

# *Stimulating Science in a Unique Setting*



## **RESEARCH UPDATE IN NEUROSCIENCE FOR NEUROSURGEONS (RUNN)**

**OCTOBER 27, 2018 - NOVEMBER 3, 2018**

**SPONSORED BY**

**The Society of  
Neurological Surgeons**

**COURSE DIRECTOR**

**Allan H. Friedman, M.D.**

**CO-DIRECTORS**

**Bruce Andersen  
Issam A. Awad  
Henry Brem**

**COURSE COORDINATOR**

**Karen Koenig**

**E. Antonio Chiocca  
Robert J. Dempsey**

## Mission Statement

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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

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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 amphitheatres 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.

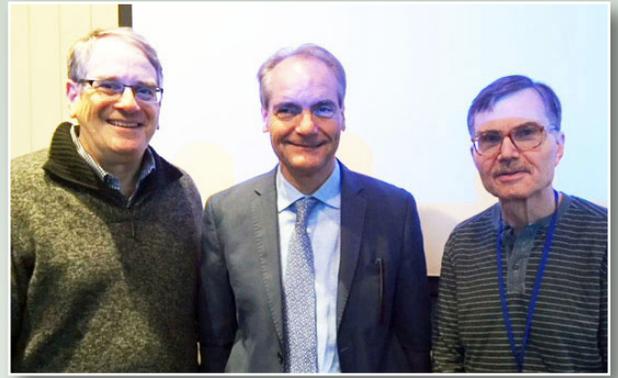
## **RUNN Course Leadership**

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. 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 2018 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 2018 Course:

#### 1. Alexandra J. Golby, M.D.

Haley Distinguished Chair in the Neurosciences

Professor of Neurosurgery, Department of Neurosurgery

Professor of Radiology, Department of Radiology

Director of Image-Guided Neurosurgery

Co-Director, Clinical fMRI Service

Clinical Co-Director Advanced Multi-Modality Image-Guided OR (AMIGO)

Harvard Medical School Brigham and Women's Hospital

**Lecture Title: "Advanced Imaging and Image Analysis for Neurosurgical Planning and Intraoperative Guidance"**

**2. Tudor G. Jovin, M.D.**

Professor of Neurology and Neurosurgery  
University of Pittsburgh Medical Center  
Director, UPMC Stroke Institute  
Director, UPMC Center for Neuroendovascular Therapy  
**Lecture: “Endovascular Therapy for Acute Stroke.  
Current Status and Future Directions”**

**3. Mustafa Sahin, M.D., Ph.D.**

Professor of Neurology  
Harvard Medical School  
Director, Translational Neuroscience Center  
Director, Translational Research Program  
Rosamund Stone Zander Chair  
**Lecture Title: “Translational Studies in Tuberous Sclerosis Complex”**

**4. Jeremy Schmammann, M.D.**

Professor of Neurology, Harvard Medical School  
Director, MGH Ataxia Unit  
Director, Laboratory for Neuroanatomy and Cerebellar Neurobiology at MGH  
Member, MGH Cognitive Behavioral Neurology Unit  
**Lecture Title: “Systems Neuroscience of Cerebral White Matter Tracts and Cerebellar  
Cognition”**



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

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We had an outstanding record number of 117 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.



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

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by Stephen Harward, II, M.D., Ph.D.  
Neurosurgical Resident, Duke University Hospital

In describing the RUNN course, only one word truly fits . . . transformative. This one week retreat to picturesque Woods Hole proved more than just a break from the clinical responsibilities of junior residency, it proved to be a moment of reflection, a moment to catch my breath, to remember my passion for science, to rekindle the fires within, and to remind me why I chose Neurosurgery.



To begin, the RUNN course is located on the beautiful and historic campus of Woods Hole, where some of the giants of Neuroscience have studied and revolutionized the field. Walking among its labs and dorms, one cannot help but be humbled and inspired by the intellectual power, rigor, and excitement that permeates through the air. Add in the crisp bite of a Massachusetts fall breeze and you have the makings for a truly sensation environment to immerse oneself in the newest ideas permeating through Neurosurgery.

Second, the line-up of lectures put together by Dr. Friedman and his fellow course directors rivals any of the National Meetings. The content covered all areas of Neurosurgery - Vascular, Pediatrics, Functional, Tumor, and Spine - and even provided

unique exposure to some new basic science techniques with huge potential for Neurosurgical applications - think optogenetics, expansion microscopy, brainbow, etc. More important is that the content was the energy and enthusiasm of the speakers. No matter the age or experience level, all seemed to revel in the opportunity to present to the up and coming generation of Neurosurgeons. In a field known for stress and burnout, it was refreshing and inspiring to see such passion for medicine, for science, and for following one's curiosity alive and well among some of the great

leaders in Neurosurgery. Personally, I found this energy infectious and left Woods Hole rejuvenated and more excited about being a Neurosurgeon-Scientist than ever before.

Third and finally, the participants are the capstone on a truly remarkable program. Hailing from residencies all across the US (and even beyond), the diverse backgrounds and perspectives proved not only fun but enlightening. The conversations I had over a jog with fellow RUNN participations along the coast of Woods Hole or even a beer at Woods Hole's only bar - the Captain Kidd - where quite memorable. After a week, I left feeling like my fellow participants and I had solved all the world's problems . . . from who would win the men's NCAA basketball national championship (Duke of course!) to how we could revolutionize treatment of GBMs. This was truly a week I will not too soon forget. Kudos to Dr. Friedman and his fellow co-directors as the goal of the RUNN program hit the mark! I would encourage anyone with a desire to learn, to grow, and to be inspired as a Neurosurgeon-Scientist to attend this course . . . you will not be disappointed.



## COURSE REPORT

by **Vikram Mehta, M.D., MPH**

Neurosurgical Resident, Duke University Hospital

My time at the Research update on Neurosciences for Neurosurgeons (RUNN) course will have a lasting impact on my neurosurgical career. I remember hearing about the RUNN course while I was interviewing for residency programs four years ago. I didn't fully understand what it meant, but everyone spoke so highly of the experience and from that time, I have been looking forward to experiencing the RUNN course for myself. In my opinion, three areas really highlight what the RUNN course is all about: 1. The Speakers 2. Spending time with colleagues and 3. Enjoying Woods Hole. From the first speaker until the last, I felt privileged to be in the audience and listening to these thought leaders in their respective fields. It was encouraging to hear their stories, their passions, their drives, and their successes, failures, and perseverance. It was not only intellectually engaging, but to me, the real highlight to hear their personal story of how they came to their field of study, and how they have overcome challenges along the way. I thought that allocating 90 minutes per lecture allowed them to dive into their story and personalities in a much more expressive manner than a rushed lecture. Their talks were inspirational and hearing what the cutting edge of their field is gave us a new and unique perspective when we returned to our residency programs. I also thought that the discussion at the end of lectures was insightful and I'm sure many innovations will come from those casual exchanges.



I first met my futures neurosurgical colleagues during our interview process in 2015/2016. During the interview process, I knew I had met friends that I would be seeing for the rest of my career. As we moved on to our residency training programs, we have grown in ways that I could not have imaged 3 years ago. I was thrilled to see the familiar faces and smiles. I was even more amazed at how we all had changed so much yet stayed the same. I could say the same for my mentors that I saw at RUNN course. These mentors still inspire the same neurosurgical passion that I had as a medical student. It also served as a time to catch up with my co-residents at Duke and go on a run with Dr. Friedman. This time away from the hospital and clinical duty served as a respite and renewed my energy.

Woods Hole is as scenic and beautiful as any town in fall. From the crisp ocean air, to the sound of waves crashing, to the slightly chilly mornings which warm into temperate afternoons and evenings, Woods Hole is exactly what we needed. It was a relief from daily stresses. I often fall victim to not appreciating moments during the middle of the grind that can be neurosurgical residency. I try to take moments, when I can, to look at the leaves and their changing color, or appreciate the local bakery, “Pie in the Sky”.

The RUNN course is a special time and I feel privileged to have been a member of the 2018 course. The combination of amazing speakers with their research topics and stories, interactions with colleagues, co-residents, and mentors, and the charming town of Woods Hole made the 2018 RUNN course unforgettable. I hope to take what I learned at the RUNN course and use it everyday in my neurosurgical career.

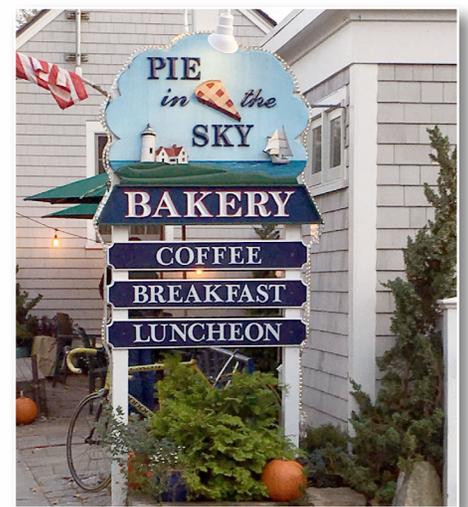
## COURSE REPORT

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by Eric Sankey, M.D.

Neurosurgical Resident, Duke University Hospital

In the fall of 2018, I had the fortunate opportunity to attend the highly acclaimed RUNN course in Woods Hole as a PGY3. Amid the challenges and stresses of junior residency, this week offered a unique chance to reaffirm my love for neuroscience and challenge my understanding of the central nervous system. In addition, the Cape provided a gorgeous backdrop to “catch up” and establish new friendships with residents from programs across the country. From inspiring lectures on topics ranging from spinal cord injury to the role of the cerebellum in human cognition, early morning runs along the coast, and countless trips to the local staples “Pie in the Sky” and “Captain Kidd”, each experience helped rejuvenate my passion for the field of neurosurgery.





I am grateful for the time and expertise of each lecturer as we learned about many of the cutting-edge projects occurring in our field. An intense passion for neuroscience was consistently reflected by both the speakers and audience, as evidenced by many of the thought-provoking conversations both during and after each lecture. Given the diverse range of topics and speaker backgrounds, carefully selected by Dr. Allan Friedman, there was something to interest everyone. As a resident who is personally involved in both basic science and clinical research, I was truly inspired.

For any resident that is pursuing a career in academic neurosurgery, or who just wants a chance to re-ignite their love for neuroscience, the RUNN course is an amazing reminder that there is much more to neurosurgery than technical excellence. Whether, your aim is to dedicate your life to being a highly-qualified and knowledgeable clinician, to deepen our understanding of the nervous system and neurological disease as an investigator, or a combination of both as a physician-scientist, we are called as neurosurgeons to continue to advance our field in order to improve the care of patients. Ultimately, the entire experience of the RUNN course helped to re-ignite my passion for the field of neurosurgery that will undoubtedly follow me throughout my entire career.



Additionally, this bond was strengthened over discussion about work back at our home institutions and learning that junior residency is the same everywhere and we all have similar struggles.



Anyone who is considering a career in academic neurosurgery should attend the RUNN Course because these speakers are a reminder of what is possible and that there is so much more to neurosurgery than just operating. They have turned what most consider a job, into a vocation. After leaving, I felt honored to be considered among this class of physicians, pioneers, scientists, and mentors.

## We acknowledge generous grants from:

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

Education Grants 2018 RUNN Course	
Integra Foundation.....	\$5,000.00
Stryker Corporation .....	\$5,000.00
Zimmer/Biomet Microfixation .....	\$3,000.00
Arbor Pharmaceutical, L.L.C. ....	\$2,500.00
Brainlab, Inc. ....	\$2,500.00
Medical Device Medical Services, Inc..... (formerly DePuy Orthopaedic)	\$2,500.00
Marathon Medical, Inc. ....	\$1,500.00
Leica Microsystems, Inc.....	\$1,500.00
Kirwan Surgical.....	\$1,000.00
Monteris Medical.....	\$1,500.00
TOTAL	<u>\$26,000.00</u>

## Toward RUNN 2019 and Beyond!

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We have finalized the space contract with the MBL for 2019. RUNN 2019 will take place from October 26, to November 2, 2019. The SNS and the Course Director, 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 2018 Attendees:

Abushehab Adeeb, Nimer . . . . .	LSUHSC – Shreveport
Adams, Crystal . . . . .	George Washington University
Ahye, Nicholas . . . . .	Temple University
Akinduro, Oluwaseun . . . . .	Mayo Clinic Florida
Algattas, Hanna . . . . .	University of Pittsburgh
Al-Gethami, Hanan . . . . .	McMaster University
Anderson, Matthew . . . . .	Brown University
Andrews, Edward . . . . .	University of Pittsburgh
Archer, Jacob . . . . .	Indiana University
Austerman, Ryan . . . . .	Houston Methodist Hospital
Awad, Al-Wala . . . . .	University of Utah
Barkley, Ariana . . . . .	University of Washington
Berry, John . . . . .	Tulane/Ochsner Clinic Foundation
Bonney, Phillip . . . . .	USC
Budde, Bradley . . . . .	University of Texas Medical School at Houston
Caffes, Nicholas . . . . .	University of Maryland
Castro, Brandyn . . . . .	University of Chicago
Chen, Stephanie . . . . .	University of Miami
Choi, Phillip . . . . .	University of Texas Medical School at Houston
Corriveau, Mark . . . . .	University of Wisconsin
Cramer, Samuel . . . . .	University of Minnesota
Cruz, Aurora . . . . .	University of Louisville
Daggubati, Lekhaj . . . . .	Penn State
Daou, Badih Junior . . . . .	University of Michigan
DiCesare, Jasmine . . . . .	UCLA
Domino, Joseph . . . . .	University of Kansas
Dowlati, Ehsan . . . . .	Georgetown University Hospital
Driver, Joseph . . . . .	Brigham and Women’s – Harvard University
Duan, Yifei . . . . .	University Hospitals Cleveland Medical Center
Duda, Taylor . . . . .	McMaster University

## RUNN Course 2018 Attendees: continues

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Falcone, Joseph . . . . .	University of California Irvine
Fessler, David . . . . .	Rush University
Fong, Reginald . . . . .	Geisinger Health System
Goodarzi, Amir . . . . .	University of California, Davis
Green, Ross . . . . .	University of New Mexico
Hartley, Benjamin . . . . .	Weill Cornell/New York Presbyterian
Harward, II, Stephen . . . . .	Duke University
Herbert, Joseph . . . . .	University of Missouri
Higgins, Dominique . . . . .	Columbia University/New York Presbyterian
Hines, Thomas . . . . .	University of Kentucky
Hitti, Frederick . . . . .	University of Pennsylvania
Hoang, Nguyen . . . . .	Ohio State University
Hong, Christopher . . . . .	Yale University
Jackson, Christina . . . . .	Johns Hopkins
Jackson Christopher . . . . .	Johns Hopkins
Jiang, Bowen . . . . .	Johns Hopkins
Kanter, John . . . . .	Dartmouth Hitchcock University
Khattar, Nicolas . . . . .	University of Louisville
Kim, Miri . . . . .	Loyola University Medical Center
Kim, Michael . . . . .	New York Medical College, Westchester Medical Center
Klein, Brendan . . . . .	Carillion Clinic- Virginia Tech
Koivunien, Andrew . . . . .	Indiana University
Kundishora, Adam . . . . .	Yale University
Kundu, Bornali . . . . .	University of Utah
Laiwalla, Azim . . . . .	UCLA
Lannon, Melissa . . . . .	McMaster University
Larrew, Thomas . . . . .	Medical University of South Carolina
Larson, Erik . . . . .	Oregon Health Sciences
Laurent, Dimitri . . . . .	University of Florida, Gainesville
Lee, Jonathan . . . . .	Houston Methodist Hospital
Limoges, Natalie . . . . .	University of Vermont
Maggio, Dominic . . . . .	National Institutes of Health
Majmundar, Neil . . . . .	Rutgers – New Jersey Medical School
Mann, David . . . . .	University of Colorado School of Medicine
Mau, Christine . . . . .	Penn State
Mayol, Miguel . . . . .	University of Puerto Rico
Mazur-Hart, David . . . . .	Oregon Health Sciences
McBride, Paul . . . . .	University of S. Florida
McDermott, Ryan . . . . .	University of Texas, San Antonio
McPheeters, Matthew . . . . .	State University of New York at Buffalo
Medress, Zachary . . . . .	Stanford University
Mehta, Vikram . . . . .	Duke University
Mendenhall, Stephen . . . . .	Indiana University
Monterey, Michael . . . . .	University of Texas Medical School at Houston

## RUNN Course 2018 Attendees: continues

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Motley, Benjamin . . . . .	University of Kentucky
Muse, John . . . . .	University of Vermont
Nail, Jayde . . . . .	Tufts Medical Center
Nechtman, Carl . . . . .	Wake Forest School of Medicine
Nowicki, Kamil . . . . .	University of Pittsburgh
Oliver, Jeffrey . . . . .	University of Maryland
Parker, Jonathan . . . . .	Stanford University
Patel, Kunal . . . . .	UCLA
Porto, Guilherme . . . . .	Medical University of South Carolina
Pruitt, Rachel . . . . .	North Shore University Hospital
Rehman, Azeem . . . . .	West Virginia University, Department of Neurosurgery
Reynolds, Rebecca . . . . .	Vanderbilt University
Rotman, Lauren . . . . .	University of Alabama
Rozman, Peter . . . . .	New York Medical University
Sankey, Eric . . . . .	Duke University
Satzer, David . . . . .	University of Chicago
Schmidt, Bradley . . . . .	University of Wisconsin
Segar, David . . . . .	Brigham and Women's – Harvard University
Shah, Kevin . . . . .	North Shore University Hospital
Shank, Christopher . . . . .	University of Alabama
Sokolowski, Jennifer . . . . .	University of Virginia
Spinazzi, Eleonora . . . . .	Columbia University/New York Presbyterian
Starling, Robert . . . . .	University of New Mexico
Sullivan, Patricia . . . . .	University of Pennsylvania
Sursal, Tolga . . . . .	New York Medical College, Westchester Medical Ctr.
Sy, Christopher . . . . .	University of Texas, San Antonio
Townsend, Robert Kyle . . . . .	Wake Forest School of Medicine
Tuchek, Chad . . . . .	University of Kansas
Tullos, Hurtis . . . . .	Oklahoma University
Vollhaber, Daniel . . . . .	University of Illinois College of Medicine Peoria
Walch Frank . . . . .	University of Colorado School of Medicine
Wang, Justin . . . . .	University of Toronto
Warsi, Nebras . . . . .	University of Toronto
Watson, Victoria . . . . .	Southern Illinois University
Westbroek, Erick . . . . .	Johns Hopkins
Wilkerson, Christopher . . . . .	University of Utah
Yaghi, Nasser . . . . .	Oregon Health Sciences
Yee, Timothy . . . . .	University of Michigan
Young, Chris . . . . .	University of Washington
Zehri, Aquib . . . . .	Wake Forest School of Medicine
Zhang, Xiaoran . . . . .	University of Pittsburgh
Zhou, Tianzan . . . . .	Georgetown University
Zyk, Stephanie . . . . .	SUNY Upstate Medical University

## Faculty and Topics

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### COURSE DIRECTOR:

**Allan H. Friedman, M.D.**

Duke University  
*“Welcome, Introduction, and Course Objectives”*

### 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”*

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

Harvard University Medical Center  
*Lecture Title: “Translational Therapeutics for Brain Tumors: From the Lab to the Clinic & Back”*

**Robert Dempsey, M.D.**

University of Wisconsin  
*Lecture Title: “Inspiration and Neurosurgical Research – How to Start a Project, Grant or Paper” and “Rethinking Neurosurgery’s Role in Cerebrovascular Disease”*

### FACULTY:

**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 Arts and Sciences of Integrity”*

**John Boockvar, M.D.**

Hofstra/Northwell  
*Lecture Title: “Intra-arterial Chemotherapy After Blood Brain Barrier Disruption to Target the Glioma Stem Cell Niche”*

**Edward Boyden, Ph.D.**

Massachusetts Institute of Technology  
*Lecture Title: “Tools for Understanding and Repairing the Brain”*

**Mark P. Burns, Ph.D.**

Georgetown University  
*Lecture Title: “Acute CNS Injury and Chronic Neurodegenerative Disease: Common Pathways and Therapeutic Targets”*

**V. Reggie Edgerton, Ph.D.**

University of California, Los Angeles  
*Lecture Title: “Activity Dependent Mechanisms that Enhance Sensorimotor Function Following Spinal Cord Injury”*

**James Galbraith, Ph.D.**

Oregon Health Sciences University  
*Director, Laboratory Experience: “Squid Lab”*

## Faculty and Topics continues

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**Zohar 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"*

**Tudor G. Jovin, M.D.**

University of Pittsburgh Medical Center

*Lecture: "Endovascular Therapy for Acute Stroke. Current Status and Future Directions"*

**Jeff W. Lichtman, M.D., Ph.D.**

Harvard University

*Lecture Title: "Connectomics"*

**Nir Lipsman, MD, PhD, FRCSC**

University of Toronto

*Lecture Title: "Brain Circuitry and Human Behavior: What Can Go Wrong and What Can We Do About It?"*

**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: "Glioblastoma Multiforme: Advances Beyond the Leading Edge"*

**Mustafa Sahin, M.D., Ph.D.**

Harvard Medical School

*Lecture Title: "Translational Studies in Tuberous Sclerosis Complex"*

**Jeremy Schmammann, M.D.**

Harvard Medical School

*Lecture Title: "Systems Neuroscience of Cerebral White Matter Tracts and Cerebellar Cognition"*

**Walter Schneider, Ph.D.**

University of Pittsburgh

*Lecture Title: "Clinically Actionable Fiber Tracking in Neurosurgery & Traumatic Brain Injury: MRI Tract Visualizations with Quality Exceeding Microdissection"*

**Andrew B. Schwartz, Ph.D.**

University of Pittsburgh

*Lecture Title: "Advances in High Performance Brain-Controlled Prosthetics"*

**Marc Simard, M.D., Ph.D.**

University of Maryland

*Lecture Title: "The SUR1-TRPM4 Channel – a Critical Player in CNS Ischemia and Trauma"*

**Beth Stevens, Ph.D.**

Harvard University Medical School

*Lecture Title: "Wiring and Unwiring the Brain: Role of Glia and Immune Molecules"*