ANNUAL REPORT

Stimulating Science in a Unique Setting

RESEARCH UPDATE IN NEUROSCIENCE FOR NEUROSURGEONS (RUNN)

OCTOBER 26, 2019 – NOVEMBER 2, 2019

SPONSORED BY

The Society of Neurological Surgeons

COURSE DIRECTORS

Allan H. Friedman, M.D.

E. Antonio Chiocca, M.D., Ph.D.

CO-DIRECTORS

Bruce Andersen, M.D., Ph.D.

Issam A. Award, M.D., MSc.

Henry Brem, M.D.

Robert J. Dempsey, M.D.

COURSE COORDINATOR

Karen Koenig

Mission Statement

The Mission of the course, Research Update in Neuroscience for Neurosurgeons (RUNN), is to provide an introduction to and update of the latest concepts, hypotheses and methods of neurobiology and neuroscience relevant to neurological surgery. These are presented by accomplished neuroscientists in an atmosphere emphasizing scientific rigor, highlighting models of career development for neurosurgeon-scientists, and illustrating potential future neurosurgical applications. A milieu of total immersion in scientific discourse is designed to foster creative discussions among neurosurgical trainees and faculty. Participants are instructed on selecting a research topic, identifying a mentor, designing hypothesis driven experiments and writing grants. The course is designed to stimulate neurosurgical trainees to participate in basic, translational, and clinical research relevant to the practice of neurological surgery.

Historical Background and Setting

The RUNN course was the brainchild of Henry Schmidek, formerly of Harvard University and the University of Vermont. The course was conceived in response to the anticipated expansion of neurosciences, which would be applicable to the practice of Neurosurgery. The course was initiated to combat illiteracy in basic neurobiology that he feared would weaken the specialty of Neurosurgery. Dr. Schmidek's RUNN Course has been instrumental in setting the course of many academic neurosurgeons.

As with so many neuroscientists from New England, Dr. Schmidek was very familiar with the Marine Biological Laboratory (MBL) at Woods Hole, Massachusetts. Established in 1888 as a non-profit institution devoted to research and education in basic biology, the MBL has been called "the uniquely national center for biology in this country" (Lewis Thomas, The Lives of a Cell). Scientists and students throughout the world come to the MBL to conduct research, teach, study and collaborate. They often use the diverse and abundant organisms found in surrounding waters as model systems. Here research ships leave everyday to study the pristine waters around Martha's Vineyard sound and to collect and maintain more than 200 species of marine life. There are 230,000 square feet of research space at the MBL and a splendid library with an extraordinary repository of books and journals and incredible electronic connectivity to everything biological.

It is here that the giant squid axon was (and continues to be) closely studied unfolding the splendid story of molecular mechanisms of neural function. There are incredible microscopy facilities, numerous amphitheaters and teaching facilities, a quintessential scientific community in true life and work, and a magnificent setting for creativity and scholarly productivity. And there is Swope Hall, a simple dormitory sleepily straddling a quaint harbor, with a friendly staff that knows how to host students and scholars. It is all in Woods Hole, that lovely little spot and ideal gateway, along the magnificent coast of Cape Cod. With miles of bicycle and jogging trails and nearby ferries, the only competition to diligent scholarship at Woods Hole is the inspiring call of nature.

It is here that Henry Schmidek cast his RUNN course, and lobbied other residency program directors to send their trainees once a year. By the mid-1980's it was an established offering for two weeks each fall, immersing neurosurgery residents from New Orleans to Saint Louis, from Minnesota to Maryland, and from San Francisco to New York City. The faculty included scientists from the MBL, demonstrating microscopy and dissection and scientists from the New England universities who would drive to the MBL for one or two days to participate in RUNN. There would also be neurosurgery's rising academic stars as role models, and wiser icons telling their tales of successes and challenges in the laboratory.

There was nothing like it in neurosurgical education, and there still is not. The founding mission of the RUNN course remains relevant today, and its culture and milieu remain as appealing. This crown jewel of American neurosurgical education was adopted in the late 1980's by the American Association of Neurological Surgeons (AANS) and later by the Joint Committee on Education of the AANS and the Congress of Neurological Surgeons (CNS). This endorsement and administrative oversight by organized neurosurgery heralded an era of expansion and uninterrupted success under the Directorship of Charles Hodge, of Syracuse, New York, with his lovely wife Cathy shepherding the Course as its coordinator. In the mid 1990's Dr. Hodge became Co-Director, passing the helm of Directorship to Cordell Gross, of Burlington, Vermont. Linda Gross served as Course Coordinator.

During this period, Charlie and Cordell cultivated a core of devoted faculty from the MBL, Syracuse, Vermont, Harvard, Brown, the National Institutes of Health (NIH), and other institutions who would participate on a regular basis as faculty. A requirement for faculty participation remains-- that the individual be an active and accomplished scientist, speaking on topics he/she actively investigates, and that he/she is an effective speaker. Only those who are highly rated by the neurosurgical trainees would be invited again.

Many would dazzle and inspire casting truly unforgettable lectures or discussions. The days would be filled with lectures, unhurried, with plenty of time for discussion. There would be long blocks of time for reading in the library, or for creative and vivid discussions with beer, wine and snacks late into the night. Friendships would be forged among attendees, and research ideas and even an occasional scholarly career would be hatched. All attendees stay at the dorm at Swope Hall, where the legendary cafeteria is like no other, and the views from each simple bedroom (many shared by two residents) as memorable.

Because of untimely illness in 1998, Dr. Gross asked to step down from the Directorship of the RUNN Course which he had grown to love so much. The opportunity of change of leadership allowed a re-examination and re-commitment to the Mission and core values of the RUNN Course. The AANS and CNS asked the Society of Neurological Surgeons (SNS) to assume sponsorship and oversight of the course. Established in 1920 the SNS is known in neurosurgical lore as the “Senior Society” or organization of North American Chairmen and Residency Program Directors. The SNS would insure Program Directors’ continued commitment to this unique educational offering, and ensure residents’ continued participation.

In 1999, the leadership of the RUNN Course was entrusted to Issam A. Awad. Dr. Awad broadened the goals of the RUNN Course to educate neurosurgical residents in formulating hypothesis driven experiments, establishing laboratories and writing grants. To this end, several neurosurgeons who headed successful basic science laboratories were added to the faculty. The Society owes a debt of gratitude to Cathy Awad who administered the Course during Dr. Awad’s tenure. Cathy coordinated everything from “T” shirts to accommodations to finances.

RUNN Course Leadership

In 2004, Dr. Awad passed the baton of leadership to Allan H. Friedman (Duke University) and Robert M. Friedlander (University of Pittsburgh) as the new Directors of the Course. In 2018, Dr. Friedlander stepped down as a Course Director and in 2019, Dr. E. Antonio Chiocca (Harvard University) was asked to direct the RUNN Course with Dr. Allan Friedman.

Co-Directors of the Course are Issam A. Awad (University of Chicago), Bruce Andersen (Idaho Neurological Institute), Henry Brem (Johns Hopkins), E. Antonio Chiocca (Harvard) and Robert J. Dempsey (University of Wisconsin). Dr. Bruce Andersen works closely with Jim Galbraith (Oregon Health Sciences) to direct a squid giant axon physiology hands-on laboratory experience. Course Coordinator, Karen Koenig, works throughout the year to insure RUNN is executed flawlessly, managing the organization, administration and accounting of the Course.

The 2019 RUNN Course Curriculum: Tradition and Innovation

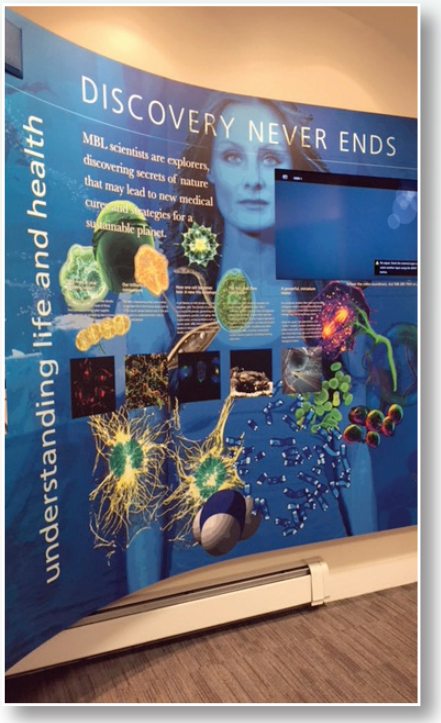
The founding mission and core values of the RUNN Course remained unchanged. The SNS Executive Committee (representing North American Residency Program Directors) rearticulated its commitment to the course and its leadership.

In response to recent course evaluations and discussions with Program Directors and residents, the course was shortened in 1999 from two weeks to one week with travel days on adjacent weekends. The one and one-half hour length of individual lectures allows for stimulating interaction between the lecturer and the participants. Two such lectures are given each morning, two each afternoon, and one each evening. Curriculum content was reshaped to include lectures covering the spectrum of molecular, cellular and systems neuroscience. Lectures covered topics on molecular genetics, signaling and receptors, stem cells, cell death, regeneration, oncogenesis, glial barriers, vascular tone and phenotype, cognitive information science, circuit modeling, and higher cortical function. Although many of the

lecturers return, their material is surprisingly fresh reflecting new discoveries made in their labs. Many of the lectures were given by practicing neurosurgeons with actively funded laboratories. There were tours of the MBL laboratories and the very popular squid giant axon dissection lab. There were discussions on academic career development, grantsmanship, history and philosophy of science and the scientific method, and history of the MBL. And there were the traditional opening get-acquainted reception and Course Orientation, and the farewell Lobster Bake and Diploma ceremony.

New Lectures Presented at the 2019 Course:

1. **Wael Asaad, M.D., Ph.D.**
   Associate Professor Neurosurgery
   Associate Professor of Neuroscience
   The Warren Alpert Medical School of Brown University
   Director, Functional Neurosurgery and Epilepsy
   Co-Director, Comprehensive Movement Disorders Center
   Director, Cognitive Neurophysiology and Neuromodulation Laboratory
   Lecture Title: "Cyborgs IRL: Emerging Strategies and Applications for Neuromodulation"



2. **David Corey, Ph.D.**
   Bertarelli Professor of Translational Medical Science
   Professor of Neurobiology
   Department of Neurobiology
   Harvard Medical School
   Lecture: "Gene Therapy for Deafness"

3. **Gordon Freeman, Ph.D.**
   Professor, Medicine, Harvard Medical School
   Dana-Farber Cancer Institute
   Lecture Title: "PD-1 Cancer Immunotherapy"

4. **Zhigang He, Ph.D., B.M.**
   Professor of Neurology
   Professor of Ophthalmology
   Harvard Medical School
   Boston Children's Hospital
   Lecture Title: "Axon Regeneration and Functional Recovery after Spinal Cord Injury"

5. **Leigh Hochberg, M.D., Ph.D.**
   Director, Center for Neurotechnology and Neurorecovery
   Neurologist, Division of Neurocritical Care & Emergency Neurology, and Stroke Service
   Department of Neurology, Massachusetts General Hospital
   Professor of Engineering, Brown University
   Senior Lecturer, Department of Neurology, Harvard Medical School
   Director, Center for Neurorestoration and Neurotechnology
   Rehabilitation Research & Development Service, Dept. of Veterans Affairs
   Center for Neurotechnology and Neurorecovery
   Lecture Title: "BrainGate: Clinical Trials in Intracortical Brain-Computer Interfaces for the Restoration of Communication and Mobility"

6. **Timothy R. Smith, M.D., Ph.D., M.P.H**
   Director, Computational Neuroscience Outcomes Center
   Assistant Professor of Neurosurgery
   Harvard Medical School
   Brigham and Women's Hospital
   Department of Neurosurgery
   Lecture Title: "The Next Generation Surgeon (Data) Scientist"

7. **Mario Suva, M.D., Ph.D.**
   Assistant Professor, Pathology, Harvard Medical School
   Assistant Professor of Pathology, Massachusetts General Hospital
   Molecular Pathology, 6010
   Institute Member, the Broad Institute of MIT and Harvard
   Lecture Title: "Lessons Learned from Single-cell RNA Sequencing of Brain Tumors"

8. **Ziv Williams, M.D.**
   Associate Professor in Neurosurgery
   Harvard Medical School
   Massachusetts General Hospital
   Lecture Title: "Functional Neurosurgical Approaches for Restoring Motor and Cognitive Function"

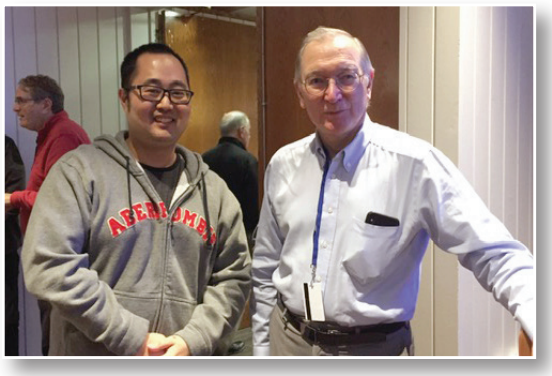
The collegial atmosphere at Swope Hall remained unchanged, as were the memorable late night sessions with snacks, beer and wine and the very late night sessions at Captain Kidd's where residents discussed everything from research topics and career paths, to residency training, to NFL football. Each attendee received a hoodie sweatshirt embroidered with Research Update in Neuroscience for Neurosurgeons (RUNN).

Splendid Cast of Faculty

The faculty are world-class scientists who are able to present their work in a stimulating fashion. There were 31 faculty and 6 directors, representing an extraordinary student/faculty ratio of 3/1. Attendees were mesmerized by the dynamic speakers and post lecture discussions were lively and probing. The residents discussed personal choices in research commitments and career direction with the invited speakers. Many faculty members had participated in the RUNN Course for several years, and all promised to come again if invited. The Course evaluations filled out by the attendees are used to make modifications in the course's speakers and structure.

An Enthusiastic Cast of Attendees

We had an outstanding record number of 120 neurosurgery residents representing programs throughout the United States, Canada and Puerto Rico who attended the course. The reshaped course is ideal for young attending neurosurgeons just embarking on their academic career. Our goal is to attract one neurosurgeon from each neurosurgical program in North America.
We had the pleasure of having Dr. Anand Germanwala, Program Director from Loyola, University of Chicago and Dr. Nicole Moaoyeri, a Neurovascular Neurosurgeon from Kaiser in Redwood City, CA, visit the RUNN Course.



Our participants continue to be enthusiastic. It is exciting to see the participants swept up in the lectures and spontaneously confronting the lecturers with insightful questions. If this group is representative of neurosurgical residents, the future of neurosurgery looks very bright.

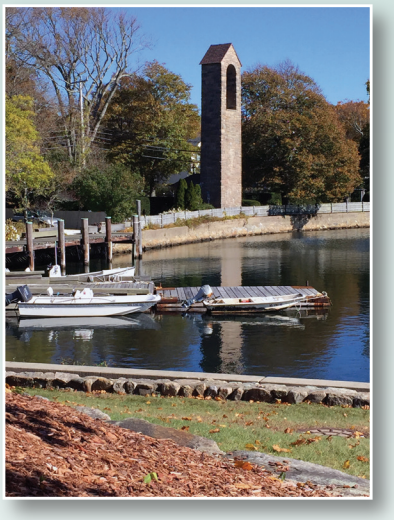
COURSE REPORT

by David Huie, M.D., M.S.
Neurosurgical Resident, Duke University Hospital

On paper, the RUNN course almost shouldn't exist. The idea that you could excuse more than a hundred neurosurgery residents from their clinical duties, fly them all to Woods Hole, MA for a week, and present them with lectures from renowned physicians and scientists who have taken time from their own busy clinical and research jobs to speak at the course, seems fantastical. And yet, for the neurosurgery residents fortunate enough to attend, the RUNN course provides exactly that opportunity to hear about the latest in neurosurgical research.

Sitting on the shore of Cape Cod, the historic Marine Biological Laboratory in Woods Hole provides a unique and incredible backdrop for the RUNN course. Mornings and afternoons are largely spent listening to lectures which span the range from basic to translational to clinical research in all of the major neurosurgical disciplines. Speakers include giants of their fields alongside up-and-coming faculty who have all come to share their knowledge with a new generation of neurosurgeons-in-training. With many of the residents currently planning out research projects for upcoming years, the opportunity to interface and speak with researchers on the cutting edge of their respective fields is both informative and inspiring. The chance to do so among future colleagues, many of whom we last saw as medical students together on the interview trail, makes the experience all the more enjoyable. Evenings are often spent at one of the several RUNN course mixers, or catching up at one of the local establishments in town.

During the week residents also have the opportunity to tour the Marine Biological Laboratory and take part in the ever-popular squid lab. There are chances to explore nearby Martha's Vineyard, or just walk along the beach or visit nearby towns. At week's end, the residents depart. We return to our hospitals and our patients, our pagers and our clinical duties, but now with a new awareness and appreciation for the frontiers of neurosurgical research, and an inspiration to continue that work which drives our field forward.



COURSE REPORT

by Kelly Murphy, M.D.
Neurosurgical Resident, Duke University Hospital

I am so thankful to have had the opportunity to attend the RUNN course as a Duke University junior resident. Coming together with co-residents at this high-yield course was cathartic in the Woods Hole setting. To say I recommend the course would be an understatement!

The lectures at RUNN course were diverse and applicable to all. From learning how focused ultrasound can selectively open the blood brain barrier, to how big data can leverage social media to promote health behaviors, to how a common diabetes drug can promote brain recovery, there really was something for everyone. Dissecting the squid's giant axon was one of my favorite experiences. I felt such pride seeing my action potential propagate across the screen!

The curriculum also emphasized critical interpretation of research. While research interests may change overtime or differ among residents, the principles of research integrity and minimizing bias is relevant to all. I enjoyed thinking about topics not always encountered during clinical duties—molecular biology, gene editing, cognitive neuroscience— the lectures reminded me why I initially fell in love with science, and especially reinvigorated my interests in neuroscience.

As someone who doesn't typically ask many questions in front of large groups, I found my hand raised at the end of many lectures—where can this go next? How can we move this topic forward? Judging by the many discussions trickling into coffee breaks (or post-lecture mixers), I know the stimulating lectures only led to more questions and "planted seeds" than final answers. I am excited to see where this group of talented residents takes this intellectual curiosity to push the field forward.

The Woods Hole atmosphere was unparalleled and really added to the unique experience. I'll always remember cracking my first lobster at the graduation ceremony (and the admitted struggle in doing so—drawing similarities to my first deformity case where my hand strength became the limiting reagent between me and victory!). Venturing over to the nearby town of Falmouth with my co-residents turned me from "seafood avoidant" to an amateur seafood aficionado as we tried the locals' best scallops, clam chowder, and mahi mahi.

The escape into the quintessential Northeast at the RUNN course allowed me to take a step back from junior residency, breathing the crisp air of fall with renewed spirit among old and new friends. We often lose touch with the scientific process in junior residency and the course reminded me of why I chose this specialty and to push the field and not "just" be a member of the field. Learning from acclaimed researchers alongside like-minded individuals has made such an impact at this juncture of residency. It was an honor, as well as humbling experience, to attend the RUNN course.

COURSE REPORT

by Timothy Wang, M.D.
Neurosurgical Resident, Duke University Hospital

The RUNN Course, a 7-day research course located in Woods Hole Massachusetts, is a wonderful retreat where junior and senior-level residents from around the country meet to hear about cutting edge developments within neurosurgery and neuroscience. It is a wonderful reprieve from the clinical duties of neurosurgery call, and functions as a reunion for many of the residents that spent time interviewing together as medical students.

The venue itself is a special corner of New England. Located on the Atlantic coast of Massachusetts approximately 80 miles from downtown Boston, Wood's Hole offers the food and drink of classic New England fare while isolating itself from the hustle and bustle of a major metropolitan area. We were fortunate in our year to have several days of sublime weather, which made exploring much more pleasant. Many of our coresidents would frequent the jogging trails and explore the neighboring town of Falmouth, where you could find local shops, restaurants, and beach access.

The RUNN course has several other highlights, including 1) lectures by a multitude of world-renowned researchers, 2) lobster bake, 3) Wood's Hole Halloween, and 4) social hours at Captain Kidd. It is a great combination of both work and play. Each talk, while lasting 90 minutes, allowed each faculty member to give an in-depth presentation on their journey through academic medicine and their journey through research and discovery, and I found myself inspired by researchers who talked about many of the same struggles that I have gone through, myself.

For any resident who is interested in research, and even for those that are not, the RUNN course is an excellent opportunity to hear about the most cutting-edge aspects of our field. The lectures were mentally stimulating, fun, informative, and challenging, and each one had many learning points that I will apply towards future research endeavors. The speakers were a constant reminder that neurosurgery is much more than just surgery. They demonstrate commitment, drive, and a genuine love for what they do, and they manage to make what most consider is a grueling field into a passionate career. After leaving, I felt honored knowing that I would soon be joining these class of physicians, pioneers, scientists, and mentors.

We acknowledge generous grants from:

Education Grants 2019 RUNN Course	
Integra Foundation	$5,000.00
Stryker Corporation	$5,000.00
Zimmer/Biomet Microfixation	$3,000.00
Brainlab, Inc.	$2,500.00
Carl Zeiss Meditech, Inc.	$1,500.00
Dabir Surfaces, Inc.	$2,500.00
Medical Device Medical Services, Inc.	$2.500.00
Marathon Medical, Inc.	$2,500.00
Medtronic	$1,000.00
Leica Microsystems, Inc.	$1,500.00
Kirwan Surgical	$1,000.00
Monteris Medical	$1,500.00
TOTAL GRANT FUNDING	$29,500.00

These grants subsidized audio-visual, laboratory, meeting room and Course administration.

Toward RUNN 2019 and Beyond!

We have finalized the space contract with the MBL for 2020. RUNN 2020 will take place from October 31 – November 7, 2020. The SNS and the Course Co-Directors and Coordinator are committed to maintaining the best of the RUNN Course, while continuing to strive to enhance curriculum content and value to each registrant. We continue to call on Residency Program Directors to support this unique gem of North American Neurosurgical Education, by providing their residents the opportunity of exposure to, and update on the best of neurobiology. We hope that future courses will also attract fellows and young faculty at formative states of their academic careers, and to practicing neurosurgeons who want to get reacquainted with the future of neurosurgery!

RUNN Web Site

http://www.societyns.org

RUNN Course 2019 Attendees:

Ahmad, Shahjehan	Rush University Medical Center
Alentado, Vincent	Indiana University
Alford, Elizabeth	University of Alabama
Alsahlawi, Aysha	McGill University
Asante, Samuel	Houston Methodist Hospital
Avila, Mauricio	University of Arizona
Bander, Evan	Weill Cornell Medicine
Bazarek, Stanley	Brigham and Women's Hospital
Bell, Joseph	David Geffen School of Medicine at UCLA
Blue, Rachel	University of Pennsylvania
Boulter, Jason	National Capital Consortium, Walter Reed
Bowden,Stephen	Oregon Health Science University
Brougham, Jared	Louisiana State University, Shreveport
Burke Shane	Tufts Medical Center
Celano, Emma	Georgetown University
Chagoya, Gustavo	University of Alabama
Chatley, Kevin	University of Kansas Medical Center
Chugh, Arunit (Jessey)	University Hospitals/Case Western University
Cleary, Daniel	University of California, San Diego
Coffman, Stephanie	Wake Forest University
Cooper, Jared	Westchester Medical Ctr./New York Medical College
Daniels, Bradley	Houston Methodist Hospital
Dean, Anudariya	University of Chicago
Do, Truong	University of Minnesota
Dominguez, Jose	Westchester Medical Ctr./New York Medical College
Ebot, James	Mayo Clinic, Florida
Elliott, Ross-Jordon	George Washington University
Elsayed, Galal	University of Alabama
Englander, Zachary	Columbia University
Erwood, Andrew	Emory University
Feng, Rui	Icahn School of Medicine at Mount Sinai
Fernandes, David	University of Pittsburgh
Fernández-de Thomas, Ricardo	University of Puerto Rico

RUNN Course 2019 Attendees: continues

Feroze, Abdullah	University of Washington
Field, Nicholas	Albany Medical University
Filippidis, Aristotelis	Beth Israel Deaconess, Harvard University
Filley, Anna	Columbia University
Gersey, Zachary	University of Pittsburgh
Goulart, Carlos	SUNY Upstate New York, Syracuse
Hamade, Youssef	University of Minnesota
Han, Nathan	University of Maryland
Hardigan, Trevor	Icahn School of Medicine at Mount Sinai
Huie, David	Duke University
Ibn Essayed, Walid	Brigham and Women's Hospital
Iordanou, Jordan	Loyola University Medical Center
Jin, Yike	Johns Hopkins
Joyce, Evan	University of Utah
Kallos, Justiss	University of Pittsburgh
Kesserwan, Mohamad	McMaster School of Medicine
Koduri, Sravanthi	University of Michigan
Kraemer, Mark	University of Wisconsin, Hospital and Clinics
Kumar, Kevin	Stanford University
Kvint, Svetlana	University of Pennsylvania
Ladd, Bryan	University of Minnesota
Lawrence, Jesse	West Virginia University
Lee, Justin	University of Southern California
Lee, James (Jack)	Dartmouth Hitchcock
Lipson, Adam	Southern Illinois University
Lockwood, Joseph	Tulane University
Look, Andrew	The Ohio State University Wexner Medical Center
Lubelski, Daniel	Johns Hopkins
Masood, Zihan	University of Kansas Medical Center
Mastorakos, Panagiotis (Panos)	Clinical Center of the National Institutes of Health
Masur, Ann	University of Toronto
Mathios, Dimitrios	Johns Hopkins
McGahan, Benjamin	The Ohio State University Wexner Medical Center
Melnick, Kaitlyn	University of Florida, Gainesville
Mullarkey, Matthew	University of Texas at Houston
Murphy, Kelly	Duke University
Mustroph, Martina	Brigham and Women's Hospital
Page, Paul	University of Wisconsin, Hospital and Clinics
Palejwala, Ali	University of Oklahoma
Park, Jung	Zucker School of Medicine at Hofstra/Northwell
Parker, Samantha	University of Texas at Houston
Paul, David	University of Rochester
Peeters, Sophie	David Geffen School of Medicine at UCLA

RUNN Course 2019 Attendees: continues

Peitz, Geoffrey	UT Health Science Center San Antonio
Peterson, Racheal	Louisiana State University, Shreveport
Podet, Adam	Louisiana State University, New Orleans
Poggi, Jonathan	Brown University/Rhode Island Hospital
Porche, Ken	University of Florida, Gainesville
Quach, Eric	Temple University
Rahmani, Redi	University of Rochester
Rai, Shawn	SUNY Upstate New York, Syracuse
Ramos, Alex	Weill Cornell Medicine
Recker, Matthew	State University of New York at Buffalo
Robert, Stephanie	Yale University
Ross, Miner	Oregon Health Science University
Sack, Kenneth	George Washington University
Schlauderaff, Abraham	Penn State Hershey
Scoville, Jonathan	University of Utah
Scullen, Tyler	Tulane University
Sefcik, Roberta	University of Pittsburgh
Sethi, Akal	University of Colorado School of Medicine
Shaaya, Elias	Brown University/Rhode Island Hospital
Sharma, Ashish	University of Maryland Neurosurgery Program
Siler, Dominic	Oregon Health Science University
Simon, Joshua	Loyola University Medical Center
Sofoluke, Nelson	Geisinger University
Spears, Robert C.	University of Kentucky
Strong, Michael	University of Michigan
Sujijantarat, Nanthiya	Yale University
Suresh, Hrishikesh	University of Toronto
Tavakoli, Samon	UT Health Science Center San Antonio
Torres, Michael Ortiz	University of Missouri
Ung, Timothy	University of Colorado School of Medicine
Wang, Catherine	University of Kentucky
Wang, Timothy	Duke University
Wessell, Jeffrey	Medical University of South Carolina
Weyhenmeyer, Jonathan	Indiana University
White, Timothy	Zucker School of Medicine at Hofstra/Northwell
Williams, Michelle	Wake Forest University
Wilson, Bayard	David Geffen School of Medicine at UCLA
Wolgamott, Laura	Medical University of South Carolina
Xu, Jordan	University of California Irvine
Ye, Vincent	University of Toronto
Zammar, Samer	Penn State
Zeineddine, Hussein	University of Texas at Houston
Zhang, Michael	Stanford University
Zhao, David	Georgetown University

Faculty and Topics

COURSE DIRECTOR:

Allan H. Friedman, M.D.
Duke University
"Welcome, Introduction, and Course Objectives"

E. Antonio Chiocca, M.D., Ph.D.
Harvard University Medical Center
"Faculty Welcome and Lecture Introductions"

CO-DIRECTORS:

Bruce Andersen, M.D., Ph.D., FAANS, FACS
Saint Alphonsus Neuroscience Institute
Director, Laboratory Experience: "Squid Lab"

Issam A. Awad, MD, MSc, FACS, MA (hon)
University of Chicago
Lecture Title: "Philosophy of Science in Relevance to Neurosurgery" and "Deconstructing a Neurosurgical Disease: A Path to Therapy for Cerebral Cavernous Malformation"

Henry Brem, M.D.
The Johns Hopkins Hospital
Lecture Title: "Brain Tumor Therapy"

Robert Dempsey, M.D.
University of Wisconsin
Lecture Title: "Inspiration and Neurosurgical Research - How to Start a Project, Grant or Paper"

FACULTY:

Wael Asaad, M.D., Ph.D.
The Warren Alpert Medical School of Brown University
Lecture Title: "Cyborgs IRL: Emerging Strategies and Applications for Neuromodulation"

Larry Benowitz, Ph.D.
Harvard University
Lecture Title: "Rewiring the Injured CNS"

Edward Benzel, M.D.
Cleveland Clinic
Lecture Title: "Spine, Biomechanics, Clinical Practice, and the Quest of Academic Excellence"

Kerry Bernstein, Ph.D.
Alexandria, VA
Lecture Title: "The Patient is Healthcare, and the Disease is Electronic"

Edward Boyden, Ph.D.
Massachusetts Institute of Technology
Lecture Title: "Tools for Understanding and Repairing the Brain"

David Corey, Ph.D.
Harvard Medical School
Lecture Title: "Gene Therapy for Deafness"

Gordon Freeman, Ph.D.
Dana-Farber Cancer Institute
Lecture Title: "PD-1 Cancer Immunotherapy"

James Galbraith, Ph.D.
Oregon Health Sciences University
Director, Laboratory Experience: "Squid Lab"

Faculty and Topics continues

Zoher Ghogawala, M.D., FACS
Tufts University School of Medicine
Lecture Title: "The Search for Truth in Spinal Surgery: Are we Prepared for What Comes Next?"

Alexandra J. Golby, M.D.
Harvard Medical School
Lecture Title: "Advanced Imaging and Image Analysis for Neurosurgical Planning and Intraoperative Guidance"

Murat Günel, M.D.
Yale School of Medicine
Lecture Title: "Next Generation Genomics"

Michael M. Haglund, M.D., Ph.D., FAANS, FCS (ECSA)
Duke University Medical Center
Lecture Title: "Academic Neurosurgery and Global Health"

Robert E. Harbaugh, MD, FACS, FAHA
Penn State University
Lecture Title: "Issues in Neurosurgical Clinical Research"

Zhigang He, Ph.D., B.M.
Harvard Medical School
Lecture Title: "Axon Regeneration and Functional Recovery after Spinal Cord Injury"

Leigh Hochberg, M.D., Ph.D.
Massachusetts General Hospital
Brown University
Harvard Medical School
Rehabilitation Research & Development Service, Dept. of Veterans Affairs
Center for Neurotechnology and Neurorecovery
Lecture Title:"BrainGate: Clinical Trials in Intracortical Brain-Computer Interfaces for the Restoration of Communication and Mobility"

Jeff W. Lichtman, M.D., Ph.D.
Harvard University
Lecture Title: "Connectomics"

Andres M. Lozano, M.D., Ph.D., FRCSC, FRSC
University of Toronto
Lecture Title: "Adjusting the Activity in Human Brain Circuits"

Joseph R. Madsen, M.D.
Harvard Medical School
Lecture Title: "Signals and Systems in the Human Brain: Water and Electricity"

Rajiv Midha, MSc, MD, FRCSC, FAANS, FCAHS
University of Calgary
Lecture Title: "Peripheral Nerve Regeneration: Possibilities and Challenges"

James T. Rutka, MD, PhD, FRCSC, FACS, FAAP, FAANS
University of Toronto
Lecture Title: "Modeling Human Brain Tumors in Worms, Flies and Fish!"

Jeremy Schmahmann, M.D.
Harvard Medical School
Lecture Title: "Systems Neuroscience of Cerebral White Matter Tracts and Cerebellar Cognition"

Marc Simard, M.D., Ph.D.
University of Maryland
Lecture Title: "The SUR1-TRPM4 Channel – a Critical Player in CNS Ischemia and Trauma"

Timothy R. Smith, M.D., Ph.D., M.P.H
Harvard Medical School
Brigham and Women's Hospital
Lecture Title: "The Next Generation Surgeon (Data) Scientist"

Mario Suva, M.D., Ph.D.
Harvard Medical School
Massachusetts General Hospital
Lecture Title: "Lessons Learned from Single-Cell RNA Sequencing of Brain Tumors"

Ziv Williams, M.D.
Harvard Medical School
Massachusetts General Hospital
Lecture Title: "Functional Neurosurgical Approaches for Restoring Motor and Cognitive Function"