“THERE WON’T BE ANY STONE LEFT UNTURNED. WE’RE GOING TO USE EVERY AVAILABLE TECHNOLOGY, METHOD AND PROCEDURE TO IMPROVE THE LIVES OF OUR PATIENTS, AND PATIENTS ALL OVER THE WORLD.”

Bob Carter, MD, PhD, Chief of Neurosurgery

Contact:
Bob S. Carter, MD, PhD, Department Chair
Aman Patel, MD, Program Director
Brian Nahed, MD, MSc, Associate Program Director
Jesse Vega, Program Coordinator

Department of Neurosurgery
Massachusetts General Hospital
White Building – Room 502
55 Fruit Street
Boston, MA 02114

617-726-5143
JLVEGA@mgh.harvard.edu

TABLE OF CONTENTS

Overview.............................................. 1
Program Overview.............................. 3
Current Residents.............................. 8
Clinical Faculty................................. 11
Research........................................... 12
Laboratory-based
Research Faculty............................... 13
Mass General Alumni......................... 14
Boston & Beyond......................... 16
OVERVIEW

The Massachusetts General Hospital neurosurgery residency program aims to train the next generation of neurosurgical leaders. We have a long and proud tradition of training neurosurgeons who have made major clinical and scientific contributions to the field of neurosurgery. Our department is dynamic, growing and strongly positioned in both clinical and scientific areas to continue to lead and innovate in neurosurgery.

Our philosophy is grounded in exposing residents to a large volume of high-quality cases, spanning the breadth of neurosurgery. Mass General is the largest hospital in New England and a tertiary referral center attracting both national and international patients. Our neurosurgical residents are trained in both the surgical and nonsurgical management of neurosurgical disease. Chief residents are expected to operate and function at the highest level as they transition to junior faculty members.

In addition to the unparalleled clinical training, our residents dedicate two years to research, a clinical fellowship or pursuing an advanced degree. Most residents spend two years in a laboratory of their choice as part of the residency training. The research opportunities in the Boston area are unrivaled and include Mass General (the largest recipient of NIH funding among U.S. hospitals), Harvard Medical School, Massachusetts Institute of Technology, Broad Institute, Dana Farber Cancer Center and Boston Children’s Hospital. In addition to traditional scientific and clinical fellowship efforts, residents have also pursued advanced degrees (MPH and MBA) at Harvard University.

Mass General is ranked as a top hospital every year and comprised of first-rate clinical services in every aspect of medicine and surgery. The Mass General neurosurgery program has a tradition of respect and camaraderie among the residents and between the residents and staff. That leads to an exceptionally supportive and stimulating educational environment. The combination of excellent clinical training, superb research and the many outstanding opportunities available here enables graduates to successfully pursue the career track of their choice.
CLINICAL TRAINING PROGRAM

Our neurosurgical residents are exposed to high clinical volume, direct patient care and are expected to gain mastery of clinical and operative skills under the guidance of experienced attending neurosurgeons. It is essential that residents are exposed to each subspecialty in sufficient depth and breadth to become fully competent. Every trainee receives a focused experience in each of the main subspecialties, working in close conjunction with an expert senior attending physician who is a leader focused in brain tumor, vascular, functional, pediatric, peripheral nerve, skull-base or spine.

EDUCATION OPPORTUNITIES

Residents contribute to lectures, group discussions and symposiums with leading national and international researchers and clinicians. In addition, residents present at the neurosurgery grand rounds, Annual Frye Halloran symposium and neuroscience grand rounds with neurology, psychiatry, otolaryngology and ophthalmology. Our residents frequently present at the American Association of Neurological Surgeons, the Academy of Neurological Surgeons, the Society of Neurological Surgeons, the Congress of Neurological Surgeons, subspecialty section meetings and at local and regional meetings. In addition, residents attend neurosurgical courses in their desired subspecialty as junior and senior residents.

PROGRAM OVERVIEW

All program phase locations are at Mass General’s main campus unless another location is specified.

<table>
<thead>
<tr>
<th>PGY1</th>
<th>PGY2 + 3</th>
<th>PGY4 + 5</th>
<th>PGY6 + 7</th>
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<tbody>
<tr>
<td>General Surgery</td>
<td>East Team Junior</td>
<td>Research/Fellowship</td>
<td>East Team Senior/Chief Resident</td>
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<tr>
<td>(6 months)</td>
<td>(4 months)</td>
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<td>(4 months as R6 Senior and 4 months as R7 Chief)</td>
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<tr>
<td>Neurosurgery &amp; ICU</td>
<td>West Team Junior/ Radiosurgery</td>
<td></td>
<td>West Team Senior/Chief Resident</td>
</tr>
<tr>
<td>(3 months)</td>
<td>(4 months)</td>
<td></td>
<td>(4 months as R6 Senior and 4 months as R7 Chief)</td>
</tr>
<tr>
<td>Neurology Service</td>
<td>Boston Children’s Hospital</td>
<td></td>
<td>North Team Chief Resident</td>
</tr>
<tr>
<td>(3 months)</td>
<td>(4 months)</td>
<td></td>
<td>(4 months as R6 Senior and 4 months as R7 Chief)</td>
</tr>
<tr>
<td></td>
<td>North Team Junior</td>
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<td></td>
<td>(4 months)</td>
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PGY1

General Surgery
(6 months)
Residents spend six months rotating on general surgery, critical care, trauma and other surgical specialty rotations developing operative skills and management of complex medical and surgical patients.

Neurosurgery & ICU
(3 months)
Residents focus on all aspects of the management of neurological and neurosurgical patients in the neuroscience ICU focused on intracranial pressure, management of IV fluids and basic management of acute neurological, cardiac and pulmonary issues common to these patients.

Neurology Service
(3 months)
Residents develop expertise in the neurological exam and diagnostic workup of neurological disease. Rotations on inpatient and outpatient neurological services include advanced neurology, neuro-oncology, neurovascular, stroke, epilepsy, movement disorders and pediatric neurology.

PGY2+3

East Team Junior
(4 months)
Residents focus on the surgical and nonsurgical management of spinal, functional and pediatric diseases. Residents are exposed to the breadth of spinal disorders including degenerative disease, tumors, deformity and peripheral nerve. In addition, residents are exposed to functional neurosurgery including deep brain stimulation, epilepsy surgery and surgery for pain. Residents care for the surgical and nonsurgical management of pediatric cranial and spinal disease.

West Team Junior/Radiosurgery
(4 months)
Residents focus on the surgical and nonsurgical care of brain tumor patients. In addition to the surgical skill, residents take part in the treatment and planning of single fraction radiosurgery, proton beam radiosurgery and the linear accelerator (LINAC).

Boston Children’s Hospital
(4 months)
Residents rotate at Boston Children’s Hospital to gain additional experience in the clinical and surgical management of pediatric patients.

North Team Junior
(4 months)
Residents focus on the management of vascular (open and endovascular) cases where they are exposed to surgical, nonsurgical and endovascular techniques. In addition, the residents focus on trauma, general neurosurgery and spine to operate on a breadth of neurosurgical cases.
PGY4+5

Research/Fellowship

Years 4 and 5 are dedicated to research, clinical fellowships or pursuing advanced degrees. Clinical responsibilities are proportionately decreased. During the first research year, the residents take night call one to two times per week. The second year of research is free of any clinical responsibilities. Residents take the written neurosurgery boards during this time.

“...The faculty at Mass General are not just your teachers for the seven years, but truly remain your teachers for life. They are never out of reach and always willing to provide counsel. For me, Mass General Neurosurgery provided a family of support, ensuring I not only made it through the gauntlet of residency training, but that I would do so with optimism, energy, and an appreciation of life both within and beyond that of neurosurgery.”

Pamela S. Jones, MD, MPH
Resident, Class of 2016

PGY6+7

East Team Senior/Chief Resident
(4 months as R6 Senior and 4 months as R7 Chief)

The East Senior/Chief assumes a large role in the operative and clinical management of complex spine, pediatric and functional cases. There is a special emphasis on complex spinal disease (degenerative, deformity and neoplasms). In addition, residents have an extensive exposure to functional neurosurgery, including deep brain stimulation, epilepsy surgery and surgery for pain. Residents are exposed to the breadth of pediatric neurosurgery during this rotation as well. There is considerable responsibility for the teaching and supervision of other residents.

West Team Senior/Chief Resident
(4 months as R6 Senior and 4 months as R7 Chief)

The West Senior/Chief Resident plays a large role in the operative and clinical management of complex tumor cases ranging from intra-axial, extra-axial, skull base and pituitary tumors. Residents gain an extensive experience in the surgical management of brain tumors with the use of cutting-edge intraoperative mapping, intraoperative imaging, endoscopic and endonasal techniques and novel minimally invasive techniques. There is considerable responsibility for the teaching and supervision of other residents.

North Team Chief Resident
(4 months as R6 Senior and as R7 Chief)

The North Chief Resident is the administrative chief resident. The North Chief has his or her own office, administrative assistant and performs a wide spectrum of cases including trauma, cerebral hemorrhage and a variety of spinal cases. The North Chief Resident is also in charge of the call schedule, the operating room assignments and has considerable responsibility for the teaching and supervision of other residents. The Vascular Chief resident plays a large role in the surgical (open vascular) and nonsurgical management of open and endovascular neurosurgical cases. The resident performs diagnostic angiograms and participates in coiling and embolization endovascular neurosurgical procedures.
“The Mass General Neurosurgery Residency provided a fantastic clinical and research training environment, giving me the experience and confidence I needed to launch my career. I will always remember the lessons learned from the tremendous collection of faculty. In addition, connections to the wide Mass General network remain invaluable to me for creating new career opportunities. I can’t imagine a better place to have trained.”

Sameer Sheth, MD, PhD, Resident, Class of 2012
CLINICAL FACULTY

Maya Babu, MD, MBA
Neurotrauma

Paul Chapman, MD
Radiosurgery

Aman Patel, MD
Neurovascular Surgery
Neuroendovascular

Frederick Barker, MD
Neurosurgical Oncology

Jean-Valery Coumans, MD
Neurosurgical Spine

Ganesh M. Shankar, MD, PhD
Neurosurgical Spine

Lawrence Borges, MD
Neurosurgical Spine

William Curry, MD
Neurosurgical Oncology

John Shin, MD
Neurosurgical Spine

Justin Brown, MD
Peripheral Nerve
Neurosurgical Spine

Tina Duhaime, MD
Pediatric Neurosurgery

Brooke Swearingen, MD
Neurosurgical Oncology

William Butler, MD
Pediatric Neurosurgery

Pamela Jones, MD
Neurosurgical Oncology

Jeffery Schweitzer, MD, PhD
Functional Neurosurgery

Daniel Cahill, MD, PhD
Neurosurgical Oncology

Robert L. Martuza, MD
Neurosurgical Oncology

Ziv Williams, MD
Functional Neurosurgery
Peripheral Nerve

Bob Carter, MD, PhD
Neurosurgical Oncology
Neurovascular Surgery

Brian Nahed, MD, MSc
Neurosurgical Oncology
Neurosurgical Spine

Nicholas Zervas, MD
Neurosurgery
Research Training

The Mass General Department of Neurosurgery is a leader in clinical, translational and basic science research. Every neurosurgical attending is engaged in research and works closely with collaborators from Neuro-oncology, Radiation Oncology, Neuropathology, Neurophysiology, Neurology and the Mass General Cancer and Vascular Centers. Residents pursue research projects with mentors stemming from neurosurgery, and researchers at Mass General, Massachusetts Institute of Technology, Broad Institute, Dana-Farber Cancer Center and Harvard University.

Research Accomplishments

The Mass General Department of Neurosurgery has a successful track record with NIH and foundation grants. Our residents are often awarded independent funding and fellowships, including awards from the NIH (NRSA, K08) NREF, ABTA, Parkinson Disease Foundation, American Parkinson Disease Associations, Burroughs Welcome Fund and many others. Numerous residents have had high-quality publications in journals such as Science, Nature Neuroscience, Nature Medicine, Cancer Discovery, New England Journal of Medicine, Journal of Neuroscience, Journal of Neurosurgery and Neurosurgery, among many others. The department has also been awarded the prestigious R25 training grant by the NIH to support the resident research years.
### LABORATORY-BASED RESEARCH FACULTY

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bob S. Carter, MD, PhD</td>
<td><strong>BLOOD-BASED BIOMARKERS FOR BRAIN TUMORS</strong></td>
<td>The lab is developing the first blood test to diagnose and monitor patients with brain tumors.</td>
</tr>
<tr>
<td>Leonora Balaj, PhD</td>
<td></td>
<td></td>
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<tr>
<td>Jeffrey Schweitzer, MD, PhD</td>
<td><strong>STEM CELL THERAPY LAB</strong></td>
<td>The lab is developing novel iPS derived therapeutics for Parkinson’s disease.</td>
</tr>
<tr>
<td>Bob S. Carter, MD, PhD</td>
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<td></td>
</tr>
<tr>
<td>Daniel P. Cahill, MD, PhD</td>
<td><strong>TRANSLATIONAL NEURO-ONCOLOGY</strong></td>
<td>The lab aims to identify genetic alterations that underlie development, progression and resistance of brain tumors.</td>
</tr>
<tr>
<td>William T. Curry, MD</td>
<td><strong>TRANSLATIONAL BRAIN TUMOR IMMUNOLOGY</strong></td>
<td>The lab focuses on the development and evaluation of novel therapies for brain tumors.</td>
</tr>
<tr>
<td>Beth Costine, PhD</td>
<td><strong>BRAIN TRAUMA</strong></td>
<td>The Brain Trauma Lab is aimed at learning how to better treat the millions of children with brain trauma and similar problems, now and in the future.</td>
</tr>
<tr>
<td>Ann-Christine “Tina” Duhaime, MD</td>
<td></td>
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<tr>
<td>Shelley I. Fried, PhD</td>
<td><strong>NEURAL PROSTHETIC</strong></td>
<td>The lab seeks to improve the effectiveness of CNS-based neural prosthetics.</td>
</tr>
<tr>
<td>Robert L. Martuza, MD</td>
<td><strong>MOLECULAR NEUROSURGERY</strong></td>
<td>The lab focuses on the use of herpes simplex virus (HSV) vectors for cancer therapy and gene delivery in the nervous system, with the long-term goal being the therapeutic application of these vectors to patients.</td>
</tr>
<tr>
<td>Samuel D. Rabkin, PhD</td>
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</tr>
<tr>
<td>Brian V. Nahed, MD, MSc</td>
<td><strong>BLOOD-BASED BIOMARKERS FOR BRAIN TUMORS</strong></td>
<td>The lab is developing the first blood test to diagnose and monitor patients with brain tumors.</td>
</tr>
<tr>
<td>Shannon Stott, PhD</td>
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<tr>
<td>John S. Pezaris, PhD</td>
<td><strong>VISUAL PROSTHESIS</strong></td>
<td>The lab works to restore sight to the blind by sending signals from a digital camera directly into the brain.</td>
</tr>
<tr>
<td>Kathleen Sweadner, PhD</td>
<td><strong>MEMBRANE BIOLOGY</strong></td>
<td>The lab studies ATP-hydrolyzing enzymes control sodium, potassium and calcium movements.</td>
</tr>
<tr>
<td>Hiroaki Wakimoto, MD, PhD</td>
<td><strong>BRAIN TUMOR STEM CELL</strong></td>
<td>The lab develops novel therapeutic strategies for GBM through a better understanding of the biological and molecular characteristics of GBM stem cells.</td>
</tr>
<tr>
<td>Ziv Williams, MD</td>
<td><strong>NEURONAL COMMUNICATION/RESTORATION</strong></td>
<td>The lab probes mechanisms which neurons communicate locally and across cortical areas, and communication across areas disrupted within the CNS.</td>
</tr>
</tbody>
</table>
2018
Andrew Venteicher, MD PhD
Assistant Prof. U Minnesota,
Skull Base Neurosurgery
Christopher Stapleton MD
Instructor, Massachusetts General
Hospital, Cerebrovascular Surgery
Matthew Mian, MD
Fellow, Functional Neurosurgery,
Emory

2017
Pankaj Agarwalla
University of Southern
Florida, Tampa
Fellow, Skull Base Surgery
Katie Fehnel
Boston Children’s Hospital
Instructor, Pediatric Neurosurgery
Ganesh M. Shankar, MD, PhD
Massachusetts General Hospital
Instructor, Neurosurgical Spine

2016
Anoop Patel
University of Washington
Assistant Professor, Skull Base
and Endoscopic Surgery; Neurosurgical Oncology
Pamela Jones
Massachusetts General Hospital
Instructor, Neurosurgical Oncology
Josh Aronson
Dartmouth
Assistant Professor; Director of Functional Neurosurgery

2015
Navid Redjal
Capital Institute
Attending; Director of Neurosurgical Oncology
Brian Walcott
University of Southern California
Assistant Professor,
Cerebrovascular Surgery
Fellow, Cerebrovascular Surgery
Patrick Codd
Duke
Assistant Professor; Director of Endoscopic Neurosurgery

2014
Kris Kahle
Yale
Assistant Professor, Pediatric Neurosurgery;
Director, Congenital Anomaly Neurosurgery
Peter Fecci
Duke
Assistant Professor, Neurosurgical Oncology;
Associate Residency Program Director
Anna Terry
Duke
Assistant Professor, Neurosurgical Spine

2013
Gavin Dunn
Washington University, St. Louis
Assistant Professor, Neurosurgical Oncology
John Barr
Duke
Assistant Professor, Neurosurgical Spine

2012
David Jho
Allegheny General Hospital
Assistant Professor, Neurosurgical Spine; Director of Endoscopic Skull Base and Spine
Sameer Sheth
Baylor
Assistant Professor, Functional Neurosurgery
Eric Chang
Southern New Hampshire
Attending, Neurosurgery

2011
Brian Nahed
Massachusetts General Hospital
Associate Professor, Neurosurgical Oncology;
Associate Residency Program Director
Rollin Hu
Kaiser Permanente
Attending, Neurosurgical Spine

2010
Jason Gerrard
Yale
Assistant Professor, Director of Functional Neurosurgery
Wael Asaad
Brown
Associate Professor; Director of Functional Neurosurgery & Epilepsy
Travis Tierney
Miami Children’s Hospital
Assistant Professor, Pediatric Functional Neurosurgery

2009
Christopher Farrell
Thomas Jefferson
Assistant Professor, Skull Base and Endoscopic Surgery; Neurosurgical Oncology
Manuel Ferreira
University of Washington
Associate Professor, Skull Base and Neurosurgical Oncology; Chief, Neurosurgical Surgery

2008
Daniel Cahill
Massachusetts General Hospital
Associate Professor, Neurosurgical Oncology
Clark Chen
University of Minnesota
Professor and Department Chair, Neurosurgical Oncology

2007
Manish Aghi
UCSF
Professor, Neurosurgical Oncology;
Co-Director, Center for Minimally Invasive Skull Base Surgery
Ramin Amirnovin
Inland Neurosurgery
Attending, Neurosurgery
2006
Ziv Williams
Massachusetts General Hospital
Associate Professor, Functional Neurosurgery; Director of Peripheral Nerve Surgery
Khalid Abbed
Yale
Associate Professor, Chief of Neurosurgery Spine

2005
Brian Hoh
University of Florida
Professor, Chair of Neurosurgery; Chief of Cerebrovascular Surgery
Ekkehard Kasper
Beth Israel Deaconess
Associate Professor, Director, Neurosurgical Oncology and Stereotactic Radiosurgery

2004
Joseph Neimat
University of Louisville
Professor and Department Chair, Functional Neurosurgery
William Curry
Massachusetts General Hospital
Professor, Director of Neurosurgical Oncology; Co-Director, Neurosciences Institute

2003
Steve Kalkanis
Henry Ford
Professor and Department Chair, Neurosurgical Oncology
Edward Smith
Boston Children’s Hospital
Professor; Director of Pediatric Cerebrovascular Neurosurgery

2002
John Brisman
NSPC
Attending, Neurosurgery
Yogish Kamath
Kell West Regional Hospital
Chair, Department of Neurosurgery

2001
Albert Lee
Tallahassee Neurological Attending, Neurosurgery
Sepi Amin-Hanjani
UIC
Professor Cerebrovascular Surgery, Residency Program Director

2000
Richard Chung
Neurosurgical Associates of Santa Barbara
Attending, Neurosurgery
Emad Eskandar
Chief of Neurosurgery, Albert Einstein Medical Center

1999
Zoher Ghogawala
Lahey Clinic
Professor and Department Chair, Neurosurgical Spine
Bob Carter
Massachusetts General Hospital
Professor and Department Chair, Neurosurgical Oncology

1998
Marius Maxwell
Arctic Spine
Attending, Neurosurgery
Robert Friedlander
University of Pittsburgh
Professor and Department Chair, Cerebrovascular Surgery

1997
John Yu
Cedars-Sinai
Attending; Co-Director, Comprehensive Brain Tumor Program
Stephen Tatter
Wake Forrest
Professor, Chief of Neurosurgical Oncology

1996
Nicole Moyaerti
Kaiser Permanente
Attending, Neurosurgery
Peiman Pakzaban
Pasadena Neurosurgery
Attending, Neurosurgery

1995
E. Antonio Chiocca
Brigham & Women’s Professor and Department Chair, Neurosurgical Oncology
David Frim
University of Chicago
Professor and Department Chair, Pediatric Neurosurgery

1994
William Butler
Massachusetts General Hospital
Assistant Professor, Pediatric Neurosurgery
William Rosenberg
Midwest Neurosurgery
Attending, Neurosurgery

1993
Andrea Halliday
Spine & Brain Center
Attending, Neurosurgery
Richard Westmark
Houston Neurosurgery
Attending, Neurosurgery

1992
Jim Schumacher
Sarasota Neurosurgery
Attending, Neurosurgery
Fred Barker
Massachusetts General Hospital
Professor, Neurosurgical Oncology; Director, Skull Base Center

To see more of our alumni visit massgeneral.org/neurosurgery/alumni
Boston is a truly exceptional place to live with something to offer for all. The city is distinguished by its proud, vibrant and unique neighborhoods, each with its own individual flair and character. More than 11 million annual visitors and residents frequent Newbury Street, Copley Place and the Prudential Center for shopping. With 37 sports titles, Boston is known as “The City of Champions.” There are miles of pathways for exercise and leisure along the Charles River and Jamaicaway. Nearby athletic options include cross-country skiing or golfing at Franklin Park, hiking at the Blue Hills Reservation and sailing and swimming at 20 regional beaches.

Boston’s diverse restaurants serve up everything from Ethiopian to Japanese to Colombian cuisines. Hundreds of food trucks operate day and night across the city. Almost 30 neighborhood farmers markets are sprinkled throughout the city.

While Boston is perhaps best known for its rich history, it is also full of true artistic and cultural gems, like the Institute of Contemporary Art, the Museum of Fine Arts, the Opera House and Boston Creates, which rotates public art displays and soundscapes along the mile-and-a-half long Rose Kennedy Greenway. The city also comes alive during each season with different festivals, concerts, markets and crafts fairs.

Beyond all the great experiences Boston offers residents, Massachusetts is consistently ranked among the top places in the country to raise a family. The years in residency can be as formidable personally as they are professionally, and many current and former Mass General residents have started their own families during their time here.

BOSTON & BEYOND

4,500+ FOOD AND RETAIL ESTABLISHMENTS, INCLUDING 100+ FOOD TRUCKS

16 JAMES BEARD AWARD WINNERS

500+ ARTS AND CULTURE EVENTS PER YEAR

20+ BREWERIES

98% OF BOSTONIANS LIVE WITHIN A 10-MINUTE WALK OF A PARK OR OPEN SPACE

217 PUBLIC PARKS, 65 PUBLIC SQUARES, OVER 35,000 STREET TREES

1 HOUR’S DRIVE TO BEACHES, LAKES, OR MOUNTAINS
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Bob S. Carter, MD, PhD, Department Chair
Aman Patel, MD, Program Director
Brian Nahed, MD, MSc, Associate Program Director
Jesse Vega, Program Coordinator

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