



# Medical College of Georgia **Neuroscience Outlook**

Department of Neurosurgery Newsletter

Volume 8, Issue 1 - Summer 2011

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MCG is now  
the **Medical College  
of Georgia**  
at  
**Georgia Health  
Sciences University**

[www.mcg.edu/som/neurosurgery](http://www.mcg.edu/som/neurosurgery)

**MCGHealth**  
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*Clinical Spotlight: Multistage Correction of Extreme Cervicothoracic Deformity*

## Chair's Message

Welcome to the fifteenth edition of our departmental newsletter in which we present a snapshot of some of the developments and accomplishments in the last six months. The institution (Georgia Health Sciences University) is now a fully integrated enterprise and with the expansion of the medical school (Medical College of Georgia) we are now one of the largest in the nation.

One of our department's two major equipment upgrades has been completed. We now have a state-of-the-art neuroangiography suite which we feature in the department news section. This unit has several unique attributes including the first in the South (and only the third in the nation) to have the VasoCT option. The other major upgrade (Gamma Knife) is well underway and will be featured in our next newsletter.

Our department's teaching and research efforts were amply recognized by the institution by the many awards received by several members of our faculty. These are outlined in the department news section. In the clinical spotlight we describe the surgical treatment of a complex cervicothoracic deformity case and also

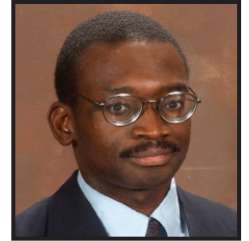
describe treatment of two vascular cases using the new angiography unit. We also recognize other accomplishments of our faculty, staff, residents and students and we chronicle the presentations and publications of our department in the last six months.

We hope you find this issue enjoyable and informative.

Sincerely,

**Cargill H. Alleyne, Jr., M.D.**

*Professor and Marshall Allen Distinguished Chair*



## Department News

### Georgia Health Sciences University now integrated

Earlier this year our institution underwent a restructuring with the goal of achieving better alignment between the hospital (Georgia Health Sciences Health System), the Physician's Practice Group and the university (GHSU). GHSU comprises the Schools of Dentistry, Nursing, Allied Health, Graduate Studies, and Medicine. The School of Medicine retains the MCG name. With the ongoing expansion of the medical school (the 2010 freshman medical school class of 230 students puts MCG among the 10 largest medical school classes in the country) it is expected become the sixth largest in the nation within a few years.

### Transitions

**Colby Polonsky, M.S.** joined our department in May as our new medical illustrator. She replaces **Mike Jensen, M.S.**, who was became a full-time member and Assistant Professor of the Department of Medical Illustration at our institution (Georgia Health Sciences University) after six extremely productive years with us. Colby recently graduated from GHSU Department of Medical Illustration and has previous work experience at Thomas Arvid Fine Art studio in Kennesaw, GA. Her outstanding work now graces the cover of this newsletter.



Colby Polonsky, M.S.

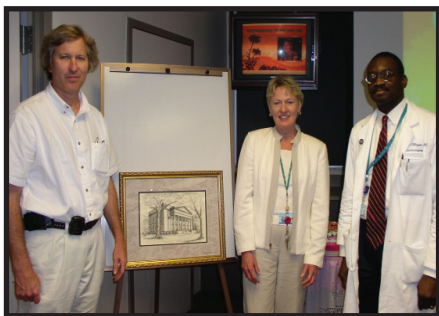
full department. We will miss Melba but wish her all the best in her retirement. We are lucky to have **Brooke Vaught** (who was promoted to Business manger II) assume many of Melba duties.

### State of the art angiography suite installed

The planned upgrade to the neuroangiography was completed in June. The unit is a Phillips Allura Xper with several state-of-the-art features (See figure below and clinical spotlight). These include three-dimensional rotational angiography, vasoCT technique, and Xper CT functionality. The vasoCT uses high resolution soft tissue imaging to reveal a high level of detail of the cerebral vasculature. Specifically, this option enables the visualization of the length of

**Melba Good**, our longtime neuroscience administrator, retired at the end of June.

Melba came to MCG in 1990. After working in the departments of surgery and then pediatrics, in 2002 she became the department manager for neurology and in the same year took responsibility for neurosurgery when its status changed from a section of surgery to a

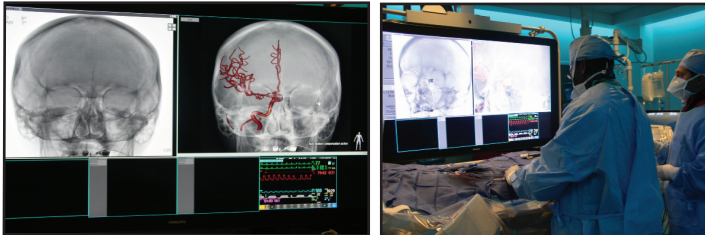


Dr. Hess, Melba Good, and Dr. Alleyne at Ms. Good's farewell luncheon



## Department News *(continued)*

a thrombus in patients undergoing mechanical thrombectomy for ischemic stroke. Our unit is the first in the South and only the third in the nation to feature this option. The Xper CT feature can be used to provide great detail in visualizing structures such as an intracranial stent. Other features of our suite include reduced radiation exposure, large flexscreen (with customizable views), color choices for ambient lighting, and a frosted privacy glass.



3-D roadmapping is used during a procedure

### **Faculty member receives a Distinguished Faculty Basic Sciences Award**

**Krishnan Dhandapani, Ph.D.** received a Distinguished Faculty Basic Sciences Award from the Georgia Health Sciences University Faculty Senate. This was one of only two awards given for excellence in research at the institution.

### **Faculty member selected as Educator of the 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.

### **Faculty member nominated for Exemplary Teacher Award**

**Cargill H. Alleyne, Jr., M.D.** was one of only two 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 previously nominated in the 2007-8 academic year.

### **Nurse manager wins Sodomka Leadership Award**

**Roslyn Marshall, M.H.S.A, B.S.N., R.N.**, clinical nurse manager of our Neuroscience Center of Excellence was the first recipient of the Patricia K. Sodomka Leadership Award for Patient Family Centered Care. The award recognizes a leader at MCGHealth System or Georgia Health Sciences University who demonstrates leadership excellence in PFCC.

### **Contributor acknowledgement**

We thank Ms. Leslie McQuigg, the Gardini Family, and Marshall Allen, M.D. for their generous donation to our department. Their support of our department is much appreciated.

## Clinical Spotlight

### Case 1

### **Multistage Correction of Extreme Cervicothoracic Deformity**

The patient is a 50 year-old white woman who presents with a history of severe progressive cervical/thoracic deformity. One year prior to presentation, she was treated for breast cancer with multiple spine metastases with mastectomy, chemotherapy and radiation. At the time of presentation, she was believed to be disease free. She had suffered a series of compression fractures which had resulted in severe deformity of the cervical and thoracic spine. (fig 1f, 1g,1h) She had developed a profound hyperkyphosis with a compensatory cervical hyperlordosis with coronal angulation as well. There was acute kyphotic angulation at the cervical/thoracic junction which was greater than 90 degrees and she was having progressive pulmonary and swallowing difficulties due to this severe deformity which has developed over a very short period of time (less than one year). She did not respond to conservative management with bracing and immobilization. Imaging with MRI demonstrated spinal cord compression at the cervicothoracic junction. There

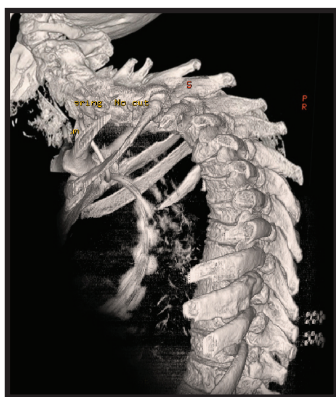


Figure 1a: 3-D image of severe cervicothoracic deformity.

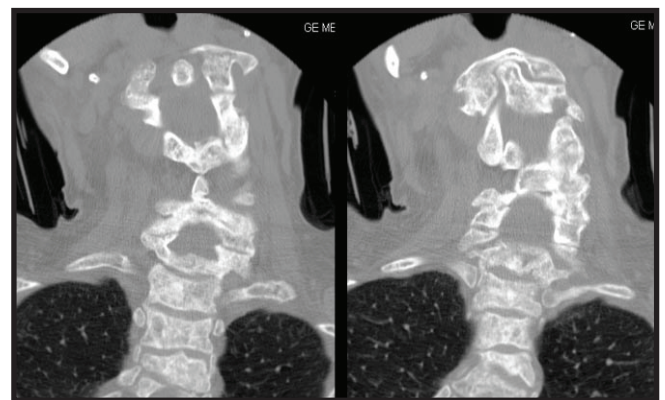
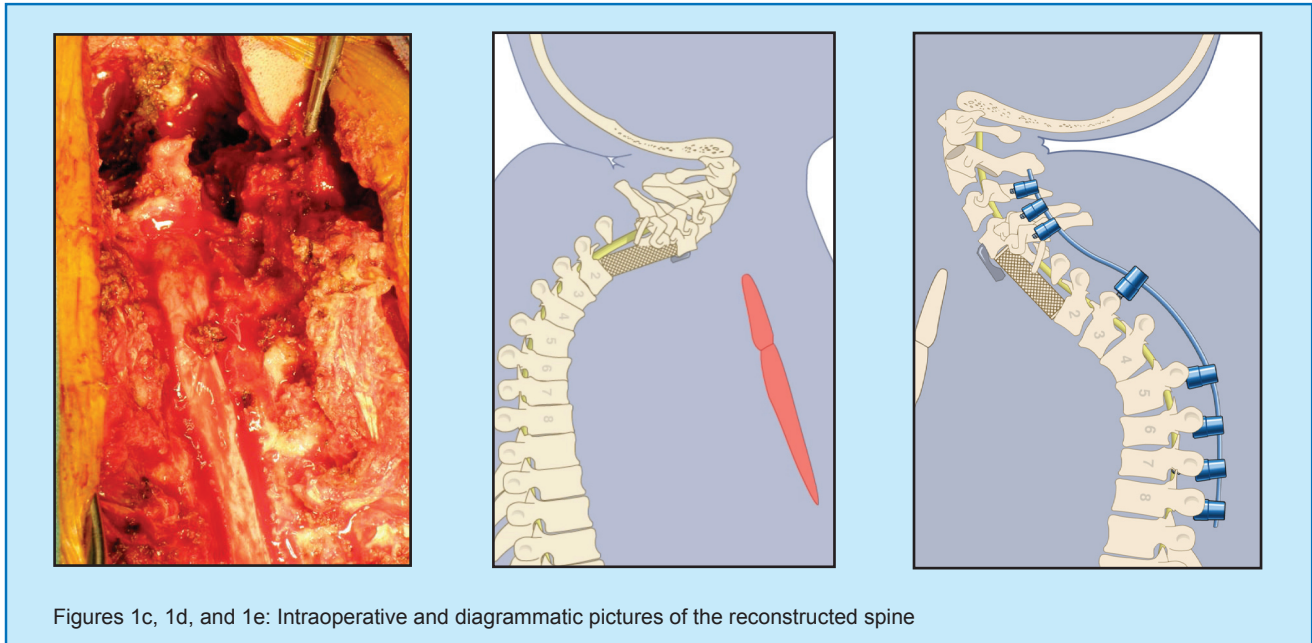


Figure 1b: CT (coronal views) of cervicothoracic junction

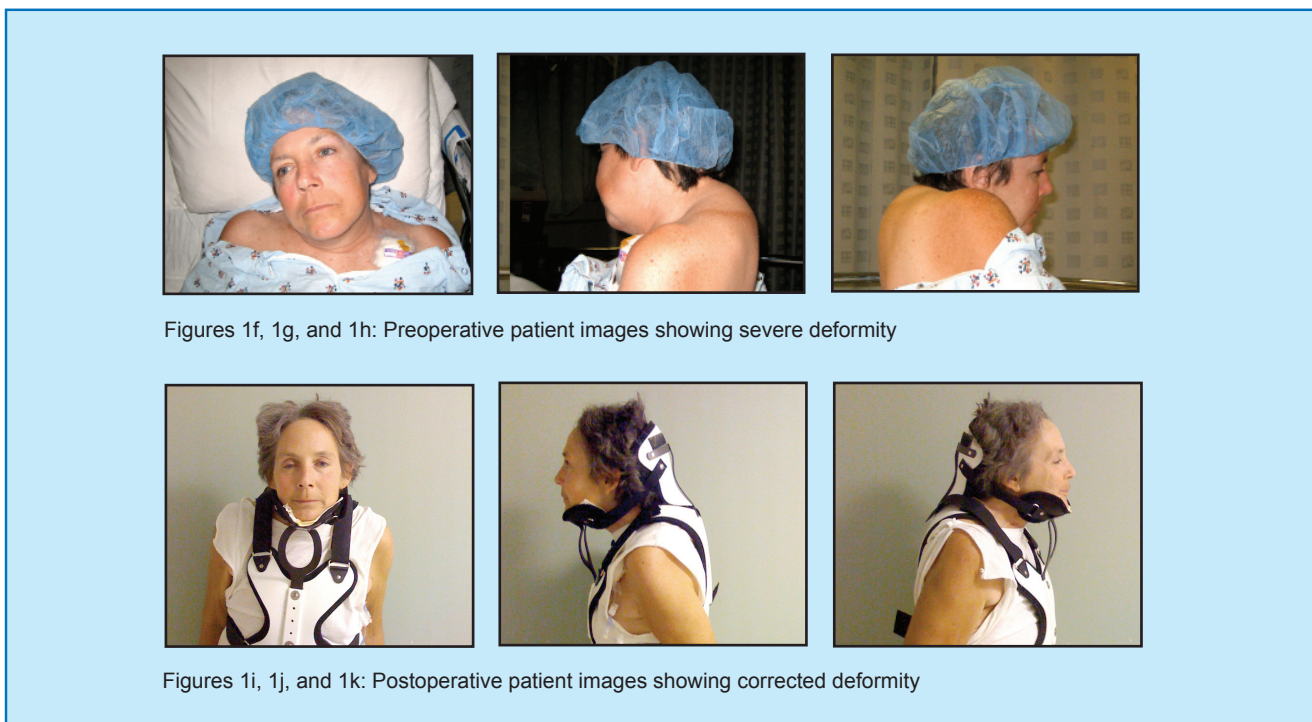
was ventral effacement of the CSF space with deformation of the cervical spinal cord as it draped over the kyphotic angulation. The kyphotic angulation was fixed. The spinal cord was deformed as it draped over this ventral ridge. (Fig 1a and 1b) The patient had severe neck pain associated with any changes in position. Plain films suggested progression of the kyphosis. In view of the deformity and mechanical instability with progressive angulation and impairment of her activities of daily living, it was decided that the patient should consider decompression and fusion.

## Clinical Spotlight *(continued)*

The surgical plan developed for this condition consisted of three stages. The first stage involved posterior decompression, osteotomies and transpedicular decompression of the ventral bone mass with placement of screws without rods. After a period of rest, a second stage was performed via an anterior cervical approach for anterior releases with corpectomies, deformity correction and anterior instrumentation. The third stage involved placement of rods within the screws (**figures 1c, 1d, and 1e**).

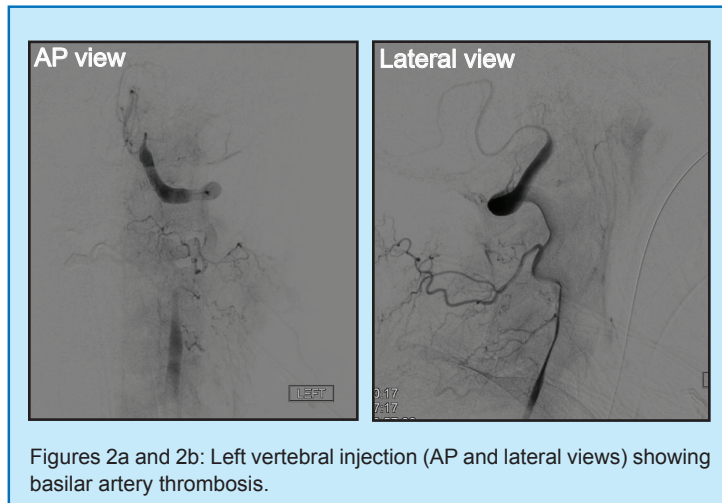


The patient tolerated these procedures very well and had a rapid recovery (**figures 1i, 1j, and 1k**). She was ultimately able to return to most of her daily routine and was able to return to work as a teacher. She was not limited by pain and described substantial improvement in her quality of life and activities of daily living. She is now three years out from this reconstruction and has been doing well in terms of her spinal condition. As recently as one month ago, she was able to ambulate independently and carry out activities such as shopping and housework without significant pain or difficulties. Over the past month, she has developed multiple brain metastases which have caused a decline in her level of functioning.

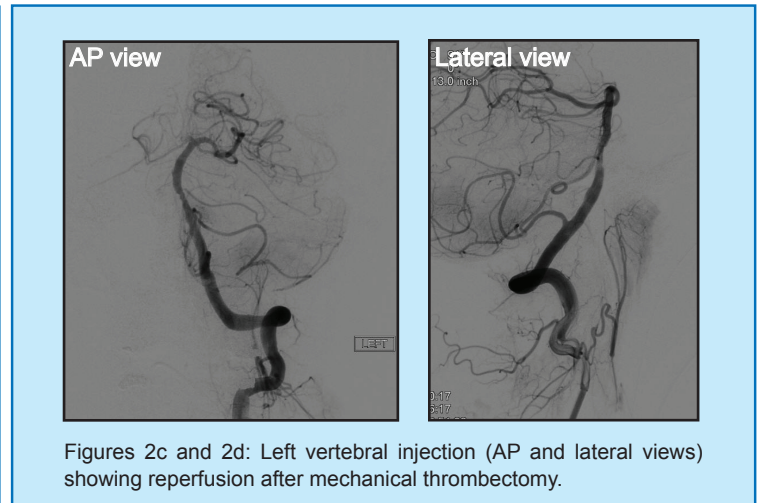


## Clinical Spotlight *(continued)*

### Case 2



Figures 2a and 2b: Left vertebral injection (AP and lateral views) showing basilar artery thrombosis.



Figures 2c and 2d: Left vertebral injection (AP and lateral views) showing reperfusion after mechanical thrombectomy.

### Revascularization after basilar artery thrombosis

A 45 year-old man presented with a gradually worsening neurologic exam that began approximately 23 hours prior to his transfer to our institution. On our initial evaluation the patient had a NIHSS of 16. A CTA of the head showed what appeared to be a small hypodensity in the brainstem most likely representing a small area of infarct and an occluded basilar artery. The patient was emergently taken to our neuroangiography suite for mechanical thrombectomy. On the left vertebral artery in injection, patient had an occluded vertebral artery immediately distal to the origin of the left posterior inferior superior cerebellar artery. (figures 2a and 2b) Using the Penumbra reperfusion device, mechanical thrombectomy was successfully performed with patency of the vertebrobasilar system representing TIMI-3 reperfusion (figures 2c and 2d). The patient was later extubated and improved to NIHSS of 4.

Scott Y. Rahimi, M.D. and Cargill H. Alleyne, Jr. M.D.

### Case 3

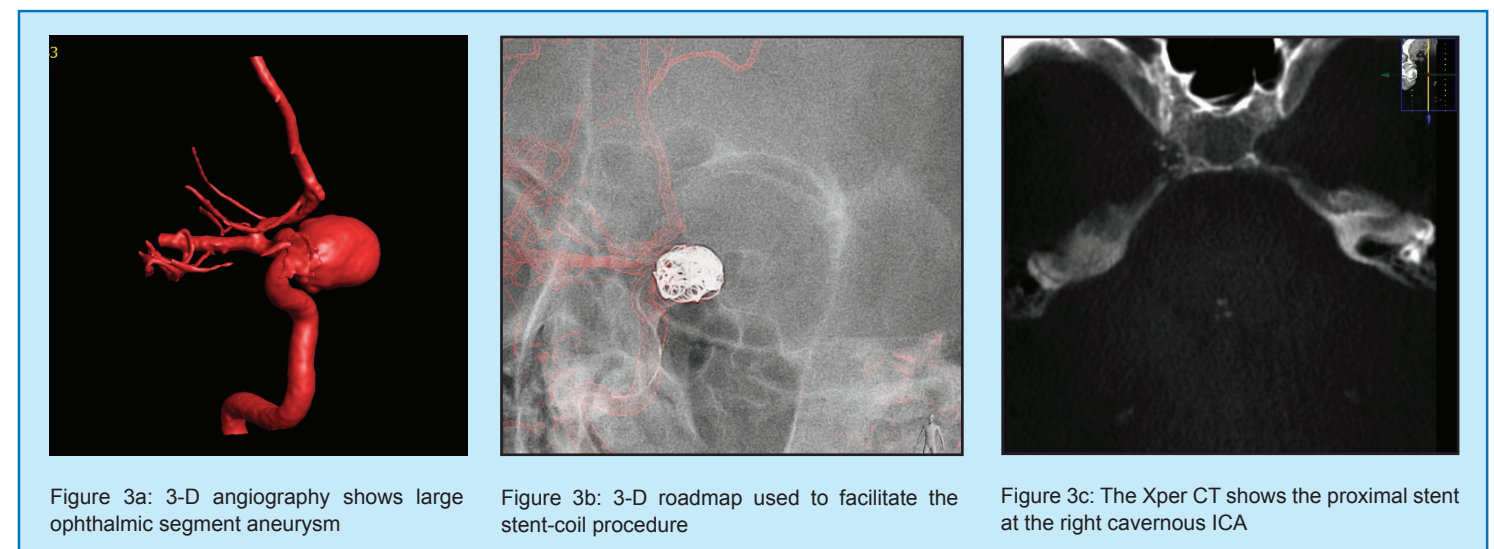


Figure 3a: 3-D angiography shows large ophthalmic segment aneurysm

Figure 3b: 3-D roadmap used to facilitate the stent-coil procedure

Figure 3c: The Xper CT shows the proximal stent at the right cavernous ICA

### Stent-coiling of carotid aneurysm

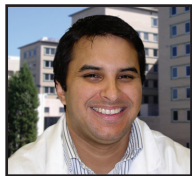
A 52 year-old woman underwent a work-up for severe vertigo. This revealed an incidental large right proximal carotid aneurysm. She underwent an elective stent-coil embolization procedure using a Cordis Enterprise stent and several Cordis Orbit Galaxy coils. Three-dimensional road-mapping was utilized during the procedure which the patient tolerated well (figures 3a, 3b, and 3c).

Cargill H. Alleyne, Jr., M.D. and Scott Y. Rahimi, M.D.

## Faculty and staff update

### Accomplishments and recognition

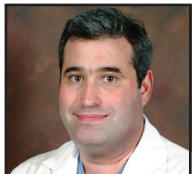
**Krishnan M. Dhandapani, Ph.D.** was the recipient of a Distinguished Faculty Basic Sciences Award from the Georgia Health Sciences University Faculty Senate. In addition, his first Ph.D. student, Melissa Laird, successfully defended her doctoral dissertation ("HMGB1-TLR4 signaling and traumatic brain injury") in May. She is currently a postdoctoral research fellow at the University of Maryland School of Medicine.



Krishnan Dhandapani, Ph.D.



Sergei Kirov, Ph.D.



John Vender, M.D.



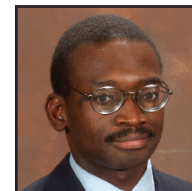
Cole Giller, M.D.

**Sergei Kirov, Ph.D.** was the panel organizer and Chair of the section, "Cortical Spreading Depolarization (SD): Emerging pathophysiologic mechanism in the acutely injured brain", at the 44th Winter Conference on Brain Research in January in Keystone, CO

**John Vender, M.D.** is the co-PI of a multi-center feasibility study of recruitment for a Phase 2 Study on the Effects of SLV334 in Moderate and Severe Traumatic Brain Injury. The grant award is \$170,701. He was also honored with the "ENT consultant of the year" award.

**Cole A. Giller, M.D., Ph.D., M.B.A.** was selected Educator of the Year by 2011 medical school graduating class. He was also a reviewer for an NIH study group (Small Business-Clinical Neurophysiology, Devices, Auditory Devices and Neuroprosthesis. 2011/10/ ZRG1 ETTN-K(10)B.

**Cargill H. Alleyne, Jr., M.D.** was nominated for an Exemplary Teacher award by the medical school. He was also selected co-Chair of the Psychiatry Chair search committee. In addition, he presented Grand Rounds at Emory University Department of Neurosurgery on the topic "Vascular malformations of the central nervous system."



Cargill Alleyne, M.D.

**Haroon F. Choudhri, M.D.** was Visiting Professor at King Fahad Medical City in Riyadh, Saudi Arabia in April.



Haroon Choudhri, M.D.



Scott Rahimi, M.D.

**Scott Y. Rahimi, M.D.** was selected to Alpha Omega Alpha.

**Mary Ann Scrapper, P.A.** passed the PANRE (re-certification examination for Physician Assistants) and is recertified for another six years.



Mary Ann Scrapper, P.A.

**Roslyn Marshall, M.H.S.A, B.S.N., R.N.**, clinical nurse manager of our Neuroscience Center of Excellence was the first recipient of the Patricia K. Sodomka Leadership Award for Patient Family Centered Care. The award recognizes a leader at MCGHealth System or Georgia Health Sciences University who demonstrates leadership excellence in PFCC.



Roslyn Marshall, R.N.

## Residents' and Students' Corner

### Accomplishments and recognition

**Ahmed Shakir, M.D.** was honored at our annual resident graduation ceremony in June. Dr. Shakir is currently completing a one-year spine fellowship in the Department of Neurosurgery at Vanderbilt.



Ahmed Shakir, M.D. at graduation

March (during his PGY-4 year). Congratulations!

**D. J. Kimbler, B.S.N, C.R.N.A.**, a Ph.D. student and army major working with Dr. Dhandapani, had his research featured in many news outlets and even caught the attention of the Public Affairs officer of the Chairman of the Joint Chief of Staff. The research which is partly funded by the US Army shows that mice fed a derivative of a common food dye (Brilliant Blue G) suffer less damage after head trauma.

**June Yowtak, M.D.** was awarded the prize for Best Resident

**David Wang, M.D.** passed the written portion of the neurosurgical board examinations in



David Wang, M.D.

Presentation at the Spring meeting of the Georgia Neurosurgical Society meeting in Sea Island Georgia. Her presentation was entitled "Intrathecal pump failure: Diagnosis and management".



June Yowtak, M.D.

**Basheer Shakir, M.D.** was elected to Alpha Omega Alpha.



Basheer Shakir, M.D.

This summer we welcomed our new PGY-1 resident into our residency.

**Ava Star, M.D.**, graduated from State University of New York Upstate in Syracuse in 2010 and recently completed a non-categorical neurosurgery internship at the Cleveland Clinic. Welcome Ava!



Ava Star, M.D.

**R. David Fessler, B.S.**, a Ph.D. student working with Dr. Dhandapani, was the Basic Science Award winner at the Southern Neurosurgical Society Meeting in Orlando, FL. His talk was "Activation of Toll-like receptor 4 (TLR4) contributes to functional loss after spinal cord injury".

## Presentations and Publications (January 2011 - June 2011)

### Presentations

**Choudhri HF:** Posterior Cervical Surgery: Advanced Instrumentation Techniques & Cadaver Lab, Columbia SC, December 2010

**Kirov SA:** Recurrent spreading depolarizations promote acute injury to dendrites and spines in the ischemic penumbra. The 44th Winter Conference on Brain Research, Keystone, CO, January 2011

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

**Fessler RD, Dhandapani KM:** Activation of Toll-like receptor 4 (TLR4) contributes to functional loss after spinal cord injury. Southern Neurosurgical Society Meeting, Orlando, FL, February, 2011

**Kirov SA:** Spreading depolarization-induced injury to dendrites and dendritic spines. The 23rd Annual Winter Conference on Neural Plasticity, Moorea, French Polynesia. February 2011

**Kirov SA:** Spreading depolarization-induced injury to synaptic circuitry. Neuroscience Seminar Series. Georgia Health Sciences University, February 2011

**Vender JR:** Common Neurological Tumors. Physician Assistant Neuroscience Course, Medical College of Georgia, February 2011

**Vender JR:** Acoustic neuroma. Masters of Otolaryngology Symposium, Medical College of Georgia, February 2011

**Kirov SA:** Astroglial and neuronal injury and recovery from stroke-induces spreading depolarizations. Gordon Research Conference on Glial Biology: Functional Interactions Among Glia & Neurons, Ventura, CA. March 2011 (Poster)

**Vender JR:** MRI and Gamma knife. Pool Society Lecture Series, Medical College of Georgia, March 2011

**Vender JR:** Focus on rehabilitation: Advances in Spasticity Management. Medical College of Georgia, March 2011

**Alleyne CH:** Subarachnoid hemorrhage and unruptured intracranial aneurysms: Diagnosis and management. Comprehensive Stroke Management Update. Hilton Head, SC, April 2011

**Alleyne CH:** Vascular malformations: Who, when and how to treat. Comprehensive Stroke Management Update, Hilton Head, SC, April 2011

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

**Alleyne CH:** Vascular malformations. Grand Rounds, Department of Neurosurgery, Emory University, Atlanta, GA, April 2011

**Choudhri HF:** Advanced management of cervical deformity. Neuroscience Grand Rounds, King Fahad Medical City, Riyadh, KSA, April 2011

**Vender JR:** Malignant cerebral edema: from hyperventilation to hemicraniectomy. Comprehensive Stroke Management Update, Hilton Head, SC, April 2011

**Kirov SA:** Spreading depolarization-induced injury to neurons and astrocytes. BRaIN Seminar. University of New Mexico, Albuquerque, NM, April 2011

**Kirov SA:** Cortical spreading depolarization: Emerging pathophysiologic mechanisms in the acutely injured brain. Neuroscience Seminar, University of Victoria, Victoria, British Columbia, Canada, March 2011

**Kirov SA:** Spreading depolarization-induced injury to neurons and astrocytes. Neuroscience Seminar Series, University of British Columbia, Vancouver, British Columbia, Canada, March 2011

**Alleyne CH:** Role of the neuroendovascular surgeon. GHSU Skull base symposium: A multidisciplinary approach from nasion to occiput. Augusta, GA, May 2011

**Giller CA:** Trends in Epilepsy Surgery at Children's Medical Center at GHSU. CMC Grand Rounds, Augusta, GA, May 2011

**Vender JR:** Radiosurgery and skull base lesions. GHSU Skull base symposium: A multidisciplinary approach from nasion to occiput. Augusta, GA, May 2011

**Alleyne CH, Woodall MN, McGettigan M, Figueroa R, Gossage J:** Neurologic sequelae of Hereditary Hemorrhagic Telangiectasia: The Georgia Health Sciences University Experience. Georgia Neurosurgical Society Meeting, Sea Island, GA, May 2011

**Amburgy J, Youssef P, Vender JR, Alleyne CH:** Phenytoin vs. Levetiracetam in the setting of neurosurgical trauma: Is it time to alter our standard of care? Georgia Neurosurgical Society Meeting, Sea Island, GA, May 2011

**Choudhri HF:** Degenerative instability: Clinical assessment and management strategy. 12th Dubai Spine Conference, UAE, May 2011

**Choudhri HF:** Anterior cervical approaches: Tips and tricks to reduce complications. 12th Dubai Spine Conference, UAE, May 2011

**Choudhri HF:** Vascular complications in spine surgery. 12th Dubai Spine Conference, UAE, May 2011

**Hughes D, Macomson SD:** Calcium, lipid-containing cyst with intraventricular rupture associated with long-term ventriculoperitoneal shunt. Georgia Neurosurgical Society Meeting, Sea Island, GA, May 2011

**Wang D, Alleyne CH, Sharma S:** Case report of transformation of malignant glioneuronal tumor to gliosarcoma. Georgia Neurosurgical Society Meeting, Sea Island, GA, May 2011

**Yowtak J, Vender JR:** Intrathecal pump failure: Diagnosis and management. Georgia Neurosurgical Society Meeting, Sea Island, GA, May 2011

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

**Giller CA:** Trends in Epilepsy Surgery at GHSU. Epilepsy report, Augusta, GA, June 2011

### Publications

**Yuan J, Sharma N, Choudhri HF, Figueroa R & Sharma S:** Intraventricular dysembryoplastic neuroepithelial tumor in a pediatric patient: is it the most common extracortical location for DNT? *Child's Nervous System* 27:3, 485-490, 2011

**Douglas HA, Callaway JK, Sword J, Kirov SA, Andrew RD (2011)** Potent inhibition of anoxic depolarization by the sodium channel blocker dibucaine. *J Neurophysiol* 105:1482-1494, 2011

**Sangeetha SR, Singh N, Dhandapani KM, Vender JR:** mTOR inhibition reduces cellular proliferation and sensitizes pituitary adenoma cells to ionizing radiation. *Surg Neurol Int* 2:22, 2011

**Sangeetha SR, Singh N, Jensen M, Dhandapani KM, Vender JR:** Anacardic acid induces caspase-independent apoptosis and radiosensitizes pituitary adenoma cells. *J Neurosurg* 114: 1681-1690, 2011

**Webb DM, Schneider JR, Lober RM, Vender JR:** Granulomatous conduit for intrathecal infusion of morphine and bupivacaine. *Reg Anesth Pain Med* 36:195-7, 2011

**Savage NM, Alleyne CH, Vender JR, Figueroa R, Zhang H, Samuel TA, Sharma S:** Dural-Based Metastatic Carcinomas Mimicking Primary CNS Neoplasia: Report of 7 cases emphasizing the role of timely surgery and accurate pathologic evaluation. *Int J Clin Exp Pathol*: 4(5):530-540, 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*. 2011 Jun 17 (DOI 10.10116)



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# Neuroscience Outlook

To learn more about the MCG Department of Neurosurgery, please visit:  
[www.mcg.edu/som/neurosurgery](http://www.mcg.edu/som/neurosurgery)

## Conference Schedule (July 2011 - December 2011)

All grand rounds and conferences take place on Friday in the 3 West amphitheater.

Jul 1	9:00 - 10:00 Radiology 10:00 - 11:00 Spine 11:00 - 12:00 Case 12:00 - 1:00 M&M	Sep 9	9:00 - 10:00 Radiology 10:00 - 11:00 Anatomy 11:00 - 12:00 Spine 12:00 - 1:00 Case	Oct 28	9:00 - 10:00 Journal Club 10:00 - 11:00 Case 11:00 - 12:00 Spine 12:00 - 1:00 M&M
Jul 8	9:00 - 10:00 Board Review 10:00 - 11:00 Gamma Knife 11:00 - 12:00 Neuro 101: Alleyne Vascular Malformation 12:00 - 1:00 Case	Sep 16	9:00 - 10:00 Board review 10:00 - 11:00 Gamma knife 11:00 - 12:00 Neuro 101: ICU Fluid and Electrolyte Management 12:00 - 1:00 Case	Nov 4	9:00 - 10:00 Radiology 10:00 - 11:00 Anatomy 11:00 - 12:00 Spine 12:00 - 1:00 Case
Jul 15	9:00 - 10:00 Pathology 10:00 - 11:00 Business 11:00 - 12:00 Case 12:00 - 1:00 Cerebrovascular	Sep 23	9:00 - 10:00 Pathology 10:00 - 11:00 Business 11:00 - 12:00 Case 12:00 - 1:00 Cerebrovascular	Nov 11	9:00 - 10:00 Board Review 10:00 - 11:00 Gamm Knife 11:00 - 12:00 Neuro 101: Neil Woodall Cervical Spine Injuries 12:00 - 1:00 Case
Jul 22	9:00 - 10:00 Journal Club 10:00 - 11:00 Board Review 11:00 - 12:00 Spine 12:00 - 1:00 M&M	Sep 30	9:00 - 10:00 Journal Club 10:00 - 11:00 Case 11:00 - 12:00 Spine 12:00 - 1:00 M&M	Nov 18	9:00 - 10:00 Pathology 10:00 - 11:00 Business 11:00 - 12:00 Case 12:00 - 1:00 Cerebrovascular
Aug 5	9:00 - 10:00 Radiology 10:00 - 11:00 Anatomy 11:00 - 12:00 Spine 12:00 - 1:00 Case	Oct 7	9:00 - 10:00 Radiology 10:00 - 11:00 Anatomy 11:00 - 12:00 Spine 12:00 - 1:00 Case	Nov 25	Thanksgiving
Aug 12	9:00 - 10:00 Board review 10:00 - 11:00 Gamma Knife 11:00 - 12:00 Neuro 101: Neil Woodall Traumatic Brain Injury 12:00 - 1:00 Case	Oct 14	9:00 - 10:00 Board Review 10:00 - 11:00 Gama Knife 11:00 - 12:00 Neuro 101: ICU Cardiopulmonary management 12:00 - 1:00 Case	Dec 2	9:00 - 10:00 Anatomy 10:00 - 11:00 Radiology 11:00 - 12:00 Spine 12:00 - 1:00 Case
Aug 19	9:00 - 10:00 Pathology 10:00 - 11:00 Business 11:00 - 12:00 Case 12:00 - 1:00 Cerebrovascular	Oct 21	9:00 - 10:00 Pathology 10:00 - 11:00 Business 11:00 - 12:00 Case 12:00 - 1:00 Cerebrovascular	Dec 9	9:00 - 10:00 Board Review 10:00 - 11:00 Gamma Knife 11:00 - 12:00 Neuro 101: B. Shakir Cspine Rediculopathy 12:00 - 1:00 Case
Sep 2	9:00 - 10:00 Journal Club 10:00 - 11:00 Case 11:00 - 12:00 Spine 12:00 - 1:00 M&M			Dec 16	9:00 - 10:00 Pathology 10:00 - 11:00 Business 11:00 - 12:00 Case 12:00 - 1:00 Cerebrovascular

## Upcoming Meetings (July 2011 - December 2011)

**Society of Neuro-Interventional Surgery Meeting**  
 7/25-29, Colorado Springs, CO

**Congress of Neurological Surgeons**  
 10/1-6, Washington, D.C.

**Research Update in Neuroscience for Neurosurgeons**

10/30-11/6, Woods Hole, MA

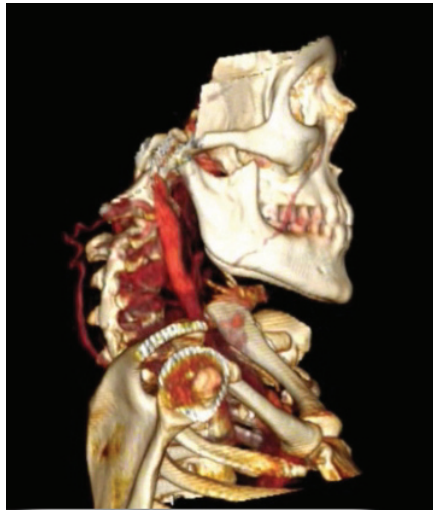
**North American Spine Society**  
 11/2-5, Chicago, IL

**American Board of Neurological Surgery (Orals)** 11/8-11, Houston, TX

**AANS/CNS Section on Pediatric Neurological Surgery**

11/29-12/2, Austin, TX

**Georgia Neurosurgical Society**  
 12/3-4, Greensboro, GA



## Credits

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