



Spine Services Division offers cutting edge surgical care; high patient satisfaction

by Adam S. Kanter, MD, and
Peter C. Gerszten, MD, MPH

The Department of Neurological Surgery has a long tradition of cutting edge surgical care for all aspects of spine disease. The Neurological Surgery Spine Services at the UPMC Presbyterian campus continue to lead innovations in spine care nationally and internationally. Many minimally invasive surgical techniques were either developed or scientifically validated for more widespread use by members of the department. Recent improvements have also taken aim at enhancing access to the highest quality spine care in western Pennsylvania.

Adam S. Kanter, MD, David O. Okonkwo, MD, PhD, Peter C. Gerszten, MD, MPH, and John J. Moossy, MD, remain at the forefront of this modernization of medicine, paving the way through technological advances allowing for high patient satisfaction.

Dr. Kanter leads the minimally invasive spine surgery division and has made considerable contributions to the global expansion of lateral access spine surgery, teaching his techniques around the world. In the past year alone, Dr. Kanter has been honored as one of America's Top Docs—as published in *Pittsburgh Magazine* (May 2013), in addition to receiving the Patient's Choice Award (October 2012), and Most Compassionate Doctor Award (December 2012). Dr. Kanter's academic and clinical focus is towards improving patient outcomes through smaller surgical incisions and minimal tissue destruction, relentlessly pushing the envelope of innovation to get patients back to full and functional capacity faster than ever before.

Dr. Okonkwo leads the scoliosis/spinal deformity and neurotrauma components of the program and remains the region's leading expert in traumatic central nervous system injury. His research team comprises one of the premier clinical neurotrauma research programs, with several nationally funded clinical studies investigating novel therapeutic techniques. Dr. Okonkwo has also been honored as one of America's Top Docs (*Pittsburgh Magazine*, May 2013), in addition to broad recognition of his expertise in the care of scoliosis and other spinal deformities.



University of Pittsburgh Spine Service Division faculty, John J. Moossy, MD (Center for Pain Management director), David O. Okonkwo, MD, PhD (scoliosis and spinal deformity program director and neurotrauma program director), Adam S. Kanter, MD, (minimally invasive spine surgery director) and Peter C. Gerszten, MD, MPH (percutaneous spine services director).

As featured in the *Pittsburgh Gazette* (July 23, 2012), *Pittsburgh Magazine* (May 2012), and The Discovery Channel (July 28, 2012), Drs. Kanter and Okonkwo have united their respective niches of minimally invasive techniques and spinal deformity to enable the treatment of complex conditions such as scoliosis and traumatic lumbar fractures in a minimally invasive fashion. Through the techniques and access portals that they have helped to develop, UPMC Presbyterian is one of the few neurosurgical centers in the country where vertebral body fractures and scoliosis can be treated in a minimally invasive manner, enabling patients to get back to work and back to life faster and safer than traditional techniques of yesteryear.

Dr. Gerszten leads the percutaneous spine services division. He obtained a master of public health degree from the University of Pittsburgh Graduate School of Public Health. Dr. Gerszten's research focus is the application of outcomes research to spinal surgical

interventions, with a special interest in elderly patients and spinal tumors. He has developed and published extensively on the percutaneous treatments of a variety of spinal disorders and has one of the largest experiences in the world in the use of percutaneous cement augmentation for compression fractures.

Dr. Gerszten is a pioneer in the field of spine radiosurgery, and the techniques developed in Pittsburgh have been widely adopted around the globe. The spine radiosurgery program is one of the most experienced centers in the world in treating a wide variety of both malignant as well as benign spine tumors that is highly effective, safe, and painless, and avoids the risks associated with open surgery.

Dr. Moossy leads the Center for Surgical Pain Management. This program provides a variety of surgical options for the management of medically intractable pain syndromes. The range of treatment options for these patients varies

(continued on page 6)

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Evaluating what we do using data

The Department of Neurosurgery at the University of Pittsburgh has for decades provided the latest in surgical care to the people of western Pennsylvania as well as patients from around the world. In many instances, these novel and ground breaking approaches were developed by our own faculty members. However, as academicians, we are charged with not only the development, but also the *objective evaluation*, of the surgical procedures that we employ to care for our patients with neurosurgical disorders.

In this issue of our newsletter, I am proud to feature our Spine Services Division. Not only do our physicians provide the latest and safest techniques for spine care, but our patients are carefully evaluated before and after surgery with *patient* self-reported outcomes measures. This large, prospectively collected database allows members of our department to carefully evaluate the care provided to our patients by tracking both positive clinical outcomes as well as potential side-effects and complications of new surgical procedures.

It appears that our patients truly appreciate this extra care. The database has revealed an overall positive patient satisfaction rate following surgery for degenerative spine conditions of 92%. One example of such careful patient evaluation is featured in this edition. The database has demonstrated that the balloon kyphoplasty procedure

for compression fractures is very safe and highly effective for even patients over the age of 80.

Dr. Nduka Amankulor describes another manner in which data are used to guide patient care. Researchers have produced a voluminous database describing the molecular genetic compositions of glioblastomas, the most devastating primary brain malignancy. Molecular genotyping of these brain tumors is now being implemented by our faculty in order to guide surgical treatment strategies.

The department has formed the Western Pennsylvania Brain Aneurysm and AVM Support Group in order to provide a platform of education and support for patients and their families, once again by dissemination of information. Along these same lines, we describe how one patient's family and friends have joined together to support aneurysm research by members of the department.

Finally, we are proud to present the scientific contributions by our faculty and residents at this year's meeting of the American Association of Neurological Surgeons. It is our commitment as an academic department to continue to collect the data necessary not just to provide outstanding care for our patients today, but even better care for all neurosurgical patients in the future.

Peter C. Gerszten, MD, MPH

Peter E. Sheptak Professor of Neurological Surgery



Some Key Department Phone Numbers

Brain Function & Behavior (412) 647-7744	MEG Brain Mapping Center.. (412) 648-6425
Brain Trauma Research Ctr (412) 647-0956	Movement Disorders (412) 647-7744
Brain Tumor (412) 647-2827	Neurosurgical Oncology (412) 647-8312
Carotid Disease..... (412) 647-2827	Pediatric Neurosurgery (412) 692-5090
Cerebrovascular (412) 647-2827	Referrals (412) 647-3685
Clinical Neurophysiology (412) 647-3450	Residency Program (412) 647-6777
CyberKnife (412) 647-1700	Spine (412) 802-8199
Donations..... (412) 647-7781	Spine Radiosurgery (412) 647-9786
Endonasal Surgery (412) 647-6778	UPMC Mercy Neurosurgery.. (412) 471-4772
Endovascular (412) 647-7768	UPMC News Bureau (412) 647-3555
Gamma Knife (412) 647-7744	UPMC Presbyterian..... (800) 533-8762

Editor: Peter C. Gerszten, MD, MPH • **Production Editor:** Paul Stanick
Newsletter .pdf archive available at neurosurgery.pitt.edu/media-resources/neurosurgery-news
General Phone & Referrals: (412) 647-3685 • **Department e-mail:** neuroinfo@upmc.edu
Department YouTube Channel: www.youtube.com/neuroPitt

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Molecular genotyping of glioblastoma: A surgeon's perspective

by Nduka Amankulor, MD

Glioblastoma (GBM) is the most devastating form of primary brain cancer. Advances in surgical technique, radiation and chemotherapy have provided modest improvements in survival outcomes over the last two decades. Patients with GBM can expect to live 12 to 18 months after initial diagnosis and treatment.

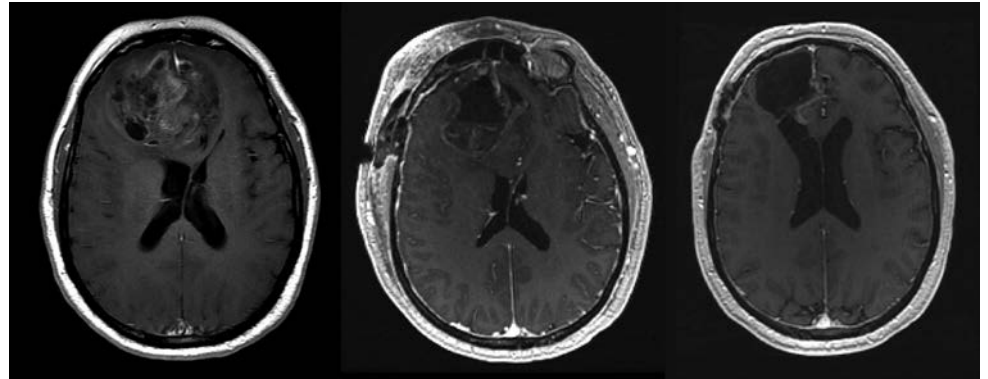
Over the last five years, researchers have produced a voluminous amount of data describing the molecular genetic composition of GBMs. These data have the potential to revolutionize the treatment for GBMs and allows investigators to begin crafting molecularly targeted therapies for this incurable disease. Molecular genotyping—the process of identifying the genetic makeup of a tumor—can also be used for neurosurgical decision making on GBM patients. The following is a summary of the current knowledge regarding GBM molecular subtypes.

GBMs can roughly be divided into primary and secondary tumors. Primary GBMs represent about 90% of all GBM cases and feature driver mutations in the Epidermal Growth Factor Receptor (EGFR) or NF1 (non-germline mutations). Secondary GBMs account for the remainder of GBM cases, and the genetic drivers for these tumors are IDH1, IDH2 and 1p/19q chromosomal deletion. Furthermore, these tumors become more aggressive through the acquisition of unique genetic alterations. For example, primary GBMs often acquire additional mutations in the PTEN gene, whereas secondary GBMs acquire p53 and PTEN mutations.

Patients with IDH1/2-mutated GBMs are more likely to respond to treatment than other GBM genotypes. The median overall survival of these patients is four years from the time of diagnosis, compared to just 13 months for other GBM cases. Currently, IDH mutation is the single best genetic prognostic factor for newly diagnosed GBM. This newly discovered mutation is over-represented in young people with GBM. Conversely, GBM patients with EGFR mutations are typically older at diagnosis than other GBM patients and usually live less than one year from the time of diagnosis.

Implementing Molecular Genotyping to Clinical Surgical Practice

Implementation of glioma genotyping data into clinical neurosurgery is currently not standard practice, in part because of the lack of formal guidelines for genotype-based surgical



T1 post-contrast MRI images from a 49-year-old man who presented with lethargy and disorientation. MRI showed a large bi-frontal heterogeneously enhancing mass. The patient underwent bi-coronal craniotomy for resection. Molecular pathology was consistent with a glioblastoma with mutant IDH1 status. The patient was treated with concurrent chemotherapy and involved-field radiation. Pre-operative, immediate post-operative and six-month follow up MRIs are displayed (from left to right). No radiographic progression was observed. The patient continues to do well and has returned to work full time.

treatment. However, for certain GBM patient populations, the use of molecular genotyping to decide surgical candidacy is intuitive and supported by some clinical evidence. In our multidisciplinary neurooncology practice, genotyping is most commonly used to decide whether patients with recurrent disease should be offered a second surgical resection. Patients with IDH mutations (or MGMT promoter methylation) who have failed initial treatment and have: 1) evidence of symptomatic tumor recurrence; 2) tumor volumes that exceed radiosurgery limits; and 3) safely resectable tumors are more likely to be offered surgery because of their favorable tumor genotypes.

Other GBM patient cohorts may also be candidates for surgical resection at recurrence, particularly those with the genotype-supported option of enrolling in clinical trials with specific molecularly-targeted therapies. Though most molecularly-targeted therapies for GBM are in the drug development phase of the drug discovery pipeline, certain immunotherapies are currently available and are showing excellent clinical results for particular GBM subtypes. For instance, the immunotherapy biotech firm Celldex® recently published outstanding results for a Phase I/Phase II molecularly-targeted peptide vaccine (CDX-110), which is specifically designed

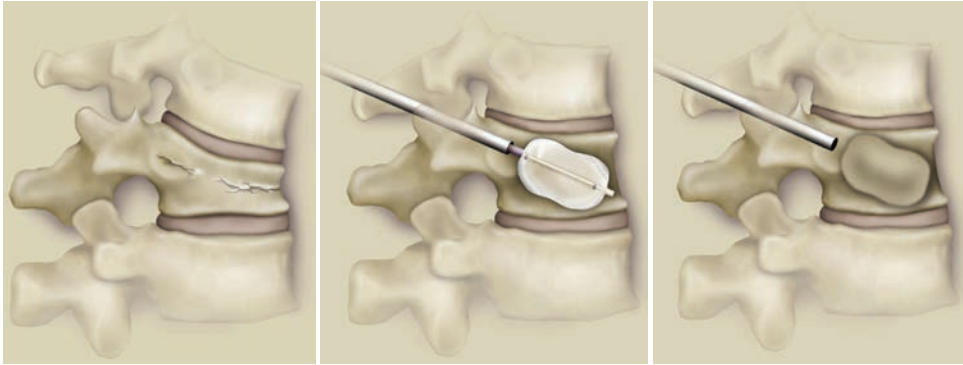
to elicit immunogenic responses against EGFRvIII-mutant GBM. Initial analyses revealed a median overall survival time of 26 months for CDX-110-treated EGFR-mutant patients, compared to only 13 months for an age and genotype matched historical cohort.

Based on these data, we are currently enrolling EGFRvIII-mutant recurrent GBM patients into the Celldex REACT-2 trial. Surgical resection in a significant portion of these patients will be followed by either CDX-110, Avastin, or CDX-110 plus Avastin. Remarkably, this treatment holds the potential to improve meaningful survival for a cohort of patients who typically have fewer treatment options compared to other GBM patients.

It is likely that advances in molecular genotyping of GBM will change patient stratification and treatment strategies. Patients with genotypically favorable tumors will continue to benefit from re-resection at recurrence; alternatively, patients with other molecular genotypes will be eligible for an increasing array of molecularly targeted therapies, such as CDX-110. No matter how we currently stratify these patients, careful molecular genotyping will help to significantly improve patient outcomes in the next decade as molecularly targeted therapies mature and begin to influence neurosurgical and medical oncological decision making. •

Type	Age @DX (yrs)	Median Overall Survival (months)	Mutation at Diagnosis	Mutations at Recurrence	Genotype-Targeted Treatment Options
Primary GBM	>60	~15 mo	EGFRvIII NF1	PTEN	CDX-110
Secondary GBM	<40	~36 mo	IDH1-2 1p/19q	P53 PTEN	None

Balloon kyphoplasty for compression fractures found very safe, effective for older patients



The kyphoplasty procedure treats vertebral compression fractures (left) by inserting an inflatable balloon within the vertebral body (middle). The inflated balloon creates a space within the center of the vertebral body for the injection of a bone cement (right).

by Peter C. Gerszten, MD, MPH

The percutaneous balloon kyphoplasty procedure is a well-accepted treatment for symptomatic osteoporotic compression fractures. The procedure is minimally invasive and is usually performed in an outpatient setting. The University of Pittsburgh Department of Neurological Surgery has one of the longest and largest experiences with the technique in the region. As one might imagine, the majority of patients who experience osteoporotic compression fractures are older individuals.

Kyphoplasty is a technique for vertebral compression fractures that involves the introduction of a cannula into the vertebral body followed by the insertion of an inflatable balloon. The balloon is inflated within the vertebral body. When the balloon is inflated, it creates a space within the center of the vertebral body for the injection of polymethylmethacrylate (bone cement).

In addition, the inflation of the balloon itself in the kyphoplasty procedure can also lead to some increase in the vertebral body height and therefore correction of the abnormal configuration of the vertebral body that existed as a result of the fracture.

After the balloon is removed, there is an empty space within the vertebral body that allows for the low-pressure injection of the polymethylmethacrylate into the cavity created by the balloon. Injection under low pressure in kyphoplasty has the advantage of decreasing the rate of leakage of polymethylmethacrylate either into the spinal canal or into the draining veins of the vertebral bodies.

Given the concern regarding a potentially greater morbidity and poor outcomes in very elderly patients who undergo the balloon kyphoplasty procedure, we undertook a study that specifically evaluated our very elderly patients. A consecutive series of 137 patients over age 80 who underwent the procedure over a six-year period were evaluated. The indication for treatment included pain unresponsive to non-surgical management in all cases.

The mean age for this group was 88 years. Common co-morbidities included diabetes, hypertension, atrial fibrillation, coronary artery disease, and a history of pulmonary embolism. Fractures from T4 to L5 were successfully treated in an outpatient setting. We found that no procedure had to be aborted due to medical issues at the time of surgery. Seventy-five patients had a single level treated, 50 had two levels treated, and 12 had three levels treated.

Back pain improvement was used as the primary outcome measure. The mean VAS score for back pain improved from 9 to 3.5 ($p < 0.0001$). There were no cases of myocardial infection, infections, cement extravasation, or new neurologic deficit. The results indicated that balloon kyphoplasty is a safe and highly effective treatment for symptomatic compression fractures, even for very elderly patients. The procedure can be safely performed in an outpatient setting. Age alone should not be an exclusion criterion for candidate patients.

For further information regarding minimally invasive treatments for compression fractures, please (412) 647-1700. •

Department forms aneurysm support group

The University of Pittsburgh Department of Neurological Surgery is dedicated to providing exceptional care for our patients, both in and out of the hospital. With this in mind, the department has formed the Western Pennsylvania Brain Aneurysm and AVM Support Group, designed to provide a platform of education and support for patients—and their families—struggling with the physical and emotional problems associated with aneurysms and AVMs.

The support group has been specifically designed to combine education about aneurysms and AVMs, as well as provide a look into the different aspects of care. Monthly speakers in such fields as neuropsychology, research, neurological surgery, stroke and critical care medicine allow patients and families to ask questions regarding their diagnosis and deficits—both emotional and physical. After each speaker, the floor is open to anyone who would like to share their concerns, fears, hopes, triumphs and effective coping mechanisms.

By providing education and support, patients and families begin to understand that their diagnosis and deficits are multifaceted and recovery is an ongoing process.

The Western Pennsylvania Brain Aneurysm and AVM support group is a division of the National Brain Aneurysm Foundation (NBAF), the world's only nonprofit organization solely dedicated to providing critical awareness, education, support and research funding to reduce the incidence of brain aneurysm ruptures.

The aneurysm and AVM support group is open to any person or family member diagnosed with either a brain aneurysm or an AVM, regardless of hospital affiliation or treatment status.

Support group meetings are held monthly in the Department of Neurological Surgery main conference room located in Suite B-400 of UPMC Presbyterian. Parking is available in an adjacent garage for \$5. Refreshments are provided.

For more information, please contact Emily Guerriero, PA-C—support group coordinator—at (412) 864-2294.

Uncommon friendship leads to extraordinary research

How a memorial to a friend helps unlock the mysteries of aneurysms

by James Olsen

Childhood friendships can last a lifetime. Some last even longer. On the appointed day each summer, friends and family of James Altieri gather at a favorite Pittsburgh-area golf course to celebrate Jim's life, reaffirm friendships, and to raise money to support aneurysm research at the University of Pittsburgh's Department of Neurosurgery.

Jim was always active in sports. He played football and competed in track at Hampton High School in Allison Park, and also enjoyed hockey and softball. Benshaw, Inc., a mechanical parts manufacturing firm, hired him immediately after graduation, and eventually promoted him to a sales staff position. Jim maintained excellent health, and enjoyed an ever-expanding group of friends. "He made friends easily," observed his mother, Nancy Altieri, "people just seemed to like him."

Jim died in early 2008 at the age of 33, within a few weeks of the diagnosis of his intracranial aneurysm, leaving behind a mourning family and an unusually close group of friends and associates.

An aneurysm is a balloon-like bulge of a blood vessel that can occur almost anywhere in the body, in people of all ages," explains Brian Jankowitz, MD, assistant professor of neurosurgery, co-director of the UPMC Center for Neuroendovascular Therapy and director of the department's neuroendovas-

cular fellowship program. "The presence of an aneurysm can often go undetected for years, and the cause may never be known. When an aneurysm occurs inside the head, the impact can be immediate and, as was the case for Mr. Altieri, potentially deadly."

"The gifts from the family and friends of Jim Altieri provide inspiration and vital support for our research...these gifts sustain our research, and in a very real way, save lives."

- Brain Jankowitz, MD

Jim's friends surrounded him until the end. They visited him in the hospital, sometimes taking the "overnight" watch, always ready with cheerful words for Jim and his family. And when he passed away, they helped the grief-stricken family make funeral arrangements. "My husband and I were very distraught," recalled Nancy. "I cannot express how grateful I am to Jim's friends for their help and support during that difficult time."

In addition to golf, the annual James Altieri Memorial Golf Event also features a raffle with donated prizes, and a card game known by many as Texas Hold 'Em. "Jim was not a big golfer, but he enjoyed poker and getting together with friends," explained event organizer Anthony (Tony) Halli. "He would have enjoyed this event."

commented Tony. "We knew this is what Jim would have wanted." The proceeds from this year's event will benefit the research of Dr. Jankowitz and others like him involved in aneurysm research.

"The gifts from the family and friends of Jim Altieri provide inspiration and vital support for our research," notes Dr. Jankowitz with gratitude. "Together with the generosity of other individuals and organizations, these gifts sustain our research, and in a very real way, save lives."

We gratefully acknowledge the family and friends of Jim Altieri for their generous support of our aneurysm research. For more information about how honor and memorial gifts can support research, please contact Jim Olsen at (412) 647-7781 or ojim@pmhsf.org.



Every summer, friends and family of James Altieri—who died of an intracranial aneurysm in 2008 at the age of 33—gather at a favorite Pittsburgh-area golf course to celebrate Jim's life, reaffirm friendships, and to raise money to support aneurysm research at the University of Pittsburgh.

Department well-represented at 2013 AANS meeting in New Orleans

Several University of Pittsburgh Department of Neurological Surgery physicians and residents presented at the 81st American Association of Neurological Surgeons annual scientific meeting held in New Orleans, LA, April 27 through May 1.

Founded in 1931, the American Association of Neurological Surgeons (AANS) is a scientific and educational association with over 8,000 members worldwide.

Practical Clinics

“Spinal Stabilization, Fusion And Instrumentations: Biomechanics And Techniques.” Co-Directors: Kaushik Das, Langston T. Holly. Faculty: Virany H. Hillard, **Adam S. Kanter**, Saad Abul Khairi, Nicholas Theodore, Eve C. Tsai .

“Update on Spinal Radiosurgery.” Director: **Peter C. Gerszten**. Faculty: Lilyana Angelov, Steven D. Chang, James McInerney, Jason P. Sheehan, Jason Andrew Weaver, Kevin C. Yao.

“MIS: Direct Lateral Retroperitoneal Transposas Fusion.” Co-Directors: **Adam S. Kanter**, Juan Santiago Uribe. Faculty: Dean Chou, Andrew T. Dailey, Larry T. Khoo, Allan D. Levi, John C. Liu, John E. O’Toole, William R. Taylor.

“Head Trauma: Current Treatments And Controversies With Hands-On Practical Session in Brain Monitoring.” Co-Directors: **David O. Okonkwo**, Shelly D. Timmons. Faculty: Gregory Hawryluk, Jack I. Jallo, Peter D. Le Roux, Joshua E. Medow, Julie G. Pilitsis, Eve C. Tsai.

“Cranial Endoscopy: State-of-The-Art.” Director: Alan R. Cohen. Faculty: **Johnathan A. Engh**, Michael R. Gaab, Daniel J. Guillaume, J. Andre Grotenhuis, Costas G. Hadjipanayis, Carl B. Heilman, Tenoch Herrada-Pineda, Subash Lohani, Henry W. S. Schroeder, Theodore H. Schwartz, Mark M. Souweidane.

“Neurotrauma Critical Care Review And Update for Practicing Neurosurgeon.” Co-Directors: M. Ross Bullock, Patricia B. Raksin. Faculty: Perry A. Ball, **Robert M. Friedlander**, oshua E. Medow, **David O. Okonkwo**, Sherry L. Taylor, Philip A. Villanueva.

Scientific Session I: Tumor

“Gamma Knife Radiosurgery For The Management of Nonfunctioning Pituitary Adenomas:

A Multicenter Study.” Authors: Jason P. Sheehan, Robert Starke, David Mathieu, Byron Young, Penny Sneed, Veronica Chiang, John Lee, **Hideyuki Kano**, Kyung-jae Park, **Ajay Niranjan**, Douglas Kondziolka, Gene Barnett, Stephen Rush, John Golfinos, **L. Dade Lunsford**.

Scientific Session V: Cerebrovascular

“Stereotactic Radiosurgery For Spetzler-Martin Grade III Arteriovenous Malformations: The University of Pittsburgh Experience in 472 Consecutive Patients.” Authors: **L. Dade Lunsford**, **Hideyuki Kano**, Douglas Kondziolka, **John Flickinger**, Huai-che Yang, Kyung-Jae Park, Thomas Flannery, Daniel Tonetti, **Ajay Niranjan**.

Scientific Session VI: Neurotrauma

“Glial Fibrillary Acidic Protein Breakdown Products For The Diagnosis of Intracranial Injury.” Authors: **David Panczykowski**, John Yue, **Ava Puccio**, Inoue Tomoo, Geoffrey Manley, **David O. Okonkwo**.

Plenary Session II

“10 Degree-of-Freedom Neuroprosthetic Control by an Individual With Tetraplegia.” Authors: **Elizabeth C. Tyler-Kabara**, Jennifer Collinger, Brian Wodlinger, John Downey, Wei Wang, Douglas Weber, Angus McMorland, Meel Velliste, Michael Boninger, Andrew Schwartz.

AANS/CNS Tumor II Section Session

“The Role of Stereotactic Radiosurgery For Intracranial Hemangioblastomas: An International Multicenter Study.” Authors: **Hideyuki Kano**, Jason Sheehan, Masaaki Yamamoto, Byron Young, Christopher Duma, David Mathieu, Heyoung McBride, Takashi Shuto, Yoshiyasu Iwai, Gillian Harrison, Douglas Kondziolka, **L. Dade Lunsford**.

Nurse/Physician Extenders Program

“Advancements in Neurotrauma Care.” Moderator: Twyila Lay. Speakers: **David O. Okonkwo**, Peter J. Hutchinson, Eve C. Tsai, Richard B. Rodgers.

Breakfast Seminar

“How I Do It: Acoustic Tumors.” Moderator: Frederick G. Barker II. Panelists: Michael J. Link, **L. Dade Lunsford**, Daniel R. Pieper, Marc S. Schwartz.

“Return to Play After Sports Injury II—Body Injury For Spine.” Moderator: **Joseph C. Marron**. Panelists: Daniel C. Lu, Srinivas Prasad.

“Max Out The Web to Improve Your Practice.” Moderator: Chaim B. Colen. Panelists: **J. Bradley Bellotte**, Jonathan E. Hodes, Brian T. Ragel, Ann R. Stroink.

“Vertebral Column Tumors.” Moderator: Mark H. Bilsky. Panelists: **Peter C. Gerszten**, Ehud Mendel, Laurence D. Rhines, Daniel M. Sciubba.

Dinner Symposia

“Stereotactic Radiosurgery and Resection of Tumors.” Panelists: Gene Barnett, Steven N. Kalkanis, **L. Dade Lunsford**.

Posters

“Prospective evaluation of neuropsychiatric co-morbidities in older adults undergoing surgical treatment of lumbar spine disease.” **Gerszten PC**, Phillips HP, McGovern J, Weiner DK, **Kanter AS**, **Okonkwo DO**, Marron M, Karp JF.

“Leukoencephalopathy in survivors of brain metastases from breast cancer treated by whole brain radiation therapy and radiosurgery versus radiosurgery alone.” **Edward Monaco, III**, Timothy Stokes, **Hideyuki Kano**, **L. Dade Lunsford**, Douglas Kondziolka.

“Obstetrical Brachial Plexus Injury: Patient Demographics and Surgical Outcomes in the Pediatric Populatio.” **Kimberly Foster**, Oluwaseun Adetayo, Lorelei Grunwald, **Stephanie Greene**.

“The Dynamic Gait Index (DGI) Score Serves as a Predictor of Gait Improvement During Temporary Cerebrospinal Fluid Diversion in Patients with Suspected Normal Pressure Hydrocephalus.” **Zachary Tempel**, **Nathan Zwagerman**, **David Panczykowski**, Michael Horowitz.

“Glial Fibrillary Acidic Protein Breakdown Products for the Diagnosis of Intracranial Injury.” **David Panczykowski**, John Yue, **Ava Puccio**, Inoue Tomoo, Geoffrey Manley, **David O. Okonkwo**.

“Surgical Management of primary cavernous sinus tumors.” **Maria Koutourousiou**, **Georgios Zenonos**, **Juan Fernandez-Miranda**, **Carl Snyderman**, **Paul Gardner**.

Richardson Helps Bring DBS Procedure to Poland

R. Mark Richardson, MD, PhD, was an invited guest of the Medical Center of Postgraduate Education in Warsaw, where he helped the Bródnowski Regional Hospital perform the first two interventional-MRI deep brain stimulation (DBS) cases in Poland, establishing the center as only the second such facility in Europe to perform this procedure.

The milestone event drew wide spread attention across Poland with extensive coverage on national television. Dr. Richardson also met with the first lady of Poland, Anna Komorowska, to discuss the procedure and the implications of this technology for future applications, such as delivery of gene therapies.

“Establishing the interventional-MRI DBS program in Warsaw allows the center to move to the leading edge of real-time MRI-guided neurosurgery,” commented Dr. Richardson. “Poland is investing significant resources in developing the infrastructure necessary for this center to become a future leader in Europe for these procedures, potentially including MRI-guided gene therapy.”

Dr. Richardson’s brain stimulation program at the University of Pittsburgh, is the only one in Pennsylvania that offers both awake frame-based DBS and asleep interventional-MRI based DBS to treat Parkinson’s disease, essential tremor, and pediatric movement disorders.

Gerszten Installed as Sheptak Professor

• **Peter C. Gerszten, MD, MPH**, professor of neurological surgery and radiation oncology and director of the department’s percutaneous spine service, was formally installed as the Peter E. Sheptak Professor of Neurological Surgery at the University of Pittsburgh, April 18.

University Senior Vice Chancellor for the Health Sciences and Dean of the School of Medicine Arthur S. Levine, MD, presented Dr. Gerszten with a medal to designate the honor in the official ceremony attended by Dr. Sheptak, family, friends and colleagues. In the past ten years, Dr. Gerszten has pioneered the development of minimally invasive techniques to treat spinal disorders and spinal tumors. He has also introduced and advanced spine radiosurgery at the University of Pittsburgh and has helped establish the university as a world leader in this area.

Pitt Neurosurgeons Cited Among Best

Several University of Pittsburgh neurosurgeons were named among greater Pittsburgh’s top doctors in their field in a national survey published locally in *Pittsburgh Magazine*.

The list includes: **Adnan Abla, MD**; **Daniel M. Bursick, MD**; **Hikmat (Matt) El-Kadi, MD, PhD**; **Johnathan Engh, MD**; **Juan C. Fernandez-Miranda, MD**; **Robert M. Friedlander, MD**; **Paul A. Gardner, MD**; **Adam S. Kanter, MD**; **L. Dade Lunsford, MD**; **Joseph C. Maroon, MD**; **John J. Moossy, MD**; **David O. Okonkwo, MD, PhD**; **Ian Pollack, MD**; **Raymond Sekula, MD**; and **Elizabeth Tyler-Kabara, MD, PhD**.

Department Honors Graduating Residents

A black-tie graduation reception and dinner was held Saturday, June 22 at the Fox Chapel Golf Club honoring 2013 chief residents **Juan J. Martin, MD**, **Edward A. Monaco, III, MD, PhD**, and **Matthew Tormenti, MD**, on their completion of the University of Pittsburgh’s seven-year neurological surgery residency program.

After graduation, Dr. Martin joined Central Minnesota Neurosciences, in Sartell, MN, while Dr. Tormenti is headed to Princeton Brain & Spine Care in Princeton, NJ. Dr. Monaco is staying at the University of Pittsburgh, working with L. Dade Lunsford, MD, in the Center for Image-Guided Neurosurgery.

Annual teaching awards were also announced at the dinner with Dr. Monaco selected as best resident teacher by the staff and **R. Mark Richardson, MD, PhD**, and **John J. Moossy, MD**, sharing the best faculty award as selected by the residents.

The department also welcomed five new residents **Amir H. Faraji, MD, PhD**; **Gurpreet S. Gandhoke, MD**; **David J. Salvetti, MD**; **Samuel S. Shin, MD, PhD**; and **Benjamin Zussman, MD**.

In the News

• **Joseph Maroon, MD**, was noted in *USA Today*, June 8, for his role in a well-documented 2009 Ben Roethlisberger concussion incident. The case was cited at a national concussion conference for its proper management of concussions.

Dr. Maroon was also interviewed on KDKA Radio, June 1, talking about concussions, the IMPACT test and sports medicine in general.

Additionally, Dr. Maroon was quoted in a *Pittsburgh Post-Gazette* article, June 7, regarding a new non-invasive hand-held scanner that can detect internal and possibly life-threatening bleeding from head injuries.

• **Robert Friedlander, MD**, was quoted in a *Pittsburgh Post-Gazette* article, April 26, talking about a new study on amyotrophic lateral sclerosis (ALS) symptoms in mice that researchers believe holds promise for treating the disease.

• **Elizabeth Tyler-Kabara, MD, PhD**, was interviewed in *U.S. News and World Report*, April 30, regarding a ground breaking research program studying how a brain interface device can allow a quadriplegic patient to control a robotic arm.



Congratulations

• **Ian F. Pollack, MD**, was selected to serve as the editorial board chairman of the *Journal of Neurosurgery: Pediatrics*.

• **Elizabeth Tyler-Kabara, MD, PhD**, and other investigators received one of the Clinical Research Forum’s Annual Top 10 Clinical Research Achievement Awards for their brain interface/robotic arm study.

• A presentation on stereotactic radiosurgery for intracranial hemangioblastomas, coauthored by **Hideyuki Kano, MD**, and **L. Dade Lunsford, MD**, was awarded the Leksell Radiosurgery Award at the American Association of Neurological Surgeons Annual Scientific Meeting held in New Orleans, LA, April 27-May 1.

Prominent Lectures

• **Juan Fernandez-Miranda, MD**, was the invited guest and director of the microsurgical neuroanatomy course at the 63rd congress of the French Speaking Society of Neurosurgery (SNCLF) in Quebec, Canada May 27-28.

• **Paul A. Gardner, MD**, and **Carl H. Snyderman, MD, MBA**, presented a course on endoscopic endonasal surgery of the cranial base and pituitary fossa at the Taipei Veterans General Hospital, May 3-4, in Taipei City, Taiwan. The two taught, presented additional lectures and performed surgery at various other Chinese hospitals, May 5-12. •

Department of Neurological Surgery
University of Pittsburgh Medical Center
UPMC Presbyterian/Suite B-400
200 Lothrop Street
Pittsburgh, PA 15213
(412) 647-3685
neuroinfo@upmc.edu

www.neurosurgery.pitt.edu



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S U M M E R 2 0 1 3 • V O L U M E 1 4 , N U M B E R 3

Spine Services Division offers cutting edge surgical care; high patient satisfaction

(continued from page 1)

widely. Neuroaugmentation procedures include spinal cord stimulation and intrathecal opioids, both highly effective treatment techniques. Dr. Moossy is one of the most highly experienced surgeons in the region for such neuroaugmentation procedures, and he is also an expert in ablative neurosurgical procedures such as cordotomy and dorsal root entry zone (DREZ) lesions.

The members of the Spine Services Division have additionally joined forces to create a unique spine surgery outcomes database. All patients who undergo elective spine surgery such as anterior cervical discectomy, lumbar microdiscectomy, and lumbar laminectomy with or without fusion are prospectively enrolled in this cohort clinical investigation. This database analytically tracks patients throughout their spinal surgery treatment, from prior to surgery, to surgery, and through their recovery.

Patient self-reported questionnaires are completed using the latest touchscreen tablets

so the data can be analyzed at each office visit with the aim to ensure every patient's return to functionality is as efficient and effective as possible. On a grander scale, the database enables instant pooling of patient population data, so that questions can be asked regarding a specific problem or procedure, and objective answers can be obtained based upon patient-centered evidence rather than anecdotal declaration.

With over a thousand patients now enrolled and followed, statistical analyses can be used to answer such important questions as rates of complications for a specific procedure, relative clinical outcomes of older versus younger patients, and a comparison of outcomes for patients who undergo lumbar fusion versus those who do not spondylolisthesis. This unique collaboration among our faculty members has thus facilitated the expeditious evaluation of surgical procedures and their outcomes in an unbiased manner, thereby leading the way for a wide array of clinical research studies to provide definitive evidence for such clinical success.

In its first two years of collection, the database has revealed an overall patient satisfaction rate following surgery for degenerative conditions of the spine at an astounding 92%! This satisfaction rate not only greatly outperforms the national norms for spine surgery, but it also reinforces the value of precision medicine: delivering the right treatment to the right patient at the right time.

The Neurosurgical Spine Division at the University of Pittsburgh is a multidisciplinary organization which works closely with specialists in the fields of physical therapy, occupations therapy, physical medicine and rehabilitation, interventional neuroradiology, and pain management among many other specialties. Specialists from these fields work together as a unified group to provide the highest quality care for patients with spinal disorders available anywhere.

Please visit our website at www.neurosurgery.pitt.edu/centers-excellence/spine-services to find more information on our services as well as detailed contact information •