# ANNUAL REPORT Stimulating Science in a

Unique Setting

RESEARCH UPDATE IN NEUROSCIENCE FOR NEUROSURGEONS (RUNN) OCTOBER 18-25, 2008

Sponsored by: THE SOCIETY OF NEUROLOGICAL SURGEONS

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Co-Directors: BRUCE ANDERSEN, ISSAM A. AWAD, HENRY BREM, ROBERT J. DEMPSEY, CHARLES HODGE, JR., AND EDWARD OLDFIELD

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 neurosurgeonscientists, 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 and 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 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 2008 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 speakers, Dr. Anna Krichevsky and Willam Hahn, introduced the attendees to the role of micro RNAs in cell biology as well as the potential of micro RNAs in the diagnosis of brain tumors. Dr. Andres Lozano mesmerized the participants with his experience using deep brain stimulation to alter human behavior.



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 complimentary copy of the Third Edition of Neuroscience, Edited by Purves, Augustine, Fitzpatrick, Hall, LaMantia, McNamara and Williams. 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 (see list), are world-class scientists who are able to present their work in a stimulating fashion. There were 28 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 77 attendees (see list) representing programs throughout the United States, Canada, 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. 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 Renee Reynolds, M.D. Neurosurgical Resident, Duke University

The annual 24th RUNN course in majestic Wood's Hole Massachusetts's, held this year from October 18-25, certainly lived up to it's noteworthy reputation. What a truly remarkable experience it was to be free of patient care responsibilities and to enjoy and devote a week to the academic side of neuroscience with friends and colleagues from around the country. In the tradition of the Marine Biological Laboratories where the RUNN course is held, where many a Nobel Laureates work was pioneered, the RUNN course provided intellectual stimulation to 76 upcoming neurosurgeons and neuroscientists of the future.

Each year the list of presenters has continued to increase in esteem and this year was no exception. The speakers covered a broad array of topics including new areas such as the discovery of microRNA and the role in cancer, particularly GBM, as well as old favorites including the giant squid axon lab. Particularly popular lectures this year included Leigh Hochberg, MD, PhD, whom presented his work on the brain machine interface and utilizing the motor cortex and neural control to direct prosthetic devices in spinal cord injured and ALS patients. Dale Purves stimulated with his lecture on current concepts of visual perception and the mechanisms underlying the perception of brightness, color, orientation, motion and depth. Kerry Bernstein of IBM shared his research using our understanding of neural circuits to contribute to the development of the ultimate supercomputer. Dr. Lozano presented his work on deep brain stimulators and his recent success in the treatment of not only Parkinson's disease but also depression and dystonia.

These lectures not only stimulated us academically, but opened our eyes to the many avenues research in the neurosciences can lead. Additionally, the lectures were woven with the personal journeys of each presenter and how they came to be research scientists. It was encouraging to see so many successful researchers whom had balanced both a clinical and academic practice and to hear their words of wisdom to those pursuing the same. This included several lectures on grantsmanship, a topic not often formally covered in traditional neurosurgical residency training but vital to the development of a successful career in research science. As a way to kick start the ideas and budding research scientists inspired by the course, it also offers a RUNN course grant to those who attend given to the best proposed clinical or laboratory research project.

Each day concluded with an informal mixer and an opportunity to continue our discussions about the lectures of the day or just catch up with old friends from the interview trail over a round of cocktails. As in previous years often these mixers continued on late into the evening hours at the only open bar off season in Wood's Hole...the infamous Captain Kidd's. Early morning runs to the light house, a ferry trip to Martha's Vineyard and a trip to see one of the local bands play live all remain highlights to me of the social atmosphere of the course as well. With plenty a prospect to mingle with your future colleagues and make new friends along with the opportunity to engage in such stimulating science all contributed greatly to my enjoyment of the course and why I will strongly encourage the continued renewal of the course and participation of neurosurgery residents for years to come.

### **Generous Educational Grants**

We acknowledge generous grants, from



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

#### Toward RUNN 2009 and Beyond!

We have finalized space contract with the MBL for the years 2010 through 2015. RUNN 2009 will take place from October 17-24, 2009. 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

#### Future Course Dates

Marine Biology Laboratory Woods Hole, MA

> October 31 – November 7, 2010 October 30 – November 6, 2011 October 28 – November 4, 2012 October 27 – November 3, 2013 October 26 – November 2, 2014 October 25 – November 1, 2015



#### RUNN Course Attendees October 18–25, 2008

#### PARTICIPANT

Abdulhamid Aiobove Albert, Jr. Alcindor Almubaslat Bandela Billingsley Cahill Chang Chesler Crowley Dakwar Desai Dimopoulos Gachiani Gandhi. Gibbons Gologorsky Grossberg Hickman Hiser Hoppenot

Huang Hughes Jain

Jimenez Jumper Khan

Kaloostian Karimi Keshavaczi

Kesler Kim Kitagawa Klemp Mohamed Norman Ladislau Dunbar Mohammad John Joshua Kevin Victor David R. Webster Eliaz Atman Vassilios John Ravi Beth Yakov Jonathan Zachary L.

Zachary L. Bradley

Regis Michael Douglas Gaurav

Lincoln Shawn H. Fahd

Paul Reza Sassan

Henry Bong-Soo Ryan Joshua INSTITUTION SUNY Syracuse New York Wake Forest NY Medical College Allegheny General Hospital **Tulane University** University of Florida Gainesville University of Louisville Brigham and Womens Childrens Henry Ford University of Maryland University of Virginia University of South Florida Dartmouth-Hitchcock University of Rochester LSUHSC - New Orleans Albany Medical Center University of Vermont The Mount Sinai School of Medicine Brown University Columbia University, NY University of Missouri Columbia SUNY Buffalo Georgetown University Medical College of Georgia Albert Einstein College of Medicine University of Puerto Rico University of Michigan University Hospitals of Cleveland University of New Mexico New Jersey Medical School University of California San Diego University of Rochester NY Temple University Baylor College of Medicine

University of Kansas

| Krishna    | Chandan           | The Methodist Hospital –<br>Houston     |
|------------|-------------------|---|
| Krishna    | Vibhor            | Medical University<br>of South Carolina |
| Kshettry   | Varun             | Cleveland Clinic                        |
| Lehmann    | Emily             | University of Michigan                  |
| Lu         | Yi                | Brigham & Womens Childrens              |
| Marsh      | Robert            | Wake Forest                             |
| Martin,    | Juan              | University of Pittsburgh                |
| Maulucci   | Christopher       | University of Maryland                  |
| Milligan   | Brian             | Mayo, Rochester, MN                     |
| Miranpuri  | Amrendra          | University of Wisconsin                 |
| Mislow     | John              | Brigham & Womens Childrens              |
| Monaco     | Edward A.         | University of Pittsburgh                |
| Munson     | Troy              | University of Illinois at Chicago       |
| Ozturk     | Ali               | Yale University                         |
| Padalino   | David             | SUNY Syracuse New York                  |
| Patel      | Toral             | Yale University                         |
| Paullus    | Wayne             | University of Missouri-Columbia         |
| Peruzzi    | Pier Paolo        | Ohio State                              |
| Piedra     | Mark              | Oregon Health & Science                 |
| Pineda     | Urquilla Estuardo | University of Puerto Rico               |
| Porenzky   | Paul              | Ohio State                              |
| Przybylo   | Jason             | SUNY Buffalo                            |
| Raore      | Bethwel           | Emory University                        |
| Raval      | Ami               | Tufts University                        |
| Reynolds   | Renee             | Duke University                         |
| Rocque     | Brandon           | University of Wisconsin                 |
| Santaguida | Carlo             | University of Toronto                   |
| Shih       | Patrick           | Northwestern University                 |
| Shorter    | Cedric            | LSUHsC – Shreveport                     |
| Souslian   | Fotis             | University of Minnesota                 |
| Spooler    | Justin            | Loma Linda University                   |
| Tharin     | Suzanne           | Brigham & Womens Childrens              |
| Thompson   | Eric              | Oregon Health & Science                 |
|            |                   | University                              |
| Tormenti   | Matthew           | University of Pittsburgh                |
| Van Poppel | Mark              | University of TN                        |
| Wadhwa     | Rishi             | LSUHsC - Shreveport                     |
| Whitlow    | Justin            | University of Kentucky                  |
| Wilden     | Jessica           | Indiana University                      |
| Yang       | Victor            | University of Toronto                   |
| Zacharia   | Brad              | Columbia University, NY                 |
| Ziu        | Mateo             | University of Jexas, San Antonio        |
| Zouzias    | Alex              | New Jersey Medical School               |

## **FACULTY AND TOPICS**

Andersen, Bruce / Galbraith, Jim Idaho Neurological Institute / NIH Squid Lab

Awad, Issam Northwestern University "Philosophy of Science and Neurosurgery" and "Translational and Integrational Research: Cavernous Angioma as a Paradigm" Benowitz, Larry Harvard University "Axonal Guidance and Regeneration" Benzel, Edward Cleveland Clinic "Science, Clinical Practice, and the Quest of Academic Excellence" Bernstein, Kerry IBM Corporation "On The Evolution of an Electronic Species" Born. Richard Harvard Medical School "Modularity and Integration in the Primate Visual Cortex" Brem, Henry Johns Hopkins University "Brain Tumor Therapy" Chiocca, Nino Ohio State University "Translational Therapeutics for Brain Tumors: From the Lab to the Clinic and Back" Connolly, E. Sander Columbia University "Neuroinflammation/Adhesion Molecules" D'Armore, Patricia Schepens Eve Institute "Angiogenesis and Neoplasia" Dempsey, Robert University of Wisconsin "Research and Balance in an Academic Neurosurgery Career. Getting Started: How do I Write a Grant?" Edgerton, V. Reggie UCLA Medical Center "Activity Dependent Mechanisms that Enhance Sensorimotor Function Following Spinal Cord Injury" Friedlander, Robert Harvard Medical School "Grantmanship" and "Mechanisms of Cell Death in Neurologic Diseases" Gunel, Murat Yale University "Molecular Genetics and Biology of Intracranial Aneurysms and Cavernous Malformations" Hahn, William Harvard University "Using Functional Genomics to Decipher Neurological Malignancies"

Haglund, Michael Duke University "Optical Imaging of Epileptiform Activity: From Brain Slices to the Operating Room" Hochberg, Leigh Harvard Medical School "Intracortically-based Brain-Computer Interfaces" Krichevsky, Anna Brigham & Womens Harvard University "MicroRNA Functions in Human Brain and Brain Tumors" Lozano, Andres University of Toronto "Adjusting the Activity in Human Brain Circuits" Madsen, Joseph Harvard University 'Neuroengineering: Pulses and Waves" Oldfield, Edward University of Virginia 'Von Hippel-Lindau Disease: Studies on Biology, Natural History, Patient Management in a Familial Tumor Suppressor Syndrome" Purves, Dale Duke University 'Why We See What We Do" Rutka, James University of Toronto "Medulloblastoma — From a Difficult Past to a Promising Future" Schwob, Jim Tufts University "Neural Regeneration and the Olfactory System" Silver, Jerry Case Western Reserve University "Functional Regeneration Beyond the Glial Scar" Simard, Marc University of Maryland 'The SUR1-regulated NC(Ca-ATP) Channel a New Player in CNS Ischemia' Walters, Beverly Brown University "An Introduction to Evidence-Based Neurosurgery"