

Stimulating Science in a Unique Setting

RESEARCH UPDATE IN NEUROSCIENCE FOR NEUROSURGEONS (RUNN)

OCTOBER 30–NOVEMBER 6, 2011

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

**Robert J. Dempsey
Charles Hodge, Jr.
Edward Oldfield**

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 he predicted in the early 1980's.

The course was to combat what he perceived as potential 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 academic neurosurgeons.

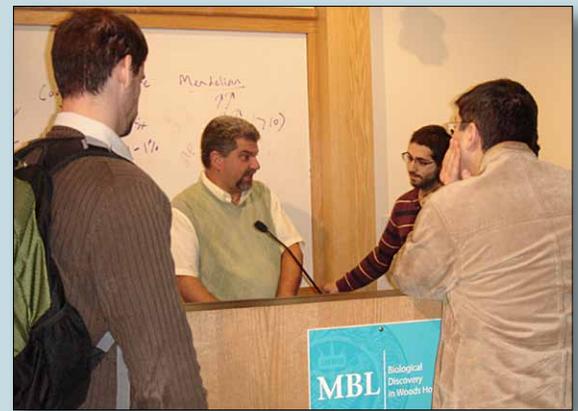
As with so many neuroscientists from New England, Dr. Schmidek was very familiar with the Marine Biological Laboratory (MBL) at Woods Hole, Massachusetts. Established in 1888 as a non-profit institution devoted to research and education in basic biology, the MBL has been called "the uniquely national 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 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) so 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 and nearby islands. With miles of bicycle 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 (Harvard) as the new Directors of the Course. The Co-Directors of the Course are Issam A. Awad (Northwestern), Bruce Andersen (Idaho Neurological Institute), Henry Brem (Johns Hopkins), Robert J. Dempsey (University of Wisconsin) and Charles Hodge, Jr. (SUNY at Syracuse). Dr. Andersen works closely with Jim Gailbraith and Paul Gallant (both of the National Institutes of Health) on the squid lab and microscopy workshop. Course Coordinator, Karen Koenig, works throughout the year to insure RUNN is executed flawlessly, managing the organization, administration and accounting of the Course.

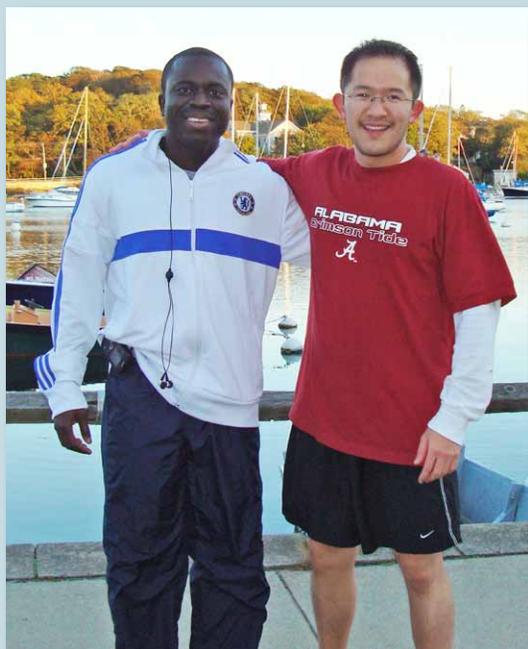
The 2011 RUNN Course Curriculum: Tradition and Innovation

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 active funded laboratories. There were tours of the MBL laboratories and the very popular microscopy seminar. 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 Clambake and certificate ceremony.

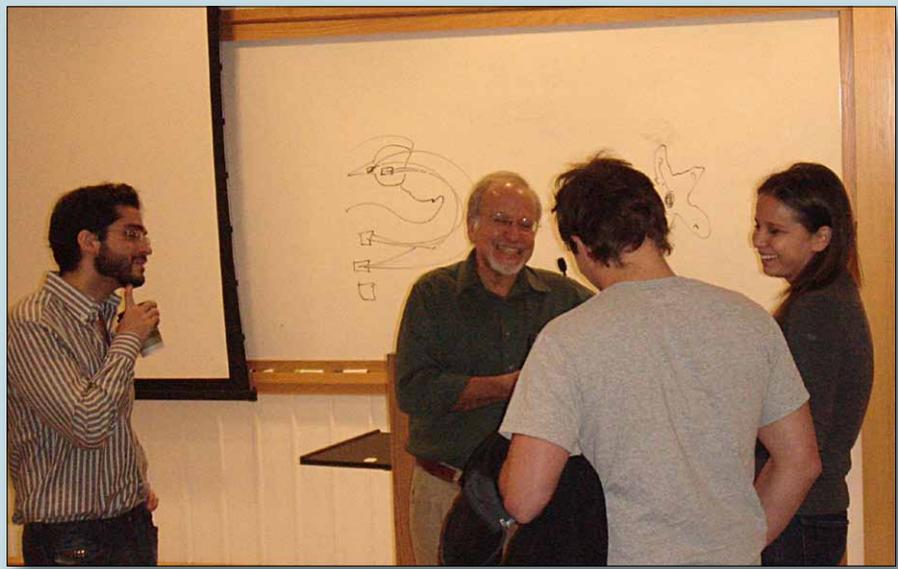


New Lectures Presented at the 2011 Course:

- **John Bookvar, M.D.—Cornell University—Lecture Title:** “Intra-arterial Chemotherapy to Target the Glioma Stem Cell Niche in Malignant Brain Tumors”
- **KEY NOTE SPEAKER: Beverly L. Davidson, Ph.D. University of Iowa—Lecture Title:** “Developing Inhibitory RNAs as a Therapeutic for Huntington’s Disease”
- **Thomas Freeman, M.D.—University of South Florida—Lecture Title:** “Neural Transplantation for the Treatment of Parkinson’s and Huntington’s Diseases: What We Have Learned and Implications for Future Therapies”
- **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”

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 where residents discussed everything from research topics and career paths, to residency training, to NFL football. Each attendee received a complimentary copy of the *Fundamental Neuroscience*, Edited by Squire, Berg, Bloom, du Lac and Ghosh. This book is a magnificent reference to the topics covered in the lectures, and it is an outstanding resource for future study. The books were funded by a grant from Synthes Spine Corporation.



A 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 8 directors, representing an extraordinary student/faculty ratio of 2/1. 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 **89** attendees (see list) representing programs throughout the **United States and Canada**. The reshaped course is ideal for young attending neurosurgeons just embarking on their academic career. Our goal is to attract one neurosurgeon from each neurosurgical program in North America. We will work hard until we achieve representation of at least one participant from each North American Program.

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 Timothy Ryan Owens

Neurosurgical Resident, Duke University Hospital

“You hear that? That’s the best part ... no pagers!” said Allan Friedman as he concluded his introductory address to the 2011 RUNN Course. By this statement, he emphasized the lack of clinical responsibility during this week which enabled the participants to fully engage in this week of discovery. Each year several neurosurgery residents gather in Woods Hole, MA to hear the giants of Neurosurgery and Neuroscience tell their tales to inspire the future leaders of Neurosurgery. The 2011 course was no different.

Unless you were a repeat attendee, I do not think any of us could fathom the assault on our minds that was about to take place as the week unfolded. The course started with an introduction explaining grantsmanship and how to compose a manuscript for publication and quickly jumped to latest advances in rewiring the central nervous system. By the end of the week we had covered DBS and brain machine interfaces, spine biomechanics, targeted polymer nanoparticle drug delivery to the brain, regeneration in the CNS, tumor genetics, and the latest in traumatic brain injury research. It was clear each attendee had been inspired by at least one lecture. Dr. Will Stetler of University of Michigan said, “Dr. Gunel’s lecture on the genetics behind aneurysmal subarachnoid hemorrhage and cavernous malformations showed me how basic science research could take lessons learned at the laboratory bench directly into the operating room or clinic to help



counsel and care for patients.”

Another attendee Jonathan Pindrick of Johns Hopkins remarked, “The RUNN course has revitalized my passion for research and has inspired me to revisit my excitement for mathematics as applied to neuroscience and neurosurgery.” Each of us left Woods Hole, MA with this feeling.

Outside of the Speck Auditorium, one of the highlights of the course was the tour of the Marine Biology

Laboratory to hear about the numerous Nobel laureates who made their important discoveries in campus laboratories. Many residents learned the all important lesson first hand while attempting to dissect a squid axon—bench research isn’t easy. Evenings were filled with meeting or reconnecting with fellow residents over pitchers of beer at the Captain Kidd pub. At the traditional farewell lobster bake, it was clear this year’s RUNN course was another success.

We acknowledge generous grants from:



Spine



These grants paid for the purchase of textbooks for each participant and subsidized faculty travel and honoraria costs.

Toward RUNN 2012 and Beyond!

We have finalized space contract with the MBL for the years 2012 through 2015. RUNN 2012 will take place from October 28, 2012–November 4, 2012. 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!

Future Course Dates

Marine Biology Laboratory
Woods Hole, MA

- Oct. 28—Nov. 4, 2012
- Oct. 27—Nov. 3, 2013
- Oct. 26—Nov. 2, 2014
- Oct. 25—Nov. 1, 2015

RUNN Web Site

<http://www.societyns.org>

RUNN Course Attendees

October 30–November 6, 2011

ATTENDEES

Ahmed, Osama	Louisiana State University, Shreveport
Al-Holou, Wajd	University of Michigan
Andrade, Nicholas	University of Texas, San Antonio
Assina, Rachid	UMDNJ
Atwal, Gursant	SUNY Buffalo
Auschwitz, Tyler	University of Tennessee, Memphis
Bandt, Katie	Washington University
Baxi, Nrupen	Albert Einstein–Montefiore University
Beaty, Narlin	University of Maryland
Bekelis, Kimon	Dartmouth–Hitchcock
Bohnstedt, Bradley	Indiana University
Campbell, Dennis	Wake Forest University School of Medicine
Chohan, Muhammad	University of New Mexico
Choi, David	Brown University
Chou, Arthur	University of California, Los Angeles
Crandall, Kenneth	University of Maryland
Dashnaw, Matthew	University of Rochester
Diaz, Roberto	University of Calgary
Garber, Sarah	University of Utah
Gross, Bradley	Brigham and Women’s/Children’s Hospital
Grupke, Steve	University of Kentucky
Hamzei-Sichani, Farid	Mount Sinai Medical Center New York
Hill, Jason	Indiana University
Horowitz, Peleg	Brigham and Women’s/Children’s Hospital
Ivanov, Alexander	University of Illinois
Jackson, Garrett	West Virginia University
Jamshidi, Ali	Ohio State
Jeevan, Dhruve	New York Medical College
Kim, Wonsuk	Penn State University
King, Cyrus	University of Cincinnati
Kolb, Luis	Yale University
Kooshkabadi, Ali	University of Pittsburgh
Kranzler, Leonard	University of Chicago
Krisht, Khaled	University of Utah
Kumar, Ravi	Mayo Clinic, Rochester MN
Kumar, Ritesh	University of Ottawa
Liniewski, David	Loyola University Medical Center
Lipinski, Lindsay	SUNY Buffalo
Liu, Jesse	Oregon Health Sciences University
Logan, Chine	Virginia Tech Carilion Clinic*
MacDougall, Matthew	University of California San Diego
Madura, Casey	University of Wisconsin
Magner, Mark	University of Cincinnati



Malone, Hani	Columbia University–NY Presbyterian Medical Center
Manix, Marc	Louisiana State Univ. Shreveport
Mansour, Nassir	University of Chicago
Marlin, Evan	Ohio State
Mbabuike, Nnenna	Tulane University
McGovern, Robert	Columbia University NY Presbyterian Medical Center
Miller, Robert	University of Pittsburg
Munyon, Charles.	University of Case Medical Center
Neal, Matthew.	Wake Forest University
Nixon, Menarvia	Louisiana State University, Shreveport
Oliveria, Seth	University of Florida
Omay, Sacit Bulent.	Yale University
Orina, Josiah	Mayo Clinic, Rochester MN
Ouattara, Jean-Marc	University of Ottawa
Owens, Ryan.	Duke University
Park, Paul	University of Utah
Pindrik, Jonathan	Johns Hopkins
Purzner, Jamie.	University of Toronto
Purzner, Teresa	University of Toronto
Raskin, Jeffrey	Oregon Health Sciences University
Reding, Jonathan.	University of Tennessee, Memphis
Riordan, Margaret.	SUNY–Upstate University
Safain, Mina	Tufts University Medical Center
Sahasrabudhe, Nikhil	New York University
Samuel, Taylon.	Medical College of South Carolina
Shakir, Basheer.	Medical College of Georgia
Shekhtman, Eugenia	New York University
Siu, Alan	George Washington University
Slavin, Justin.	University of Maryland
Soliman, Hesham	University of Kansas
Spurgeon, Angela	University of Missouri-Columbia MO
Srinivasan, Vasisht	University of Rochester
Stetler, Jr., William.	University of Michigan
Swanson, Kyle	University of Wisconsin
Torre-Healy, Andrew	Cleveland Clinic
Tsen, Andrew	University of Vermont
Vacchani, Jay	University of Illinois, Peoria
Vasquez, Ciro	University of Minnesota
Waller, Samuel	University of Colorado, Denver
Weingarten, David	University of California San Diego
Williams, Brian.	University of Virginia
Wilson, Thomas	University of Michigan
Wright, Zachary	Allegheny General Hospital
Yeremeyeva, Esmiralda	Ohio State University
Young, Richard.	George Washington University
Zhang, Zoe	University of Minnesota

* *Virginia Tech Carilion Clinic is a New Residency Program*

Faculty and Topics

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

Idaho Neurological Institute
“Squid Lab”

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

Northwestern University
Lecture Title: “Philosophy of Science and Neurosurgery” and “Translational and Integrational Research: Cavernous Angioma as a Paradigm”

Larry Benowitz, Ph.D.

Harvard University
Lecture Title: “Rewinding 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., CPT(VT)

Research Staff Member
IBM T.J. Watson Research Center
Lecture Title: “On The Evolution of an Electronic Species”

Brem, Henry, M.D.

Johns Hopkins University
Lecture Title: “Brain Tumor Therapy”

John Bookvar, M.D.

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

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.

Ohio State University
Lecture Title: “Translational Therapeutics for Brain Tumors: From the Lab to the Clinic and Back”

Beverly L. Davidson, Ph.D.

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

Robert Dempsey, M.D.

University of Wisconsin
Lecture Title: “Research and Balance in an Academic Neurosurgery Career. Getting started: How do I Write a Grant or paper?”

Peter Dirks, M.D., Ph.D.

University of Toronto
Lecture Title: “Probing the Relationship between Stem Cells and Brain Cancer”

C. Edward Dixon, Ph.D.

University of Pittsburgh
Lecture Title: “Traumatic Brain Injury: Lessons Learned from the Bench”

V. Reggie Edgerton, Ph.D.

UCLA Medical Center
Lecture Title: “Activity Dependent Mechanisms that Enhance Sensorimotor Function Following Spinal Cord Injury”

Thomas Freeman, M.D.

University of South Florida
Lecture Title: “Neural Transplantation for the Treatment of Parkinson’s and Huntington’s Diseases: What We Have Learned and Implications for Future Therapies”

James Galbraith, Ph.D.

National Institutes of Health
Laboratory Experience: "Squid Lab"

Murat Gunel, M.D.

Yale University
*Lecture Title: "Molecular Genetics
and Biology of Intracranial Aneurysms
and Cavernous Malformations"*

Robert M. Friedlander, M.D.

University of Pittsburgh
*Lecture Title: "Mechanisms of Cell Death
in Neurologic Diseases"*

Michael M. Haglund, Ph.D., M.D.

Duke University
*Lecture Title: "Optical Imaging of
Epileptiform Activity: From Brain Slices
to the Operating Room"*

Robert E. Harbaugh, MD, FACS, FAHA

Penn State University
*Lecture Title: "Issues in Neurosurgical
Clinical Research"*

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

Harvard University
Lecture Title: "Connectomics"

Jeffrey Macklis, M.D., D. HDT

Harvard University
*Lecture Title: "Rebuilding Corticospinal
Circuitry is Complex (duh); Assembly
Instructions Required"*

Joseph R. Madsen, M.D.

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



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—va New Player
in CNS Ischemia?"*

David Sinclair, Ph.D.

Harvard University
*Lecture Title: "Genes and Small Molecules
that Extend Lifespan"*

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"*