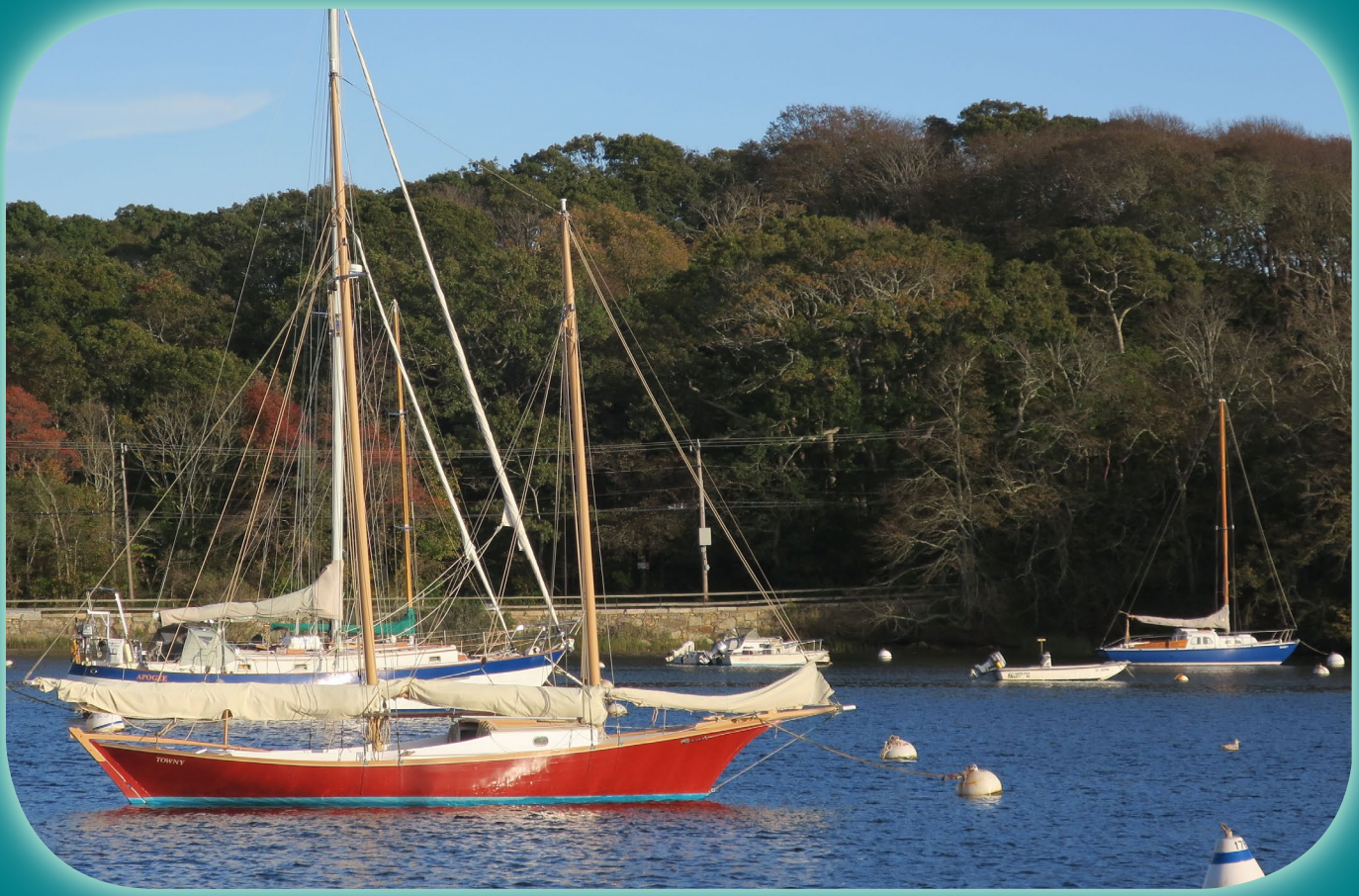
ANNUAL REPORT

Stimulating Science in a Unique Setting



RESEARCH UPDATE IN NEUROSCIENCE FOR NEUROSURGEONS (RUNN)

OCTOBER 28, 2017 - NOVEMBER 4, 2017

SPONSORED BY

The Society of Neurological Surgeons

COURSE DIRECTORS

Allan H. Friedman, M.D.
Robert M. Friedlander, M.D.

CO-DIRECTORS

Bruce Andersen
Issam A. Awad
Henry Brem
E. Antonio Chiocca
Robert J. Dempsey

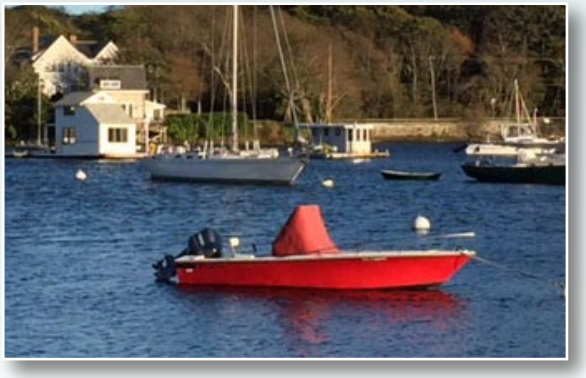
COURSE COORDINATOR

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

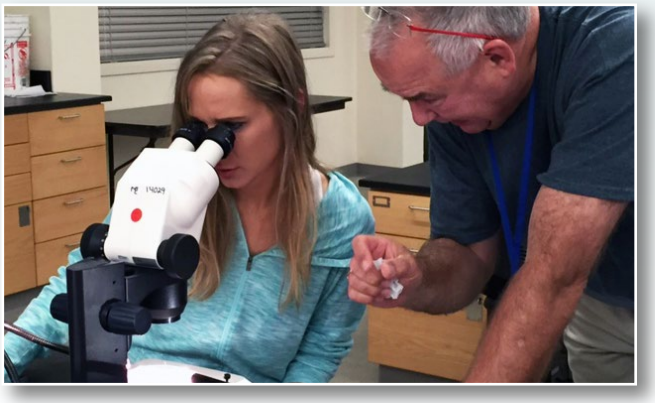


The RUNN course was the brainchild of Henry Schmidek, formerly of Harvard University and the University of Vermont. The course was conceived in response to the anticipated expansion of neurosciences, which would be applicable to the practice of Neurosurgery. The course was initiated to combat illiteracy 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 be 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.

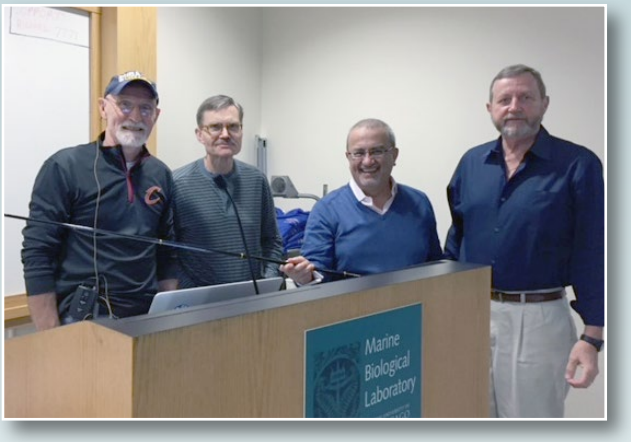
Because of untimely illness in 1998, Dr. Gross asked to step down from the Directorship of the RUNN Course which he had grown to love so much. The opportunity of change of leadership allowed a re-examination and re-commitment to the Mission and core values of the RUNN Course. The AANS and CNS asked the 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.

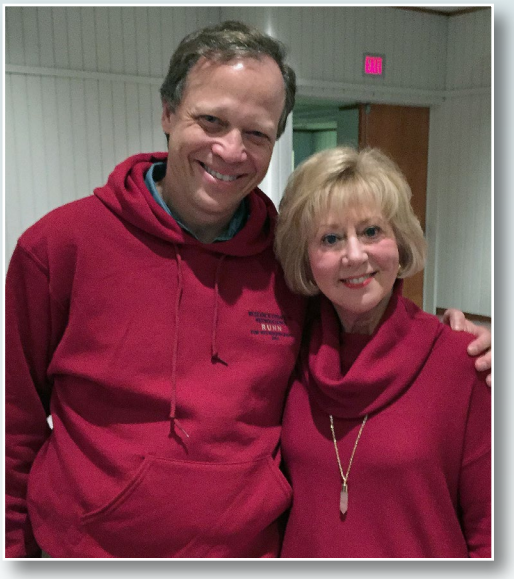
RUNN Course Leadership

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. The 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 run 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 2017 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 had limited sessions due to inclement weather. 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 2017 Course:

1. **Nduka Amankulor, MD,** Assistant Professor, Neurological Surgery, Associate Director, Neurosurgical Oncology, University of Pittsburgh, Department of Neurological Surgery. **Lecture Title: "From Bench to Bedside: Targeting IDH Mutations in Human Cancer"**

2. **Rajiv Midha, MSc, MD, FRCSC, FAANS, FCAHS,** Professor and Head, Department of Clinical Neurosciences, Calgary Zone, Alberta Health Services Scientist, Hotchkiss Brain Institute, Cumming School of Medicine, University of Calgary. **Lecture Title: "Peripheral Nerve Regeneration and Repair: Possibilities and Challenges"**

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) 2017.

Splendid Cast of Faculty

The faculty are world-class scientists who are able to present their work in a stimulating fashion. There were 30 faculty and 7 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 group of 103 neurosurgery residents representing programs throughout the United States and Canada 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

by Andrew Cutler , M.D.
Neurosurgical Resident,
Duke University Hospital

I attended the RUNN course as a PGY3 from Duke University in the Fall of 2017. While I had heard much from my co-residents, and even my father, who had attended the first RUNN course, the course far surpassed what I was expecting. Driving into beautiful Woods Hole from Boston, you begin to get the sense that this is a special place and will be no ordinary neurosurgery course.

The lectures and lecturers mirrored that special quality and we had to opportunity to learn about some of the most cutting-edge research that will impact the field of Neurosurgery in the coming years. The excitement from the speakers was infectious and would spark numerous conversations in the breaks about how their work will impact clinical practice. For example, I still watch Professor Lichtman's videos from his lab that show his reconstruction of a single micron cube of a mouse cortex and the almost unimaginable complexity that it contains. His lecture, and many others, rekindled an interest in the unknown and wanting to be a part of the discovery process shaping our world. In one week, we learned about topics ranging from the single protein level up through macro-policy effecting neurosurgery world-wide. Seeing the breath of research that can intersect with a neurosurgeon's role was inspiring and will help all of those in attendance to find their unique niche within the field. The variability of the speakers' balance between clinical practice and research, and the type of research, showed how there is no ideal set up, but that each of us can find our own unique balance.

The mechanics of the course also encourage interactions amongst the residents and faculty presenters. Listening to each other's thoughts on the topics discussed broadened my own understanding and helped to stimulate more interest in certain topics. It was also refreshing getting to talk to residents from across the nation about what they were experiencing in residency. Aside from the intern bootcamps, there is likely no other event that bring together such a diverse group of residents in this way.

While there, we also had the opportunity to experience Woods Hole and the surrounding area. That in of itself was refreshing as a short walk brought you to a beautiful cove or to the other end of the area with a breathtaking view of the ocean. The location helped to get us all in a different mindset away from pagers, HER, and call, which meant we all could truly "just" be there to listen and learn for a week.

Without a doubt, this was a transformative experience and one that I hope continues for many years to come. I walked away with new understanding, thought, and friendships which will serve me well throughout my career in neurosurgery.

COURSE REPORT

by Alexa Bramall, M.D., Ph.D.
Neurosurgical Resident, Duke University Hospital

"Medicine is not only a science; it is also an art. It does not consist of compounding pills and plasters; it deals with the very processes of life, which must be understood before they may be guided" – Paracelsus

Since the 1990's, evidence-based medicine (EBM) has been used to describe the relatively new paradigm for decision making in health care that emphasizes scientific evidence over subjective clinical reasoning. In a world of EBM, physician judgement based on sound scientific evidence is paramount in decision making in hospital wards and clinics; traditional beliefs and practices may stand the test of scientific rigor or become the dogmas of yesterday. Some of the most important medical discoveries of the 20th Century, such as the discovery of penicillin, were born in research laboratories. As quoted by Paracelsus (1493-1541), a Swiss German physician and chemist, the very processes of life must be understood before they may be guided. In the quest to elucidate the mechanisms underlying the biology of human existence, it is necessary for physicians to turn to science as well as our innermost sensitivities to provide the answers.

As neurosurgery residents immersed in the often hectic, unremitting assembly line of admissions, diagnoses and discharges, the RUNN course serves an oasis of intellectual discovery, uninterrupted by beeping pagers and dinging iPhones. It provides the listener an opportunity to be regaled with the incredible scientific journeys illustrated by course presenters, oftentimes representing a lifetime of dedicated scientific research. From discussions of artificial neural networks by Dr. Bernstein, Dr. Lozano's novel applications of deep brain stimulation to "re-program" the brain, or Dr. Boyden's discovery of expansion microscopy using responsive polymers, residents can tap into a new world of creative possibilities. Taking a step back from the minutia of everyday medicine, one is allowed to ask, "why do we do this?", and, more importantly, "how can we improve?" To quote Teller, how can the "science of today" be used to create the "technologies of tomorrow?" At the RUNN course, residents may be inspired by the natural beauty of Woods Hole; the diaphanous waters of Buzzards Bay, glistening with the orange reflection of the morning sun, and the lighthouse standing as a beacon of the town's rich history. Indeed, the Marine Biological Laboratory, home to more

than 50 Nobel Laureates, has a world-renowned reputation as one of the foremost collaborative institutes for biological discovery. Relishing a well-made cappuccino at the local coffee shop in the crisp morning air (and one of the few places I know open before 6:30am), one is struck with awe again and a sense of invincibility, tempered by a reminder of the privilege bestowed upon us as neurosurgery residents as we take care of some of the most unfortunate, emotionally impoverished patients in medicine.

It is an immense honor to participate in the RUNN course and to be surrounded by some of the most engaging, prolific neuroscientists of the day. It is a time for residents, at the early stage of what will likely be long and fulfilling careers, to take a step back and think about how we can further contribute as physicians and possibly also scientists in a context that inspires deeper reflection. Although we may never claim to fully understand the processes of life, we can make a concerted effort to unravel more of its mystery for the benefit of the community and the patients we serve.

COURSE REPORT

by Jacquelyn Corley, M.D.
Neurosurgical Resident, Duke University Hospital

I had the privilege of attending the RUNN course this year in the scenic Woods Hole on the Cape. This experience is nothing short of a rejuvenating respite that gave us space to relax and get away from buzzing pagers and sterile patient wards and fall in love again with the profession we have dedicated our lives to.

At each presentation we were inspired by these surgeon scientists who push the boundaries of our knowledge about the nervous system and the pathologies that plague it. Among a variety of different topics, we learned about new applications of immunotherapy to attack glioblastoma multiforme, inventions for targeted chemotherapy in the brain, how bringing neurosurgical care can change the landscape of public health in low income countries, or how using electrical stimulation can give those who were previously paralyzed the ability to use their hands once again. While various topics resonated differently with each of us depending on our background or interests, each presentation had something to offer us about pursuit of excellence, dedication to work, and passion for research.

This inspiration was collective, and sharing this with other residents was a unique bond that few enjoy. 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.

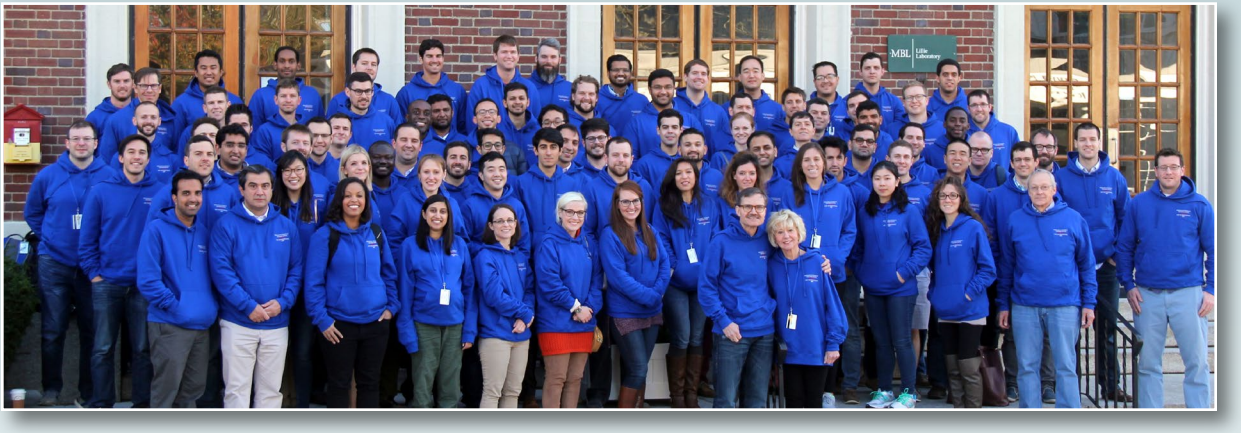
We acknowledge generous grants from:

These grants subsidized audio-visual, lab, faculty travel and honoraria expenses.

Education Grants 2017 RUNN Course	
Integra Foundation	$5,000.00
Zimmer/Biomet Microfixation	$3,000.00
Arbor Pharmaceutical, L.L.C.	$2,500.00
Brainlab, Inc.	$2,500.00
DePuy Synthes Codman Neuro	$2.500.00
Medical Device Medical Services, Inc. *(formerly DePuy Orthopaedic)*	$2.500.00
Marathon Medical, Inc.	$2,500.00
Leica Microsystems, Inc	$2,500.00
Kirwan Surgical	$1,000.00
Carl Zeiss Meditec, Inc.	$2,500.00
Mizuho America	$1,000.00
Monteris Medical	$1,000.00
Osteomed	$2,500.00
Medtronic Corporation	$2,500.00
TOTAL	$33,500.00

Toward RUNN 2018 and Beyond!

We have finalized space contract with the MBL for 2018. RUNN 2018 will take place from October 27 to November 3, 2018. 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 2017 Attendees:

Alan, Nima	University of Pittsburgh
Alshardan, Mohammad	University of Ottawa
Alshareef, Mohammed	Medical University of South Carolina
Alvarado, Anthony	University of Kansas
Attiah, Mark	University of California, Los Angeles
Bakhsheshian, Joshua	University of Southern California
Banu, Matei	Columbia University, New York Presbyterian
Bauer, Clayton	University of South Florida
Baum, Justin	Ohio State University
Belton, Patrick	University of Missouri
Benko, Michael	Carilion Clinic – Virginia Tech
Bhimireddy, Sujit	University of Illinois College of Medicine Peoria
Bina, Robert	University of Arizona
Bonda, David	Hofstra Northwell School of Medicine
Bramall, Alexa	Duke University
Brimley, Cameron	Geisinger Health System
Brown, Erik C.	Oregon Health & Science University
Bruzek, Amy	University of Michigan
Buch, Vivek	University of Pennsylvania
Cannarsa, Gregory	University of Maryland
Carminucci, Arthur	Rutgers – New Jersey Medical School
Carpenter, Candice	Ohio State University
Carrasquilla, Alejandro,	Icahn School of Medicine Mt. Sinai
Cheok, Stephanie	Yale University
Cheyuo, Cletus	West Virginia University
Choi, Jason,	University of Chicago
Chrysskios, Timothy	University of Maryland

RUNN Course 2017 Attendees: continues

Conner, Christopher	University of Texas at Houston
Corley, Jacquelyn	Duke University
Cutler, Andrew	Duke University
Dawkins, Demi	University of Wisconsin
Delavari, Nader	NYU Langone Medical Center
Dowd, Richard	Tufts University
Eli, Ilyas	University of Utah
Erwood, Matthew	University of Alabama
Fayed, Islam	Georgetown University
Freeman, David	University of Minnesota
Ganguly, Ranjit	Ohio State University
Gassie, Kelly	Mayo Clinic Jacksonville
Gummadavelli, Abhijee	Yale University
Hall, Jason	University of Kentucky
Hogan, Elizabeth	George Washington University
Hosein, Jeremy	University of Colorado
Huang, Kevin	Brigham and Women's Hospital
Huff, Wei	University of Indiana
Iqbal, Omar	Rutgers - New Jersey Medical School
Jenson, Amanda	Houston Methodist Hospital
Jones, Breck	Southern Illinois University
Jowdy, Patrick	State University of New York at Buffalo
Jusué Torres, Ignacio	Loyola University Medical Center
Karas, Patrick	Baylor College of Medicine
Khalsa, Siri	University of Michigan
Khan, Imad	Dartmouth Hitchcock Medical Center
Kilianski, III, Joseph	Medical College of Georgia at Augusta University
Kim, Teddy	Wake Forest School of Medicine
Ksendzovsky, Alexander	National Institutes of Health
Lai, Pui Man Rosalind	Brigham and Women's Hospital
Lane, Jessica	Penn State University
Lasseigne, Lindsay	Louisiana University New Orleans
Lewis, Cole	University of Texas Medical School at Houston
Lin, Yimo	Oregon Health & Science University
Lundy, Paige	University of Kansas
Madsen, Peter	University of Pennsylvania
Malik, Athar	Massachusetts General Hospital, Harvard University
Mohammad, Laila	University of New Mexico
Nwachuku, L. Enyinna	University of Pittsburgh
Olszewski, Adam	University of Vermont

RUNN Course 2017 Attendees: continues

Ozpinar, Alp	University of Pittsburgh
Palma, Atilio	Wake Forest School of Medicine
Parker, Whitney	Weill Cornell Medical College
Parmar, Vikas	University of Wisconsin
Passer, Joel	Temple University
Patel, Nitesh	Rutgers – New Jersey Medical School
Pease, Matthew	University of Pittsburgh
Phillips, H. Wesley (Wes)	University of California, Los Angeles
Pierre, Clifford	University of Rochester
Rabski, Jessica	University of Ottawa, Canada
Rapoport, Benjamin	Weill Cornell/New York Presbyterian
Riffle, Jonathan	Tulane/Ochsner Clinic Foundation
Sadrameli, Saeed	Houston Methodist Hospital
Samples, Derek Clay	University of Texas Health Science Center, San Ant
Sand (Albert), Lauren	University of Minnesota
Santos, Jaime Martinez	Medical University of South Carolina
Savaliya, Sandeep	Penn State University
Schwarz, Justin	Weill Cornell Medical College/NYP
Shah, Ashish	University of Miami/Jackson Memorial
Shin, David	University of Florida, Gainesville
Smitherman, Adam	Oklahoma University
Snyder, Brian	University of Kentucky
Sun, Xiaonan	Hofstra Northwell School of Medicine
Sun, Matthew	University of California, Los Angeles
Syed, Sohail	Brown University
Thoms, Dewey	University of Texas Health Science Ctr, San Antonio
Towner, James	University of Rochester Medical Center
Turner, Ryan	West Virginia University
Villelli, Nicolas	University of Indiana
Voce, David	Vanderbilt University
Wainwright, John	Westchester Med. Ctr, New York Medical College
West, James	Wake Forest School of Medicine
Whelan, Ros	University of Colorado School of Medicine
Wojtasiewcz, Teresa	Johns Hopkins
Zakaria, Jehad	Loyola University
Zimering, Jeffrey	Icahn School of Medicine Mount Sinai

Faculty and Topics

Nduka Amankulor, M.D.
University of Pittsburgh
Lecture Title: "From Bench to Bedside: Targeting IDH Mutations in Human Cancer"

Bruce Andersen, M.D., Ph.D.
Saint Alphonsus Neuroscience Institute
"Squid Lab"

Issam A. Awad, M.D., MSc, FACS
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"

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.
Lecture Title: "Will Machines Wake Up?"

John Bookvar, M.D.
Cornell University
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"

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

Mark P. Burns, Ph.D.
Georgetown University
Lecture Title: "Acute CNS Injury and Chronic Neurodegenerative Disease: Common Pathways and Therapeutic Targets"

E. Antonio Chiocca, M.D., Ph.D.
Harvard University
Lecture Title: "Translational Therapeutics for Brain Tumors: From the Lab to the Clinic and Back"

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

V. Reggie Edgerton, Ph.D.
UCLA Medical Center
Lecture Title: "Activity Dependent Mechanisms that Enhance Sensorimotor Function Following Spinal Cord Injury"

Robert M. Friedlander, M.D.
University of Pittsburgh
Lecture Title: "Mechanisms of Cell Death in Neurologic Diseases"

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

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?"

Faculty and Topics continues

Murat Günel, M.D.
Yale University
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, M.D., FACS, FAHA
Penn State University
Lecture Title: "Issues in Neurosurgical Clinical Research"

James D. Kang, M.D.
Harvard Medical School
Lecture Title: "Novel Advances in Biological Therapies for Disc Degeneration: A Surgeon-Scientist Perspective"

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

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

L. Dade Lunsford, M.D., F.A.C.S.
The University of Pittsburgh
Lecture: "The Expanding Role of Radiosurgery as a Part of Neurosurgery."

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

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

James T. Rutka, MD, PhD, FRCSC, FACS, FAAP
University of Toronto
Lecture Title: "Glioblastoma Multiforme: Advances Beyond the Leading Edge"

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"

Peter L. Strick, Ph.D.
University of Pittsburgh
Lecture Title: "Basal Ganglia and Cerebellar 'Loops' with the Cerebral Cortex: Circuits for Movement, Cognition and Affect"