NEUROSURGERY
UCI Department of Neurological Surgery Newsletter
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What is Endovascular Neurosurgery?

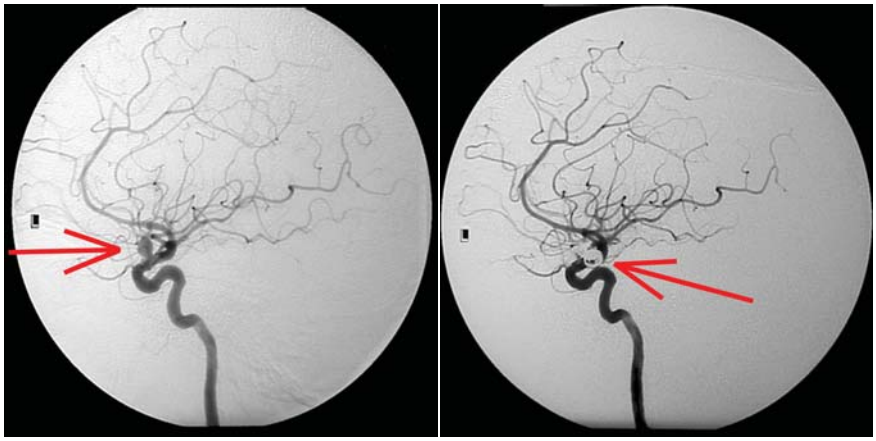
by Chiedozie Nwagwu, M.D.

Endovascular Neurosurgery or interventional neuroradiology, as a specialty, has undergone rapid evolution during its short existence. Originally developed in the 1980's by neurological surgeons and radiologists, endovascular neurosurgery is made possible by dramatic advances in computer technology and state-of-the-art equipment. Essentially, endovascular neurosurgery therapies are accomplished through microcatheters inserted in the groin area and, under X-ray guidance, threaded through the blood vessels leading into the brain or spinal cord. Endovascular neurosurgeons currently employ minimally invasive procedures to accomplish a wide variety of treatments including stroke therapy by delivering clot-busting drugs directly to the site of blood vessel blockage. Aneurysm therapy is accomplished by inserting platinum coils into the aneurysm bulge to promote clotting and prevent rupture. Spinal compression fractures are treated by injecting acrylic directly into the bone.

How did Endovascular Neurosurgery Develop?

Traditionally a consulting service, radiology as a medical specialty, developed after the discovery of X-rays. X-rays allowed physicians to create images of internal anatomy of the body without surgery. Today, tens of thousands of radiologists are regularly consulted to perform diagnostic procedures that are foundational to the medical practice of most all physicians in every specialty. While physical examination is the first step in the evaluation of any patient, the best examination skills cannot match the precision and accuracy of modern medical imaging in the diagnosis and characterization of anatomical abnormalities or disease processes.

Endovascular Neurosurgery is a subspecialty discipline of both neurosurgery and radiology. Initially, neurosurgeons performed surgical procedures with the operating microscope. Neurosurgeons can now perform minimally invasive techniques utilizing x-ray fluoroscopy ("real-time" x-ray technology to monitor movement inside the body) and angiography (injection of x-ray contrast or "dye" to obtain pictures of blood vessel anatomy). In addition, physicians have added ultrasound, computed tomography (CT), and even magnetic resonance imaging (MRI) to their arsenals. Such advanced technology allows physicians to visualize operative procedures without making a skin incision to see inside the body.



Left: This angiogram depicts an untreated aneurysm.
Right: This angiogram demonstrates the aneurysm after it has been coiled and obliterated.

How Can An Endovascular Neurosurgeon Help Me?

Today, approximately 300 endovascular neurosurgeons, interventional neuroradiologists, and interventional neurologists offer a wide variety of minimally invasive procedures to treat everything from stroke to spinal compression fractures.

As compared to conventional neurosurgery, endovascular treatments often involve less risk and result in less pain and a faster recovery period. ■

Gamma Knife Stereotactic Radiosurgery

by Franklin Westhout, M.D. and Mark E. Linskey, M.D.

Stereotactic radiosurgery (SR) is a neurosurgical procedure that delivers a single very large dose of radiation to a precisely defined and targeted volume of tissue with little dose delivered to tissue as close as 2 mm away. The goal of the procedure is to permanently damage or biologically inactivate all the tissue within the target volume, which can be a tumor (malignant or benign), an arteriovenous malformation (AVM), or a normal tissue structure requiring a therapeutic lesion (e.g. trigeminal neuralgia–TN). While many technologies can be utilized to deliver SR (X-Knife®, Novalis®, Varian Trilogy®, Cyberknife®, etc.), none has been able to exceed the safety and accuracy of the Gamma Knife® (GK). Certainly, no other technology even approaches the long-term clinical experience and proven long-term and published clinical results of GK stereotactic radiosurgery.

How the Gamma Knife Works

Stereotactic radiosurgery is only possible because the neurosurgeons are able to: 1) concentrate and focus the radiation tightly, and 2) targeting is so accurate that not only are they sure they are treating the whole lesion but, just as importantly, they are sure that they are excluding the important surrounding normal structures from receiving this high radiation dose. The focusing and concentration is achieved by the Gamma Unit, which is a machine where 201 radia-

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Department News

Message from the Chair

Welcome to the first issue of the UCI Neurosurgery Newsletter. I am very pleased to be able to share with our readers our recent successes in the Department of Neurological Surgery. Academic year 2004-05 has been tremendous for us and the future looks very promising indeed. We have been fortunate to recruit two new faculty members into our department over the last year. Our practice at UCI Medical Center is increasingly busy, with a 40% increase in case volume. We have also begun treating patients at the Hoag/UCI Gamma Knife Center, providing radiosurgery for selected tumor patients, patients with trigeminal neuralgia and vascular lesions such as arterio-venous malformations. We are entering a new phase of development by aggressively building our research programs with our first faculty basic science Ph.D. on board, with one research grant recently approved, and two more pending. We have established the first IRB-approved, prospective clinical outcomes database at UCI, which will allow us to collect outcomes information on our patients. This will help us develop improved therapies in the future.

Mark Linskey, M.D.
Chairman

I would like to welcome the new faculty members into our Department. Dr. Chiedozie Nwagwu has a primary interest in Cerebrovascular Neurosurgery with expertise in both transcranial and endovascular neurosurgery. He completed his residency at the New York Medical College and recently a 2-year fellowship in Endovascular Surgery and Interventional Neuroradiology in Indianapolis. He joined us in August as Assistant Clinical Professor, and will head the neurosurgery cerebrovascular service and Co-Direct the UCI Comprehensive Cerebrovascular Program. Dr. Kimberly Anderson joined our department as Assistant Professor in January. She is a neuroscientist who has a joint appointment with the Reeve-Irvine Research Center on the UCI Campus. Her interest relates to spinal cord injury, and its repair, and she has also received a Quality of Life Grant which is directed at detailing the sexual dysfunctions experienced by people living with spinal cord injury and to then use that information to guide basic science and clinical research addressing those issues. Dr. Anderson received her Ph.D. from the University of New Mexico and was a post-doctoral fellow at the Reeve-Irvine Research Center.

We are currently actively recruiting a medical neurooncologist as well an additional Ph.D. investigator who will be involved in basic brain tumor biology research. This is the last step in completing our comprehensive neuro-oncology program at our NCI-designated, UCI Chao Family Comprehensive Cancer Center. We are also recruiting a complex spine specialist. This is to assist in the development of a comprehensive operative and non-operative spine program here at UCI Medical Center in coordination with the departments of orthopedic surgery and rehabilitative medicine. We have now established the annual John A. Kusske Lectureship as a continuing medical education opportunity for clinical neuroscience in southern California. It is linked to an all-day Continuing Medical Education (CME) seminar centered around the lecture topic. The 2004 lecturer was Martin Weiss from University of Southern California, and the 2005 lecturer was M. Gazi Yasargil from the University of Arkansas. We are very grateful to our industry partners for supporting our CME efforts on an ongoing basis. Ultimately we are positioning ourselves to restore our UCI neurosurgery residency training program. This effort will include Children's Hospital of Orange County as well as one additional Orange County Hospital. An invited external consultant will be reviewing our plans, preparations, and progress during a site visit in the Spring of 2006. His input will assist us in preparing our application for the residency program.

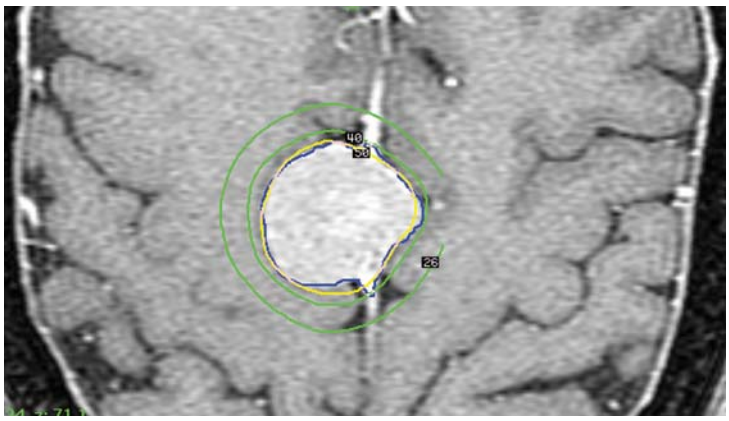
It is our goal to establish and solidify our position as the only academic neurosurgery service in Orange County. We aim to be the primary Orange County site for advanced tertiary and quaternary neurosurgery patient care, as well as the main Orange County site for clinical outcomes studies, clinical trials, and translational neuroscience research. We intend to establish a first-class neurosurgery training program, and to be the preferred regional site for neurosurgery CME. With the continuing support of our medical center and school of medicine leadership, our referring physicians, private industry, and the community, along with the enthusiastic efforts of our new faculty members, we are well on our way to these goals. ■

Gamma Knife Stereotactic Radiosurgery (continued from page 1)

tion sources are arranged in an array around the head to send very fine beams of radiation through the patient to a single intersection focus spot. Each beam emits a very small dose of radiation, but at the point of intersection, the dose is 201 times stronger. Precise targeting is done with a neurosurgical procedure called stereotaxis. A targeting frame is positioned over the patients head and attached in four places around the head using fine pins and local anesthetic. An MR image and sometimes an angiogram are then obtained with the frame in place. Every point inside the patient's head can now be defined by a coordinate on the attached frame with an accuracy of 0.2 – 0.5 mm in three dimensions. A treatment plan is then devised so that the entire tumor, or AVM, can be treated. GK works equally well for benign tumors and malignant tumors and equally well for malignant tumors traditionally thought to be radioresistant.

Clinical Uses of Gamma Knife Stereotactic Radiosurgery

Radiosurgery has a well-established role for treating selected patients with small AVMs. It has emerged as a preferred treatment for TN, when potential curative surgery has failed, or is either not medically advisable or wanted. For tumors, SR has already assumed the dominant clinical role for the surgical treatment of selected patients with multiple metastatic brain tumors of appropriate size, and remains an attractive alternative to microsurgery for selected patients with single metastatic brain tumors. It is emerging as a preferred initial treatment for many benign tumors of appropriate size, particularly those located in skull base locations.



Magnetic Resonance Image cross section showing the precision and focusing of a Gamma Knife treatment plan for a 65-year-old woman with a cerebral meningioma (benign tumor). The therapeutic dose is outlined by the yellow line and outside the inner green line gets less than 40% of the maximum dose.

DID YOU KNOW?

The first Gamma Knife surgery was performed in Sweden in 1968. Since then, nearly 20,000 patients per year are being treated worldwide.

UCI Gamma Knife Stereotactic Radiosurgery

UCI SR is performed at the Hoag/UCI Gamma Knife Center in Newport Beach. UCI patients are treated by a multidisciplinary team of UCI radiation-oncologists and neurosurgeons led by Dr. Mark Linskey. Dr. Linskey has been performing GK SR since 1987. He was trained on the first Gamma Unit in the U.S. at the University of Pittsburgh, and is one of the academic pioneers of the technique. He is one of 12 physicians world-wide serving on the international scientific advisory board for the company that developed and continues to refine the GK. The Hoag/UCI unit represents his fourth gamma knife center and he has extensive experience and publications in this area. The Hoag/UCI Gamma Knife Center is directed by Dr. Christopher Duma who has been performing GK SR since 1991, and has been at the Hoag/UCI Gamma Unit since 1997. He treats patients from his community practice on the unit. He also trained on the University of Pittsburgh Gamma Unit and has extensive experience and publications in this area. Dr. Duma is a member of the voluntary UCI Neurosurgery faculty. ■

Normal Pressure Hydrocephalus (NPH)

by Laura Pare, M.D.

Normal Pressure Hydrocephalus, or NPH, is a non-genetic neurological disorder that normally occurs in adults 55-60 years or older. It is often misdiagnosed as Alzheimer's or Parkinson's Disease. NPH is caused by an excess amount of cerebrospinal fluid (CSF) within the spaces of the brain called ventricles. Normally, the amount of CSF that is produced is equal to the amount that is drained out. When the CSF produced is not properly drained, the ventricles can become enlarged, causing a distortion of nearby brain tissue. The enlargement of the ventricles and distortion of the surrounding brain tissue causes three main symptoms of NPH called "the triad." The NPH triad consists of difficulty walking, urinary incontinence, and memory problems. Walking difficulty is characterized by a wide-based, slow, shuffling gate; the feet may seem to be "stuck" to the floor. Urinary incontinence is characterized both by inability to reach the toilet in time and by loss of bladder control. The dementia, or memory difficulties, is characterized by reduced short-term memory which can progress to difficulties performing normal daily activities.

NPH can be caused by brain injury from trauma, hemorrhage, or infection. For many patients who have no history of infection or brain injury, the cause may be aging of the brain, itself.

NPH can be treated surgically by placing a draining device, or shunt, to drain the excess CSF into the abdomen, where it will be absorbed. This allows the ventricles to return to their normal size and reduces the distortion of the brain tissues. The brain can then function properly and send the correct messages down to other parts of the body, resulting in better control of walking, bladder, and memory. ■

NPH vs. Alzheimer's or Parkinson's Disease

NPH is often misdiagnosed as Alzheimer's disease or Parkinson's disease. There are some overlap of symptoms in Alzheimer's disease as compared to NPH. Cognitive changes predominate earlier and the gait difficulties occur later in Alzheimer's disease. In Parkinson's disease the symptoms of tremor and rigidity are usually more pronounced, the gait is often narrow-based, and cognitive decline appears late or not at all.

NPH can be difficult for physicians to diagnose. If you think that you or a family member may suffer from NPH, it is best to be evaluated by a neurologist, who is familiar with the diagnosis and treatment of NPH, Parkinson's, and Alzheimer's. The neurologist will then refer you or your family member for neurosurgical evaluation, if appropriate. ■

Meet Our Faculty

Mark E. Linskey, M.D.

Dr. Linskey is Associate Professor and Chairman of the Department of Neurological Surgery at UCI as well as Co-Director of the UCI Chao Family Comprehensive Cancer Center Neuro-Oncology Program. Dr. Linskey attended Columbia University College of Physicians and Surgeons, completed his neurosurgery residency at the University of Pittsburgh in 1993, as well as a neuro-oncology fellowship at the Ludwig Institute for Cancer Research in London in 1994. He is certified by the American Board of Neurological Surgery (ABNS). His clinical interests include skull base microsurgery, adult and pediatric malignant and benign brain tumors, Gamma Knife stereotactic radiosurgery, and microvascular decompression for cranial nerve disorders. Research interests include molecular epidemiology and biomarkers for brain tumors, developmental glial biology, radiobiology, brain tumor clinical trials, and clinical outcomes studies.

Laura Paré, M.D.

Dr. Paré is Associate Clinical Professor of Neurological Surgery and Medical Director of the General Neurosurgery Ambulatory Care Clinic. Dr. Paré attended the University of Chicago Pritzker School of Medicine, completed her Neurosurgical Residency at the Montreal Neurological Institute, McGill University, Canada in 1991, as well as a spine fellowship at UCLA in 1997. She is certified by the ABNS as well as being a fellow of the Royal College of Surgeons of Canada. Her clinical interests include general neurosurgery, complex and minimally invasive spine surgery, normal pressure hydrocephalus, and the surgical treatment of depression. Her research interests include cerebrospinal fluid physiology, intracranial pressure wave form analysis, antibody cytokine interruption and human stem cell transplantation for spinal cord injury, and the effects of vagal nerve stimulation on depression and cognition.

Kimberly Anderson, Ph.D.

Dr. Anderson is Assistant Adjunct Professor of Neurological Surgery at UCI, and Staff Researcher at the Reeve-Irvine Research Center for spinal cord injury. Dr. Anderson received her Ph.D. in Molecular and Cell Biology from the University of New Mexico School of Medicine in 2000, and completed a post-doctoral research fellowship at the Reeve-Irvine Research Center in 2004. She has been NIH funded for studies manipulating gene expression after spinal cord injury in the mouse by using a nervous system specific RNA-binding protein. She assisted in developing the national standard rodent model for objectively quantifying cervical spinal cord recovery after cord hemisection. She is involved in clinical research projects involving patients after spinal cord injury. She is the organizer and founder of the first Think First® spinal cord injury prevention chapter for Orange County.

John A. Kusske, M.D.

Dr. Kusske is Professor emeritus and Vice Chairman of the Department of Neurological Surgery at UCI in charge of program and business development. Dr. Kusske attended University of California School of Medicine, San Francisco, and completed his neurosurgery residency at the University of Washington in 1972. He is certified by the ABNS. Dr. Kusske retired from UCI in 2004 after 32 continuous years of service to the university and has returned in a part-time capacity. A national expert in neurosurgery healthcare economics and policy, he was recently appointed to the Emergency Medical Treatment and Labor Act (EMTALA) Technical Advisory Group for the Centers for Medicare and Medicaid Services of the Department of Health and Human Services.

Chiedozie Nwagwu, M.D.

Dr. Nwagwu is Assistant Clinical Professor of Neurological Surgery, Head of Cerebrovascular Neurosurgery, and Co-Director of the UCI Comprehensive Cerebrovascular Program. Dr. Nwagwu attended Mt. Sinai School of Medicine in New York City and completed his neurosurgical residency at New York Medical College in 2003. He completed a fellowship in endovascular surgery and interventional neuroradiology in Indianapolis in 2005. He is eligible for certification by the ABNS. His clinical interests include general neurosurgery as well as microsurgery of cerebral aneurysms and AVMs, carotid endarterectomy, cerebral revascularization, stereotactic radiosurgery for AVMs, and endovascular management of complex vascular lesions involving the nervous system including coiling, glues, stenting, embolectomy, and thrombolysis. His research interests include advancing endovascular technology, aneurysm wall structure and dynamics, cerebrovascular clinical trials, and clinical outcome studies.

To schedule an appointment or to refer a patient, please call (714) 456-6392.

Members

Volunteer Faculty Members

Michael Muhonen, M.D., William Loudon, M.D., & Laurie Ackerman, M.D. are Assistant Clinical Professors of Neurological Surgery and members of the voluntary UCI neurosurgery faculty. Dr. Muhonen attended Oral Roberts School of Medicine and completed his residency in neurosurgery at the University of Iowa in 1993. Dr. Loudon attended the University of Oklahoma School of Medicine, completed his neurosurgery residency at Medical College of Virginia in 1999, and a pediatric neurosurgery fellowship at Children's Hospital of Philadelphia in 2000. Dr. Ackerman attended the University of Iowa College of Medicine, completed her neurosurgery residency at the University of Iowa in 2003 and a pediatric neurosurgery fellowship at Indiana University in 2004. Dr. Muhonen serves as Head of the UCI Pediatric Neurosurgery Service. He and his colleagues provide general pediatric neurosurgery care both at UCI Medical Center and Children's Hospital of Orange County (CHOC). CHOC will serve as one of the major affiliated hospitals in the planned UCI neurosurgery residency training program.

E. Thomas Chappell, M.D. is Associate Clinical Professor of Neurological Surgery at UCI and a member of the voluntary UCI neurosurgery faculty. Dr. Chappell attended Bowman Grey School of Medicine and completed his neurosurgery residency at George Washington University in 1994. Research interests, that he is pursuing at UCI, include traumatic brain injury, neurocritical care, intracranial pressure physiology, brain tumor kinetics, and clinical outcomes studies. He is, on staff, at Kaiser Hospital in Anaheim.

Christopher Duma, M.D. is Assistant Clinical Professor of Neurological Surgery and a member of the voluntary UCI neurosurgery faculty. Dr. Duma attended Cornell University School of Medicine, completed his neurosurgery residency at Georgetown University in 1993, and an intra-residency fellowship in stereotactic neurosurgery including radiosurgery at the University of Pittsburgh in 1991-1992. Dr. Duma serves as Head of the Stereotactic Radiosurgery Service for the UCI Department of Neurological Surgery and will coordinate and oversee that service for the planned UCI neurosurgery residency training program. He also is an affiliate member of the UCI Chao Family Comprehensive Cancer Center Neuro-Oncology Program.

Richard Kim, M.D. is Assistant Clinical Professor of Neurological Surgery and a member of the voluntary UCI neurosurgery faculty. Dr. Kim attended St. Louis University School of Medicine, completed his neurosurgery residency at New York University in 1997, and an epilepsy surgery fellowship at Yale University in 1998. Dr. Kim serves as Head of the Epilepsy Service for the UCI Department of Neurological Surgery and works closely with the Epilepsy Services of the UCI Department of Neurology and Division of Pediatric Neurology including assisting them with their epilepsy research studies.

Additional Volunteer Faculty include *Robert Jackson, M.D., Bradley Noblett, M.D., & Sylvain Palmer, M.D.* who are Assistant Clinical Professors of Neurological Surgery and members of the voluntary UCI neurosurgery faculty. They participate in patient care and teaching through on-call patient care coverage and educational conference participation at UCI MC.

> ***"...The operation is not the beginning and end of surgery, but a therapeutic measure alone; and those employing this manner of treatment must have the same knowledge of disease, the same ability to make examinations, the same instincts to follow pathological material to the laboratory and to investigate there the causes and symptoms of disease, as should characterize any other well-trained member of the body medical."***
>
> *-Harvey Cushing 1906*
> *the father of American Neurological Surgery*


Dear Friends:

We are writing to ask whether you would consider helping to make a real difference in the development of the faculty of neurological surgery as well as the research and educational activities in the Department of Neurological Surgery at UCI. The process of re-establishing a residency program in neurological surgery is well underway. This will enable us to acquaint young physicians with the skills they will need to master the goals of being competent and caring neurosurgeons. This is the realm of education. One of the charges of our university residency program will be to encourage our residents, along with talented investigators, to explore, to question, to push beyond known boundaries, and in that process to develop better, safer therapies for the neurosurgical diseases of mankind. This is the realm of research.

> **"...WE AIM**
>
> *to repay your thoughtfulness and generosity with new levels of skill, new therapies, and other research advances that will benefit all who have need of us."*

We are impressed by the immense potential for combining clinical efforts at UCI Medical Center with the work of world renowned basic neuroscientists on the UCI main campus. Research in brain tumors, cerebrovascular disease, brain and spinal cord injuries, movement disorders, come quickly to mind. With the re-establishment of our residency program this will undoubtedly come to fruition, but this will develop much more quickly and at a higher level of excellence with your help and participation. These activities will occur in the laboratory, in the operating room, as well as at the bedside. In order to support these young people fully with a first class educational and research experience, a UCI Neurological Surgery Resident Education fund and a UCI Neurological Surgery Research fund have been created. In addition, a fund to endow faculty chairs in Neurological Surgery has also been established. A funded chair will enable us to recruit the best and brightest neurosurgeons into this high priced southern California market.

We are seeking to raise a $2,000,000 endowment to support resident education and a $2,000,000 endowment to support neurosurgical research. An endowment of $5,000,000 is needed to assure the establishment of a neurosurgical faculty chair. These sums are very large, but we firmly believe it is an essential goal if we are to go beyond what we already know and what we are already doing in order to further improve the quality of the care we provide to our patients and our community. We would be honored if you would consider a gift to this fund, which is fully tax deductible to the extent of the law. Your help would make a great deal of difference to the quality of education that we can offer to our residents in the future. In turn, we aim to repay your thoughtfulness and generosity with new levels of skill, new therapies, and other research advances that will benefit all who have need of us. Please join us in supporting this effort by considering a generous donation on either a one-time or annual basis.

Sincerely,

Mark E. Linskey, M.D.
Chairman

Neurosurgery FAQ's

What is Neurosurgery?

When people hear the word neurosurgery, they often think of brain surgery. However, neurosurgery encompasses far more than the brain. Neurosurgery is the medical specialty concerned with the diagnosis and treatment of the entire nervous system, composed of the brain, spinal cord, and spinal column, as well as the nerves that travel through all parts of the body (hands, legs, arms, face).

What conditions do neurosurgeons routinely treat?

Neurosurgeons routinely see patients for low back pain, carpel tunnel syndrome, epilepsy, stroke, Parkinson's disease, sciatica, pinched nerves in the neck, sports injuries, chronic pain, and many other ailments. A recent statistical study showed the range of neurosurgeons expertise. The number one surgical procedure performed by neurosurgeons was spine (includes neck and back disorders), followed by brain (includes aneurysms, tumors, and head injuries), CSF shunting (for hydrocephalus), peripheral nerve (includes carpal tunnel), pain-functional (includes medication pumps and deep brain stimulation), and blood vessel abnormalities (includes strokes).

Do neurosurgeons often provide or recommend non-surgical care?

Yes. They diagnose what is wrong and work with the patient to develop the optimal treatment plan, whether that includes surgery or not. For example, most cases of back pain are treated with anti-inflammatory medication, physical therapy, and muscle relaxants. A common treatment a generation ago, surgery is now considered necessary for only a small percentage of back pain patients.

What is a cerebral aneurysm?

Cerebral aneurysms, also called intracerebral or intracranial aneurysms, are balloon-like outpouchings of the arteries in the brain. They arise from a weak point in the wall of the artery and enlarge over time as a result of the pressure within the artery. Because aneurysms have thin walls, their primary danger is that they may rupture, bleed into the brain, and have potentially disastrous consequences. This type of bleeding is known as subarachnoid hemorrhage.

What can I do to decrease my risk for aneurysm occurrence?

Several factors are known to increase the chances of aneurysm development and rupture. These include cigarette smoking, excess alcohol consumption and heart disease. Some families have a definite genetic predisposition; in such families aneurysms may run as high as 10 percent. While there is no way to prevent aneurysm rupture, certain lifestyle modifications such as a smoking cessation classes can help decrease your risk.

What does AVM stand for?

Arteriovenous malformations, or AVMs, are complex tangles of arteries and veins which result from abnormal development. They are congenital (present at birth) but enlarge during a person's lifetime. AVMs divert arterial blood, which is under high pressure, directly to the venous system without intervening capillaries. This may have several effects, including hemorrhage and seizures. AVMs may also be associated with aneurysms.

How has the treatment for brain tumors changed?

Treatment for brain tumors has changed in many ways over the last decade. Neurosurgeons today use sophisticated techniques and tools. They rely on computers, MRIs, and image-guidance technology to help them navigate through the complex terrain of the brain with greater precision. The new techniques and tools insure the safest and most complete removal of tumors. One of the most common advanced surgical tools used to treat tumors is a high-powered microscope. Microsurgery produces a magnified view of the surgical field, making it easier to see and remove tumor tissue without disturbing healthy tissue. Image guidance, or stereotaxis, involves the use of magnetic resonance imaging (MRI) or computerized tomography (CT) scanning.

A neurosurgeon, in the operating room, uses the latest computer technology to reformat data previously obtained from an MRI or CT scan to guide him/her in the safe resection of tumor tissue. An intra-operative MRI (soon to be available to neurosurgeons of UCI) further aids a neurosurgeon. Because the brain "shifts" slightly during an operation, the real-time imaging allows for a more precise removal of the brain tumor.

Can parents, coaches, and players take precautionary measures to prevent head injuries?

Yes. The American Association of Neurological Surgeons (AANS) estimates that brain-related football injuries occur at a rate of one in every 3.5 games. Of over 250,000 football players, 15 percent suffer a concussion each season. In any given season, 10 percent of all college players will sustain a head injury and 20 percent of high school players sustain brain injuries. After a concussion, the most common sports-related injury, the patient can have problems with amnesia, confusion, and concentration. The damage caused after one concussion is often reversible after an appropriate recovery time, but if a second injury is sustained before then, the damage can be devastating. Every head injury should be taken seriously and it is important to understand that the damage done by multiple concussions can be cumulative. Football players are not alone. Athletes in hockey, baseball, boxing, gymnastics, biking, skiing, snow boarding, and soccer can all suffer from head injuries.

Parents should be certain that players wear appropriate safety gear; that the playing surface is conducive to safe play; and leagues and teams should be selected, which have the same commitment to safety as the parents do. Each player should receive baseline neurological testing before the season so that the results can be used for comparison in the event the athlete receives a blow to the head.

The Department of Neurological Surgery at the University of California, Irvine would like to Thank You for your generous donations!

UNIVERSITY OF CALIFORNIA, IRVINE
DEPARTMENT OF NEUROLOGICAL SURGERY

This newsletter is presented to you by the UCI Department of Neurological Surgery to raise an endowment fund to support resident education, advance neurological research, and establish a neurosurgical chair.

NEWSLETTER CREATED BY:
Minh D. Tran

PLEASE VISIT US ONLINE AT:
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If you do not wish to receive any further UCI Department of Neurosurgery fundraising communications, please contact Minh D. Tran at (714) 456-6966.

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