

PALMETTO HEALTH • Vol. 1 Issue 1 Summer 2015

# Neuroscience Journal



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# We are excited to introduce our neuroscience journal.

As physician co-leaders of Palmetto Health's neuroscience service, we share a vision to provide the most advanced neurology and neurological surgery treatments available to the residents of South Carolina. Through recruitment of the best and brightest neurologists and neurosurgeons, investment in the most advanced equipment and technology, participation in cutting edge research, and education of the next generation of neuroscience physicians, Palmetto Health and the University of South Carolina School of Medicine are committed to offering the area's premier neuroscience services. We are excited to introduce our neuroscience journal to share the latest information in neuroscience care and research with our physician colleagues. Each quarter we will bring you new information from our team of neurology and neurological surgery subspecialists so, that together, we can improve the lives of the patients we serve.



**Roham Moftakhar, MD**, Chief of Neurosurgery, Palmetto Health Richland, and Associate Professor, Clinical Surgery, USC School of Medicine, is a board certified neurosurgeon with subspecialization in neuroendovascular, cerebrovascular and neuro-oncological surgery.

Dr. Moftakhar received his medical degree from George Washington University School of Medicine in Washington, DC, and completed his neurological surgery residency at the University of Wisconsin Hospital and Clinics, Madison, Wisconsin. He went on to complete fellowships in endovascular and cerebrovascular neurosurgery, as well as skull-base and complex brain tumor surgery at the University of Miami/Jackson Memorial Hospital. Dr. Moftakhar is among only a few dual-trained neurosurgeons in South Carolina who can treat vascular diseases of the brain with either endovascular techniques or open surgery. He also has expertise in the treatment of brain tumors, as well as complex skull-base tumors, with the latest minimally invasive endoscopic techniques.

Dr. Moftakhar's research and laboratory interests include surgical treatment of intracerebral and intraventricular hemorrhages with minimally invasive techniques. In addition, he has patented novel endovascular devices for treatment of cerebral aneurysms, which are undergoing laboratory investigation.

To refer a patient, call Palmetto Health Neurosurgery Associates at 803-434-8323.



**Souvik Sen, MD, MPH**, Chair, USC School of Medicine Neurology Department, is an internationally known stroke neurology professor and has published in peer-reviewed journals including *Circulation*, *Stroke* and the *New England Journal of Medicine*. He has received research funding from the American Heart Association and the National Institutes of Health and was nominated as a Fellow of the American Heart Association. He serves on several national and international committees. His specific research interests include acute stroke treatment, stroke and TIA pathophysiology, stroke prevention and epidemiology.

Dr. Sen received his medical degree from University of Calcutta R. G. Kar Medical College, Calcutta, India, and completed a Masters in Science in Cardiovascular Pharmacology at Wayne State University in Detroit, Michigan. He then completed a medical internship at Henry Ford Hospital, Detroit, Michigan. He completed a neurology residency at Temple University Health Science Center, Philadelphia, Pennsylvania, and a vascular neurology fellowship at Johns Hopkins University Hospital, Baltimore, Maryland. After his fellowship he served as the co-director and subsequently as the director of the stroke center at the New Jersey Neuroscience Institute in Edison, New Jersey. He then served as the founding director of the UNC Stroke Center in Chapel Hill, North Carolina. While there he completed a Masters in Public Health with Epidemiology major. He is board certified in neurology, and subspecialty board certified in vascular neurology.

To refer a patient, call the USC School of Medicine Department of Neurology at 803-545-6050.

# Meet our team

## Palmetto Health Neurosurgery Associates



**Burke H. Dial, MD, FACS**

MEDICAL SCHOOL: Medical University of South Carolina  
 RESIDENCIES: Montreal Neurological Hospital and Institute, Montreal Children's Hospital, University of London Institute of Neurology  
 SPECIALTY: Gamma Knife  
 BOARD CERTIFIED: American Board of Neurological Surgery



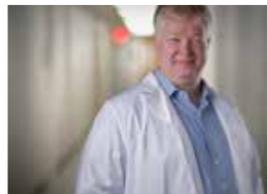
**Roham Moftakhar, MD**

MEDICAL SCHOOL: George Washington School of Medicine  
 RESIDENCIES: University of Wisconsin Hospital and Clinics  
 FELLOWSHIP: Endovascular and Cerebrovascular Neurosurgery/Skullbase and Complex Brain Tumor Surgery, University of Miami/Jackson Memorial Hospital  
 SPECIALTY: Neuroendovascular Surgery; Cerebrovascular/Skull-Base Surgery  
 BOARD CERTIFIED: American Board of Neurological Surgery



**Seth S. Molloy, DO, MSc**

MEDICAL SCHOOL: Kirksville College of Osteopathic Medicine  
 RESIDENCIES: Advocate BroMenn Medical Center  
 FELLOWSHIP: Neurosurgical Spine, University of Miami  
 SPECIALTY: Minimally Invasive Spine Surgery  
 BOARD CERTIFIED: American Osteopathic Board of Surgery



**Stanley O. Skarli, MD, FAANS, FACS, FAAP**

MEDICAL SCHOOL: Oral Roberts University School of Medicine  
 RESIDENCY: University of Maryland Medical System  
 FELLOWSHIP: Pediatric Neurosurgery, Primary Children's Medical Center  
 SPECIALTY: Pediatric Neurosurgery  
 BOARD CERTIFIED: American Board of Neurological Surgery

**Advanced Practice Providers:**

Leah Cuff, ACNP  
 Annette Darby, PA  
 Karen Drawdy, PA  
 Christopher Hooks, PA  
 Jason Kaylor, PA  
 Bhadrak Patel, PA  
 Joseph Wehner, PA  
 Natalie Wethington, PA

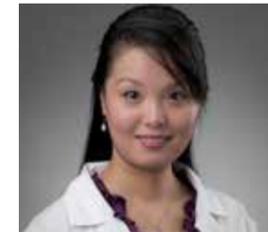
## Pitts Radiology



**C. Blease Graham, III, MD**

MEDICAL SCHOOL: University of North Carolina  
 RESIDENCY: Medical College of Virginia Hospitals  
 FELLOWSHIP: Neuroradiology, Mallinckrodt Institute of Radiology at Washington University School of Medicine; Interventional Neuroradiology, University of Miami School of Medicine  
 SPECIALTY: Aneurysm Coiling, AVM Embolization and Intracranial Stenting

## University of South Carolina School of Medicine Department of Neurology



**X. Michelle Androulakis, MS, MD** | Assistant Professor of Clinical Neurology

MEDICAL SCHOOL: Xiang Ya School of Medicine  
 RESIDENCY: Emory University, School of Medicine  
 SPECIALTY: Headache  
 BOARD CERTIFIED: American Board of Psychiatry and Neurology, United Council for Neurologic Subspecialty, Headache



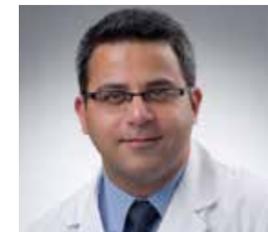
**Miroslav Cuturic, MD** | Assistant Professor of Clinical Neurology

MEDICAL SCHOOL: University of Zagreb School of Medicine  
 RESIDENCY: St. Louis University Health Sciences Center  
 FELLOWSHIP: Neuromuscular/Electrodiagnostics, Tulane University Medical Center  
 SPECIALTY: Neurology, Neurophysiology, Movement Disorders  
 BOARD CERTIFIED: American Board of Psychiatry and Neurology, American Board of Psychiatry and Neurology Subspecialty of Clinical Neurophysiology, American Board of Electrodiagnostic Medicine



**Priyantha Herath, MD, PhD** | Assistant Professor of Neurology

MEDICAL SCHOOL: University of Peradeniya  
 RESIDENCY: University of Pittsburgh Medical Center  
 FELLOWSHIP: Advanced Movement Disorders, University of Maryland  
 SPECIALTY: Movement Disorders  
 BOARD CERTIFIED: American Board of Psychiatry and Neurology



**Sonal Mehta, MD** | Assistant Professor of Clinical Neurology

MEDICAL SCHOOL: B.J. Medical College  
 RESIDENCY: Michael Reese Hospital/ UIC (Internship), University Hospitals Case Medical Center  
 FELLOWSHIP: Endovascular Surgical Neuroradiology, Vascular Neurology, St. Louis University Hospital  
 SPECIALTY: Vascular Neurology, Neurology, Endovascular Surgical Neuroradiology  
 BOARD CERTIFIED: American Board of Psychiatry and Neurology – Neurocritical Care, Neurology, Vascular Neurology



**Davit Mrelashvili, MD, MBA** | Assistant Professor of Clinical Neurology

MEDICAL SCHOOL: Aieti Medical School  
 RESIDENCY: Vanderbilt University  
 SPECIALTY: Neurology, Multiple Sclerosis, Neuroimmunology  
 BOARD CERTIFIED: American Board of Psychiatry and Neurology



**James Selph, MD** | Assistant Professor of Clinical Neurology

MEDICAL SCHOOL: University of South Florida  
 RESIDENCY: Vanderbilt University Medical Center  
 FELLOWSHIP: Neurophysiology, Vanderbilt University Medical Center  
 SPECIALTY: Neurology, Epilepsy, Neurophysiology  
 BOARD CERTIFIED: American Board of Clinical Neurophysiology, American Board of Electrodiagnostic Medicine, American Board of Psychiatry and Neurology – Neurology, Clinical Neurophysiology

University of South Carolina School of Medicine, Department of Neurology (cont.)



**Souvik Sen, MD, MPH** | Professor of Neurology  
MEDICAL SCHOOL: R.G.Kar Medical College  
RESIDENCY: Henry Ford Hospital, Temple University Health Science Center  
FELLOWSHIP: Vascular Neurology, Johns Hopkins Hospital  
SPECIALTY: Neurology, Stroke-Epilepsy-Neuromuscular, Movement Disorder-Headaches, Multiple Sclerosis-Memory Disorder  
BOARD CERTIFIED: American Board of Psychiatry and Neurology – Neurology, Vascular Neurology



**Yedatore Swamy Venkatesh, MD, DM, FRCP (Edin), FAAN, FACP** | Professor and Program Director  
MEDICAL SCHOOL: Bangalore Medical College  
RESIDENCY: Boston City Hospital  
FELLOWSHIP: Clinical Neurophysiology and Neuromuscular Disease, Brigham and Women's Hospital  
SPECIALTY: Neurology, Neurophysiology, Vascular Neurology, Neuromuscular Disease  
BOARD CERTIFIED: American Board of Psychiatry and Neurology – Neurology, Neuromuscular Medicine, Vascular Neurology, EMG/Clinical Neurophysiology

**Department of Neurology Residents**

Amar Anand, MD, PGY-3  
Ravish Kothari, MD, PGY-3  
Neil Patel, MD, PGY-3  
Nikil Swamy, MD, PGY-3  
Katherine Dahlberg, MD, PGY-3  
Douglas Davis, MD, PGY-2  
Julian Duda, MD, PGY-2

Nimit Patel, MD, PGY-2  
Nzinga Robertson, MD, PGY-1  
Candace Schaefer, MD, PGY-1  
Tushar Trivedi, MD, PGY-1

# Introducing Palmetto Health's "4-BRAIN" phone line for emergent neurosurgical transfers.

Providers now can call 844-64-BRAIN to transfer urgent and emergent neurosurgical and neurological patients easily and efficiently.

Studies have shown that one of the challenges faced by emergency room providers and referring physicians is fast and efficient access to neurological and neurosurgical physicians in tertiary medical centers. Palmetto Health's 4-BRAIN line allows emergency room providers and referring physicians to speak directly with a neurosurgeon or neurologist without going through an operator or long waits on the phone. Neurological problems that the 4-BRAIN line may be used for include intracerebral hemorrhages, subarachnoid hemorrhage, aneurysms, vascular malformations and brain tumors. The 4-BRAIN line is answered 24 hours a day, seven days a week.

**Call 844-64-BRAIN (27246) for emergent neurosurgical transfers.**





# Endovascular treatment for acute ischemic stroke: an update

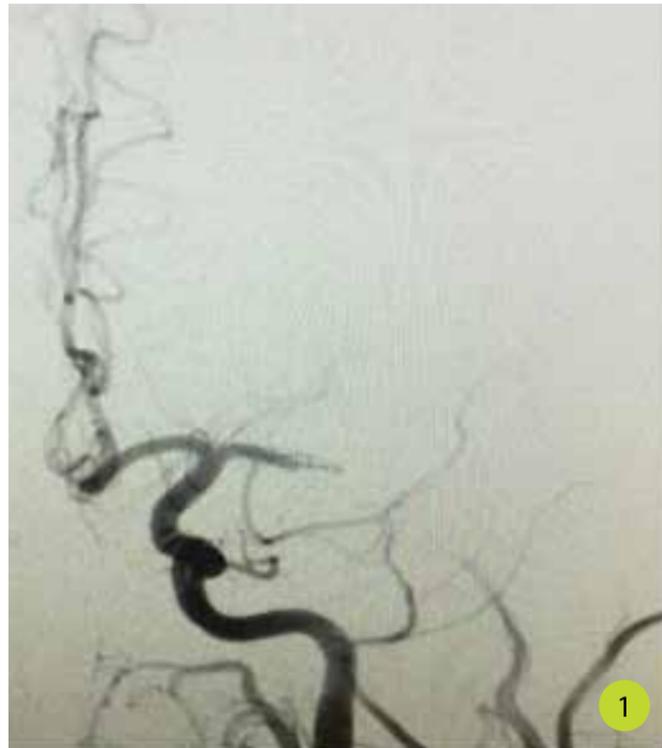
By: Sonal Mehta, MD, Assistant Professor of Clinical Neurology  
University of South Carolina School of Medicine, Department of Neurology

**In the last few years, a revolution has been coming in the world of acute stroke care.** In the past few months, this came to a head as we received results from several pivotal large international randomized controlled trials (RCT) evaluating the safety and efficacy of intra-arterial (endovascular) treatment of acute ischemic stroke (AIS) caused by large vessel occlusions (LVO). In some studies, LVOs affecting the internal carotid artery (ICA), middle cerebral artery (MCA), vertebral and basilar arteries have been estimated to be responsible for up to 50 percent of all ischemic strokes.<sup>1</sup> Historically, these have been associated with a poor prognosis, as well as poor rates of vessel recanalization with intravenous recombinant tissue-type plasminogen activator (r-tPA) which, since its FDA approval almost two decades ago, has been the only available treatment option for AIS.

While the trials discussed in this article are new and significantly likely to alter the practice of managing AIS due to LVO, endovascular treatment itself is not an entirely new approach. A pivotal RCT to evaluate the efficacy of intrarterial (IA) thrombolysis was PROACT

2, published in 1999, showing a trend towards benefit, but not a statistically significant result.<sup>2</sup> The use of IA thrombolysis was not approved by the FDA, but still was adopted by several large centers as rescue treatment for LVOs. This subsequently led to further modifications in techniques for recanalizing occluded intracranial vessels with the first generation thrombectomy devices, the MERCI and Penumbra.<sup>3,4</sup> The MERCI device was a corkscrew-shaped device used to retrieve thrombus, whereas the Penumbra system used a suction catheter to aspirate the clot and recanalize the occluded vessel. Both of these showed promising results and were widely used, even in the absence of a RCT evaluating their clinical efficacy to achieve good functional outcomes.

To answer that issue, several RCTs were conducted and, much to the dismay of the vascular neurology community, showed little or no benefit of IA treatment compared with IV r-tPA alone.<sup>5,6,7</sup> In the interim, however, there had been tremendous improvements in the technology and tools available to the neurointerventionalist, as two new devices had been tested and approved by the FDA. These second



generation devices, the Solitaire and the Trevo, were “stent-retrievers” or “stentrievers” – self-expanding stents which are deployed within the clot in order to engage it and then retrieved with the delivery wire (figure 1).<sup>8,9</sup> These provided much faster and higher rates of recanalization and were safer. Many believed that the initial trials were negative due to these devices largely being untested in those cohorts.

Several new RCTs were planned and conducted to then evaluate the efficacy of the stent-riever in AIS due to LVOs. Over the last few months the results of these trials have been published, and they have all been overwhelmingly positive.

The first of these, MR CLEAN,<sup>10</sup> was a Dutch trial that showed a statistically significant result in favor of using endovascular treatment in addition to IV r-tPA versus intravenous treatment alone. There was an absolute difference of 13.5 percent in the rate of functional independence, defined as a modified Rankin Scale (mRS) of 0-2, in favor of the endovascular treatment arm.

A concurrent trial, the EXTEND-IA,<sup>11</sup> was conducted in Australia and New Zealand comparing endovascular plus IV treatment versus IV treatment alone. This was stopped after an interim analysis showed

overwhelming efficacy. This trial found reperfusion rates as high as 89 percent in the endovascular arm as well as greater early neurological recovery at three days from ictus. The percentage of patients who were functionally independent at 90 days was 71 percent in the endovascular group, compared to 40 percent in the IV r-tPA group.

The ESCAPE trial<sup>12</sup> was an international study that also was stopped early due to efficacy. The results showed that the endovascular treatment group had a 53 percent chance of a good functional outcome, compared to only 29 percent in the IV r-tPA group.

Another international trial held across the US and Europe was the SWIFT PRIME<sup>13</sup> trial. This, too, was stopped earlier than planned after an interim analysis showed positive results in favor of the endovascular treatment group. The rates of functional independence at 90 days were 60 percent in the endovascular group versus 35 percent in the IV treatment group, and thrombectomy was shown to achieve substantial reperfusion in 88 percent of cases, and found a number needed to treat (NNT) of only four to achieve one independent functional outcome.

The last in this series of trials evaluating endovascular therapy for AIS to be reported was the REVASCAT,<sup>14</sup> which was conducted in Catalonia, Spain. This trial also was stopped early after the other thrombectomy trials reported their positive results resulting in a loss of equipoise. REVASCAT found 43.7 percent of patients in the endovascular group to be functionally independent compared to just 28.2 percent in the IV r-tPA group, which was statistically significant.

It is important to note that the vast majority of patients in both arms of all these trials did receive thrombolytic therapy in the form of IV r-tPA, and these positive results suggest that the role of endovascular therapy would be adjunctive to rather than as an alternative to intravenous treatment. However, in patients ineligible for IV thrombolysis, endovascular treatment still remains a viable alternative. It also is important to note that in addition to efficacy, all the

above trials found endovascular thrombectomy to be safe, without any significant increase in intracerebral hemorrhage or mortality.

The results of these trials have been received with great enthusiasm amongst those of us who care for these complex and critically ill patients. From the perspective of a vascular and interventional neurologist especially, it is extremely heartening to know that we have another very efficacious option in our arsenal. This will not only help reduce morbidity and mortality due to AIS, but also shorten hospital stays, hasten recovery and allow these patients to return to work, thereby reducing the cost burden on the health care system and economy.

These trials do leave a few unanswered questions, which further studies and analyses will hope to answer. What is the best way to select patients who will likely benefit most from endovascular treatment? How can we offer these treatments to as many patients as possible, in the most efficient way possible? What, if any, is the time window for endovascular treatment since the time windows in these trials varied from 6-12 hours?

These trials are certain to impact systems of care as well as influence the way stroke centers triage and treat these patients. There may now be a more urgent need to identify patients with LVOs either by clinical examination or vascular imaging and then triage them to a center offering these procedures. It is estimated that at large referral centers, 5-10 percent of all ischemic stroke patients may be candidates for these procedures.<sup>15</sup>



We at Palmetto Health and the University of South Carolina School of Medicine are proud to be at the forefront of providing stroke care in the Midlands. We are uniquely placed in our ability to offer 24/7 coverage with neurology, a young neurology residency program, three fellowship-trained neurointerventionalists and leaders of both neurology and neurosurgery departments who have special interest and training in cerebrovascular disease. Over the years, we have been performing these procedures as they have evolved and are constantly working to optimize our protocols to offer these treatments to as many eligible patients in as timely a fashion as possible (Figure 2). We look forward to what promises to be a bright future in the treatment of cerebrovascular disease. ◀

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## Contact us for more information or to refer a patient

### Palmetto Health Neurosurgery Associates

3 Richland Medical Park Dr., Suite 310, Columbia, SC 29203  
9 Richland Medical Park Dr., Suite 640, Columbia, SC 29203 (pediatric office)  
300 Palmetto Health Pkwy., Suite 200, Columbia, SC 29212  
Phone: 803-434-8323  
Fax: 803-434-8326  
[PalmettoHealth.org/PHNeurosurgery](http://PalmettoHealth.org/PHNeurosurgery)

### University of South Carolina School of Medicine Department of Neurology

8 Richland Medical Park Dr., Suite 420, Columbia, SC 29203  
Phone: 803-545-6050  
Fax: 803-545-6051  
[neurology.med.sc.edu](http://neurology.med.sc.edu)

**Call 844-64-BRAIN (27246) for emergent neurosurgical transfers.**



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**Our Vision:** To be remembered by each patient as providing the care and compassion we want for our families and ourselves.