Volume 3, Number 3 Summer 2002

UNIVERSITY *of* PITTSBURGH
neurosurgerynews

Published by the University of Pittsburgh Department of Neurological Surgery • • • www.neurosurgery.pitt.edu

Gamma Knife radiosurgery program treats 5000th patient

On May 23, 2002, the Center for Image-Guided Neurosurgery performed gamma knife radiosurgery on its 5000th patient. Much has happened in the field of radiosurgery since the first patient had the procedure on August 14, 1987.

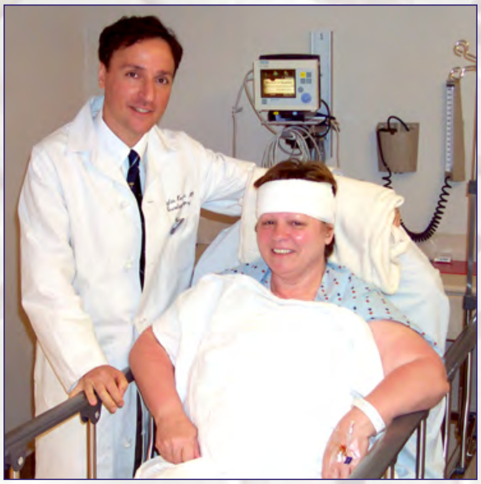
Over the last 15 years, no center in this country has managed more patients, and no center has performed more research, nor published more reports than the University of Pittsburgh group. The initial team of Dr. L. Dade Lunsford, Dr. John Flickinger, David Bissonette, and physicist Ann Maitz still work daily in the program. Dr. Doug Kondziolka joined the group in 1989.

Gamma knife radiosurgery achieves destruction of an intracranial target through the precise focus of image-guided radiation. Radiosurgery is one of several "minimally invasive" techniques for brain disorders, and has received great interest as an alternative to either conventional surgical resection, or to fractionated radiation therapy.

Surgery using the gamma knife is safer than many existing procedures because patients need not undergo risky, open-skull procedures and adult patients do not require general anesthesia. It causes few side effects, and patients usually leave the hospital within 24 hours.

Presently, radiosurgery is used for the management of patients with benign or malignant brain tumors, intracranial arteriovenous malformations (AVMs), trigeminal neuralgia, and selected movement disorders such as disabling tremor. It has become widely used for patients with acoustic neuromas and brain metastases because of the excellent clinical and imaging outcomes achieved.

Dr. Kondziolka with 5000th Gamma Knife patient.



The University of Pittsburgh has housed the first U.S. model U Gamma Knife (1987), model B unit (1996), and the new robotic model C unit (2000). Pittsburgh is the only facility in the country with two machines allowing treatment of approximately 600 patients annually.

5000 Gamma Knife Radiosurgeries at UPMC

Indication	*Number of Patients*
Brain Metastases	1120
Arteriovenous Malformations	916
Acoustic Neuromas	774
Meningiomas	713
Trigeminal Neuralgia	460
Glial Tumors	450
Pituitary Tumors	176
Cavernous Malformations	96
Other tumors	75
Other Schwannomas	55
Thalamotomy for tremor	52
Chordoma/Chondrosarcoma	37
Craniopharyngiomas	28
Hemangioblastoma	25
Pineal Region Tumors	23

The recently introduced robotic model C unit with automatic patient positioning system (APS) permits greater accuracy in radiation-dose planning, provides faster treatment and allows more flexibility in dose delivery, according to a study published in the February issue of *Neurosurgery*.

The study also found that because of the APS system, multiple uses of different sizes of collimator helmets — used to focus the radiation — were not needed, saving time and making the procedure more comfortable for patients.

"We found the accuracy of the robotic system allows us to use greater numbers of smaller and narrower beams of radiation," says Dr. Kondziolka. "This results in steeper falloffs of the radiation outside the target area, resulting in a more conformal dose plan and a potentially better outcome for the patient,"

Important collaborators in the radiosurgery program include faculty in neuroradiology (Drs. Charles Jungreis, Emanual Kanal, and Carolyn Meltzer), radiation oncology (Drs. Melvin Deutsch, John Varlotto, Jr., Shalom Kalnicki), medical oncology (Drs. John Kirkwood, Sanjiv Agarwala, Adam Brufsky, Chandra Belani, Joseph Baar, Barry Lembersky, David Friedland), neurology (Dr. Mark Scheuer), and many others.

(*see* **5000th Patient** *on page 6*)

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Spotlight: Graduating Resident

Dr. Atul Patel

Dr. Atul Patel is one of three graduating chief residents in neurological surgery at the University of Pittsburgh, having chosen this field while a medical student at the University of California, San Francisco. Initially, Dr. Patel was fascinated with the mind/body interface, centered in the brain and conveyed by the spinal cord, and with its potential to both affect and be affected by disease processes. His enjoyment of neuroanatomy led to a keen anticipation of his medical neurology rotation, which itself was ultimately tempered by the feeling of helplessness often encountered in dealing with this patient population.

In choosing the Department of Neurosurgery at the University of Pittsburgh, Dr. Patel believed and — after seven years of training — now confirms that "the greatest benefit of training at UPMC is the diversity and breadth of education received," Patel says, "When I compiled my results with six months left in my chief residency I had already completed about 1200 cases, including over 275 lumbar spine procedures, 150 cervical spine procedures, and 300 craniotomies.

The diverse interests of the large number of attending surgeons gave him the unique opportunity to learn particular skills from internationally respected experts in their fields that would otherwise have required subsequent fellowship training.

He learned Gamma Knife radiosurgery as well as stereotactic/functional procedures from Dr. L. Dade Lunsford and Dr. Douglas Kondziolka during a concentrated four-month rotation, was trained in microvascular decompressions for tic doloreaux and hemifacial spasm by Dr. Peter Jannetta, was taught about both operative and medical management of head-injured patients by Dr. Donald Marion, and was instructed in endoscopic endonasal pituitary surgery by Dr. Hae-Dong Jho and Dr. Amin Kassam.

▲ *Dr. Atul Patel*

"The list goes on and on," adds Dr. Patel. "Instruction in complex spine came from numerous attendings at UPMC. Eventually, my facility with thoraco-lumbar fusion procedures allowed me to serve as a clinical instructor with Dr. William Welch to teach these techniques to participants in the UPMC Center of Excellence courses. I feel fortunate to be so well trained in both open, complex spine procedures, including ALIFs, PLIFs, pedicle screw fusions, lateral interbody fusions and both anterior and posterior cervical fusion techniques, as well as minimally invasive spinal procedures such as IDETs, nucleoplasties, kyphoplasties and facet ablations. This training will allow me to use all modalities in providing comprehensive spine care for my patients in practice."

Dr. Patel became active in organized neurosurgery as one of twelve elected resident representatives to the joint Council of State Neurosurgical Societies of the AANS/CNS and as a resident member to the Joint Executive Committee of the AANS/CNS.

He also engaged in basic science research in molecular genetics, a long-standing interest of his which he will continue to explore in his future practice, and one that he believes will be of vital importance to understand as oncologic advancements are made in neurosurgical diseases. His research and clinical examinations have resulted in over 30 publications, published abstracts, or presentations. He was also awarded the Resident Teaching Award for the 2001-2002 year by the faculty in the Department of Neurosurgery.

Dr. Patel is currently assessing practice opportunities. He is excited to have received multiple offers and is evaluating them to determine which will afford him the proper environment to best employ the many skills learned during his residency training. ■

Chairman's Letter: Dr. L. Dade Lunsford

A vision of advances in the delivery of neurosurgical health care

Over the past five years, there are several significant events, technologies or innovations that continue to expand the field of neurological surgery. These advances will blend with future practice since they are in continual evolution.

Minimally invasive neurosurgical techniques.

Minimally invasive techniques comprise a wide variety of surgical procedures for the management of spinal disorders, brain tumors, vascular surgery of the nervous system, chronic pain conditions, epilepsy, and movement disorders. They include technologies which are both diagnostic and therapeutic. Currently the University of Pittsburgh Department of Neurosurgery performs more than 6,000 operations per year, half of which are minimally invasive procedures.

Examples include:

- Microvascular decompression for cranial nerve disorders (trigeminal neuralgia, hemifacial spasm);
- Percutaneous management strategies for chronic pain (glycerol rhizotomy for trigeminal neuralgia, dorsal column stimulation, intrathecal and epidural electrodes for pain implantation technologies);
- Gamma knife radiosurgery (5,000 procedures in 15 years);
- Minimally invasive spine surgery including microdisectomy, selective uncovertebrectomy, thoracoscopic disc removal, intradiscal electrothermia (IDET), and facet nerve blocks);
- Endovascular surgery.

Minimally invasive technologies represent important ways to reduce average length of stay, improve the quality of patient care and reduce hospital costs. When such strategies are used, average length of stay has been reduced to between one and 3.7 days in our neurosurgical department.

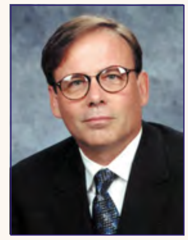
Unfortunately, professional reimbursement continues to fall, despite a broader application of bio-engineering minimally invasive technologies. In contrast, hospital revenues appear to be enhanced by the reduction in the average length of stay and by increasing the overall number of admissions to the institution.

Image Guidance

The increasing application of preoperative and intraoperative imaging (CT, MRI, PET) facilitated early recognition of disease states, accurate definition of the disease process, and definitive anatomic localization of the area of abnormality. Image guidance has been used broadly during stereotactic surgery, brain tumor resection, spinal surgery, and gamma knife radiosurgery. It has been used in our center widely: intraoperative CT (more than 5,000 cases), intraoperative MRI (more than 3,000 cases). It has widely replaced less useful imaging technologies such as fluoroscopy and ultrasound.

Bio-engineering Technology Transfer

Examples of technology transfer into clinical practice include the usage of Gamma Knife® radiosurgery and its evolution into application of robotic positioning systems. Robotics are also being used in the delivery of radiation for fractionated stereotactic technologies using the CyberKnife® System at Shadyside, as well as positioning of operative microscopes, such as the UPMC-Presbyterian (SurgiScope®). Advances in bio- engineering and robotics have permitted increased precision and also have facilitated the rapid introduction of enhanced visualization methodologies such as straight and angled endoscopes.



Molecular Neurosurgery

Advances in current investigational molecular technologies are likely to be expanded over the next five to ten years in the neurosurgical case load. The first of such projects are under way. As an example, cellular technologies (using a neuronal cell implant for stroke) have been pioneered by Dr. Douglas Kondziolka. The development of such cells, possibly transformed to be able to serve as dopamine or acetylcholine pumps, may be applicable to large numbers of patients suffering from degenerative brain disease (e.g. Parkinson's or Alzheimer's).

Cooperative and collegial research with molecular biology has introduced non-replicating herpes simplex vectors that can be used to deliver tumor suicide gene cocktails, genes which enhance response to radiation, or genes which can be placed into stem cells to enhance radiobiological repair or tumor apoptosis (cell death). These molecular technologies have widespread application into brain tumors, neurodegenerative disease, stroke, brain and spinal cord injury, epilepsy and possibly degenerative spine disease. Tumor vaccine research has been pioneered by Drs. Pollack and Okada.

Because of the large number of patients estimated to be effected by degenerative brain disease in the United States (30 million by the year 2020), it is believed that such technologies will be important over the next five to ten years. These vectors will be delivered to the brain using image guidance technique, usually done with stereotactic precision. As these technologies advance, additional physician, as well as allied health care practitioners will be necessary in order to attend to the rising estimated patient load.

Advances in Minimally Invasive Technologies

One example will be the conversion of current cerebrovascular surgery from exovascular to endovascular surgery. Using catheter techniques, endovascular specialists open closed blood vessels, dilate spastic blood vessels, remove blood vessel clots and coil aneurysms. In addition, the ability to open clogged blood vessels endovascularly (using stent technologies) as opposed to open carotid endarterectomy will lead to a revolution in the delivery of treatment of both thrombotic and hemorrhagic stroke within the brain. Minimally invasive techniques will also likely be used as part of endovascular delivery of radio-sensitizing agents

*(see **Vision of advances** on back cover)*

Regionalization of trauma care: Helpful or Harmful?

Dr. Marion
Director, Brain Trauma Research Center

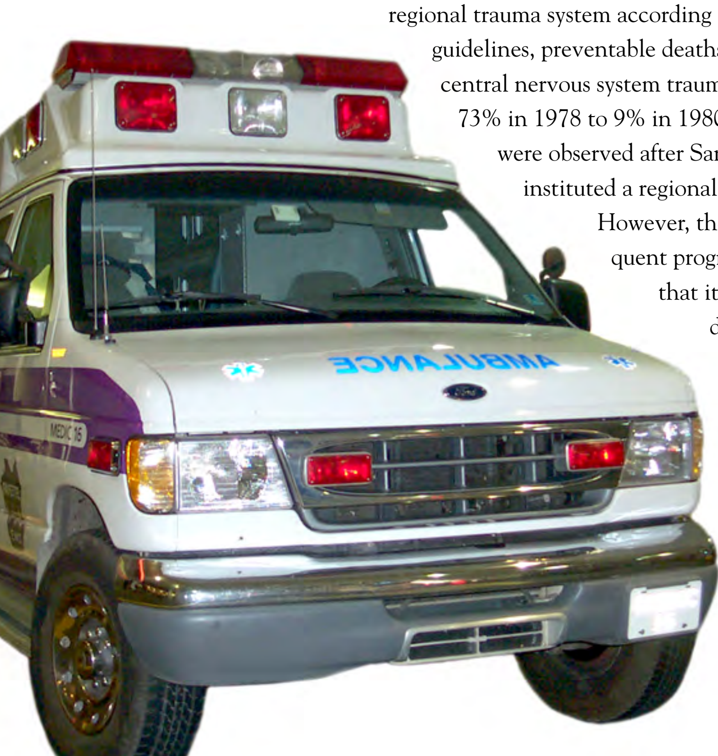
By Donald W. Marion, MD

The availability of high-quality, government-regulated trauma centers is often taken for granted by Pennsylvanians, but many states do not have such systems, and controversy continues regarding the benefits and cost of such centers.

The impetus to develop regional trauma systems and designated trauma hospitals originated with a 1966 National Academy of Sciences publication citing trauma as the leading cause of death in the first half of life and urging a national commitment to improve the delivery of emergency care. That same year, Robert J. Freeark and F. William Blaisdell were the first to establish formal trauma centers at Cook County Hospital in Chicago and San Francisco General Hospital, respectively.

In 1973, Congress passed the Emergency Medical Services System Act, which provided financial aid to states for coordinating EMS activities. A coordinated national plan for the design of “trauma hospitals” appeared three years later, when the Committee on Trauma of the American College of Surgeons published the *Optimal Hospital Resources for Care of the Seriously Injured*, a comprehensive list of criteria believed essential for appropriate treatment of the acutely injured. The document, often referred to as the “Gold Book,” has since been revised five times and currently is titled *Resources for Optimal Care of the Trauma Patient*.

After Orange County, California, established a regional trauma system according to Gold Book guidelines, preventable deaths from non-central nervous system trauma dropped from 73% in 1978 to 9% in 1980. Similar results were observed after San Diego County instituted a regional trauma system. However, these and subsequent programs soon realized that it was expensive to develop and maintain trauma systems that complied with the recommendations of the Gold Book. In 1990, Congress passed the “Trauma Care Systems Planning and Development Act,” which provided funding for the development and implementation of statewide trauma systems. Nonetheless, only 34 states had established regional trauma systems by the year 2000.



It seems obvious that regionalization of trauma services should lead to improved outcomes for trauma patients, and therefore perplexing that more states have not taken advantage of the funding that would help them develop trauma systems. For example, an occult but potentially lethal abdominal or chest hemorrhage should be more quickly diagnosed and treated by fellowship-trained trauma surgeons who are immediately available to assess the trauma patient at a trauma center.

A common requirement of designated trauma centers is that a neurosurgeon be available within thirty minutes of arrival of the neurotrauma patient, and that operating room space be immediately available. In addition, regionalization of trauma care is based on the premise that quality and cost-effectiveness improve with the experience of those providing that care. This concept is strongly supported by studies of elective surgery which demonstrate a significant inverse correlation with volume and surgical morbidity and mortality.

Unfortunately, a common reason why 16 states still do not have state regulated trauma systems, and other states are considering withdrawing their authority, is political. Many hospitals believe that the public attributes a higher level of competency and quality to the “trauma center” designation, and vigorously fight for that designation even if their community is not large enough to support and maintain more than one fully compliant trauma center. If two or three hospitals are competing for patients in a community, each will fight to be the designated trauma center and will usually oppose state regulations that might lead to designation of one over the others. But without government intervention the quality of trauma care provided by trauma centers suffers.

In the absence of government regulation, any hospital can designate itself a trauma center. The distinction between “designated” and “verified” then becomes crucial. Designation simply determines that injured patients will be preferentially transported to that hospital. Verification confirms that the hospital actually has the resources, personnel and established processes to provide optimal care to the trauma patient.

The impact of this difference was dramatically illustrated in a study published this year that found significantly better outcomes among trauma patients treated at a designated trauma center that complied with formal guidelines compared with a similar sized designated trauma center that was not compliant.

Another reason for diminished enthusiasm for state regulation of trauma systems is that there has not been scientific proof that regionalized trauma care provides for better outcomes or is cost-effective. Several studies of large populations of trauma patients have found that outcomes of those treated at large non-trauma designated hospitals were just as good as the outcomes for those treated at large, designated and verified (and expensive) trauma centers.

Most agree that this is an aberration resulting from the fact that those with the most severe injuries are the ones that are most likely to benefit from comprehensive trauma centers, yet in very large populations of trauma patients only a small fraction will have severe injuries. Thus, benefits to the small group of severely injured patients will be overshadowed by the much larger group with lesser injuries that do not need the comprehensive services provided by the designated trauma center. But opponents of state-regulated trauma systems have used these studies to effectively block legislation mandating trauma center certification in several states.

In an effort to more clearly define the population of trauma patients that may benefit from verified trauma centers, and the cost of care for patients hospitalized at those centers, a national study has been organized to compare care provided by large designated and verified trauma centers to that provided by other large hospitals not designated as trauma centers in all regions of the United States. UPMC Presbyterian is participating in this study, which is expected to be completed next year.

Yet another concern raised by the regionalization of trauma care is the time-sensitive nature of certain injuries, particularly head injuries. UPMC Presbyterian is a designated and verified Trauma Center that serves as the trauma referral hospital for a relatively large geographic area of southwestern Pennsylvania. Trauma patients who have been injured as far away as 100 miles from our hospital are referred to us for their acute care. Air transport systems have been developed to provide for rapid transport of these patients, but they cannot be used in inclement weather. As a result, each year some head-injured patients initially evaluated and stabilized at a remote hospital emergency department must be transferred to our trauma center by ground transport and suffer significant deterioration or die because of the duration of the transport. A potentially life-saving craniotomy at the transferring hospital is no longer even considered because of state-regulated regionalization of our trauma system.

All regions of the U.S. should have designated trauma centers, but the guidelines for patient transport from small rural hospitals to the trauma center may need to be reconsidered.

In the future, regional trauma systems, and particularly neurotrauma care, could be improved if there was a greater focus on rural trauma care. When transport of a head-injured patient with an expanding intracranial hematoma will be prolonged (2-3 hours or more) and a local neurosurgeon is available, craniotomy for evacuation of the clot may best be done at the rural hospital and the patient transported to the trauma center after surgery.

In very remote hospitals, particularly in rural areas of the U.S., general surgeons in those communities would ideally be trained to perform emergency craniotomies under the remote supervision of a neurosurgeon. In such regions, trauma system resources should be used to install a digital radiology link between the rural hospitals and the regional trauma center. With this technology the neurosurgeon at the trauma center could advise the general surgeon on the need for immediate craniotomy based on direct visualization of the hematoma, and could review details of the best operative approach. Following surgery, the patient could be transferred to the neurosurgeon for postoperative care which often is more challenging than the surgery itself. In the latest version of the *ATLS Manual*, this concept is discussed at the end of the head injury chapter and thereby acknowledged as a possibility in rural communities by the Committee on Trauma of the American College of Surgeons.

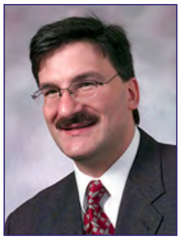
Most important of all, however, is that if neurosurgeons are available, they should always be involved in the management of patients with severe head or spinal cord injury. No other subspecialty in medicine is as well and comprehensively trained in neurotrauma.

Note about the author:

Dr. Marion is chair of the Joint Section on Neurotrauma and Critical Care of the American Association of Neurological Surgeons and Congress of Neurological Surgeons. He also is chair of the Neurosurgery Subspecialty Section of the Committee on Trauma, American College of Surgeons, co-author of the 2002 edition of the *Advanced Trauma Life Support* manual, and consultant to the National Trauma Center study referred to in this article. ■

Intraoperative neurophysiologic monitoring improves safety

by William C. Welch, MD, FACS, FICS
and Jeffrey Balzer, PhD



Dr. Welch
Director, Neurosurgical Spine Services

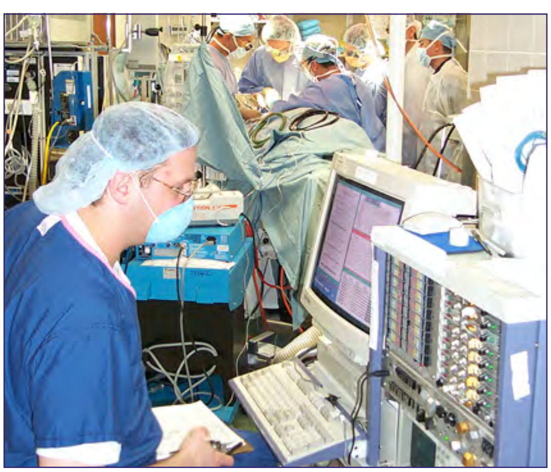
Dr. Balzer
Assistant Professor of Neurosurgery

During the course of spinal instrumentation performed with pedicle screw and interbody fusion device insertion, the nerve roots, spinal cord and cauda equina may be injured. To minimize this possibility, we developed a neurophysiology monitoring technique that provides immediate evaluation of bone integrity in patients undergoing instrumented lumbar fusion by using electrified surgical instruments throughout the pedicle screw instrumentation procedure. This technique provides continuous monitoring during the placement of interbody fusion devices. Initially, this was performed as a prospective study. Our experience has been used to gain a long-term evaluation of the reliability and efficacy of this neurophysiological monitoring technique.

Intraoperative evoked electromyographic (EMG) stimulation was performed using a pedicle probe and feeler as monopolar stimulators during the insertion of 396 pedicle bone screws in 89 patients undergoing pedicle screw instrumentation placement alone. Another group of 42 patients underwent placement of either anterior lumbar interbody fusion devices or posterior lumbar interbody fusion devices with pedicle screw augmentation.

Neurophysiologic monitoring consisted of suprathreshold stimulation of the intact pedicles for EMG response prior to pedicle screw insertion followed by assessment of EMG activity to subthreshold stimulation intensities during pedicle probing, tapping and screw insertion. EMG activity during pedicle preparation indicated cortical bone compromise. All cases of cortical bone compromise were confirmed visually or manually. Interbody fusion cases were monitored with continuous somatosensory evoked potentials (SSEPs) and spontaneous EMG activity during insertion of posteriorly placed interbody fusion devices.

Technician monitoring patient activities during surgery.



Our results indicated that evoked EMG activity in appropriate muscle groups identified pedicle cortical bone compromise in 8 patients (true positives) using stimulated pedicle probes in patients undergoing pedicle screw instrumentation alone. This correlated well to pedicle fracture. One false positive and one false negative evoked EMG was noted. Pedicle screws were re-directed or removed in each of the true positive and in the single false positive case. During interbody fusion device insertion, six patients had abnormal spontaneous EMG activity and one patient had reversible SSEP changes with cauda equina retraction. One patient with abnormal spontaneous EMG activity awoke with L5 root deficits.

This preliminary study demonstrated that intraoperative evoked EMG monitoring alerted the surgeon that re-direction of the pedicle probe or screw was necessary to avoid nerve root irritation or injury. The determination of spontaneous EMG activity and continuous monitoring of SSEP activity provided important and useful information during interbody fusion device insertion. These neurophysiologic determinations are sensitive, specific, reliable and efficacious and provided important neurophysiologic information to the surgical team.

Based on this and other similar studies, the surgeons at UPMC Presbyterian utilize ongoing neurophysiologic monitoring data to reduce the possibility of nerve, spinal cord or cauda equina injury during surgical positioning, decompression, fusion and instrumentation insertion. ■

5000th Gamma Knife patient

(from page 1)

A dedicated nursing team (Jonet Vacsulka, Donna Brenlove, and Cheryl Rogers), and administration (Charlene Baker, Grace Yum, Michael Habeck, Peggy Schmitt, Maryann Vincenzini, Katie Benchoff) have been the key to the care of so many patients.

Visiting fellows and residents from over 20 different countries have worked on a broad array of basic and clinical research projects in this field. Many now direct gamma knife radiosurgery programs in their own countries.

The department also offers a quarterly training course attended by neurosurgeons, radiation oncologists and medical physicists from around the world.

In addition, this September, the department will offer a Gamma Knife training course geared for nurses and other allied health personnel. ■

news & NOTES

Several Department Neurosurgeons Cited as Best Doctors in National Survey

Several University of Pittsburgh neurosurgeons were cited as 'best doctors' in a recent national survery undertaken by Best Doctors, Inc., of Aiken, SC. Named to the list were **Drs. P. David Adelson**, **A. Leland Albright**, **Douglas Kondziolka**, **L. Dade Lunsford**, **Donald Marion**, **Joseph Maroon**, **Ian Pollack**, **Peter Sheptak**, **William Welch** and **Howard Yonas**.

Best Doctors, Inc. is widely regarded as the preeminent provider of information about the best medical care available. It has been featured on *60 Minutes*, *The Today Show*, *CNN Headline News* as well as in major print media including *USA Today*, *The New York Times*, *The Los Angeles Times* and *The Wall Street Journal*.

In the survey, more than 30,000 doctors throughout the United States were asked the question, "If a loved one needed a doctor in your specialty, to whom would you refer them?" Evaluations of the thousands of doctors named — some of them by hundreds of their peers — were weighed, scored and filtered for bias. Only those physicians who earned the consensus support of their peers were included.

Recent Grant Awards

• "A Prospective, Randomized, Controlled, Multicenter, Pivotal Study of OP-1 Putty in Uninstrumented Posterolateral Fusion," **Dr. Peter Gerszten**, Stryker Biotech ($18,528). Study intended to establish the safety and efficacy of OP-1 putty as a substitute for harvesting autograft bone for solid bone fusion of lumbar spine.

• "Phase I Open Label Safety and Pharmacokinetic Study of the Oxygenated Fluorocarbon Nutrient Emulsion (OFNE) Perfusion System," **Dr. Howard Yonas**, Neuron Therapeutics ($258,138). Study to evaluate the safety of ventriculo-lumbar perfusion with the OFNE Perfusion System.

• "Evaluation of the Cyberknife Stereotactic Radiosurgery System for the Treatment of Spinal Lesions," **Dr. Peter Gerszten**, Joint Section on Disorders of the Spine of the American Association of Neurological Surgeons and Congress of Neurological Surgeons ($30,000). Study to establish the feasibility and clinical response of treating spine tumors with precisely administered high-energy radiation via CyberKnife®.

• "Efficacy of Hypothermia in Pediatric TBI," **Dr. P. David Adelson**, National Institutes of Health, National Institute of Neurological Disorders and Stroke ($1,062,283). Attempt to define the neurotransmitter release response following treatment with hypothermia and the subsequent age related impact of injury and treatment on histologic damage.

• "Automobile Crash Risks in Persons with Diabetes," **Dr. Thomas J. Songer, PhD**, the National Institute of Diabetes and Digestive and Kidney Diseases ($324,799). Study investigating motor vehicle crash risks involving persons with Type 1 diabetes.

Media

• **Dr. Howard Yonas** was interviewed by Marilyn Brooks of WTAE-TV (Pittsburgh) on March 14 regarding his work with brain bypass surgery.

Announcements

• **Dr. C. Edward Dixon, PhD** was elected president of the National Neurotrauma Society. **Dr. Larry Jenkins, PhD** was elected secretary/treasurer of the same organization.

• **Dr. Donald Marion** was elected chair of the Joint Section on Neurotrauma and Critical Care Medicine of the American Association of Neurological Surgeons/Congress of Neurological Surgeons for 2002-2004.

• **Dr. L. Dade Lunsford** served as honored guest of the Hungarian Institute for Neurosurgery in Budapest, Hungary, May 9-12. He also served as keynote speaker at the Leksell Gamma Knife Society meeting in Prague, Czech Republic, May 12-15. He also was the honored guest of the Georgia Neurosurgery Society at Sea Island, GA, May 24-26. In addition, he served as visiting professor in the Department of Neurological Surgery at the Chicago Institute of Neurosurgery and Neuroresearch at Rush Presbyterian St. Luke's Medical Center, April 5.

• **Dr. Douglas Kondziolka** served as visiting professor in the Department of Neurological Surgery at the University of Pennsylvania, May 15-16.

Welcome

Dr. Kevin Walter, assistant professor of neurological surgery, specializing in nervous system tumors. **Dr. Masaki Oishi, MD, PhD**, visiting instructor, will be working with Dr. William Welch in the Spine Services Division.

Appointments

Dr. Douglas Kondziolka was named vice chairman of education and **Dr. Donald Marion** was named vice chairman of research for the Department of Neurological Surgery.

The department also announced the establishment of two new "Centers of Excellence:" The Center for Epilepsy and Peripheral Nerve, headed by **Dr. P. David Adelson**, and the Center for Pain Management, headed by **Dr. John Moossy**.

Awards

Carol Whitehead, 5G nurse, was the UPMC Presbyterian recepient of the Cameos of Caring Award; **Dr. Masaki Oishi, MD, PhD** was awarded the CNS Wilder Penfield Investigation Scholarship.

Upcoming Events

• September 21 - 25: **Gamma Knife Radiosurgery Training for Nurses**. Training course directed to nurses and other allied health personnel providing clinical care for patients undergoing gamma knife radiosurgery. Contact Charlene Baker at (412) 647-7744 for more information.

UNIVERSITY of PITTSBURGH
neurosurgerynews

Department of Neurological Surgery
University of Pittsburgh
UPMC Presbyterian/Suite B-400
200 Lothrop Street
Pittsburgh, PA 15213
(412) 647-3685

Douglas Kondziolka, MD, *Editor*
Paul Stanick, *Production Editor*

Patient Referrals
(412) 647-3685

Volume 3, Number 3 **Summer 2002**

A vision of advances in the delivery of neurosurgical health care

(from page 3)

during radiosurgical management of vascular malformations.

Endoscopic technologies will increasingly be incorporated into robotic head holders and lead to the replacement of microsurgical intervention in deep seated structures. New instruments are being designed and will be required to facilitate this kind of work in the operating room. Future trainees in neurological surgery will become proficient in minimally invasive technologies in order to be on the forefront of health care delivery.

Large volumes of spine surgery have to date occurred because of an increasing interest in spinal stabilization techniques. The usage of these spinal stabilization procedures is under evaluation by sustained evidence based outcome measurements.

This will have impact on orthopaedics as well as neurological surgery. Minimally invasive spine technologies will continue to progress, both with intradiscal therapies, kyphoplasty, and percutaneous techniques. Chronic pain will continue to be treated in a certain group of patients by both dorsal column stimulation as well as in the case of cancer pain, by placement of morphine pumps in the intrathecal space.

Multi-Disciplinary Cores

Because of rapidly expanding molecular, basic science and clinical protocols which span disciplines, it is likely that multi-disciplinary centers of excellence will emerge. The academic department will become the base for faculty appointment and grant submission. Multi-disciplinary clinical entities such as the proposed UPMC Neurological Institute will serve as umbrella organizations to facilitate rapid translational efforts from the basic science laboratories into the clinical arena.

UPMC has been a pioneer in the assessment and purchase of new technologies. The rapid growth in imaging advances is one example. New technology such as magnetic magnetoencephalography (MEG) will be important aspects of defining the physiology of the brain in conjunction with new imaging techniques such as MRI, functional MRI, and magnetic resonance spectroscopy. ■