



Stimulating Science in a Unique Setting



RESEARCH UPDATE IN NEUROSCIENCE FOR NEUROSURGEONS (RUNN)

OCTOBER 26 - NOVEMBER 2, 2013

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**

COURSE COORDINATOR

Karen Koenig

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

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 2013 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 2012 Course:

1. **Beverly L. Davidson, Ph.D.**, from the University of Iowa, Lecture Title: “Developing Inhibitory RNAs as a Therapeutic for Huntington’s Disease”
2. **Jaenisch, M.D.**, from MIT, Lecture Title, Keynote Speaker: “iPS Cell Technology and Disease Research: Issues to be Resolved”
3. **Michael Taylor. M.D., Ph.D., FRCS(C)**, Lecture Title: “*Clinical Implications of Paediatric Brain Tumor Molecular Genetics*”
4. **Mehmet Fatih Yanik, Ph.D.**, from MIT, Lecture Title: “Technologies for Regenerative CNS Therapeutics”

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) 2013.



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

There were 88 attendees (see list) representing programs throughout the United States, Canada and Puerto Rico. 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 Mary I. Huang Neurosurgical Resident, Duke University Hospital

For over 20 years, neurosurgery residents from around the country take a week off from their rigid clinical schedules in the fall to meet in one of the most beautiful places in the world - Woods Hole, MA. The leaves are changing colors, the air is crisp, sailboats are docked on the harbor, and Halloween is right around the corner.

In a setting where you feel the ghosts of so many great Nobel laureates that have come before, residents and faculty alike reaped the year's harvest from the brightest minds and innovators in the neuroscience. Lectures covered the span of neurosurgery from tumors to cerebrovascular, pediatrics, spine, and functional. This year, we were fascinated by the phantasmagoric diversity of cells in just one inch of the brain. We learned about drugs in the pipeline that can extend the human lifespan, and saw how human-machine interface development allowed a paralyzed woman to eat by thinking about it.



We saw how the expansion of deep brain stimulator targets can improve learning and memory, and wished technologies like these were immediately available to take it all in. Lecturers told us their story of how they started from our positions as residents onto paths that led to triple threat careers of surgeon, scientist, and clinician. We saw how patent holders and Nobel laureates had similar recipes alike. They started with a simple

observation, tested their hypothesis, and allowed their innate curiosity and persistence drive them to break frontiers in understanding the human mind.

With the importance of collaboration and teamwork drilled into us by all the lectures, fellow residents were able to justify skipping a lecture or two to take a boat to Martha's Vineyard, or sleep in after a late night dancing on Halloween, or watching the World Series at Captain Kidd's bar. Friendships were made over daily runs past the lighthouse on the hill, bike rides along the coast, and the concentration of stimulating conversation, commiserations, and laughs about our lives as residents, and our lives outside of residency. We shared with each other a slice of our lives, our aspirations, and our dreams. Closed with the traditional lobster bake at the end of the week, our minds were opened just a peak more. Our friendships were strengthened, and our resolve to go back to the grind of residency and contribute to our field of neurosurgery was made just that much lighter.

Course Report by Timothy Miller Neurosurgical Resident, Duke University Hospital

Each October, neurosurgery residents from programs across the country meet in Woods Hole, Massachusetts, and a quaint town on the Southern side of Cape Cod with a total population of fewer than 800, just a ferryboat ride from Martha's Vineyard. This historical fishing, whaling, and shipping center has become home to a small but productive scientific research community centered around the Marine Biological Laboratory.

This year, the weather was beautiful and we were lucky to attract some of neuroscience's greatest minds to give lectures during the one week mini vacation from the rigors of the life of residency. Research topics spanned the full breadth of neuroscience, from basic cell science and molecular signaling pathways, to clinical outcomes and data analysis, to cutting edge technologies and the future of the field of neurosurgery.

We learned about the genetics, cell communication, and scaffolding of cavernous malformations from one of the cerebrovascular surgery greats. We were inspired by the achievements of several program's chairmen, and their impressive research portfolios. We were encouraged to pursue research no matter our intended field, with success. Colleague collaboration was fostered through various activities, from running or riding bikes on the beautiful paths through Woods Hole and neighboring Falmouth, to grabbing a drink at the local watering hole, a bar called Captain Kidd.

The camaraderie that is built through this one week in Woods Hole cannot be matched in other settings where residents typically meet, such as national meetings. I arrived in Woods Hole not knowing many of the other residents, and left with many new friends and colleagues, and tighter bonds with my established acquaintances. I would encourage any neurosurgery resident, no matter the year of training, to attend the awe-inspiring RUNN course at least once in his/her career, whether as a resident, attending, or private practice neurosurgeon.

We acknowledge generous grants from:

These grants subsidized faculty travel and honoraria costs.

Education Grants 2013 RUNN Course	
Integra Foundation.....	\$5,000.00
Osteomed, L.L.C.....	\$5,000.00
Stryker Corporation (Spine & CMF).....	\$5,000.00
Aesculap, Inc.....	\$2,500.00
Biomet Microfixation / W. Lorenz	\$3,000.00
Brainlab, Inc.....	\$2,500.00
Codman Neuro, Division of DePuy Orthopedics, Inc.	\$2,500.00
Globus Medical, Inc.....	\$2,500.00
IMIRS, Inc.....	\$2,500.00
Leica Microsystems, Inc.....	\$2,500.00
DePuy Synthes Power Tools/Anspach	\$2,500.00
DePuy Synthes, CMF.....	\$2,500.00
Mizuho America, Inc.	\$1,000.00
TOTAL	\$39,000.00

Toward RUNN 2014 and Beyond!

We have finalized space contract with the MBL for the years 2014 through 2015. RUNN 2014 will take place from October 25, 2014 – November 1, 2014. 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 2013 Attendees:

Anene-Maidoh, Tony	Virginia Commonwealth University
Atsina, Jr., Komli-Kofi	Yale University
Baidya, Nishanta	Ohio State University
Barber, Sean	University of Texas Methodist Hospital Houston
Biswas, Arundhati	Albert Einstein Montefiore University
Brandmeir, Nicholas (Nick)	Penn State University
Bridges, Kelly	Oregon Health & Science University
Caralopoulos, Ilias	Tulane University
Carr, Steven	University of Colorado
Chavakula, Vamsidhar	Brigham and Women's
Chen, Kevin	University of Michigan
Cheng, Jennifer	Johns Hopkins University
Cheng, Ron	Medical University of South Carolina
Cisse, Babacar	Cornell Universtiy New York Hopsital
D'Amico, Randy	Columbia University, New York Presbyterian
Damisah, Eyiymisi	Yale University
Danison, Aaron	Carilion Clinic
Dasenbrock, Hormuzdiyar	Brigham and Women's Hospital
Dengler, Bradley	University of Texas, San Antonio
DeRosa, Peter	George Washington University
Desai, Sohum	University of Texas Galveston
Ditty, Benjamin	University of Alabama
Dornbos, David	Ohio State University
Ducis, Katrina	University of Vermont
Evans, Linton	Dartmouth
Fanou, Andrew	SUNY, University of Buffalo
Feinberg, Michelle	George Washington University
Fernholz, Brian	Rutgers
Ferrone, David	SUNY Upstate University, Syracuse
Galgano, Michael	SUNY Upstate University, Syracuse
Gandhi, Gautam	University of Arkansas
Gibani, Siraj	Temple University
Gillick, John	New York Medical College
Gogela, Steve	University of Cincinnati
Goyal, Amit	University of Minnesota
Gozal, Yair	University of Cincinnati
Gupte, Akshay	University of Minnesota
Hanak, Brian	University of Washington
Hanif, Rimal	LSUHSC – Shreveport
Hardaway, Frances (Fran)	Oregon Health Sciences University
Hedayat, Hirad	Wake Forest Medical School
Hersh, David	University of Maryland
Huang, Mary	Duke University
Hwang, Roy	West Virginia University

RUNN Course 2013 Attendees: continues

Jayarao, Mayur	University of Missouri-Columbia
Kahn, Elyne	University of Michigan
Khan, Sajeel	University of Illinois Chicago
Koch, Paul	University of Pennsylvania
Le, Elizabeth	University of Maryland
Lee, Philip	University of Pittsburgh
Liebelt, Brandon	University of Texas Methodist Hospital Houston
Lo, Sheng-Fu Larry	Johns Hopkins University
Marquez, Juan Carlos	University of Puerto Rico
Martin, Allan	University of Toronto
Menger, Richard	LSUHSC – Shreveport
Miller, Timothy	Duke University
Montoya, Simone	University of Rochester
Moore, Nina Zobenica	Cleveland Clinic
Mosley, Yusef	University of South Florida
Moussazadeh, Nelson	Cornell University New York Hospital
Mubita, Lynn	Henry Ford Hospital
Panczykowski, David	University of Pittsburgh
Patel, Ashish	Cedars-Sinai
Patel, Daxa	University of Alabama at Birmingham
Ralston, Ashley	University of Chicago
Rodriguez, Analiz	Wake Forest Medical School
Sandoval-Garcia, Carolina	University of Wisconsin
Sandwell, Stephen	University of Rochester
Scharnweber, Rudi	UCLA
Scherer, Andrea	Indiana University
Scranton, Robert	University of Texas Methodist Hospital Houston
Shah, Kushal	University of Kansas
Shakir, Hakeem	SUNY, University of Buffalo
Sharma, Abhishiek	Medical Collete of Wisocnsin
Shepherd, Daniel	Mayo Clinic, Rochester, Minnesota
Sindelar, Brian	University of Florida
Son, Colin	University of Texas,San Antonio
Stephens, Bradley	Washington University, St. Louis
Thakur, Jai	LSUHSC - Shreveport
Thawani, Jayesh	University of Pennsylvania
Timoney, Nessa	University of Kentucky
Torabi, Radmehr	Brown University
Vargas Machaj, Jan	Medical University of South Carolina
Weiner, Gregory	University of Pittsburgh
Yew, Andrew	University of California Los Angeles
Youngerman, Brett	Columbia University, New York Presbyterian
Yowtak, June	Georgia Regents U. formerly Medical College of GA
Zenonos, Gergios	University of Pittsburgh

Faculty and Topics

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

Idaho Neurological Institute
“Squid Lab”

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

University of Chicago
Lecture Title: “Philosophy of Science In Relevance to Neurosurgery “and “From Genes to Treating Disease: Cavernous Angioma as a Paradigm”

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: “Big Data, Little Tokens and Neuro”

John Bookvar, M.D.

Cornell University
Lecture Title: “Intra-arterial Chemotherapy to Target the Glioma Stem Cell Niche in Malignant Brain Tumors”

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”

Beverly L. Davidson, Ph.D.

University of Iowa
Lecture Title: “Developing Inhibitory RNAs as a Therapeutic for Huntington’s Disease”

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”

Emad N. Eskandar, M.D.

Harvard Medical School
Lecture Title: “Neurophysiology of learning, motivation, and impulsivity”

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”

Murat Günel, MD

Yale University
Lecture Title: “Next Generation Genomics”

Faculty and Topics continues

Robert E. Harbaugh, MD, FACS, FAHA

Penn State University

Lecture Title: "Issues in Neurosurgical Clinical Research"

Rudolf Jaenisch, M.D.

Massachusetts Institute of Technology

Lecture Title, Keynote Speaker: "iPS Cell Technology and Disease Research: Issues to be Resolved"

Sean E. Lawler, Ph.D.

Ohio State

"MicroRNAs – Key Players in CNS Biology and Tumorigenesis"

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"

L. Dade Lunsford, M.D., F.A.C.S.

University of Pittsburgh

Lecture Title: "Clinical Research as Part of a Career in Neurosurgery"

Joseph R. Madsen, M.D.

Harvard University

Lecture Title: "Signals and Systems in the Human Brain: Water and Electricity"

**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-Regulated NC(Ca-ATP) Channel – a New Player in CNS Ischemia and Trauma"

David Sinclair, Ph.D.

Professor of Pathology

Lecture Title: "Genes and Small Molecules that Extend Lifespan"

Michael Taylor, M.D., Ph.D., FRCS(C)

University of Toronto

Lecture Title: "Clinical Implications of Paediatric Brain Tumor Molecular Genetics"

Mehmet Fatih Yanik, Ph.D.

Massachusetts Institute of Technology

Lecture Title: "Technologies for Regenerative CNS Therapeutics"