

# BRAIN ACTIVITY

ACADEMIC AND RESEARCH NEWS

VOLUME 5 NUMBER 1

## IN THIS ISSUE . . .

. . . we mark the 30th anniversary of UCSF's Brain Tumor Research Center (BTRC) and focus on the research undertaken through the award of a Specialized Program of Research Excellence (SPORE) grant to UCSF for the study of brain tumors. Funded by the National Cancer Institute and led by faculty of the BTRC, this grant will provide for innovative translational research into the prevention, early detection, diagnosis, prognosis, and treatment of brain tumors.



## UCSF NAMED A NATIONAL CANCER INSTITUTE SPECIALIZED PROGRAM OF RESEARCH EXCELLENCE FOR THE STUDY OF BRAIN TUMORS\*

UCSF is one of two research centers in the United States named a Specialized Program of Research Excellence (SPORE) for the study of brain tumors by the National Institutes of Health. SPORE Principal Investigator (PI) Mitchel S. Berger MD is joined by Michael D. Prados MD, co-PI for Clinical Science, and Russell O. Pieper PhD, co-PI for Basic Science, leading an exceptional group of investigators whose research is distinguished by originality and innovation. The other brain tumor SPORE is at the University of Alabama.

SPOREs were instituted by the National Cancer Institute in 1992 through a special appropriation from Congress to promote translational research focused on an organ-specific human cancer or a highly related group of cancer types. SPOREs are intended to foster interaction between basic and applied scientists, providing them with the flexibility to rapidly test new approaches to the prevention and treatment of cancer. Translational research, in relation to SPOREs, is research that uses knowledge of human biology to develop and test the feasibility of cancer-relevant interventions in humans and/or determines the biological basis for observations made in people with or at risk for cancer. "Interventions" is meant in the broadest sense to include molecular assays, imaging techniques, drugs, biologicals, and other methods relevant to the prevention, early detection, diagnosis, prognosis, or treatment of cancer.

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*On September 13-14, 2002, a symposium was held at the Four Seasons Hotel in San Francisco, celebrating the 30th Anniversary of the Brain Tumor Research Center (BTRC). The symposium focused on advances in neuro-oncology research and treatment in the 21st century.*



## LOOKING TO THE FUTURE

In the many adages about the “Ages of Man,” it seems that human beings approach maturity at 30 years and wisdom at 40 years of age. Maybe institutions follow a similar course. The symposium to celebrate the 30th year anniversary of the dedication of the Brain Tumor Research Center (BTRC) – a pioneering translational research center at the University of California, San Francisco (UCSF) dedicated to finding a cure for brain tumors – seemed a landmark in the history of the Center. Many of our colleagues who have studied with us and helped to build the BTRC came from great distances to share their most recent findings and their ideas for the future of brain tumor research and advances in patient care. Opening with a retrospective on the center’s development given by the BTRC’s founder, Charles B. Wilson, the symposium featured talks by former BTRC fellows like Laurence J. Marton, Rolf Bjerkvig, Mark L. Rosenblum, Corey Raffel, and Philip J. Tofilon, who have gone on to illustrious careers in brain tumor research; by former faculty of the BTRC like Kenneth T. Wheeler, Victor A. Levin, and Mark A. Israel; by eminent colleagues from other institutions like Darell D. Bigner, Webster K. Cavenee, W. K. Alfred Yung, Francis Ali-Osman, and Luis F. Parada, and from the UCSF Cancer Center Joe W. Gray and Gerard Evan; and by Roy S. Wu from the National Cancer Institute, in addition to current BTRC investigators. The occasion is commemorated with an elegant book detailing the history of the BTRC to its 30th year and honoring the people who have dedicated their lives to its work and commitment to cure brain tumors. Coincidentally with this landmark, we celebrate the award of a grant from the National Cancer Institute to UCSF as a Specialized Program of Research Excellence (SPORE) in brain tumor research. This grant draws from the Neuro-Oncologic Program in the UCSF Cancer Center, the Department of Neurological Surgery, and the campus brain tumor community as a whole, as well as the Brain Tumor Research Center and its Neuro-Oncology Program. The four main projects, which are described in this newsletter, reflect the core principles of the SPORE: a translational research focus; a collaborative design and implementation of research projects; the flexibility to change research direction; a team approach; a specialized research infrastructure; means of fostering translational research careers, research collaborations, networks, and consortia; and sharing information. This newsletter introduces a series of new newsletters that will ensure the sharing of information between the UCSF SPORE investigators and their colleagues world wide.

Mitchel S. Berger MD  
Professor and Chairman

## SPECIALIZED PROGRAM OF RESEARCH EXCELLENCE

*Continued from page 1*

Since the 1950s, investigators in the UCSF Department of Neurological Surgery have been engaged in what is known today as translational research. Creation of the Brain Tumor Research Center (BTRC) in 1972 formalized the commitment to translational research, strengthened the translational brain tumor research community, and produced one of the premier neurological oncology programs in the United States. It was only logical, in response to the announcement of SPORE funding for brain tumor research, that the BTRC would take the lead in formulating an application highlighting the best of translational brain tumor research at UCSF. Over a nearly 2-year period, BTRC investigators and the UCSF brain tumor community as a whole developed and evaluated over 15 translational projects. After consultation with an external advisory board consisting of experts in translational research and the SPORE process, four projects were selected and the proposal was submitted. Five-year funding of this proposal in August 2002 rewarded the hard work, commitment, and dedication of all those involved in the SPORE process and the dedicated translational researchers who came before them.

The four translational projects supported by the SPORE grant are shared efforts between applied and basic scientists, all focused on improving the diagnosis and treatment of brain tumors by applying laboratory advances in the clinical setting. They represent diverse research areas – population science, research neuroimaging, molecular research of signaling pathways important in glioma, and developmental therapeutics with novel delivery systems. The natural connection between the Department of Neurological Surgery and the SPORE projects facilitates the transfer of important findings into clinical trials and speeds implementation of exciting new therapies derived from the investigators’ work. Because the future of brain tumor research relies on recruitment of new investigators to the field, a Career Development Research Program is included in the SPORE to identify and support new investigators. A Developmental Research Program is included to provide initial funding of promising projects that may develop into SPORE projects. Administrative and Tissue Bank Cores provide administrative support and access to tissues required for the success of the translational projects.

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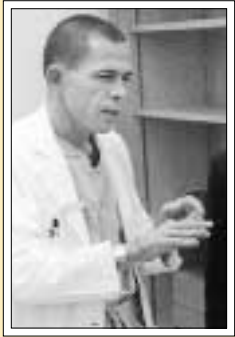
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# BRAIN TUMOR RESEARCH CENTER CELEBRATES ITS 30<sup>TH</sup> ANNIVERSARY

## NEUROSURGERY NEWS

The Brain Tumor Research Center (BTRC) was conceived at Tulane University School of Medicine where, as a resident, Charles Byron Wilson MD thought that future hope against the dismal outlook for patients with brain tumors might lie in the use of anticancer drugs. In 1968, Wilson was invited to be Professor and Chair of Neurological Surgery at UCSF. With the aid of Professors Marvin Barker, Takao Hoshino, and soon other innovative researchers, a center was established to investigate the biological nature of brain tumors and to improve neurosurgical techniques and treatment with chemotherapy.



Charles B. Wilson MD  
BTRC Director 1972-1997

BTRC researchers shortly afterward established the first drugs effective against brain tumors. The combination

of active research and training programs and the prime academic and clinical setting of UCSF culminated in a Cancer Center research grant to UCSF in 1972, making the BTRC the first such categorical Center approved by the National Cancer Institute (NCI). Its creation indicated a policy of major interest and investment in brain tumor research by the NCI that encouraged activity in the field at other centers. In April 1979, the BTRC was awarded its first Program Project Grant from the National Institutes of Health (NIH), an award that has been renewed consistently to the present day – a period of nearly 27 years.

Over the next two decades, BTRC basic science investigators and clinical trials specialists worked together in a dedicated effort to improve known effective therapies for brain tumors and develop new ones. During the 1980s, BTRC investigators refined radiation therapy and defined new applications for its use. Work done by neurosurgeons in collaboration with pediatric radiation oncologists presaged later development of the BTRC as a pediatric center for brain tumor research and therapy. In chemotherapy research, BTRC investigators were leaders in developing and improving therapies then tested in clinical trials. In 1997, Dr. Wilson commended the departmental chair and directorship of the BTRC to Mitchel S. Berger MD.

Institution of the Michael Douglas Pediatric Brain Tumor Research Center in 1999 made the BTRC the most comprehensive brain tumor program in the nation and one of few centers in the world offering state-of-the-art research and treatment for brain tumors afflicting both children and adults. Funding of an



BTRC Faculty, staff, and colleagues circa 1975, from left to right: First row (seated): Tana Pischer; Benjamin Usog. Second row: Kazuhiro Nomura; Dennis Deen; a BTRC graduate student; Laurence Marton; Marvin Barker; Kathleen Smith Barker; Victor Levin; Takao Hoshino; Stephanie Pentecost. Third row: Tom Wang; a BTRC graduate student; Robert Weinkam; Mark Rosenblum; Warren Lubich. Fourth row (seated): Nancy Gordon. Fifth row: Mary Freeman Dove.

NIH Specialized Program of Research Excellence (SPORE) grant for brain tumor research in 2002 opened collaborative work between BTRC investigators and investigators in other UCSF departments and the other SPORE programs in the UCSF Comprehensive Cancer Center. Today, the BTRC's mission is still to define the basic nature of human brain tumors and develop effective therapies – and ultimately to find a cure through a translational approach to clinical research that is based on a foundation of experimental laboratory investigation.



BTRC staff circa 1977, from left to right: First row: Kathleen Smith Barker, Pamela Vestneys, Charles Nelson, Warren Lubich. Second row: Dolores V. Dougherty, Susan Eastwood, Peggy Seager.

**SPECIALIZED PROGRAMS OF RESEARCH EXCELLENCE (SPORE) GRANT  
NATIONAL INSTITUTES OF HEALTH**

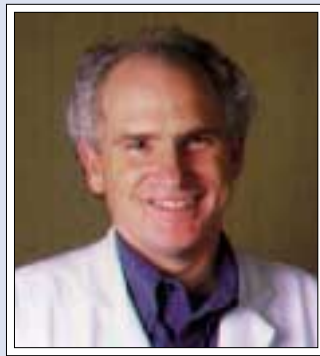
**UCSF BRAIN TUMOR SPORE**

Mitchel S. Berger MD, *Principal Investigator* • Michael D. Prados MD, *Co-Principal Investigator for Clinical Science* •  
Russell O. Pieper PhD, *Co-Principal Investigator for Basic Science*

PROJECT PERIOD: 1 August 2002 – 31 July 2007 • SPECIFIC TRANSLATIONAL RESEARCH OBJECTIVES

**PROJECT 1: San Francisco Bay Area Adult Glioma Survival Study**

**Principal Investigator:** Margaret Wrench PhD  
**Clinical Co-Principal Investigator:** Michael Prados MD



Three important goals of clinical research pertinent to glioma are to choose the best treatment available for each patient, to enhance stratification of patients so that new treatments can be more quickly and accurately evaluated, and to provide better information to patients and their families on what they can expect as a result of their disease. Unambiguous diagnosis is a cornerstone for each of these goals. Currently, however, glioma diagnosis is primarily based on assessments of tumor morphology, which are inherently subjective. There is an urgent need to identify characteristics of tumors and patients that better define glioma subtype and prognosis. This project will address this need by examining survival in relationship to several tumor markers that define genetic subtypes of gliomas and are thought to be potentially important in prognosis. In addition to consideration of known prognostic indicators such as age, the study also will consider survival as a function of patients' characteristics, including a variety of polymorphisms in DNA repair and carcinogen metabolizing genes, personal and family medical histories, diet, smoking and alcohol consumption before diagnosis, and other demographic factors such as education. Finally, this project proposes to validate results obtained in 100 newly diagnosed patients with glioblastoma multiforme on clinical trial protocols at UCSF. The survival information derived from this project is expected to be useful to clinicians in planning and refining treatments, while information from other factors will be useful in providing patients with a clearer picture of their probable outcomes based on their individual characteristics.

**PROJECT 2: Prognostic Value of MRSI Parameters for Patients with Glioma**

**Principal Investigator:** Sarah Nelson PhD  
**Clinical Co-Principal Investigator:** Susan Chang MD



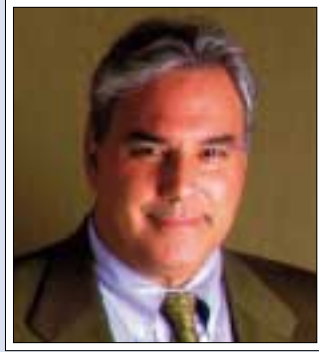
The objective of this project is to determine whether quantitative parameters derived from magnetic resonance spectroscopy imaging (MRSI) data are predictive of response to therapy for patients with gliomas. This is an important clinical question because gliomas are heterogeneous, infiltrative tumors with poorly defined margins. Although histological grade has been shown to be predictive of outcome in large-scale clinical trials, there is considerable variability between tumors of the same grade in terms of response to therapy and time to progression. The identification of new factors that predict treatment response are critical for tailoring therapy to individual patients' characteristics and are expected to have a significant impact on the criteria used to select patients for future clinical trials. In our laboratory, we have used MRSI to derive a number of different quantitative parameters that are valuable for defining the metabolic activity and spatial extent of tumor. These include a choline to N-acetylaspartate index (CNI), a choline to creatine index (CCrI), a creatine to N-acetylaspartate index (CrNI), and a lactate plus lipid index (LLI). This project will determine if these indices provide information that is clinically relevant for the management of gliomas and will determine, by using patients on clinical trial protocols at UCSF, if there is a basis for integrating the technology into the design of future clinical trials.

# f o c u s o n F A C U L T Y

## PROJECT 3: Development of Novel Targeted Therapeutics for Brain Tumor Treatment

**Principal Investigator:** John Park MD

**Clinical Co-Principal Investigator:** Mitchel Berger MD



Newer, more targeted therapies are needed for brain tumor treatment. Radiation therapy and chemotherapy are limited by inadequate tumor specificity, inherent and/or acquired resistance, and the inability to achieve effective exposure within the brain without causing excessive systemic toxicity. Better therapies must achieve efficient delivery of agents not only to the brain but also through selective and efficient targeting to the tumor cells themselves. Based on our previous work, we have developed immunoliposome technology for receptor-targeted, intracellular drug delivery. We are now applying this technology to brain tumor treatment. In this project, liposomes will be designed to carry various toxic small molecules or nucleic acid constructs that are potent agents against brain tumors. These liposomes will then be targeted to glioma cells by linkage to antibody fragments specific for tumor cells expressing epidermal growth factor receptor (EGFR) or mutant EGFR. In close collaboration with Dr. Krysz Bankiewicz, these liposomes and immunoliposomes will be administered into the brain by using convection-enhanced delivery. Further development will be directed toward moving the most promising constructs into clinical trials in coordination with the Neuro-Oncology Service of the UCSF Neuro-Oncology Program. This approach is expected to selectively increase drug delivery to brain tumors and to have a significant impact on the therapy of otherwise untreatable gliomas. Dr. Park is also a Principal Investigator of a project in the UCSF Breast Cancer SPORE that concerns the creation of immunoliposomes specifically designed for use in the treatment of metastatic breast cancer.

## PROJECT 4: Exploiting the PI3-Kinase Pathway in Human Glioma Therapy

**Principal Investigator:** David Stokoe PhD

**Clinical Co-Principal Investigator:** Daphne Haas-Kogan MD



Dysregulation of the phosphoinositide 3-kinase (PI3-kinase) signaling pathway plays a key role in the development of gliomas. Novel agents that inhibit elements within this pathway are in clinical trials, although to date it is not known which tumor will respond to which kinase pathway inhibitor. Our goal is to use the molecular profile of individual tumors to guide therapy with molecularly targeted treatments that will improve survival for patients with glioma. To achieve it, we must identify the most promising target for therapeutic inhibition, define the population most likely to benefit from treatment with signaling inhibitors, and validate the ability of molecular features to guide the choice of signaling inhibitor in individual patients. To identify the signaling molecule whose inhibition is likely to affect survival, elements within the PI3-kinase cascade will be analyzed in diffuse gliomas of all grades. We will characterize molecules that function upstream and downstream of PI3-kinase for each tumor and correlate those molecules with each other and with patients' survival. We will also define the patients most likely to benefit from inhibition of the PI3-kinase pathway. To validate the ability of molecular features to guide the choice of signaling inhibitor, we will analyze tumors from patients enrolled in phase I clinical trials that include signaling inhibitors. The status of elements within the PI3-kinase pathway will be retrospectively correlated with tumor response to the novel agent. We plan a phase II trial to examine the value of molecular profiling in selecting treatment for individual patients with glioma. The choice of signaling inhibitor tested will rest on prevalence of the targeted aberration, the strength of its association with patients' survival, and clinical response data from completed phase I trials. To enhance the specificity of agents that inhibit the PI3-kinase pathway, we will incorporate into therapy agents that target central elements of this signaling cascade. To this end, we have developed approaches to specifically inhibit PI3-kinase or its immediate downstream effector PDK1. We will test delivery and efficacy of these agents in xenograft models of human gliomas with the goal of incorporating them into the multi-modality treatment of patients.

# SPECIALIZED PROGRAM OF RESEARCH EXCELLENCE

## CAREER DEVELOPMENT AWARDS

Gabriele Bergers PhD

*Assistant Professor of Neurological Surgery*  
Principal Investigator, BTRC

**PROJECT TITLE:** Hypoxia and Neovascularization: Cause or Consequence of Glioblastoma Multiforme Progression?

**FUNDING AGENCY:** Sidney Kimmel Foundation/National Cancer Institute/SPORE

**Co-Investigator:** Dr. Randall Johnson



**PROJECT SUMMARY:** A specific feature of glioblastoma multiforme (GM) progression is the formation of a necrotic center due to reduced oxygen and nutrient levels. Consequently, these hypoxic conditions are able to trigger the formation of new blood vessels by inducing hypoxia-inducible transcription factors (HIF-1), which in turn induce proangiogenic molecules, including vascular endothelial growth factor (VEGF-A) and its receptors, allowing the tumor to co-opt and progress. We hope to reveal the biological significance of hypoxia and VEGF in GM progression by generating tumors that are unable to induce HIF-1  $\alpha$  or VEGF and comparing their characteristics. This will help to elucidate hypoxia-induced tumor-promoting pathways that are distinct from the hypoxia-induced VEGF pathways and help shed light on the importance of these factors in GM progression.

Tracy Richmond McKnight PhD

*Assistant Professor of Radiology*  
Principal Investigator, BTRC

**PROJECT TITLE:** Correlation of MRS Features of Glioma with Tumor Markers

**FUNDING AGENCY:** National Cancer Institute/SPORE



**PROJECT SUMMARY:** Magnetic resonance spectroscopy (MRS) is currently used to aid in the clinical management of patients with glial tumors. Magnets with field strength greater than 1.5 Tesla are beginning to be used for both clinical and research purposes. We will investigate the difference between the high-field MRS signature of normal and transformed cells in culture by using high-resolution magic angle spinning (HRMAS) MRS. Recent data from our laboratory show that normal brain, oligodendroglioma, and astrocytoma each have different MRS profiles. We have designed a series of HRMAS experiments to investigate whether such differences are observed in cultured cell models of normal and transformed brain, and whether the MRS signature is more reflective of the genetic features or morphologic features of the cells.

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## DEVELOPMENTAL RESEARCH AWARDS

Andrew T. Parsa MD, PhD

*Assistant Professor of Neurological Surgery*  
Principal Investigator, BTRC

**PROJECT TITLE:** Antigen-Specific Modeling of Glioma Immunotherapy

**FUNDING AGENCY:** National Cancer Institute/SPORE

**Co-Investigator:** Abul K. Abbas MD

**Collaborators:** Drs. Lawrence Fong, Sang-Mo Kang, Lewis Lanier



**PROJECT SUMMARY:** Immunotherapy depends on evoking an immune response with tumor-related antigens. Clinical protocols designed to treat glioma to date have been uniformly unsuccessful, suggesting that the preclinical model systems used to test them are inherently flawed. Our preliminary results established the need for a more appropriate model system for studying mechanisms of efficacy in glioma immunotherapy. Our project is designed to study basic tenets of immunology while providing readily translatable treatment plans. A murine model of glioma generated from transgenic strains engineered to overexpress oncogenic V12Ha-ras in astrocytes will be used. In the murine system, V12Ha-ras can cause expansion of MHC restricted specific T-cells readily detected by tetramer analysis. For the first time, we have a relevant glioma model for immunotherapy to investigate the following: T-cell trafficking in the CNS; antigen-presenting cells in the CNS; epitope spreading in anti-glioma immunity; in-vivo loading of dendritic cells.

William A. Weiss MD, PhD

*Assistant Professor of Neurology, Neurological Surgery, & Pediatrics*  
Principal Investigator, BTRC

**PROJECT TITLE:** Stem Cells as Delivery Agents in the Treatment of Glioma

**FUNDING AGENCY:** National Cancer Institute/SPORE

**Collaborators:** Drs. Arturo Alvarez-Buylla, Evan Snyder, Karen Aboody



**PROJECT SUMMARY:** We have generated a model for oligodendroglioma by over-expressing the oncogenic form of the epidermal growth factor receptor v-erbB in oligodendroglial cells of transgenic mice. These mice develop infiltrating oligodendrogliomas that are initiated using a gene that is commonly over-expressed in human oligodendroglioma. Our hypothesis is that this mouse model for spontaneously arising oligodendroglioma provides a valuable preclinical model for the treatment of patients with glioma. Neural stem cells are ideally suited for delivery of antitumor agents in the brain; they are migratory and specifically hone to human tumor xenografts. We propose to test whether neural stem cell lines and primary neural stem cell populations are effective vehicles for delivery of therapy in a mouse model for spontaneously arising glioma.



Jay Chun received his BS degree in Biology from Creighton University in Omaha, Nebraska, and his MA and MPhil degrees from Columbia University in New York. During the MD-PhD Program at the Columbia University College of Physicians and Surgeons, he received his PhD working with Richard Axel of the Howard Hughes Medical Institute in 1993 and his MD in 1996. After an internship at the University of California, San Francisco (UCSF), he began his residency in Neurological Surgery at UCSF.

Throughout his training, Jay has been an active research investigator. He has been the recipient of two Medical Research Fellowships from the National Institutes of Health (NIH), working on Neuronal Voltage-Dependent Calcium Channels with the late Nobel Laureate Marshall Nirenberg of the National Heart, Lung, and Blood Institute (NHLBI) and on Novel Protein 120D which Co-Isolates with Complement 2 with Michael Frank, Director of the Laboratory of Clinical Investigation at the National Institute of Allergy and Infectious Diseases (NIAID). As a faculty member at Columbia, he cloned the Cocaine Catalytic Antibody with Donald Landry and was active in the biotechnology field. He was approved for an NIH Individual National Research Service Award and was awarded a Groupe International Cotrel Dubousset (GICD) Traveling Grant.

During his residency, Jay has been investigating Stem-Cell Delivery of Anti-Angiogenesis Factors in a Mouse Glioma Model at UCSF in which he studied a novel method to deliver antitumor agents to intracranial tumors. Among some of his clinical studies, he has shown that, contrary to previous reports, surgical resection of meningiomas should be delayed until more than 24 hours after embolization because there is then less intraoperative blood loss. In conjunction with Michael Lawton MD, he has also created an algorithm for the treatment of patients with infectious intracranial aneurysms.

Jay has presented both clinical and research papers at conferences of the American Association of Neurological Surgeons (AANS), the Congress of Neurological Surgeons, the Western Neurosurgical Society, and the International Workshop on Cerebrovascular Surgery. He was honored with the Best Resident Paper Award from the AANS in 2002.

Jay greatly values the time he is able to spend with his wife Jung and his daughter Chloe, and in his rare free time he enjoys fencing, at which he excels. He was nationally ranked Nebraska State Foil Champion in 1984-1986. When Jay completes his residency in June 2003, he will undertake a fellowship in spine surgery at Emory University School of Medicine in Atlanta.

## SELECTED PUBLICATIONS

**Chun JY, Dillon WP, Berger MS.** Symptomatic enlarged cervical anterior epidural venous plexus in a patient with Marfan syndrome. *AJNR Am J Neuroradiol* 2002;23:622-4.

**Chun JY, McDermott MW, Lamborn KR, Wilson CB, Higashida R, Berger MS.** Delayed surgical resection reduces intraoperative blood loss for embolized meningiomas. *Neurosurgery* 2002;50:1231-5; discussion 1235-7.

**Chun JY, Smith W, Halbach VV, Higashida RT, Wilson CB, Lawton MT.** Current multimodality management of infectious intracranial aneurysms. *Neurosurgery* 2001;48:1203-13; discussion 1213-4.

**Lawton MT, Chun J, Wilson CB, Halbach VV.** Ethmoidal dural arteriovenous fistulae: an assessment of surgical and endovascular management. *Neurosurgery* 1999;45: 805-10; discussion 810-1.

## RESIDENTS' PUBLICATIONS

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**Vates GE, Lawton MT, Wilson CB, McDermott MW, Halbach VV, Roberts TP, Rowley HA.** Magnetic source imaging demonstrates altered cortical distribution of function in patients with arteriovenous malformations. *Neurosurgery* 2002;51:614-23; discussion 623-7.

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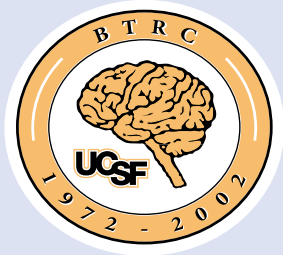
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**von Koch CS, Quinones-Hinojosa A, Gulati M, Lyon R, Peacock WJ, Yingling CD.** Clinical outcome in children undergoing tethered cord release utilizing intraoperative neurophysiological monitoring. *Pediatr Neurosurg* 2002;37:81-6.

**von Koch CS, Rosenblum ML.** Surgical infections of the central nervous system. In Way LW, Doherty GM (eds): *Current surgical diagnosis and treatment* (11th ed). New York, McGraw-Hill, 2002, pp 958-61.

**von Koch CS, Young G, Chin CT, Lawton MT.** Magnetic resonance imaging/spectroscopy of an intraaxial epidermoid: similarity to an abscess. Case illustration. *J Neurosurg* 2002; 97:492.



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## - Selected Recent Publications from the Department of Neurological Surgery -

Bardach NS, Zhao S, Gress DR, **Lawton MT**, Johnston SC. Association between subarachnoid hemorrhage outcomes and number of cases treated at California hospitals. *Stroke* 2002;33:1851-6.

Calcagnotto ME, Paredes MF, **Baraban SC**. Heterotopic neurons with altered inhibitory synaptic function in an animal model of malformation-associated epilepsy. *J Neurosci* 2002;22:7596-605.

Castro PA, Pleasure SJ, **Baraban SC**. Hippocampal heterotopia with molecular and electrophysiological properties of neocortical neurons. *Neuroscience* 2002;114:961-72.

**Costello JF**, Smiraglia DJ, Plass C. Restriction landmark genome scanning. *Methods* 2002;27:144-9.

**Costello JF**, Vertino PM. Methylation matters: a new spin on maspin. *Nat Genet* 2002;31:123-4.

Halim AX, Singh V, Johnston SC, Higashida RT, Dowd CF, Halbach VV, **Lawton MT**, Gress DR, McCulloch CE, Young WL. Characteristics of brain arteriovenous malformations with coexisting aneurysms: a comparison of two referral centers. *Stroke* 2002;33:675-9.

Karkar KM, Garcia PA, Bateman LM, Smyth MD, **Barbaro NM**, **Berger M**. Focal cooling suppresses spontaneous epileptiform activity without changing the cortical motor threshold. *Epilepsia* 2002;43:932-5.

Kokubo Y, Matson GB, **Liu J**, Mancuso A, Kayama T, Sharp FR, **Weinstein PR**. Correlation between changes in apparent diffusion coefficient and induction of heat shock protein, cell-specific injury marker expression, and protein synthesis reduction on diffusion-weighted magnetic resonance images after temporary focal cerebral ischemia in rats. *J Neurosurg* 2002;96:1084-93.

**McDermott MW**, **Kunwar S**, **Berger MS**. Neurosurgery and surgery of the pituitary: brain tumors. In Way LW, Doherty GM (eds): *Current surgical diagnosis and treatment* (11th ed). New York, McGraw-Hill, 2002, pp 915-26.

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