SUN VALLEY
CEREBROVASCULAR CONFERENCE

Refining Revolutionary Treatments

January 29-31, 2026

St Luke's | The University of Tennessee Health Science Center | UC San Diego School of Medicine | College of Medicine Phoenix

Presented by St. Luke's Neurosciences in partnership with the University of Arizona College of Medicine-Phoenix, University of Tennessee Health Science Center, and the University of California San Diego School of Medicine.

Photo courtesy of Sun Valley Resort

Welcome to the Sun Valley Cerebrovascular Conference

Welcome to SVCC 2025, and to the historic Wood River Valley! The goal for this meeting, from the start, has been to promote provocative discussion and informative education, while allowing for world-class recreation in a family-friendly environment. Now in our sixth year, we have once again assembled key opinion leaders from across the country to discuss cerebrovascular disease and stroke. The disciplines of neurology, neurosurgery, and neuroradiology are among those represented.

The meeting focuses on procedural treatments for cerebrovascular disease, as well as high-yield medical interventions. As will be demonstrated during our sessions, cerebrovascular is one of the most dynamic and progressive subspecialties in medicine. Mechanical thrombectomy for stroke is arguably the greatest medical achievement in a generation. Treatment of vascular malformations, subdural hematomas, and idiopathic intracranial hypertension is being rethought and redefined. Yet these advances are best appreciated when we examine the historical context in which they occurred. Thus, the meeting opens Thursday evening with accounts from neurology, neurosurgery, and radiology pioneers describing the development of novel and revolutionary ideas.

This sets the stage for Friday's focus on real-world solutions for patients who don't necessarily match the criteria on which many landmark trials have been based. Old debates will be revisited, competing treatment strategies argued, and less common scenarios considered. Saturday will focus on technology and systems of care. Discussion topics will include team structures, novel workflows, and technological advances coming to fruition.

Partnership with industry is not only critical to advancing devices and technology, but essential for putting on an educational conference such as this. We are grateful to the sponsors who have graciously supported our venture. Please make sure to visit with them during breakfast, breaks, and après-ski sessions to exchange ideas.

We trust you will take advantage of the free time each day! Sun Valley is known for alpine and Nordic skiing, but numerous indoor and outdoor family-friendly activities abound at the resort. Don't miss out on our social events, including an opening reception, daily après-ski refreshments, and horse-drawn sleigh rides at our "Star and Sleigh" closing reception. To take advantage of the mountain during the day, our meeting starts early! To help kickstart your day, we are hosting a coffee bar each morning. Stop by the Konditorei restaurant from 6:30-7:30 a.m. and show your badge to get your favorite morning beverage.

There are two additions to the meeting for this year. Due to a record number of abstract submissions, we are now incorporating poster presentations as part of our scientific program. Feel free to view posters at any time during the meeting in the Limelight A room. Posters will be judged during the Après-Ski Hour Friday and Saturday from 3-4 p.m. In order to foster "on mountain" networking and camaraderie, we are including helmet stickers in each welcome bag. Please utilize these so that fellow conference goers can identify other attendees!

A core principle of the meeting is that it is interactive; we strongly encourage audience participation in discussion, as well as in live polling. Lastly, please make sure to complete evaluations at the end of our meeting to help us make the 2026 Sun Valley Cerebrovascular Conference even better.

Sincerely,

Edward A.M. Duckworth, MD, MS, FAANS

Intended Audience

A conference for medical providers involved in the treatment of cerebrovascular disorders and stroke. The intended audience includes neurosurgeons, neurologists, neurointerventionalists and anyone involved with stroke care: primary care providers, emergency physicians, hospitalists, EMS providers, nurses and stroke coordinators.

Learning Objectives

- Review the history of treatments for cerebrovascular disease.
- Describe the latest management strategies for cerebrovascular disease.
- Discuss complex cases involving surgical, endovascular, and medical management of stroke and cerebrovascular disease.
- Analyze and discuss the optimization of stroke systems of care.

Conference Check-in

Thursday, January 29
Limelight Lobby at the Sun Valley Inn,
1:30-7:30 p.m.

Friday, January 30, and Saturday, January 31
Limelight Lobby at the Sun Valley Inn, 7-8 a.m.
and 3-4:30 p.m.

SVCC WIFI Access

SSID: **SVCC2026**
Password: **SVCCBaldy**

Conference Organizing Committee

Dan Abenroth, MD

Andrei Alexandrov, MD

Anne Alexandrov, PhD, AGACNP-BC

Adam Arthur, MD, MPH

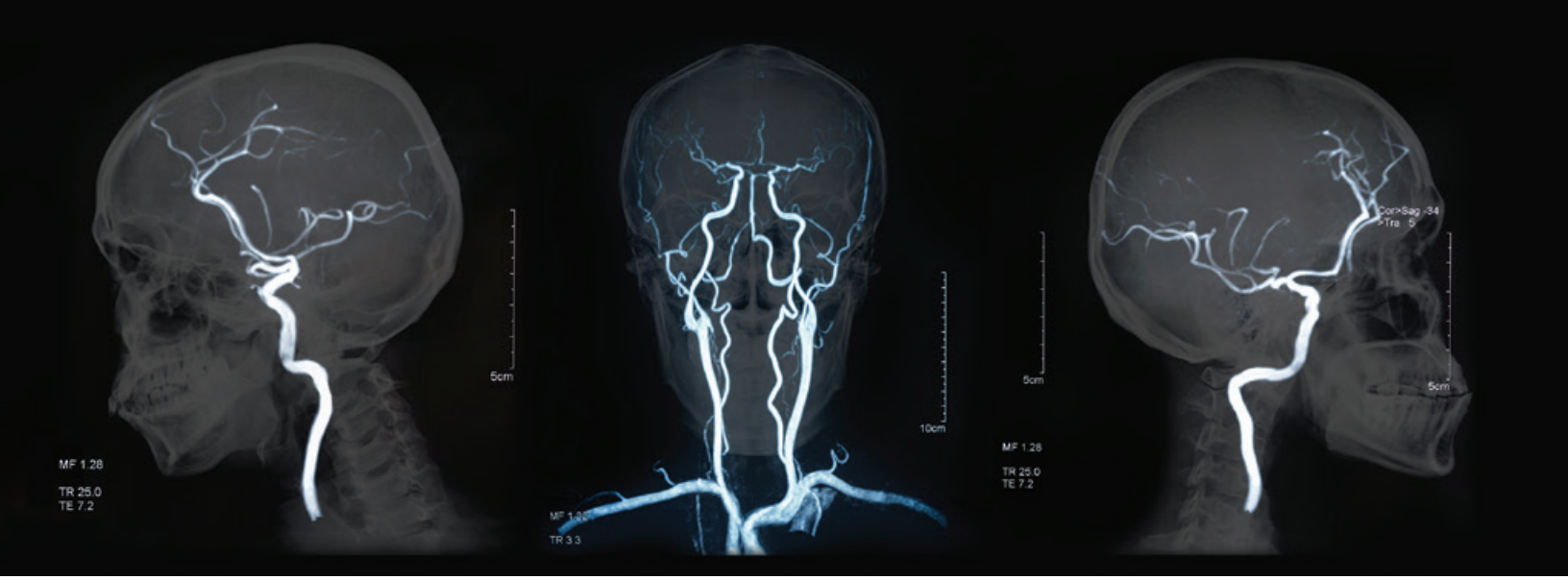
Edward Duckworth, MD, MS

Lucas Elijovich, MD

Alexander Khalessi, MD, MBA

Special thanks to the contributions of:

Aimee Borders
Maggie Gaynor
Traci Gluch
Kirk Rasmussen
Stephanie Shawver
Shannon Warner
Jennifer Walls
Alisha Zweifel



Scientific Program

The program is designed to be dynamic, with short lectures in the morning punctuated by roundtable discussions and abstract presentations. These are followed by case presentations, hot topics and head-to-head debates during the evening sessions. The meeting will cover the spectrum of cerebrovascular care, including discussions on the history of stroke, navigating difficult treatment scenarios, systems of care, and emerging technology and treatments for hemorrhagic and ischemic stroke.

All conference meetings will be held in the Limelight B room.

Thursday, January 29, 4-7 p.m.		
Ideas and Innovators That Have Shaped the Field *Moderator: Alex Khalessi, MD, MSA*		
4-4:20 p.m.	Introduction and Welcome	*Edward Duckworth, MD*
4:20-4:50 p.m.	The Origins and Evolution of Aspiration Thrombectomy	*Imran Chaudry, MD*
4:50-5:20 p.m.	The History of Neurosurgical Medical Illustration	*Stephen Graepel*
5:20-5:50 p.m.	Tales from the Other Side: What Happens When the Doctor Becomes the Patient?	*Pascal Jabbour, MD*
5:50-6 p.m.	**Break**	
6-6:30 p.m.	Flow Diversion: Past, Present, and Future	*Ajay Wakhloo, MD*
6:30-7 p.m.	How an AVM Can Turn You Into Mr. Potato Head, with Actor, Comedian, and AVM Survivor, T.J. Miller	*T.J. Miller*
7-8:30 p.m.	**Opening Reception**	

Friday, January 30, 7:30 a.m.-4 p.m.

Treatment Beyond the Trials

Moderator: Adam Arthur, MD

7:30-7:53 a.m.	Critical Analysis of MeVO Trial	*Jared Knopman, MD*
7:53-8:04 a.m.	**Abstract 1:** Beyond Imaging and NIHSS – Incorporating Frailty Using RAI-rev Improves Prognostic Assessment After Mechanical Thrombectomy in Acute Ischemic Stroke	*Ramesh Grandhi, MD*
8:04-8:15 a.m.	**Abstract 2:** The Tenzing-Dotter Technique for Endovascular Management of Tandem Atherosclerotic Cervical ICA and Intracranial Large Vessel Occlusions	*Joey English, MD, PhD*
8:15-8:45 a.m.	**Roundtable Discussion:** Cerebral Venous Sinus Thrombosis – When Should Intervention Be Considered? What Is the Best Interventional Technique?	*Vivish Srinivasan, MD (Moderator); Dan Abenroth, MD; Ramesh Grandhi, MD; John Perl, MD*
8:45-9 a.m.	**Break**	
9-9:11 a.m.	**Abstract 3:** Single Cell Analysis of Endothelial Cells Reveals Novel Genes Responsible for Endothelial Dysfunction in Intracranial Aneurysms	*Allison Liang, MD*
9:11-9:22 a.m.	**Abstract 4:** Mapping Real-Time Hemodynamic Changes in Venous Sinus Stenting Using Intraoperative TCD and Quantitative Angiography	*Vivish Srinivasan, MD*
9:22-9:45 a.m.	**Hot Topic**: Intravascular Neuromodulation	*Alex Khalessi, MD, MBA*
9:45-9:56 a.m.	**Abstract 5:** Cost-Effectiveness of Adjunctive Middle Meningeal Artery Embolization for Chronic Subdural Hematoma – Secondary Analysis of EMBOLISE	*Ramesh Grandhi, MD*
9:56-10:07 a.m.	**Abstract 6:** Intracranial B Waves as A Targetable End Point for Glymphatic Optimization	*David Newell, MD*
10:07-10:30 a.m.	Can Artificial Intelligence Accurately Predict the Risk of Hematoma Expansion in Intracerebral Hemorrhage?	*Pascal Jabbour, MD*
10:30 a.m.-3 p.m.	**Break**	
3-4 p.m.	Poster Presentations and Medical Illustration Gallery	*Courtesy of Mayo Clinic*

Friday, January 30, 4-7 p.m.

Interactive Case Presentations, Hot Topics, and Debates
Moderator: Andrei Alexandrov, MD

4-4:18 p.m.	**Interactive Case:** When the Algorithm Fails: Managing High-Complexity Stroke	*Nikhil Mehta, MD*
4:18-4:36 p.m.	**Interactive Case:** TBD	*Evan Joyce, MD*
4:36-4:57 p.m.	**Interactive Case:** Challenges in Managing a Thrombotic Posterior Circulation Aneurysm	*Vivish Srinivisan, MD*
4:57-5:15 p.m.	**Interactive Case:** More Than Meets the Eye: A Challenging Case of Recurrent Posterior Circulation Infarcts	*Raja Godasi, MD*
5:15-5:57 p.m.	**Consensus Session:** Defining Medium and Distal Vessel Occlusions – Would You Randomize This Patient?	*Adnan Qureshi, MD (Moderator)*
5:57-6:15 p.m.	**Interactive Case:** TBD	*Robert Starke, MD, MS*
6:15-6:33 p.m.	**Interactive Case:** Dural Arteriovenous Fistula Endovascular Repair – A Welcome Win	*Lee Pride, MD*
6:33-7 p.m.	**Head-to-Head Debate:** CREST 2 Implications for Changing Referral Patterns	*Dan Abenroth, MD vs Ray Grams, DO*

Saturday, January 31, 7:30 a.m.-4 p.m.

Systems and Technology to Improve Outcomes
Moderator: Lucas Elijovich, MD

7:30-7:53 a.m.	Neurointerventional Oncology – Beyond Retinoblastoma	*Yafell Serulle, MD*
7:53-8:04 a.m.	**Abstract 7:** Venous Sinus Stenting Outcomes are Independent of Absolute Venous Pressure in Idiopathic Intracranial Hypertension	*Vishnu Suresh, MD*
8:04-8:15 a.m.	**Abstract 8:** Intracranial Hypercapnia is Associated with Decreased Platelet Activation and Parenchymal Viability Following Stroke Thrombectomy	*Dave Dornbos, MD*
8:15-8:45 a.m.	**Roundtable Discussion:** Neurointerventional Device Development – From Napkin to Market	*Jared Knopman, MD (Moderator); Nicole Bongers, Ajay Wakhloo, MD, Adam Arthur, MD, MPH*
8:45-9 a.m.	**Break**	
9-9:11 a.m.	**Abstract 9:** End-of-treatment Thresholds for Minimally Invasive Surgery in Intracerebral Hemorrhage – Subanalysis of the MIND Study	*Robert Ryan, MD*
9:11-9:22 a.m.	**Abstract 10:** A First Look at National Door-In/Door-Out Transfer Times for Thrombectomy and Hemorrhagic Stroke Captured by the **S**troke **WI**th **F**ast **T**ransfer (SWIFT)© Instrument	*Jennifer Patterson, MD*
9:22-9:45 a.m.	Intrasaccular Therapy: Progress and Innovation	*Ramesh Grandhi, MD*
9:45-9:56 a.m.	**Abstract 11:** Awake Middle Meningeal Artery Embolization Using NBCA Glue with Intra-Arterial Lidocaine – A Feasibility and Technical Series	*Anoton Peled, MD*
9:56-10:07 a.m.	**Abstract 12:** Real-Time AI-Driven Prediction of Intracranial Aneurysm Healing Using the QAS.AI Quantitative Angiography Platform	*Vincent Tutino, PhD*
10:07-10:30 a.m.	TBD	*Lucas Elijovich, MD*
10:30 a.m.-3 p.m.	**Break**	
3-4 p.m.	Poster Presentations and Medical Illustration Gallery	*Courtesy of Mayo Clinic*

Saturday, January 31, 4-7 p.m.

Interactive Case Presentations, Hot Topics and Debates
Moderator: Dan Abenroth, MD

4-4:18 p.m.	**Interactive Case:** Can Modern Devices Treat All Intracranial Aneurysms?	*Jeffrey Steinberg, MD*
4:18-4:36 p.m.	**Interactive Case:** TBD	*Robert Darflinger, MD*
4:36-4:57 p.m.	**Hot Topic:** AVM Treatment Since Aruba – What Does the Evidence Show?	*Robert Starke, MD*
4:57-5:15 p.m.	**Interactive Case:** Tentorial Fistula	*Eric Smith, MD*
5:15-5:33 p.m.	**Interactive Case:** TBD	*Iman Chaudry, MD*
5:33-5:54 p.m.	**Hot Topic:** Interventional Techniques for Headache	*Scott Pannell, MD*
5:54-6:12 p.m.	**Interactive Case:** TBD	*Susan Tierney, MD*
6:12-6:30 p.m.	**Interactive Case:** TBD	*Edward Duckworth, MD*
6:30-7 p.m.	**Head-to-Head Debate:** DAPT vs IV Thrombolysis for Non-Disabling Stroke	*Andrei Alexandrov, MD vs Balaji Krishnaiah, MD*
7:30-9:30 p.m.	**Star and Sleigh Closing Reception** – Featuring horse drawn sleigh rides and star gazing; Adjourn & enjoy Sun Valley in the Continental Room!	

Continuing Medical Education (CME) Information: St. Luke's Health System designates this **LIVE** activity for a maximum of 14.00 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

St Luke's Health System is accredited by the Utah Medical Association to provide continuing medical education for physicians.

Claiming CME: You will be able to obtain a total of 14.00 CME credits for this conference. To receive all the credits offered you must complete the post conference evaluation.

Conference Attire: Mountain casual or ski clothing. Business attire discouraged.

Method of Instruction: Live programs with oral presentations and interactive discussions. We will be using Poll Everywhere for live audience participation:

- Download the Poll Everywhere app from the Apple or Google Play store.
- Access online at pollev.com/SVCC.
- Text SVCC to 22333.

Early Morning Espresso: Enjoy a complimentary espresso at the Konditorei Friday and Saturday mornings from 6:30-7:30 a.m. (must show your conference badge).

Breakfast and Refreshments: Enjoy breakfast each morning at 7 a.m. and après-ski refreshments each afternoon at 3 p.m. in Limelight C with the exhibitors.

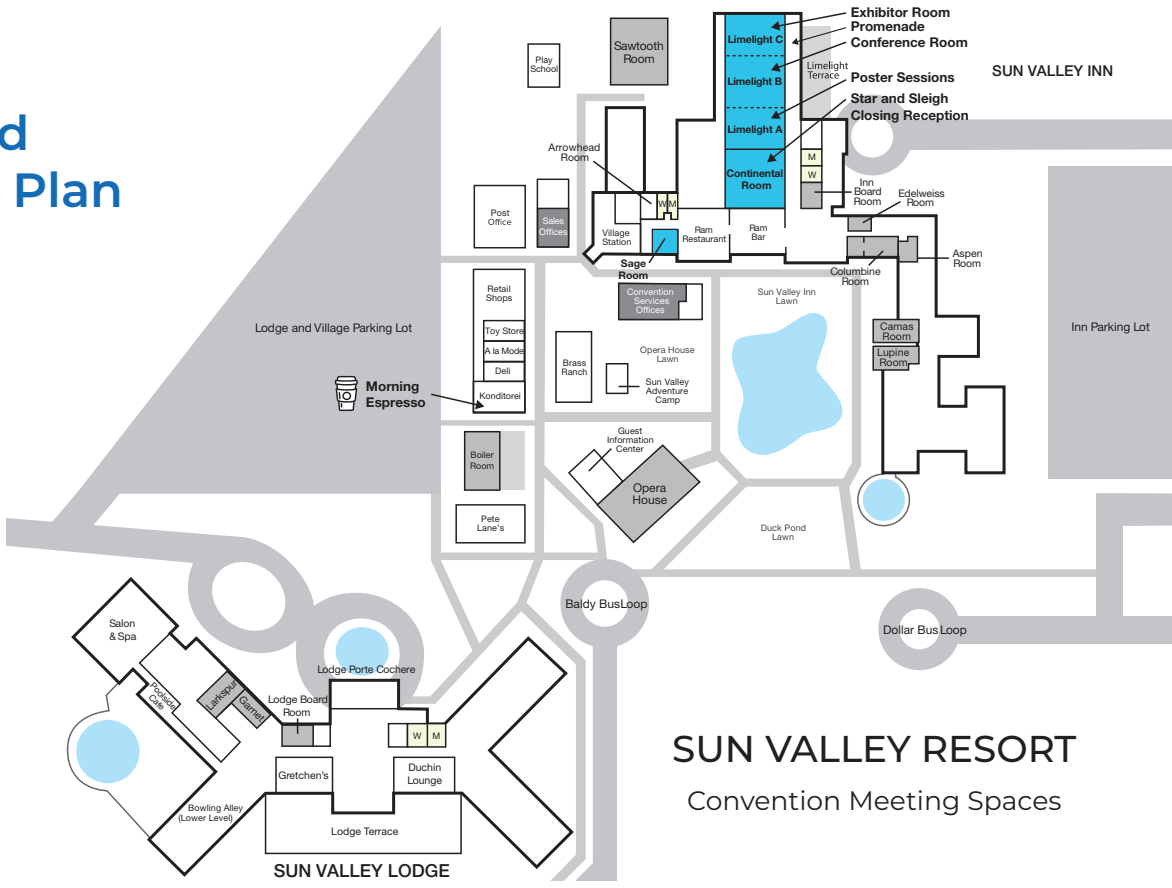
Conference Social Activities: In addition to providing an excellent educational opportunity at the Sun Valley Cerebrovascular Conference, we are hosting several recreational and interactive social events.

Access the post conference evaluation at https://forms.office.com/r/hPcfu8SR3m or scanning the QR code. Evaluation deadline is February 27th, 2026.

Conference and Exhibitor Floor Plan

SVCC WIFI Access

SSID: **SVCC2026**
Password: **SVCCBaldy**



Planned Social Events

Thursday, January 29
7 to 8:30 p.m. – Welcome reception with hors d'oeuvres and hosted bar in the Promenade and Limelight C.

Friday, January 30
3 to 4 p.m. – Après-ski with exhibitors and speakers in Limelight C sponsored by Medtronic Neurovascular

Saturday, January 31
3 to 4 p.m. – Après-ski with exhibitors and speakers in Limelight C sponsored by Arbor Endovascular.

7:30 to 9:30 p.m. – Star and Sleigh Closing Reception in the Continental Room, featuring horse drawn sleigh rides, and star gazing.

Sun Valley Cerebrovascular Conference Recreational Activities

There are ample opportunities for fun and adventure in Sun Valley and at the Sun Valley Resort, including downhill skiing and snowboarding, snowshoeing and Nordic skiing. For those of you who don't want to tackle the snowy terrain, you can find cultural activities and shopping in Ketchum and other towns in the surrounding Wood River Valley.

To relax and rejuvenate, check out the heated swimming pools at both the Sun Valley Lodge and Sun Valley Inn or the spa at the Sun Valley Lodge.

For a comprehensive list of recreational opportunities, please visit sunvalley.com/things-to-do.

Discounted lift tickets: These can be purchased on the day of skiing from any Sun Valley Resort lift ticket retail outlet with a conference badge or other proof of identification.

Courtesy of Sun Valley Resort

Featured Speakers

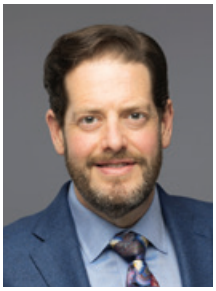
Dan Abenroth, MD, is a vascular neurologist and neurohospitalist who serves as the Clinic Director of the St. Luke's Health System Stroke Program (Boise, ID). He completed his undergraduate studies at Brigham Young University, medical education at Michigan State University, Adult Neurology residency at the University of Utah, and Vascular Neurology fellowship at Medical University of South Carolina.

Andrei Alexandrov, MD, completed his fellowship training in stroke and cerebrovascular ultrasound at the University of Toronto and at the University of Texas.

He published 338 original papers, 3 textbooks, 16 case reports, 167 review articles, editorials, invited publications, and book chapters & over 350 abstracts presented at major scientific meetings and published in refereed journals. Current h-index 87.

Dr Alexandrov has trained 61 fellows in stroke and cerebrovascular ultrasound. He served as Director of the Neurosonology Examination (1998-2018) and President of the American Society of Neuroimaging (2019-2021), Board member of the Intersocietal Accreditation Commission (IAC-Vascular, 2006-20, IAC-CT 2023-26), Editor-in-Chief, *Journal of Neuroimaging* (2026-).

As Semmes Murphey Professor and Chair of the University of Tennessee Health Science Center Neurology Department (2013-2023), he directed Mobile Stroke Unit with state-of-the-art CT performing head and neck CTA and accredited by IAC as CT laboratory and created Memphis city-wide Stroke Team that achieved and sustained the highest per capita treatment rates with tPA and mechanical thrombectomy in the world in 2015-2022. In 2023, he became the inaugural Chair of the Department of Neurology, University of Arizona College of Medicine – Phoenix.



Adam Arthur, MD, MPH, attended college and medical school at the University of Virginia. During that time he joined the University of Virginia's Department of Neurosurgery and conducted research on aneurysms and cerebral vasospasm. He completed his internship and residency at the University of Utah, where he also completed an MPH with a focus on clinical trials methodology. After finishing his neurosurgery residency, he joined the Semmes Murphey Clinic and the University of Tennessee Department of Neurosurgery. During his first two years in Memphis, he completed a fellowship in endovascular and cerebrovascular neurosurgery.

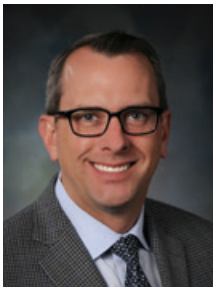
Dr. Arthur is one of the first neurosurgeons in the country to develop a busy practice in both open cerebrovascular surgery and endovascular neurosurgery. He is the Past President of the Society for Neurointerventional Surgery and Past Chair of the Joint AANS/CNS Cerebrovascular Section. Now in his twentieth year in Memphis he is the James T. Robertson Endowed Professor and Chair of the Department of Neurosurgery at UTHSC and is also the Chair of the Neurosurgery Research and Education Foundation. He is currently leading six different large scale multicenter clinical trials and is actively engaged in developing and testing innovative strategies to improve patients' lives across a number of disease states.

Nicole Bongers is a senior medical device executive with more than 25 years of experience leading innovation across the full product lifecycle, from early development through global commercialization. She is recognized for building high-performing teams, advancing novel technologies, securing FDA and international approvals, and establishing scalable, compliant quality systems for Class I, II, and III medical devices.

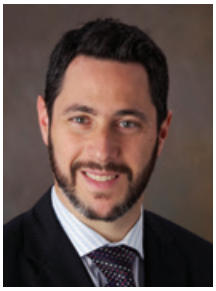
She is the Owner of Concept to Commercialization, LLC, advising venture-backed and early-stage medical device companies, and serves as President of CB MedTech Foundry, providing executive leadership across clinical, regulatory, and quality functions while leading fundraising, due diligence, and business development for portfolio and spin-off companies.

Nicole has led global regulatory and clinical strategies resulting in 510(k) clearances, PMA approvals, and successful FDA engagements, working closely with regulators, investors, and key opinion leaders. She is actively involved in leading industry organizations and advances health equity initiatives that expand access to clinical research and innovative therapies in rural communities.

Imran Chaudry, MBBS, is a neurointerventional radiologist who completed his radiology residency at the Mercy Hospital of Pittsburgh, a Neuroradiology fellowship at University of Wisconsin and his Neurointerventional radiology fellowship at the University of Wisconsin and at the Medical University of South Carolina, Charleston. Dr. Chaudry was the fellowship director at MUSC. He is currently a Professor at the Medical University of South Carolina (Greenville, SC) and serves as program and fellowship director at Prisma Health Greenville, SC.



Edward Duckworth, MD, MS, is an intracranial-focused neurosurgeon specializing in the treatment of complex cranial disorders, including the surgical treatment of hemorrhagic and ischemic stroke. He is system director of neurosurgery for St. Luke's and a voluntary clinical professor at UC San Diego. Dr. Duckworth holds the distinction of being dual fellowship-trained: in open cerebrovascular and cranial base surgery at Northwestern University and in endovascular neurosurgery/ interventional neuroradiology at Semmes Murphey Neurologic and Spine Institute/ University of Tennessee Health Science Center. He has particular expertise in the treatment of complex aneurysms, arteriovenous malformations, carotid disease and cerebral hypoperfusion. He is the founder and director of the Sun Valley Cerebrovascular Conference.



Lucas Elijovich, MD, earned his bachelor's degree in biology from Tufts University and his medical degree from the University of Texas at Galveston. He completed his neurology residency at New York University, where he served as chief resident. He pursued advanced interests in cerebrovascular disease, neurocritical care and interventional neuroradiology, completing fellowship training in stroke and neurocritical care at the University of California, San Francisco.He then trained with Dr. Alejandro Berenstein, one of the pioneers of interventional neuroradiology,in New York. Dr. Elijovich joined Semmes Murphey Clinic in 2010 and is a professor in the Departments of Neurology and Neurosurgery at the University of Tennessee Health Sciences Center. He also serves as director of neurocritical care for the University and director of neurointerventional surgery and the Vascular Anomalies Center for LeBonheur Children's Hospital.

Raja Godasi, MD, Godasi is a vascular neurologist and a member of the St. Luke's Neurohospitalist team. He completed medical school in India, followed by a neurology residency at SUNY Upstate Medical University in Syracuse, New York, and a vascular neurology fellowship at Mayo Clinic Florida in Jacksonville. He is board certified in neurology and vascular neurology. His clinical interests include inpatient general neurology, vascular neurology, and neurosonology.

Stephen Graepel, MA, is the dedicated illustrator for Mayo Clinic Neurosurgery, developing images for publication, presentation and grant applications. A 1995 graduate of the Johns Hopkins University School of Medicine, he earned a Master of Arts in Medical and Biological Illustration. Holding joint assistant professor in Biomedical Communications and Neurosurgery, beyond his illustration work, he leads medical illustration elective courses for Mayo Clinic medical students and learners. He takes great pride in the unique privilege to tell stories that haven't been told before, bring clarity to complex topics, collaborate across disciplines, with high impact visuals that increase patient outcomes.

Raymond Grams, MD,

Ramesh Grandhi, MD, is an ABNS certified, dual-trained cerebrovascular neurosurgeon who treats vascular pathologies through both endovascular techniques and traditional, open microsurgical approaches. He has extensive experience with patients with cerebrovascular conditions such as arteriovenous malformations, brain aneurysms, and intracranial hemorrhages. In addition, he has a significant interest in treating patients with stroke and uses minimally-invasive approaches ranging from carotid and intracranial stenting to mechanical thrombectomy for large vessel occlusions. He received his undergraduate degree from Duke University and a master's degree in physiology at Georgetown University. Dr. Grandhi attended medical school at Virginia Commonwealth University and did his residency at the University of Pittsburgh Medical Center, where he completed an enfolded fellowship in Interventional Neuroradiology. He then completed a fellowship in Cerebrovascular Neurosurgery at the Baptist Neurological Institute in Jacksonville, Florida.

Pascal Jabbour, MD, is the Angela and Richard T. Clark Distinguished Professor of Neurological Surgery and Radiology and the Head of the Division of Neurovascular and Endovascular Neurosurgery in the Department of Neurological Surgery at the Sidney Kimmel Medical College at Thomas Jefferson University. He is a dually trained vascular neurosurgeon, he performs endovascular and open procedures.

Dr. Jabbour is a very active speaker, lecturing on various neurovascular topics nationally and internationally. He has authored 811 papers in peer-reviewed journals, including *NEJM, The Lancet, Stroke, Neurosurgery, Journal of Neurointerventional Surgery, Interventional Neuroradiology, Journal of Neurosurgery, World Neurosurgery, Ophthalmology* and *Retina, h-index: 83* with 29,055 Citations. He has authored more than 100 book chapters, Dr. Jabbour serves as a section editor for *Neurosurgery* and is a reviewer for *Neurosurgery, Neuroradiology, World Neurosurgery, Lancet Neurology,* the *Journal of Neurointerventional Surgery* and many others. He is the author of 4 comprehensive textbooks, one of them, *Neurovascular Surgical Technique*, was translated into multiple languages. He has given more than 285 invited lectures nationally and internationally.

Dr. Jabbour received a national award for his pioneering of a new technique in the treatment of retinoblastoma in babies. He is the National Primary Investigator (PI) on several trials. He is also one of the pioneers in neuroendovascular robotics.

Dr. Jabbour is a graduate of the Saint Joseph University School of Medicine in Beirut. He completed his residency in neurosurgery at the University of Colorado and Thomas Jefferson University and his fellowship at Thomas Jefferson University.

Dr. Jabbour is past President of the World Association of Lebanese Neurosurgeons (WALN). He is an active member of the Congress of Neurological Surgeons, The American Association of Neurological Surgery, Society of Neurointerventional Surgery, AANS/CNS joint CV section the American College of Surgeons. He is the course director of a yearly conference The CV update in Philadelphia. He is the past Vice-Chair of the Cerebrovascular Section of the American Association of Neurological Surgeons AANS and the Congress of Neurological Surgeons CNS. He was the Drake invited lecture at the CNS 2024. He is also a certified level IV Sommelier from the National Wine School.

Brian T. Jankowitz, MD, is a board certified neurosurgeon with a special focus on cerebrovascular surgery. He is CAST (Committee on Advanced Subspeciality Training) accredited in neuroendovascular surgery.

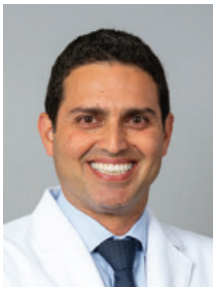
Dr. Jankowitz specializes in innovative treatments for ischemic and hemorrhagic stroke including carotid disease, intracranial stenosis, brain aneurysms, arteriovenous malformations (AVMs), and vascular malformations of the spine. He has extensive training in open and endovascular surgical procedures including CEA, TCAR, carotid stenting, aneurysm clipping, aneurysm coiling, and acute stroke interventions.

Prior to joining the Hackensack Meridian Neuroscience Institute at JFK University Medical Center, Dr. Jankowitz was the Division Head of Cerebrovascular Surgery at the Perelman School of Medicine at the University of Pennsylvania. He had previously served as the Director of the Cerebrovascular Program at Cooper Neurological Institute in Camden, New Jersey. He was also an associate professor of neurological surgery at the University of Pittsburgh School of Medicine and served as faculty of the UPMC Neurosurgery Department and UPMC Stroke Institute where he specialized in both open and endovascular neurosurgery.

Earning his bachelor of science degree from the University of Notre Dame, Dr. Jankowitz received his medical degree from Temple University School of Medicine. He then went on to complete his surgical internship, neurosurgical residency, and fellowship in Neuroendovascular surgery at the University of Pittsburgh Medical Center in Pittsburgh, Pennsylvania.

Dr. Jankowitz is a member of the American Board of Neurological Surgeons, the Society of NeuroInterventional Surgery and the American Heart Association. He is also a member of the Congress of the Neurological Surgeons and the Endovascular Neurosurgery Research Group, and holds editorial positions on several national medical publications including *The Spine Journal, World Neurosurgery, Neurosurgical Review, Interventional Neurology* and the *Journal of NeuroInterventional Surgery*. He is also a primary investigator for several national clinical trials.

Joyce, MD,



Alexander Khalessi, MD, MBA, serves as Chief Innovation Officer at UC San Diego Health and Interim Assistant Vice Chancellor for Health Sciences Innovation and AI at UC San Diego. In these dual roles, he leads strategy at the intersection of clinical care, digital transformation, artificial intelligence, and translational science. His portfolio includes enterprise innovation strategy, systemwide technology implementation, perioperative and procedural innovation, and capital alignment to position UC San Diego Health for AI integration. He also guides the alignment of academic discovery, clinical translation, and commercialization, and engages industry partners across the region's biotech ecosystem to advance innovation and applied AI.

Dr. Khalessi is also Chair of the Department of Neurological Surgery at UC San Diego Health, one of the nation's premier neurosurgery programs and consistently ranked among the top 25 by U.S. News & World Report. A board-certified cranial and endovascular neurosurgeon, he leads a comprehensive subspecialty department performing more than 4,500 major surgical cases annually and supporting key system designations including dual comprehensive stroke centers, level I trauma, level 4 epilepsy, comprehensive cancer, and advanced spine care. His clinical practice spans complex cranial surgery and catheter-based interventions for brain tumors, aneurysms, arteriovenous malformations, stroke, cavernomas, Moyamoya disease, and carotid disease.

Nationally, Dr. Khalessi is recognized for his leadership in neurosurgical policy, innovation, and education. He currently serves as Chair of the AANS/CNS Washington Committee and is Immediate Past President of the Congress of Neurological Surgeons (CNS). He also serves on the Boards of the American College of Surgeons (ACS) and North American Neuromodulation Society (NANS), and is an elected member of the American Academy of Neurological Surgery. A founding member of the Medical Device Innovation Consortium, he advises the FDA on neurovascular technology and has served on NINDS study sections for translational device development and small business innovation.

Dr. Khalessi has authored more than 175 peer-reviewed publications and delivered over 250 scientific presentations. He serves as principal or co-investigator on more than 25 clinical trials and grants advancing surgical, endovascular, and device-based innovation. He earned his BA and MSc in Health Services Research from Stanford University, his MD from the Johns Hopkins School of Medicine, completed neurosurgical residency at the University of Southern California with a CAST-certified fellowship in endovascular neurosurgery at SUNY Buffalo, and received his MBA from the MIT Sloan School of Management.

Jared Knopman, MD, is an Associate Professor of Neurological Surgery at Weill Cornell Medical Center, where he serves as Director of Cerebrovascular Surgery and Interventional Neuroradiology, as well as Fellowship Director of Endovascular Neurosurgery.

His clinical expertise includes embolization and microsurgery for aneurysms and AVMs, carotid artery stenting and endarterectomy, microvascular decompression, and he is one of the pioneers of middle meningeal artery embolization for subdural hematomas, serving as National Co-PI of the EMBOLISE Trial.

Bala Krishnaiah, MD, is an Associate Professor of Neurology at the University of Tennessee Health Science Center, where he serves as Vice Chair for Education, Division Chief of Vascular Neurology, Residency Program Director, and Neuroscience Course Director. He completed his neurology residency at Penn State and his fellowship training at the University of Tennessee Health Science Center in Memphis, where he joined the faculty.

He is the Medical Director of the Methodist Le Bonheur Stroke Network, overseeing regional stroke care delivery, including technology implementation, protocol development, and system coordination. He has mentored numerous trainees, developed neurology education pathways, and received more than 30 teaching awards, including the A.B. Baker Award, the AAN Neuroscience Course Director Excellence Award, and the Burton A. Sandok Visiting Professorship in Neurology Education from Mayo Clinic. He serves as principal investigator for multiple NIH StrokeNet trials and as site principal investigator for all StrokeNet trials at UTHSC, and he has authored more than 40 peer-reviewed publications. He is a Fellow of the American Academy of Neurology and the American Neurological Association.

Nikhil Mehta, MD, is a board-certified Neurointerventional Surgeon with Vascular & Interventional Partners in Phoenix, Arizona, specializing in advanced endovascular treatment of complex cerebrovascular disease. Dual-trained in IR and NIR, he focuses on innovative solutions for high-risk and “no-option” cases and is actively involved in education, research, and national presentations. Beyond clinical practice, he is a healthcare entrepreneur and thought leader working to improve access, effciency, and innovation in medicine.

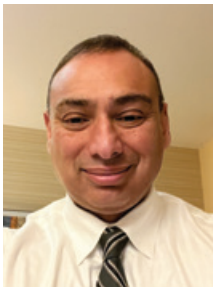
T.J. Miller,

J. Scott Pannell, MD, is a board-certified endovascular surgeon and interventional neuroradiologist. He is the director of neurointerventional surgery in the Department of Neurological Surgery at UC San Diego Health. Dr. Pannell earned his bachelor's degree in chemistry from the University of Georgia, along with an additional American Chemical Society certification, and his medical degree from the Medical College of Georgia. He completed his fellowships in endovascular neurosurgery and neuroradiology at University of California San Diego School of Medicine; his radiology residency at the University of Alabama at Birmingham; and his internship at Emory University. As an associate professor in the Departments of Neurological Surgery and Radiology, Dr. Pannell instructs medical students, residents and fellows in both departments. He specializes in the minimally invasive catheter-based treatment of blood vessel disorders that can lead to hemorrhagic or ischemic strokes. He is currently involved in multiple National Institutes of Health and industry-funded research projects investigating cerebrovascular diseases and spinal pain disorders. Dr. Pannell has co-authored more than 50 peer-reviewed journal articles and more than 30 book chapters; he is also a reviewer for multiple journals, including *World Neurosurgery* and the *Journal of Neurointerventional Surgery*. He has given over 40 lectures and presentations at national meetings.

John Perl II, MD, is the director of neurointervention at St. Luke's and formerly served as its neuroscience medical director. He was instrumental in establishing the stroke program and the endovascular neurosurgical and interventional neuroradiology program for the health system. He completed his diagnostic radiology residency at the University of Alabama and his neuroradiology fellowship at the Cleveland Clinic Foundation. His neurointerventional radiology training was at the University of Wisconsin under one of the founders of neurointerventional therapies, Dr. Charlie Strothers. Prior to coming to St. Luke's in 2010, Dr. Perl worked at Abbott Northwestern Hospital in Minneapolis and at the Cleveland Clinic Foundation. In his previous roles, he was active in fellowship education and translational science as well as actively developed some of the neurointerventional tools that are still in use today.

Lee Pride, MD, FACR, is Professor of Radiology and Neurosurgery at the University of Texas Southwestern Medical Center in Dallas (UTSW) where he serves the fellowship director of the Neuroendovascular Surgery fellowship and maintains participation in an active multidisciplinary academic cerebrovascular practice. His research interests include intracranial atherosclerotic disease, stroke, and participation in device trials for cerebrovascular disease.

He completed medical school at the University of Alabama in 1989, two residencies (Neurology and Diagnostic Radiology) and two fellowships (Diagnostic Neuroradiology and Interventional Neuroradiology) at UTSW under the mentorship of Phillip Purdy. Since joining the UTSW faculty in 1999, he has held administrative positions as the Director of the Radiology Department fellowship programs and the program director for the Diagnostic Neuroradiology fellowship from 2008-2020. He is the current director of the Neuroendovascular Fellowship program at UTSW.

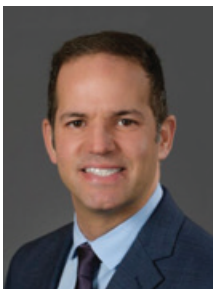


Adnan Qureshi, MD, is a Professor of Neurology and Program Director of the Endovascular Surgical Neuroradiology program at the University of Missouri, Columbia. He brings a unique experience and perspective that would be highly valuable as a member of an advisory committee for clinical trial design. He offers the combined insights of a clinician, trialist, mentor, patient advocate, and educator.

Dr. Qureshi has served as the principal investigator for a large multinational clinical trial funded by the National Institutes of Health and was honored with the Established Investigator award from the American Heart Association for his work in acute stroke treatment. He has also led Investigator New Drug trials approved by the Food and Drug Administration. Currently, he is the principal investigator of a large, industry-funded multinational clinical trial and serves on the steering committee of a National Institutes of Health-funded trial focused on treatments for acute stroke, including intracerebral and subdural hemorrhage. His patient-centered work extends to leadership roles in the American Heart Association, American Academy of Neurology, World Stroke Organization, and Stroke Survivor groups. He has authored over 890 scientific publications in prestigious journals such as the New England Journal of Medicine, Lancet, Archives of Internal Medicine, Critical Care Medicine, Neurology, American Journal of Medicine, JAMA Neurology, Stroke, and Circulation. Additionally, he has presented over 4,000 times at national and international conferences. As an editor, he has overseen more than 14 books on diverse topics ranging from Ebola to Zika virus diseases. He was the Editor of the *Textbook of Interventional Neurology* and the *Atlas of Interventional Neurology,* served as Associate Editor for the *Journal of Neuroimaging,* and currently is Editor-in-Chief for the *Journal of Vascular and Interventional Neurology* and *HealthCare Research Journal*.

His leadership roles include serving as President of the Society of Vascular and Interventional Neurology and the International Society of Interventional Neurology, as well as section chair for Interventional Neurology at the American Academy of Neurology. He has established the Zeenat Qureshi Stroke Institutes across the United States, China, Guinea, the Philippines, and Turkey, fostering cutting-edge research in epidemiology, clinical trials, and basic research on cerebrovascular diseases.

In addition to his research, he is deeply committed to training the next generation of medical professionals, having served as Program Director for Endovascular Surgical Neuroradiology programs at three institutions over the past 20 years. He has trained 41 stroke and interventional physicians, many of whom have become Deans, Chairs, Program Directors, Presidents of national organizations, and Directors of stroke and interventional programs both in the U.S. and internationally. He has also mentored over 150 researchers and medical students across various institutions.



Yafell Serulle, MD, PhD, is Chief of Neuroendovascular Surgery and Director of the Neurointerventional Fellowship Program in the Department of Neurosurgery at Lenox Hill Hospital/Northwell Health in New York City. He is a board-certified interventional neuroradiologist specializing in the endovascular treatment of stroke, intracranial aneurysms, vascular malformations, atherosclerotic disease of the head and neck, and other vascular pathologies of the head, neck and spine. Dr. Serulle leads a rapidly expanding, multi-hospital neuroendovascular program and is deeply involved in clinical trials focused on neurointerventional oncology, intra-arterial drug delivery, blood–brain barrier modulation, and neuroprotective strategies. His academic interests bridge translational research, innovation, and global neurointerventional education, with a focus on advancing precision endovascular therapies for complex neurological disease.

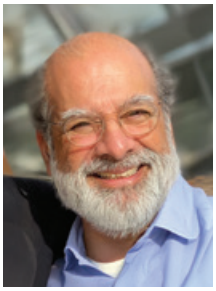
Eric Smith, MD, is a fellowship-trained neurointerventional radiologist with expertise in minimally invasive procedures of the brain, head, neck and spine. He specializes in both arterial and venous approaches for the treatment of many cerebrovascular disorders including pulsatile tinnitus, idiopathic intracranial hypertension, spontaneous intracranial hypotension, cerebrospinal fluid venous fistulas, dural arteriovenous fistulas, arteriovenous malformations, stroke, brain aneurysms and other vascular disorders. Dr. Smith's other interests include neurointerventional robotics, treatment of congenital vascular anomalies, and MRI-guided, focused ultrasound for the treatment of movement disorders such as essential tremor and Parkinson's disease. After finishing his diagnostic radiology residency at the Medical College of Wisconsin, Dr. Smith completed diagnostic and interventional neuroradiology fellowships at the University of California, San Francisco.

Visish Srinivasan, MD, is a comprehensive cerebrovascular neurosurgeon, with advanced training in both microsurgical/skull base techniques as well as endovascular techniques to treat cerebrovascular disorders. As director of the Kim Innovation Lab, his group performs translational research studying aneurysm healing, endovascular device development and testing, intravascular imaging, and intra-arterial therapy for tumors.

Robert Starke, MD, MS, is a tenured full professor in the departments of Neurological Surgery, Neuroradiology, Neurosciences, Pharmacology, and Radiation Oncology. He has a busy clinical practice performing more than 750 operations each year. He specializes in the treatment of cerebral vascular disease and brain tumors. Dr. Starke is currently a member of the University of Miami MILLER School of Medicine. Previously, he graduated magna cum laude with a B.A. from Princeton University and distinction in neuroscience. He obtained his medical doctorate from Albert Einstein graduating with distinction in clinical and translational research. He also obtained a Masters of Medical Science with distinction in neuroscience research as part of the National Institute of Health Clinical Research Training Program. He also completed a cerebral vascular research fellowship at Columbia University, which provided him with a wide background in epidemiology and statistics. Dr. Starke attended neurosurgery residency at the University of Virginia. He also completed endovascular neuroradiology fellowships at Thomas Jefferson University and University of Virginia and a cerebral vascular and skull base fellowship at Auckland University Hospital, New Zealand. He is board certified in Neurosurgery ABNS and certified by the Committee on Advance Subspecialty Training in Endovascular Therapies (CAST). His laboratory is supported by multiple grants including more than 3 million dollars from the National Institute of Health to study aneurysms. His research focuses on cerebral vascular pathophysiology. These avenues allow for the development of novel cellular, medical, radiographic, surgical, and endovascular techniques. He has co-authored over 800 academic publications. As the Director of Neurovascular Research, he helps run numerous clinical trials for minimally invasive treatment of cerebral vascular disease brain tumors.

Jeffrey Steinberg, MD, is a neurosurgeon at UC San Diego Health who specializes in vascular diseases of the nervous system. Dr. Steinberg completed specialized training in both open and endovascular neurosurgery; this includes traditional open neurosurgical procedures, such as aneurysm clipping, as well as minimally invasive endovascular procedures, such as aneurysm coiling. He also specializes in cerebral bypass procedures. Dr. Steinberg completed his neurosurgery training and a fellowship in neuroendovascular surgery at UC San Diego School of Medicine. He spent additional time at Stanford Medical Center with a focus on open cerebrovascular neurosurgery and moyamoya disease. During his residency, he received the Kaiser Excellence in Teaching Award. Currently, he is the director of the neurosurgical resident skull base lab, where he has contributed to the development of a novel surgical technique for the treatment of trigeminal neuralgia. Dr. Steinberg has published numerous manuscripts in peer-reviewed journals and regularly presents at national conferences. He is a member of the American Association of Neurological Surgeons, Congress of Neurological Surgeons and the North American Skull Base Society.

Shannon Tierney, MD, is a board-certified vascular neurologist. She joined the St. Luke's neurohospitalist group in September 2024 after completing her training at the University of Washington. Her special interests include acute stroke care, strokes in young adults, cerebral amyloid angiopathy, neurosonology, and clinical education.



Ajay Wakhloo, MD, earned both his MD and PhD in endocrinology and metabolic disorders from the University of Mainz, Germany. He completed fellowships in diagnostic and interventional neuroradiology, as well as endovascular neurosurgery, at the University of Freiburg, SUNY Buffalo, and the BNI in Phoenix. In 1995, he was awarded the venia legendi from the University of Tübingen, Germany, for his research and thesis on flow diversion for brain aneurysms. He served as an Associate Professor in the Department of Neurosurgery at SUNY Buffalo (1995-1999), a Professor of Radiology, Neurology, and Neurosurgery at the University of Miami (1999–2005), and Professor and Chief of Neurointervention and Neuroimaging at the University of Massachusetts Medical School (2005–2018) and at the Beth Israel Lahey Clinic, Boston (2018–2023).

He currently holds the position of Professor at Tufts University School of Medicine and serves as CMO and CEO for various start-ups. His groundbreaking contributions have earned him numerous scientific awards from the Whitaker Bioengineering Research Foundation, the German Society of Neuroradiology, and the Society of Vascular Interventional Neurology Innovation. He was named a Fellow of the AHA and Stroke Council and a Fellow of the Society for Neurointerventional Surgery. Renowned as the father of flow diversion, Dr. Wakhloo was the first to introduce the concept in 1989. His pioneering work also extended to stent retriever thrombectomy for acute ischemic stroke, published in 2008. Holding multiple U.S. patents for neurovascular devices, he has been at the forefront of innovation. Dr. Wakhloo has served on editorial boards of major medical journals, played key advisory roles in Medtech companies, and secured private and federal research funding as a PI and Co-Investigator on numerous grants from NIH and industry. With over 500 peer-reviewed publications, book chapters, and scientific articles, he continues to advance the field of neurovascular medicine.

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Abstract Publications

Beyond Imaging and NIHSS: Incorporating Frailty Using RAI-rev Improves Prognostic Assessment After Mechanical Thrombectomy in Acute Ischemic Stroke

Presenting Author: Omid Shoraka, MD

Co-Authors: Allison Liang, MD; Diwas Gautam; Julian Brown; Santiago Gomez-Paz, MD; Oz Haim, MD; Anton Peled, MD; Kent Richter, MD; Jackson Aubrey; Leonardo Cruz-Criollo, MD; Anderson Brito, MD; Craig J. Kilburg, MD; Robert C. Rennert, MD; Edgar A. Samaniego, MD; Karol P. Budohoski, MD; Santiago Ortega-Gutierrez, MD; Ramesh Grandhi, MD

Introduction: The Risk Analysis Index–Revised (RAI-rev), a validated measure of frailty, has demonstrated prognostic value across multiple surgical and neurovascular populations; however, its performance and clinical utility in the setting of mechanical thrombectomy (MT) for acute ischemic stroke (AIS) remain incompletely defined. This study aimed to evaluate the ability of RAI-rev to predict clinical outcomes following MT for AIS.

Methods: This retrospective study included patients who underwent MT for AIS across two high-volume stroke centers between February 2018 and March 2024. The primary outcome was a good functional outcome at 90 days, defined by modified Rankin Scale (mRS) score ≤2. Multivariable logistic regression was used to evaluate the association between RAI-rev and clinical outcomes. In addition, a random forest model with repeated tenfold cross-validation (five repeats) was developed to assess the incremental predictive value of RAI-rev. The optimal RAI-rev threshold was determined using the Youden index.

Results: Among 698 patients who underwent MT, 43.8% achieved good 90-day outcomes. Patients with poor outcomes were generally older, had a greater burden of comorbidities, and presented with higher baseline National Institutes of Health Stroke Scale score (NIHSS) and RAI-rev scores (p<.001); detailed characteristics are summarized in Table 1. In adjusted logistic regression analyses, higher RAI-rev scores were independently associated with increased 30-day mortality (OR 1.05, 95% CI 1.03–1.08, p < .001) and lower odds of good functional outcome (OR 0.96, 95% CI 0.93–0.98, p < .001; Table 2). A random forest model incorporating key predictors of thrombectomy outcomes demonstrated good discrimination (AUC 0.757), with RAI-rev ranking as the third most important predictor after baseline NIHSS and time from last known well to puncture, surpassing variables such as modified Thrombolysis in Cerebral Infarction (mTICI) and Alberta Stroke Program Early CT Score (ASPECTS) (Figure 1). A RAI-rev threshold <26, identified using the Youden index, was associated with significantly improved survival and functional recovery (Table 3).

Conclusion: Frailty measured by the RAI-rev independently predicted 90-day functional outcomes and 30-day mortality after MT for AIS. RAI-rev demonstrated strong prognostic performance, ranking among the most influential predictors and offering meaningful value beyond conventional clinical and imaging metrics. A threshold score of 26 effectively stratified patients by risk, supporting its potential role in individualized prognostication and guiding clinical decision-making.

The Tenzing-Dotter Technique for Endovascular Management of Tandem Atherosclerotic Cervical ICA and Intracranial Large Vessel Occlusions

Co-Authors: ?

Introduction: Endovascular treatment of tandem atherosclerotic lesions of the cervical internal carotid artery (ICA) and an intracranial large vessel occlusion (LVO) remains challenging. Options include angioplasty/stenting of the cervical lesion followed by intracranial thrombectomy versus Dotter navigation of catheters through the cervical lesion to first target the intracranial LVO. We describe a novel Tenzing-Dotter technique which utilizes a Tenzing device to Dotter delivery a large bore (0.070") or super-large bore (0.088") catheter through cervical atherosclerotic lesions to gain access to the intracranial circulation in tandem LVO patients.

Methods: We performed a retrospective review of atherosclerotic tandem occlusion patients at four high volume stroke centers in which the Route 92 Medical Tenzing® 7 and Tenzing® 8 delivery catheters were used to Dotter-deliver large bore or super-large bore catheters, respectively, through cervical ICA lesions to gain access to the intracranial circulation. We reviewed clinical, radiographic and procedural data to describe safety and efficacy of this approach.

Results: Thirty-one patients were identified with atherosclerotic occlusion/near-occlusion of the cervical ICA and a single intracranial LVO. The mean age was 67 and 49% were female. The mean NIHSS was 14 (9-19) and 39% were treated initially with intravenous thrombolytics. The cervical ICA was occluded in 16/31 (52%) and nearly-occluded (degree of stenosis 90-99%) in 15/31 (48%). The intracranial occlusions were carotid terminus (22.6%), M1 (67.7%) and M2 (9.7%). 16/31 patients were treated with Tenzing 7 paired with a large bore catheter and 15/31 were treated with Tenzing 8 paired with a super-large bore catheter. Successful Tenzing-Dotter navigation of the paired catheter through the cervical lesion was achieved in 30/31 (96.8%). The mean time from groin puncture to Tenzing-Dotter delivery was 10 minutes, and the mean time from groin puncture to device delivery to the intracranial occlusion was 13 minutes. TICI 2B-3 reperfusion was achieved in all patients, with a mean number of intracranial passes of 1.3. The degree of cervical ICA stenosis improved from 94.2% to 61.4%. No cervical arterial dissections were noted, and symptomatic intracranial hemorrhage occurred in 2/31 (6.5%).

Conclusions: The Tenzing-Dotter Technique, in which a Route 92 Medical Tenzing® delivery catheter is utilized to Dotter navigate a large or super-large bore catheter through an occluded or nearly-occluded cervical atherosclerotic lesion, may be a promising technique for safe and fast access to the intracranial circulation in patients presenting with tandem large vessel occlusions.

Single cell analysis of endothelial cells reveals novel genes responsible for endothelial dysfunction in intracranial aneurysms

Presenting author: Allison Liang, MD, Department of Neurosurgery, University of Utah

Co-Authors: Sricharan Veeturi, PhD, Department of Neurosurgery, University of Utah; Sarah Dabb, BS, Department of Neurosurgery, University of Utah; Leo Kim, MD, PhD, Department of Neurosurgery, University of Utah; Karol Budohoski, MD, PhD, Department of Neurosurgery, University of Utah

Introduction: Endothelial dysfunction is believed to be a primary cause of formation, growth and rupture of intracranial aneurysms (IAs). However, mechanistic pathways highlighting unique genes and the pathways leading to rupture and subsequent vasospasm are still obscure. Our study objective was to identify unique high-risk genes associated with high-risk or ruptured aneurysms via single cell sequencing of endothelial cells (ECs) obtained via endoluminal IA coil biopsies.

Methods: From 2023-2025, endoluminal biopsies were obtained from aneurysmal patients undergoing endovascular treatment via retrieval of coils within the aneurysm domes. Coil samples were freshly processed and ECs were extracted by a in-house protocol, then undergoing single-cell sorting and sequencing via the ResolveOME workflow (BioSkryb Genomics Inc.). Viable ECs were defined as ≥50 detectable genes with <10% mitochondrial genes. Genes present in at least 25% of the cells were considered for further analysis. To remove noise, gene counts were normalized in each cell, scaled counts to 10000 and log transformed the counts Unsupervised clustering was performed with the final set of cells and gene counts.

Results: A total of 14 patients with 89 ECs and 55 genes were included. There were 3 distinct clusters: cluster 1 was all ruptured ECs, cluster 2 was evenly distributed (22 ruptured and 12 unruptured) and cluster 3 was majority unruptured ECs (35 unruptured and 3 ruptured) (Figure 1). In differential expression analysis, 23 characterized genes were significantly different between the clusters (q<.001). Of note, genes SP100, GREM1, PRRG3 and LDB1 were significantly higher in cluster 1. SP100 is a nuclear antigen gene that is responsible for local inflammation through the interferon pathway. Higher expression could lead to local inflammation and rupture of the IA. GREM1 encodes gremlin 1 protein which is responsible for antagonizing bone morphogenetic proteins (BMPs) which in turn are responsible for ECM degradation, cell proliferation, apoptosis among other functions. High expression could lead to EC dysfunction and abnormal remodeling of the ECM leading to wall weakening and rupture. PRRG3 is understudied in the context of ECs and is primarily responsible for cell adhesion and signaling. Higher expression could inhibit EC migration and expand junctions leading to wall damage and rupture.

Conclusion: Overall, we present single-cell analyses of endovascular coil biopsied aneurysms and identified five genes of interest (i.e SP100, GREM1, PRRG3, and LDB1) that could be associated with EC dysfunction and subsequent IA rupture.

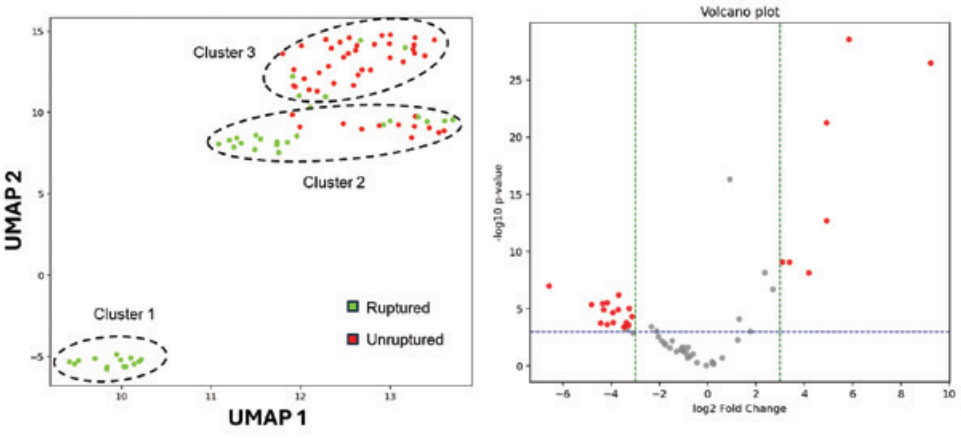

Figure 1. Clustering analysis of endovascular-biopsied intracranial aneurysmal (IA) endothelial cells: 1 represents all ECs from ruptured IAs, 2 is composed of majority ruptured IAs, and 3 represent majority unruptured ECs. 23 genes were significantly different amongst the clusters (q<.001)

Mapping Real-Time Hemodynamic Changes in Venous Sinus Stenting Using Intraoperative TCD and Quantitative Angiography

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Introduction: Venopathic intracranial hypertension (VIH) is a condition of elevated intracranial pressure (ICP) associated with venous sinus stenosis. Venous sinus stenting (VSS) can reconstitute outflow, yet physiologic biomarkers to aid patient selection and assess treatment response remain limited. This study assessed intraoperative transcranial Doppler (TCD) and quantitative angiography using iFlow as tools for detecting cerebral hemodynamic changes during VSS in patients with VIH.

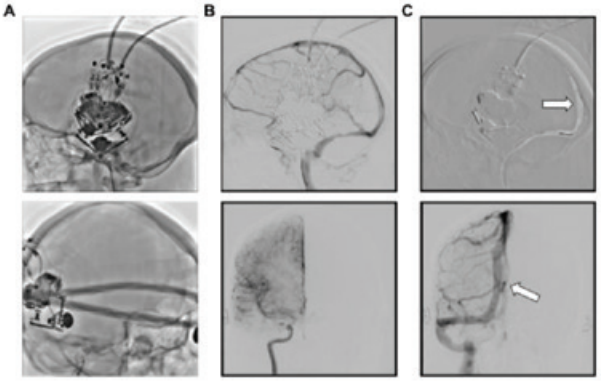

Figure 1. Representative setup for transcranial Doppler (TCD) monitoring in the angiography suite, demonstrating probe fixation (A), corresponding angiographic runs (B), and post-procedural imaging confirming successful venous sinus stenting (arrows; C)

Methods: We retrospectively analyzed 11 consecutive VIH patients who underwent VSS with intraoperative TCD monitoring and quantitative angiographic assessment. Bilateral middle cerebral arteries (MCAs) were insonated via transtemporal windows to record mean flow velocity (MFV) and pulsatility index (PI) pre- and post-stenting. In a subset of five patients, iFlow time-to-peak (TTP) contrast opacification was measured in the internal carotid artery (ICA), anterior cerebral artery (ACA), and MCA using standardized injection parameters. One-sample, one-tailed t-tests compared pre-post changes against zero to determine significance.

Results: Median patient age was 37 years (IQR: 29.5–40), 90.9% were female, and median BMI was 33.9 kg/m2. Stenosis was most common in the transverse-sigmoid sinus junction (72.7%). After stenting, MFV increased in all patients (left MCA: mean +6.73 cm/s, SD 10.45, p=0.029; right MCA: +7.44 cm/s, SD 10.61, p=0.021). PI decreased in most

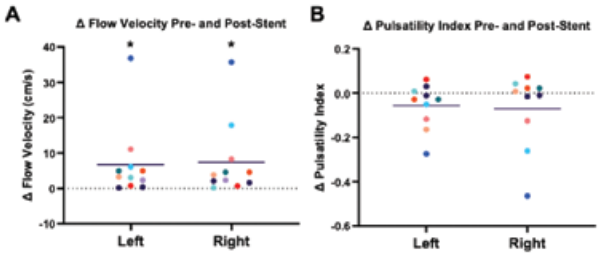

Figure 2. Scatterplots showing the results of TCD. Change in flow velocity (A) and PI (B) in the left and right MCA pre- and post-stenting was plotted for each individual patient. Points are color-coded for each patient, each group mean is denoted by a horizontal line, and significance from 0 for each group mean is denoted by asterisks (*p<0.05).

patients (left: -0.058, SD 0.101, p=0.053; right: -0.071, SD 0.169, p=0.109) but without statistical significance. iFlow analysis demonstrated variable TTP changes, with mean reductions in the ICA (-0.32 s, p=0.178) and ACA (-0.48 s, p=0.197) and slight change in the MCA (+0.21 s, p=0.666). Limitations included patient-specific physiology and procedural factors, including region-of-interest measurements, bone overlay, and potential interference from TCD probes.

Conclusions: Consistent patterns of MFV increase after venous sinus stenting suggest that TCD may be a robust modality for real-time assessment of arterial inflow hemodynamics in VIH. By contrast, iFlow revealed heterogeneous arterial transit changes, potentially limited by sensitivity to imaging conditions. These findings support the potential complementary use of TCD and quantitative angiography for physiologic monitoring in venous outflow disorders, favoring TCD as the more reliable modality. Both methods are promising, low-risk clinical tools for prospective studies seeking to refine patient selection strategies in VSS.

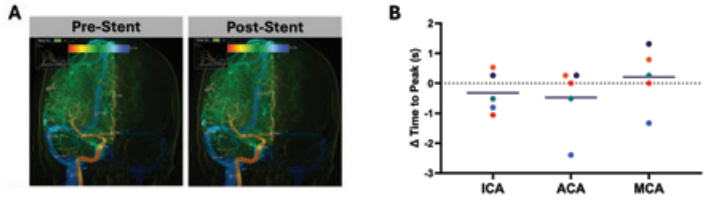

Figure 3. A: This example from 1 patient in the study shows that quantitative angiography enabled comparison of TTP contrast opacification at operator-defined ROIs on angiography before and after VSS. B: Scatterplot showing the change in TTP pre- and post-stenting determined at the ICA, MCA, and MCA for 5 patients. The group mean is denoted by a horizontal solid line and datapoints are color-coded for each individual patient.

Cost-Effectiveness of Adjunctive Middle Meningeal Artery Embolization for Chronic Subdural Hematoma: Secondary Analysis of EMBOLISE

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Introduction: Chronic subdural hematoma (cSDH) has high recurrence rates after evacuation surgery (ES). Adjunctive middle meningeal artery embolization (MMAE) to ES reduces recurrence but increases hospital costs. This study evaluated the cost-effectiveness of adjunctive MMAE (ES/MMAE) versus ES alone as a secondary post-hoc analysis of the EMBOLISE randomized trial of ES/MMAE vs ES alone.

Methods: Cost-effectiveness analysis using 2024 U.S. dollars was conducted averaging hospital costing data from two EMBOLISE trial sites for 42 cSDH patients (21 ES/MMAE, 21 ES alone) from the perspective of facility-spent costing, with clinical data (e.g., cSDH recurrence rates) derived from the EMBOLISE trial. Quality-adjusted life years (QALYs) were derived from EQ-5D-5L data with a 180-day horizon. Incremental cost-effectiveness ratio (ICER) was calculated. One- and two-way sensitivity analyses and probabilistic sensitivity analysis (PSA) with 5,000 Monte Carlo iterations (gamma distributions for costs and beta for utilities/probabilities) were performed.

Results: Mean expected costs were $23,809 for ES/MMAE (4.1% recurrence rate), $17,197 for ES alone (11.3% recurrence rate), and $10,376 for rescue surgery for either treatment. ES/MMAE provided a 0.02 QALY gain over ES alone, at an incremental cost of $6,612. The resultant ICER was approximately $382,267.50/QALY, exceeding the commonly cited $100,000/QALY cost-effectiveness criterion. One-way sensitivity analyses indicated QALY gain was the most impactful economic driver. PSA indicated a 31.8% probability of ES/MMAE being cost-effective at $100,000/QALY (68.2% for ES alone).

Conclusion: At 2024 pricing, ES/MMAE for cSDH may not be cost-effective within a 180-day horizon, but PSA suggests a greater favorability towards ES/MMAE at higher willingness-to-pay thresholds. The positive net QALY benefit with adjunctive MMAE for cSDH suggests a small but meaningful quality-of-life improvement, preventing complete ES dominance. Cost-reduction strategies, longer time frames, and validated cSDH-specific patient-reported outcome measures could enhance ES/MMAE cost-effectiveness. These findings could guide future optimization efforts for ES/MMAE for cSDH management.

Intracranial B Waves as a Targetable End Point for Glymphatic Optimization

Presenting Author: David W. Newell, MD[1]

Co-Authors: David W. Newell, MD; Sai Zhou, PhD[2]

Introduction: Slow spontaneous CBF oscillations which surge during sleep and napping are drivers of brain glymphatic flow and can be measured using TCD as intracranial B-waves, that serve as a noninvasive tracking method. In addition to tracking, it is desirable to determine optimal targets for augmentation of impaired glymphatic activity and establish ideal parameters to improve impaired CSF rinsing functions following hemorrhagic, ischemic stroke and prevention of cognitive decline.

Methods: We analyzed digital recordings of B waves in 29 patients with head injury, and 10 normal controls, including MCA flow velocity (FV) during resting. Further analysis of frequency, wave amplitude, and waveform asymmetry features, was compared to 5 other published studies of spontaneous CBF and CSF fluctuations using transcranial doppler (TCD) or MRI, and additional published results of microvascular slow oscillations during non-REM sleep in mice. Portions of the analysis were conducted using Open AI for data analytic and comparison purposes and were confirmed using visual and mathematical confirmation.

Results: The B waves, combined from all 6 clinical studies, had a maximum frequency distribution at 1.45 cycles per minute. Comparison of the amplitude of the CBF oscillations in the 6 studies, evaluated by % change in MCA velocity or MRI BOLD during B waves, followed a sigmoidal distribution from lower to higher, and approached maximal levels at about 25% oscillation amplitude. Waveform asymmetry index across the same studies had an average ramp symmetry index (Rsx, longer upstroke than downstroke) of 1.5 (1.0 = equal upstroke and downstroke) and a prolonged “dwell time” and were also like values reported from microvascular recordings in mice during non-REM sleep.

Conclusion: The TCD and ICP recordings of intracranial B waves show a similar frequency, and amplitude range as CBF and CSF flow oscillations measured using MRI and share other unique morphological wave features including wave asymmetry, prolonged “dwell time” at the peak of the wave which also reflect similar changes observed at the microvascular level in mice. These findings strongly suggest that continuous recording and targeted augmentation of intracranial B waves serving as a direct reflection of microvascular function is possible. Utilizing these parameters, continuous wearable TCD and B wave monitoring during sleep and napping is feasible and may be useful to evaluate therapies to optimize hemodynamic drivers of glymphatic flow for therapeutics, including TBI, cognitive decline, stroke, SAH, and ICH recovery.

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Venous Sinus Stenting Outcomes are Independent of Absolute Venous Pressure in Idiopathic Intracranial Hypertension

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Co-Authors: Michael Abraham, MD; Lee Birnbaum, MD; Nicholas Borg, MD

Introduction: Venous sinus stenting (VSS) is an established treatment for Idiopathic Intracranial Hypertension (IIH), with most physicians using a trans-stenotic venous pressure gradient (VPG) >6-8 mmHg as a treatment threshold. While a significant gradient is important, controversies remain over the relevance of absolute pressure readings, including the need for lumbar puncture (LP) and whether superior sagittal sinus (SSS) pressures can act as a surrogate for intra-cranial pressure (ICP), and if patients with a significant VPG but conventionally normal SSS pressures (<15 mmHg or <20cmH20) still benefit from VSS.

Methods: A retrospective analysis of a prospectively maintained VSS registry across three neurovascular sites was performed. Patients ≥19 years with IIH who underwent VSS between May 2016 and October 2025 were eligible. Patients with SSS pressures <15 mmHg were screened for inclusion in a low-pressure cohort and matched 1:1 to patients with the closest VPG and SSS pressures ≥15 mmHg. Baseline demographics and details of presentation, investigations, procedures and outcomes, including symptom improvement and need for repeat procedures, were extracted and compared between groups. Institutional Review Board approval was obtained.

Results: Of 424 VSS procedures, 35 patients met criteria for inclusion in the low SSS pressure cohort (median 12 mmHg; median VPG 6 mmHg) and were matched to 35 high SSS pressure patients (median 22 mmHg; median VPG 6 mmHg). Between the two groups, there were no significant differences in baseline demographics, presentation or lumbar puncture opening pressures (22 vs 27 cmH20 in low and high-pressure groups respectively, p=0.30). Baseline papilledema was also comparable (53% low-pressure vs. 64% high-pressure, p=0.39). There were no differences in the following outcomes between low- and high-pressure groups: procedural complications (2% vs. 0%, p=0.49), re-stenosis (11% vs. 31%, p=0.19), improvement in headaches (85% vs. 87%, p=1.00), tinnitus (78% vs. 80%, p=1.00) and papilledema (83% vs. 94%, p=0.56), repeat VSS (3% vs. 11%, p=0.36) and shunt placement (0% in both groups).

Conclusion: VSS is beneficial to patients with elevated VPGs even when their SSS pressures are normal. LP pressures appear to correlate more closely with higher SSS pressures; however, this relationship may be insignificant altogether as VPG is the key predictor of response to stenting. This supports our emerging understanding that venous hypertension is central to IIH pathophysiology and that raised ICP is merely a secondary effect.

Intracranial Hypercapnia is Associated with Decreased Platelet Activation and Parenchymal Viability Following Stroke Thrombectomy

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Introduction: Despite the proven efficacy and good rates of reperfusion with thrombectomy, rates of moderate to severe disability following large vessel occlusion stroke remain high. Even with small pre-procedural ischemic core, infarct growth occurs following successful reperfusion, leading to worsened stroke outcomes. While this is likely driven by endothelial injury, microthrombosis, and blood-brain barrier breakdown, exact mechanisms are unknown.

Methods: The PRISM study integrates real-time cone-beam CT (CBCT) perfusion imaging with intracranial sampling during thrombectomy procedures to identify specific proteomic fingerprints and platelet phenotypes in regions of hypoperfusion and their relation to clinical outcomes. A prototype CBCT perfusion platform generates quantitative TMax maps at the time of thrombectomy, with automated delineation of core, penumbra, and non-ischemic regions. Sampling sites are co-registered using a custom 2D-3D fusion program, enabling precise localization of the microcatheter sample.

Intracranial and systemic blood samples were collected using the BACTRAC protocol, followed by an immediate point-of-care arterial blood gas (ABG) and proteomic (O-link platform) analysis. Clinical outcomes measures were also assessed, including discharge NIH Stroke Scale (NIHSS), Montreal Cognitive Assessment (MoCA), and modified Rankin Scale (mRS). Statistical analysis was performed using R with linear regression, T test for individual comparisons, and F-test for overall differences, adjusting for age and sex.

Results: Comparison of systemic and intracranial samples revealed significant ABG differences. Intracranial samples exhibited lower pO2, pCO2, HCO3-, and base excess relative to systemic blood ($p<0.001$), consistent with impaired oxygen delivery and a compensated metabolic acidosis. pH remained stable across locations. When stratified by microcatheter location, intracranial pCO2 was significantly lower in ischemic core (31.5±1.5 mmHg) than penumbra (37±1.2 mmHg, $p=0.007$). Assessing the impact of ABG values on outcomes, elevated intracranial pCO2 correlated with a significantly lower discharge NIHSS ($p=0.028$), which was particularly pronounced within the penumbra ($p=0.0093$; Figure 1). These relationships were not observed in systemic blood sample analysis.

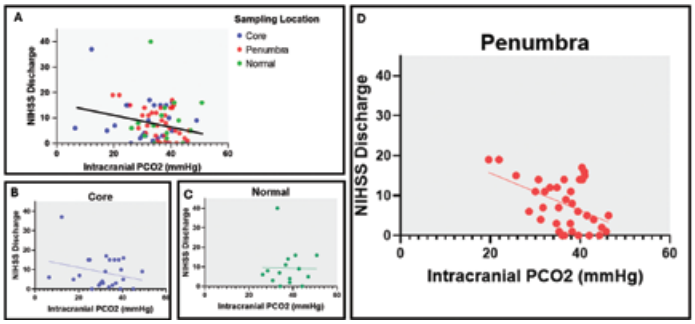

Figure 1.

Analysis of plasma expression of platelet activation identified increased VWF, platelet-derived growth factor (PDGF), platelet aggregation (TIMP-1, TIMP-4), and thrombosis (plasminogen activator inhibitor, PAI) within areas of ischemic core compared to penumbra (Figure 2).

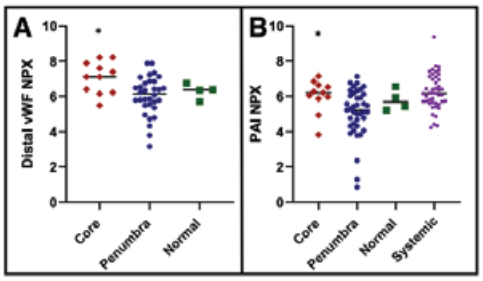

Figure 2.

Conclusion: The intracranial microenvironment during large vessel occlusion stroke is highly perfusion-specific and cannot be reliably inferred from systemic analysis. Intracranial hypercapnia is associated with decreased platelet activation, enhanced parenchyma viability, and improved outcomes. Whether this is due to the vasodilatory effect of pCO2 or a reduced metabolic acidosis compensation deserves further study and may provide an avenue to reduce stroke injury.

End-of-treatment Thresholds for Minimally Invasive Surgery in Intracerebral Hemorrhage: Subanalysis of the MIND Study

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Introduction: Intracerebral hemorrhage (ICH) remains one of the most devastating forms of stroke, with high rates of mortality and long-term disability. While minimally invasive surgery (MIS) has shown promise in improving outcomes for patients with lobar ICH, the evidence for deep ICH remains limited. Surgical goals have traditionally focused on lobar bleeds, leaving a gap in understanding optimal treatment thresholds for deep hemorrhages. This analysis from the MIND trial investigates the prognostic value of postoperative ICH volume in patients undergoing MIS, with a focus on location-specific outcomes for deep versus lobar bleeds.

Methods: MIND (NCT03342664) was a multicenter trial that enrolled patients with moderate-to-large (20-80mL) supratentorial ICH. Participants were randomized (2:1) to MIS with the Artemis Neuro Evacuation Device or to medical management (MM) alone, stratified by severity and ICH location. Logistic regression assessed both continuous post-procedural ICH volumes and predefined thresholds (>15 vs ≤15mL). Outcomes included ordinal and dichotomized (0-3 vs 4-6) modified Rankin Score (mRS) at 30 and 180 days. Additionally, receiver operating characteristic (ROC) curve analyses were employed to identify optimal end-of-treatment volume (EOTV) cutoffs for dichotomization.

Results: Of 236 enrolled participants, 144 MIS cases were included in the per-protocol analysis [mean (SD), age 59.6 (11.71) years; 35.7% female]. Most had primarily deep ICH (69.4%) with volumes > 30mL (75.3%) and underwent MIS 24h after symptom onset (61.3%). Overall, for every 5mL evacuated volume, the likelihood of a better 180-day functional outcome increased by 32% for ordinal (P=0.001) and 41% for dichotomized mRS (P=0.009). Achieving an EOTV ≤15 mL was associated with significantly better functional outcomes: odds ratios (OR, [95%CI]) for ordinal mRS were 2.87 [1.26 to 6.54] at 30 days and 2.19 [1.03 to 4.66] at 180 days. Location-specific optimal EOTV cutoffs for dichotomized 180-day mRS were identified as 5 mL for deep ICH and 10 mL for lobar ICH [area under-ROC (95% CI): 0.63 [0.51–0.75] and 0.78 [0.65–0.92], respectively; P < 0.001 for both].

Conclusion: This MIND analysis demonstrates that postoperative ICH volume is a significant predictor of clinical benefit in MIS patients. The respective EOTV cutoffs were location-specific, highlighting the need for tailored treatment goals based on hemorrhage location.

A First Look at National Door-In/Door-Out Transfer Times for Thrombectomy and Hemorrhagic Stroke Captured by the *Stroke WIth Fast Transfer* (SWIFT)© Instrument

Co-Authors: Jennifer Patterson, PhD[1,2]; Andrei V. Alexandrov, MD[1,2]; Barbara B. Brewer, PhD[3]; Anne W. Alexandrov, PhD[4]

Background: Inefficient stroke systems produce excessive door-in/door-out (DIDO) transfer times that exceed American Heart Association/American Stroke Association recommendations and threaten stroke patient outcomes. We developed the first and only valid and reliable instrument to quantify factors contributing to DIDO delays and performed the first national survey of acute stroke patients requiring transfer from primary stroke centers (PSC) to comprehensive stroke centers (CSC) for thrombectomy or hemorrhagic stroke management.

Methods: *SWIFT*© was developed from national qualitative and quantitative studies over a two-year period as previously described. The instrument was distributed via mail to certified stroke centers listed on The Joint Commission's and Det Norske Veritas' (DNV) websites; snowballing distribution to other PSC hospitals was encouraged. PSC sites qualified for participation if they were 50 miles from a CSC or thrombectomy-capable stroke center. Returned data were analyzed using SPSS to understand sample characteristics, quality metric performance, response times for PSC, telemedicine responders, transport agencies, and CSCs.

Results: A total of 155 surveys were returned from PSCs representing 20 US states; 70% of patients had large vessel occlusions, 8% had aneurysmal subarachnoid hemorrhage, 7% had intracranial hemorrhages and 15% were other complex strokes. Median NIHSS was 13 [6, 20]. Median DIDO time was 128 minutes [94, 181]; internal PSC processes accounted for 38% of DIDO time, CSC processes accounted for 15% of DIDO time, and time from transport company request to departure accounted for 47% of DIDO time. Among the 55% of PSCs that used telemedicine, those using their affiliated CSC as their telemedicine provider had significantly shorter DIDO times (129 minutes) compared to those sites using contracted telemedicine companies (166 minutes, $p = 0.035$). Presence of VAN positive findings on admission assessment was associated with faster DIDO times (141.8 minutes) compared to those patients lacking VAN findings (191.4 minutes; $p = 0.040$). PSCs with ambulance prenotification of a possible stroke on route had significantly faster DIDO times (137.1 minutes) than those lacking prenotification (183.4 minutes; $p = 0.010$).

Conclusions: National median DIDO times are lengthy, with significant delays attributed to internal PSC and telemedicine processes, external factors such as transport services, and slow CSC transfer approval processes. Widespread use of *SWIFT*© will improve identification of factors ripe for improvement on a national scale, enabling targeted interventions and legislative policies that support improved acute stroke patient transfer mechanisms.

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Awake Middle Meningeal Artery Embolization Using NBCA Glue with Intra-Arterial Lidocaine: A Feasibility and Technical Series

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Introduction: Middle meningeal artery embolization (MMAe) is important treatment for patients with chronic subdural hematoma (CSDH), especially in frail, elderly populations. However, adding an additional procedure under general anesthesia (GA) poses significant risks in these patients. Intra-arterial lidocaine administration into the branches of the middle meningeal artery prior to embolization with N-butyl cyanoacrylate (NBCA) may facilitate safe embolization under conscious sedation (CS) without associated pain.

Objective:

To evaluate the efficacy and anesthetic feasibility of NBCA-based MMAe under conscious sedation (CS) with intra-arterial lidocaine pretreatment in patients with CSDH.

Methods: Fifteen consecutive patients (median age 69, range 45–89) underwent NBCA embolization of the MMA for CSDH between July 2024 and April 2025. Each procedure involved intra-arterial administration of 10cc of 1% lidocaine into each MMA branch prior to embolization with NBCA. Data on procedural tolerance, need for conversion to GA, hospital course and hematoma resolution were prospectively collected.

Results: A total of 28 MMA branches were embolized in 15 patients. 9 patients underwent embolization following surgical evacuation of CSDH, while 6 underwent standalone MMAe; two patients were treated as outpatients and discharged home the same day. Fourteen out of 15 patients (93%) reported no discomfort during the procedure. There were no conversions to GA and no use of steroids. Intra-arterial lidocaine administration did not affect NBCA penetration. Median hospital length of stay was 4 days.

Conclusions: Intra-arterial lidocaine administration prior to MMAe with NBCA under CS is feasible and well-tolerated by elderly patients. This approach has the potential to reduce the need for GA, improve hospital efficiencies and will support a shift toward minimally invasive, outpatient-friendly neurointerventional care for frail and elderly patients.

Real-Time AI-Driven Prediction of Intracranial Aneurysm Healing Using the QAS.AI Quantitative Angiography Platform

Presenting Author: Vincent Tutino, PhD

Co-Authors: Adnan H. Siddiqui, MD, PhD; Ciprian N. Ionita, PhD

Introduction: ICurrent angiographic assessment relies heavily on subjective visual judgment and is highly sensitive to user technique and imaging geometry. This limitation particularly affects treatment of intracranial aneurysms with flow diverters, where 20–30% fail to heal and ruptures contribute nearly $3B in U.S. healthcare costs. In our lab, we have created a real-time intraoperative decision-support platform designed to transform routine neurovascular angiography into objective, bias-corrected flow maps that are then used for accurate outcome predictions (aneurysm occlusion on follow-up).

Methods: Integrated as a DICOM/PACS plug-in for Canon and Siemens systems, our tool, called QAS.AI, processes raw digital subtraction angiography (DSA) runs in real-time. The system automatically identifies the aneurysm lesion, extracts quantitative angiography biomarkers linked to hemodynamics (e.g., flow speed, timing, and volume), and applies proprietary image "corrections" that remove variability due to contrast injection and projection angle, thereby standardizing quantitative angiography. Corrected outputs are then fed into machine-learning models for outcome prediction. These models were trained on multicenter datasets of ~1,200 aneurysms patients. The platform delivers risk scores, confidence levels, and color-coded flow maps back to the angiography suite within 10 seconds, supporting but not replacing surgical decision-making.

Results: In our testing, we found that the platform can delivers risk scores, confidence levels, and color-coded flow maps back to the angiography suite within 10 seconds. Our data also show that eliminating user and scanner bias (implementing "corrections") across raw angiographic data enables our AI modes to predict 6–8-month aneurysm healing with ~85% accuracy. This platform (see workflow example in Figure 1) has since been deployed in a research-use-only capacity, and is integrated into Canon and Siemens systems at UB and USF. The vendor-agnostic architecture supports scalable deployment across hospitals via PACS plug-ins with AWS or on-prem options.

Conclusion: This software tool is the first quantitative-angiography platform built explicitly for intraoperative neurovascular guidance. By standardizing angiographic interpretation and delivering rapid outcome predictions during the procedure, it has the potential to reduce retreatments, complications, and trial variability for intracranial aneurysm.

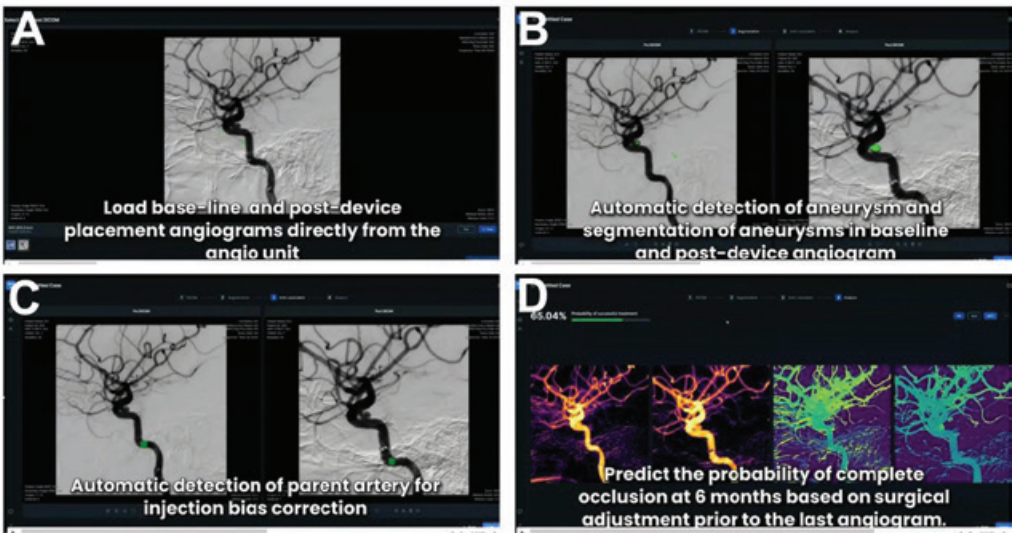


Figure 1

The University of Arizona Phoenix Stroke Program

The University of Arizona Phoenix Stroke Program, located in the 5th largest city in the country, is a nationally recognized leader in comprehensive stroke care and serves as the first designated Comprehensive Stroke Center (CSC) in the state of Arizona. As the largest and busiest stroke program in Arizona, we provide advanced, high-volume, and evidence-based care to patients with acute cerebrovascular disease from across the region.

Our program performs over 300 mechanical thrombectomies annually, reflecting both the complexity of cases managed and the depth of expertise among our multidisciplinary stroke and neurointerventional teams. This high procedural volume supports excellent clinical outcomes and offers a robust educational environment for trainees.

The program is anchored by a 40-bed Neurocritical Care Unit (Neuro ICU), one of the largest in the states, staffed by fellowship-trained neuro-intensivists and supported by dedicated stroke neurology, neurosurgery, neurointerventional radiology, and specialized nursing teams. This infrastructure allows for seamless care from emergency presentation through critical care, recovery, and rehabilitation planning.

In addition to on-site comprehensive services, the University of Arizona Phoenix Stroke Program provides 24/7 tele stroke coverage to five regional hospitals, ensuring timely access to expert stroke consultation for underserved communities. There are active plans to expand tele stroke services to a total of 14 hospitals, significantly broadening access to advanced stroke care across Arizona.

The program also maintains a dedicated Stroke Fellowship, accepting two fellows annually, with comprehensive training in acute stroke management, neurocritical care exposure, advanced imaging interpretation, quality improvement, research, and systems-based stroke care. Fellows benefit from high patient volumes, strong mentorship, and participation in a mature comprehensive stroke system.

Through clinical excellence, education, research, and regional outreach, the University of Arizona Phoenix Stroke Program remains at the forefront of stroke care delivery and innovation, setting the standard for comprehensive stroke care in Arizona and beyond.

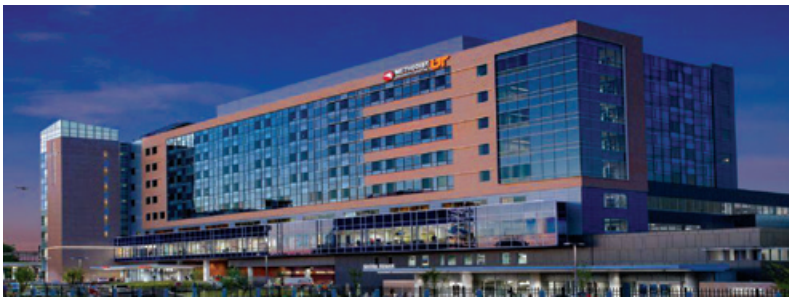
College of Medicine Phoenix

The University of Tennessee Health Science Center and Semmes Murphey Clinic

The University of Tennessee Health Science Center and Semmes Murphey Clinic partner to create one of the largest neurovascular groups in the country. The multispecialty program is shaped by the Memphis area community it serves, where the stroke rate is 37% higher than the national average, and utilizes a wealth of knowledge, experience and diversity of thought to fight the terrible damage stroke brings to patients and their families.

Covering five hospitals, the UTHSC/SMC cerebrovascular team's exceptional level of expertise is built through experience, handling one of the highest patient volumes in the United States. It delivers tPA and mechanical thrombectomy to the largest number of patients in the nation.

This environment enriches the quality of the neurology and neurosurgery residency programs and the numerous fellowship programs, which include vascular neurology, neurocritical care, open vascular and vascular neurosurgery; enhances the quality of the clinical research program with numerous NIH-funded research efforts; and provides the platform to develop ambitious solutions in stroke-care technology and methods. In 2016, the program deployed an IAC-accredited mobile stroke unit with advanced CT imaging capabilities, the first of its kind.



UTHSC/SMC's cerebrovascular team was also heavily involved in the clinical trials for the first deployment of the WEB Aneurysm Embolization System. The system boasts a significant improvement in safety and recovery time for aneurysm patients undergoing surgery.

With valuable lessons learned from caring for patients and dedication to world-class care, UTHSC/SMC's cerebrovascular team serves its community diligentlyand contributes to the advancement of knowledge and treatment.

THE UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

Neurological Surgery at UC San Diego Health

Delivering the Latest in Research-Informed Care

The UC San Diego Department of Neurological Surgery provides the full range of contemporary neurosurgical practice and delivers the highest-quality neurosurgical care to people around the world. In addition, our Center for the Future of Surgery—an international destination for state-of-the-art surgical training—serves as a clearinghouse for the research and development of new technologies.

National Recognition

We're proud to have earned several distinctions that make us a care destination, including:

- #21 in the nation for best neurosurgery and neurology care (U.S. News & World Report).
- #3 in the nation for quality (Vizient).
- First health organization in California to receive advanced certification in spine surgery by The Joint Commission.
- Region's only NCI-Designated Cancer Center.
- Level 4 Epilepsy Center.
- Region's first Level I Trauma Center.
- Two Comprehensive Stroke Centers.
- Region's only intraoperative MRI.
- World-class skull base surgery program.

Advanced Treatment Options

Our neurosurgeons are experts in using innovative technology and therapies to deliver the best possible treatment outcomes, including:

- Minimally invasive surgery.
- Intraoperative MRI.
- Robotic-assisted brain surgery.
- Stereotactic brain surgery.
- Awake brain surgery.
- Deep brain stimulation.
- Angiography and endovascular therapies.

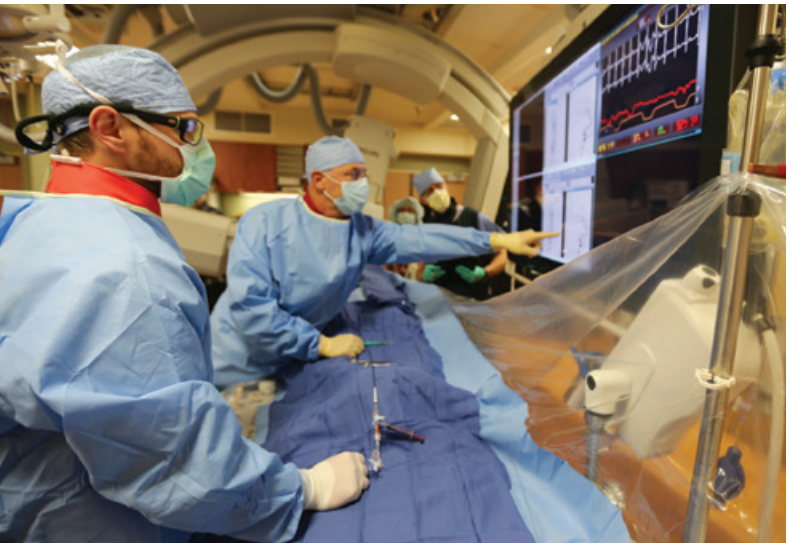
UC San Diego
School of Medicine

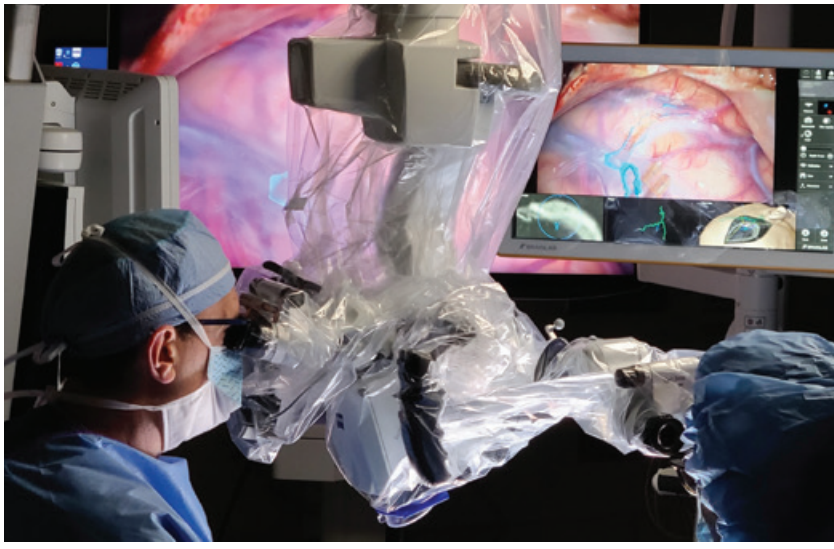
For more information, visit neurosurgery.ucsd.edu or follow us on Twitter or Instagram @UCSDNeuroSurg.

St. Luke's Cerebrovascular and Stroke Programs

St. Luke's cerebrovascular programs and physicians comprise the largest stroke system in Idaho, spanning nine medical centers. Three are Joint Commission Primary Stroke Centers, while the Regional Medical Center in Boise is designated as a Level 1 Stroke Center (Idaho Time Sensitive Emergency System). St. Luke's neurointerventional team possesses depth and breadth of endovascular neurosurgical experience including a dual fellowship-trained cerebrovascular neurosurgeon, and three fellowship-trained interventional neuroradiologists. St. Luke's utilizes cutting-edge technology for open and endovascular cerebrovascular procedures, which are performed at both the Boise and Meridian Medical Centers. Our hub Boise hospital features the state-of the-art Siemens Icono biplane platform as part of an advanced hybrid neurovascular operating suite. St. Luke's utilizes a broad telestroke video network to provide acute stroke evaluation and treatment within each hospital's Emergency Department. St. Luke's 10-member neurohospitalist/vascular neurology team provides inpatient care in the Boise, Meridian, Magic Valley, and Nampa Medical Centers. In addition to coordinating care across the St. Luke's system, the stroke program has strong collaborative relationships with numerous regional hospitals and EMS agencies to optimize patient care and timely transport.

St Luke's®





Please join us for the 2027 Sun Valley Cerebrovascular Conference, January 28-30. Register at www.sunvalleycerebrovascularconference.org

SUN VALLEY
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