Department a leader in advanced, professional neurosurgical training

Neurological surgery at the University of Pittsburgh began over 60 years ago with a three-fold commitment to patient care, teaching and research. One of our primary goals has been to equip the neurosurgeons of the future with state-of-the-art techniques and analytical skills to lead the field of neurosurgery. Building on this commitment, we also strive to educate the neurosurgeons and physicians of today with the latest advances in neurosurgical care.

To accomplish this task, the Department of Neurological Surgery at the University of Pittsburgh sponsors a number of advanced training courses to highlight cutting edge technologies for today’s professional.

These courses are taught by faculty from our department and from other departments at the university—experts in their field who practice these techniques on a daily basis. Attendees to these courses typically come from around the world.

The following is a summary of these courses:

**Principles and Practice of Gamma Knife Radiosurgery**

Targeted at neurosurgeons, radiation oncologists and medical physicists interested in Gamma Knife radiosurgery education. In this intensive week-long class, attendees learn about the practical aspects of stereotactic radiosurgery using the Leksell Gamma Knife®. Principles of radiation physics and radiobiology—as they apply to single-session, focused, small volume irradiation—are covered. Registrants are taught radiosurgery dose plans for brain tumors, vascular malformations and trigeminal neuralgia.

The course co-directors are L. Dade Lunsford, MD, and Douglas Kondziolka, MD, co-directors of the department’s Center for Image-Guided Neurosurgery.

**Endoscopic Surgery of the Cranial Base and Pituitary Fossa Course**

This two-day course consists of a series of lectures on approaches for endoscopic surgery of the cranial base and pituitary fossa. In particular, minimally invasive techniques are discussed as well as interactive live cases. Experts on the subject present technical aspects of those operations along with risks, benefits and outcomes. This course is designed for neurosurgeons, minimally invasive surgeons and other allied health professionals.

Attendees have the opportunity to gain and expand their knowledge regarding endoscopic surgery of the cranial base and pituitary fossa using minimally invasive techniques.

Amin Kassam, MD, and Carl Snyderman, MD, co-directors for the Center for Minimally Invasive and Cranial Base Neurosurgery are co-directors for this course.

**Spine Training**

The Department of Neurological Surgery’s Spine Service Division in association with the Zimmer Spine Corporation hosts advanced training for spine surgeons from around the world. These courses usually span two days and include review of the theory and practice of advanced techniques developed by Amin Kassam.
University chair honors, facilitates outstanding work

One of the highest honors that can be bestowed upon a member of a university faculty is an endowed chair. Such a designation recognizes eminence in a field of study that reflects outstanding contributions to a discipline and national and international recognition for those contributions. Chairs that are endowed in perpetuity provide a unique and lasting source of support to individuals who have achieved national prominence in patient care, investigative research, and teaching. An endowed chair also confers special recognition upon the principal donor, since the chair carries the donor’s name.

To be considered for an endowed chair at the University of Pittsburgh School of Medicine, a faculty member must be recommended for the honor by the department chair and confirmed by the executive committee of the School of Medicine. At the time of the formal appointment of the faculty member to the chair, the university provost presents the honoree with a specially crafted endowment medal, and an inaugural lecture is delivered.

In some instances, the candidate for an endowed chair is already a member of the faculty. Such academic appointments are important and invaluable tools in recognizing and retaining talented faculty members. In some cases, an endowed chair can be used to assist in the recruitment of a highly respected faculty member who will contribute to our mission of excellence in patient care, research, and education, and who will help train the next generation of neurosurgeons.

The Department of Neurological Surgery at the University of Pittsburgh has four fully endowed professorships in neurological surgery. They are the Lars LekSELL Chair, held by L. Dade Lunsford, MD, department chairman; the Walter Dandy Chair, held by Ian Pollack, MD; the Peter J. Jannetta Chair, held by Howard Yonas, MD; and the Children’s Neurosurgery Chair, held by A. Leland Albright, MD.

A campaign is underway to complete funding for a fifth chair to be named in honor of Peter E. Sheptak, MD, clinical professor of neurological surgery and vice chairman of clinical affairs with the department. This chair will be held by William Welch, MD.

Revenue from a fully endowed chair provides annual benefit to the holder of the chair by facilitating his or her work within the department. Current holders of endowed chairs in the department have achieved national and international recognition for their clinical, research, and teaching abilities.

Dr. Lunsford is a world-renowned leader in the field of image-guided neurosurgery; Dr. Pollack is an expert in pediatric neurosurgery and brain tumor research; Dr. Yonas has been at the forefront of cerebrovascular care and research; and Dr. Albright is an expert in the field of pediatric movement disorders.

This issue of University of Pittsburgh Neurosurgery News takes a look at the four endowed chairs at the Department of Neurological Surgery. Each holder writes about the history of their chair and the significance it has in their work.
Lars Leksell, MD, PhD, was a pioneer neurological surgeon and neurophysiologist in Stockholm, Sweden. Professor Leksell described the gamma motor system in his Ph.D. thesis in the 1940’s, seminal work that enabled his mentor, Professor Ragnar Granit, to win the Nobel Prize in Medicine.

Professor Leksell was trained in an era of early generation neurosurgery; he became convinced that with proper training and special tools, neurosurgeons could explore the hidden depths of the brain in a minimally invasive way. He studied stereotactic brain surgery with the first team to apply this concept to human patients, Ernst Spiegel and Henry Wycis at Temple University.

In 1949, Leksell returned to Stockholm to work in the clinic of the Scandinavian neurosurgical pioneer, Herbert Olievecrona. He developed and published his first human stereotactic device in 1949.

Leksell was a restless inventor, an innovative surgeon, and a perfectionist. After a brief time in Lund, he succeeded Olievecrona as Professor of Neurosurgery at the Karolinska Institute in Stockholm. During the next two decades, he continued to expand upon the role of stereotactic surgery, functional neurosurgery, and radiosurgery, a field he first defined in a publication in 1951.

Leksell's interests reflected his goal of performing less invasive, safer, and better outcome surgery by combining precise imaging tools with precise brain guidance devices.

I had the opportunity to meet Leksell during my first trip to Sweden in 1979. During my AANS Van Wagenen Fellowship Award from 1980 to 1981, I had the opportunity to work with Leksell and his main disciple, Eric Olof Backlund. Leksell’s and Backlund’s interests paralleled my own, and I was launched on a career to pursue similar goals of minimally invasive surgery.

During the same time, I became close friends with Leksell’s family, including Dr. Larry Leksell, a Ph.D. in economics, who pioneered the growth of the medical device company, AB Elekta. He was assisted by his brother, Dan Leksell, an ENT physician. The company grew from two employees in 1980 to over 1,300 employees in 2004.

Elekta and the University of Pittsburgh Medical Center formed a collaborative team. When I proposed in the mid-1990’s the establishment of the Lars Leksell Endowed Chair in Neurological Surgery, the University, Elekta and UPMC were enthusiastic. We also began an internal fundraising campaign to help underwrite this chair, which required a $1.5 million investment to fully capitalize at the University of Pittsburgh. Our fundraising efforts persisted over several years, and were supplemented by a ten-year commitment from Elekta.

Based on this commitment, the university, under the direction of Senior Vice Chancellor, Dr. Thomas Detre, authorized the installation of the Lars Leksell Endowed Professorship in Neurological Surgery with myself as the first incumbent.

The Lars Leksell Chair was the third of five endowed neurosurgical chairs established at the University of Pittsburgh. Its focus is not only in memory of an outstanding and innovative neurosurgeon, but is designed to support an individual who pursues image guided minimally invasive neurosurgical techniques. The chair has been fully funded for more than four years. Revenue from interest generated from the principle of the chair helps to support our current clinical research program.

Endowed chairs provide a lasting legacy that provides additional honor to an already illustrious name. We are pleased that we now have five endowed chairs at the University of Pittsburgh.
Walter Dandy, MD, was a master neurosurgeon-scientist, responsible for seminal discoveries in the neurosciences as well as remarkable technical achievements in the operating room. He discovered the source, flow pattern, and mechanism of absorption of cerebrospinal fluid, and the cause of many forms of obstructive hydrocephalus.

Building on this work, he also developed techniques for treating hydrocephalus, one of the most common problems in pediatric neurosurgery, and for ventriculography, which was one of the principal methods for visualizing intracranial lesions before the advent of CT and MRI. He was nominated for a Nobel Prize for these accomplishments.

From a surgical perspective, he reported the first total removal of an acoustic tumor using a suboccipital approach, developed the first postoperative intensive care unit, and originated surgical techniques for the treatment of trigeminal neuralgia, glossopharyngeal neuralgia, and Ménière's disease. He also demonstrated that a herniated disc was the cause of sciatica and performed the first successful clipping of an intracranial aneurysm.

The Walter Dandy Chair in Neurological Surgery was established at the University of Pittsburgh to support the work of Dr. Peter Jannetta, former department chairman, who had in many ways built upon Dandy’s legacy by developing landmark surgical advancements in the management of microvascular compression syndromes, such as trigeminal neuralgia, hemifacial spasm, and glossopharyngeal neuralgia.

Upon Dr. Jannetta’s relocation, I was named the Walter Dandy Professor of Neurosurgery. Like Dandy, I received my medical education at the Johns Hopkins University, and have pursued a career as a surgeon-scientist, focusing on neurosurgical problems in children, where Dandy made some of his greatest contributions, and the management of childhood and adult brain tumors.

I am currently director of the University of Pittsburgh Cancer Institute Brain Tumor Program and chief of pediatric neurosurgery at the Children’s Hospital of Pittsburgh. Given the poor prognosis of many types of childhood and adult brain tumors with current therapies, my work has focused significant attention on the identification of novel therapeutic strategies for these lesions and better techniques for predicting which tumors are likely to respond to a given therapy.

My research, which has been supported by the Dandy Professorship, has defined the contribution of platelet-like growth factor receptor (PDGFR), protein kinase C (PKC), and Ras to the growth of malignant glial tumors, and has translated these observations into novel preclinical and clinical studies designed to target the signaling pathways that drive glioma cell proliferation. These include the first pediatric neuro-oncology trials of PKC inhibition and of PDGFR blockade as therapeutic strategies.

My laboratory has demonstrated the contribution of molecular abnormalities to treatment response in childhood brain tumors, and was the first to define an adverse association between p53 mutations and outcome in pediatric gliomas.

We have also collaborated with other members of the brain tumor program in preclinical studies of immunomodulatory therapies for malignant gliomas, which have been translated into ground-breaking clinical trials under the direction of Dr. Hideho Okada. These include the first study involving cytokine gene-transduced autologous glioma vaccine therapy, for which I am principal investigator. Because several patients enrolled on the study have exhibited dramatic tumor regression, this work has formed a foundation for further studies, which have identified glioma rejection antigens that are being incorporated in a subsequent trial.

My molecular marker studies are also supported by NIH R01 funding, the experimental therapeutics program for novel brain tumor therapies is supported by an NIH program project grant, and the clinical trials efforts are supported by NIH U01 and U10 funding.

The funds generated by the Dandy chair have therefore been a critical foundation for research activities that have not only helped to advance the management of children and adults with brain tumors, but have also led to additional extramural funding that has broadened the scope of innovative treatment approaches available to patients in the region.

The professorship is therefore both a lasting legacy to Dr. Dandy’s neurosurgical and scientific achievements, as well as a vital force for supporting our current research program in brain tumor therapy.
It has been an honor to be the first occupant of the Peter J. Jannetta Chair of Neurological Surgery at the University of Pittsburgh. Dr. Jannetta has represented to many “the best of neurological surgery.” He has always been a warm and sincerely concerned physician to his patients, a demanding mentor who lead by example to his many students.

Despite many accomplishments Peter Jannetta remains curious and unsatisfied that he has done all that he can do. Despite being responsible for making available to thousands, new approaches to the treatment of otherwise devastating pain and movement disorders, despite building one of the largest and most respected neurosurgical programs in the nation which has trained hundreds of the nations finest physicians, Dr. Jannetta still seeks to better understand and hopefully find “the treatment” for other disorders as yet unconquered.

Dr. Jannetta is a graduate of the University of Pennsylvania School of Medicine where he also completed his post-graduate training in surgery. This was followed by a National Institute of Health fellowship in neurophysiology and a residency in neurosurgery at the UCLA Center for Health Sciences.

From 1966-1971—and at an uncommonly young age—Dr. Jannetta held the role of professor and chief of the division of neurological surgery at Louisiana State University Medical Center following which he assumed the chair of the department of neurological surgery at the University of Pittsburgh.

Under his leadership a group of surgeons came to Pittsburgh who brought not only highest levels of modern surgical skills but also a unique spirit of innovation. It was taken for granted that they would do “the best” for their patients based upon solid clinical training and uncommonly high levels of technical skill, but in addition it was assumed they would not be satisfied with the “status quo.”

An example of the unselfish quest for “better” was Dr. Jannetta’s support provided to Dr. Dade Lunsford (his resident who subsequently followed Dr. Jannetta as the Chair of Neurological Surgery) to seek less invasive treatments for Tic Doloreux, the disorder for which Dr. Jannetta had built his career with as an open surgical procedure. As a result both an “open” and a new “closed” procedure became available providing physicians an option depending upon a patient’s clinical setting.

I first met Dr. Jannetta at a meeting at Mt. Sinai Hospital in 1977. After having an opportunity to meet with Peter I knew that I wanted to spend more time with this very talented but also very personable individual. I also met Dr. Gazi Yasargil at that meeting and subsequently spent a year in fellowship with both surgeons.

I subsequently joined the faculty under Dr. Jannetta pursuing a surgical career focused upon microvascular surgery. To this area that demanded technical expertise I sought to better understand the basic physiological process of cerebral ischemia (lack of blood supply) that was the mechanism of injury for so many disorders.

Collaborating with Dr. David Gur, a young and talented radiation physicist, a new approach to measuring cerebral blood flow (CBF) using a CT scanner and the inhalation of stable xenon was developed. Using this technology combined with other evolving technologies (MRI and positron emission tomography, PET) I have been able to provide new insights into the basic injury processes of occlusive vascular disease, delayed stroke following subarachnoid hemorrhage, secondary brain injury following head trauma, delayed injury associated with fulmant hepatic encephalopathy, to name a few areas.

With the support provided by the Peter J. Jannetta Chair, new funded research projects are being directed into the understanding of acute ischemic stroke with the goal being the extension of the “window” of opportunity for treatment to more patients by using physiological rather than time based criteria. Another research project that has won support will examine criteria for identification of patients at increased subsequent risk for stroke following occlusion of extra and or intracranial vessels. This and associated studies should be the basis for making “bypass surgery” a treatment option for patients with symptomatic carotid occlusion. Despite decades of work trying to make the CBF technology more available in the United States many new directions including incorporation of this technology into a new bedside, portable CT scanner should make it possible to reach this goal.

As I am preparing to leave the University of Pittsburgh for the University of New Mexico (see related News & Notes article on page 7), I will look back at being the first Peter Jannetta Chair of Neurological surgery as an honor that I will always remember with pride and humility.

The support and funding provided by the Jannetta chair will continue to foster innovation and research for the benefit of our patients.
The endowed chair in pediatric neurosurgery was developed by a committee of parents led by Dan Martin, whose daughter Carrie had been treated at the Children’s Hospital of Pittsburgh for a malignant brain tumor. Dan asked what he could do that would provide the greatest help to the clinical research of Dr. Albright. The committee worked for approximately six years to collect one million dollars toward the chair. The remainder was contributed by the department of neurological surgery and UPMC.

Interest from the endowed chair has helped support my clinical research, which is devoted to improving the care of children with movement disorders, particularly the movement disorders associated with cerebral palsy. Grant support at a national level for such research is relatively limited because of a relative disinterest in children with developmental disabilities.

In the last three years, the clinical research of myself and my colleagues in the Spasticity and Movement Disorder’s clinic has determined that generalized dystonia—a common movement disorder that occurs in children with CP and sometimes after severe head injuries—can be effectively treated by continuously infusing the medication baclofen into the spinal fluid via an implanted pump. Prior to that, no good treatments were available. In the early 1990s, I had been the first to demonstrate that baclofen infused into the spinal fluid effectively alleviated spasticity, the most common movement problem in children with CP.

I have worked in collaboration with Dr. Douglas Kondiolka in the department of neurosurgery to treat other pediatric movement disorders with deep brain stimulation. That treatment has helped children with chorea, a movement disorder characterized by rapid involuntary jerking movements, and others with tremor.

At the present time, funds from the endowed chair are being used to support a study infusing baclofen into the brains of dogs, a study required by the FDA before the technique is used in children.

There are only 3-4 endowed chairs in pediatric neurosurgery in the United States. The presence of such a chair in the department of neurosurgery enhances the stature of the pediatric neurosurgery section nationally and internationally, and will facilitate the hiring of top-quality academic pediatric neurosurgeons for years to come.

(Editors note: Upon Dr. Albright’s retirement, the ‘Children’s Neurosurgery Chair’ will be renamed the ‘A. Leland Albright Neurosurgery Chair.’)

William C. Welch, MD, named Peter E. Sheptak Chair holder

William Welch, MD, director of the Spine Services Division at the Department of Neurological Surgery and chief of neurosurgery at UPMC Presbyterian, has been named recipient of the Peter E. Sheptak Chair in Neurological Surgery.

Dr. Welch specializes in advanced spine surgical techniques—including new methods for spine fusion and artificial disc replacement—and he has established one of the largest spine programs in the United States.

The chair honors the 30+ year career of Peter E. Sheptak, MD, vice chairman of clinical affairs for the department.

Recent donations to the department

Children's Neurosurgery Chair
• Up to $1,000:
  United Way of Allegheny County

Peter J. Jannetta Chair
• Up to $1,000:
  Robert W. Coffin

Lars Leksell Chair
• Up to $1,000:
  Mr. & Mrs. Gene A. Solomon

Peter E. Sheptak Chair
• Greater than $50,000:
  Anonymous

• $5,000 - $10,000:
  Jeffrey E. Flynn

• Up to $1,000:
  Frank J. Zimmerman
  Carol Zimmerman

General Fund
• $1,000 - $5,000:
  Utility Workers Union of America
  Jean Hill Chisolm

• Up to $1,000:
  Allegheny Power Employees of Waynesboro
  William J. Geibel & Theodosia M. Regal
  Mr. & Mrs. Alex K. Tinker, III
  Teresa Gross
  Kathleen A. Gross
  Linda F. and John D. Wright
  Mary Margaret Wolfgang
  Joyce A. Napoline
  IBEW Local Union #37
  Mr. & Mrs. Richard S. Millhouse
  David J. Bissonette
  John Thomas Jakiela
  Andrea E. Haaz
  Penn State Club of Westmoreland County
  Mr. & Mrs. Robert B. Eicher
  Henry Senf
Department of Neurosurgery Sponsors Magnetoencephalography (MEG) Lecture

Lauri Parkkonen, MSc, of the Helsinki University of Technology presented a lecture on “Magnetoencephalography (MEG) in Clinical Routine and Brain Research,” October 28, in Scaife Hall. The talk was an introduction to the advanced technology soon to be available at the University of Pittsburgh when a MEG unit is installed in the spring of 2005 as part of the department’s Center for Image-Guided Neurosurgery.

Parkkonen’s talk covered current clinical applications of MEG—including epilepsy and presurgical functional mapping—and illustrated how the system is used in research.

MEG is considered by some as the most efficient method for tracking brain activity in real time. MEG measures the magnetic field produced by the brain and localizes the brain activity with no need to invasively enter the body. The result is a functional image of brain impulse pathways—a real-time map of brain activity. These images should help answer many questions regarding brain function during healthy periods and times of illness.

MEG offers a unique combination of both fine-spatial and fine-temporal resolution with millimeter and sub-millisecond accuracy. Unlike Computer Tomography (CT) and Magnetic Resonance Imaging (MRI), it helps see the brain “in action” rather than still images.

The list of new applications for magnetoencephalography is growing daily and includes presurgical mapping for neurosurgery as well as MEG MRI integration to enhance accuracy of surgical navigation and planning of radiation therapy.

For patients with drug resistant focal epilepsy, surgery is an increasingly common alternative and MEG is proving useful in research programs for locating epileptogenic areas in relation to functionally important cortical regions.

On-going research and development in other areas include cerebrovascular disease and mild brain trauma; psychiatric disorders, such as schizophrenia and depression; learning disorders, such as dyslexia; as well as normal cognitive functions underlying memory and language.

When operational this spring, the university will be one of a select few centers around the world with MEG capabilities.

CIRCL Webcast Wins LOLA Award

The Center for Injury Research and Control’s (CIRCL) webcast “Car Crashed During Pregnancy” was selected as the “Most Compelling or Engaging Online Learning Moment” in the recent 2004 Live Online Awards (LOLA). The awards, presented by LearningTimes.org, recognize outstanding achievement in the design, delivery and production of live online learning events.

New Research Grants


Visiting Lectures

• Amin Kassam, MD, was the first ever Hitelberger Lecturer at the American Neurotology Society Meeting in New York, September 18.

• Dr. Kassam was the Michael T. Richards Visiting Lecturer at the University of Ottawa, November 18-19.

• L. Dade Lunsford, MD, gave the keynote speech at the Annual Meeting of Taiwan Neurological Society and the 5th Congress of Asian Society for Stereotactic, Functional and Computer Assisted Neurosurgery in Kaohsiung, Taiwan, November 22.

• Douglas Kondziolka, MD, served as visiting professor at Columbia University, December 7-8.

Announcements

• Richard Spiro, MD, was promoted to full-time assistant professor of neurological surgery.

• C. Edward Dixon, PhD, was elected councilor of the National Neurotrauma Society for the 2004-07 term.

• Dr. Lunsford joined the board of directors of the Tri-century Insurance Company. Dr. Lunsford is also a board member of the Pittsburgh Opera and is chair of the UPMC Rehabilitation Hospital board.

Welcome

Nancy Cole, nurse to Matt El-Kadi, MD, PhD; Erin Donovan, Tri-State Neurological Associates physician assistant; Robin Lampenfeld, Tri-State physician assistant; Patricia Taylor, nurse to Adnan Abla, MD, Maureen Worst, nurse to Ghasan Bejjani, MD, Stacey Johnson, secretary to Dr. Bejjani; Jennifer Schmigel, senior adm. assistant.

Upcoming Events

• February 23: Visiting Lecture Series. Phillip Purdy, MD, director of neuroradiology and professor, department of radiology, University of Texas Southwestern Medical Center. “Neurosurgical Access to the Brain by Lumbar Puncture,” 4:00 p.m., main conference room, B-467, UPMC Presbyterian. Contact Melissa Hawthorne at (412) 647-6358 for more information.

• February 26-27: Management of the Critical Care Patient. Covers the systemic, skeletal and soft tissue considerations in managing critical care patients. This course is intended for senior residents having a keen interest in trauma care. UPMC 11th Floor conference rooms. Phone (610) 719-5665 for more information.

• March 14-18: Principles and Practice of Gamma Knife Radiosurgery. Training course targeted at neurosurgeons, radiation oncologists and medical physicists interested in Gamma Knife radiosurgery certification. The next course date is May 9-13. Contact Charlene Baker at (412) 647-6250 for more information.

Yonas Accepts Chairmanship at New Mexico

The Department of Neurological Surgery is proud to announce that Howard Yonas, MD, has accepted the position of chair of the Department of Neurosurgery at the University of New Mexico. We wish him the best of luck as he pursues this exciting career opportunity.

Dr. Yonas’ new patient practice effectively closed here December 31, 2004. In transition, Michael Horowitz, MD, director of the Center of Endovascular Therapy, has assumed Dr. Yonas’ vascular duties while Dr. Spiro and Kevin Walter, MD, have assumed the trauma responsibilities.

If you have any clinical questions regarding this transition, please contact Jocelyn Koessler at (412) 647-7614.
Department offers advanced radiosurgery, endoscopic, spinal surgery training

(continued from page 1)

spinal procedures, including techniques in fusion and non-fusion, operative exposure, adjuvant treatments for pain related to spinal disease. Attendees are spine surgeons and associated staff such as general and vascular surgeons as well as physician assistants.

William Welch, MD, Spine Services Division director, is the local chair and Peter Gerszten, MD, is the co-host along with an invited co-host from outside the UPMC Health System. Residents and spine faculty are recruited to assist in the theoretical and practical training.

A highly specific and unique feature of the course is the cadaver training. With the assistance of the University of Pittsburgh’s Department of Anatomy, a number of models are provided for hands-on training. An “operative-type” environment is maintained with the use of surgical assistants and fluoroscopy.

**Gamma Knife Radiosurgery Training for Nurses**

A three-day basic training course for nurses and other allied health care personnel interested in providing clinical care for patients undergoing Gamma Knife radiosurgery treatment.

Attendees learn proficiency in the practical aspects of patient care during stereotactic radiosurgery using the Leksell Gamma Knife. Principles of device management, patient preparation, patient education, neuroimaging, and post-radiosurgery care are discussed. Drs. Lunsford and Kondziolka are co-directors for this course, also.

**Gamma Knife Radiosurgery for Brain Metastases**

An online continuing medical education course discussing the treatment choices and management strategies regarding brain metastases is available through the University of Pittsburgh’s Health Sciences website at cme.health.pitt.edu.

Content for this course, which includes videos and a slide presentation, was developed and presented by Drs. Lunsford and Kondziolka.

**Gamma Knife Radiosurgery for Acoustic Neuromas: Sorting out Treatment Options**

An online continuing medical education course discussing the different treatment options for acoustic neuromas and the efficacy and applicability of Gamma Knife surgery in these cases. This course, developed by Drs. Lunsford and Kondziolka, is also available through the University of Pittsburgh’s Health Sciences website.

Further information on these courses is available by calling us at (412) 647-3685. You can also access full information on each course—programs, dates, speakers, registration options, etc.—by visiting our website at www.neurosurgery.pitt.edu.