Georgia Health Sciences University

Neuroscience Outlook

Department of Neurosurgery Newsletter

Volume 8, Issue 2 - Winter 2012

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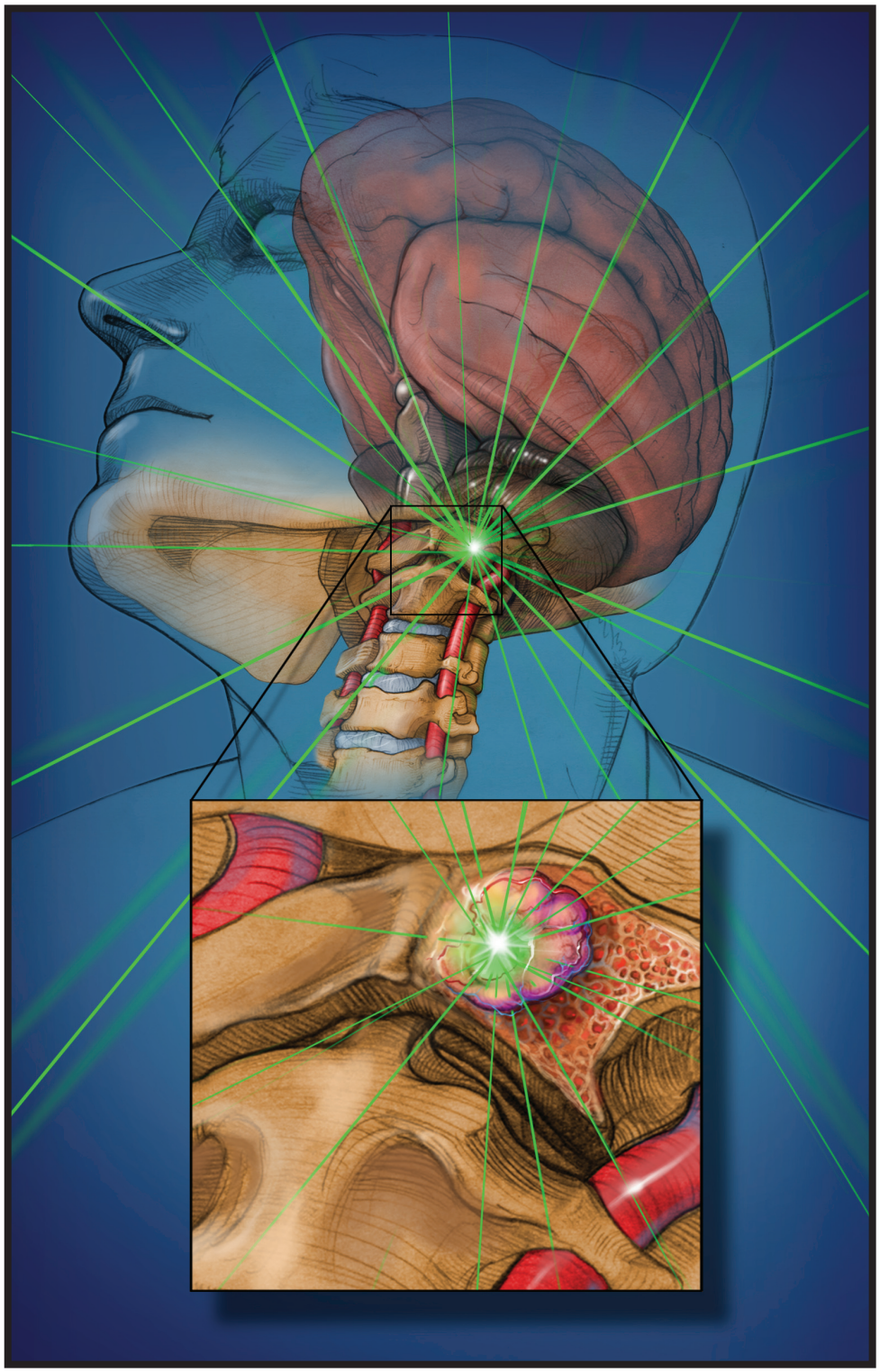
Georgia Health Sciences University



Clinical Spotlight: ***PERFEXION: Extending the reach of Gamma Knife stereotactic radiosurgery***

Chair's Message

This year marks our tenth year as a full department. Despite the many challenges we face today in the practice of academic medicine we are proud of the accomplishments we have achieved in the research, clinical, and educational arenas in the past decade. Some of the more significant accomplishments are listed below.

Research:

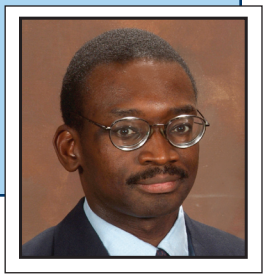
- In 2009 our department achieved **top quartile** rank (number 25 of 102 neurosurgery training programs in the US) in NIH funding, up from a rank of 40 in 2006.
- Krishnan Dhandapani, Ph.D. received a **Distinguished Faculty Basic Sciences Award** from the Georgia Health Sciences University Faculty Senate in 2011. This was one of only two awards given each year for excellence in research at the institution.
- In 2006 Sergei Kirov, Ph.D., received an **outstanding priority score** of 125 (top 3-4 percentile) for an NIH R21 grant entitled, "Neuroprotection in the Human Brain Tissue Model of Stroke."
- In 2009 Krishnan M. Dhandapani, Ph.D. and Cargill H. Alleyne, Jr., M.D. was one of four groups awarded an inaugural **Brain and Behavior Discovery Institute (BBDI) grant.**
- John Vender, M.D. was awarded a **Brain and Behavior Discovery Institute grant** in 2010
- An article by Cole A. Giller, M.D., Ph.D., M.B.A. was **one of the top 100 cited** in the neurosurgical literature at number 88. (Ponce FA, Lozano AM: Highly cited works in neurosurgery. Part I: the 100 top-cited papers in neurosurgical journals. J Neurosurg 112:223-232, 2010).

Education and Teaching:

- In 2006 our residency program was extended from six to seven years.
- Dion Macomson, M.D. (assistant Program director) was selected for **an inaugural Exemplary Teaching Award** from the School of Medicine for outstanding contributions to resident teaching during the 2007-8 academic year.
- Cole A. Giller, M.D., Ph.D., M.B.A., F.A.C.S. was selected as **Educator of the Year** by the 2011 medical school graduating class.
- Cargill H. Alleyne, Jr., M.D. was one of only two clinical chairs at the institution nominated for an **Exemplary Teacher Award** based on evaluations for medical students during the 2009-10 academic year. Dr. Alleyne was also nominated in the 2007-8 academic year.

Clinical growth:

- We now have a total of nine faculty (including 2 affiliated VA faculty) and two full-time researchers in our department
- A major **expansion and upgrade** of our neuroscience ICU and floor was completed in 2010. We now have 20 universal beds in the ICU and 16 private rooms on the floor.
- In 2011 we **upgraded** to a state-of-the-art Phillips Allura neuroangiography suite which has several unique attributes including the first in the South (and only the third in the nation) to have the VasoCT option.
- In the last six months we completed a major **upgrade** of our Gamma Knife to the Perfexion model. The benefits of this upgrade are highlighted in the clinical spotlight.
- Three members of our faculty have been repeatedly cited as of one the **Best Doctors in America.** This accolade is given to the top 5% of clinicians in the country.



While we continue to face ever-increasing challenges in the shifting sands of academic medicine we look forward to reaching new heights in the next decade.

Cargill H. Alleyne, Jr., M.D.
Professor and Marshall Allen Distinguished Chair

Department News

Gamma Knife upgrade

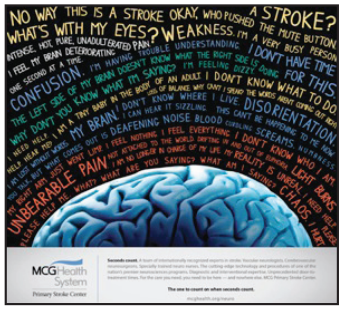
Last summer our Gamma Knife unit underwent a major upgrade to the state-of-the-art Perfexion model. This model and its advantages are featured in the clinical spotlight section of this newsletter.

Photograph from publication makes Glia cover

An image from an article by one of our Ph.D. researchers **(Sergei A. Kirov, Ph.D.)** was featured on the cover of Glia. The article is: Masuda T, Croom D, Hida H, Kirov SA: Capillary blood flow around microglial somata determines dynamics of microglial processes in ischemic conditions. Glia 59(11): 1744-1753 [Epub ahead of print; (2011) Jul 28], 2011. The image can be viewed in the Publications and Presentations section.

Stroke marketing ad wins national award

We recently completed a major stroke marketing campaign in late 2011. One of the print adverstisements, "Stroke seconds count", devised by our ad agency (CJ&P advertising) in conjunction with the Neurology and Neurosurgery departments won the gold award for "Best Individual Consumer Print Advertisement" from the Medical Marketing & Media Awards. Judges praised its "stopping power" and its "iconic execution".



Contributor Acknowledgement

We thank the **A. R. Staulcup Foundation** for their continued support. We are also indebted to **Ms. Louann H. Turnage, Mrs. H. Leroy Wilkerson** and **Marilyn Montgomery** who made contributions to the department. Thanks also go to **Haroon Choudhri, M.D., John Vender, M.D**. and **Cargill H. Alleyne, Jr., M.D**. for their contribution to the Neurosurgery Resident Book Fund.

In addition, one of our alumni **Ernest Fokes, M.D.** has made a contribution to the Neurosurgery Library Fund in honor of **Marshall Allen, M.D.** We are delighted and grateful that he has pledged to contribute annually.

Clinical Spotlight

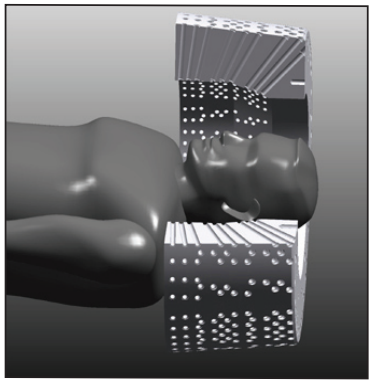
Perfexion: Extending the reach of Gamma Knife stereotactic radiosurgery

There have been several recent major changes for the Gamma Knife Program at GHSU.

First, the Southeast Gamma Knife Center has been renamed the Georgia Health Sciences Gamma Knife Center. The new name reflects the integration of our Gamma Knife Center into the new Georgia Health Sciences University enterprise.

Gamma Knife Perfexion

Second, the Gamma Knife Center has successfully transitioned from its prior B model technology to the Perfexion. Since the launch of the Perfexion on August 23, 2011 to December 2011, we treated over seventy patients. The shorter treatment times have been a significant advantage for patients requiring multiple shots. The real time shot placement and inverse planning capabilities (see inset) improve treatment planning with increased flexibility.



We have also already seen multiple benefits from the extended reach of this new technology. While a patient with a vagal nerve schwannoma (Case 1) was unable to receive treatment on the previous B model, she underwent a successful treatment on the Perfexion. Similarly, a patient with a large glomus jugulare tumor with substantial lateral and inferior extension, unreachable with prior gamma knife technology, was also treated successfully. Historically, only 50% of glomus tumors evaluated, those with primarily superior and medial extension, was treatable. Additionally, select upper cervical spinal lesions can now be targeted. We recently treated our first spinal tumor with the Gamma Knife (Case 2). The Perfexion now provides a non-invasive option for upfront and/or adjuvant Gamma Knife-based stereotactic radiosurgery for these patients.

Clinical Spotlight *(continued)*

Our new unit also has the Extend capability. With this function we can treat larger lesions or lesions in more dangerous locations. This is accomplished by the ability to relocate the frame and perform multisession radiosurgery. Several patients with large meningiomas are being evaluated for this new treatment option.

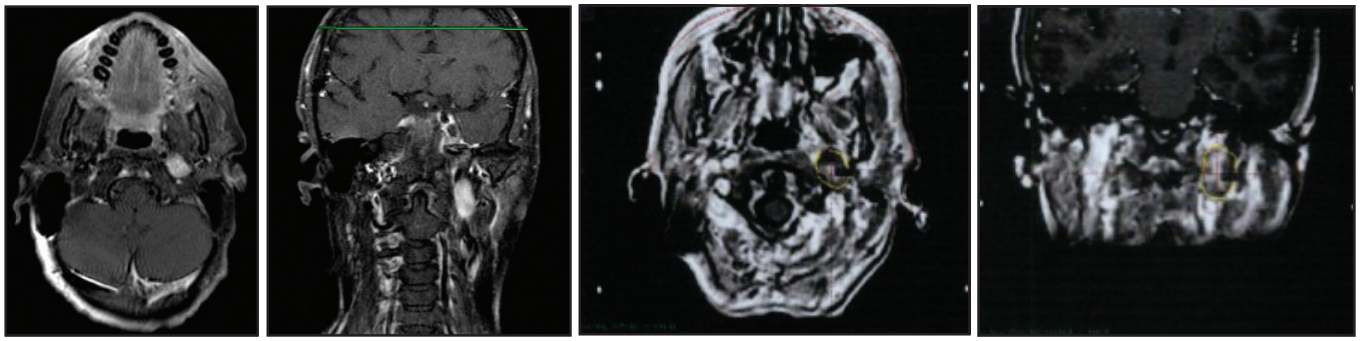
A New Innovation: Inverse Planning

The Gamma Knife delivers its treatment as a series of sphere-shaped parcels of radiation aimed at different parts of the targeted tumor. These spheres are arranged according to directions from the radiosurgeon – the radiosurgical plan – in a way that maximizes conformality, i.e., that maximizes the radiation dose given to the tumor while minimizing the dose to the surrounding normal tissue. With practice and skill, highly effective plans can be constructed using this "sphere packing" method to treat a wide range of complex targets.

The Perfexion planning system introduces a powerful method that extends the planning capabilities of the Gamma Knife. Instead of packing spheres, the radiosurgeon specifies a series of priorities and constraints to an algorithm that automatically generates a plan optimizing four parameters: coverage of the target, sparing of the surrounding normal tissue, dose falloff outside the target, and beam-on time. Because the plan can then be reviewed and modified as needed, inverse planning combines the best features of computer optimization and human expertise to produce superlative radiosurgical plans.

Case 1

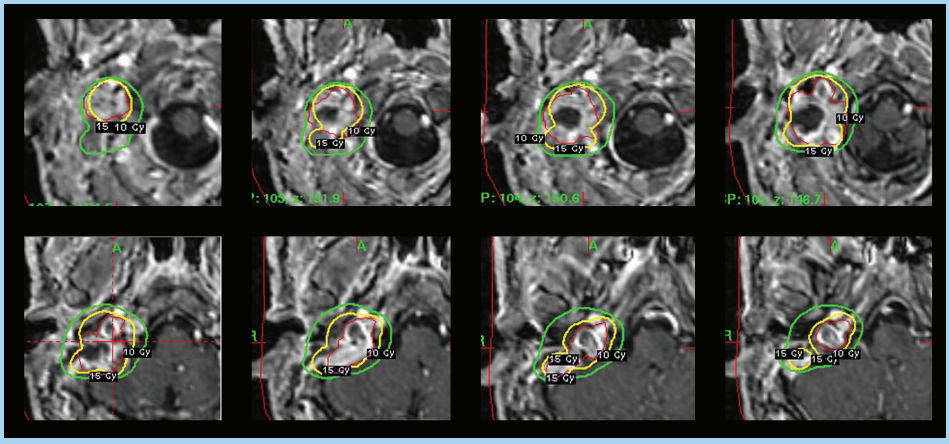
The patient is a 25-year-old woman with a history of neurofibromatosis and syncopal episodes. Her MRI revealed a vagal nerve schwannoma and she underwent an attempted treatment with the older Gamma Knife model. This failed because of the caudal location of the lesion. Her treatment was rescheduled with the Perfexion model and was completed uneventfully with 15 Gy administered to the 41% isodose line.



AP and coronal MRI showing a left vagal nerve schwannoma

Case 2

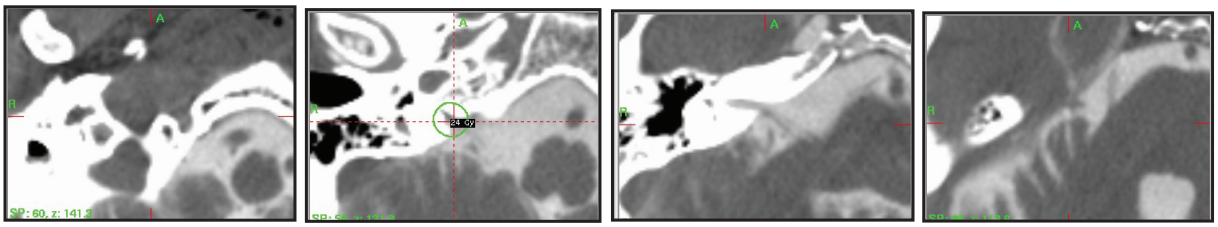
A 49-year-old patient with metastatic disease in the arch of C1 and pathologic instability underwent occipital cervical fixation. The patient had previously received radiation to the skull base as part of his initial therapy. The spinal cord had received a maximum dose and further radiation therapy was not an option. Surgical resection in the irradiated field for this extensive lesion was high risk. The treatment was completed with 16 Gy administered to the 46% isodose line. Stereotactic radiosurgery was the patient's best option and was delivered without incident.



Treatment Plan: target is outlined in red line, 15 Gy line is in yellow, 10 Gy line is in green.

Case 3

A 70-year-old patient with glossopharyngeal neuralgia and hemodynamic instability due to hyper and hypotensive episodes related to pain exacerbations. Pt was experiencing multiple attacks per day and required ongoing management in the medical ICU. A targeting MRI could not be done due to issues related to his pacemaker. He underwent a CT cisternogram and treatment with 80 gy to the 100% isodose line. He has had no further hyper or hypotensive episodes since treatment.



CT cisternogram showing glossopharyngeal nerve. Target with a 24 Gy line in green.

John R. Vender, M.D., Cole A. Giller, M.D., Ph.D., M.B.A., Haroon F. Choudhri, M. D., Cargill H. Alleyne, Jr., M.D.

Alumni Reflections

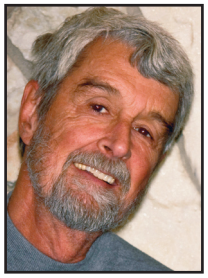
Some thoughts from a country neurosurgeon

I had finished my residency, been in practice for about two years; passed my boards, when I suddenly had the thought, "Is this it?" Is this what I went to school all of those years for? I believe that my feeling was about the same, only multiplied, as that which one remembers perhaps the day after Christmas when the presents have all been opened and it's "all over". The sensation was strong enough that I set aside some time to think about my circumstance. In doing so I remembered that someone had once asked my father what I was going to be when I finished school and he answered, "Old."

In reflecting, what I realized was that I had been given a platform of knowledge. One of the things which attracted me to Neurosurgery in the first place was that it was (is) what I call an "open ended process". True, I had finished the formal training part of my education but the "open endedness" was still there and it was up to me to take advantage of it. What I had in effect was a broad base of knowledge upon which it was now my responsibility to build more. "I 'am' a Neurosurgeon," I thought but that seems to have a passive sense to it, and thinking more I began to realize the difference between "being" and "becoming". I was at the threshold of "becoming". Furthermore, there was the matter of happiness or pleasure. There is a pleasure in the acquisition of knowledge and not necessarily with any particular goal in sight but simply in the process of gaining information.

I could passively stand on the platform which I had built, go about my daily practice of "being" a Neurosurgeon or take a more dynamic approach and look on where I now stood as just the first stage of actually "becoming" a Neurosurgeon. The former approach was the passive one and required little or no expenditure of energy and the latter more active and held the promise of an expenditure of some effort. I would need to strive much as I had done during the formal portion of my training, but by doing so my knowledge would grow, the beauty of knowledge would happen and be appreciated and my growth would continue. In the words of Friedrich von Schiller, "…he makes his way from an *ordinary actuality* (italics mine) to an aesthetic one, from a sense of mere life to a sense of Beauty." The decision then in the plainest sense was whether to be content with Schiller's (and my) "ordinary actuality" of simply "being", which to my mind I had achieved, or to allow my Reason to take command and proceed to something more elevated and rewarding. In other words, delve into and experience a real sense of beauty. To do less seemed a waste of all of my previous training and even more important, of a substantial portion of my life.

I chose to continue to learn and the more I did so the more opportunities presented themselves. As examples, transsphenoidal pituitary surgery was rediscovered along with the use of the operating microscope and I applied myself to that; then to the various forms and approaches to the matter of trigeminal neuralgia made more elegant thanks to the work by my friend Peter Janetta. Once I embarked on this voyage for the continued acquisition of knowledge there was no turning back as I became caught up in the learning tide and with it I was able to realize the sense of Beauty that comes with the feeling of fulfillment. Instead of pausing at the station of Being I participated in the continuum of Becoming and thereby "…from a sense of mere life to a sense of Beauty," rewarding to me and, I believe, to my patients.



Ernest Fokes, M.D.

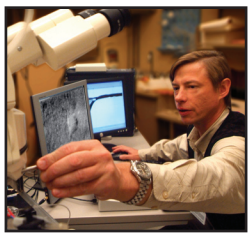
Dr. Fokes graduated from the *MCG Neurosurgery* program in 1969.

He now enjoys retirement in Hayden Lake, ID.

Faculty Update and Staff Update

Accomplishments and recognition

An image from an article by **Sergei A. Kirov, Ph.D.** was featured on the cover of **Glia.** The article is: Masuda T, Croom D, Hida H, **Kirov SA:** Caapillary blood flow around microglial somata determines dynamics of microglial processes in ischemic conditions. Glia 59(11): 1744-1753 [Epub ahead of print; (2011) Jul 28], 2011



Sergei A. Kirov, Ph.D.

Cargill H. Alleyne, Jr., M.D. was guest examiner at the Neurosurgical Oral Board Examinations in Houston,TX in November 2011. He was also featured in a local TV news segment: School superintendent's doctor proclaims him "lucky" after being "near death's door", News 12 Channel 10 News. In addition he was a reviewer for Neurosurgery, Journal of NeuroInterventional Surgery, and BioMed Central Research Notes.

Cargill H.Alleyne Jr., M.D.

Cole A. Giller, M.D., Ph.D., M.B.A. was a reviewer for Technology in Cancer Research and Treatment, and for the 16th Leksell Society Gamma Knife meeting.

Cole A. Giller, M.D., Ph. D. , MBA

Haroon F. Choudhri, M.D. was visiting professor at New Al Mowasat Hospital in Kuwait in October and December 2011 and at the Kuwait Oil Company/Ahmadi Hospital in Kuwait in December 2011

Haroon Choudhri, M.D.

Scott Rahimi, M.D. was featured in a local TV news segment (Channel 6, WJBF Augusta): Responding to stroke symptoms early, in September 2011.

Scott Rahimi, M.D.

Presentations and Publications *(July 2011 - December 2011)*

Presentations

Alleyne CH: Vascular malformations. National Medical Association Meeting, Washington, D.C., July 2011

Kirov SA: Spreading depolarization-induced injury to neurons and astrocytes. Vasospasm 2011. The 11th International Conference on Neurovascular Events after Subarachnoid Hemorrhage, Cincinnati, OH, July 2011

Alleyne CH: Introduction to Neurosurgery. Surgery 5000 lecture series, Medical College of Georgia, August 2011

Alleyne CH: Vascular malformations. Neurology Residents' Noon Conference, Medical College of Georgia, August 2011

Giller CA: Questions and answers about surgery for Parkinson's Disease. Augusta Parkinson's support group, Augusta, GA, August 2011

Giller CA: Surgery for Essential Tremor. International Essential Tremor Foundation seminar, Augusta, GA, August 2011

Kirov SA, Risher WC: Persistent astroglial swelling accompanies acute neuronal injury and recovery during stroke-induced spreading depolarizations. The 10th European meeting on Glial Cells in Health and Disease. Prague, the Czech Republic, September 2011

Alleyne CH, King M, **Dhandapani KM**: Necrostatin promotes hematoma resolution and attenuates cerebral edema following intracerebral hemorrhage. Congress of Neurological Surgeons Meeting, Washington, D.C., October 2011

Kirov SA: Cortical spreading depolarization: Emerging pathophysiologic mechanisms in the acutely injured brain. Albany Medical College, Center for Neuropharmacology and Neuroscience (CNN) Seminar Series, Albany, NY, October 2011

Woodall MN, Alleyne CH: Penetrating head injury with a nail gun: Case presentation and review of the literature. Congress of Neurological Surgeons Meeting, Washington, D.C., October 2011

Woodall MN, McGettigan M, Figueroa R, Gossage J, **Alleyne C**: Neurologic sequelae of Hereditary Hemorrhagic Telangectasia; The Georgia Health Sciences University Experience. Congress of Neurological Surgeons Meeting, Washington, D.C., October 2011

Alleyne CH: Introduction to Neurosurgery. Surgery 5000 lecture series, Medical College of Georgia, September 2011

Kirov SA: Cortical spreading depolarization: Emerging pathophysiologic mechanisms in the acutely injured brain. Karolinska Institute, Astrid Lindgren Children's Hospital, Stockholm, Sweden, September 2011

Choudhri HF: Management of cervical spondylotic myelopathy and minimally invasive lumbar fusion. Visiting Professor in Neurosurgery, New Al Mowasat Hospital, Kuwait, October 2011

Alleyne CH: Introduction to Neurosurgery. Surgery 5000 lecture series, Medical College of Georgia, November 2011

Sukumari-Ramesh S, **Alleyne CH**, **Dhandapani KM**: Astrocyte-specific expression of survivin following intracerebral hemorrhage in mice: a possible role in reactive gliosis? The 41st Society for Neuroscience Annual Meeting, Washington D.C., November 2011

Presentations and Publications *(July 2011 - December 2011)*

Kimbler DE, Shields J, **Dhandapani KM**: P2X7 inhibition improves neurological outcomes in a murine model of traumatic brain injury. The 41st Society for Neuroscience Annual Meeting, Washington D.C., November 2011

Giller CA: Aspects of surgery for essential tremor. Aiken essential tremor support group, Aiken, SC, November 2011

Sword J, Masuda T, **Kirov SA**: Two-photon imaging of dendrites and astrocytes after successive rounds of spreading depolarizations during traumatic brain injury. The 41st Society for Neuroscience Annual Meeting, Washington DC, November 2011

Kirov SA: Real-time acute injury to dendrites and astrocytes in the peri-contusional cortex revealed by 2-photon microscopy. US-Russia Brain Science Meeting, NIH, National Institute of Neurological Disorders and Stroke, Bethesda, MD, November 2011

Macomson SD, Shakir B: Atypical encephalitis in a 17 year-old female: A case report. Georgia Neurosurgical Society Meeting, Greensboro, GA, December, 2011

Woodall MN, Rahimi SY: Open surgical management of a ruptured intracranial aneurysm in Klippel-Trenaunay-Weber (KTW) sydrome: A case report. Georgia Neurosurgical Society Meeting, Greensboro, GA, December 2011

Choudhri HF: Management of cervical spondylotic myelopathy and minimally invasive lumbar fusion. Visiting Professor in Neurosurgery, New Al Mowasat Hospital, Kuwait, December 2011

Choudhri HF: Management of cervical spondylotic myelopathy. Visiting Professor in Neurosurgery, Kuwait Oil Company/ Ahmadi Hospital, Ahmadi, Kuwait, December 2011

Publications

Sangeetha SR, Bentley JN, **Laird MD**, Singh N, **Vender JR**, **Dhandapani KM**: Dietary phytochemicals induce p53- and caspase-independent cell death in human neuroblastoma cells. Int J Dev Neurosci 29: 701-710, 2011

Vender JR, Dhandapani KM, Waller JL, McDonnell DE: An evaluation and comparison of intraventricular, intraparencyhmal, and fluid-coupled techniques for intracranial pressure monitoring in patients with severe traumatic brain injury. J Clin Monit Comput 25: 231-236, 2011

Kimbler DE, Murphy M, **Dhandapani KM**: Concussion and the adolescent athlete. J Neurosci Nursing, 43: 286-290, 2011

Shields J, Kimbler DE, Radwan W, Yanasak N, **Sukumari-Ramesh S**, **Dhanadapani KM.** Therapeutic targeting of cerebral edema after traumatic brain injury. Translational Stroke Research, 2: 633-645, 2011

Giller CA: Feasibility of identification of Gamma Knife planning strategies by identification of Pareto optimal Gamma Knife plans. Technology in Cancer Research and Treatment 10:561-574, 2011

Masuda T, Croom D, Hida H, **Kirov SA**: Capillary blood flow around microglial somata determines dynamics of microglial processes in ischemic conditions. Glia 59(11): 1744-1753 [Epub ahead of print; (2011) Jul 28], 2011. (See cover illustration from this article below)

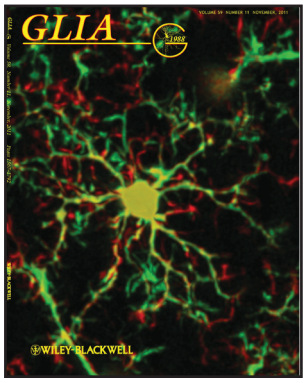
Risher WC, Lee MR, **Fomitcheva IV**, Hess DC, **Kirov SA**: Dibucaine mitigates spreading depolarization in human neocortical slices and prevents acute dendritic injury in the ischemic rodent neocortex. PLoS One 6(7), e22351. [Epub, Jul 15, 2011]

Liu X, Bates R, Yin DM, Shen C, Wang F, Su N, **Kirov SA,** Luo Y, Wang JZ, Xiong, WC, Mei L: Specific regulation of NRG1 isoform expression by neuronal activity. J Neurosci 31(23), 8491-8501, 2011

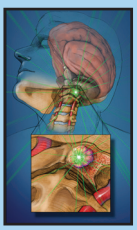
Vender J, Waller J, **Dhandapani K**, McDonnell D: An evaluation and comparison of intraventricular, intraparenchymal, and fluid-coupled techniques for intracranial pressure monitoring in patients with severe traumatic brain injury. J Clin Monit Comput 25(4):231-6, 2011 [Epub Sep 22, 2011]

Prosser JD, **Vender JR**, Solares CA: Traumatic cerebrospinal fluid leaks. Otolaryngol Clin North Am 44(4):857-73, 2011

Sukumari-Ramesh S, Bentley JN, Laird MD, Singh N, **Vender JR, Dhandapani KM:** Dietary phytochemicals induce p53- and caspase-independent cell death in human neuroblastoma cells. Int J Dev Neurosci 29(7):701-10, 2011



Cover that featured Dr. Kirov's article: Masuda T, Croom D, Hida H, Kirov SA: Capillary blood flow around microglial somata determines dynamics of microglial processes in ischemic conditions.



This issue's cover illustration reveals the remarkable case of a 49-year-old man with a metastatic disase in the arch of CI that was treated with the Perfexion Gamma Knife. See case 2 on page 4. The illustration is by Colby Polonsky, M.S.

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Neuroscience Outlook

To learn more about the GHSU Department of Neurosurgery, please visit:
www.georgiahealth.edu/medicine/neurosurgery/

Conference Schedule *(January 2012 - June 2012)*

Jan 13	10:00 - 11:00	Gamma Knife
	11:00 - 12:00	Board Review
	12:00 - 1:00	Case Conference
Jan 20	9:00 - 10:00	Pathology
	10:00 - 11:00	Board Review
	11:00 - 12:00	Business
	12:00 - 1:00	Cerebrovascular
Jan 27	9:00 - 10:00	Resident/Faculty Meeting
	10:00 - 11:00	Journal Club
	11:00 - 12:00	Spine
	12:00 - 1:00	M&M
Feb 3	10:00 - 11:00	Radiology
	11:00 - 12:00	Spine
	12:00 - 1:00	Case Conference
Feb 10	10:00 - 11:00	Gamma Knife
	11:00 - 12:00	Neuro 101: Neil Woodall
	12:00 - 1:00	Case Conference
Feb 17	9:00 - 10:00	Pathology
	10:00 - 11:00	Board Review
	11:00 - 12:00	Business
	12:00 - 1:00	Cerebrovascular
Feb 24	9:00 - 10:00	Resident/Faculty Meeting
	10:00 - 11:00	Journal Club
	11:00 - 12:00	Anatomy
	12:00 - 1:00	M&M
Mar 2	10:00 - 11:00	Radiology
	11:00 - 12:00	Spine
	12:00 - 1:00	Case Conference
Mar 9	10:00 - 11:00	Gamma Knife
	11:00 - 12:00	Neuro 101
	12:00 - 1:00	Case Conference
Mar 16	9:00 - 10:00	Pathology
	10:00 - 11:00	Board Review
	11:00 - 12:00	Business
	12:00 - 1:00	Cerebrovascular
Mar 23	9:00 - 10:00	Resident/faculty meeting
	10:00 - 11:00	Journal Club
	11:00 - 12:00	Anatomy
	12:00 - 1:00	M&M
Apr 06	10:00 - 11:00	Radiology
	11:00 - 12:00	Spine
	12:00 - 1:00	Case Conference
Apr 13	10:00 - 11:00	Gamma Knife
	11:00 - 12:00	Neuro 101
	12:00 - 1:00	Case Conference
Apr 20	9:00 - 10:00	Pathology
	10:00 - 11:00	Board Review
	11:00 - 12:00	Business
	12:00 - 1:00	Cerebrovascular
Apr 27	9:00 - 10:00	Resident/Faculty Meeting
	10:00 - 11:00	Journal Club
	11:00 - 12:00	Anatomy
	12:00 - 1:00	M&M
May 04	10:00 - 11:00	Radiology
	11:00 - 12:00	Spine
	12:00 - 1:00	Case Conference
May 11	10:00 - 11:00	Gamma Knife
	11:00 - 12:00	Neuro 101
	12:00 - 1:00	Case Conference
May 18	9:00 - 10:00	Pathology
	10:00 - 11:00	Board Review
	11:00 - 12:00	Business
	12:00 - 1:00	Cerebrovascular
May 25	9:00 - 10:00	Resident/Faculty Meeting
	10:00 - 11:00	Journal Club
	11:00 - 12:00	Anatomy
	12:00 - 1:00	M & M
Jun 01	10:00 - 11:00	Radiology
	11:00 - 12:00	Spine Conference
	12:00 - 1:00	Case Conference
Jun 08	10:00 - 11:00	Gamma Knife
	11:00 - 12:00	Neuro 101
	12:00 - 1:00	Case Conference
Jun 15	9:00 - 10:00	Pathology
	10:00 - 11:00	Board Review
	11:00 - 12:00	Business
	12:00 - 1:00	Cerebrovascular
Jun 22	9:00 - 10:00	Resident/Faculty Meeting
	10:00 - 11:00	Journal Club
	11:00 - 12:00	Anatomy
	12:00 - 1:00	M&M

Upcoming Meetings *(January 2012 - June 2012)*

AANS/CNS Section on Cerebrovascular Surgery
1/30-31, New Orleans, LA

International Stroke Conference
2/1-3, New Orleans, LA

AANS/CNS Section on Disorders of the Spine & Peripheral Nerves
3/7-10, Orlando, FL

Southern Neurosurgical Society
3/28-31, Amelia Island, FL

Comprehensive Stroke Management Update 2012
4/5-7, Hilton Head, SC

American Association of Neurological Surgeons
4/14-18, Miami, FL

Society of Neurological Surgeons
5/19-22, Atlanta, GA

Georgia Neurosurgical Society
5/21-24, Sea Island, GA

Neurosurgical Society of America
6/10-13, Park City, UT

Credits

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