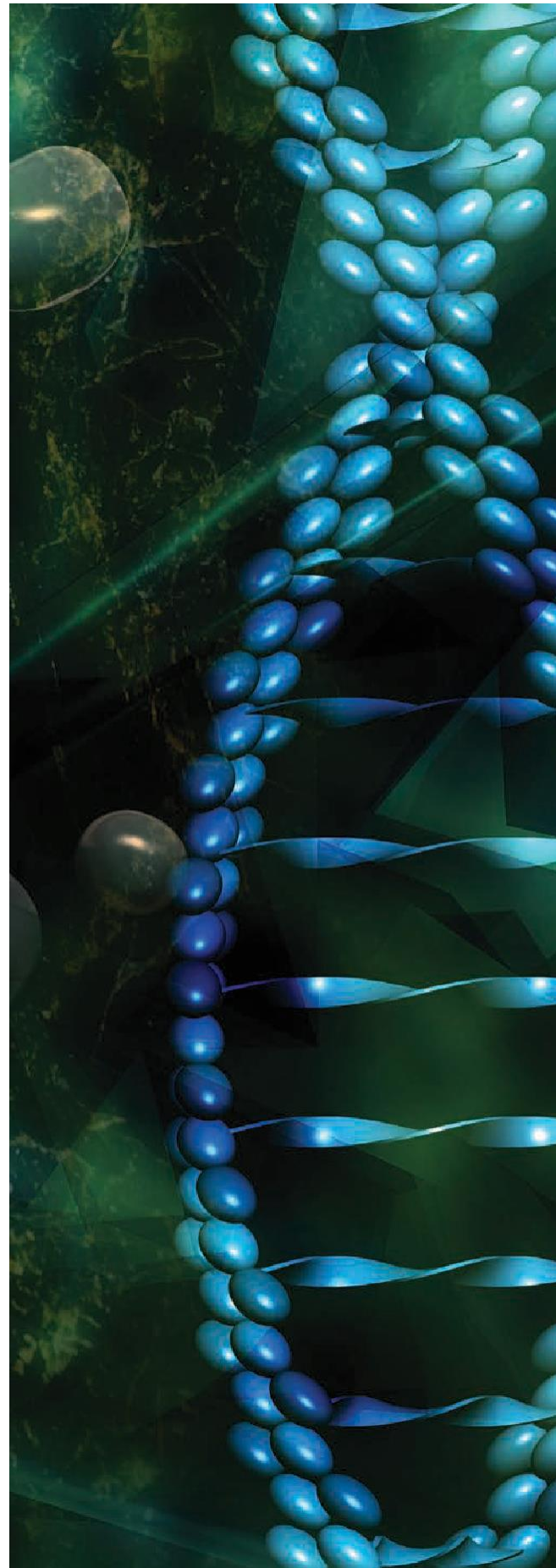
Oregon Health and Sciences University, Orthopaedic Spine Fellowship, 2010

### CERTIFICATIONS

Neurological Surgery, 2015

### CLINICAL INTERESTS

Artificial disc replacement, cervical radiculopathy, cervical stenosis, degenerative disc disease, lumbar radiculopathy, lumbar stenosis, minimally invasive surgery, spinal deformity, spine tumors, spondylolisthesis



## ROSE DU, MD, PHD

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### ACADEMIC TITLE

Professor of Neurosurgery, Harvard Medical School

### MEDICAL SCHOOL

Harvard Medical School, 2000

### INTERNSHIP

University of California at San Francisco, General Surgery, 2001

### RESIDENCY

University of California, San Francisco School of Medicine, Neurosurgery, 2006

### FELLOWSHIP

Brigham and Women's Hospital, Cerebrovascular and Skull Base Surgery, 2007

### CERTIFICATIONS

Neurological Surgery, 2011

### CLINICAL INTERESTS

Aneurysms, Arteriovenous Malformations, Brain Tumors, Bypass, Carotid Artery Disease, Cavernomas, Cavernous Malformations, Cerebral Ischemia, Cerebral Revascularization, Cerebrovascular Disease, Hemifacial Spasm, Meningiomas, Microvascular Decompression, Moyamoya Disease, Skull Base Neurosurgery, Skull Base Tumors, Trigeminal Neuralgia

## PUBLICATIONS

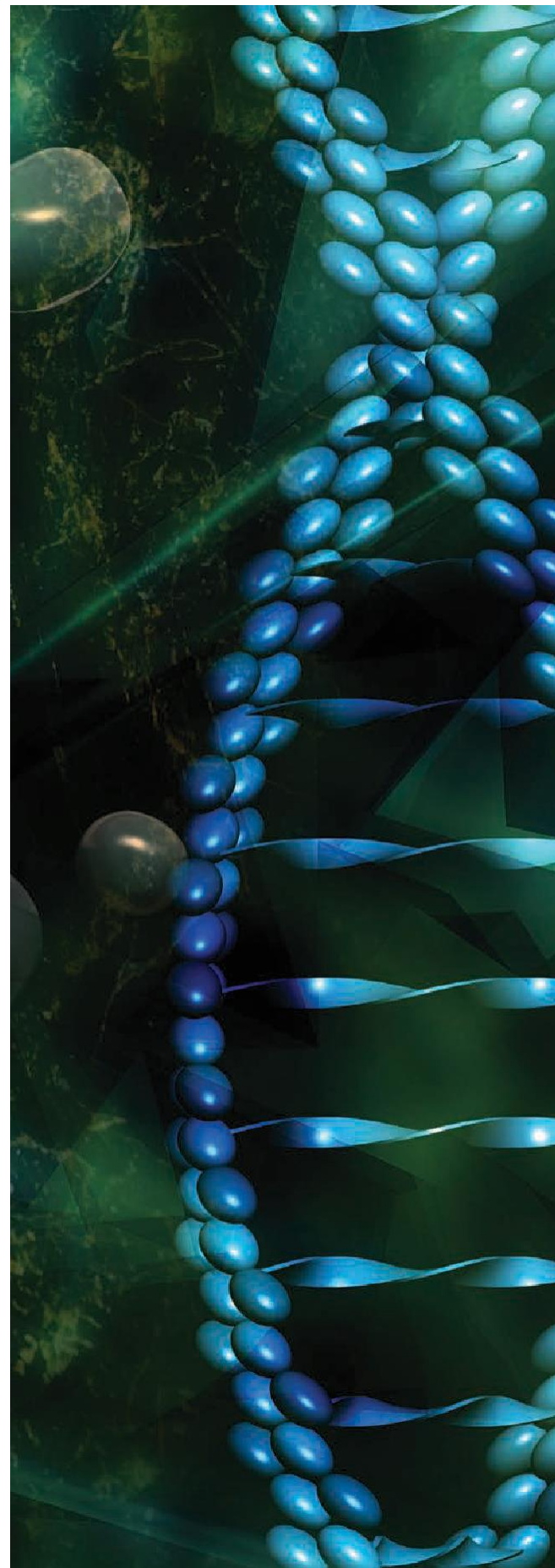
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61. Musmar B, Roy JM, Abdalrazeq H, Kaul A, Atallah E, Naamani KE, Chen CJ, Jabre R, Saad H, Grossberg JA, MD, Dmytriw AA, Patel AB, Khorasanizadeh M, Ogilvy CS, Thomas AJ, Monteiro A, Siddiqui A, Cortez GM, Hanel RA, Porto G, Spiotta AM, Piscopo AJ, Hasan DM, Ghorbani M, Weinberg J, Nimjee SM, Bekelis K, Salem MM, Burkhardt J, Zetchi A, Matouk C, Howard BM, Lai R, Du R, Abbas R, Sioutas GS, Amllay A, Munoz A, Herial NA, Tjoumakaris SI, Gooch MR, Rosenwasser RH, and Jabbour P. Comparative outcomes of unilateral vs bilateral revascularization in moyamoya disease: A multicenter retrospective study, *Neurosurgery*, accepted.
62. Lai PMR, Jimenez M, Rexrode K\*, and Du R\*. Plasma estrogen levels and aneurysmal subarachnoid hemorrhage in women, *World Neurosurgery*, accepted. \*These authors contributed equally.
63. Ryu JY\*, Zhang J\*, Tirado S, Dagen S, Frerichs KU, Patel NJ, Aziz-Sultan MA, Brown A, Rogers-Grazado M, Amr SS, Weiss T, and Du R. MiRNA expression profiling reveals a potential role of microRNA-148b-3p in cerebral vasospasm in subarachnoid hemorrhage, *Sci Reports*, accepted. \*These authors contributed equally.



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### ACADEMIC TITLE

Assistant Professor, Harvard Medical School

### MEDICAL SCHOOL

Ludwig-Maximilians-Universitat Munchen, Medical School, 1988

### INTERNSHIP

Brigham and Women's Hospital, Surgery, 1994

### RESIDENCY

Brigham and Women's Hospital/  
Boston Children's Hospital, Neurosurgery, 2000

### FELLOWSHIP

Brigham and Women's Hospital,  
Interventional Neuroradiology,  
2002

### CERTIFICATIONS

Neurological Surgery, 2005

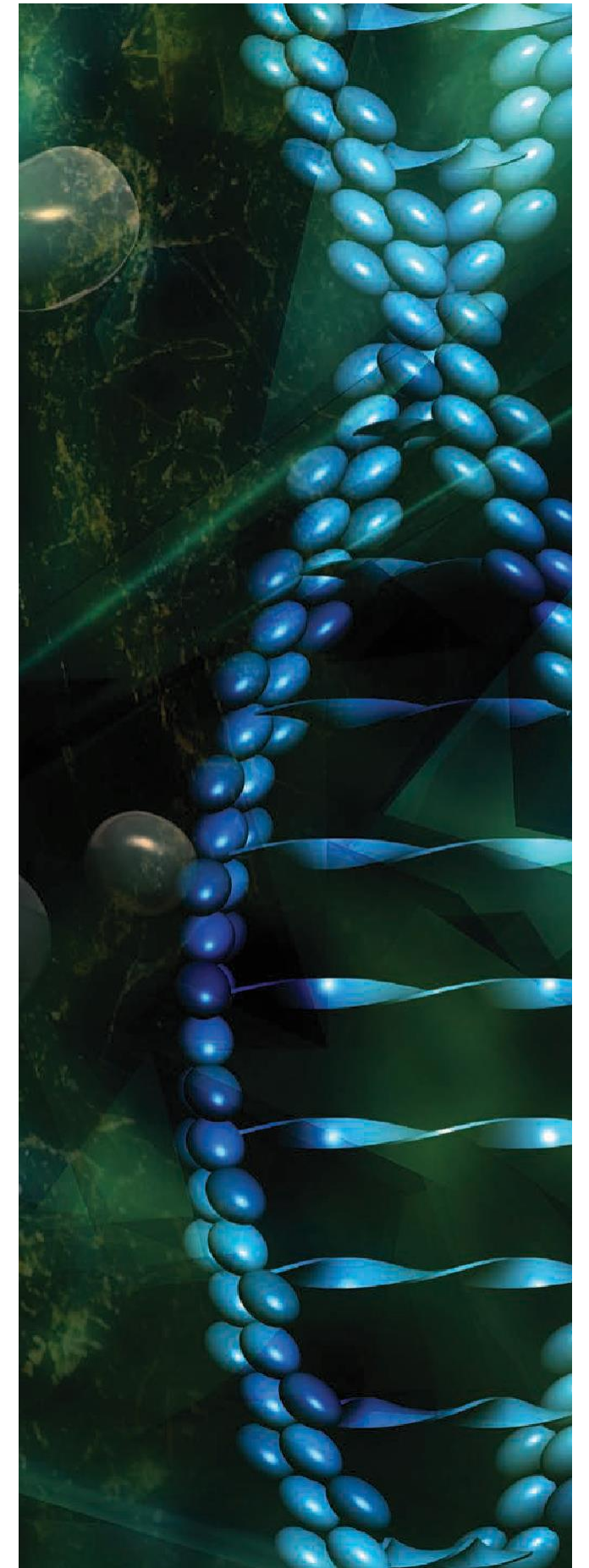
### CLINICAL INTERESTS

Aneurysms, arteriovenous malformations, Carotid Artery Disease, Cerebral Hemorrhage, Cerebral Ischemia, Cerebral Revascularization, Cerebrovascular Disease, Embolization, Neurological, Endovascular Neurosurgery, Petrosal Sinus Sampling, Stroke Therapy

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21. Lai PMR, Beazer M, Frerichs KU, Patel NJ, Aziz-Sultan MA, Du R. Association Between Moyamoya Revascularization Surgery and Neurologic Events During Pregnancy: Systematic Review. *Neurosurgery.* 2024 Oct 2. doi: 10.1227/neu.0000000000003184. Epub ahead of print. PMID: 39356157.
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### ACADEMIC TITLE

Professor of Neurosurgery and  
Radiology, Harvard Medical School

### MEDICAL SCHOOL

Stanford University School of Medicine, 1995

### INTERNSHIP

Stanford University School of  
Medicine, Neurosurgery, 2000

### RESIDENCY

Brigham and Women's  
Hospital/ Boston Children's  
Hospital, 2002

Stanford University School of  
Medicine, Neurosurgery, 2000

### FELLOWSHIP

Centre Hopitalier de Grenoble, 2001

### CERTIFICATIONS

Neurosurgery, 2007

### CLINICAL INTERESTS

Acoustic neuroma, arachnoid cyst, awake surgery  
for speech and motor monitoring, brain  
mapping, brain tumors, Chiari malformation,  
epilepsy, fibrous dysplasia, gliomas,  
hydrocephalus, image-guided surgery, laser  
assisted tumor deconstruction,  
meningiomas, minimally invasive surgery,  
neurological oncology, oligodendroglioma, pituitary  
tumors, radiosurgery, seizure management

## PUBLICATIONS

1. Frisken S, Luo M, Juvekar P, Bunevicius A, Machado I, Unadkat P, Bertotti MM, Toews M, Wells WM, Miga MI, Golby AJ. A comparison of thin-plate spline deformation and finite element modeling to compensate for brain shift during tumor resection. *Int J Comput Assist Radiol Surg.* 2020 Jan;15(1):75-85. doi: 10.1007/s11548-019-02057-2. Epub 2019 Aug 23. PMID: 31444624; PMCID: PMC6952552.
2. Xie G, Zhang F, Leung L, Mooney MA, Epprecht L, Norton I, Rathi Y, Kikinis R, Al-Mefty O, Makris N, Golby AJ, O'Donnell LJ. Anatomical assessment of trigeminal nerve tractography using diffusion MRI: A comparison of acquisition b-values and single- and multi-fiber tracking strategies. *Neuroimage Clin.* 2020;25:102160. doi: 10.1016/j.nicl.2019.102160. Epub 2020 Jan 8. PMID: 31954337; PMCID: PMC6962690.
3. Yao S, Liebenthal E, Juvekar P, Bunevicius A, Vera M, Rigolo L, Golby AJ, Tie Y. Sex Effect on Presurgical Language Mapping in Patients With a Brain Tumor. *Front Neurosci.* 2020 Jan 24;14:4. doi: 10.3389/fnins.2020.00004. PMID: 32038154; PMCID: PMC6992642.
4. Golby AJ, Leuthardt EC, Duffau H, Berger MS. Introduction. Advances and future directions in brain mapping in neurosurgery. *Neurosurg Focus.* 2020 Feb 1;48(2). doi: 10.3171/2019.11.FOCUS19880. PMID: 32006943.
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7. Stopa BM, Senders JT, Broekman MLD, Vangel M, Golby AJ. Preoperative functional MRI use in neurooncology patients: a clinician survey. *Neurosurg Focus.* 2020 Feb 1;48(2). doi: 10.3171/2019.11.FOCUS19779. PMID: 32006949; PMCID: PMC7818717.
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9. Zhang F, Noh T, Juvekar P, Frisken SF, Rigolo L, Norton I, Kapur T, Pujol S, Wells W 3rd, Yarmarkovich A, Kindlmann G, Wassermann D, San Jose Estepar R, Rathi Y, Kikinis R, Johnson HJ, Westin CF, Pieper S, Golby AJ, O'Donnell LJ. SlicerDMRI: Diffusion MRI and Tractography Research Software for Brain Cancer Surgery Planning and Visualization. *JCO Clin Cancer Inform.* 2020 Mar;4:299-309. doi: 10.1200/CCI.19.00141. PMID: 32216636; PMCID: PMC7113081.
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19. Sprugnoli G, Rossi S, Liew SL, Bricolo E, Costantini G, Salvi C, Golby AJ, Musaeus CS, Pascual-Leone A, Rossi A, Santarnecchi E. Enhancement of semantic integration reasoning by tRNS. *Cogn Affect Behav Neurosci.* 2021 Aug;21(4):736-746. doi: 10.3758/s13415-021-00885-x. Epub 2021 Apr 2. PMID: 33796985; PMCID: PMC8976450.
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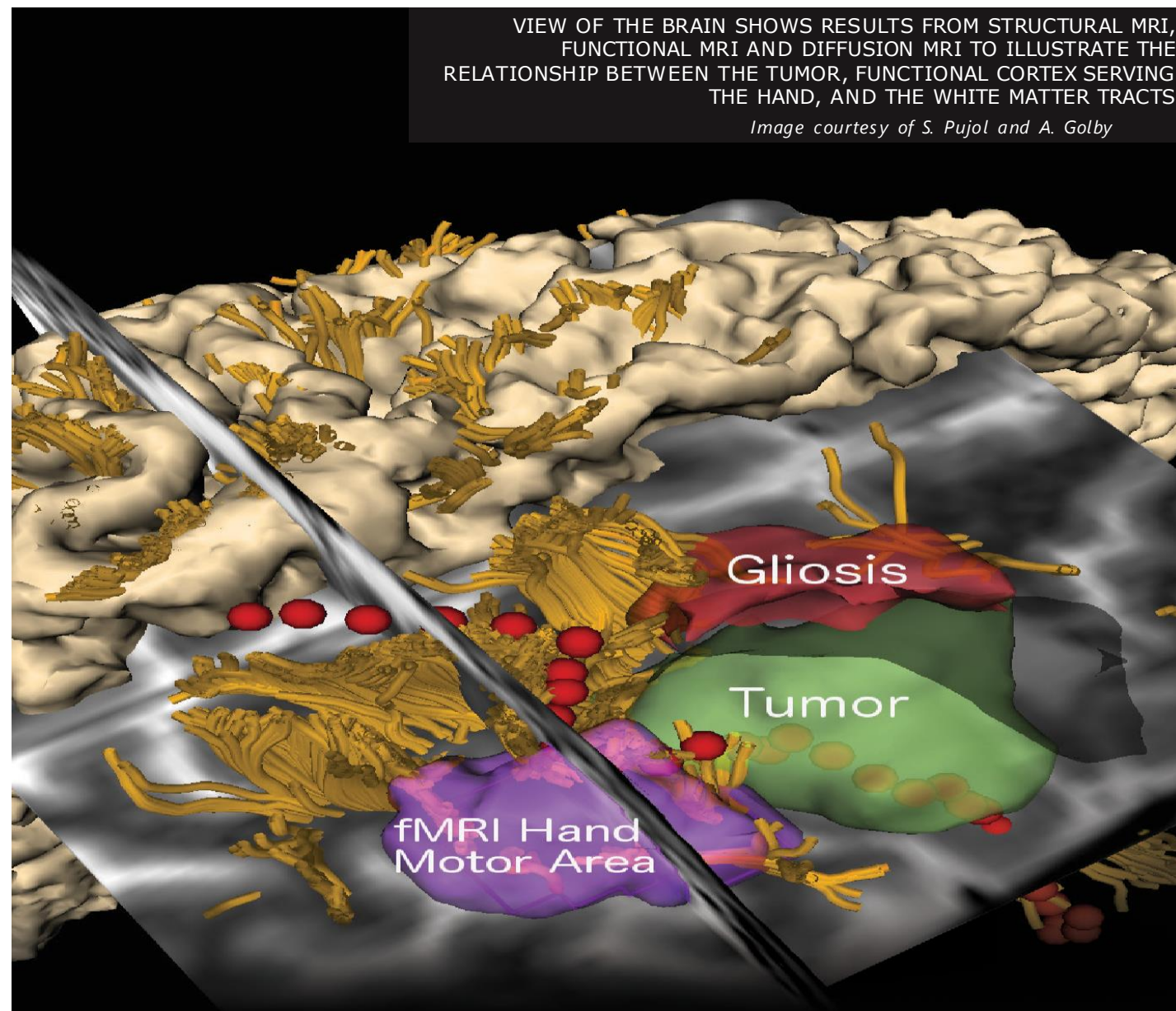
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PUBLICATIONS

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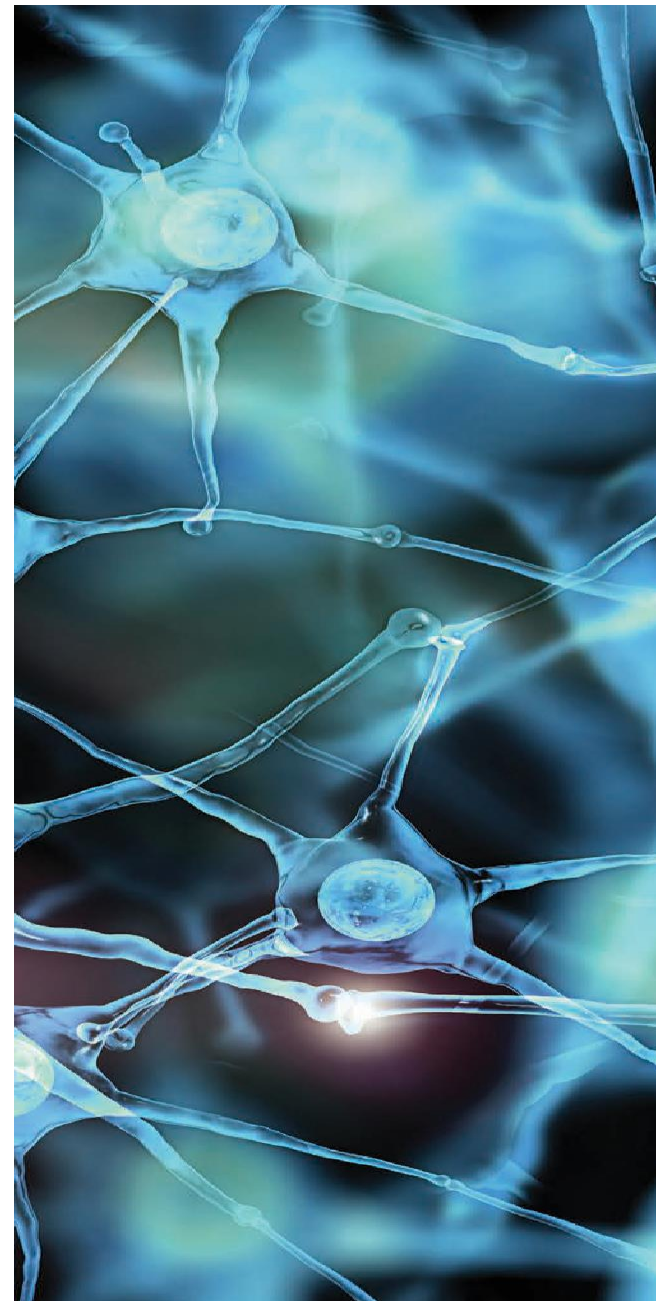
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40. 3D Technologies for Retinal Disease Modeling and Regeneration. Submitted to *Bioengineering and Translational Medicine*.
41. American College of Radiology ACR Appropriateness Criteria® Suspected Primary Bone Tumors.



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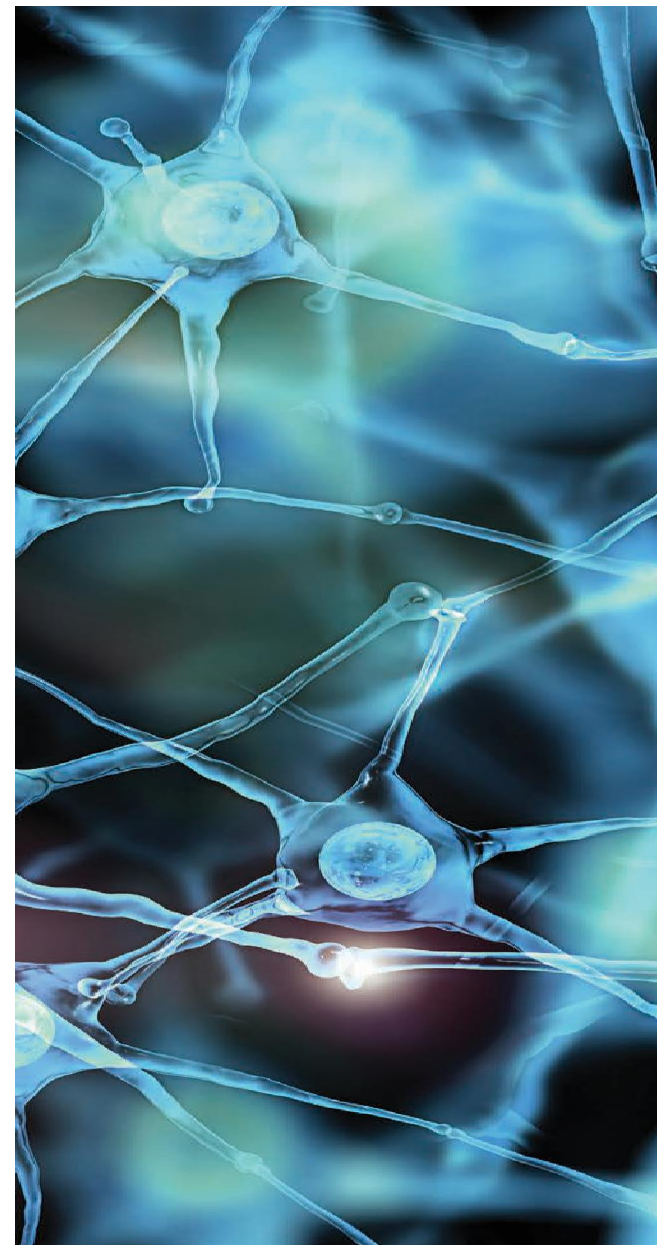
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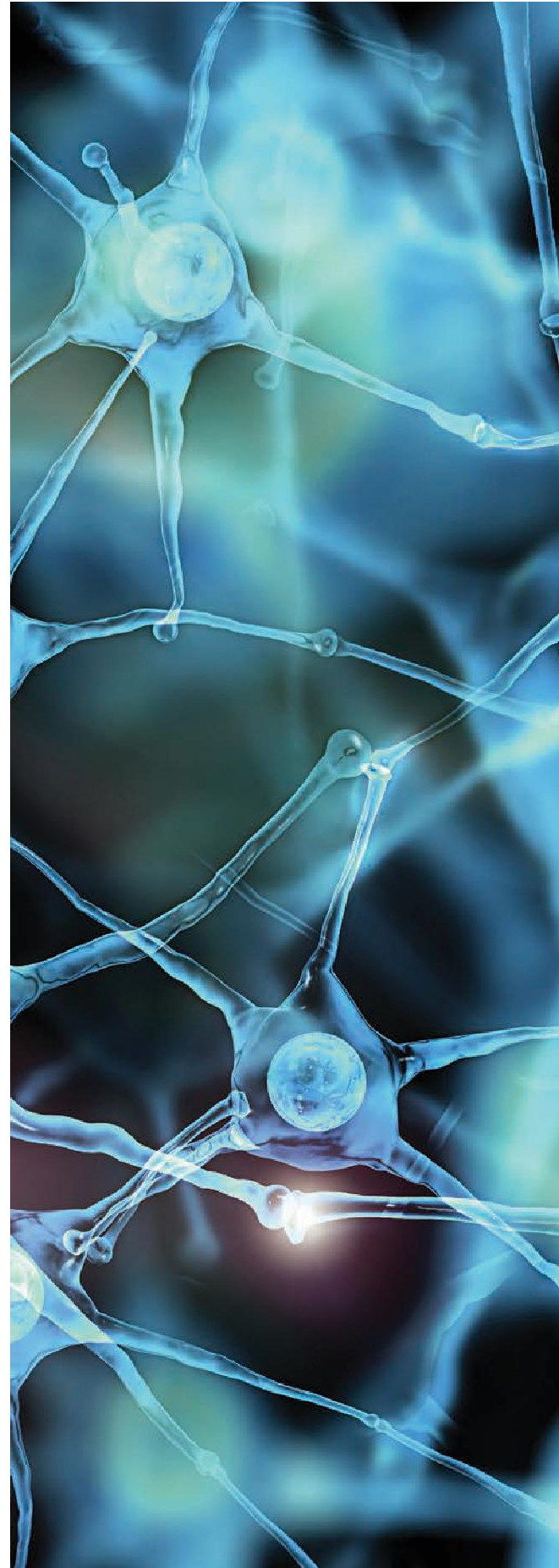
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41. Zhang J, Ryu JY, Tirado SR, Dickinson LD, Abosch A, Aziz-Sultan MA, Boulos AS, Barrow DL, Batjer HH, Binyamin TR, Blackburn SL, Chang EF, Chen PR, Colby GP, Cosgrove GR, David CA, Day AL, Folkerth RD, Frerichs KU, Howard BM, Jahromi BR, Niemela M, Ojemann SG, Patel NJ, Richardson RM, Shi X, Valle-Giler EP, Wang AC, Welch BG, Williams Z, Zusman EE, Weiss ST, Du R; GENIE Investigators. A Transcriptomic Comparative Study of Cranial Vasculature. *Transl Stroke Res.* 2024 Dec;15(6):1108-1122. doi: 10.1007/s12975-023-01186-w. Epub 2023 Aug 23. PMID: 37612482.



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### ACADEMIC TITLES

Assistant Professor, Harvard Medical School

### MEDICAL SCHOOL

Università La Sapienza di Roma, Medicine, 2004

### RESIDENCY

Ohio State University Medical Center, Neurosurgery, 2014

### FELLOWSHIP

Nationwide Children's Hospital, Pediatric Neurosurgery, 2015

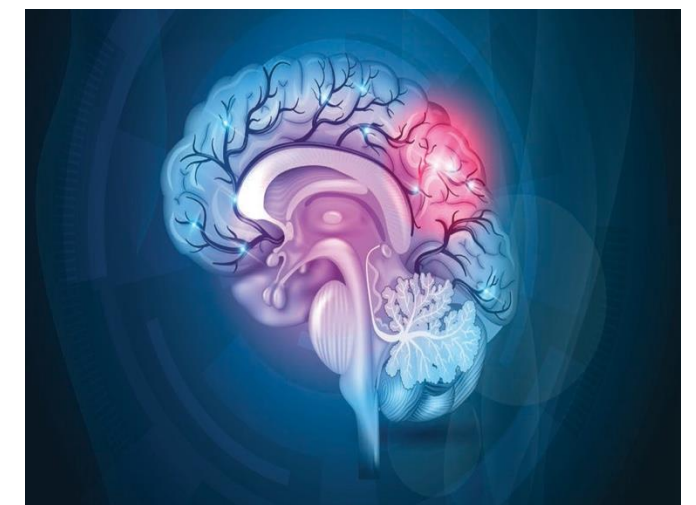
### CLINICAL INTERESTS

Awake Surgery for Speech and Motor Monitoring, Brain Metastases, Brain tumors, Chiari malformation, endoscopic neurosurgery, gliomas, meningiomas, peripheral nerve disease, skull base neurosurgery, spinal cord tumors, spinal disorders

## PUBLICATIONS

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2. Bronisz A, Rooj AK, Krawczyński K, Peruzzi P, Salińska E, Nakano I, Purow B, Chiocca EA, Godlewski J. The nuclear DICER-circular RNA complex drives the deregulation of the glioblastoma cell microRNAome. *Sci Adv.* 2020 Dec 16;6(51). doi: 10.1126/sciadv.abc0221. PMID: 33328224; PMCID: PMC7744081.
3. Rigoard P, Billot M, Ingrand P, Durand-Zaleski I, Roulaud M, Peruzzi P, Dam Hieu P, Voirin J, Raoul S, Page P, Djian MC, Fontaine D, Lantéri-Minet M, Blond S, Buisset N, Cuny E, Cadenne M, Caire F, Ranoux D, Mertens P, Naous H, Simon E, Emery E, Béraud G, Debais F, Durand G, Serrie A, Diallo B, Bulsei J, Ounajim A, Nivole K, Durantou S, Naiditch N, Monlezun O, Bataille B. How Should we Use Multicolumn Spinal Cord Stimulation to Optimize Back Pain Spatial Neural Targeting? A Prospective, Multicenter, Randomized, Double-Blind, Controlled Trial (ESTIMET Study). *Neuromodulation.* 2021 Jan;24(1):86-101. doi: 10.1111/ner.13251. Epub 2020 Aug 31. PMID: 32865344.
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## JASON P. RAHAL, MD

### ACADEMIC TITLES

Instructor of Neurosurgery, Harvard Medical School

### MEDICAL SCHOOL

Tufts University School of Medicine, 2008

### INTERNSHIP

Tufts Medical Center, 2009

### RESIDENCY

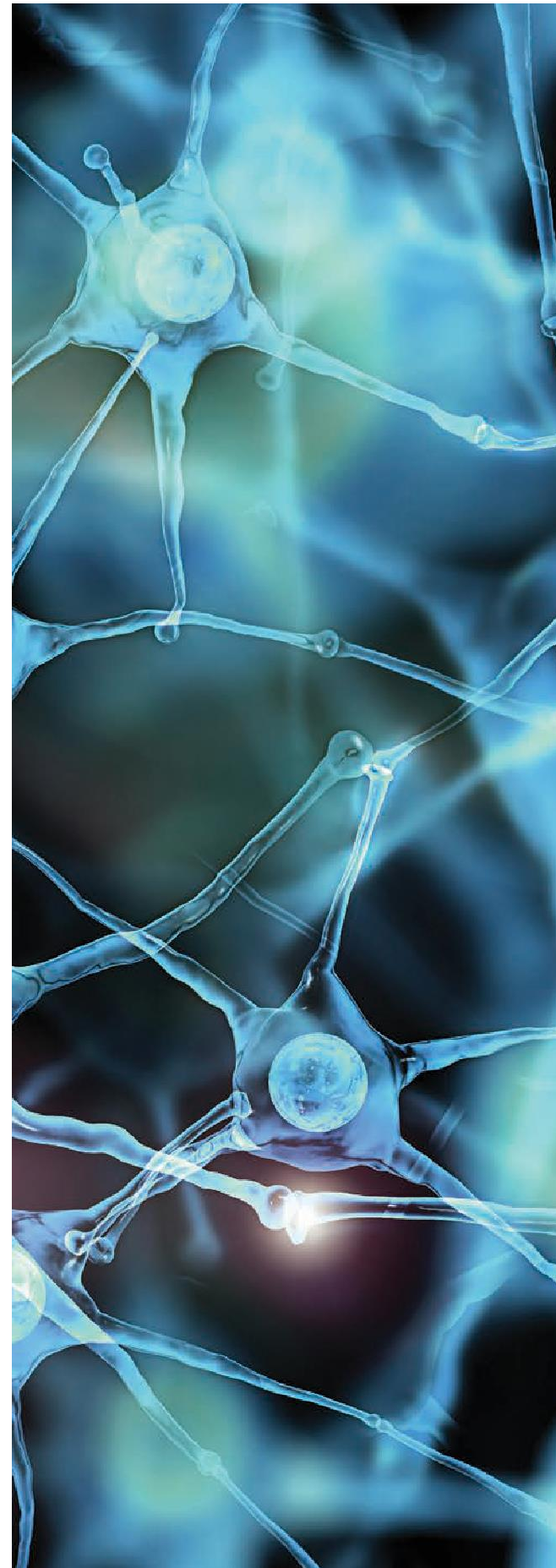
Tufts Medical Center 2014

### BOARD CERTIFICATION

ABNS, Neurosurgery 2020

### CLINICAL INTERESTS

Artificial Disc Replacement, Cervical Radiculopathy, Chiari Malformation, Degenerative Disc Disease, Endoscopic Neurosurgery, Image-Guided Surgery, Lumbar Radiculopathy, Neurological Oncology, Pituitary Tumors, Radiosurgery, Skull Base Neurosurgery, Spinal Disorders, Spinal Fusion, Spine Treatment, Cervical Stenosis, Lumbar Stenosis, Spinal Deformity, Spondylolisthesis



## JOHN ROLSTON, MD, PHD

DIRECTOR, MAPPING & ENGINEERING NEURAL DYNAMICS (MEND) LABORATORY

### ACADEMIC TITLE

Associate Professor, Harvard Medical School

### MEDICAL SCHOOL

Emory University School of Medicine, 2011

### RESIDENCY

University of California, San Francisco, 2017

### BOARD CERTIFICATION

Neurological Surgery, 2020

### CLINICAL INTERESTS

Deep Brain Stimulation, Dystonia, Epilepsy, Essential Tremor, Focused Ultrasound, Hemifacial Spasm, Laser Ablation, Microvascular, Decompression, Movement Disorder Surgery, Parkinson's Disease, Psychiatric Neurosurgery, Seizure Management, Trigeminal Neuralgia

## PUBLICATIONS

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11. Davis TS, Caston RM, Charlebois CM, Philip B, Anderson DN, Weaver KE, Smith EH, Rolston JD (2021). LeGUI: A fast and accurate graphical user interface for automated detection and anatomical localization of intracranial electrodes. *Frontiers in Neuroscience*, 15:769872.
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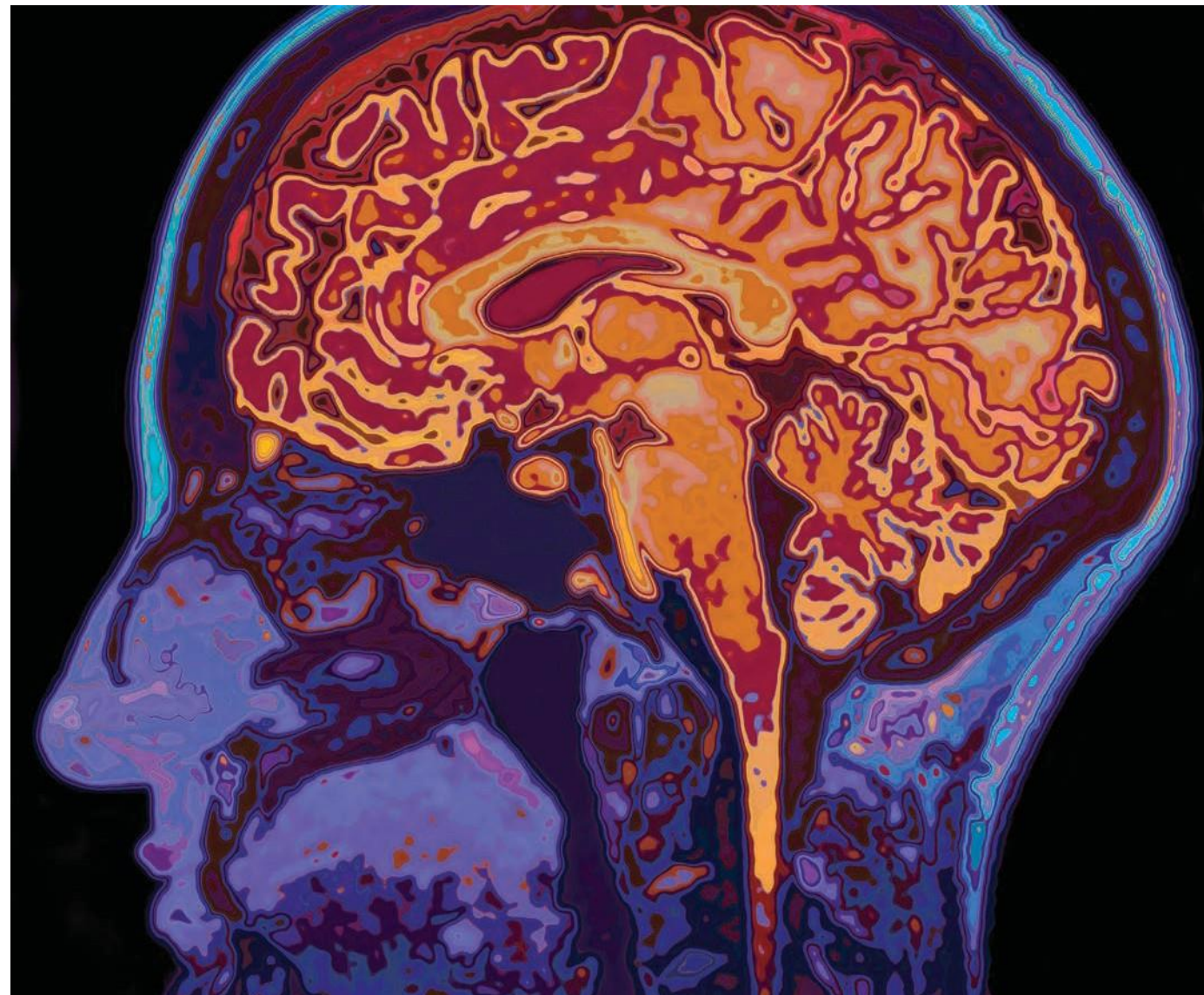
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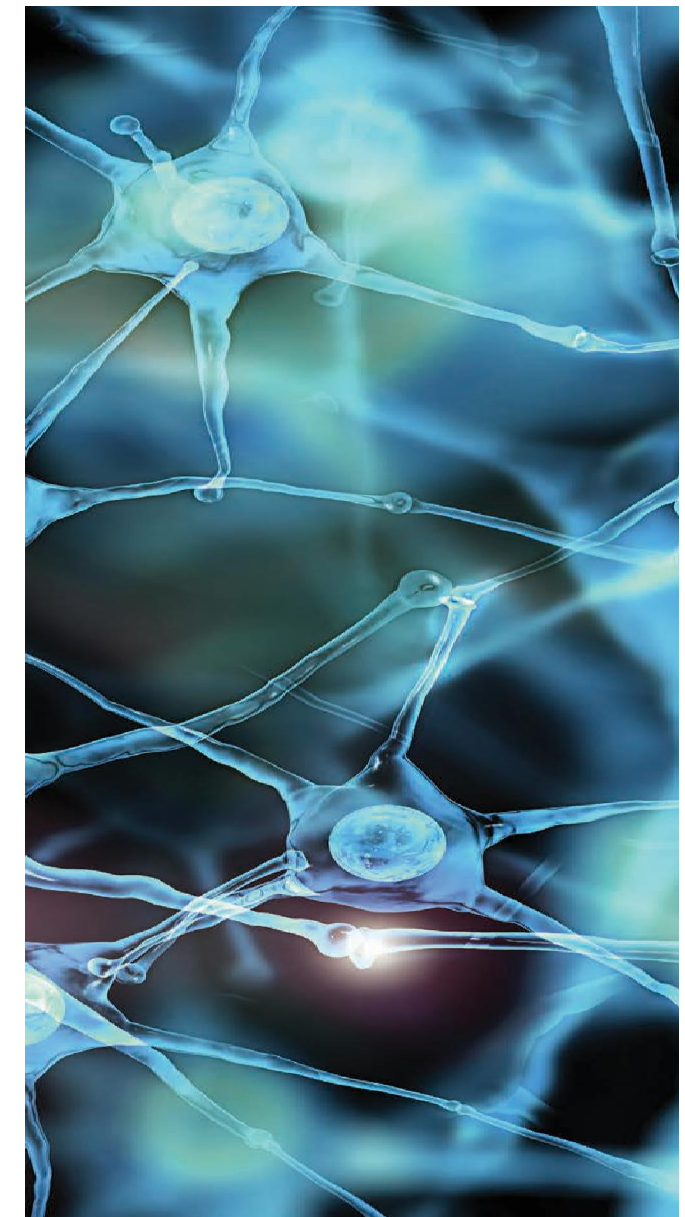
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following epilepsy surgery. *Epilepsy & Behavior*.

55. Anderson DN, Charlebois CM, Smith EH, Davis TS, Peters AY, Newman BJ, Arain AM, Wilcox KS, Butson CR, Rolston JD (in press). Closed-loop stimulation in periods with less epileptiform activity drives improved epilepsy outcomes. *Brain*.

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## STEPHEN C. SARIS, MD

### ACADEMIC TITLES

Lecturer, part-time, Harvard Medical School

### MEDICAL SCHOOL

Boston University School of Medicine, 1979

### RESIDENCY

Duke Hospital - Duke Medical School, Neurosurgery, 1985

### FELLOWSHIP

Massachusetts General Hospital, Neurosurgery, 1981

National Institutes of Health, 1989

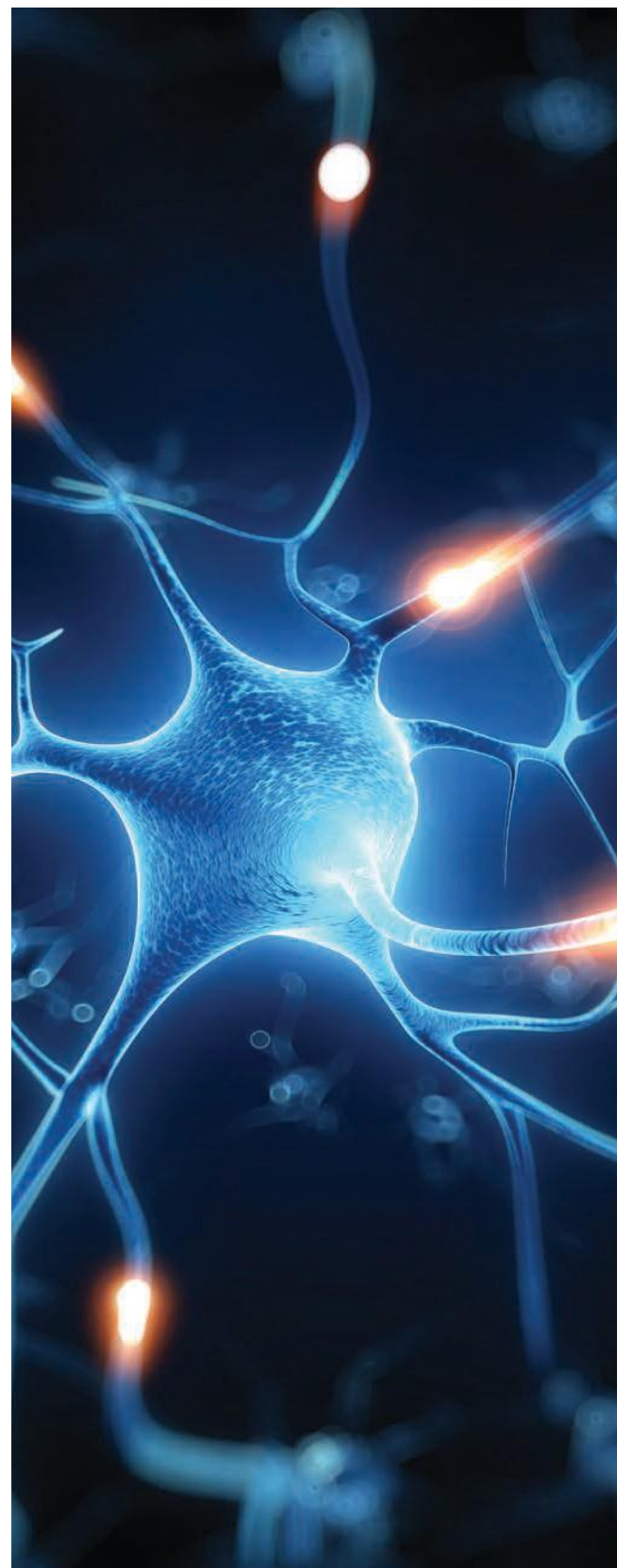
### CERTIFICATIONS

Neurological Surgery, 1988

### CLINICAL INTERESTS

Cervical radiculopathy, cervical stenosis, disc herniation, hydrocephalus, lumbar radiculopathy, lumbar stenosis, meningiomas, spinal fusion, spondylolisthesis

1. Chua M. J. M., Bazarek S. F., Meredith, D. M., Hsu, L., Saris, S., C. Falcine chondroma: illustrative case. *Journal of Neurosurgery: Case Lessons*, 2021



## DANIELLE SARNO, MD

DIRECTOR, INTERVENTIONAL PAIN MANAGEMENT

CO-DIRECTOR, HARVARD INTERVENTIONAL PAIN SIMULATION CENTER

### ACADEMIC TITLE

Instructor in Physical Medicine and Rehabilitation, Harvard Medical School

### MEDICAL SCHOOL

George Washington University School of Medicine, 2011

### RESIDENCY

New York-Presbyterian/Columbia University and Weill Cornell Medical Center, Physical Medicine and Rehabilitation, 2015

### FELLOWSHIP

Massachusetts General Hospital, Pain Management, 2016

### CERTIFICATIONS

Physical Medicine & Rehabilitation, 2017  
Pain Medicine, 2018

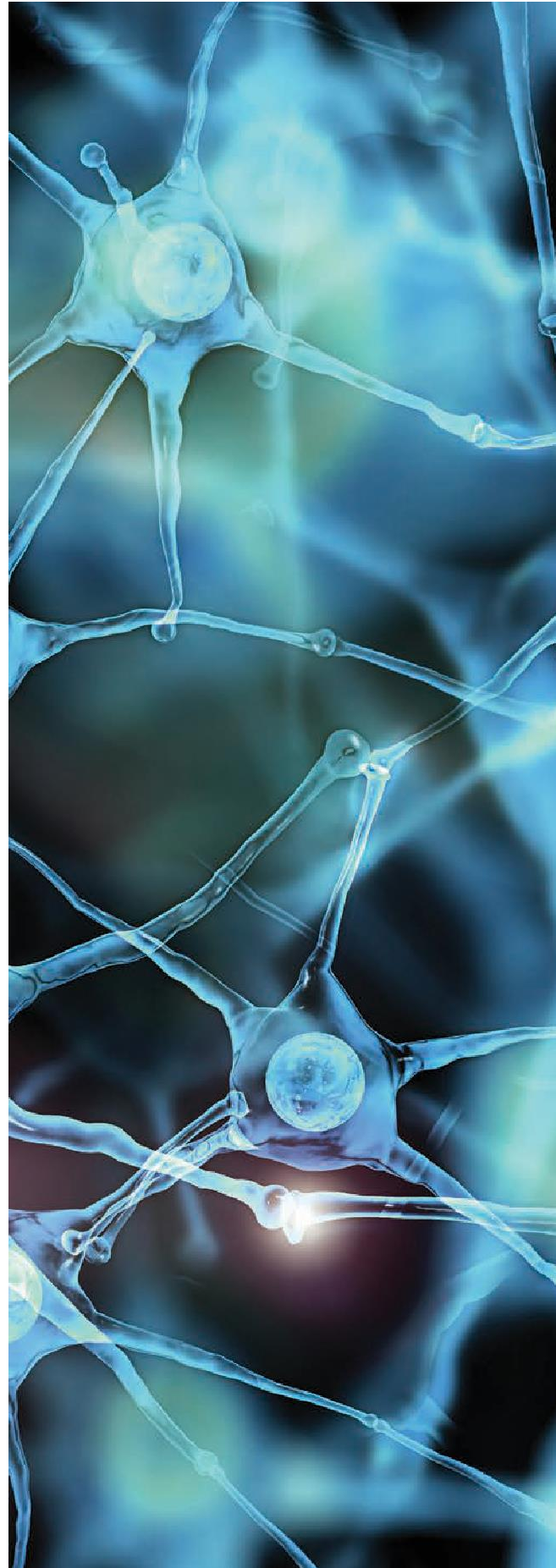
### CLINICAL INTERESTS

Interventional Pain Management, Low Back Pain/ Lumbar Spine Disorders, Musculoskeletal Rehabilitation/Exercise Therapy, Myofascial Pain and Trigger Point Injections, Neck Pain/ Cervical Spine Disorders, Sacroiliac Joint Disorders, Sciatica, Spine Arthritis

## PUBLICATIONS

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3. Katz NB, Bryan KM, Jumreornvong O, Sarno DL, Ulep RD, Englander MJ. Re: "Academic Productivity Differences by Gender and Child Age in Science, Technology, Engineering, Mathematics, and Medicine Faculty During the COVID-19 Pandemic" by Krukowski et al. *J Womens Health (Larchmt).* 2021 Jul;30(7):1052-1053. doi: 10.1089/jwh.2021.0238. Epub 2021 Jun 10. PMID: 34115546.
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5. Bryan KM, Jumreornvong O, Katz NB, Sarno DL, Ulep RD, Verduzco-Gutierrez M. Reply: "The Physiatry Workforce in 2019 and Beyond Part 2: Modeling Results". *Am J Phys Med Rehabil.* 2021 Oct 1;100(10). doi: 10.1097/PHM.0000000000001765. PMID: 33843759.
6. Sarno DL, Yong RJ, Fields KG, Lim SM, Gilligan CJ, Khan L, Nelson ER. A novel interventional pain simulation-based education curriculum: Implementation to enhance procedural training. *Interv Pain Med.* 2022 Dec 15;1(4):100167. doi: 10.1016/j.inpm.2022.100167. PMID: 39238865; PMCID: PMC11373074.
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8. Fu M, Shen J, Gu C, Oliveira E, Shinchuk E, Isaac H, Isaac Z, Sarno DL, Kurz JL, Silbersweig DA, Onnela JP, Barron DS. The Pain Intervention & Digital Research Program: an operational report on combining digital research with outpatient chronic disease management. *Front Pain Res (Lausanne)*. 2024 Feb 2;5:1327859. doi: 10.3389/fpain.2024.1327859. PMID: 38371228; PMCID: PMC10869590.
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10. Sarno DL, Landry AI, Oxentenko AS. Letter to the Editor on "The Chief Wellness Officer: A long overdue catalyst for systemic change in Emergency Medicine". *Int J Health Plann Manage*. 2024 Jul;39(4):1195-1197. doi: 10.1002/hpm.3793. Epub 2024 Feb 27. PMID: 38412052.
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## TIMOTHY SMITH, MD, PHD, MPH

DIRECTOR, COMPUTATIONAL  
NEUROSCIENCE OUTCOMES CENTER

DIRECTOR OF DATA SCIENCE,  
DEPARTMENT OF NEUROSURGERY

DIRECTOR, ENDOSCOPIC SKULLBASE  
FELLOWSHIP

SURGICAL CO-DIRECTOR,  
MULTIDISCIPLINARY PITUITARY CENTER

### ACADEMIC TITLE

Assistant Professor, Harvard Medical School

### MEDICAL SCHOOL

UCLA David Geffen School of Medicine, 2007

University of California, Los Angeles, Medicine, 2007

### RESIDENCY

Northwestern Memorial  
Hospital, Neurological Surgery,  
2014

Northwestern  
University/Feinberg Medical  
School, 2014

### FELLOWSHIP

Brigham and Women's  
Hospital, Neurological  
Surgery, 2015

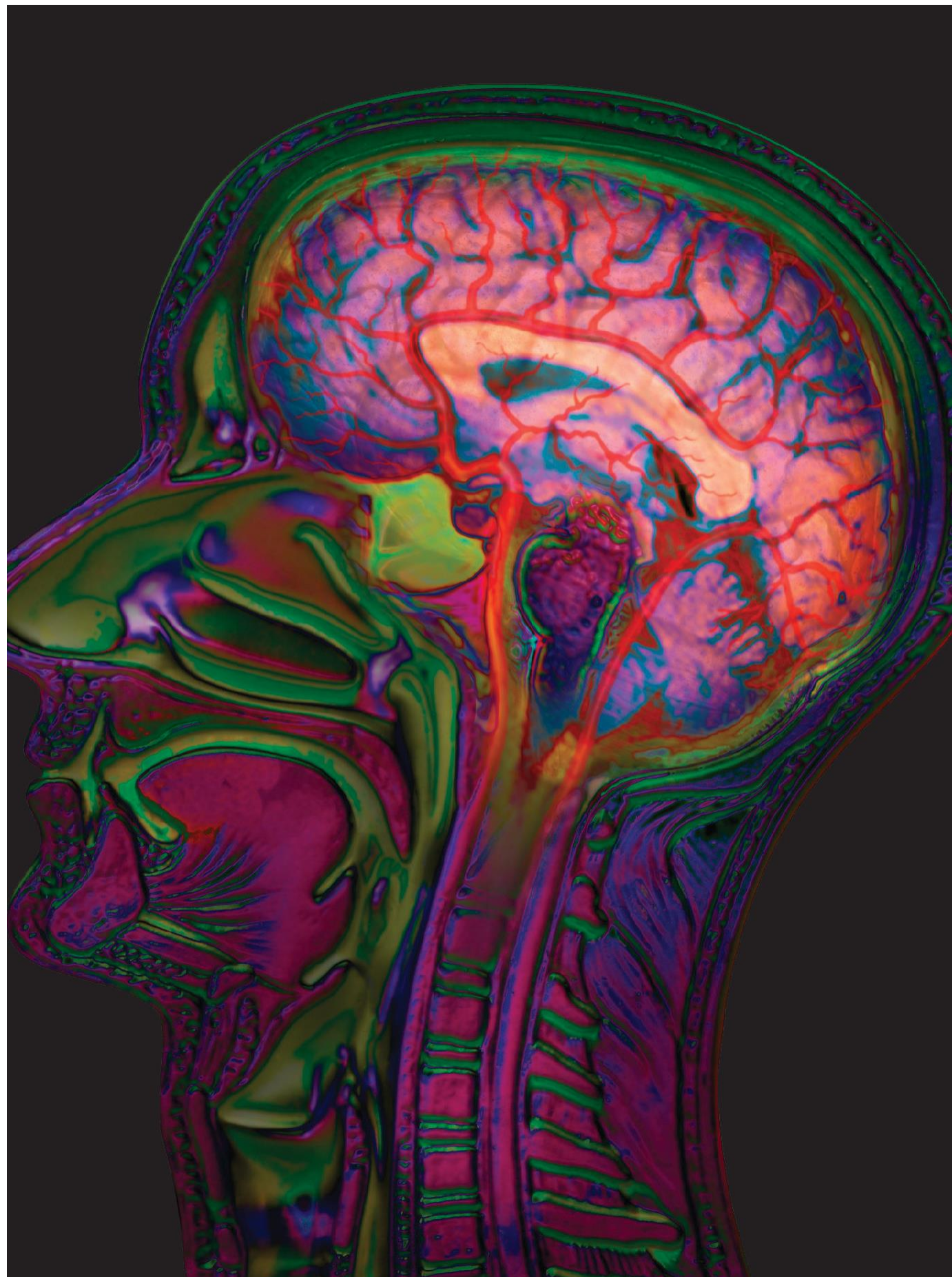
### CLINICAL INTERESTS

Brain tumors, craniopharyngioma, disc herniation,  
endoscopic neurosurgery, epilepsy, gliomas,  
lumbar radiculopathy, lumbar stenosis,  
meningiomas, minimally invasive surgery, pituitary  
tumors,  
skull base neurosurgery, skull base tumors,  
spinal disorders, spinal fusion

## PUBLICATIONS

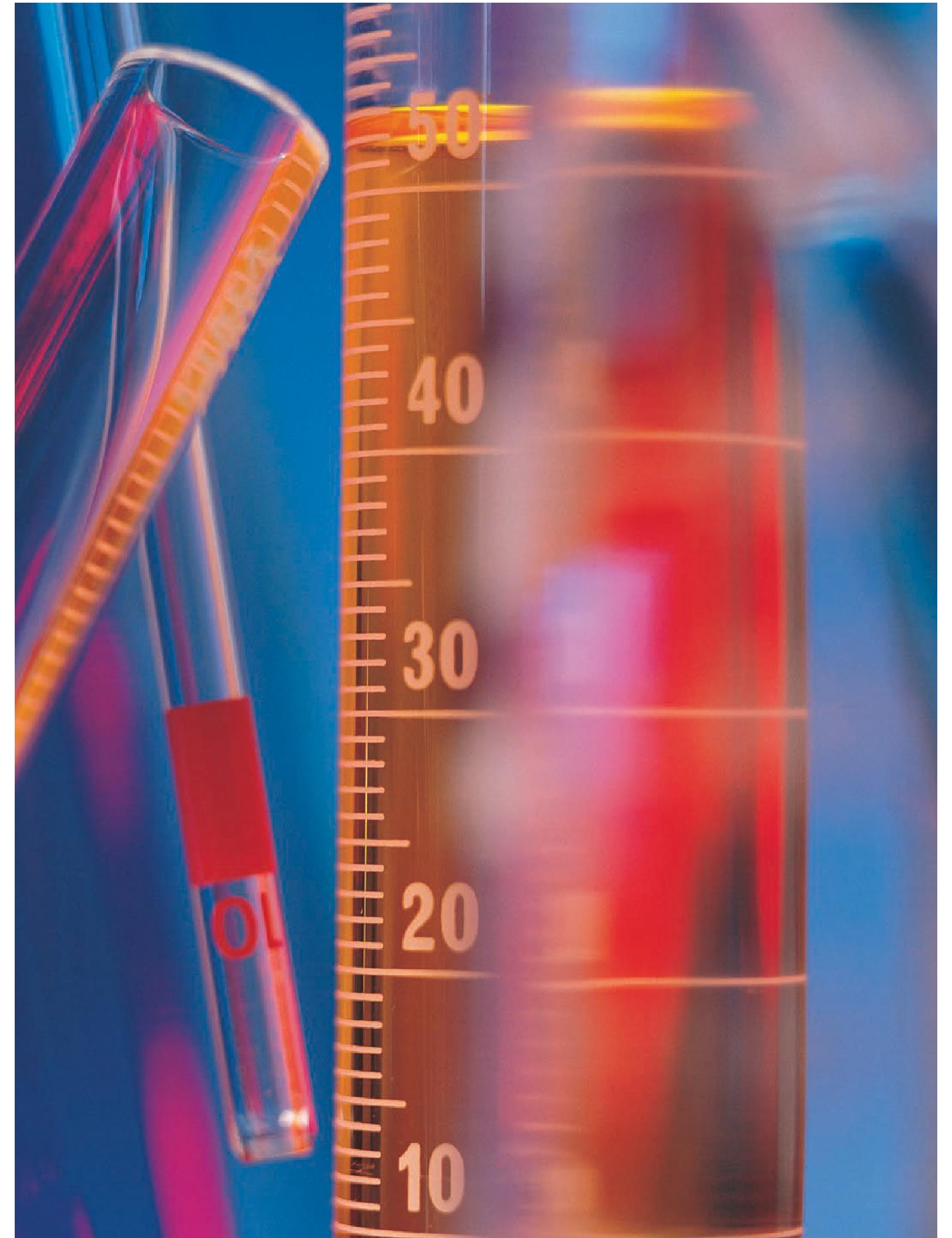
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8. Harary M, Tung JK, Sood S, Corrales CE, Smith T, Iorgulescu JB. Benign purely intraosseous meningioma of the skull: diagnosis and surgical outcomes. *Journal of Clinical Neuroscience*. 2020;82:36-42.
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19. Lamba N, Smith T, Iorgulescu B. Brain Metastasis Among Female Patients Diagnosed with Stage IV Breast Cancer. *Neuro-oncology*. 2020.
20. Lee CW, Lo YT, Devi S, Seo Y, Simon A, Zborovancik K, Alsheikh MY, Lamba N, Smith TR, Mekary RA, Aglio LS. Gender Differences in Preoperative Opioid Use in Spine Surgery Patients: A Systematic Review and Meta-analysis. *Pain Med*. 2020;21(12):3292-300. Epub 2020/09/30. doi: 10.1093/pm/pnaa266. PubMed PMID: 32989460.
21. Lo YT, Lim-Watson M, Seo Y, Fluetsch N, Alasmari MM, Alsheikh MY, Lamba N, Smith TR, Aglio LS, Mekary RA. Long-Term Opioid Prescriptions After Spine Surgery: A Meta-Analysis of Prevalence and Risk Factors. *World Neurosurg*. 2020;141:e894-e920. Epub 2020/06/23. doi: 10.1016/j.wneu.2020.06.081. PubMed PMID: 32569762.
22. Lu VM, Graffeo CS, Perry A, Link MJ, Meyer FB, Dawood HY, Mekary RA, Smith TR. Pearls for Interpreting Neurosurgical Systematic Reviews and Meta-Analyses: Lessons From a Collaborative Effort. *Neurosurgery*. 2020;87(3):435-41. Epub 2020/03/07. doi: 10.1093/neuros/nyaa027. PubMed PMID: 32140720.
23. Lu VM, Ravindran K, Perry A, Graffeo CS, Dawood HY, Van Gompel JJ, Mekary RA, Smith TR. Recurrence of Rathke's cleft cysts based on gross total resection of cyst wall: a meta-analysis. *Neurosurg Rev*. 2020;43(3):957-66. Epub 2019/05/02. doi: 10.1007/s10143-019-01107-2. PubMed PMID: 31041618.
24. Mammi M, Boaro A, Kavouridis V, Hulsbergen AF, Senders JT, Gormley WB, Smith TR, Arnaout O. Artificial intelligence for management of patients with intracranial neoplasms. *Artificial Intelligence in Precision Health*. Academic Press; 2020. p. 203-30.
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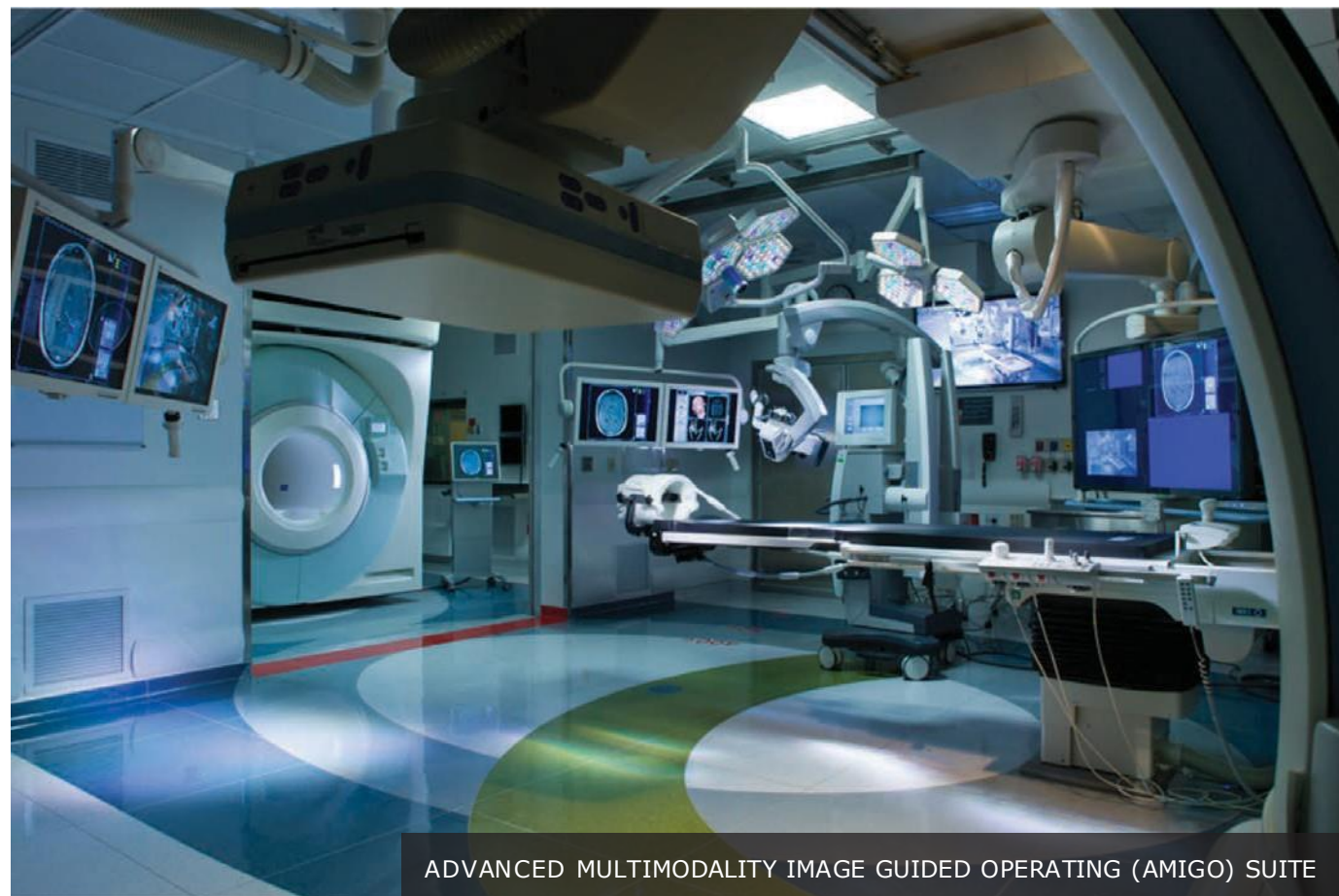
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## JAMES STEPHEN, MD

### ACADEMIC TITLE

Instructor of Neurosurgery, Harvard Medical School

### MEDICAL SCHOOL

University of Pennsylvania  
Perelam School of Medicine,  
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### RESIDENCY

University of Pennsylvania, Neurosurgery

### FELLOWSHIP

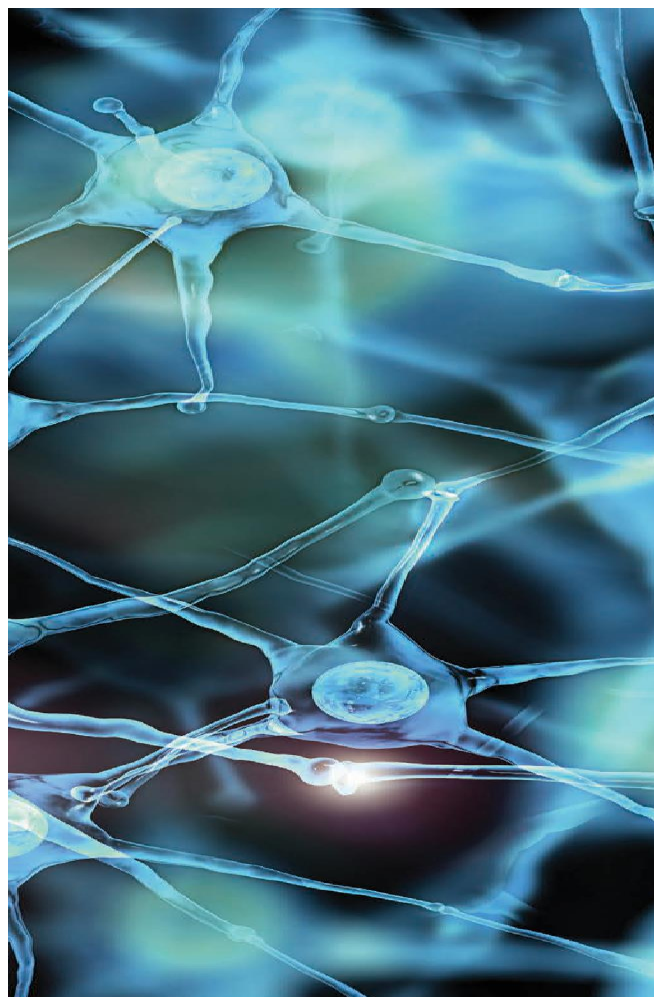
Enfolded Pediatric Spinal Deformity  
Fellowship, Shriners' Hospital for Children,  
2016

### CLINICAL INTERESTS

Artificial Disc Replacement, Cervical Radiculopathy,  
Cervical Stenosis, Chiari Malformation, Claudication,  
Degenerative Disc Disease, Disc Herniation, Image-  
Guided Surgery, Lumbar Radiculopathy, Lumbar  
Stenosis, Minimally Invasive Surgery, Myelopathy,  
Scoliosis, Spinal Cord Injury, Spinal Cord Tumors,  
Spinal Deformity, Spinal Fracture, Reconstruction,  
Spinal Fusion, Spondylolisthesis, Traumatic Brain  
Injury

## PUBLICATIONS

1. Jada A, Mackel CE, Hwang SW, Samdani AF, Stephen JH, Bennett JT, Baaj AA. Evaluation and management of adolescent idiopathic scoliosis: a review. *Neurosurg Focus* 2017 Oct; 43(4):E2
2. Mackel CE, Jada A, Samdani AF, Stephen JH, Bennett JT, Baaj AA, Hwang SW. A comprehensive review of the diagnosis and management of congenital scoliosis. *Childs Nerv Syst*. 2018 Nov;34(11):2155-2171.
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4. Stephen JH, Lee JYK. "Endoscopic Transoral approach to Craniocervical Junction." *Endoscopic Spine Surgery*, 2nd Ed. New York, Stuttgart, Thieme, 2018. 291-294.



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Johns Hopkins University School of  
Medicine, Baltimore, MD, 2010

### RESIDENCY

Barrow Neurological  
Institute, Neurological  
Surgery, 2017

### FELLOWSHIPS

Johns Hopkins Hospital,  
Baltimore Neuro-oncology, 2009

Barrow Neurological Institute,  
Complex Spine/Adult Spinal Deformity, 2015

Brigham and Women's Hospital,  
Pituitary/Neuroendoscopic Surgery,  
2016

### CERTIFICATIONS

Neurosurgery, 2017

### CLINICAL INTERESTS

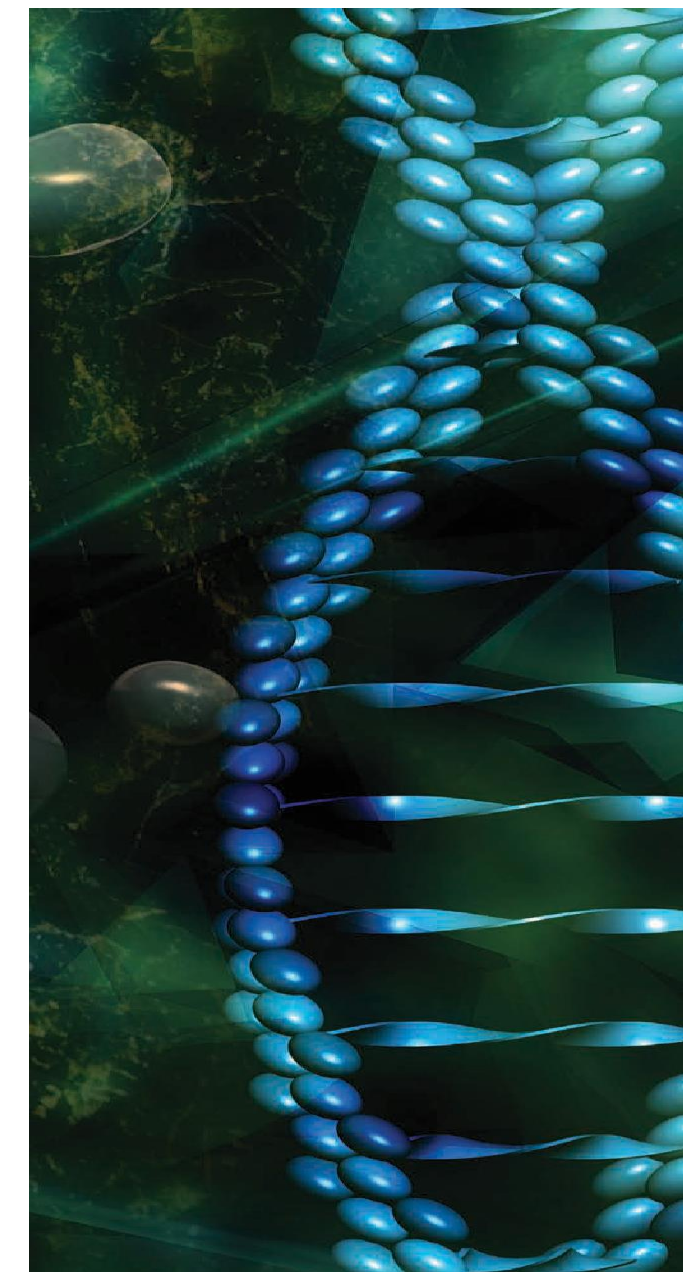
Arthroplasty, Artificial Disc Replacement, Cervical  
Radiculopathy, Cervical Stenosis, Chordoma,  
Degenerative Disc Disease, Disc Herniation,  
Endoscopic Neurosurgery, Image-Guided Surgery,  
Lumbar Radiculopathy, Lumbar Stenosis, Minimally  
Invasive Surgery, Muscle Sparing Spine Surgery,  
Myelopathy, Neurological Oncology, Pain  
Management, Pituitary Tumors, Scoliosis, Slipped  
Disc, Spinal Cord Injury, Spinal Cord Tumors Spinal  
Deformity, Spinal Disorders, Spinal Fractures  
Reconstruction, Spinal Fusion, Spine Tumors,  
Spondylolisthesis, Tethered Cord, Transnasal  
Endoscopic Pituitary Surgery

## PUBLICATIONS

1. Lak AM, Rahimi A, Abunimer AM, Tafel I, Devi S, Premkumar A, Ida F, Lu Y, Chi JH, Tanguturi S, Groff MW, Zaidi HA. Quantifying the impact of surgical decompression on quality of life and identification of factors associated with outcomeAs in patients with symptomatic metastatic spinal cord compression. *Journal of Neurosurgery—Spine*. 2020 Apr 3:1-8. PMID: 32244218.
2. Lak A, Tafel IA, Rahimi A, Zaidi HA. Outcomes of Minimally Invasive versus Open surgery for Intermediate to High Grade Spondylolisthesis Correction: a 10 year retrospective, Multicenter experience. *Spine*. 2020 Oct 15: 15;45(20):1451-1458. PMID: 32453240.
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20. Smith C, Lamba N, Ou Z, Vo QA, Araujo-Lama L, Lim S, Joshi D, Doucette J, Papatheodorou S, Tafel I, Aglio LS, Smith TR, Mekary RA, Zaidi H. The prevalence of complications associated with lumbar and thoracic spinal deformity surgery in the elderly population: a meta-analysis. *J Spine Surg*. 2019 Jun;5(2):223-235. PMID: 31380476.
21. Fidelia I, Lamba N, Papatheodorou SI, Yunusa I, O'Neil K, Chun S, Wilson J, Maher T, Tafel I, Smith TR, Aglio LS, Mekary RA, Zaidi HA. The Safety and Efficacy of Tranexamic Acid (TXA) in Adult Spinal Deformity Surgery A Systematic Review and Meta-Analysis. *Drugs* Oct 2019 79 (15), 1679-1688. PMID: 31432435.
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30. Lak A, Segar D, Abunimer A, Zaidi HA. Partially Cystic Lumbar Schwannoma with Atypical Histopathological Features. *World Neurosurgery*. Jun 2020;138:440-443. PMID: 32251817
31. Jha R, Chalif JI, Yearley AG, Chalif E, Zaidi HA. Defining the Post-Operative Progression of Degenerative Scoliosis: An Analysis of Cases without Instrument Failure. *J Clin Neurosci*. 2024 Feb;120:107-114. doi: 10.1016/j.jocn.2024.01.013. Epub 2024 Jan 18. PMID: 38237488.
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- Intervention and Health-Related Quality of Life Among Racial/Ethnic Groups With Degenerative Lumbar Spondylolisthesis. *Neurosurgery*. 2024 Sep 1;95(3):576-583. doi: 10.1227/neu.0000000000002925. Epub 2024 Apr 18. PMID: 39145650.
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# BOSTON CHILDREN'S HOSPITAL NEUROSURGICAL RESEARCH

## OVERVIEW

Laboratory research in the Neurosurgery Department focuses on the basic mechanisms of common neurosurgical conditions such as trauma to the brain and spinal cord, the genetic make-up of brain tumors, and the dynamics of brain and cerebrospinal fluid pulsation. The researchers are investigating the utility of measuring certain enzymatic compounds as markers of tumor growth and recurrence, as well as of cerebral ischemia. They are also exploring the role of temporarily-implanted cortical electrodes in the study of memory and learning paradigms.

## RESEARCHERS

**Katie Fehnel, MD**

**FOCUS:** Brain Tumors

**Joseph Madsen, MD**

**FOCUS:** Epilepsy

**Mark Proctor, MD**

**FOCUS:** Improvement of longterm outcomes in neurotrauma, Craniostyostosis

## AREAS OF CURRENT RESEARCH

- The role of novel growth factors in optic nerve regeneration, stroke, and spinal cord injury;
- Inosine and cell-signaling pathways in the CNS;
- Finite element analysis description of the changes in brain and ventricular system during the cardiac cycle;
- Detailed genetic analysis of malignant and non-malignant brain tumors in children;
- The role of matrix metalloproteinases in the detection of recurrence of pediatric brain tumors;
- Advance precision medicine for brain disorders using genome-edited human stem cells.

**Alfred Pokemeng See, MD**

**FOCUS:** Venous malformations

**Edward R. Smith, MD**

**FOCUS:** Moyamoya syndrome, Brain tumors

**Scellig Stone, MD, PhD**

**FOCUS:** Pediatric Movement Disorders

**Xin Tang, PhD**

**FOCUS:** Pathology of brain disorders, molecular mechanism-guided therapeutics

**Benjamin C. Warf, MD**

**FOCUS:** Hydrocephalus





## LISSA BAIRD, MD

DIRECTOR OF NEUROSURGICAL ONCOLOGY

### ACADEMIC TITLE

Associate Professor, Harvard Medical School

### MEDICAL SCHOOL

Columbia University,  
College of Physicians and Surgeons, 2004

### INTERNSHIP

UCSD Medical Center, 2005

### RESIDENCY

UCSD Medical Center, 2011

### FELLOWSHIP

LSU Health Sciences Center-  
Shreveport, Skull Base, 2010

Boston Children's Hospital, Harvard Medical  
School, Pediatric Neurosurgery, 2012

### CLINICAL INTERESTS

Brain Tumors, Hydrocephalus, Tethered Spinal  
Cord, Chiari Malformation, Vascular  
Malformations

## PUBLICATIONS

1. Dietz MS, Beach CZ, Barajas R, Parappilly MS, Sengupta SK, Baird LC, Ciporen JN, Han SJ, Loret de Mola R, Cho YJ, Nazemi KJ, McClelland S 3rd, Wong MH, Jaboin JJ. Measure Twice: Promise of Liquid Biopsy in Pediatric High-Grade Gliomas. *Adv Radiat Oncol.* 2020 Jan 28;5(2):152-162. doi: 10.1016/j.adro.2019.12.008. PMID: 32280814; PMCID: PMC7136635.
2. Bauer DF, Baird LC, Klimo P, Mazzola CA, Nikas DC, Tamber MS, Flannery AM. Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Treatment of Pediatric Hydrocephalus: Update of the 2014 Guidelines. *Neurosurgery.* 2020 Nov 16;87(6):1071-1075. doi: 10.1093/neuros/nyaa434. PMID: 34791462.
3. Fouda MA, Day EL, Staffa SJ, Scott RM, Marcus KJ, Baird LC. Postoperative MR imaging surveillance of pediatric craniopharyngioma: new institutional guidelines. *Childs Nerv Syst.* 2021 Mar;37(3):853-861. doi: 10.1007/s00381-020-04901-2. Epub 2020 Oct 3. PMID: 33011870.
4. Fouda MA, Karsten M, Staffa SJ, Scott RM, Marcus KJ, Baird LC. Management strategies for recurrent pediatric craniopharyngioma: new recommendations. *J Neurosurg Pediatr.* 2021 Mar 5;27(5):548-555. doi: 10.3171/2020.9.PEDS20606. PMID: 33668031.
5. Bauer DF, Baird LC, Flannery AM, Klimo P, Tamber MS, Nikas DC, Mazzola CA, Rehring P. In Reply: Congress of Neurological Surgeons Systematic Review and Evidence-Based Guidelines on the Treatment of Pediatric Hydrocephalus: Update of the 2014 Guidelines. *Neurosurgery.* 2021 Jun 15;89(1). doi: 10.1093/neuros/nyab098. PMID: 33822192.
6. Slingerland AL, Baird LC, Scott RM. Optic nerve compression in craniopharyngioma by taut anterior cerebral arteries visualized in frontal and transsphenoidal exposures: illustrative cases. *J Neurosurg Case Lessons.* 2022 Jan 17;3(3). doi: 10.3171/CASE21642. PMID: 36130574; PMCID: PMC9379650.
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9. Yearley AG, Blitz SE, Patel RV, Chan A, Baird LC, Friedman GK, Arnaout O, Smith TR, Bernstock JD. Machine Learning in the Classification of Pediatric Posterior Fossa Tumors: A Systematic Review. *Cancers (Basel).* 2022 Nov 15;14(22):5608. doi: 10.3390/cancers14225608. PMID: 36428701; PMCID: PMC9688156.
10. Longacre MM, Seshadri SC, Adil E, Baird LC, Goobie SM. Perioperative management of pediatric patients undergoing juvenile angiofibroma resection. A case series and educational review highlighting patient blood management. *Paediatr Anaesth.* 2023 Jul;33(7):510-519. doi: 10.1111/pan.14655. Epub 2023 Mar 21. PMID: 36869694.
11. Warf BC, Weber DS, Day EL, Riordan CP, Staffa SJ, Baird LC, Fehnel KP, Stone SSD. Endoscopic third ventriculostomy with choroid plexus cauterization: predictors of long-term success and comparison with shunt placement for primary treatment of infant hydrocephalus. *J Neurosurg Pediatr.* 2023 May 12;32(2):201-213. doi: 10.3171/2023.4.PEDS2310. PMID: 37178026.
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## KATIE PRICOLA FEHNEL, MD

DIRECTOR, SPINAL CORD TUMOR PROGRAM

### ACADEMIC TITLE

Assistant Professor, Harvard Medical School

### MEDICAL SCHOOL

Stanford University, 2010

### INTERNSHIP

Massachusetts General Hospital, 2011

### RESIDENCY

Massachusetts General Hospital, 2017

### FELLOWSHIP

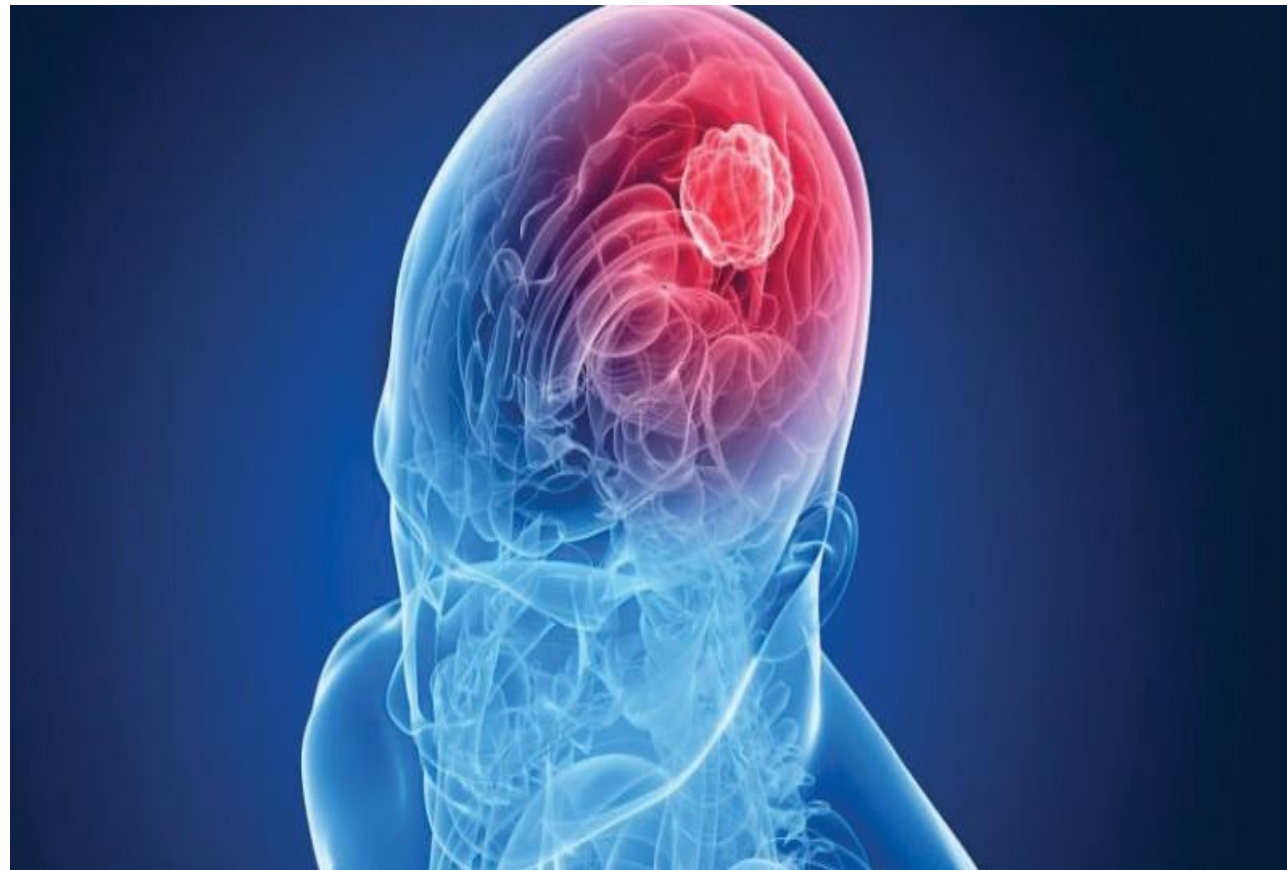
Boston Children's Hospital, 2018

### CLINICAL INTERESTS

Brain Tumors, Chiari Malformation, Hydrocephalus, Spinal Cord Injury, Spine problems, Tethered Spinal Cord, Vascular Malformations, Hemangioma

## PUBLICATIONS

1. Rolle M, Fehnel KP. Low threshold for intracranial imaging in fever of unknown origin associated with cyanotic heart disease in the pediatric population [published online ahead of print, 2020 Jun 6]. *Childs Nerv Syst.* 2020;10.1007/s00381-020-04696-2. doi:10.1007/s00381-020-04696-2
2. Touat M, Li YY, Boynton AN,[...] Fehnel KP [...] et al. Mechanisms and therapeutic implications of hypermutation in gliomas. *Nature.* 2020;580(7804):517-523. doi:10.1038/s41586-020-2209-9 April 15, 2020
3. Tsetsou S, Butler W, Borges L [...] Fehnel KP [...]Dynamic mapping of the corticospinal tract in open cordotomy and myelomeningocele surgery. *J Clin Neurosci.* 2020;74:225-231. doi:10.1016/j.jocn.2020.01.054
4. Bernstock, JD; Tafel, I; Segar, DJ; ... Aglan, O; Montaser, A; Gupta, S; Johnston, B; Judge, J; Fehnel, K; Stone, S.S; Warf, B.C. Complex Management of Hydrocephalus Secondary To Choroid Plexus Hyperplasia, *World Neurosurgery*, 2020, ISSN 1878-8750.
5. Fehnel KP, McClain CD, Smith ER: Indirect bypass for maternal symptomatic moyamoya in the first trimester of pregnancy: case report. *J Neurosurg Pediatr*:1-6, 2019 <https://doi.org/10.1016/j.wneu.2020.05.211>
9. Koch MJ, Mahal BAV, Hadzipasic M, Fehnel KP, Chapman PH, Loeffler JS, Orbach D.B., Smith ER: Dynamic Changes in Arteriovenous Malformations (AVMs): Spontaneous Growth and Resolution of AVM-Associated Aneurysms in Two Pediatric Patients. *Pediatr Neurosurg* 54:394-398, Oct. 2019
10. Fehnel KP, Penn DL, Duggins-Warf M [...] Smith ER. Dysregulation of the EphrinB2-EphB4 ratio in pediatric cerebral arteriovenous malformations is associated with endothelial cell dysfunction in vitro and functions as a novel noninvasive biomarker in patients. *Exp Mol Med.* 2020;52(4):658-671. doi:10.1038/s12276-020-0414-0
11. Fehnel KP, Proctor MR. Spinal Cord Injuries in Children. Kliegman, St Geme, Blum, Shah, Tasker and Wilson (Ed.), *Nelson Textbook of Pediatrics*, 22nd Ed., Elsevier Publishing. In press, 2021.
9. Day EL, Smith ER, Fehnel KP. Single-institution case series of pituitary biopsy for suspected germinoma in the pediatric population: diagnostic utility, operative risks, and biopsy approaches. *Sci Rep.* 2020 Sep 17;10(1):15257. doi: 10.1038/s41598-020-71988-7. PMID: 32943645.
10. Hadzipasic M, Karsten MB, Olson H, Rodan L, Lidov H, Prabhu SP, Wright K, Fehnel KP. Medulloblastoma in the setting of megalencephaly polymicrogyria polydactyly hydrocephalus. *Am J Med Genet A.* 2021 May;185(5):1614- 1618. doi: 10.1002/ajmg.a.62125. Epub 2021 Feb 25. PMID: 33634562.
11. Fouda MA, Day EL, Zurakowski D, Scott RM, Smith ER, Marcus KJ, Fehnel KP. Predictors of progression in radiation-induced versus nonradiation-induced pediatric meningiomas: a large single-institution surgical experience. *J Neurosurg Pediatr.* 2021 Jun 11:1-7. doi: 10.3171/2021.1.PEDS20819. Epub ahead of print. PMID: 34116509
16. Sesen J, Driscoll J, Shah N, Moses-Gardner A, Luiselli G, Alexandrescu S, Zurakowski D, Baxter PA, Su JM, Pricola Fehnel K, Smith ER. Neogenin is highly expressed in diffuse intrinsic pontine glioma and influences tumor invasion. *Brain Res.* 2021 Jul. PMID: 33571520
17. Blandin AF, Giglio R, Graham MS, Garcia G, Malinowski S, Woods JK, Rankissoon S, Rankissoon L, Duboi F, Schoolcraft K, Tsai J, Wang D, Jones R, Vogelzang J, Pelton K, Becker S, Watkinson F, Sinai C, Cohen EF, Booker MA, Tolstorukov MY, Haemels V, Goumnerova L, Wright K, Kieran M, Fehnel K, Reardon D, Tauziède-Espariat A, Lulla R, Carcamo B, Chaleff S, Charest A, D Smet F, Ligon AH, Dubuc A, Pages M, Varlet P, Wen PY, Alexander BM, Chi S, Alexandrescu S, Kittler R, Bachoo R, Bandopadhyay P, Beroukhim R, Ligon KL. ALK amplification and rearrangements are recurrent targetable events in congenital and adult glioblastoma. *Clinical Cancer Research.* 2023 Feb 13. doi: 10.1158/1078-0432.CCR-21-3521
18. Zhao S, Mekbib KY, A van der Ent M, Allington G, Prendergast A, Chau JE, Smith H, Shohfi J, Ocken J, Duran D, Furey CG, Thi Li H, Duy PQ, Reeves BC, Zhang J, Nelson-Williams C, Chen D, Li B, Nottolo T, Bai S, Rolle M, Zeng X, Dong W, Fu P, Wang Y, Mane S, Piwowarczyk P, Fehnel KP, See AP, Iskandar BJ, Aagaard-Kienitz B, Kundishora AJ, DeSpenza T, Greenber ABW, Kidanemariam SM, Hale AT, Johnston JM, Jackson EM, Storm PB, Lang S, Butler WE, Carter BS, Chapman P, Stapleton CJ, Patel AB, Rodesch G, Smajda S, Berenstein A, Barak T, Erson-Omay EZ, Zhao H, Moreno-de-Luca A, Proctor MR, Smith ER, Orbach DB, Alper SL, Nicoli S, Boggon TJ, Lifton RP, Gunel M, King PD, Jin SC, Kahle KT. Genetic dysregulation of an endothelial Ras signaling network in vein of Galen malformations. *bioRxiv.* 2023 March 21. doi: 10.1101/2023.03.18.532837.
19. Warf BC, Weber DS, Day EL, Riordan CP, Staffa SJ, Baird LC, Fehnel KP, Stone SSD. Endoscopic third ventriculostomy with choroid plexus cauterization: predictors of long-term success and comparison with shunt placement for primary treatment of infant hydrocephalus. *J Neurosurgery Pediatrics.* 2023 May 12:1-13. doi: 10.3171/2023.4.PEDS2310
20. Slingerland AL, Papadakis JE, Staffa SJ, Scott RM, See AP, Orbach DB, Fehnel KP. Management of Choroid Plexus Tumors and the Benefit of Preoperative Embolization in Pediatric Patients: Report of 46 Cases from a Single Institution. *World Neurosurg.* 2024 Jan;181. doi: 10.1016/j.wneu.2023.11.044. Epub 2023 Nov 17. PMID: 37977483.
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22. Karsten MB, Slingerland AL, Riordan CP, Smith ER, Fehnel KP. Benefits and limitations of a dual faculty neurosurgeon approach to resection of pediatric craniopharyngioma. *Childs Nerv Syst.* 2024 Mar;40(3):647-653. doi: 10.1007/s00381-023-06185-8. Epub 2023 Oct 20. PMID: 37857860.
23. Yeo KK, Macrae CB, Gampel B, Ahrendsen JT, Lidov H, Wright KD, Chi S, Fehnel K, Baird L, Clymer J, Aldape K, Alexandrescu S. Clinical utility of DNA methylation profiling for choroid plexus tumors. *Neurooncol Adv.* 2024 Jun 12;6(1). doi: 10.1093/noajnl/vdae097. PMID: 38962753; PMCID: PMC11221062.
24. Villanueva OP, Papadakis JE, Mosher AM, Cooney T, Fehnel KP. The disparity in pediatric spinal cord tumor clinical trials: A scoping review of registered clinical trials from 1989 to 2023. *Neurooncol Pract.* 2024 May 17;11(5):532-545. doi: 10.1093/nop/npae041. PMID: 39279782; PMCID: PMC11398943.



## WESTON NORTHAM, MD

### ACADEMIC TITLE

Instructor, Harvard Medical School

### MEDICAL SCHOOL

Eastern Virginia Medical School, Norfolk, VA

### RESIDENCY

University of North Carolina, Chapel Hill, NC

### FELLOWSHIP

Boston Children's Hospital

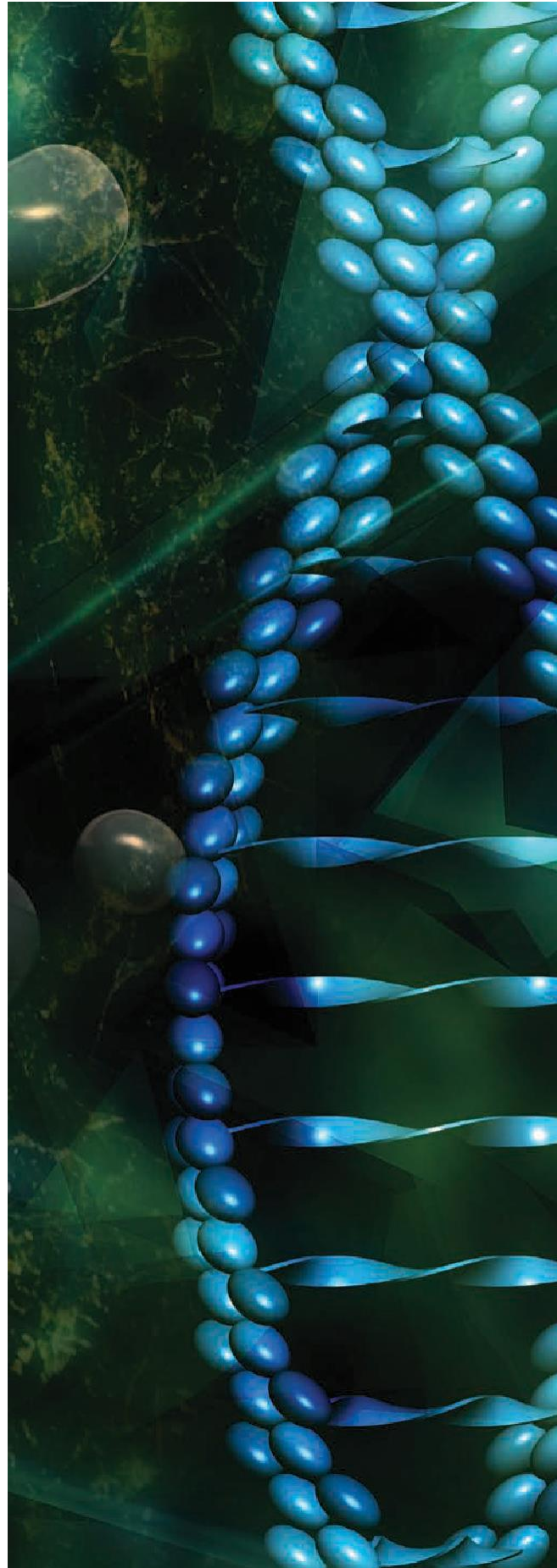
### CLINICAL INTERESTS

Movement disorders, maternal fetal care, spina bifida and spinal cord conditions

## PUBLICATIONS

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2. Harbert A, Northam WT, Elton S, Quinsey C. Targeted head CT reduction for pediatric patients with hydrocephalus and traumatic brain injury: academic center institutional experience as an example of opportunities for further improvement. *Childs Nerv Syst.* 2020 Mar;36(3):583–9.
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### MEDICAL SCHOOL

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### RESIDENCY

Massachusetts General Hospital, 1988

### FELLOWSHIP

Beth Israel Hospital, Surgery, 1982

Beth Israel Hospital, Surgery / Cerebrospinal Fluid (CSF) Physiology, 1983

Massachusetts General Hospital, Surgery, 1989  
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### CLINICAL INTERESTS

Surgical treatment of epilepsy, minimally invasive laser surgery, hemispherectomy, vagal nerve stimulator, invasive phase II monitoring for epilepsy, hydrocephalus, fetal anomalies, chiari malformations, brain tumors, congenital anomalies

## PUBLICATIONS

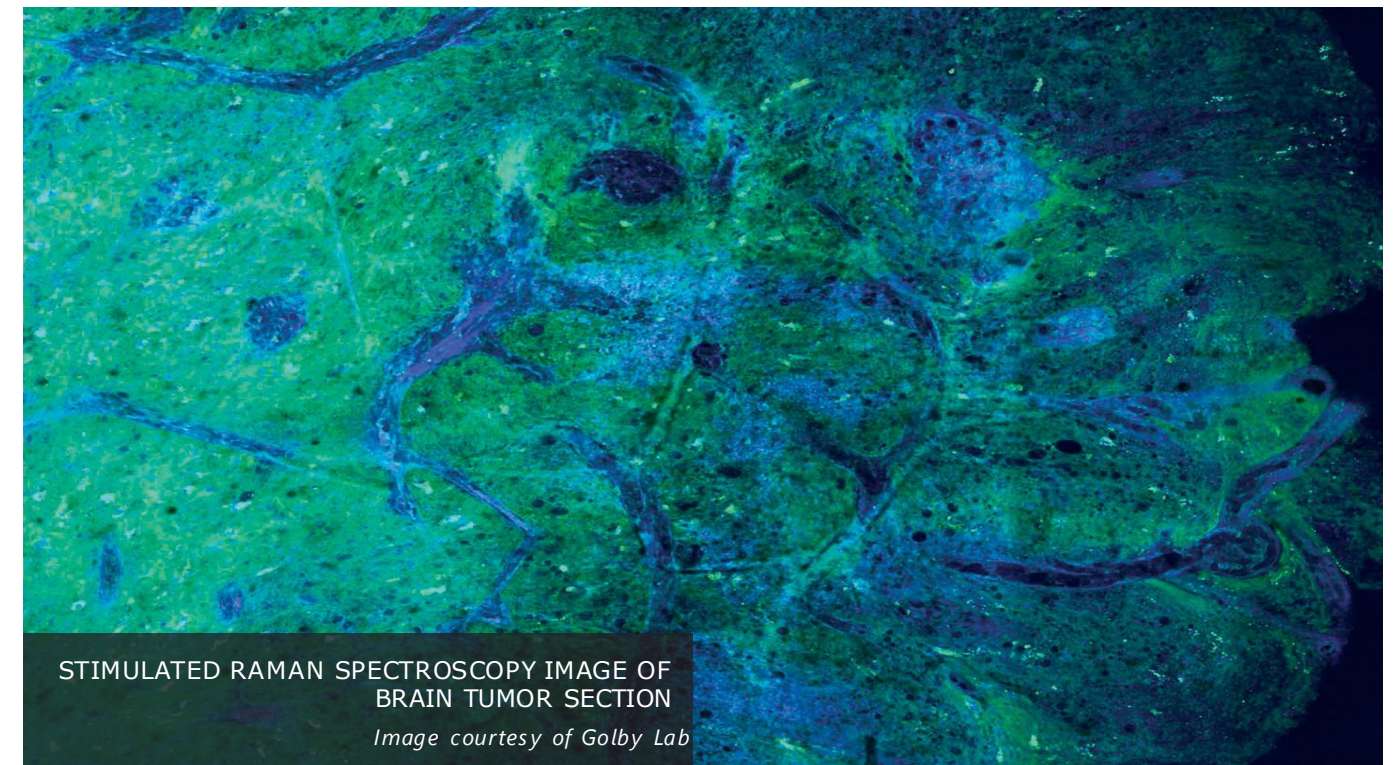
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4. Peters JM, Hyde DE, Chu CJ, [...] Madsen J, Stone SS [...]. Lesion-Constrained Electrical Source Imaging: A Novel Approach in Epilepsy Surgery for Tuberous Sclerosis Complex. *J Clin Neurophysiol.* 2020;37(1):79-86. doi:10.1097/WNP.0000000000000615
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Columbia University, College of  
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### INTERNSHIP

Columbia Presbyterian Medical Center, 1991

### RESIDENCY

Children's National Medical  
Center, Pediatric Neurosurgery,  
1993

Shock Trauma Hospital,  
University of Maryland,  
1993

Georgetown University  
Hospital, Neurosurgery, 1997

### FELLOWSHIP

Boston Children's Hospital,  
Pediatric Neurosurgery,  
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### CLINICAL INTERESTS

Craniosynostosis, chiari malformations,  
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trauma, brain and spine trauma, sports related  
head and spine injury, general neurosurgery

## PUBLICATIONS

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2. Goobie SM, Staffa SJ, Meara JG, Proctor MR [...] High-dose versus low-dose tranexamic acid for paediatric craniostomy surgery: a double-blind randomised controlled non-inferiority trial [published online ahead of print, 2020 Jun 30]. *Br J Anaesth*. 2020;S0007-0912(20)
3. Proctor MR, Meara JG: A review of the management of single-suture craniostomy, past, present, and future. *J Neurosurg Pediatr* 24:622-631, 2019
4. O'Neill NP, Hresko MT, Emans JB, Glotzbecker MP, Verhofste BP, Karlin LI, Proctor MR, Hedequist DJ Acute Implant- related Complications in Pediatric Cervical Spine Fusion. *J Pediatr Orthop*, 2019
5. Riordan CP, Zurakowski D, Meier PM, Alexopoulos G, Meara JG, Proctor MR, Goobie SM. Minimally Invasive Endoscopic Surgery for Infantile Craniostomy: A Longitudinal Cohort Study. *J Pediatr*, 2019
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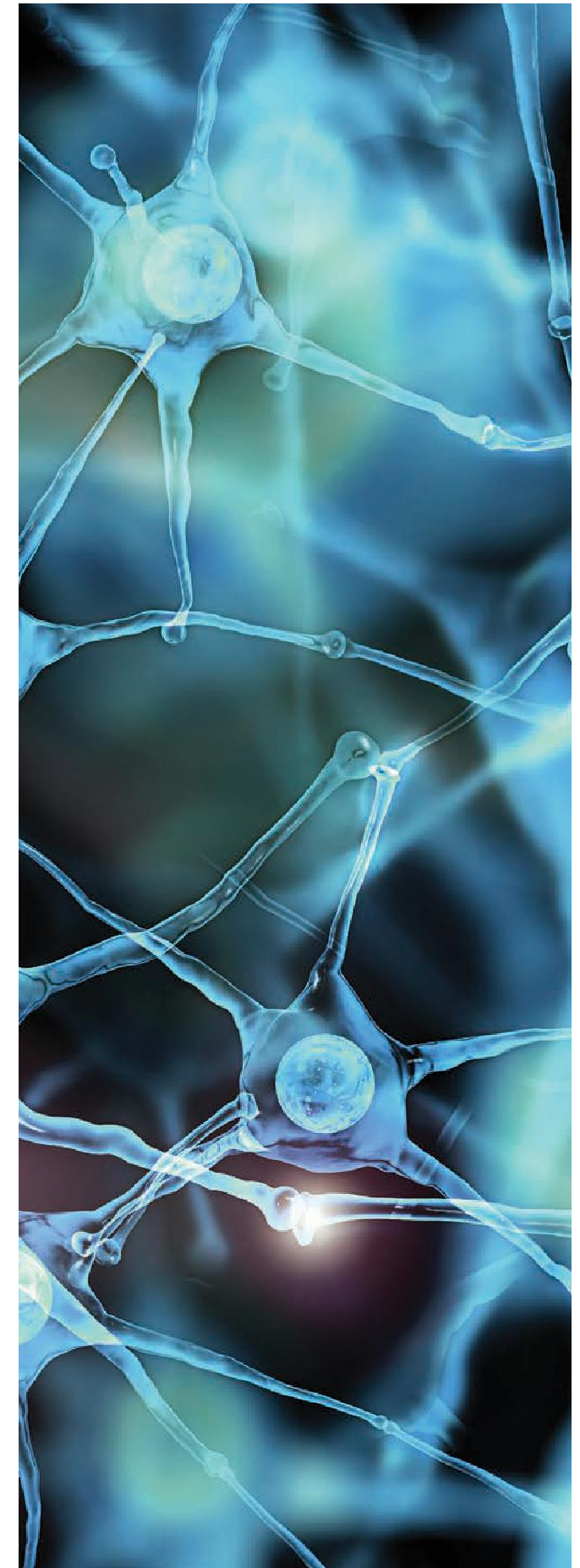
CLINICAL INTERESTS  
Arteriovenous fistulas (AVFs), Pediatric stroke, Brain Aneurysms, Brain Arteriovenous Malformation, Cavernous Malformations, Moyamoya in Children, Retinoblastoma, Vein of Galen Malformation (VOGM)

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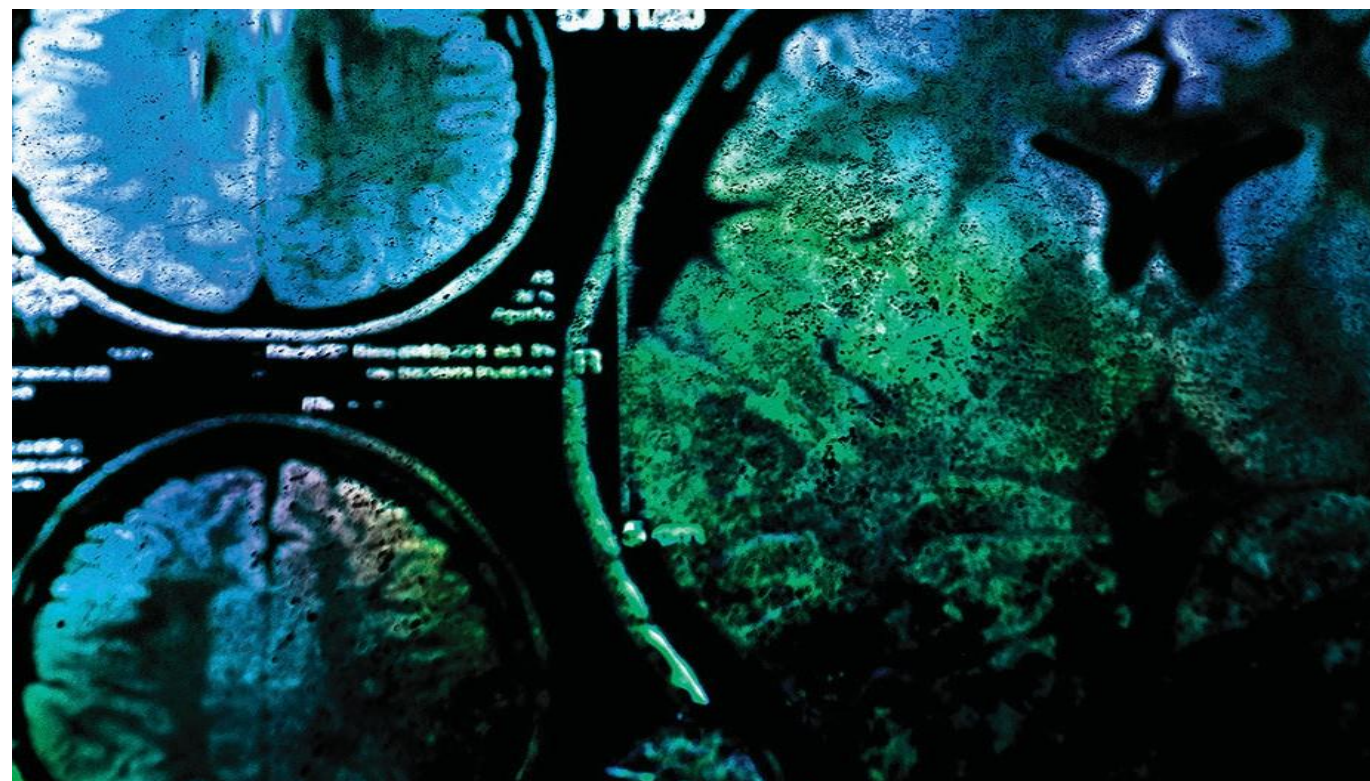
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PUBLICATIONS

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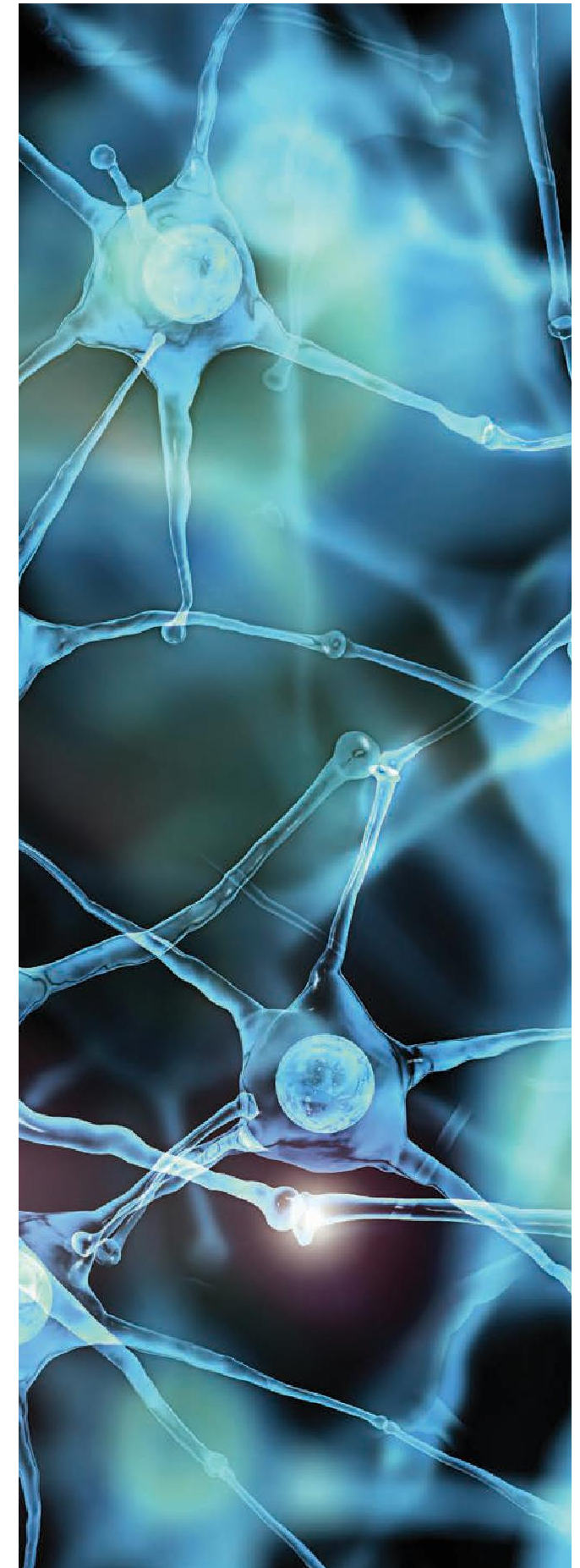
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Hospitals of Cleveland, Surgery, 1985

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