PRECISION, UNRIVALLED.
POSSIBILITIES, UNLEASHED.

Stealth Autoguide™
Cranial Robotic Guidance Platform

ROBOTIC PRECISION,
POWERED BY YOU.
STEALTH + ROBOTICS

Midas Rex™ MR8™
High Speed Drill System

ADVANCING
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Northdale, FL USA 33788
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Fax: (813) 985-1500
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The 7D Surgical System lets you harness the full potential of image guidance with the first and only Machine-vision Image Guided Surgery (MvIGS) platform—using only visible light to acquire thousands of virtual fiducials for nearly instantaneous cranial registrations in any position.

The 7D Surgical System Cranial Module has FDA 510(k) clearance for cranial navigation. The Cranial Navigation Module is also approved in Canada and Australia.

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Discover a new kind of vision for cranial navigation at booth 831.

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There is robotic navigation... then there is ExcelsiusGPS®

SMARTER
- Smart tools to maintain navigation integrity

FASTER
- Streamlined workflow for less disruption

STRONGER
- Rigid arm guidance for any approach
The purpose of the 2019 Annual Meeting of the Congress of Neurological Surgeons is to provide continuing medical education for practicing neurosurgeons, neurosurgical residents in training, and postgraduate neurosurgical fellows, as well as advanced practice providers including nurses, physician assistants, and clinical specialists.
STEALTH™ + ROBOTICS

Stealth Autoguide™ cranial robotic guidance platform is engineered to provide stereotactic positioning and trajectory guidance. Continuous real-time monitoring, feedback, and robotically assisted movement allows you to quickly and accurately align to your surgical plans for cranial procedures.

Seamlessly integrating with your StealthStation™ system and Midas Rex™ MR7 drill technology, the innovative Stealth Autoguide™ improves your workflow efficiency with a minimal footprint in your OR.

Visualase™
Stealth Autoguide™ aligns the bone anchor to a planned trajectory. A flexible Visualase™ laser catheter is passed through the bone anchor to the target area.

Depth Electrodes
Stealth Autoguide™ assists in the placement of sEEG bolts to enable the placement of depth electrodes. Allowing you to place multiple sEEG bolts quickly and efficiently.

Biopsy
Stealth Autoguide™ easily and precisely aligns to your surgical plan to place the biopsy needle. This solution enables accurate location of lesion with direct depth stop calculation and confirmation of biopsy location with biopsy needle navigation.
WELCOME MEMBERS:

Thank you for joining us for the 2019 Congress of Neurological Surgeons Annual Meeting. This year’s meeting is taking controversy head on. Think you know the right thing to do for a patient with a low-grade glioma? How about advising an athlete about Chronic Traumatic Encephalopathy? Is a randomized controlled trial the most ethical way to decide whether or not a treatment is effective? In keeping with this year’s meeting theme, “The Age of Reason for Neurosurgery,” you’ll be presented with the latest evidence on either side of these issues to help you determine the best way to help your patients.

The Scientific Program Committee, led by Alexander Khalessi, Nader Pouratian, and Brian Nahed, has put together an outstanding program with exciting speakers and relevant content. We are featuring specialty-specific, all-day symposia on Saturday and Sunday at a lower price. We’re also introducing three International Symposia featuring neurosurgeons from around the world and providing more opportunities to present original science. For the first time, we included an abstract category on operative technique in order to highlight novel surgical strategies for treating neurological disease across all disciplines.

In addition to top-line neurosurgical content, we have special speakers who will provide you with a unique perspective on a variety of topics. There are also many social events for you to enjoy.

On behalf of the Congress of Neurological Surgeons’ Executive Committee, the Scientific Program Committee, and the 2019 Honored Guest Raymond Sawaya, I welcome you to this year’s CNS Annual Meeting in San Francisco, California.

Sincerely,
Ganesh Rao, MD
CNS President

THE CNS WELCOMES YOU TO SAN FRANCISCO

The Moscone Center is in the trendy SoMa neighborhood of San Francisco. After coming into prominence as a high-tech hub in the 1990s, SoMa—short for South of Market—is one of the coolest neighborhoods in the city, packed with shops, museums, art galleries, and restaurants.
Raymond Sawaya, MD, was the founding chair of Neurosurgery at The University of Texas MD Anderson Cancer Center, as well as an advisor to the leaders of the Glioblastoma Multiforme (GBM) Moon Shot. He also served as director of the Brain Tumor Center and is currently holder of the Anne C. Brooks & Anthony D. Bullock III Distinguished Chair in Neurosurgery. Dr. Sawaya was the chairman of the Department of Neurosurgery at Baylor College of Medicine from 2005 to 2015.

Dr. Sawaya has influenced the field of neurosurgical oncology in several major ways. Ever since he was recruited in 1990 to establish a newly formed Department of Neurosurgery at MD Anderson, he has built the most comprehensive and best recognized neurosurgical oncology program in the country (Neurosurgery 56: 841-50, 2005). Dr. Sawaya was also residency program director at Baylor College of Medicine for several years during his term as chairman. He continues to contribute his expertise to one of the largest residency programs in the United States.

Dr. Sawaya is an internationally recognized leader in neurosurgery, with particular expertise in primary and metastatic brain tumors. His laboratory work helped identify molecular determinates of brain tumor invasiveness, and in particular, the role of serine proteases and their roles in glioma oncogenesis (over 60 publications). On the clinical side, he has helped identify brain metastases as a major threat to the well-being of cancer patients, and was the first to promote the treatment of patients with multiple brain metastases (J Neurosurg 79: 210-6, 1993; 368 citations). Dr. Sawaya is renowned for his great strides in enhancing the accessibility and safety of brain tumor surgery. This can best be demonstrated in his landmark paper on the importance of extent of resection on the survival of glioblastoma patients (J Neurosurg 95: 190-8, 2001; 1440 citations). He has also conducted the first prospective trial on the use of intraoperative MRI to maximize the extent of resection (Neurosurgery 64: 1073-81, 2009; 105 citations).

Dr. Sawaya has published more than 300 articles and book chapters and has served as both reviewer and editor for a number of peer-reviewed journals. He is the past president of the American Radium Society, the past president of the Houston Neurological Society and past chair of the American Association of Neurological Surgeons/Congress of Neurological Surgeons Section on Tumors. He is in demand as a lecturer across the nation and around the world and has received a number of awards in recognition of his expertise.

Dr. Sawaya is a “triple threat” who has excelled as a surgeon, researcher, and teacher and has been very successful as a leader and an advocate for the field. Dr. Sawaya considers his greatest achievement the building and maintaining of MD Anderson’s comprehensive brain tumor program, which has allowed him to touch the lives of many patients.

Look for Dr. Sawaya at the following sessions:

**MONDAY, OCTOBER 21**

General Scientific Session II
9:13–9:40 am
Honored Guest Presentation: Role of Resection for Glioblastoma: Can Technology Overcome Biology?

Meet Dr. Sawaya in the CNS Xperience Lounge inside the Exhibit Hall immediately following his General Scientific Session presentation.

**TUESDAY, OCTOBER 22**

General Scientific Session III
8:51–9:13 am
Honored Guest Presentation: Evidence-based Medicine Through Development of Home-grown Databases

**WEDNESDAY, OCTOBER 23**

General Scientific Session IV
8:50–9:12 am
Honored Guest Presentation: The Evolving Landscape and Management of Brain Metastases
**FEATURED SPEAKERS**

**Lucy Kalanithi, MD**  
*A Conversation with Lucy Kalanithi*  
**SUNDAY, OCTOBER 20**  
General Scientific Session I  
5:56–6:30 pm  
*Lucy Kalanithi will be signing copies of “When Breath Becomes Air” immediately following the conclusion of her lecture in the 3rd floor foyer of Moscone West Convention Center.*

Lucy Kalanithi, MD, is the widow of the late Dr. Paul Kalanithi, author of The New York Times #1 bestselling memoir “When Breath Becomes Air” for which she wrote the epilogue. An internal medicine physician and faculty member at the Stanford School of Medicine in Palo Alto, California, Dr. Kalanithi completed her medical degree at Yale, where she was inducted into the Alpha Omega Alpha national medical honor society, her residency at the University of California-San Francisco, and a postdoctoral fellowship training in healthcare delivery innovation at Stanford’s Clinical Excellence Research Center. At the cross-section of her career as a medical professional and her personal experience standing alongside her husband during his life, diagnosis, treatment, and death, Dr. Kalanithi has special interests in healthcare value, meaning in medicine, patient-centered care, and end-of-life care. She has appeared on “PBS NewsHour,” “NPR Morning Edition,” and “Yahoo News with Katie Couric,” and been interviewed for People, NPR, and The New York Times. She lives in the San Francisco Bay Area with her daughter, Elizabeth Acadia.

**CNS MICHAEL L. J. APUZZO LECTURER ON CREATIVITY AND INNOVATION**  
**Shankar Vedantam**  
*Hidden Brain*  
**MONDAY, OCTOBER 21**  
General Scientific Session II  
8:48–9:13 am  
*Shankar Vedantam will be signing copies of his book, “The Hidden Brain” in the CNS Xperience Lounge during the morning beverage break.*

Shankar Vedantam is the host of NPR’s “Hidden Brain” podcast and radio show. His goal is to help people think about the world in new and interesting ways. He is endlessly fascinated by research in fields ranging from psychology and history to sociology and economics.

Before joining NPR in 2011, Vedantam spent 10 years as a reporter at The Washington Post. From 2007 to 2009, he was also a columnist, and wrote the “Department of Human Behavior” column for the Post.


In 2009–2010, Vedantam served as a fellow at the Nieman Foundation for Journalism at Harvard University.

“Hidden Brain” is among the most popular podcasts in the world, with over two million downloads per week. The “Hidden Brain” radio show is featured on more than 250 public radio stations across the United States.

Vedantam and “Hidden Brain” have been recognized with the Edward R. Murrow Award, and honors from the American Association for the Advancement of Science, the Webby Awards, and others.

Vedantam has served as a part-time lecturer at Harvard University and Columbia University. He has also served as a senior scholar at the Woodrow Wilson International Center in Washington.
FEATyURED SPEAKERS

WALTER E. DANDY ORATOR

Doris Kearns Goodwin

Leadership in Turbulent Times

MONDAY, OCTOBER 21

General Scientific Session II
11:23 am–12:10 pm

Doris Kearns Goodwin will be signing copies of her book, “Leadership: In Turbulent Times,” in the CNS Xperience Lounge immediately following the conclusion of this session.

Doris Kearns Goodwin is a world-renowned presidential historian, public speaker, and Pulitzer Prize-winning New York Times #1 best-selling author. Her career as a presidential historian and author was inspired when, as a 24-year-old graduate student at Harvard, she was selected to join the White House Fellows, one of America’s most prestigious programs for leadership and public service. Goodwin worked with Lyndon Johnson in the White House and later assisted him in the writing of his memoirs. She then wrote “Lyndon Johnson and the American Dream,” which became a national bestseller and achieved critical acclaim.

Goodwin was awarded the Pulitzer Prize for “No Ordinary Time: Franklin and Eleanor Roosevelt–The Home Front in World War II.” Her sixth book, “The Bully Pulpit: Theodore Roosevelt, William Howard Taft, and the Golden Age of Journalism,” won the Carnegie Medal and is being developed into a film.

Goodwin’s “Team of Rivals: The Political Genius of Abraham Lincoln” served as the basis for Steven Spielberg’s hit film “Lincoln,” and was awarded the prestigious Lincoln Prize, the inaugural Book Prize for American History, and the Lincoln Leadership Prize.

Goodwin is frequently seen in documentaries including Ken Burns’ “The History of Baseball” and “The Roosevelts: An Intimate History,” on news and cable networks, and shows including “Meet the Press” and “The Late Show with Stephen Colbert.”

Goodwin graduated magna cum laude from Colby College. She earned a doctorate degree in Government from Harvard University, where she taught Government, including a course on the American Presidency.

Among her many honors and awards, Goodwin was awarded the Charles Frankel Prize, the Sarah Josepha Hale Medal, the New England Book Award, as well as the Carl Sandburg Literary Award.

Goodwin lives in Concord, Massachusetts. She was the first woman to enter the Boston Red Sox locker room in 1979, and is a devoted fan of the World Series-winning team.

Carl Zimmer

A Journey to the Center of the Brain

TUESDAY, OCTOBER 22

General Scientific Session III
9:13 am–9:40 am

Carl Zimmer will be signing copies of his book, “She Has Her Mother’s Laugh: The Powers, Perversions, and Potential of Heredity,” in the CNS Xperience Lounge during the morning beverage break.


Zimmer’s writing has earned a number of awards, including the 2016 Stephen Jay Gould Prize, awarded by the Society for the Study of Evolution to recognize individuals whose sustained efforts have advanced public understanding of evolutionary science. In 2017, he won an Online Journalism Award for his series of articles in which he explored his genome. “She Has Her Mother’s Laugh” was named a Notable Book of the Year by The New York Times Book Review. It was also selected for Publisher’s Weekly Best 10 Books of 2018 and the 2018 shortlist for Baillie-Gifford Prize for Nonfiction. The Guardian named it the best science book of 2018.

Zimmer created the podcast “What Is Life?” and is a familiar voice on other programs such as Radiolab. A professor adjunct at Yale University, he lives in Connecticut with his wife Grace and their children, Charlotte and Veronica. He is, to his knowledge, the only writer after whom a species of tapeworm has been named. For more information on Carl Zimmer please visit www.prhspeakers.com.
Bret Stephens  
U.S. Foreign Policy and the World  
TUESDAY, OCTOBER 22  
General Scientific Session III  
11:41 am–12:10 pm  
Bret Stephens will be signing copies of his book, “America in Retreat,” in the CNS Xperience Lounge immediately following the conclusion of this session.

Bret Stephens became an op-ed columnist and associate editor for The New York Times in April 2017. Before that, he spent 11 years as the author of “Global View,” the foreign-affairs column of the Wall Street Journal, for which he was awarded the Pulitzer Prize for distinguished commentary in 2013. He also served eight years as the Journal’s deputy editorial-page editor, responsible for the newspaper’s global opinion section, as well as a member of the editorial board.

Stephens began his career at The Wall Street Journal in 1998 as an editor in New York, and later wrote editorials and articles for the newspaper from Brussels. In January 2002, he was named editor-in-chief of The Jerusalem Post, a position he assumed at age 28. At the Post, he was responsible for the newspaper’s news, editorial, digital, and international editions, and also wrote a weekly column.

Stephens returned to the Journal in late 2004. He has reported stories from around the world, including Pakistan, Afghanistan, Iraq, Lebanon, Gaza, and interviewed dozens of world leaders. In June 2017 he became a regular political analyst for MSNBC.

Stephens has twice been chairman of Pulitzer Prize juries and is a national judge of the prestigious Livingston Awards. He holds two honorary doctorates. In 2014 he was awarded the Professional Achievement Prize by the University of Chicago, a distinction he shares with composer Philip Glass, astronomer Carl Sagan, and Nobel laureate Gary Becker.


Stephens was born in New York and raised in Mexico City. He holds a BA with honors from the University of Chicago and an MSc from the London School of Economics. He lives with his wife Corinna, a classical music and opera critic for The New York Times, and their three children. The family divides its time between New York City and Hamburg, Germany.

Rebecca Skloot  
WEDNESDAY, OCTOBER 23  
General Scientific Session IV  
9:12–9:40 am  
Rebecca Skloot will be signing copies of her book, “The Immortal Life of Henrietta Lacks,” in the CNS Xperience Lounge during the morning beverage break.

Bestselling author Rebecca Skloot spent more than 10 years doggedly uncovering the truth about the life, death, and ultimate “immortality” of a poor Black tobacco farmer named Henrietta Lacks. Her phenomenal book, “The Immortal Life of Henrietta Lacks,” has sold nearly 3 million copies to date.

In “The Immortal Life,” Skloot tells the story of a young Black woman who died of cervical cancer in 1951—and left behind an inexplicably immortal line of cells known as HeLa. Henrietta’s cells—harvested without her knowledge or consent—contributed to scientific advancements as varied as the polio vaccine, treatments for cancers and viruses, in-vitro fertilization, and the impact of space travel on human cells.

Recognizable for its engaging, straightforward language, Skloot’s writing—both in “The Immortal Life” and her many feature articles for major publications—has charmed readers around the world. More than 250 communities, schools, and universities have chosen “The Immortal Life” for their common read programs.

“The Immortal Life” was selected as a best book of 2010 by over 60 media outlets. It spent more than four years on The New York Times bestseller list, was named one of Amazon’s 100 Books to Read in a Lifetime, and has been translated into more than 25 languages. Skloot was named One of Five Surprising Leaders of 2010 by The Washington Post. “The Immortal Life of Henrietta Lacks” was also made into an HBO film produced by Oprah Winfrey and Alan Ball.

Rebecca Skloot has a BS in biological sciences and an MFA in creative nonfiction. She has taught creative writing and science journalism at the University of Memphis, the University of Pittsburgh, and New York University. She is the founder and president of the Henrietta Lacks Foundation, which strives to provide financial assistance to needy individuals who have made important contributions to scientific research without their knowledge or consent. Skloot remains in close contact with the Lacks family.
Aaron Carroll
Healthcare in the U.S.
WEDNESDAY, OCTOBER 23
General Scientific Session IV
11:31 am–12:10 pm
Meet Aaron Carroll in the CNS Xperience Lounge immediately following the conclusion of this session.

Aaron Carroll, MD, is a Professor of Pediatrics, Associate Dean for Research Mentoring, and the Director of the Center for Health Policy and Professionalism Research at the Indiana University School of Medicine. His research focuses on health care financing reform; the study of information technology to improve pediatric care; and areas of health policy including physician malpractice and the pharmaceutical industry/physician relationship. Dr. Carroll also serves as Regenstrief Institute’s Vice President for Faculty Development where he leads Regenstrief’s faculty development strategy and implementation efforts.

He was one of the first to study the use of mobile devices in actual care and has written numerous publications on the subject. Dr. Carroll has held millions of dollars in various government agency grants to explore the use of information technology in health care and is one of the leading pediatric informaticists in the U.S. He has also served in this capacity in committees for the American Academy of Pediatrics and is the co-founder of Medical Data Solutions, one of the first software companies to create programs for health professionals for mobile devices.

Dr. Carroll is the web and social media editor at JAMA Pediatrics, co-editor of The Incidental Economist and host of “Healthcare Triage,” a YouTube channel that received the National Institute of Health Care Management Digital Media Award. He is a regular contributor to The New York Times’ “The Upshot,” as well as other media outlets, and he has appeared on “Good Morning America,” the “CBS Evening News,” “ABC News,” and “The Colbert Report.” Dr. Carroll’s latest book, “Bad Food Bible,” joins the three books he co-authored on medical myths.

Dr. Carroll earned a BA in chemistry from Amherst College, an MD from the University of Pennsylvania School of Medicine, and an MS in health services research from the University of Washington, where he was also a Robert Wood Johnson Clinical Scholar.


CNS Education Courses*

Innovative live courses that move our specialty forward and foster collaboration and growth in our community.

<table>
<thead>
<tr>
<th>Event</th>
<th>Dates</th>
<th>Location</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor Complications</td>
<td>January 25–26, 2020</td>
<td>Las Vegas, Nevada</td>
<td>cns.org/TCC</td>
</tr>
<tr>
<td>Spine Complications Course</td>
<td>February 7–9, 2020</td>
<td>Park City, Utah</td>
<td>cns.org/SCC</td>
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<tr>
<td>Oral Boards Review Course</td>
<td>February 22–23, 2020</td>
<td>Houston, Texas</td>
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<tr>
<td>SANS Written Boards Course</td>
<td>February 22–23, 2020</td>
<td>Houston, Texas</td>
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<tr>
<td>Minimally Invasive Cranial Course</td>
<td>March 2020</td>
<td>San Diego, California</td>
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<tr>
<td>Leadership Institute</td>
<td>May 2020</td>
<td>Rosemont, Illinois</td>
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<tr>
<td>2020 Skull Base Course</td>
<td>August 27-28</td>
<td>2020 Cleveland, OH</td>
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</table>

CNS provides relevant learning experiences for today’s practice challenges, with informative, world-class education. Discover more at cns.org.

**Jointly Provided Courses**

- **Spine Summit 2020**
  - March 5–8, 2020 | Las Vegas, Nevada
  - cns.org/spine

- **Pain Section 2020 Annual Meeting**
  - March 5–7, 2020 | Las Vegas, Nevada
  - cns.org/pain

- **ASSFN Biennial Meeting**
  - June 20–23, 2020 | Boston, Massachusetts
  - www.assfn.org/biennial.html

- **Tumor Section Satellite Symposium**
  - September 11–12, 2020 | Miami, Florida

* Schedule subject to change
# 2019 SCHEDULE OF EVENTS

All events will be held at Moscone West Convention Center unless otherwise indicated.

## Saturday, October 19

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>7:00 am–6:00 pm</td>
<td>CNS Oral Boards Review Course</td>
<td>Golden Gate C2-C3</td>
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<td>San Francisco Marriott Marquis</td>
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<tr>
<td>7:00 am–4:30 pm</td>
<td>Speaker Ready Room</td>
<td>3000</td>
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<tr>
<td>7:00 am–4:30 pm</td>
<td>Sergeant-at-Arms Office</td>
<td>2022 Overlook</td>
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<tr>
<td>7:00 am–5:30 pm</td>
<td>Registration and CNS Central</td>
<td>Level 1 Lobby</td>
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<tr>
<td>7:30–9:00 am</td>
<td>CSNS/CNS Caucus</td>
<td>Pacific I</td>
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<td>San Francisco Marriott Marquis</td>
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<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM1: Spine Trauma and Spinal Cord Injury Symposium</td>
<td>3022</td>
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<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM2: Functional Neurosurgery Update: Emerging Concepts</td>
<td>2016</td>
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<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM3: Maximizing Your Neurosurgical Employment Opportunities (Non-CME)</td>
<td>2011</td>
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<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM4: Cerebrovascular Symposia: Stenting and Bypasses Bundle</td>
<td>2001</td>
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<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM4A: New Era in Stenting</td>
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<tr>
<td>12:45–4:15 pm</td>
<td>SYM4B: Bypass Techniques in Cerebrovascular Surgery</td>
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<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM5: Advanced Topics in Spinal Operative Techniques Bundle</td>
<td>2008</td>
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<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM5A: Advanced Minimally Invasive Spine Surgery—Operative Nuances, Indications, and Complication Avoidance</td>
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<tr>
<td>12:45–4:15 pm</td>
<td>SYM5B: Cervical Spine Case Management: When to Preserve Motion and When Not To—The Evidence in the Age of Reason</td>
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<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM6: Brain Tumor Update Bundle</td>
<td>2004</td>
</tr>
<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM6A: Brain Tumor Update: Advanced and Minimally Invasive Techniques for Resection of Malignant Brain Tumors (Breakout Session with NX Development from 10–10:30 am in Room 2006.)</td>
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<tr>
<td>12:45–4:15 pm</td>
<td>SYM6B: Brain Tumor Update: Benign Brain Tumors</td>
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<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM7: Morbidity and Mortality</td>
<td>2007</td>
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<tr>
<td>9:15 am–12:00 pm</td>
<td>CSNS Plenary Session</td>
<td>Golden Gate B</td>
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<td>San Francisco Marriott Marquis</td>
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<tr>
<td>12:00–1:00 pm</td>
<td>CSNS Luncheon</td>
<td>Golden Gate A</td>
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<td>San Francisco Marriott Marquis</td>
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<td>12:15–4:15 pm</td>
<td>SYM8: Residency Program Update &amp; Training the Trainers</td>
<td>2007</td>
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<td>1:00–3:00 pm</td>
<td>CNS Education Committee Meeting</td>
<td>Yerba Buena Salons 1-2</td>
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<td>San Francisco Marriott Marquis</td>
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<tr>
<td>3:00–4:00 pm</td>
<td>CNS Ad Hoc Committee on Wellness</td>
<td>Laurel</td>
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<td>San Francisco Marriott Marquis</td>
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<tr>
<td>3:00–4:00 pm</td>
<td>CNS Nexus Committee Meeting</td>
<td>Yerba Buena Salons 1-2</td>
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<td>San Francisco Marriott Marquis</td>
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<tr>
<td>3:30–4:30 pm</td>
<td>Joint Communications and Public Relations Meeting</td>
<td>Pacific I</td>
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<td>San Francisco Marriott Marquis</td>
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<tr>
<td>4:00–5:00 pm</td>
<td>CNS Ad Hoc Data Science Committee Meeting</td>
<td>Laurel</td>
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<td>San Francisco Marriott Marquis</td>
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<tr>
<td>4:00–5:00 pm</td>
<td>CNS SANS Committee Meeting</td>
<td>Yerba Buena Salons 1-2</td>
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<td>San Francisco Marriott Marquis</td>
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<tr>
<td>4:15–5:45 pm</td>
<td>CNS Resident Social and CSNS Young Neurosurgeons Reception</td>
<td>2000</td>
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<tr>
<td>Time</td>
<td>Event</td>
<td>Location</td>
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<tr>
<td>4:30–5:30 pm</td>
<td>Neurosurgery PAC Board Meeting</td>
<td>Pacific H San Francisco Marriott Marquis</td>
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<tr>
<td>5:30–7:00 pm</td>
<td>CNS International Reception</td>
<td>Yerba Buena Ballroom Salon 7 San Francisco</td>
</tr>
<tr>
<td>6:30–8:30 pm</td>
<td>DiN1: How Do I Avoid Getting Penalized—ICD-10, CPTs, MACRA, ACOs, and APMs?</td>
<td>Boulevard 1 Mission Street, San Francisco</td>
</tr>
<tr>
<td><strong>Sunday, October 20</strong></td>
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<tr>
<td>7:00–8:30 am</td>
<td>CNS Leadership Institute Meeting</td>
<td>Yerba Buena Salon 8 San Francisco Marriott</td>
</tr>
<tr>
<td>7:00–11:00 am</td>
<td>CNS Oral Boards Review Course Spine Breakout</td>
<td>Golden Gate C2 San Francisco Marriott Marquis</td>
</tr>
<tr>
<td>7:00–11:00 am</td>
<td>CNS Oral Boards Review Course Core Topics Breakout</td>
<td>Golden Gate C1 San Francisco Marriott Marquis</td>
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<tr>
<td>7:00–11:00 am</td>
<td>CNS Oral Boards Review Course Specialty Breakout</td>
<td>Golden Gate C3 San Francisco Marriott Marquis</td>
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<tr>
<td>7:00 am–6:30 pm</td>
<td>Speaker Ready Room</td>
<td>3000</td>
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<tr>
<td>7:00 am–4:30 pm</td>
<td>Sergeant-at-Arms Office</td>
<td>2022 Overlook</td>
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<tr>
<td>7:00 am–7:30 pm</td>
<td>Registration and CNS Central</td>
<td>Level 1 Lobby</td>
</tr>
<tr>
<td>8:00 am–4:15 pm</td>
<td>Association of Neurosurgical Physician Assistants (ANSPA) Fall 2019 CME Meeting Presented in Collaboration with Congress of Neurological Surgeons</td>
<td>3014</td>
</tr>
<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM10: Acute Stroke Care: Guidelines Review and Future Directions (Breakout Session with Penumbra from 2:00–2:30 pm in Room 3016.)</td>
<td>3018</td>
</tr>
<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM11: Neurotrauma Update (Breakout Session with Natus Neurology from 9:00–9:30 am in Room 3024.)</td>
<td>3022</td>
</tr>
<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM12: A Comprehensive and Evidence-based Guidelines Review for the Treatment of Intracranial Aneurysms</td>
<td>2016</td>
</tr>
<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM13: Spine Biomechanics and Deformity Symposium Bundle</td>
<td>2011</td>
</tr>
<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM13A: Spinal Biomechanics for the Practicing Neurosurgeon: What I Need to Know for My Practice</td>
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<tr>
<td>12:45–4:15 pm</td>
<td>SYM13B: Thoracolumbar Spinal Deformity for the Non-deformity Spine Surgeon</td>
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<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM14: Advanced Functional Mapping and 3D Anatomy for the Neurosurgeon Bundle</td>
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<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM14A: Surgical Management of Eloquent Area Tumors: Functional Mapping and/or Navigation</td>
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<tr>
<td>12:45–4:15 pm</td>
<td>SYM14B: 3D Surgical Neuroanatomy</td>
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<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM15: Emerging Technologies in Neurosurgery Bundle</td>
<td>2008</td>
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<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM15A: Intraoperative Technological Adjuncts: Indications and Techniques for Laser Therapy, Robotics, and Exoscopes</td>
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<tr>
<td>12:45–4:15 pm</td>
<td>SYM15B: Virtual and Augmented Reality: Science and Clinical Applications</td>
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<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM16: Pain and Peripheral Nerve Symposium Bundle</td>
<td>3003</td>
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<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM16A: Non-spinal Targets for Pain: Nerve, DRG, and Brain</td>
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<tr>
<td>12:45–4:15 pm</td>
<td>SYM16B: Peripheral Nerve Surgery: Techniques and Exposure</td>
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<tr>
<td>8:00 am–4:15 pm</td>
<td>SYM17: Quality Summit Bundle</td>
<td>2014</td>
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<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM17A: QI: Implementation and Results</td>
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<tr>
<td>12:45–4:15 pm</td>
<td>SYM17B: Using Big Data to Help Neurosurgeons and Their Patients</td>
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<tr>
<td>8:00 am–12:00 pm</td>
<td>SYM18: Morbidity and Mortality</td>
<td>2007</td>
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<tr>
<td>8:30 am–12:00 pm</td>
<td>SNS Summit</td>
<td>Yerba Buena Salons 11-12 San Francisco Marriott Marquis</td>
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<tr>
<td>Time</td>
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<tr>
<td>9:00–10:00 am</td>
<td>CNS Resident Committee Meeting</td>
<td>Yerba Buena Salons 3-4</td>
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<td>Joint Guidelines Committee Meeting</td>
<td>Yerba Buena Salons 1-2</td>
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<tr>
<td>10:00–10:30 am</td>
<td>CNS Quarterly Editorial Board Meeting</td>
<td>Yerba Buena Salon 5</td>
</tr>
<tr>
<td>10:00–10:45 am</td>
<td>ThinkFirst Executive Committee Meeting</td>
<td>Yerba Buena Salon 14-15</td>
</tr>
<tr>
<td>10:30–11:30 am</td>
<td>CNS Guidelines Committee Meeting</td>
<td>Yerba Buena Salons 1-2</td>
</tr>
<tr>
<td>10:45 am–12:15 pm</td>
<td>ThinkFirst Board of Directors Meeting</td>
<td>Yerba Buena Salon 14-15</td>
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<tr>
<td>11:00 am–12:00 pm</td>
<td>Joint Section on Disorders of the Spine and Peripheral Nerve Scientific Program Committee Meeting</td>
<td>Golden Gate B</td>
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<tr>
<td>11:00 am–1:00 pm</td>
<td>Joint Section on Women in Neurosurgery Executive Committee Meeting</td>
<td>Yerba Buena Salon 10</td>
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<td>11:00 am–1:00 pm</td>
<td>Neurosurgery Quality Council</td>
<td>Yerba Buena Salon 6</td>
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<tr>
<td>11:30 am–1:00 pm</td>
<td>Joint Section on Tumors Executive Committee Meeting</td>
<td>Golden Gate A</td>
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<tr>
<td>12:30–2:00 pm</td>
<td>ThinkFirst Reception</td>
<td>Yerba Buena Salon 14-15</td>
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<tr>
<td>12:30–3:00 pm</td>
<td>Joint Section on Disorders of the Spine and Peripheral Nerve Executive Committee Meeting</td>
<td>Golden Gate B</td>
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<tr>
<td>12:30–4:30 pm</td>
<td>American Society for Stereotactic and Functional Neurosurgery Executive Committee Meeting</td>
<td>Yerba Buena Salon 13</td>
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<tr>
<td>12:45–4:15 pm</td>
<td>SYM19: My Worst Spinal Complication: Lessons Learned</td>
<td>2022</td>
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<td>12:45–4:15 pm</td>
<td>SYM20: Modern Approaches to SRS</td>
<td>2007</td>
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<tr>
<td>1:00–3:00 pm</td>
<td>Resident SANS Challenge Preliminary Round</td>
<td>2018</td>
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<tr>
<td>2:00–4:00 pm</td>
<td>Joint Section on Cerebrovascular Surgery Executive Committee Meeting</td>
<td>Golden Gate A</td>
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<tr>
<td>2:30–4:30 pm</td>
<td>Joint Section on Pain Executive Committee Meeting</td>
<td>Yerba Buena Salon 10</td>
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<tr>
<td>4:30–6:30 pm</td>
<td>GENERAL SCIENTIFIC SESSION I</td>
<td>Ballroom</td>
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<tr>
<td>5:03–5:47 pm</td>
<td>CONTROVERSY: Chronic Traumatic Encephalopathy</td>
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<tr>
<td>5:59–6:30 pm</td>
<td>FEATURED SPEAKER</td>
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<tr>
<td>6:30–8:30 pm</td>
<td>Opening Reception</td>
<td>Level 2 Lobby</td>
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**Monday, October 21**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>6:00–7:00 am</td>
<td>Joint Drugs &amp; Devices Committee Meeting</td>
<td>Pacific J</td>
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<tr>
<td>6:30 am–6:30 pm</td>
<td>Speaker Ready Room</td>
<td>3000</td>
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<tr>
<td>6:30 am–6:30 pm</td>
<td>Registration and CNS Central</td>
<td>Level 1 Lobby</td>
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<tr>
<td>8:00–10:30 am</td>
<td>Spouse Hospital</td>
<td>2nd Floor Atrium</td>
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<tr>
<td>7:00–8:30 am</td>
<td>Sunrise Science and Late-breaking Abstract Session (Tumor)</td>
<td>3014</td>
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<tr>
<td>7:00–8:30 am</td>
<td>Sunrise Science and Late-breaking Abstract Session (Cerebrovascular)</td>
<td>2014</td>
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<tr>
<td>7:00–8:30 am</td>
<td>Guidelines for the Management of Metastatic Disease to the Spine: The Evidence</td>
<td>2016</td>
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<tr>
<td>7:00–8:30 am</td>
<td>Guidelines for DBS for Parkinson's Disease and Neuroablation for Pain</td>
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<tr>
<td>7:00–8:30 am</td>
<td>Neurotrauma Debates</td>
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</table>
| 8:40 am–12:10 pm | **GENERAL SCIENTIFIC SESSION II**  
Presiding Officer: Steven N. Kalkanis  
Moderators: Nader Pouratian, Martina Stippler |
| 8:51–9:13 am | FEATURED SPEAKER  
Hidden Brain  
Shankar Vedantam |
| 9:18–9:40 am | HONORED GUEST PRESENTATION  
Role of Resection for Glioblastoma: Can Technology Overcome Biology?  
Raymond Sawaya |
| 10:48–10:55 am | JAPANESE CNS PRESIDENTIAL ADDRESS  
Yukihiko Sonoda |
| 10:55–11:00 am | 2019 CNS RESIDENT AWARD PRESENTATION  
Ambulation on POD#0 is Associated with Decreased Adverse Events After Elective Lumbar Spine Surgery: Analysis of the Michigan Spine Surgery Improvement Collaborative (MSSIC)  
Hesham M. Zakaria |
| 11:03–11:23 am | PRESIDENTIAL ADDRESS  
The Age of Reason for Neurosurgery  
Ganesh Rao |
| 11:26 am–12:10 pm | WALTER E. DANDY ORATION  
Leadership in Turbulent Times  
Doris Kearns Goodwin |
| 10:00–10:30 am | Live Tumor Surgery in 3D using Synaptive's Robotic Digital Microscope (Presented by Synaptive) |
| 10:30 am–2:30 pm | Sergeant-at-Arms Office |
| 12:15–14:55 pm | M1: Honored Guest Luncheon: Leadership Engagements  
M2: So You've Been Sued... Medical Practice 2019 Update  
M3: Is Intracerebral Hemorrhage a Surgical Disease?  
M4: Cervical Spondylotic Myelopathy—Anterior Versus Posterior  
M5: Spinal Tumor Surgery: Case-based Management  
M6: Peripheral Nerve Entrapment Syndromes: Diagnosis and Management  
M7: Neurocritical Care: A Multidisciplinary Collaboration  
M8: Pediatric Concussion  
M9: Acoustic Neuromas: Current Management Strategies  
M10: Harnessing the Immune System to Treat Brain Tumors  
Non-CME Sponsored Luncheon Session: Stealth Autoguide™ Robotic Navigation |  
Robotic Precision | Powered by You Development and Clinical Experience by Dr. Stefan Wolfsberger  
Non-CME Sponsored Luncheon Session: See Addendum for details  
Non-CME Sponsored Luncheon Session: See Addendum for details  
Joint Section on Neurotrauma & Critical Care Executive Committee Meeting  
San Francisco Marriott Marquis |
<p>| 1:45–2:45 pm | Afternoon Beverage Break – Visit the Exhibit Hall! |
| 1:45–2:45 pm | Special Session: The FDA: Investigational Device Exemptions, Regulatory Process, and Moving Medical Devices to Patients (Non-CME) |</p>
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>1:45–2:45 pm</td>
<td>Special Session: ABNS Case Log Course</td>
<td>3003</td>
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<tr>
<td>2:45–4:15 pm</td>
<td>Council of State Neurosurgical Societies Achieving High Quality</td>
<td>3016</td>
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<tr>
<td>2:45–4:15 pm</td>
<td>Section on Cerebrovascular Surgery Artificial Intelligence in Cerebrovascular Neurosurgery</td>
<td>2014</td>
</tr>
<tr>
<td>2:45–4:15 pm</td>
<td>Section on Disorders of the Spine and Peripheral Nerves Spine Section Update</td>
<td>2016</td>
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<tr>
<td>2:45–4:15 pm</td>
<td>Section on Neurotrauma and Critical Care</td>
<td>3022</td>
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<tr>
<td>2:45–4:15 pm</td>
<td>Section on Pain Complex Facial Pain: When to Use What</td>
<td>3024</td>
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<tr>
<td>2:45–4:15 pm</td>
<td>Section on Pediatric Neurological Surgery Pediatric Brain Tumors: Advancements in Molecular Diagnosis and Update on Clinical Trials</td>
<td>3018</td>
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<tr>
<td>2:45–4:15 pm</td>
<td>Section on Peripheral Nerves Peripheral Nerve Task Force</td>
<td>2018</td>
</tr>
<tr>
<td>2:45–4:15 pm</td>
<td>Section on Stereotactic and Functional Neurosurgery The Future of Preoperative Functional Mapping</td>
<td>3020</td>
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<tr>
<td>2:45–4:15 pm</td>
<td>Section on Tumors Complications in Tumor Surgery: Navigating the Unexpected</td>
<td>3014</td>
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<tr>
<td>4:15–5:45 pm</td>
<td>Operative Techniques and Case-based Discussion Session CSNS: How to Build a Spine Center</td>
<td>3016</td>
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<tr>
<td>4:15–5:45 pm</td>
<td>Challenging Skull Based Tumors: Operative Techniques and Case-based Discussions</td>
<td>3014</td>
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<tr>
<td>4:15–5:45 pm</td>
<td>Treating Cerebral Vascular Malformations: Operative Techniques and Case-based Discussions</td>
<td>2014</td>
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<tr>
<td>4:15–5:45 pm</td>
<td>Spinal Deformity and MIS Surgery: Operative Techniques and Case-based Discussions</td>
<td>2016</td>
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<tr>
<td>4:15–5:45 pm</td>
<td>Challenging Cases in ICP Management: Operative Techniques and Case-based Discussions</td>
<td>3022</td>
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<tr>
<td>4:15–5:45 pm</td>
<td>The Case Against Spinal Cord Stimulation: Operative Techniques and Case-based Discussion</td>
<td>3024</td>
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<tr>
<td>4:15–5:45 pm</td>
<td>Recurrent Disease in Pediatric Brain Tumors Patients: Case-based Discussions and Operative Techniques</td>
<td>3018</td>
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<tr>
<td>4:15–5:45 pm</td>
<td>Challenging Cases in Epilepsy Surgery: Operative Techniques and Case-based Discussions</td>
<td>3020</td>
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<td>4:15–5:45 pm</td>
<td>Peripheral Nerve: Operative Techniques and Case-based Discussions</td>
<td>2018</td>
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<tr>
<td>5:45–7:15 pm</td>
<td>The International Masters Symposium on Brain Tumor Surgery</td>
<td>3001</td>
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<tr>
<td>5:45–7:15 pm</td>
<td>The International Cerebrovascular Symposium</td>
<td>3003</td>
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<tr>
<td>5:45–7:15 pm</td>
<td>The International Functional Neurosurgery Symposium</td>
<td>3002</td>
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<tr>
<td>6:30–8:15 pm</td>
<td>Joint Military Committee</td>
<td>Pacific I San Francisco Marriott Marquis</td>
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<tr>
<td>6:30–7:30 pm</td>
<td>BNI Reception</td>
<td>Nob Hill D San Francisco Marriott Marquis</td>
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<tr>
<td>6:30–7:30 pm</td>
<td>USC Neurosurgery Reception</td>
<td>Yerba Buena Salon 4 San Francisco Marriott Marquis</td>
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<tr>
<td>7:30–9:30 pm</td>
<td>DIN2: Multi-modality AVM Treatment in the Past, Present, and Future</td>
<td>Prospect 300 Spear Street, San Francisco</td>
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<tr>
<td>7:30–9:30 pm</td>
<td>DIN3: Navigation and Robotics: Fad or Future?</td>
<td>Morton’s 400 Post Street, San Francisco</td>
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<td>6:30 am–6:30 pm</td>
<td>Registration and CNS Central</td>
<td>Level 1 Lobby</td>
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<td>6:30 am–5:30 pm</td>
<td>Speaker Ready Room</td>
<td>3000</td>
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<td>7:00–8:30 am</td>
<td>Sunrise Science and Late-breaking Abstract Session (Spine)</td>
<td>2016</td>
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<tr>
<td>7:00–8:30 am</td>
<td>Sunrise Science and Late-breaking Abstract Session (Socioeconomic)</td>
<td>3016</td>
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<tr>
<td>7:00–8:30 am</td>
<td>Guidelines on Management on Brain Metastases Update</td>
<td>3014</td>
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<td>7:00–8:30 am</td>
<td>The Voice of Reason in Brain Death: From Bedside to the News</td>
<td>3022</td>
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<td>8:00–10:30 am</td>
<td>Spouse Hospitality</td>
<td>2nd Floor Atrium</td>
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<tr>
<td></td>
<td><strong>GENERAL SCIENTIFIC SESSION III</strong></td>
<td>Ballroom</td>
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<tr>
<td></td>
<td>Presiding Officer: Brian L. Hoh</td>
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<td>Moderators: Ashok R. Asthagiri, Jennifer A. Sweet</td>
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<td></td>
<td><strong>HONORED GUEST PRESENTATION</strong></td>
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<td>Evidence-based Medicine Through Development of Home-grown Databases</td>
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<td>Raymond Sawaya</td>
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<td><strong>FEATURED SPEAKER</strong></td>
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<tr>
<td></td>
<td>A Journey to the Center of the Brain</td>
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<td>Carl Zimmer</td>
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<td>Controversy: Clinical Trials, Ethics, and Stem Cells: Are RCTs</td>
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<td>Necessary to Validate a Novel Therapy</td>
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<td><strong>FEATURED SPEAKER</strong></td>
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<td></td>
<td>U.S. Foreign Policy and the World</td>
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<td></td>
<td>Bret Stephens</td>
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<tr>
<td>9:30 am–3:00 pm</td>
<td>Exhibit Hall Open – Visit the CNS Xperience Lounge!</td>
<td>Exhibit Hall</td>
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<tr>
<td>9:40–10:40 am</td>
<td>Morning Beverage Break – Visit the Exhibit Hall and enjoy a</td>
<td>Exhibit Hall</td>
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<tr>
<td></td>
<td>complimentary cup of coffee!</td>
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<tr>
<td>10:00–10:30 am</td>
<td>Live Surgery in the Exhibit Hall (Presented by Cerenovus)</td>
<td>CNS Xperience Lounge</td>
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<td>Exhibit Hall</td>
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<tr>
<td>10:30 am–2:30 pm</td>
<td>Sergeant-at-Arms Office</td>
<td>2022 Overlook</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>T11: Perioperative Pain Management: Opioids, Non-opioids, and</td>
<td>2001</td>
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<td></td>
<td>Neurosurgery Advocacy</td>
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<tr>
<td>12:15–1:45 pm</td>
<td>T12: Carotid Artery Disease: Symptomatic/Asymptomatic/Stent/CEA</td>
<td>2003</td>
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<tr>
<td>12:15–1:45 pm</td>
<td>T13: Peak Performance: Optimizing the Spine Surgical Patient from</td>
<td>2005</td>
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<td>Pre-op to Post-op</td>
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<td>12:15–1:45 pm</td>
<td>T14: Controversies in Spinal Deformity Surgery</td>
<td>2007</td>
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<tr>
<td>12:15–1:45 pm</td>
<td>T15: Is There an Outcome Worse than Death? Outcomes, Palliative Care,</td>
<td>2008</td>
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<td></td>
<td>and Ethical Considerations in Neurosurgical Care</td>
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<tr>
<td>12:15–1:45 pm</td>
<td>T16: Patient Specific Goal-directed Therapy in TBI</td>
<td>2009</td>
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<tr>
<td>12:15–1:45 pm</td>
<td>T17: Clinical Trials in Movement Disorder Surgery</td>
<td>2010</td>
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<td>12:15–1:45 pm</td>
<td>T18: Management of Pituitary Adenomas and Parasellar Pathology</td>
<td>2012</td>
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<tr>
<td>12:15–1:45 pm</td>
<td>T19: Malignant Gliomas: Advances in Surgery and Adjuvant Therapy</td>
<td>2011</td>
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<tr>
<td>12:15–1:45 pm</td>
<td>T20: Beating Press Ganey</td>
<td>2000</td>
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<tr>
<td>12:15–1:45 pm</td>
<td>Non-CME Sponsored Luncheon Session: See Addendum for details</td>
<td>2004</td>
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<tr>
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</tr>
<tr>
<td>1:00–2:00 pm</td>
<td>NEUROSURGERY® Publications: Meet the Editors</td>
<td>3002</td>
</tr>
<tr>
<td>1:45–2:45 pm</td>
<td>Afternoon Beverage Break – CNS Wellness Afternoon. Enjoy a fresh fruit smoothie in the Xperience Lounge and listen to Voices of Neurosurgery stories. Also see presentations from our corporate partners at the Device Innovation Showcase.</td>
<td>Exhibit Hall</td>
</tr>
<tr>
<td>1:45–2:45 pm</td>
<td>Resident SANS Challenge Championship Round</td>
<td>2018</td>
</tr>
<tr>
<td>2:00–2:45 pm</td>
<td>CNS Annual Business Meeting</td>
<td>3001</td>
</tr>
<tr>
<td>2:45–4:15 pm</td>
<td>Council of State Neurosurgical Societies What is Value?</td>
<td>3016</td>
</tr>
<tr>
<td>2:45–4:15 pm</td>
<td>Section on Cerebrovascular Surgery Future Training of the Cerebrovascular Surgeon</td>
<td>2014</td>
</tr>
<tr>
<td>2:45–4:15 pm</td>
<td>Section on Neurotrauma and Critical Care Neuromodulation for Spinal Cord Injury</td>
<td>3022</td>
</tr>
<tr>
<td>2:45–4:15 pm</td>
<td>Section on Pain Targets Outside the Dorsal Columns for Pain</td>
<td>3024</td>
</tr>
<tr>
<td>2:45–4:15 pm</td>
<td>Section on Pediatric Neurological Surgery Post-hemorrhagic Hydrocephalus in Premature Infants: Time for a Paradigm Shift?</td>
<td>3018</td>
</tr>
<tr>
<td>2:45–4:15 pm</td>
<td>Section on Stereotactic and Functional Neurosurgery Stereotactic and Functional Neurosurgery Update</td>
<td>3020</td>
</tr>
<tr>
<td>2:45–4:15 pm</td>
<td>Section on Tumors Emerging Concepts in the Management of Brain Metastases</td>
<td>3014</td>
</tr>
<tr>
<td>4:15–5:45 pm</td>
<td>Operative Techniques and Case-based Discussion Session CSNS: Patient Safety in Neurosurgical Practice</td>
<td>3016</td>
</tr>
<tr>
<td>4:15–5:45 pm</td>
<td>Challenging Intrinsic Brain Tumors: Operative Techniques and Case-based Discussions</td>
<td>3014</td>
</tr>
<tr>
<td>4:15–5:45 pm</td>
<td>Treating Cerebral Aneurysms: Operative Techniques and Case-based Discussions</td>
<td>2014</td>
</tr>
<tr>
<td>4:15–5:45 pm</td>
<td>Cervical and Thoracolumbar Trauma: Operative Techniques and Case-based Discussions</td>
<td>2016</td>
</tr>
<tr>
<td>4:15–5:45 pm</td>
<td>Timing of Spinal Trauma Surgery: Operative Techniques and Case-based Discussions</td>
<td>3022</td>
</tr>
<tr>
<td>4:15–5:45 pm</td>
<td>Neurosurgery for Pain: Operative Techniques and Case-based Discussions</td>
<td>3024</td>
</tr>
<tr>
<td>4:15–5:45 pm</td>
<td>Challenges in Recurrent Pediatric Epilepsy: Operative Techniques and Case-based Discussions</td>
<td>3018</td>
</tr>
<tr>
<td>5:45–7:15 pm</td>
<td>Interactive Multimedia Research Presentation Session</td>
<td>Level 2 Lobby</td>
</tr>
<tr>
<td>6:30–8:30 pm</td>
<td>Tumor Section Young Neurosurgeon’s Reception</td>
<td>Nob Hill AB San Francisco Marriott Marquis</td>
</tr>
<tr>
<td>6:30–8:30 pm</td>
<td>Women in Neurosurgery Reception</td>
<td>Foothill C San Francisco Marriott Marquis</td>
</tr>
<tr>
<td>7:15–8:15 pm</td>
<td>Duke University Alumni Reception</td>
<td>Yerba Buena Salon 1 San Francisco Marriott Marquis</td>
</tr>
<tr>
<td>7:15–8:15 pm</td>
<td>Brigham &amp; Women’s Hospital Alumni Reception</td>
<td>Yerba Buena Salon 2 San Francisco Marriott Marquis</td>
</tr>
<tr>
<td>7:15–8:15 pm</td>
<td>Weill Cornell Medicine Alumni Reception</td>
<td>Yerba Buena Salon 3 San Francisco Marriott Marquis</td>
</tr>
<tr>
<td>7:30–9:30 pm</td>
<td>DIN4: Advances in LITT</td>
<td>Harris’ Steakhouse 2100 Van Ness Avenue San Francisco</td>
</tr>
</tbody>
</table>
### Wednesday, October 23

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:30 am–3:15 pm</td>
<td>Registration and CNS Central</td>
<td>Level 1 Lobby</td>
</tr>
<tr>
<td>6:30 am–3:30 pm</td>
<td>Speaker Ready Room</td>
<td>3000</td>
</tr>
<tr>
<td>7:00–8:30 am</td>
<td>Sunrise Science and Late-breaking Abstract Session (Stereotactic and Functional)</td>
<td>3020</td>
</tr>
<tr>
<td>7:00–8:30 am</td>
<td>Sunrise Science and Late-breaking Abstract Session (Pain)</td>
<td>3024</td>
</tr>
<tr>
<td>7:00–8:30 am</td>
<td>Cerebrovascular Guidelines: Aneurysms, Arteriovenous Malformations, and Acute Ischemic Stroke</td>
<td>2014</td>
</tr>
<tr>
<td>7:00–8:30 am</td>
<td>Guidelines for Management of Glioblastoma</td>
<td>3014</td>
</tr>
<tr>
<td>7:00–8:30 am</td>
<td>Brain and Spine Trauma Guidelines—What You Need to Know</td>
<td>2016</td>
</tr>
<tr>
<td>8:00–10:30 am</td>
<td>Spouse Hospitality</td>
<td>2nd Floor Atrium San Francisco Marriott Marquis</td>
</tr>
<tr>
<td>8:40 am–12:10 pm</td>
<td>GENERAL SCIENTIFIC SESSION IV</td>
<td>Ballroom</td>
</tr>
<tr>
<td>8:50–9:12 am</td>
<td>HONORED GUEST PRESENTATION</td>
<td></td>
</tr>
<tr>
<td>9:15–9:40 am</td>
<td>JOHN THOMPSON HISTORY OF MEDICINE LECTURE</td>
<td></td>
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<tr>
<td>10:49–11:11 am</td>
<td>Controversy: Low-grade Glioma Management</td>
<td></td>
</tr>
<tr>
<td>11:30 am–12:10 pm</td>
<td>FEATURED SPEAKER</td>
<td></td>
</tr>
<tr>
<td>9:30 am–2:00 pm</td>
<td>Exhibit Hall Open – Visit the CNS Xperience Lounge!</td>
<td>Exhibit Hall</td>
</tr>
<tr>
<td>9:40–10:40 am</td>
<td>Morning Beverage Break – Visit the Exhibit Hall and enjoy a complimentary cup of coffee!</td>
<td>Exhibit Hall</td>
</tr>
<tr>
<td>10:00–10:30 am</td>
<td>Live Surgery in the Exhibit Hall (see page 20 for details)</td>
<td>CNS Xperience Lounge</td>
</tr>
<tr>
<td>10:30 am–2:30 pm</td>
<td>Sergeant-at-Arms Office</td>
<td>2022 Overlook</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>W21: Middle Meningeal Artery Embolization for Subdural Hematoma Treatment</td>
<td>2001</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>W22: Contemporary and Practical Management of an Enigmatic Process: Cerebral Vasospasm (Delayed Cerebral Ischemia)</td>
<td>2003</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>W23: Novel Techniques for Management of Lumbar Spondylolisthesis</td>
<td>2010</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>W24: TBI in the Elderly</td>
<td>2011</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>W25: Neurosurgeon Entrepreneur</td>
<td>2005</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>W26: Chiari Malformations</td>
<td>2012</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>W27: Clinical Trials in Epilepsy Surgery</td>
<td>2007</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>W28: Update on Diagnosis and Management of Low Grade Gliomas</td>
<td>2008</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>W29: Advanced Imaging in Brain Tumors</td>
<td>2009</td>
</tr>
<tr>
<td>12:15–1:45 pm</td>
<td>W30: Branding and Social Media in your Practice</td>
<td>2000</td>
</tr>
<tr>
<td>1:45–3:15 pm</td>
<td>Cranial Abstract Session</td>
<td>3020</td>
</tr>
<tr>
<td>1:45–3:15 pm</td>
<td>Spine Abstract Session</td>
<td>2016</td>
</tr>
<tr>
<td>1:45–3:15 pm</td>
<td>Late-breaking Abstract Session</td>
<td>3024</td>
</tr>
<tr>
<td>1:45–4:45 pm</td>
<td>Advanced Endoscopic and Exoscopic Neurosurgery Seminar</td>
<td>2014</td>
</tr>
</tbody>
</table>
CONGRATULATIONS TO THE 2019 CNS ABSTRACT AWARD RECIPIENTS!

Each year, merit-based abstract awards at the CNS Annual Meeting are granted to acknowledge the achievements of residents, fellows, and attending neurosurgeons in various categories.

INTERNATIONAL ABSTRACT WINNERS

- **Best International Basic Science:** Museung Park
  South Korea

- **Best International Clinical Research:** Naokado Ikeda
  Japan

- **Best International Operative Technique:** Toshiki Endo
  Japan
IMMERSE YOURSELF IN THE CNS XPERIENCE LOUNGE

RELAX and connect with your colleagues. Grab a drink at the CNS Espresso Bar and see what’s next on your agenda. On Tuesday, please attend our Wellness Afternoon, where we’ll have a CNS sweatpants giveaway (limited quantity) as well as a bike blender to create your own smoothie.

MEET and interact with our Featured Speakers, and don’t miss a chance to get their books signed. Also, experience live surgery via telemedicine technology, Educational Update Sessions, Innovator of the Year finalists, digital posters, NVIDIA: Artificial Intelligence for Neurosurgeons—a Hands-on Demo, and more!

COME pick up the latest copy of NEUROSURGERY® Publications, watch demos of the Surgeon’s Armamentarium, listen to Neurosurgery Speaks! or chat with journal staff. Also, ask any membership questions you may have and get answers from the CNS team. We’re here to help!

MONDAY
9:40 am
Book Signing: Shankar Vedantam, “The Hidden Brain”

Special Presentation: Executive Presence and a Glimpse into the CNS Leadership Institute: Alan Scarrow
Book signing immediately following

Meet and Greet: Honored Guest, Raymond Sawaya

12:15 pm

TUESDAY
9:40 am

Special Presentation: NVIDIA: Artificial Intelligence for Neurosurgeons – A Hands-on Demo

12:15 pm
Book Signing: Bret Stephens, “America in Retreat”

1:45 pm
CNS Wellness Afternoon: Join us to receive CNS sweatpants (limited quantity), and take a ride on our smoothie blender bike.

Special Presentation: Voices of Neurosurgery: The Unforgettable Moments

2:30 pm
Book Signing: Gary Simonds, “The Thriving Physician: How to Avoid Burnout by Choosing Resilience Throughout Your Medical Career”

WEDNESDAY
9:40 am
Book Signing: Rebecca Skloot, “The Immortal Life of Henrietta Lacks”

9:40 am
Meet and Greet: Gary Simonds

12:15 pm
Meet and Greet: Aaron Carroll

HOURS:
MONDAY 9:30 am–4:00 pm
TUESDAY 9:30 am–3:00 pm
WEDNESDAY 9:30 am–2:00 pm
Come visit the CNS Exhibit Hall to discover cutting-edge technology to enhance your skills and your practice. Check out a variety of in-booth demonstrations with subspecialty experts and gain hands-on experience with the latest devices—all brought to you by more than 130 of our industry partners. For a complete list of exhibitors, see page 115.

Join Us in the Exhibit Hall

DAILY LIVE SURGERY PRESENTATIONS
Monday–Wednesday | 10:00–10:30 am
Join us in our Presentation Theater in the Xperience Lounge where surgeons from top institutions in the United States operate live via telemedicine, giving you the chance to observe and ask questions of the operating surgeon.
- Synaptive: Monday 10:00–10:30 am
  Live Tumor Surgery in 3D using Synaptive’s Robotic Digital Microscope | Moderator: Dr. Brian Nahed
  Surgeon: Dr. Costas Hadjipanayis from Mount Sinai
- Tuesday 10:00–10:30 am | See Addendum for details.
- Wednesday 10:00–10:30 am | See Addendum for details.

DEVICE INNOVATION SHOWCASE
See the newest products, services and technologies from our corporate partners with these live demonstrations from our technology theater during the afternoon break on Tuesday.
- 7D Surgical

IN-BOOTH DEMONSTRATIONS
- Synaptive Medical: Booth 318
  Live Tumor Surgery in 3D using Synaptive’s Robotic Digital Microscope | Tuesday 9:50–10:20 am

EXHIBIT HALL BEVERAGE BREAKS
Monday–Wednesday Morning Break: 9:40–10:40 am
Monday and Tuesday Afternoon Break: 1:45–2:45 pm

EXHIBIT HALL HOURS:
MONDAY 9:30 am–4:00 pm
TUESDAY 9:30 am–3:00 pm
WEDNESDAY 9:30 am–2:00 pm

Interact Outside of the Exhibit Hall

INDUSTRY-SPONSORED LUNCH SYMPOSIA
(CME is NOT offered for these sessions)
Monday–Tuesday | 12:15–1:45 pm
- Medtronic: Stealth Autoguide™ Robotic Navigation | Robotic Precision | Powered by You Development and Clinical Experience by Dr. Stefan Wolfsberger | Room 2002
- Sponsored Lunch with Olympus | Room 2006

Tuesday
- Medtronic: OLIF360SM Single-Position Surgery: OLIF and Posterior Fixation “Without the Flip” Faculty: Ernest Braxton, MD | Room 2002
- Sponsored Lunch with Cerenovus | Room 2004
- Portola: Reversal of Specific Direct Oral Anticoagulants In Patients Experiencing Life-Threatening Bleeds: Review of Clinical Evidence and Practical Recommendations for Patient Management Faculty: Shakeel Chowdhry | Room 2006

BREAKOUT SESSIONS DURING SYMPOSIA
During the full-day symposia on Saturday and Sunday, gain hands-on experience, training, and see demonstrations of the most advanced equipment and techniques during these 30-minute, non-CME breakout sessions. These will be held in individual rooms upstairs.

HANDS-ON CADAVER SESSION
New this year! These educational surgical cadaver suites located in the convention center give you the opportunity to gain hands-on experience with the latest and greatest neurosurgical technology. This is brought to you by our industry sponsors.
- Medtronic: Monday and Tuesday all day
- Xoran Technologies: Tuesday | 10:30 am–12:30 pm
Please reach out to companies directly to attend.
The Congress of Neurological Surgeons gratefully acknowledges our Industry Allies Council Partners for their continued support.
Crossed-arms Neurosurgery
With the NaoTrac autopilot robot

Make your decision, NaoTrac gives you a hand for precision.

The unique autonomous procedure allows you to focus on surgical planning and let NaoTrac be your new assistant. NaoTrac Robot merges high-tech and your experience of to improve accuracy and outcome by streamlining surgical procedures and improving the learning curve equipped with AI, Machine Vision, and Robotic-Assisted Surgery.

Fast and precise navigation with non-contact registration, pre-operative imagine infusion planning, assists in choosing the surgery pathway with 3D vision for precise anatomical location.

• AUTOPilot robot-assisted neurosurgery
• AUTOMATIC Surface Matching Facial Recognition & 3D Position Tracking
• INTELLIGENT Instrument registration technology

Join the evolution of neurosurgery at booth #127, Oct 21 & 22, 2019

10:00 AM - Human Pilot study of NaoTrac
02:00 PM - Crossed-arm neurosurgery workshop
Share your first impression, idea, and become our partner!

www.brainnavi.com
SUBSPECIALTY SESSION HIGHLIGHTS

**SPINE**

**SATURDAY**
8:00 am–4:15 pm
- **SYM1**: Spine Trauma and Spinal Cord Injury Symposium
- **SYM5**: Advanced Topics in Spinal Operative Techniques

**SUNDAY**
8:00 am–4:15 pm
- **SYM13**: Spine Biomechanics and Deformity Symposium
- **SYM19**: My Worst Spinal Complication: Lessons Learned

**MONDAY**
7:00–8:30 am
- Guidelines for the Management of Metastatic Disease to the Spine: The Evidence
- Neurotrauma Debates
- **M4**: Cervical Spondylotic Myelopathy—Anterior Versus Posterior
- **M5**: Spinal Tumor Surgery: Case-based Management
- Section on Disorders of the Spine and Peripheral Nerve: Spine Section Update
- Spinal Deformity and MIS Surgery: Operative Techniques and Case-based Discussions

**TUESDAY**
12:15–1:45 pm
- **T13**: Peak Performance: Optimizing the Spine Surgical Patient from Pre-op to Post-op
- **T14**: Controversies in Spinal Deformity Surgery
- The FDA: Investigational Device Exemptions, Regulatory Process, and Moving Medical Devices to Patients (Non-CME)
- Section on Disorders of the Spine and Peripheral Nerve: Spine Section Update
- The International Cerebrovascular Symposium

**WEDNESDAY**
7:00–8:30 am
- Brain and Spine Trauma Guidelines—What You Need to Know
- **W23**: Novel Techniques for Management of Lumbar Spondylolisthesis
- Spine Oral Abstract Presentation Session
- Advanced Endoscopic and Exoscopic Neurosurgery Seminar

**CEREBROVASCULAR**

**SATURDAY**
8:00 am–4:15 pm
- **SYM4**: Cerebrovascular Symposia: Stenting and Bypass

**SUNDAY**
8:00 am–4:15 pm
- **SYM10**: Acute Stroke Care: Guidelines Review and Future Directions
- **SYM12**: Advanced Techniques in Assessment and Treatment of Intracranial Aneurysms

**MONDAY**
7:00–8:30 am
- Sunrise Science and Late Breaking Abstract Session
- **M3**: Is Intracerebral Hemorrhage a Surgical Disease?
- Section on Cerebrovascular Surgery—Artificial Intelligence in Cerebrovascular Neurosurgery

**TUESDAY**
12:15–1:45 pm
- **T12**: Carotid Artery Disease: Symptomatic/Asymptomatic/Stent/CEA
- The FDA: Investigational Device Exemptions, Regulatory Process, and Moving Medical Devices to Patients (Non-CME)
- Section on Cerebrovascular Surgery: Future Training of the Cerebrovascular Surgeon
- Treating Cerebral Aneurysms: Operative Techniques and Case-based Discussion

**WEDNESDAY**
7:00–8:30 am
- Cerebrovascular Guidelines: Aneurysms, Arteriovenous Malformations, and Acute Ischemic Stroke
- **W21**: Middle Meningeal Artery Embolization for Subdural Hematoma Treatment
- **W22**: Contemporary and Practical Management of and Enigmatic Process: Cerebral Vasospasm (Delayed Cerebral Ischemia)
- Cranial Oral Abstract Presentation Session
- Advanced Endoscopic and Exoscopic Neurosurgery Seminar
**SUBSPECIALTY SESSION HIGHLIGHTS**

### SATURDAY
8:00 am–4:15 pm
- SYM2: Functional Neurosurgery Update: Emerging Concepts

### SUNDAY
8:00 am–4:15 pm
- SYM15: Emerging Technologies in Neurosurgery

### MONDAY
7:00–8:30 am
- Guidelines for DBS for Parkinson's Disease and Neuroablation for Pain
- Section on Stereotactic and Functional Neurosurgery: The Future of Preoperative Functional Mapping
- Challenging Cases in Epilepsy Surgery: Operative Techniques and Case-based Discussions
- The International Functional Neurosurgery Symposium

### TUESDAY
12:15–1:45 pm
- T17: Clinical Trials in Movement Disorder Surgery
- The FDA: Investigational Device Exemptions, Regulatory Process, and Moving Medical Devices to Patients (Non-CME)

### WEDNESDAY
7:00–8:30 am
- Sunrise Science and Late Breaking Abstract Session
- Cerebrovascular Guidelines: Aneurysms, Arteriovenous Malformations, and Acute Ischemic Stroke

### SATURDAY
8:00 am–4:15 pm
- SYM3: Maximizing Your Neurosurgical Employment Opportunities

### SUNDAY
8:00 am–4:15 pm
- SYM17: Quality Summit Bundle

### MONDAY
7:00–8:30 am
- Guidelines for the Management of Metastatic Disease to the Spine: The Evidence
- Guidelines for DBS and for Parkinson’s Disease

### TUESDAY
12:15–1:45 pm
- M2: So You’ve Been Sued… Medical Practice 2019 Update
- Council of State Neurosurgical Societies—What is Value
- CSNS: Patient Safety in Neurosurgical Practice

### WEDNESDAY
7:00–8:30 am
- Sunrise Science and Late Breaking Abstract Session

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**SOCIOECONOMIC**

### SATURDAY
12:45–4:15 pm
- SYM9: Appropriate Coding, ICD, and CPT 2019 Update

### MONDAY
12:15–1:45 pm
- M3: Honored Guest Luncheon
- ABNS Candidate Case Log: POST (Non-CME)

### TUESDAY
7:00–8:30 am
- The Voice of Reason in Brain Death: From Bedside to the News
- Interactive Multimedia Research Presentation Session

### WEDNESDAY
7:00–8:30 am
- Cerebrovascular Guidelines: Aneurysms, Arteriovenous Malformations, and Acute Ischemic Stroke
- Guidelines for Management of Glioblastoma
- Brain and Spine Trauma Guidelines - What you Need to Know

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**RE: RESIDENT**

### SATURDAY
8:00 am–4:15 pm
- SYM3: Maximizing Your Neurosurgical Employment Opportunities

### SUNDAY
8:00 am–4:15 pm
- SYM17: Quality Summit Bundle

### MONDAY
7:00–8:30 am
- Guidelines for the Management of Metastatic Disease to the Spine: The Evidence
- Guidelines for DBS and for Parkinson’s Disease

### TUESDAY
2:45–4:15 pm
- Council of State Neurosurgical Societies—What is Value
- CSNS: Patient Safety in Neurosurgical Practice
- Interactive Multimedia Research Presentation Session

### WEDNESDAY
7:00–8:30 am
- Sunrise Science and Late Breaking Abstract Session
- W25: Neurosurgeon Entrepreneur
- W30: Branding and Social Media in your Practice
TU TUMOR

SATURDAY
8:00 am–4:15 pm
SYM6: Brain Tumor Update

SUNDAY
8:00 am–4:15 pm
SYM14: Advanced Functional Mapping and 3D Anatomy for the Neurosurgeon
SYM15: Emerging Technologies in Neurosurgery
SYM20: Modern Approaches to SRS

MONDAY
7:00–8:30 am
Sunrise Science and Late Breaking Abstract Session
12:15–1:45 pm
M5: Spinal Tumor Surgery: Case-based Management
M9: Acoustic Neuromas: Current Management Strategies
M10: Harness the Immune System to Treat Brain Tumors
2:45–4:15 pm
Section on Tumors—Complications in Tumor Surgery: Navigating the Unexpected
Challenging Skull Base Tumors: Operative Techniques and Case-based Discussions
4:15–5:45 pm
The International Masters Symposium on Brain Tumor Surgery

TUESDAY
7:00–8:30 am
Guidelines on Management on Brain Metastases Update
12:15–1:45 pm
T18: Management of Pituitary Adenomas and Parasellar Pathology
T19: Malignant Gliomas: Advances in Surgery and Adjuvant Therapy
Section on Tumors—Emerging Concepts in the Management of Brain Metastases
4:15–5:45 pm
Challenging Intrinsic Brain Tumors: Operative Techniques and Case-based Discussions
7:30–9:30 pm
DIN4: Advances in LITT
5:45–7:15 pm
Interactive Multimedia Research Presentation Session

WEDNESDAY
7:00–8:30 am
Guidelines for Management of Glioblastoma
12:15–1:45 pm
W28: Update on Diagnosis and Management of Low-grade Gliomas
W29: Advanced Imaging in Brain Tumors
1:45–3:15 pm
Cranial Oral Abstract Presentation Session
1:45–4:45 pm
Advanced Endoscopic and Exoscopic Neurosurgery Seminar

AP ADVANCED PRACTICE PROVIDER

SATURDAY
8:00 am–4:15 pm
SYM1: Spine Trauma and Spinal Cord Injury Symposium

SUNDAY
8:00 am–4:15 pm
ANSPA Fall 2019 CME Meeting in Collaboration with Congress of Neurological Surgeons
SYM17: Quality Summit Bundle

MONDAY
5:45–7:15 pm
All International Symposia

TUESDAY
5:45–7:15 pm
Interactive Multimedia Research Presentation Session

TR NEUROTRAUMA

SATURDAY
8:00 am–4:15 pm
SYM11: Neurotrauma Update

MONDAY
7:00–8:30 am
Neurotrauma Debates
12:15–1:45 pm
M6: Peripheral Nerve Entrapment Syndromes: Diagnosis and Management
Section on Neurotrauma and Critical Care Session
4:15–5:45 pm
Challenging Cases in ICP Management: Operative Techniques and Case-based Discussions

TUESDAY
7:00–8:30 am
The Voice of Reason in Brain Death: From Bedside to the News
12:15–1:45 pm
T15: Is There an Outcome Worse than Death: Outcome, Palliative Care, and Ethical Considerations in Neurosurgical Care
12:15–1:45 pm
T16: Patient Specific Goal-directed Therapy in TBI
Section on Neurotrauma and Critical Care Session—Neuromodulation for Spinal Cord Injury
4:15–5:45 pm
Timing of Spinal Trauma Surgery: Operative Techniques and Case-based Discussions
5:45–7:15 pm
Interactive Multimedia Research Presentation Session

WEDNESDAY
7:00–8:30 am
Brain and Spine Trauma Guidelines—What You Need to Know
12:15–1:45 pm
W24: TBI in the Elderly
1:45–3:15 pm
Oral Abstract Presentation Session
1:45–4:45 pm
Advanced Endoscopic and Exoscopic Neurosurgery Seminar
SUBSPECIALTY SESSION HIGHLIGHTS

**PAIN**

**SUNDAY**
8:00 am–4:15 pm
- **SYM16**: Pain and Peripheral Nerve Symposium

**MONDAY**
2:45–4:15 pm
- Section on Pain Session—When to Use What
4:15–5:45 pm
- The Case Against Spinal Cord Stimulation: Operative Techniques and Case-based Discussion
5:45–7:15 pm
- The International Functional Neurosurgery Symposium

**TUESDAY**
12:15–1:45 pm
- T11: Perioperative Pain Management: Opioids, Non-opioids, and Neurosurgery Advocacy
2:45–4:15 pm
- Section on Pain Session—Targets Outside the Dorsal Columns for Pain
4:15–5:45 pm
- Neurosurgery for Pain: Operative Techniques and Case-based Discussions
5:45–7:15 pm
- Interactive Multimedia Research Presentation Session

**WEDNESDAY**
7:00–8:30 am
- Sunrise Science and Late Breaking Abstract Session

**PEDIATRIC**

**SUNDAY**
8:00 am–4:15 pm
- **SYM15**: Emerging Technologies in Neurosurgery

**MONDAY**
12:15–1:45 pm
- **M8**: Pediatric Concussion
2:45–4:15 pm
- Section on Pediatric Neurological Surgery—Pediatric Brain Tumors: Advancements in Molecular Diagnosis and Updated on Clinical Trials
4:15–5:45 pm
- Recurrent Disease in Pediatric Brain Tumors Patients: Case-based Discussions and Operative Techniques

**TUESDAY**
7:00–8:00 am
- Sunrise Science and Late Breaking Abstract Session
2:45–4:15 pm
- Post-hemorrhagic Hydrocephauls in Premature Infantants: Time for a Paradigm Shift?
4:15–5:45 pm
- Challenges in Recurrent Pediatric Epilepsy: Operative Techniques and Case-based Discussions
5:45–7:15 pm
- Interactive Multimedia Research Presentation Session

**WEDNESDAY**
12:15–1:45 pm
- **W26**: Chiari Malformations

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**Visit the New CNS Pop-up Shop!**

We’ll feature the latest trends in CNS swag—including t-shirts, jackets, umbrellas, and accessories.
PERIPHERAL NERVES

SUNDAY
8:00 am–4:15 pm
SYM16: Pain and Peripheral Nerve Symposium

MONDAY
12:15–1:45 pm
M6: Peripheral Nerve Entrapment Syndromes: Diagnosis and Management
2:45–4:15 pm
Section on Peripheral Nerve—Peripheral Nerve Task Force
4:15–5:45 pm
Peripheral Nerve: Operative Techniques and Case-based Discussions

TUESDAY
5:45–7:15 pm
Interactive Multimedia Research Presentation Session

WINS

SATURDAY
12:45–4:15 pm
SYM8: Training the Trainers

SUNDAY
8:00 am–4:15 pm
SYM17: Quality Summit Bundle

MONDAY
5:45–7:15 pm
All International Symposia

TUESDAY
12:15–1:45 pm
T20: Beating Press Ganey
5:45–7:15 pm
Interactive Multimedia Research Presentation Session

WEDNESDAY
12:15–1:45 pm
W30: Branding and Social Media in your Practice

SUBSPECIALTY SESSION HIGHLIGHTS KEY

AP ADVANCED PRACTICE PROVIDER
CV CEREBROVASCULAR
TR NEUROTRAUMA
PA PAIN
PE PEDIATRIC
PN PERIPHERAL NERVES
RE RESIDENT
SE SOCIOECONOMIC
SP SPINE
SF STEREOTACTIC AND FUNCTIONAL
TU TUMOR
WINS WINS
SYMPOSIA

SYM1: Spine Trauma and Spinal Cord Injury Symposium
Course Directors: Sanjay S. Dhall, Michael G. Fehlings, James S. Harrop, Eve C. Tsai
Agenda Highlights
- Research updates in spinal cord injury
- Top 3 management considerations for acute spinal cord injury and unstable fractures
- Rehabilitation and neuromodulation after spinal cord injury
- Spinal cord injury case management: face offs
- Case-based discussion of central cord injury, geriatric odontoid fracture, cervical facet dislocation and unstable thoracic spinal column fractures
- Non-operative and operative management to maximize outcomes, including timing, hemodynamics, and prognostication
- Timing of surgery for spinal trauma and spinal cord injury

SYM2: Functional Neurosurgery Update: Emerging Concepts
Course Directors: Ellen L. Air, Casey H. Halpern, John D. Rolston
Faculty: Raag Airan, Nicholas M. Barbaro, Edward F. Chang, Shabbar F. Danish, Robert S. Fisher, Kelly D. Foote, Wayne Goodman, Ryder P. Gwinn, Douglas Kondziolka, Vibhor Krishna, Jean-Philippe Langevin, Paul S. Larson, Kai J. Miller, Francisco A. Ponce, Robert M. Richardson, Sameer A. Sheth, Peter A. Tass, David P. Vansickle
Agenda Highlights
- Update on electrode implantation techniques
- Emerging concepts in movement disorders surgery
- Non-motor brain stimulation
- Emerging concepts in stereotactic lesioning
- New versus established techniques in epilepsy surgery
- Emerging concepts in restorative neurosurgery

SYM3: Maximizing Your Neurosurgical Employment Opportunities Non-CME
Note: $400 Physician; $50 Nurse/NP/PA; $50 Fellow/Resident/Medical Student
Course Directors: Mohamad Bydon, Lola B. Chambless, Jennifer A. Sweet
Faculty: John A. Braca, Andrew R. Conger, Timothy H. Lucas, Michael W. McDermott, Brian V. Nahed, Joseph S. Neimat, Judith Rosman, Justin A. Singer, Anand Veeravagu
Agenda Highlights
- Critical insights and perspectives on starting your neurosurgery practice
- Advantages and considerations of distinct practice settings and models
- Valuing yourself as a neurosurgeon in the job search and in negotiations
- Do’s and don’ts during job interviews
- Chair and Program Director’s perspectives on establishing a new neurosurgery career
- Leadership insights and pathways

SYM4A: New Era in Stenting
Course Director: Andrew W. Grande
Agenda Highlights
- Introduction and review of next generation low profile intracranial stents
- Indications for placement of next generation stents
- Technical tips for placement of next generation stents
- Hands on exposure and experience with new stents with simulators

SYM4B: Bypass Techniques in Cerebrovascular Surgery
Course Director: Sepideh Amin-Hanjani
Faculty: Adib A. Abla, Amir R. Dehdashti, Michael T. Lawton, Leonardo Rangel-Castilla, Jonathan Russin, Laligam N. Sekhar, Gregory J. Zipfel
Agenda Highlights
- EC-IC bypass for complex aneurysms
- STA-MCA bypass for ischemia – indications and technique
- STA-MCA bypass for moyamoya – indications and technique
- Posterior Circulation bypass for ischemia
- Posterior Circulation bypass for aneurysms
- Alternative donors: Imax, STA stump
- IC-IC bypass options for complex aneurysms

Full Day and Discounted Bundles (includes lunch):
Physician $400, Nurse/NP/PA $300, Resident/Fellow/Graduate Student/Post-doctoral Scholar/Medical Student $175
Half Day: (Does not include lunch) Physician $250, Nurse/NP/PA $200, Resident/Fellow/Graduate Student/Post-doctoral Scholar/Medical Student $125

Look for this image for a SANS exam that accompanies this course and can be purchased on the Annual Meeting registration site.
SYM6: Brain Tumor Update Bundle
Comprised of 2 sessions: SYM6A & SYM6B. Select this option to take both at a discounted rate.

SYM6A: Advanced Minimally Invasive Spine Surgery—Operative Nuances, Indications, and Complication Avoidance
Course Directors: Adam S. Kanter, Praveen V. Mummaneni
Faculty: Aaron J. Clark, Kevin T. Foley, Langston T. Holly, Catherine Miller-Simington, John Pollina, Khoi D. Than, Juan S. Uribe
Agenda Highlights
- Member-submitted case-based discussion of minimally invasive techniques and approaches to management of spinal disease
- Choosing between minimally invasive and open spine surgery
- Review of indications
- Patient selection in minimally invasive spine surgery
- Selecting the right approach for lumbar fusion: minimally invasive TLIF versus trans-psoas versus ALIF
- Complication avoidance and management in minimally invasive spine surgery

SYM6B: Brain Tumor Update: Benign Brain Tumors
Course Directors: Ian F. Dunn, Koji Yoshimoto
Agenda Highlights
- The role of microsurgery and endoscopy in the management of benign tumors
- Contemporary management of specific tumor histologies, including skull base meningiomas, pituitary adenomas, acoustic neuromas, chordomas, peripheral nerve tumors, and pediatric tumors
- Stereotactic Radiosurgery for benign tumors

SYM6B: Brain Tumor Update: Benign Brain Tumors
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Agenda Highlights
- The role of microsurgery and endoscopy in the management of benign tumors
- Contemporary management of specific tumor histologies, including skull base meningiomas, pituitary adenomas, acoustic neuromas, chordomas, peripheral nerve tumors, and pediatric tumors
- Stereotactic Radiosurgery for benign tumors

SYM7: Morbidity and Mortality
Space is limited, check at registration for availability
Course Director: Mark E. Shaffrey
Faculty: Won Kim, Philipp Taussky, G. Edward Vates
Agenda Highlights
- Satisfy ABNS MOC requirement for quarterly participation in morbidity and mortality
- Case-based discussion of member submitted complications
- Identify opportunity to surgical technique and systems of care improvement
- Implementing improvements in clinical care
- Creating a no-blame environment for case review

SYM8: Residency Program Update & Training the Trainers
This program is designed for Program Directors and Program Coordinators.
Course Director: Sarah Woodrow
Agenda Highlights
- Overview of new ABNS milestones
- Adult learning theory
- Teaching to millennials/ diversity
- Different models of feedback
- Intra-operative teaching
- Incorporating structured teaching into rounds
- Teaching “soft” skills (communication, giving bad news, collaboration with other services)
- How to identify learning gaps and learning styles
- Giving feedback to a learner
### SYM9: Appropriate Coding, ICD, and CPT—2019 Update

**Course Directors:** Mark E. Oppenlander, Clemens M. Schirmer  
**Faculty:** Joseph S. Cheng, Scott A. Meyer, Kim Pollock, John K. Ratliff, Khoi D. Than, Luis M. Tumialan, Anand Veeravagu

**Agenda Highlights**
- Medicare update modifiers
- Evaluation and management coding
- CD-10 coding and hospital coding for surgeons
- Revenue cycle optimization to ensure payment, PA/NP billing

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### CNS RESIDENT SOCIAL AND CSNS YOUNG NEUROSURGEONS RECEPTION

All residents are invited to attend and network with their peers. Recruiters will be available to assist with your future job search. Beer, wine, and appetizers will be served.

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### INTERNATIONAL RECEPTION

**Saturday, October 19 | 5:30–7:00 pm**  
**San Francisco Marriott Marquis | Yerba Buena Salon 7**

Join your colleagues from around the world at the CNS International Reception. Enjoy hors d’oeuvres and cocktails while chatting with some of the top international professionals in the field of neurological surgery. All international registered attendees and their registered guests are invited to attend.

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### DINNER SEMINAR 1 | SATURDAY, OCTOBER 19 | 6:30–8:30 PM

**SE01: How Do I Avoid Getting Penalized—ICD-10, CPTs, MACRA, ACOs, and APMs?**

**Moderator:** John K. Ratliff  
**Faculty:** Atman Desai, Rachel Groman, Kim Pollock, Cheerag D. Upadhyaya

**BOULEVARD**

This high-end San Francisco landmark showcasing the culinary vision of Nancy Oakes continues to excel thanks to the robust flavors of its mind-blowing, market-driven American cuisine paired with a terrific wine list and served with the ultimate professionalism amid spectacular Bay Bridge views.

Boulevard is recognized on Zagat’s “Most Popular” and “Best Business Dinners” lists in San Francisco.

Complimentary shuttle service will depart from the San Francisco Marriott Marquis at 6:15 pm.
SYMPOSIA

SYM10: Acute Stroke Care: Guidelines Review and Future Directions
Course Directors: Mohammad A. Aziz-Sultan, Mandy J. Binning, R. Webster Crowley
Agenda Highlights
- Guidelines for the Pre-hospital Triage of Patients with Acute Stroke (Breakout Session with Penumbra from 2:00–2:30 pm in Room 3016.)
- Management of Emergent Large Vessel Occlusion: Medical and Interventional Management
- Stroke Systems of Care
- New Technology and Artificial Intelligence for the Pre-hospital Triage of Acute Stroke
- Surgical Options for Stroke: Decompressive craniectomy, stenting, and bypass
- Thrombectomy Tools and Techniques
- The Management of Tandem Lesions
- Surgical Management of Intracerebral Hemorrhage: Minimally invasive and endoscopic approaches
- Translational Science in Acute Stroke

SYM11: Neurotrauma Update
Course Directors: Gregory W.J. Hawryluk, Shelly D. Timmons
Faculty: Randy S. Bell, Tene A. Cage, Rodrigo M. Faleiro, Ramesh Grandhi, Alan S. Hoffer, Ryan S. Kitagawa, Laura B. Ngwenya, Richard B. Rodgers, Uzma Samadani, Emily P. Sieg, Martina Stippler, Jamie S. Ullman
Agenda Highlights
- Severe TBI and Advanced Neuromonitoring

SYM12: A Comprehensive and Evidenced-based Guidelines Review for the Treatment of Intracranial Aneurysms
Course Directors: Peter Kan, Stacey Q. Wolfe
Agenda Highlights
- Guidelines for the Management of Unruptured and Ruptured Intracranial Aneurysms
- Imaging Guidelines for Small Unruptured Intracranial Aneurysms
- An Evidence Based Approach to Clip versus Coil for Unruptured and Ruptured Aneurysms
- New Horizons in the Treatment of Cerebral Vasospasm: Devices and Drugs
- Bifurcation aneurysms
- Treatment strategies for internal carotid aneurysms
- Guidelines for the Outpatient Management of Dual Antiplatelet Agents
- Endovascular Management of Basilar Apex Aneurysms—Management Strategies for Vertebral, Vertebrobasilar and Mid-Basilar Aneurysms

SYM13: Spine Biomechanics and Deformity Symposium
Comprised of 2 sessions: SYM13A & SYM13B. Select this option to take both at a discounted rate.

SYM13A: Spinal Biomechanics for the Practicing Neurosurgeon: What I Need to Know for My Practice
Course Directors: Joseph S. Cheng, Tyler R. Koski
Agenda Highlights
- Relevance of biomechanics in the management of degenerative, traumatic, and deformity-related spine disease

Full Day and Discounted Bundles (includes lunch):
Physician $400, Nurse/NP/PA $300, Resident/Fellow/Graduate Student/Post-doctoral Scholar/Medical Student $175
Half Day: (Does not include lunch) Physician $250, Nurse/NP/PA $200, Resident/Fellow/Graduate Student/Post-doctoral Scholar/Medical Student $125

Look for this image for a SANS exam that accompanies this course and can be purchased on the Annual Meeting registration site.

Agenda Highlights
- Common Indications and Complications of Decompressive Craniectomy
- TBI in the Elderly and Disparities in TBI care
- Controversies in Hyperosmolar Therapy
- Update in Critical Care for the Neurosurgeon
- Cerebral Autoregulation: What a Neurosurgeon Should Know
- VTE Prophylaxis in TBI8. Objective Measures of Acute TBI: Ocular, Serum, and Radiographic (Breakout Session with Natus Neurology from 9:00–9:30 am in Room 3024)
SYM13B: Thoracolumbar Spinal Deformity for the Non-deformity Spine Surgeon

Course Directors: Dean Chou, Christopher I. Shaffrey
Faculty: Kai-Ming G. Fu, D. Kojo Hamilton, Paul Park, Rod J. Oskouian, John H. Shin, Justin S. Smith, Lee A. Tan

Agenda Highlights
- Case-based review of thoracolumbar deformity management
- Indications for larger spinal constructs versus minimal approaches
- Measures for diagnosis and classification of thoracolumbar deformity
- Techniques for correction of thoracolumbar spinal deformity
- Complication avoidance and management based of thoracolumbar deformity

SYM14: Advanced Functional Mapping and 3D Anatomy for the Neurosurgeon

Comprised of 2 sessions: SYM14A & SYM14B. Select this option to take both at a discounted rate.

SYM14A: Surgical Management of Eloquent Area Tumors: Functional Mapping and/or Navigation

Course Directors: Mitchel S. Berger, Sunit Das
Faculty: Lorenzo Bello, Richard W. Byrne, Edward F. Chang, Hugues Duffau, Shawn L. Hervey-Jumper, Jason Heth, Eric C. Leuthardt, George Samandouras, Michael E. Suhgrue, Phiroz E. Tarapore

Agenda Highlights
- Preoperative assessment using structural and functional imaging
- Novel preoperative functional mapping techniques
- Intraoperative mapping: Surgical and anesthetic considerations
- Adjuncts to define and direct resection: Costas Hadjapanayis
- Case-based discussion

SYM14B: 3D Surgical Neuroanatomy

Course Director: Juan C. Fernandez-Miranda
Faculty: Mustafa K. Baskaya, Vladimir Benes, Spiros L. Blackburn, Aaron A. Cohen-Gadol, Paul A. Gardner, Jeffrey M. Sorenson, Necmettin Tanriover, Ugur Ture

Agenda Highlights
- Review relevant surgical neuroanatomy using 3D stereoscopic projection and high-definition fiber tractography (HDFT), including cortical and white matter anatomy, cerebrovascular, and skull base anatomy
- Review of intricate anatomical regions such as insula, ventricles, basal cisterns, middle fossa, and cavernous sinus
- Surgical approaches to cerebellum and fourth ventricle, posterior circulation, and lateral and posterior skull base approaches, including the cerebello-pontine angle, clival and petroclival region, jugular foramen, and foramen magnum

SYM15: Emerging Technologies in Neurosurgery

Comprised of 2 sessions: SYM15A & SYM15B. Select this option to take both at a discounted rate.

SYM15A: Intraoperative Technological Adjuncts: Indications and Techniques for Laser Therapy, Robotics, and Exoscopes

Course Director: Daniel Curry
Faculty: David D. Gonda, Jeffrey S. Raskin, Mitesh V. Shah, Scellig S. D. Stone, Jon T. Willie

Agenda Highlights
- Survey of current robotic technologies and applications across neurosurgical specialties
- Laser technology options, indications, limitations, and complication avoidance and management
- Exoscope technologies, including visualization, advantages, indications, and limitations
- Assessment of published outcomes using various new intraoperative adjunctive technologies, with a focus on specific advantages of each
- Complication avoidance and management with each adjunct
- Hands on experience with relevant technologies

SYM15B: Virtual and Augmented Reality: Science and Clinical Applications

Course Directors: Walter C. Jean, Cameron C. McIntyre
Faculty: Harith Akram, Joshua B. Bederson, Raphael Guzman, Alfred M.C. Illoreta, Paul S. Larson, Robert G. Louis, Nader Pouratian

Agenda Highlights
- Virtual Reality: Utility in surgical rehearsal, teaching and patient engagement
- Augmented Reality: Microscopes, endoscopies, and holography
- Image rendering: Novel MR sequences and analyses, tractography, and segmentation to guide surgical procedures

SYM16: Pain and Peripheral Nerve Symposium

Comprised of 2 sessions: SYM16A & SYM16B. Select this option to take both at a discounted rate.

SYM16A: Non-spinal Targets for Pain: Nerve, DRG, and Brain

Course Directors: Sean J. Nagel, Jennifer A. Sweet
SYM16B: Peripheral Nerve Surgery: Techniques and Exposure
Course Directors: Rajiv Midha, Robert J. Spinner
Faculty: Justin M. Brown, Amgad S. Hanna, Marie-Noelle Hebert-Blouin, Line G. Jacques, Allan D. Levi, Mark A. Mahan, Elias B. Rizk, Thomas J. Wilson, Eric L. Zager
Agenda Highlights
- Basics of history and physical exam
- Basics of nerve injury and regeneration
- Brachial plexus disorders, anatomy, and exposure
- Upper and lower extremity entrapments
- Peripheral nerve surgery emergencies
- Peripheral Nerve Tumors

SYM17: Quality Summit Bundle
Comprised of 2 sessions: SYM17A & SYM17B. Select this option to take both at a discounted rate.
8:00 am–12:00 pm

SYM17A: QI: Implementation and Results
Course Directors: Mohamad Bydon, Jeremy T. Phelps
Faculty: Erica F. Bisson, Zoher Ghogawala, Michael Glantz, Elizabeth B. Habermann, John J. Knightly, Mark E. Shaffrey, Jonathan Slotkin
Agenda Highlights
- Quality Improvement
- Patient Reported Outcomes
- Trial Design
- Evidence based Medicine
- Registry Establishment
- National Benchmarking and MCID
- Cost equations and Risk adjustment
12:45–4:15 pm

SYM17B: Using Big Data to Help Neurosurgeons and Their Patients
Course Directors: Katie Link, Eric K. Oermann
Faculty: Lola B. Chambless, Jason Davies, Mona Flores, Elizabeth B. Habermann, Andriy Myronenko
Agenda Highlights
- Machine learning overview
- Deep neural networks
- Analysis of Administrative Datasets
- Analysis of registry data
- Descriptive analytics
- Translating big data into practice
GENERAL SCIENTIFIC SESSION I

Presiding Officer: Ganesh Rao
Moderators: Lola B. Chambless, Alexander A. Khalessi

4:30–4:41 pm
Welcome to the 2019 CNS Annual Meeting
Ganesh Rao

4:41–4:49 pm
Neurosurgery Update: Cutting Edge in Neuro-oncology
Mitchel S. Berger

4:49–4:57 pm
Neurosurgery Update: Cutting Edge in Spinal Surgery – Prospective Studies versus Registries in the Age of Reason
Zoher Ghogawala

4:57–5:03 pm
Operative Technique Demonstration
Michael T. Lawton

5:03–5:07 pm
Introduction of Controversy: Chronic Traumatic Encephalopathy (CTE)
Joseph C. Maroon

5:07–5:25 pm
Controversies: The Evidence for CTE is Compelling
Julian E. Bailes

5:25–5:43 pm
Controversies: The Evidence for CTE is Underwhelming
Peter Cummings

5:43–5:47 pm
Controversies: Discussion and Outcomes
Joseph C. Maroon

5:47–5:49 pm
Introduction of Brain Tumor Guha Award
Manish K. Aghi

5:49–5:56 pm
Brain Tumor Guha Award Presentation
David H. Gutmann

5:56–5:59 pm
Introduction of Lucy Kalanithi
Anil Nanda and Julie G. Pilitsis

5:59–6:30 pm
FEATURED SPEAKER
A Conversation with Lucy Kalanithi
Lucy Kalanithi

JOIN US AT THE OPENING RECEPTION

6:30–8:30 pm
Moscone West Convention Center – Level 2 Lobby
MONDAY, OCTOBER 21

GUIDELINES AND SUNRISE SCIENCE

7:00–8:30 am  Room: 3014
TUMOR SUNRISE SCIENCE AND LATE-BREAKING ABSTRACT SESSION
Moderators: Maryam Rahman, Nader Sanai
For a listing of Sunrise Science and Late-breaking Oral Presentations, please see page 61.

7:00–8:30 am  Room: 2014
CEREBROVASCULAR SUNRISE SCIENCE AND LATE-BREAKING ABSTRACT SESSION
Moderators: Jan-Karl Burkhardt, Rohan V. Chitale
For a listing of Sunrise Science and Late-breaking Oral Presentations, please see pages 60-61.

7:00–8:30 am  Room: 3020
Guidelines for DBS for Parkinson's Disease
Moderators: Clement Hamani, Ahmed M.T. Raslan
Speakers: Kelly D. Foote, Julie G. Pilitsis, Anand I. Rughani, Jason M. Schwalb
7:00–7:17 am
STN Versus GPi Efficacy in Treating Motor Symptoms of PD
Jason M. Schwalb
7:17–7:34 am
STN Versus GPi for Reduction of Dopaminergic Meds, How to Assess This in Your Clinical Practice
Kelly D. Foote
7:34–7:51 am
STN Versus GPi for Dyskinesias and Quality of Life
Clement Hamani
7:51–8:08 am
STN Versus GPi for Concern of Cognitive Decline, Depression, and Quality of Life
Julie G. Pilitsis
8:08–8:25 am
STN Versus GPi in Risk of Surgical Adverse Events
Anand I. Rughani
8:25–8:30 am
Questions and Discussion
WELCOME SPOUSES & GUESTS!

Please plan to join us for complimentary breakfast Monday, Tuesday, and Wednesday morning from 8:00–10:30 in the 2nd Floor Atrium at the San Francisco Marriott Marquis Hotel.

And don’t miss all of the exciting speakers during the General Scientific Sessions each day and the events happening in the CNS Xperience Lounge.

WE’RE GLAD YOU ARE HERE!
MONDAY, OCTOBER 21  |  8:40 AM–12:10 PM  |  BALLROOM

GENERAL SCIENTIFIC SESSION II

Presiding Officer: Steven N. Kalkanis
Moderators: Nader Pouratian, Martina Stippler

8:40–8:48 am
GSS II Kickoff
Steven N. Kalkanis

8:48–8:51 am
Introduction of Shankar Vedantam
Akash J. Patel

8:51–9:13 am
FEATURED SPEAKER
Hidden Brain
Shankar Vedantam
Shankar Vedantam will be signing copies of his book, “The Hidden Brain” in the CNS Xperience Lounge during the morning beverage break.

9:13–9:18 am
Introduction of Honored Guest
Frederick F. Lang

9:18–9:40 am
Honored Guest Presentation:
Role of Resection for Glioblastoma: Can Technology Overcome Biology?
Raymond Sawaya

9:40–10:40 am
MORNING BEVERAGE BREAK
Visit the Exhibit Hall and enjoy a complimentary cup of coffee!

10:00–10:30 am
LIVE SURGERY IN THE EXHIBIT HALL
See page 20 for details.

10:40–10:46 am
Operative Neurosurgery Highlight
Laurence D. Rhines

10:46–10:48 am
CNS Foundation Update
Elad I. Levy

10:48–10:55 am
Japanese CNS Presidential Address
Yukihiro Sonoda

11:01–11:03 am
Introduction of CNS President
Adam S. Arthur

11:03–11:23 am
Presidential Address: The Age of Reason for Neurosurgery
Ganesh Rao

11:23–11:26 am
Introduction of Doris Kearns Goodwin
Daniel J. Hoh

11:26 am–12:10 pm
WALTER E. DANDY ORATOR
Leadership in Turbulent Times
Doris Kearns Goodwin

Doris Kearns Goodwin will be signing copies of her book, “Leadership: In Turbulent Times,” in the CNS Xperience Lounge immediately following the conclusion of this session.
LUNCHEON SEMINARS

All Luncheon Seminars include a plated lunch served in the seminar room. Luncheon Seminar fee is $95 each ($75 for residents, fellows, graduate students/post-doctoral scholars, medical students, and advance practice providers). Add a Luncheon Seminar to your profile at registration.

Room: 2001
RE M1: Honored Guest Luncheon: Leadership Engagements
Complimentary advanced registration recommended
Speaker: Raymond Sawaya

Room: 2002
SR M2: So You’ve Been Sued... Medical Practice 2019 Update
Moderators: Bharat Guthikonda, Rishi K. Wadhwa
Faculty: Deborah L. Benzil, Lawrence M. Shuer, James T. Tran, Richard N. Wohns

Room: 2003
CV M3: Is Intracerebral Hemorrhage a Surgical Disease?
Moderator: J D. Mocco
Faculty: Mark D. Bain, Abel P. Huang, Christopher P. Kellner, Gustavo Pradilla, Lauren Sansing, Alejandro M. Spiotta

Room: 2005
CNS SANS Lifelong Learning
SP M4: Cervical Spondylotic Myelopathy—Anterior Versus Posterior
Moderator: Zoher Ghogawala
Faculty: Erica F. Bisson, Perry P.S. Dhaliwal, Asdrubal Falavigna, Iain H. Kalfas, Vincent C. Traynelis, Luis M. Tumialan, Christopher E. Wolff, Takao Yasuhara

Room: 2007
SP TU M5: Spinal Tumor Surgery: Case-based Management
Moderators: Joseph S. Cheng, Ziya L. Gokaslan
Faculty: Mark H. Blisky, Dean Chou, Michelle J. Clarke, Charles Fisher, Ilya Laufer, Paul C. McCormick, Laurence D. Rhines

Room: 2008
CNS SANS Lifelong Learning
PP M6: Peripheral Nerve Entrapment Syndromes: Diagnosis and Management
Moderator: Line G. Jacques
Faculty: Jason H. Huang, Mark A. Mahan, Gabriel C. Tender, Christopher J. Winfree, Lynda J. Yang

Room: 2009
TR M7: Neurocritical Care: A Multidisciplinary Collaboration
Moderator: Joshua E. Medow
Faculty: Nicholas J. Brandmeir, Kristine O’Phelan, Lori Shutter

Room: 2000
PE M8: Pediatric Concussion
Moderator: Susan R. Durham
Faculty: Robert J. Bollo, Meeryo C. Choe, Michael L. Levy, Carolyn Quinsey, Christina M. Sayama

Room: 20010
TU M9: Acoustic Neuromas: Current Management Strategies
Moderators: William T. Couldwell, Steven L. Giannotta
Faculty: Frederick G. Barker, Lola B. Chambless, John G. Golfinos, Michael J. Link, Jacques J. Morcos, Marc S. Schwartz

Room: 2011
TU M10: Harnessing the Immune System to Treat Brain Tumors
Moderators: Hideho Okada, E. Antonia Chiocca
Faculty: Gavin P. Dunn, Peter Fecci, Amy B. Heimberger, Michael Lim, Yoshitaka Narita

1:45–2:45 pm
AFTERNOON BEVERAGE BREAK
Visit the Exhibit Hall and enjoy a complimentary beverage. Coffee will be served throughout the Exhibit Hall and beer, wine, and snacks will be served in the CNS Xperience Lounge!

Give to the Future of Neurosurgery

Please visit the CNS Foundation booth and silent auction across from registration on Level 1 of Moscone West. Donate today!

The CNS Foundation’s philanthropic mission is to improve worldwide patient health by supporting innovative programs that allow neurosurgeons to collaborate globally as researchers, learners, educators, and caregivers. Visit cns.org/Foundation to help us achieve our goals.

Look for this image for a SANS exam that accompanies this course and can be purchased on the Annual Meeting registration site.
Special Session: The FDA: Investigational Device Exemptions, Regulatory Process, and Moving Medical Devices to Patients (Non-CME)
Speakers: Carlos Pena, Mohamad Bydon

The United States (U.S.) Food and Drug Administration (FDA) ensures that patients in the U.S. have access to safe and effective medical devices. The Division of Neurological and Physical Medicine Devices reviews medical devices that interface with the nervous system. This presentation will assist attendees in how to navigate the FDA’s regulatory landscape to successfully move medical devices to patients.

- Agency Overview and Organization
- Neurological Medical Device Review and Oversight
- Clinical Overview and Perspectives
- Broader Engagement and Best Practices for FDA Engagement

Join Us for a Special Presentation by Dr. Alan Scarrow:

Executive Presence and a Glimpse into the CNS Leadership Institute


Monday, October 21, at 9:40 am in the Xperience Lounge!
MONDAY, OCTOBER 21

AFTERNOON SESSIONS

SECTION SESSIONS

SE 2:45–4:15 pm  Room: 3016
COUNCIL OF STATE NEUROSURGICAL SOCIETIES
Achieving High Quality
Moderators: Darlene A. Mayo, Paul L. Penar
Speakers: Anthony L. Asher, Rachel Groman, John J. Knightly, Ahilan Sivaganesan
2:45–2:59 pm
Data to Drive Quality Improvement
Anthony L. Asher
3:00–3:14 pm
How Do I Implement Quality?
John J. Knightly
3:15–3:24 pm
What Does the Government and CMS Think?
Rachel Groman
3:25–3:27 pm
Questions and Discussion
3:27–3:33 pm
Neurosurgery Socioeconomics, Health Policy, and Law Paper of the Year: Drivers of Variability in 90-day Cost for Elective Laminectomy and Fusion for Lumbar Degenerative Disease
Ahilan Sivaganesan
3:33–4:15 pm
Oral Abstract Presentations
For a listing of Oral Presentations, see page 62.

CV 2:45–4:15 pm  Room: 2014
SECTION ON CEREBROVASCULAR SURGERY
Artificial Intelligence in Cerebrovascular Neurosurgery
Moderator: E. Sander Connolly
Speakers: Sepideh Amin-Hanjani, Hormuzdiyar H. Dasenbrock, Johanna Fifi, Eric K. Oermann, Alejandro M. Spiotta
2:45–2:55 pm
AI in the Management of Acute Stroke
Johanna Fifi
2:55–3:05 pm
AI as a Database Research Tool
Hormuzdiyar H. Dasenbrock
3:05–3:15 pm
AI in Neuroimaging of Acute Neurologic Disease
Eric K. Oermann
3:15–3:25 pm
AI in Clinical Decision Making
Alejandro M. Spiotta
3:25–3:27 pm
Questions and Discussion
3:27 – 3:33 pm
Neurosurgery Cerebrovascular Paper of the Year: Accuracy in Identifying the Source of Subarachnoid Hemorrhage in the Setting of Multiple Intracranial Aneurysms
Sepideh Amin-Hanjani
3:33–4:15 pm
Oral Abstract Presentations
For a listing of Oral Presentations, see page 62.

SP 2:45–4:15 pm  Room: 2016
SECTION ON DISORDERS OF THE SPINE AND PERIPHERAL NERVES
Spine Section Update
Moderators: Domagoj Coric, Michael P. Steinmetz
Speakers: Regis W. Haid, Paul K. Kim, Paul Park, Kevin M. Walsh, Michael Y. Wang
2:45–2:53 pm
Outpatient Degenerative Spine Surgery: Patient Outcomes, Realities, and Finances
Paul K. Kim
2:53–3:03 pm
Pushing the Envelope of Spine Surgery: Update on ERAS, Outpatient Surgery, and Awake TLIFs
Michael Y. Wang
3:03–3:11 pm
Cervical Stenosis Without Myelopathy in Lumbar Pathology Patients: Do We Really Always Need to Decompress the Cervical Spine Before Lumbar Surgery?
Paul Park
3:12–3:20 pm
Cervical Laminectomy and Fusion: Should We Always Go to T1 or is Stopping at C7 Just as Good?
Kevin M. Walsh
3:21–3:28 pm
Interbody Surface Technology Update: Is it Worth the Additional Cost? The Evidence
Regis W. Haid
3:29–4:15 pm
Oral Abstract Presentations
For a listing of Oral Presentations, see pages 62-63.

TR 2:45–4:15 pm  Room: 3022
SECTION ON NEUROTRAUMA AND CRITICAL CARE
Charles Tator Lecture — Bench to Bedside to Bench: A Physician-scientists 30-Year Journey in the World of Spinal Cord Injury
Richard G. Fessler
2:45–3:05 pm
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Charles Tator Lecture — Bench to Bedside to Bench: A Physician-scientists 30-Year Journey in the World of Spinal Cord Injury
Richard G. Fessler
3:05–3:25 pm
Edema in Traumatic Brain Injury
J. Marc Simard
3:25–3:31 pm
Neurosurgery Neurotrauma and Critical Care Paper of the Year: The Intracerebral Hemorrhage Score: A Self-Fulfilling Prophecy?
D. Jay McCracken
3:31–4:15 pm
Oral Abstract Presentations
For a listing of Oral Presentations, see page 63.
PA  2:45–4:15 pm  Room: 3024
SECTION ON PAIN
Complex Facial Pain: When to Use What
Moderators: Sean J. Nagel, Ahmed M.T. Raslan
Speakers: Sharona Ben-Haim, Sean J. Nagel, Julie G. Pilitsis, Konstantin V. Slavin, Doris D. Wang
2:45–2:55 pm
Characterization of Complex Facial Pain Syndromes
Sharona Ben-Haim
2:56–3:06 pm
Neuromodulation Options for Complex Facial Pain
Konstantin V. Slavin
3:07–3:17 pm
Management of Recurrent TN/Revision MVD
Doris D. Wang
3:18–3:28 pm
When to Use What: Lesioning Versus Decompression Versus Neuromodulation for Complex Facial Pain
Sean J. Nagel
3:28–3:34 pm
Neurosurgery Pain Paper of the Year: Spinal Cord Stimulation for the Treatment of Chronic Pain Reduces Opioid Use and Results in Superior Clinical Outcomes When Used Without Opioids
Julie G. Pilitsis
3:34–4:15 pm
Oral Abstract Presentations
For a listing of Oral Presentations, see pages 63-64.

PE  2:45–4:15 pm  Room: 3018
SECTION ON PEDIATRIC NEUROLOGICAL SURGERY
Pediatric Brain Tumors: Advancements in Molecular Diagnosis and Update on Clinical Trials
Moderators: Toba Niazi, Amanda Muhs Saratsis
Speakers: Paul Klimo, Alyssa Reddy
2:45–3:02 pm
Discussion and Update on Advancements in Pediatric Brain Tumors, the Molecular Basis of Diagnosis, Current and Upcoming Clinical Trials, and Personalized Medicine
Alyssa Reddy
3:03–3:20 pm
Targeted Muscle Reinnervation: Ready for Prime Time?
Mark A. Mahan
3:20–3:26 pm
B. Indira Devi
3:26–4:15 pm
Oral Abstract Presentations
For a listing of Oral Presentations, see pages 63-64.

SF  2:45–4:15 pm  Room: 3020
SECTION ON STEREOTACTIC AND FUNCTIONAL NEUROSURGERY
The Future of Preoperative Functional Mapping
Moderators: Ellen L. Air, Nitin Tandon
Speakers: Raag Airan, Dario J. Englot, Hui Ming Khoo, Bomin Sun
2:45–2:58 pm
EEG-fMRI and Network-based Mapping for Localizing Epilepsy Foci
Hui Ming Khoo
2:59–3:12 pm
Neurosurgery Stereotactic and Functional Paper of the Year: Long-Term Follow-up Study of MRI-Guided Bilateral Anterior Capsulotomy in Patients With Refractory Anorexia Nervosa
Bomin Sun
3:13–3:26 pm
Connectivity-based Preoperative Functional Mapping to Predict Outcomes
Dario J. Englot
3:27–3:33 pm
Neurosurgery Stereotactic and Functional Paper of the Year: Long-Term Follow-up Study of MRI-Guided Bilateral Anterior Capsulotomy in Patients With Refractory Anorexia Nervosa
Bomin Sun
3:34–4:15 pm
Oral Abstract Presentations
For a listing of Oral Presentations, see page 65.

TU  2:45–4:15 pm  Room: 3014
SECTION ON TUMORS
Complications in Tumor Surgery: Navigating the Unexpected
Moderators: Wenyu L. Bi, WALAVAN SIVAKUMAR
Speakers: Frederick G. Barker, Mitchel S. Berger, William T. Couldwell, Daniel F. Kelly, Michael A. Vogelbaum
2:45–2:55 pm
Open Skull Base
William T. Couldwell
2:55–3:05 pm
Glioma Tumor Surgery Complications
Mitchel S. Berger
3:05–3:15 pm
Navigating Medicolegal Complications
Frederick G. Barker
3:15–3:25 pm
Endoscopic and Keyhole Surgery Complications
Daniel F. Kelly
3:25–3:28 pm
Questions and Discussion
Neurosurgery Tumor Paper of the Year: Phase I Trial of Radiosurgery Dose Escalation Plus Bevacizumab in Patients With Recurrent/Progressive Glioblastoma
Michael A. Vogelbaum

OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION SESSIONS

SE 4:15–5:45 pm  Room: 3016
CSNS: How to Build a Spine Center
Moderators: James S. Harrop, Anand Veeravagu
Speakers: Khalid M. Abbed, James S. Harrop, Richard N. Wohns
4:16–4:30 pm
Lessons Learned from Working with our Orthopedic Colleagues
James S. Harrop
4:31–4:45 pm
Building a Regional Network
Khalid M. Abbed
4:46–5:00 pm
Lessons on ASCs and Outpatient Surgery
Richard N. Wohns
5:01–5:15 pm
Questions and Discussion
5:16–5:40 pm
Abstract Presentations
For a listing of Oral Presentations, see page 66.
5:41–5:45 pm
Questions and Discussion

TU 4:15–5:45 pm  Room: 3014
Challenging Skull Based Tumors: Operative Techniques and Case-based Discussions
Moderator: Jacques J. Morcos
Case Discussants: Lola B. Chambless, John G. Golfinos, Anil Nanda, Nelson M. Oyesiku, Marc S. Schwartz
Speakers: Juan C. Fernandez-Miranda, Akihide Kondo, Soichi Oya
4:16–4:25 pm
Surgeries for Optic Nerve Tumors
Akihide Kondo
4:26–4:35 pm
Extended Middle Fossa Approach with Anterior Petrosectomy and Anterior Clinoidectomy for Resection of Spheno-Cavernous-Tentorial Meningioma: The Hakuba-Kawase-Dolenc Approach: 3-Dimensional Operative Video
Juan C. Fernandez-Miranda
4:36–4:45 pm
Ultra-Early Optic Nerve Decompression for the Resection of Anterior Clinoidal Meningioma
Soichi Oya
4:46–4:59 pm
Abstract Presentations
For a listing of Oral Presentations, see pages 67-68.
5:00–5:45 pm
Case-based Discussion
TR 4:15–5:45 pm  Room: 3022
TBI and AI: Operative Techniques and Case-based Discussions
Moderators: Gregory J. Murad, Martina Stippler
Case Discussants: Samuel R. Browd, Ramesh Grandhi, Emily P. Sieg, Eve C. Tsai
4:15–4:39 pm
Abstract Presentations
For a listing of Oral Presentations, see pages 66-67.
4:40–5:45 pm
Case-based Discussion

PA 4:15–5:45 pm  Room: 3024
The Case Against Spinal Cord Stimulation: Operative Techniques and Case-based Discussion
Moderators: Gaddum D. Reddy, Jason M. Schwalb
Speakers and Case Discussants: Steven M. Falowski, Wendall B. Lake, Jason M. Schwalb, Konstantin V. Slavin, Christopher J. Winfree
4:17–4:26 pm
Review the Literature that Shows Poor Outcomes/Poor Responders/Placebo Effect
Steven M. Falowski
4:27–4:36 pm
Why Does SCS Fail Long Term
Wendall B. Lake
4:37–4:46 pm
Complications and Patient Complaints
Konstantin V. Slavin
4:47–4:56 pm
Cost Analysis
Jason M. Schwalb
4:57–5:06 pm
Alternatives-revision Spine Surgery: Medications and Marijuana
Christopher J. Winfree
5:06–5:45 pm
Case-based Discussion

PN 4:15–5:45 pm  Room: 3018
Peripheral Nerve: Operative Techniques and Case-based Discussions
Moderators: Rajiv Midha, Robert J. Spinner, Gabriel C. Tender, Eric L. Zager
Discussants: Zarina S. Ali, Justin M. Brown, Amgad S. Hanna, Line G. Jacques, Mark A. Mahan, Shaun T. O’Leary, Christopher J. Winfree
4:15–4:35 pm
Technical Nuances and Cases: Benign Peripheral Nerve Tumors
Moderator: Robert J. Spinner
Discussants: Zarina S. Ali, Line G. Jacques
4:35–4:55 pm
Technical Nuances and Cases: Carpal Tunnel Release (Endoscopic Versus Open)
Moderator: Gabriel C. Tender
Discussants: Mark A. Mahan, Christopher J. Winfree
4:55–5:15 pm
Technical Nuances and Cases: Ulnar Nerve Decompression (Anterior Transposition Versus in Situ)
Moderator: Rajiv Midha
Discussants: Justin M. Brown, Shaun T. O’Leary
5:15–5:35 pm
Technical Nuances and Cases: Meralgia Paresthetica (Neurectomy Versus Decompression)
Moderator: Eric L. Zager
Discussants: Amgad S. Hanna, Line G. Jacques
5:35–5:45 pm
Questions on the Case Discussion
Line G. Jacques, Robert J. Spinner
NEW to the 2019 Scientific Program are three International Symposia, which feature world-renowned neurosurgeons sharing their insights on these cutting-edge topics.

**THE INTERNATIONAL MASTERS SYMPOSIUM ON BRAIN TUMOR SURGERY**
- Moderators: Mitchel S. Berger, George Samandouras
- Speakers: Mitchel S. Berger, Fred Gentili, Takeshi Kawase, George Samandouras, Theodore H. Schwartz
- **TU 5:45–6:02 pm**
  - USA—Mapping Techniques for Low-grade Gliomas
    - Mitchel S. Berger
  - **6:03–6:20 pm**
  - Japan—Surgery in the Cavernous Sinus
    - Takeshi Kawase
  - **6:21–6:38 pm**
  - Canada—Skull Base Meningioma Surgery
    - Fred Gentili
  - **6:39–6:56 pm**
  - Endoscopic Pituitary Surgery
    - Theodore H. Schwartz
  - **6:57–7:14 pm**
  - UK—Surgery for Insular Gliomas
    - George Samandouras

**THE INTERNATIONAL CEREBROVASCULAR SYMPOSIUM**
- Moderators: Miki Fujimura, Clemens M. Schirmer
- Speakers: Tomohito Hishikawa, Ichiro Nakagawa, Philipp Taussky
- **TU 5:45–5:55 pm**
  - Natural History and Management Strategy for Intracranial Aneurysms
    - Tomohito Hishikawa
- **5:56–6:10 pm**
  - Endovascular Management of Complex Intracranial Aneurysms
    - Philipp Taussky

**THE INTERNATIONAL FUNCTIONAL NEUROSURGERY SYMPOSIUM**
- Moderators: Jorge A. Gonzalez-Martinez, Makoto Taniguchi
- Speakers: Masaki Iwasaki, Hui Ming Khoo, Takaomi Taira
- **SU 5:45–6:00 pm**
  - Recent Advance in Epilepsy Research
    - Hui Ming Khoo
- **6:01–6:16 pm**
  - Stereotactic Lesioning for Dystonia and Movement Disorders
    - Takaomi Taira

**STAY CONNECTED**
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- Review all courses, speakers, exhibitors, and events
- View all meeting abstracts
- Create your own preferred schedule each day
- Keep notes and activity logs in real time, in one place
THANK YOU
INDUSTRY AMBASSADOR

FOR YOUR VALUABLE SUPPORT!

DePuy Synthes

CERENOVUS
DINNER SEMINAR 2 | MONDAY, OCTOBER 21 | 7:30–9:30 PM

$190 (includes three-course dinner and beverages)

CV DIN2: Multi-modality AVM Treatment in the Past, Present, and Future
Moderator: E. Sander Connolly
Faculty: Kevin M. Cockroft, Jason Davies, Iris C. Gibbs, Douglas Kondziolka, Babu G. Welch

PROSPECT
Prospect hosts a warm and modern urban environment, with high service standards and exceptional cuisine. The restaurant offers local sustainable, organic ingredients staying consistent with what you would expect from this San Francisco gem.

On Zagat’s Best Restaurant and Best Craft Cocktails lists in SoMa (South of Market neighborhood).

Complimentary shuttle service will depart from the San Francisco Marriott Marquis at 7:15 pm.

DINNER SEMINAR 3 | MONDAY, OCTOBER 21 | 7:30–9:30 PM

$190 (includes three-course dinner and beverages)

SP DIN3: Navigation and Robotics: Fad or Future?
Moderators: Paul Park, Mark E. Shaffrey
Faculty: Victor W. Chang, Domagoj Coric, Laura A. Snyder, Nicholas Theodore, Juan S. Uribe, Michael Y. Wang

MORTON’S
Enjoy a classic steakhouse experience with perfectly cooked chops and welcoming service at Morton’s. This high-end restaurant is newly renovated and offers an award-winning wine list.

Morton’s Steakhouse is the top-scoring Fine-dining Chain in National Restaurant News’ Consumer Picks of 2016.

Complimentary shuttle service will depart from the San Francisco Marriott Marquis at 7:15 pm.

Visit the CNS Xperience Lounge in the Exhibit Hall

Connect with colleagues, grab a beverage, and see what’s next on your agenda!

- Connect with the CNS Membership Team
- Innovator of the Year Finalists
- Digital Posters
- Book signings with Featured Speakers
- Meet Honored Guest, Raymond Sawaya, MD
- Alan Scarrow Presentation and Book Signing
- Voices of Neurosurgery: The Unforgettable Moments
- Gary Simonds Presentation and Book Signing
- NVIDIA: Artificial Intelligence for Neurosurgeons – A Hands-on Demo
- Wellness Afternoon: Tuesday at 1:45–2:45 pm

For a complete schedule check the CNS Meeting App!
**Guidelines and Sunrise Science**

**7:00–8:30 am  Room: 3014**

**Guidelines on Management on Brain Metastases Update**

**Moderators:** Melanie H. Gephart, Jonathan H. Sherman  
**Speakers:** James B. Elder, Ricardo J. Komotar, Michael A. Vogelbaum, Y. Josh Yamada  
7:00–7:05 am  
**Introduction**  
7:05–7:25 am  
**Treatment Strategies for Single Versus Multiple Metastases**  
Ricardo J. Komotar  
7:25–7:45 am  
**The Tipping Point: When to use SRS Versus WBRT**  
Y. Josh Yamada  
7:45–8:05 am  
**The Role of Emerging Therapies Including LITT and Brachytherapy: The Need for Clinical Trials**  
James B. Elder  
8:05–8:25 am  
**Brain Metastasis Guidelines: A Critical Overview**  
Michael A. Vogelbaum  
8:25–8:30 am  
**Questions and Discussion**

**7:00–8:30 am  Room: 3022**

**The Voice of Reason in Brain Death: From Bedside to the News**

**Moderators:** Kathryn M. Beauchamp, Jamie S. Ullman  
**Speakers:** Justin Davanzo, Flora Hammond, Shaun D. Rodgers, Uzma Samadani  
7:00–7:20 am  
**Status Quo of Brain Death: Guidelines and Protocols**  
Justin Davanzo  
7:20–7:50 am  
**Behavioral Recovery and Early Decision-making in Disorders of Consciousness**  
Flora Hammond  
7:50–8:10 am  
**Brain Death in the Media**  
Uzma Samadani  
8:10–8:30 am  
**Mastering Pediatric Brain Death Determination**  
Shaun D. Rodgers

**Subspecialty Session Highlights Key**

| AP | ADVANCED PRACTICE PROVIDER | PA | PAIN | PE | PEDIATRIC | PN | PERIPHERAL NERVES | SE | SOCIOECONOMIC | SP | SPINE | SF | STEREOTACTIC AND FUNCTIONAL | TR | TUMOR | TU | TUMOR | WINS | Wins |
TUESDAY, OCTOBER 22 | 8:40 AM–12:10 PM | BALLROOM

GENERAL SCIENTIFIC SESSION III

Presiding Officer: Brian L. Hoh
Moderators: Ashok R. Asthagiri, Jennifer A. Sweet

8:40–8:42 am
Introduction and Disclosures
Brian L. Hoh

8:42–8:45 am
NEUROSURGERY® Publications Update
Nelson M. Oyesiku

8:45–8:51 am
Neurosurgery Top and Spine Paper of the Year: Symptomatic Adjacent Level Disease Requiring Surgery: Analysis of 10-Year Results From a Prospective, Randomized, Clinical Trial Comparing Cervical Disc Arthroplasty to Anterior Cervical Fusion
Allan D. Levi

9:13–9:15 am
Introduction of Carl Zimmer
Garni Barkhoudarian

9:15–9:40 am
FEATURED SPEAKER
Journey to the Center of the Brain
Carl Zimmer

9:40–10:40 am
MORNING BEVERAGE BREAK
Visit the Exhibit Hall and enjoy a complimentary cup of coffee!

10:00–10:30 am
LIVE SURGERY IN THE EXHIBIT HALL
See page 20 for details.

10:40–10:44 am
AANS President
Christopher I. Shaffrey

10:44–10:49 am
Washington Committee
Ann R. Stroink

10:49–10:51 am
Introduction of Controversy: Clinical Trials, Ethics, and Stem Cells: Are RCTs Necessary to Validate a Novel Therapy?
Robert E. Gross

10:51–10:59 am
Controversies: RCTs Are Not Necessary and Might Not Be Ethical
Richard G. Fessler

10:59–11:07 am
Controversies: RCTs are Always Necessary for New Therapies
Gary K. Steinberg

11:07–11:12 am
Controversies: Discussion and Outcomes
Robert E. Gross

11:12–11:20 am
Neurosurgery Update: Cutting Edge in NeuroTrauma: Severe TBI Algorithm
Randall M. Chesnut

11:20–11:28 am
Neurosurgery Update: Cutting Edge in Cerebrovascular Surgery
Adnan H. Siddiqui

11:28–11:30 am
Educator of the Year Award Presentation
Neil E. Roundy
Presented by Ganesh Rao

11:30–11:33 am
Distinguished Service Award Presentation
David C. Berg
Presented by Ashwini D. Sharan

11:33–11:36 am
Founder’s Laurel Award Presentation
Daniel L. Barrow
Presented by Ashwini D. Sharan

11:36–11:41 am
SNS Update
Karin M. Muraszko

11:41–11:43 am
Introduction of Bret Stephens
Nicholas C. Bambakidis

11:43–12:10 pm
FEATURED SPEAKER
U.S. Foreign Policy and the World
Bret Stephens

Bret Stephens will be signing copies of his book, “America in Retreat,” in the CNS Xperience Lounge immediately following the conclusion of this session.

8:51–9:13 am
Honored Guest Presentation: Evidence-based Medicine Through Development of Home-grown Databases
Raymond Sawaya

9:40–10:44 am
AANS President
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TUESDAY, OCTOBER 22 | 12:15–1:45 pm

LUNCHEON SEMINARS

All Luncheon Seminars include a plated lunch served in the seminar room. Luncheon Seminar fee is $95 each ($75 for residents, fellows, graduate students/post-doctoral scholars, medical students, and advance practice providers). Add a Luncheon Seminar to your profile at registration.

Room: 2001
**P A T11:** Perioperative Pain Management: Opioids, Non-opioids, and Neurosurgery Advocacy  
*Moderators:* Robert F. Heary, Christopher J. Winfree  
*Faculty:* Victor W. Chang, Joshua M. Rosenow, Jason M. Schwalb, Jennifer A. Sweet

Room: 2003
**C V T12:** Carotid Artery Disease: Symptomatic/Asymptomatic/Stent/CEA  
*Moderator:* Stacey Q. Wolfe  
*Faculty:* Mark R. Harrigan, Brian T. Jankowitz, Adnan H. Siddiqui, Justin A. Singer, John A. Wilson

Room: 2005
**S P T13:** Peak Performance: Optimizing the Spine Surgical Patient from Pre-op to Post-op  
*Moderators:* Scott A. Meyer, Laura A. Snyder, Marjorie C. Wang  
*Faculty:* Christopher M. Holland, Luke Macyszyn, Hesham M. Soliman, Michael S. Virk, Robert G. Whitmore

Room: 2007
**S P T14:** Controversies in Spinal Deformity Surgery  
*Moderator:* Christopher P. Ames  
*Faculty:* Richard G. Fessler, Kai-Ming G. Fu, Robert F. Heary, Justin S. Smith, Jay D. Turner, Juan S. Uribe

Room: 2008
**T R T15:** Is There an Outcome Worse than Death: Outcome, Palliative Care, and Ethical Considerations in Neurosurgical Care  
*Moderator:* Martina Stippler  
*Faculty:* Nicholas J. Brandmeir, Flora Hammond, Kimberly P. Kicielinski

Room: 2009
**T R T16:** Patient Specific Goal-directed Therapy in TBI  
*Moderator:* Julian E. Bailes Jr.  
*Faculty:* Randall M. Chesnut, Gregory W.J. Hawryluk, Laura B. Nwengya, Eiichi Suehiro, Lori Shutter

Room: 2010
**S P T17:** Clinical Trials in Movement Disorder Surgery  
*Moderators:* Sharona Ben-Haim, Ashwin Viswanathan  
*Faculty:* H. Isaac Chen, John D. Rolston

Room: 2012
**T U T18:** Management of Pituitary Adenomas and Parasellar Pathology  
*Moderators:* Daniel F. Kelly, Pamela S. Jones  
*Faculty:* Paul A. Gardner, Anand V. Germanwala, Nelson M. Oyesiku, Dimitris G. Placantonakis, Daniel M. Prevedello, Gabriel Zada

Room: 2011
**T U T19:** Malignant Gliomas: Advances in Surgery and Adjuvant Therapy  
*Moderators:* Jeffrey N. Bruce, James B. Elder  
*Faculty:* E. Antonio Chiocca, Gavin P. Dunn, Constantinos G. Hadjipanayis, Melanie Hayden Gephart

Room: 2000
**T U T20:** Beating Press Ganey  
*Moderator:* Ellen L. Air  
*Faculty:* Sharona Ben-Haim, Sheri Dewan, Lauren Ostling

1:00–2:00 pm  
**Room 3002**

NEUROSURGERY® PUBLICATIONS: MEET THE EDITORS

Hear from leading voices in scholarly publishing! The NEUROSURGERY® Publications: Meet the Editors Session is open to all attendees free of charge. Attendees will hear from the following editors of leading neurosurgical journals:

- **Edward C. Benzel, MD**  
  Editor-in-Chief, World Neurosurgery

- **Nancy E. Epstein, MD, FACS**  
  Editor-in-Chief, Surgical Neurology International

- **Tiit Mathiesen, MD, PhD**  
  Editor-in-Chief, Acta Neurochirurgica

- **Nelson M. Oyesiku, MD, PhD, FACS**  
  Editor-in-Chief, NEUROSURGERY® Publications

- **James T. Rutka, MD, PhD**  
  Editor-in-Chief, Journal of Neurosurgery Publishing Group

- **Peter C. Warnke, MD, Dr.med., FRCS**  
  Associate Editor, Journal of Neurology, Neurosurgery and Psychiatry
TUESDAY, OCTOBER 22

AFTERNOON SESSIONS

SECTION SESSIONS

SECTION ON COUNCIL OF STATE NEUROSURGICAL SOCIETIES
SE 2:45–4:15 pm  Room: 3016
What Is Value
Moderators: Joseph S. Cheng, Deborah L. Benzil
Speakers: Deborah L. Benzil, John K. Ratliff
2:45–3:03 pm
Value—An Easily Defined Concept
Deborah L. Benzil
3:04–3:22 pm
Value-based Care
John K. Ratliff
3:23–3:27 pm
Questions and Discussion
3:27–4:15 pm
Oral Abstract Presentations
For a listing of Oral Presentations, see page 72.

SECTION ON CEREBROVASCULAR SURGERY
CV 2:45–4:15 pm  Room: 2014
Future Training of the Cerebrovascular Surgeon
Moderators: Judy Huang, Murat Gunel
Speakers: Daniel L. Barrow, C. Michael Cawley, Brian L. Hoh, Louis J. Kim, Elad I. Levy
2:45–2:55 pm
Modern Open Cerebrovascular Training
Daniel L. Barrow
2:55–3:05 pm
Modern Endovascular Training
Elad I. Levy
3:05–3:15 pm
Simultaneous Combined Training
C. Michael Cawley
3:15–3:27 pm
Questions for the Panel
3:27–4:15 pm
Oral Abstract Presentations
For a listing of Oral Presentations, see pages 72-73.

SECTION ON DISORDERS OF THE SPINE AND PERIPHERAL NERVES
PN SP 2:45–4:15 pm  Room: 2016
Spine Update: The Evidence
Moderators: Erica F. Bisson, John H. Chi, Eric A. Potts, John H. Shin
Speakers: Dean Chou, Zoher Ghogawala, Praveen V. Mummaneni, William R. Taylor, Juan S. Uribe
2:45–2:53 pm
Lateral Stand-alone Corrects Stenosis and Does Not Subside: The Evidence
William R. Taylor
2:54–3:02 pm
Lateral Stand-alone Subsides and Fails to Correct Stenosis: The Evidence
Juan S. Uribe
3:03–3:11 pm
Discussant: Lateral Stand-alone Versus with Posterior Fixation: The Final Analysis
Dean Chou
3:12–3:20 pm
Degenerative Adult Scoliosis: Is MIS Ready for Prime Time or Should We Really Just Do These Open?
Praveen V. Mummaneni
3:21–3:29 pm
L4-5 Degenerative Spondylolisthesis with Stenosis: Decompression Only—Are we Just Avoiding the Inevitable Fusion Later?
Zoher Ghogawala
3:29–4:15 pm
Oral Abstract Presentations
For a listing of Oral Presentations, see page 73.
### SECTION ON NEUROTRAUMA AND CRITICAL CARE

**Neuromodulation for Spinal Cord Injury**
Moderators: Ann M. Parr, Craig H. Rabb  
Speaker: V. Reggie Edgerton

2:45–3:14 pm

**Epidural Stimulation in Patients with Spinal Cord Injury**  
V. Reggie Edgerton

3:15–3:27 pm

Questions and Discussion

3:28–4:15 pm

Oral Abstract Presentations  
For a listing of Oral Presentations, see pages 73-74.

### Afternoon Sessions

**SECTION ON PAIN**

**Targets Outside the Dorsal Columns for Pain**  
Moderators: Nicholas Au Yong, Ashwin Viswanathan  
Speakers: Ausaf A. Bari, Nicholas M. Bouls, Sameer A. Sheth, Ido Strauss, Ashwin Viswanathan

2:45–2:53 pm

**Cingulotomy & Capsulotomy for Pain**  
Sameer A. Sheth

2:54–3:02 pm

**DBS for Pain**  
Ausaf A. Bari

3:03–3:11 pm

**DRG Stimulation for Pain**  
Ashwin Viswanathan

3:12–3:20 pm

**Peripheral Nerve Stimulation**  
Nicholas M. Bouls

3:21–3:29 pm

**Future Therapies for Pain**  
Ido Strauss

3:29–4:15 pm

Oral Abstract Presentations  
For a listing of Oral Presentations, see page 74.

### SECTION ON STEREOTACTIC AND FUNCTIONAL NEUROSURGERY

**Stereotactic and Functional Neurosurgery Update**  
Moderators: Guy M. McKhann, Doris D. Wang

2:45–3:27 pm

**Didactic Session is combined with the Neurotrauma and Critical Care Session in Room 3022**

3:27–4:15 pm

Oral Abstract Presentations  
For a listing of Oral Presentation, see page 75.

### SECTION ON TUMORS

**Emerging Concepts in the Management of Brain Metastases**
Moderators: Albert H. Kim, Gelareh Zadeh  
Speakers: Manmeet Ahluwalia, Steven N. Kalkanis, Teddy Kim, Jennifer A. Moliterno Gunel

2:45–2:59 pm

**Surgical Management of Mets: Surgery, SRS, WBRT, Evidence, and Case-based Talk**
Steven N. Kalkanis

3:00–3:13 pm

**Treatment of Recurrent/Refractory Mets and Radiation Necrosis: Redo RT or SRS?**
Jennifer A. Moliterno Gunel

3:14–3:27 pm

**How Precision Medicine and Immunotherapy are Changing the Management of Mets**
Manmeet Ahluwalia

3:28–3:33 pm

**Andrew T. Parsa Research Fellowship**
**Presentation: VSV-LASV as Oncolytic Virus Therapy for Glioblastoma**
Teddy Kim

3:33–4:15 pm

Oral Abstract Presentations  
For a listing of Oral Presentation, see pages 75-76.

### OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION SESSIONS

**CSNS: Patient Safety in Neurosurgical Practice**
Moderators: Zarina S. Ali, Kristopher T. Kimmel  
Speakers: Kristopher T. Kimmel, Brad E. Zacharia

4:16–4:27 pm

**Anti-coagulation Protocols**  
Kristopher T. Kimmel

4:28 pm–4:39 pm

**Wrong Side, Wrong Level Protocols**  
Brad E. Zacharia

4:40–4:51 pm

Safety in Practice
Kristopher T. Kimmel

4:51–5:15 pm

Oral Abstract Presentations  
For a listing of Oral Presentation, see page 76.

5:16–5:45 pm

Case Presentations and Discussion
TU  4:15–5:45 pm  Room: 3014
**Challenging Brain Tumors: Operative Techniques and Case-based Discussions**
Moderator: Manish K. Aghi
Case Discussants: Mitchel S. Berger, William T. Curry, Frederick F. Lang, Marie Roguski
Speakers: Akihide Kondo, James K. Liu, Ugur Ture
4:16–4:25 pm
Ugur Türe
4:26–4:35 pm
Operative Nuances for Complex Tumors of the Skull Base: Operative Neurosurgery Video
James K. Liu
4:36–4:45 pm
Reconsideration of the Dolenc Approach
Akihide Kondo
4:45–5:03 pm
**Oral Abstract Presentations**
For a listing of Oral Presentation, see page 77.
5:04–5:45 pm
**Case Presentations and Discussion**

CV  4:15–5:45 pm  Room: 2014
**Treating Cerebral Aneurysms: Operative Techniques and Case-based Discussions**
Moderator: Scott D. Simon
Case Discussants: Sepideh Amin-Hanjani, Geoffrey P. Colby, Sean D. Lavine, Stavropoulou I. Tjomakaris, Erol Veznedaroglu
Speakers: Elad I. Levy, Leonardo Rangel-Castilla
4:16–4:25 pm
Novel Endovascular Neck Reconstruction and Coiling Technique for the Treatment of a Large Wide-necked Basilar Apex Aneurysm Through a Radial Artery Approach: 2-Dimensional Operative Neurosurgery Video
Leonardo Rangel-Castilla
4:26–4:43 pm
Novel Endovascular Treatment of a Large Basilar Apex Aneurysm with Neck Reconstruction (Barrel Stent) and Coiling Technique: 2-Dimensional Operative Neurosurgery Video
Elad I. Levy
4:44–5:02 pm
**Oral Abstract Presentations**
For a listing of Oral Presentation, see page 76.
5:03–5:45 pm
**Case Presentations and Discussion**

SP  4:15–5:45 pm  Room: 2016
**Cervical and Thoracolumbar Trauma: Operative Techniques and Case-based Discussions**
Moderators: Daniel C. Lu, Justin S. Smith
Discussants: Victor W. Chang, Bradley Jacobs, Rod J. Oskouian, Eric A. Potts, Laura A. Snyder, Cheerag D. Upadhyaya, Todd D. Vogel, Lynda J. Yang
Speakers: Christopher P. Ames, Pravin Salunke
4:16–4:25 pm
Safeguarding the Anomalous Vertebral Artery While Dissecting, Drilling, and Instrumentation of C1-2 Joint for Congenital Atlantoaxial Dislocation: 2-Dimensional Operative Neurosurgery Video
Pravin Salunke
4:26–4:35 pm
Proximal Junctional Kyphosis Prevention Strategies: A Video Technique Guide
Christopher P. Ames
4:36–5:00 pm
**Oral Abstract Presentations**
For a listing of Oral Presentations, see page 76.
5:00–5:45 pm
**Case Presentations and Discussion**

TR  4:15–5:45 pm  Room: 3022
**Timing of Spinal Trauma Surgery: Operative Techniques and Case Based Discussions**
Moderators: Ann M. Parr, Craig H. Rabb
Discussants: Maya A. Babu, Randy S. Bell, Alan S. Hoffer, Ryan S. Kitagawa, Patricia B. Raksin
4:15–4:39 pm
**Oral Abstract Presentations**
For a listing of Oral Presentations, see pages 76-77.
4:40–5:45 pm
**Case-based Discussion**

PA  4:15–5:45 pm  Room: 3024
**Neurosurgery for Pain: Operative Techniques and Case-based Discussions**
Moderator: Julie G. Pilitsis
Discussants: Sharona Ben-Haim, Jason M. Schwalb, Jennifer A. Sweet, Christopher J. Winfree
Speakers: Jason M. Schwalb, Ido Strauss
4:16–4:25 pm
Cordotomy for Pain
Jason M. Schwalb
4:26–4:35 pm
Cingulotomy for Pain
Ido Strauss
4:36–4:54 pm
**Oral Abstract Presentations**
For a listing of Oral Presentations, see page 77.
4:55–5:45 pm
**Case Presentations and Discussion**

PE  4:15–5:45 pm  Room: 3018
**Challenges in Recurrent Pediatric Epilepsy: Operative Techniques and Case-based Discussions**
Moderator: Gary W. Mathern
Case Discussants: David F. Bauer, Daniel Curry, David D. Gonda, Jeffrey S. Raskin
4:15–4:39 pm
**Oral Abstract Presentations**
For a listing of Oral Presentations, see page 77.
4:40–5:45 pm
**Case Presentations and Discussion**
INTERACTIVE MULTIMEDIA RESEARCH PRESENTATION SESSION


The Interactive Multimedia Research Presentation Session aims to invigorate scientific presentation and discussion and engage attendees with presenters in exciting and compelling conversations. Enjoy a glass of wine and cheese during this interactive session consisting of both mini-oral presentations and posters.

There will be four podium presentation stages integrated throughout the poster area, and selected poster authors will present “mini-podium talks” during the Interactive Multimedia Research Presentation session, highlighting key advances in neurosurgery. Don’t miss this exciting new session!

For a listing of Mini-Podium Oral Presentations, see pages 77-84.
For a listing of Poster Presentations, see pages 92-108.

DINNER SEMINAR 4 | TUESDAY, OCTOBER 22 | 7:30–9:30 PM

$190 (includes three-course dinner and beverages)

SF TU DIN4: Advances in LITT

Moderators: Gene H. Barnett, Shabbar F. Danish
Faculty: Robert E. Gross, Jonathan R. Jagid, Aileaza M. Mohammadi, Dimitris G. Placantonakis

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In 2019, Eater San Francisco recognized Harris’ as one of the Top 14 Steakhouses in San Francisco. The San Francisco Chronicle recognized Harris’ as one of the most beautiful restaurants in San Francisco in 2018.

Complimentary shuttle service will depart from the San Francisco Marriott Marquis at 7:15 pm.

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- Review all courses, speakers, exhibitors, and events
- View all meeting abstracts
- Create your own preferred schedule each day
- Keep notes and activity logs in real time, in one place
GUIDELINES AND SUNRISE SCIENCE

7:00–8:30 am  Room: 3024
PAIN SCIENCE AND LATE-BREAKING ABSTRACT SESSION
Moderators: Ausaf A. Bari, Sharona Ben-Haim
For a listing of Sunrise Science and Late-breaking Oral Presentations, please see page 85.

7:00–8:30 am  Room: 3020
STEREOTACTIC AND FUNCTIONAL SUNRISE SCIENCE AND LATE-BREAKING ABSTRACT SESSION
Moderators: Emad N. Eskandar, Jon T. Willie
For a listing of Sunrise Science and Late-breaking Oral Presentations, please see page 86.

Guidelines and Outcomes of Surgery for Cerebral Aneurysms
7:00–7:10 am
Screening, Natural History, and Medical Management
Aaron S. Dumont
7:10–7:20 am
Indications and Outcomes of Endovascular Surgery for Cerebral Aneurysms
Babu G. Welch
7:20–7:30 am
Guidelines for the Neurosurgical Treatment of Spontaneous Intraparenchymal Hemorrhage: Update on Trials
Mark D. Bain
7:30–8:00 am
Guidelines for Management of Glioblastoma
Moderators: S. Kathleen Bandt, Ricardo J. Komotar
Speakers: Mitchel S. Berger, Susan M. Chang, Ali Jalali, Eric C. Leuthardt, Taiichi Saito, Adam M. Sonabend
7:00–7:15 am
Active Surgical Clinical Trials
Adam M. Sonabend
7:15–7:30 am
Surgical Update on Glioblastoma Genetics
Ali Jalali
7:30–7:45 am
Re-evaluating the Evidence for Extent of Resection in Glioblastoma
Mitchel S. Berger
7:45–8:00 am
Recommended Practices for Neuro-monitoring in Glioblastoma
Taiichi Saito
8:00–8:15 am
Evidence for LITT in Glioblastoma
Eric C. Leuthardt
8:15–8:30 am
Personalized Medicine and Chemotherapy in the Management of Glioblastoma
Susan M. Chang

Brain and Spine Trauma Guidelines—What you Need to Know
Moderators: Paul M. Arnold, Patricia B. Raksin
Speakers: Randall M. Chesnut, John H. Chi, Sanjay S. Dhall, R. John Hurlbert, Daniel M. Scuibba, Emily P. Sieg, Michael F. Stiefel, Eve C. Tsai
7:00–7:10 am
BTF Guidelines 4: Are They Still Useful? Next steps
Randall M. Chesnut
7:10–7:20 am
ICP and Decompressive Craniectomy According to the 4th Edition Guidelines
Emily P. Sieg
7:20–7:30 am  
Guideline for Reversal of Antithrombotics in Intracranial Hemorrhage  
Michael F. Stiefel

7:30–7:40 am  
Update on NOACs Not in the Guidelines  
Eve C. Tsai

7:40–7:50 am  
Thoracolumbar Spine Trauma Operative Versus Non-operative Treatment  
Daniel M. Sciubba

7:50–8:00 am  
Timing of Surgical Intervention in Spine Trauma  
John H. Chi

8:00–8:10 am  
Hemodynamics and Spinal Cord Perfusion in SC  
Sanjay S. Dhall

8:10–8:20 am  
Pharmacologic Treatment of Acute Spinal Cord Injury  
R. John Hurlbert

8:20–8:30 am  
Questions and Discussion

THANK YOU  
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SUBSPECIALTY SESSION HIGHLIGHTS KEY

AP  ADVANCED PRACTICE PROVIDER  PE  PEDIATRIC  SP  SPINE
CV  CEREBROVASCULAR  PN  PERIPHERAL NERVES  SF  STEREOTACTIC AND FUNCTIONAL
TR  NEUROTRAUMA  RE  RESIDENT  TU  TUMOR
PA  PAIN  SE  SOCIOECONOMIC  WINS
THANK YOU
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GENERAL SCIENTIFIC SESSION IV

Presiding Officer: Elad I. Levy
Moderators: Maya A. Babu, Praveen V. Mummaneni

8:40–8:43 am
Introduction and Disclosures
Elad I. Levy

8:43–8:50 am
Operative Neurosurgery Highlight:
The Role of Endoscopic Endonasal Approaches for the Surgical Management of Anterior Skull Base Meningiomas
Daniel M. Prevedello

8:50–9:12 am
Honored Guest Presentation:
The Evolving Landscape and Management of Brain Metastases
Raymond Sawaya

9:12–9:15 am
Introduction of Rebecca Skloot
Brian V. Nahed

9:15–9:40 am
JOHN THOMPSON HISTORY OF MEDICINE LECTURE
Rebecca Skloot
Rebecca Skloot will be signing copies of the book, “The Immortal Life of Henrietta Lacks,” in the CNS Xperience Lounge during the morning beverage break.

9:40–10:40 am
MORNING BEVERAGE BREAK
Visit the Exhibit Hall and enjoy a complimentary cup of coffee!

10:00–10:30 AM
LIVE SURGERY IN THE EXHIBIT HALL
See page 20 for details.

10:40–10:43 am
Announcement of SANS Challenge Winners, Top Posters, and Residency Program Abstract Competition Winners
Maya A. Babu

10:43–10:46 am
Announcement of Innovator of the Year
Lola B. Chambless

10:46–10:49 am
Preview of 2020 CNS Annual Meeting in Miami
Steven N. Kalkanis

10:49–10:51 am
Introduction of Controversy:
Low-grade Glioma Management
Manish K. Aghi

10:51–10:59 am
Controversies: Supramaximal Resection
Hugues Duffau

10:59–11:07 am
Controversies: A Conservative Approach to Low-grade Gliomas
Gelareh Zadeh

11:07–11:11 am
Controversies: Discussion and Outcomes
Manish K. Aghi

11:11–11:19 am
Neurosurgery Update: Cutting Edge in Stereotactic and Functional:
Dramatic Clinical Improvement on Children Affected by AADC Mutation after MR-guided AAV2-AADC Gene Therapy into the Midbrain
Krystof S. Bankiewicz

11:19–11:26 am
Central Atlantoaxial Instability – Changing Paradigm in Craniovertebral Junction Surgery
Atul H. Goel

11:26–11:31 am
Update from the ABNS
Carl B. Heilman

11:31–11:33 am
Introduction of Aaron Carroll
Mohamad Bydon

11:33 am–12:10 pm
FEATURED SPEAKER
Healthcare in the U.S.
Aaron Carroll
Meet Aaron Carroll in the CNS Xperience Lounge immediately following the conclusion of this session!
**LUNCHEON SEMINARS**

All Luncheon Seminars include a plated lunch served in the seminar room. Luncheon Seminar fee is $95 each ($75 for residents, fellows, graduate students/post-doctoral scholars, medical students, and advance practice providers). Add a Luncheon Seminar to your profile at registration.

**Room: 2001**
**W21: Middle Meningeal Artery Embolization for Subdural Hematoma Treatment**
Moderator: Christopher P. Kellner
Faculty: Bradley N. Bohnstedt, Peter Kan, Jared Knopman, Adnan H. Siddiqui

**Room: 2003**
**W22: Contemporary and Practical Management of an Enigmatic Process: Cerebral Vasospasm (Delayed Cerebral Ischemia)**
Moderator: Brian M. Howard
Faculty: Spiros L. Blackburn, Peng R. Chen, R. Loch Macdonald, Matthew Reynolds, Edgar Samaniego

**Room: 2010**
**W23: Novel Techniques for Management of Lumbar Spondyloolisthesis**
Moderators: Noojan Kazemi, Randy Kritzer
Faculty: Deb A. Bhowmick, Nathaniel P. Brooks, John H. Chi, John H. Shin

**Room: 2011**
**W24: TBI in the Elderly**
Moderator: Daniel B. Michael
Faculty: Gary Abrams, Jack Jallo, Emily P. Sieg, Eve C. Tsai

**Room: 2012**
**W26: Chiari Malformations**
Moderator: David D. Limbrick
Faculty: Ulrich Batzdorf, David M. Frim, Jeffrey R. Leonard, Karin M. Muraszko

**Room: 2007**
**W27: Clinical Trials in Epilepsy Surgery**
Moderator: Aviva Abosch
Faculty: Jorge A. Gonzalez-Martinez, Robert E. Gross, Timothy H. Lucas

**Room: 2008**
**W28: Update on Diagnosis and Management of Low Grade Gliomas**
Moderators: Susan M. Chang, Viviane S. Taber
Faculty: Cameron W. Brennan, Daniel P. Cahill, Jennifer A. Moliterno Gunel, Daniel A. Orringer

**Room: 2009**
**W29: Advanced Imaging in Brain Tumors**
Moderator: Shawn L. Hervey-Jumper
Faculty: S. Kathleen Bandt, Sunit Das, Alexandra J. Golby, Javier E. Villanueva-Meyer, Masahiko Wanibuchi

**Room: 2000**
**W30: Branding and Social Media in your Practice**
Moderator: Isaac Yang
Faculty: Christopher S. Graffeo, Michael E. Ivan, Carrie R. Muh, Faith C. Robertson, Linda Xu

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1:45–3:15 pm  Room: 2016
**SPINE AFTERNOON SCIENCE ABSTRACT SESSION**
*Moderators:* Yi Lu, Laura A. Snyder
*For a listing of Oral Presentations, please see pages 87-88.*

1:45–3:15 pm  Room: 3020
**CRANIAL AFTERNOON SCIENCE ABSTRACT SESSION**
*Moderators:* Isabelle M. Germano, Sean D. Lavine
*For a listing of Oral Presentations, please see pages 86-87.*

1:45–3:15 pm  Room: 3022
**NEUROTRAUMA AFTERNOON SCIENCE ABSTRACT SESSION**
*Moderators:* Ronald A. Torres, Sarah Woodrow
*For a listing of Oral Presentations, please see pages 88-89.*

1:45–3:15 pm  Room: 3024
**LATE-BREAKING ABSTRACT SESSION**
*Moderators:* Orin Bloch, Michael S. Virk
*For a listing of Oral Presentations, please see pages 89-90.*

1:45–4:45 pm  Room: 2014
**ADVANCED ENDOSCOPIC AND EXOSCOPIC NEUROSURGERY SEMINAR**
*Course Directors:* William T. Curry, Brian V. Nahed
*Faculty:* John A. Boockvar, Christopher J. Farrell, Juan C. Fernandez-Miranda, Paul A. Gardner, Constantinos G. Hadjipanayis, Peter Nakaji, Shaan M. Raza

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<table>
<thead>
<tr>
<th>Time</th>
<th>Abstract</th>
</tr>
</thead>
</table>
| 7:00–7:06 am | 300 Wall Enhancement in Evolving Cerebral Aneurysms on MR Vessel Wall Imaging  
Shunsuke Omodaka, Hidenori Endo, Kuniyasu Nizumiza, Miki Fujimura, Takashi Inoue, Toshiki Endo, Teiji Tominaga |
| 7:06–7:12 am | 301 Lessons Learned from the Initial Experience with Pedicled Temporoparietal Fascial Flap for Combined Revascularization in Moyamoya Angiopathy: A Case Series  
Kristine Ravina, Paul Kim, Robert Rennert, Erik M. Wolfswinkel, Ben A. Strickland, Joseph Carey, Jonathan Russin |
| 7:12–7:18 am | 302 Cost-Effectiveness Analysis of Active Surveillance for Small Asymptomatic Intracranial Aneurysms  
David M. Panczykowski, Clark Veet, Natasa Parekh, Spiros L. Blackburn |
| 7:18–7:24 am | 303 Identification of PPIL4 as a Disease Causing Gene in Intracranial Aneurysms and its Role in Vertebrate CNS Specific Angiogenesis  
Tanyeri Barak, Adife Gulhan Ercan Sencicek, Danielle F. Miyagishima, Octavian Henegariu, Ketu Mishra Gorur, Kaya Bilguvar, Murat Gunel |
| 7:24–7:30 am | 304 Decreased Time to Evacuation Improves Long-term Functional Outcome in Minimally Invasive Endoscopic Intracerebral Hemorrhage Evacuation  
| 7:30–7:36 am | 305 Metabolite Profiling the Cerebral Spinal Fluid in Subarachnoid Hemorrhage: Insights into Patient Outcomes  
Matthew J. Koch, Zsuzsanna Ament, Christina Hansen, Matthew Bevers, Christopher J. Stapleton, Aman B. Patel, W. Taylor Kimberly |
| 7:36–7:42 am | 306 The R2ed AVM Score: A Novel Predictive Tool for Arteriovenous Malformation Presentation with Hemorrhage  
James Feghali, Wuyang Yang, Risheng Xu, Jason Liew, Cameron G. McDougall, Justin M. Caplan, Rafael J. Tamargo, Judy Huang |
Matthew McIntyre, Vikas Patel, Andrew Long, Alex Vonhoof, Boyi Li, Adil Afridi, Mohamed Halabi, Fawaz Al-Mufti, Chirag D. Gandhi, Justin G. Santarelli, Meic H. Schmidt, Chad D. Cole, Christian A. Bowers |
| 7:48–7:54 am | 308 The Efficacy and Safety of Middle Meningeal Artery Embolization in the Management of Chronic Subdural Hematomas: Systematic Review and Meta-analysis  
Fareed Jumah, Muhammad Osama, Abdurrahman Islim, Ammar Jumah, Devi Prasad Patra, Vinatak Narayan, Rimal Hanif H. Hanif |
| 7:54–8:00 am | 309 Inverse National Trends in Decompressive Craniectomy versus Endovascular Thrombectomy for Stroke  
Nicolas K. Khatar, Beatrice Ugilweneza, Mayur Sharma, Enzo Fortuny, Shawn W. Adams, Kimberly Sue Meyer, Maxwell Boakey, Robert F. James, Dale Ding |
| 8:00–8:06 am | 900 Increasing the Utility of Administrative Databases for Clinical Research of Stroke Patients Treated with a Mechanical Thrombectomy  
Pious D. Patel, Sanjana Salwi, Campbell Liles, Akshikumar Mistry, Eva Mistry, Rohan V. Chitale, Matthew Fusco, Chevis N. Shannon |
| 8:06–8:12 am | 901 Middle Meningeal Artery Embolization for Chronic Subdural Hematoma: A Multi-center Experience of 160 Consecutive Embolizations  
| 8:12–8:18 am | 902 Stereotactic Direct-coiling of Intracranial Aneurysms  
Arun-Angelo Patil, Sidharta Kumar, Megha Jacob |
| 8:18–8:24 am | 903 Utility of CT Angiography of the Head in Patients with Intracerebral Hemorrhage  
Richard J. Garling, Bryan Lieber, Catherine Peterson, Shiwei Huang, Ari D. Kappel, Miles Hudson, Hassan A. Fadel, Robert R. Johnson, Il |
8:24–8:30 am
**904 The Flow Redirection Intraluminal Device (FRED) for Cerebral Aneurysms of the Posterior Circulation: A Subgroup Analysis of the EuFRED Registry**
Christoph J. Griessenauer, Markus Möhlenbruch, Philipp Hendrix, Christian Ulfert, Naci Kocer, Civan Islak, Michael Sonnberger, Tobias Engelhorn, Erasmia Müller-Thies-Broussalis, Thomas Finkenzeller, Markus Holtmannspötter, Jan-Hendrik Buhr, Wolfgang Reith, Andreas Singen, Hendrik Janssen, Monika Killer-Oberpfalzer

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7:00–7:06 am
**310 High Sensitivity and Specificity Detection of Protoporphyrin IX Fluorescence in GBM by Means of Simultaneous 2-photon Microscopy and Stimulated Raman Histology**
Constantinos G. Hadjipanayis, Alexandros Bouras, Joe Gerald Jesu Raj, Dominique Bozec, Daniel Rivera

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7:06–7:12 am
**311 Genomic Analysis of Temozolomide-Related Hypermutation in Adult Diffuse Glioma**
Anzhela D. Moskalik, Floris P. Barthel, Kevin C. Johnson, Roel Verhaak

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7:12–7:18 am
**312 Stem Cell Delivery of Oncolytic Adenovirus DNX-2401 Following Surgical Resection for the Treatment of Glioblastoma in a Murine Model**
Sricharan Gopakumar, Joy Gumin, Marc Daou, Daniel Ledbetter, Brittanay Parker-Kerrigan, Frederick F. Lang

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7:18–7:24 am
**313 Combination Therapy with Anti-PD-1 and Anti-BTLA Results in a Synergistic Therapeutic Effect Against Murine Glioblastoma**
John Choi, Laura Saleh, Ayush Pant, Denis Routkevitch, Luqing Tong, Young-Hoon Kim, Yuanxuan Xia, Christopher M. Jackson, Christina Jackson, Michael Lim

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7:24–7:30 am
**314 Pro-tumoral Effects of Intra-tumoral Neutrophils in the Glioblastoma Microenvironment**
Sümedh S. Shah, Garima Yagnik, Alan T. Nguyen, Harsh Wadhwa, Jordan Spatz, Michael Safae, Justin Cheng, Manish A. Kghi

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7:30–7:36 am
**315 Regulation of Amino Acid Transport in Glioma**
Stephanie Robert, Robyn Umans, Joelle Martin, Harald Sontheimer

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7:36–7:42 am
**316 Targeting TIP1 Results in Cytotoxic and Radiosensitizing Effects in Cancer**
David Yaw Amoah Dadey

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7:42–7:48 am
**317 Multiplatform Molecular Profiling of Vestibular Schwannoma Reveals 2 Subgroups of Tumors with Distinct Radiographic Features and a Methylation-based Predictor of Local Recurrence**

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7:48–7:54 am
**BEST DATA SCIENCE AWARD**
**318 Predicting Growth Trajectory in Vestibular Schwannoma from Radiomic Data Using Supervised Machine Learning Techniques**
Conor Grady, Hesheng Wang, Zane Schnurman, Tanxia Qu, Douglas Kondziolka

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8:00–8:06 am
**319 The Impact of Insulin-like Growth Factor Index and Biological Effective Dose on Outcomes After Stereotactic Radiosurgery for Acromegaly**
Christopher S. Grafeo, Diane Donegan, Dana Erickson, Paul D. Brown, Avital Perry, Michael J. Link, William F. Young, Jr., Bruce E. Pollock

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8:06–8:12 am
**320 Precision Targeting Therapy of Malignant Brain Tumor by a Local Interstitial Delivery System Loading with a Small Molecule Drug First in Human Trial**

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8:12–8:18 am
**321 Brain Tumor Organoid (BTO) Platform as a Unique Tool in Discovery of Novel Therapy Approaches and Stratifying Treatment Regimens**
Dorota Lubanska, Swati Kulikarni, Mohamed A.R. Soliman, Abdalla Shamisa, Ana DeCarvalho, Alexander Rodzinkee, Adit Nyayachavadi, Simon Rondeau-Gagné, Lisa Porter

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8:18–8:24 pm
**322 Mini Beam Radiation Treatment- Final Report of a Randomized Phase III Study of Treating Canine De-novo Brain Tumors - New Kid on the Block**
Vijayananda Kundapur, Monique Mayer, Andrew Alexander, Sheldon Wiebe, Narinder Sidhu, Gavvin C. Sargison, Susan L. Kraft

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8:24–8:30 am
**323 The CREB-binding Protein Inhibitor ICG-001 Underlying a Promising Therapeutic Strategy in NF2-associated Meningiomas**
Hongda Zhu, Jiaojiao Deng, Lingyang Hua, Shuchen Sun, Ye Gong
**GENERAL SCIENTIFIC SESSION II**

Ballroom

10:53–11:00 am

**CNS RESIDENT AWARD**

100 Ambulation on POD#0 is Associated with Decreased Adverse Events After Elective Lumbar Spine Surgery: Analysis of the Michigan Spine Surgery Improvement Collaborative (MSSIC)

Hesham M. Zakaria, Rachel J. Hunt, Theresa A. Elder, Michael Bazydlo, Lonni Schultz, Muwaffak Abdulhak, David Nerenz, Victor W. Chang, Jason M. Schwalb

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**COUNCIL OF STATE NEUROSURGICAL SOCIETIES ORAL PRESENTATIONS**

Room 3016

3:33–3:39 pm

101 Patterns of Opioid and Benzodiazepine Use in Opioid-Naïve Patients With Newly Diagnosed Low Back and Lower Extremity Pain

Tej D. Azad, Yi J. Zhang, Martin N. Stienen, Daniel Vail, Jason Bentley, Allen L. Ho, Paras Fatemi, Lily H. Kim, Anand Veeravagu, John K. Ratliff

3:39–3:45 pm

102 Enhanced Peri-operative Care Decreases Cost after Major Spinal Surgery

Daniel A. Carr, Rajiv Saigal, Armagan Dagal

3:45–3:51 pm

103 The Impact of Hospital Safety-Net Burden on Outcomes for Primary Supratentorial Brain Tumor Surgery

Oliver Y. Tang, Anna Kimata, Steven A. Toms

3:51–3:57 pm

104 Medico-legal Implications of Video Recording Patient-provider Communication

Komal Naeem, Malika Bhargava, Randall W. Porter

3:57–4:03 pm

105 Regional Variation in 90-day Postoperative Costs Among Patients Undergoing Posterior Lumbar Fusion (PLF): Insights from the OPTUM Labs Data Warehouse (OLDW)

Panagiotis Kerezoudis, Mohammed A. Alvi, Anshit Goyal, Yagiz U. Yolcu, Stephanie Payne, Lindsey Sangaralingham, Molly Jeffery, Mohamad Bydon

4:03–4:09 pm

106 Impact of CMS Non-Reimbursement on Hospital-Acquired Conditions Following Spine Procedures

Layton Lamsam, Michael Zhang, Marc Carmichael, Hriday Bhambvanl, Ian D. Connolly, Tina Hernandez-Boussard, Anand Veeravagu, John K. Ratliff

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**SECTION ON CEREBROVASCULAR SURGERY ORAL PRESENTATIONS**

Room 1014

3:33–3:39 pm

107 Stereotactic Radiosurgery for Pediatric Brain Arteriovenous Malformations: Long-Term Outcomes

Ching-Jen Chen, Cheng-Chia Lee, Kathryn N. Kearns, Dale Ding, Douglas Kondziolka, L. Dade Lunsford, Jason P. Sheehan

3:39–3:45 pm

108 Blockade of the Platelet-driven CXCL7-CXCR1/2 Pathway Prevents Cerebral Aneurysm Formation

Kamil W. Nowicki, Michael P. D’Angelo, Wendy Fellows-Mayle, Michael M. McDowell, Robert M. Friedlander

3:45–3:51 pm

109 Inflammation in Murine Aneurysm Healing: The Role of CXCL1

Devan Patel, Kartik Motwani, Koji Hosaka, Brian L. Hoh

3:51–3:57 pm

110 Treatment of Acutely Ruptured Cerebral Aneurysms with the Woven EndoBridge (WEB) Flow Disruptor: A Multicenter Experience

Fadi Al Saiegh, David M. Hasan, Nikolaos Mouchtouriis, Mario Zanaty, Nohra Chalouli, Ritam Ghosh, Ahmad Sweid, Stavropoula I. Tjoumakaris, M. Reid Gooch, Robert H. Rosenwasser, Pascal Jabbour

3:57–4:03 pm

111 Preventing Microthrombi Formation Improves Function After Subarachnoid Hemorrhage in Mice

Hussein Zeineddine, Spiros L. Blackburn, Remya Veettil, Kanako Matsumura, Devin McBride

4:03–4:09 pm

112 Small Aneurysms with Low Rupture Risk Account for a Majority of Subarachnoid Hemorrhage

Caleb Rutledge, Soren Jonzzon, Ethan A. Winkler, Kunal P. Raygor, Michael T. Lawton, Adib A. Abla

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**SECTION ON DISORDERS OF THE SPINE ORAL PRESENTATIONS**

Room 2016

3:33–3:39 pm

113 Addition of Fusion to Decompression for Grade I Degenerative Lumbar Spondylolisthesis is Associated with Greater Patient-Reported Outcome Improvements at 24-Month Follow-Up: A Multicenter Study Using the Quality Outcomes Database

3:35–3:41 pm  
**114** Trends in Spine Surgery Training During Neurological and Orthopedic Surgery Residency: A Ten-Year Analysis of ACGME Case Log Data  
Martin H. Pham, Andre M. Jakoi, Arvin R. Wali, Lawrence Lenke

3:41–3:47 pm  
**115** Towards Opioid-Free Elective Spine Surgery: A Prospective Cohort Study  
Ahilan Sivaganesan, Amanda Wright, Regis W. Haid, Jr., Praveen V. Mummaneni, Richard Berkman

3:47–3:53 pm  
**116** The Impact of Preoperative Mindfulness-Based Stress Reduction on Postoperative Patient-Reported Pain, Disability, Quality of Life, and Prescription Opioid Use in Lumbar Spine Degenerative Disease: 3- and 12-Month Results  
Juneyoung L. Chavez, Christina A. Porucznik, Lisa H. Gren, Jian Guan, Evan Joyce, Darrel S. Brodke, Andrew T. Dailey, Mark A. Mahan, Robert S. Hood, Brandon Lawrence, William R. Spiker, Nicholas T. Spina, Erica F. Bisson

3:53–3:59 pm  
**117** Changes in the Operative Corridor in Oblique Lumbar Interbody Fusion Between Pre-operative Imaging and Intraoperative Cone-beam Computed Tomography Using Morphometric Analysis  
Aqib Zehri, Hector E. Soriano-Baron, Wesley Hsu, Matthew Neal, Jonathan L. Wilson

3:59–4:05 pm  
**118** Sexual Dysfunction: Prevalence and Prognosis in Patients Operated for Degenerative Lumbar Spondylolisthesis  

4:05–4:11 pm  
**119** Complications of Robotic Spine Surgery  
Daniel Myers, Gordon Mao, Alexander K. Yu, Donald M. Whiting

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**SECTION ON NEUROTRAUMA AND CRITICAL CARE ORAL PRESENTATIONS**  
Room 3022

3:31–3:37 pm  
**120** Long Term Prognosis of Severe Traumatic Brain Injured Patients Using Acute Phase Neurophysiology Testing  
Joshua S. Bauer, David M. Panczykowski, Ava Puccio, David O. Okonkwo, Jeffrey Balzer, Phillip Choi, Benjamin Zusman

3:37–3:43 pm  
**121** Brain Derived Neurotrophic Factor (BDNF) Val66Met Single Nucleotide Polymorphism (rs6265) is Associated with Decreased Functional Outcome After Traumatic Brain Injury: A Multicenter Cohort Study  

3:43–3:49 pm  
**122** Early Versus Late Surgical Decompression for Acute Spinal Cord Injury: An Individual Patient Data Meta-Analysis of 1,548 Patients  
Jetan H. Badihiwala, Christopher D. Witt, Jefferson R. Wilson, Michael G. Fehlings

3:49–3:55 pm  
**123** MRI Tracking of iPS Cells-Induced Neural Stem Cells in Traumatic Brain Injury Rats  
Hailiang Tang

3:55–4:01 pm  
**124** The Hematoma Evacuation Score: Reducing 30-day Postoperative Mortality in Intracranial Subdural and Epidural Hematomas  
Andrew K. Rock, Nora T. Poulos, Matthew T. Carr, Alper Dincer, Charles F. Opalak, William C. Broaddus

4:01–4:07 pm  
**125** Traumatic Brain Injury as a Risk Factor for Dementia: An 18-Year, Two Institution Clinical Experience  
Elisabetta Mezzalira, Brittany M. Stopa, Ajaz Khawaja, Saef Izzy, William B. Gormley

4:07–4:13 pm  
**THINKFIRST INJURY PREVENTION RESEARCH AWARD**  
**126** Developing an Adjunct to an Electronic Medical Records System in a Developing Country: Establishing the First Electronic Traumatic Brain Injury Database in Yangon, Myanmar  
### ORAL ABSTRACT PRESENTATIONS

#### 3:46–3:52 pm

**129 The Impact of Preventative Multimodal Analgesia on Postoperative Opioid Requirement and Pain Control in Patients Undergoing Lumbar Fusions**  
Sharad Rajpal, Steven L. Hobbs, Ewell L. Nelson, Alan T. Villavicencio, Christopher Zielenksi, Kara D. Beasley, Vinod Kantha, Jamie Mesenbrink, Sigita Burneikiene

#### 3:52–3:58 pm

**130 Prescriber Aimed Intervention to Optimize Opioid Prescribing Patterns After Intracranial Surgery: Addressing the Nation’s Opioid Epidemic and Decreasing the Neurosurgeon’s Narcotic Footprint**  

### SECTION ON PERIPHERAL NERVES ORAL PRESENTATIONS

#### Room 2018

#### 3:26–3:32 pm

**139 Integrated Multi-Omics Characterization of Neurofibromatosis Type 1 Related Peripheral Nerve Sheath Tumors Identifies Two Distinct Malignant Peripheral Nerve Sheath Tumors Subtypes with SHH or WNT Pathway Activation**  
Suganth Suppiah, Jeff Liu, Qingxia Wei, Yasin Mamatjan, Pardeep Heir, Farshad Nassiri, Sheila Mansouri, Kenneth Aldape, Gelareh Zadeh

#### 3:32–3:38 pm

**140 Mineral Coated Microparticle Sutures Impregnated with GDNF (Gliaal Derived Neurotrophic Factor) and NGF (Nerve Growth Factor) Improve Axonal Growth and Functional Recovery in Rat Sciatic Nerve Injuries**  
Clayton Haldeman, Amgad S. Hanna

### SECTION ON PEDIATRIC NEUROLOGICAL SURGERY ORAL PRESENTATIONS

#### Room 3018

#### 3:33–3:39 pm

**133 Intraoperative Detection of Pediatric Brain Tumor Margins Using Raman Spectroscopy.**  
Rashad Jabarkheel, Jonathon J. Parker, Chi-Sing Ho, Travis Shaffer, Sanjiv Gambhir, Gerald A. Grant, Derek W. Yecies

#### 3:39–3:45 pm

**134 Exome Sequencing Implicates SWI/SNF Chromatin Remodeling Genes in Human Congenital Hydrocephalus.**  
August A. Allocco, Sheng C. Jin, Weilai Dong, Xue Zeng, Sierra B. Conine, Charuta G. Furey, Priya P. Date, Jonathan Gaalnder, Carol Nelson-Williams, Ashley Dunbar, Tyrone DeSpenza, Jr., Engin Deniz, Mustafa K. Khokha, Richard P. Lifton, Kristopher T. Kahle

#### 3:45–3:51 pm

**135 Intraventricular Hemorrhage Induces Rapid Calcium Signaling and Transcriptional Changes in the Developing Choroid Plexus**  
Cameron Saadegh, Huixin Xu, Frederick Shipley, Neil Dani, Maria K. Lehtinen

#### 3:51–3:57 pm

**136 Risk of Subsequent Primary Cancers After External Beam Radiotherapy Treatment of Pediatric Low Grade Gliomas: A SEER Analysis 1973-2015**  
Adrian Rodrigues, Michael C. Jin, Adela Wu, Gordon Li, Gerald A. Grant

#### 3:57–4:03 pm

**137 The Effectiveness of Medical and Surgical Treatment for Children with Refractory Epilepsy**  
Melissa LoPresti, Iwen Pan, Dave Clarke, Sandi Lam

### SECTION ON PEDIATRIC NEUROLOGICAL SURGERY ORAL PRESENTATIONS

#### Room 3018

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#### 3:57–4:03 pm

**137 The Effectiveness of Medical and Surgical Treatment for Children with Refractory Epilepsy**  
Melissa LoPresti, Iwen Pan, Dave Clarke, Sandi Lam
146 Functional Recovery via Preregenerated Nerve Graft in Rat Sciatic Nerve Injury Model
Umang Khandpur, Ying Yan, Wilson Z. Ray, Matthew R. MacEwan

SECTION IN STEREOTACTIC AND FUNCTIONAL NEUROSURGERY ORAL PRESENTATIONS
Room 3020

3:34–3:40 pm
147 Early Feasibility Study of a Neurostimulator to Create Artificial Vision
Nader Pouratian, Daniel Yoshor, Soroush Niketeghad, Jessy Dorn, Robert Greenberg

3:40–3:46 pm
148 Distributed Global Functional Connectivity Networks Predict Responsiveness to L-DOPA and Subthalamic Deep Brain Stimulation
Chengyuan Wu, Thomas Foitynie, Patricia Limousin, Ludvic Zrinzo, Harith Akram

3:46–3:52 pm
STEREOTACTIC AND FUNCTIONAL NEUROSURGERY RESIDENT AWARD
149 A Fully Implantable Brain Machine Interface for Volitional Hand Grasp Restoration in Cervical Quadriplegia
Iahn Cajigas, Noeline W. Prins, Sebastian Gallo, Jasim A. Naeeem, Santiago Guerra, Brandon Parks, Anne Palermo, Audrey Wilson, Letitia Fisher, Steven Vanni, Michael E. Ivan, Abhishek Prasad, Jonathan R. Jagid

3:52–3:58 pm
150 Tackling Big Data in Human Intracranial EEG Recordings
Patrick J. Karas, John F. Magnotti, Zhengjia Wang, Daniel Yoshor, Michael S. Beauchamp

3:58–4:04 pm
151 Thalamic Arousal Network Disturbances in Temporal Lobe Epilepsy and Improvement After Surgery
Dario J. Englot, Srijata Chakravorti

4:04–4:10 pm
152 Sphenopalatine Ganglion Stimulation Upregulates Transport of Intra-arterial Temozolomide Across the Blood-Brain Barrier
Thana N. Theofanis, Ankit Rochani, Richard F. Schmidt, Michael J. Lang, Geoffrey Stricsek, Gagan Kaushal, Lorraine Iacobitti, Ashwini D. Sharan, Robert H. Rosenwasser

SECTION ON TUMORS ORAL PRESENTATIONS
Room 3014

3:34–3:40 pm
ROSENBLUM/MAHALEY CLINICAL RESEARCH AWARD
153 First in Human Phase I Trial of Dual Vector (HSV1-TK, Fit3L) Immunotherapy for the Treatment of Newly Diagnosed High-Grade Glioma: Initial Results

3:40–3:46 pm
JOINT SECTION ON TUMOR NEURO-ONCOLOGY TRAINEE AWARD
154 Combination Immune Treatment of a Highly Aggressive Orthotopic Murine Glioblastoma with Checkpoint Blockade Inhibition and Neoantigen Vaccination
Connor Liu, Maximilian Schaeottler, Jay Bowman-Kirigin, Diane Bender, Dale K. Kobayashi, Chris A. Miller, Tanner M. Johanns, Gavin P. Dunn

3:46–3:52 pm
AMERICAN BRAIN TUMOR ASSOCIATION YOUNG INVESTIGATOR AWARD
155 BiTE-armed CAR T Cells Overcome Antigen Escape from EGFRvIII-Targeted Therapy for Glioblastoma
Bryan D. Choi, Xiaoling Yu, Ana P. Castano, Amanda A. Bouffard, Andrea Schmidts, Rebecca C. Larson, Stefanie R. Bailey, Angela C. Bouroghs, Matthew J. Frigault, Mark B. Leick, Irene Scarfo, Curtis L. Cetrulo, Shadmehr Demehri, Brian V. Nahed, Daniel P. Cahill, Hiroaki Wakimoto, William T. Curry, Bob S. Carter, Marcela V. Maus

3:52–3:58 pm
PREUSS RESEARCH AWARD
156 Immuno-stimulatory Effects of Mechanical and Thermal High Intensity Focused Ultrasound
James Wang, Chin-Hsin Huang, Oscar H. Echeagaray, Siham Amirfakhri, Sarah L. Blair, William C. Trogler, Andrew C. Kummel, Clark C. Chen

3:58–4:04 pm
JOINT SECTION SKULL BASE SURGERY AWARD
157 Dural Venous Sinus Thrombosis After Vestibular Schwannoma Surgery: The Anticoagulation Dilemma

4:04–4:10 pm
INTEGRA FOUNDATION AWARD
158 Candidate Regulatory Elements in Coding and Noncoding Regions are Associated with Invasive Behavior in Pituitary Tumors
CSNS CASE-BASED DISCUSSION ORAL PRESENTATIONS
Room 3016

5:16–5:22 pm
400 Disparities in Patient Outcomes After Elective Lumbar Fusions in Single-Level Lumbar Disc Pathologies
Abhinav K. Reddy, Philip B. Ostrov, James S. Ryoo, Soobin Kim, Ankit Indravadan Mehta

5:22–5:28 pm
401 A Multidisciplinary Spine Clinic Model Significantly Reduces Lead Times for Appropriate Specialist Visit and Appropriate Intervention in an Underserved Population: A Case Control Pilot Study
Michael Longo, Yaroslav J. Gelfand, Andrew I. Gitkind, Reza Yassari, Vijay Yanamadala

4:36–4:42 pm
404 Use of Virtual Reality Platforms in the Preoperative Planning and Intraoperative Navigation of Deep-seated Cavernomas
Carolina Gesteira-Benjamin, Omar Tanweer, Monica Mureb, Keiji Drysdale, Timothy M. Shepherd, John G. Golfinos, Howard A. Riina

4:42–4:48 pm
405 Direct Access Embolization of Intracranial Vascular Pathology: Preliminary Experience and Technical Notes
Min S. Park, Daniel Raper, Stepan Capek, Jeffrey Hakim, David Asuzu, M. Yashar S. Kalani

4:48–4:54 pm
406 Morphometric Comparison of the Pterional Trans-sylvian and the Pretemporal Trans-clinoidal Approaches to Posterior Communicating Artery Aneurysms: Anatomical Study

5:34–5:40 pm
Ryan P. Monaghan, Mary K. Robertson, Scott C. Robertson

CEREBROVASCULAR OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS
Room 2014

4:36–4:42 pm
408 Outcomes of Surgical Treatment for 138 Patients with Severe Sagittal Deformity at a Minimum 2-Year Follow Up
Justin K. Scheer, Lawrence Lenke, Justin S. Smith, Peter G. Passias, Han Jo Kim, Shay Bess, Themistocles Protopsaltis, Douglas C. Burton, Eric Klineberg, Virginie Lafage, Frank Schwab, Christopher I. Shaffrey, Sr., Christopher P. Ames

4:42–4:48 pm
409 C2 versus C3 as the Upper Instrumented Vertebra for Cervicothoracic Posterior Laminectomy and Fusion Demonstrate Equivalent Postoperative Outcomes
Ryan K. Badiee, Andrew Kai-Hong Chan, Joshua Rivera, Chih-Chang Chang, Dean Chou, Praveen V. Mummaneni, Lee A. Tan

4:48–4:54 pm
410 Preoperative SPECT Imaging as a Tool for Surgical Planning in Patients with Axial Neck and Back Pain
G. Damian Brusko, Roberto Perez-Roman, Harold Tampano, Michael Y. Wang

4:54–5:00 pm
411 A Comparison of Minimally Invasive and Open Transforaminal Lumbar Interbody Fusion for Grade 1 Degenerative Lumbar Spondylolisthesis: An Analysis of the Prospective Quality Outcomes Database

NEUROTRAUMA OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS
Room 3022

4:15–4:21 pm
412 Important Predictors of In-hospital Mortality in Patients with Acute Subdural Hematomas using Machine Learning
Aaron McPheters, Andrew Donovan, Nicolas K. Khattar, Jacob R. Shpilberg, Kevin John, Quan H. Do, Daniella Patton, Emily P. Sieg
4:21–4:27 pm
**413 Prognostic Value of Admission Parameters in a Machine Learning Predictive Model in Patients with Severe Traumatic Brain Injury and Acute Subdural Hematomas**
Kevin John, Aaron McPheters, Andrew Donovan, Nicolas K. Khattar, Jacob R. Shpilberg, Quan H. Do, Emily P. Sieg

4:27–4:33 pm
**414 Augmented Reality Systems for Improved Operating Room Workflow**
Nhu Q. Nguyen, Jillian Cardinell, Joel Ramjist, Yuta Dobashi, Dimitrios Androutsos, Victor Xiao Dong Yang

4:33–4:39 pm
**415 Segmentation and Measurement of Ventricular and Cranial Vault Volumes in 15,223 Subjects Using Artificial Intelligence**
Georgios Maragkos, Sasank Chilamkurthy, Santiago Gomez-Paz, Mohamed M. Salem, Swetha Tanamala, Pooja Rao, David Hackney, Ajith J. Thomas

**PAIN OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS**
Room 3024

5:06–5:12 pm
**416 Flat Panel Fluoroscopy (O-arm) Guided Percutaneous Radiofrequency Anterolateral Cordotomy.**
Zaid Aljuboori, Joseph Samir Neimat

5:12–5:18 pm
**417 Bi-Plane Fluoroscopic-Guided Balloon Rhizotomy for Trigeminal Neuralgia: A Technical Note**

5:18–5:24 pm
**418 Complex Regional Pain Syndrome and Failed Back Surgery Syndrome with Failed High-Frequency Spinal Cord Stimulation Salvaged with Arthrodesis Revision Surgery and Burst Therapy.**
Erin McCormack, Mansour H. Mathkour, Lora Wallis-Kahn, Maged Guirguis, Gassan Chaiban, Reda Tolba, Daniel Denis

5:24–5:30 pm
**419 Onyiuke Grading Scale: A Clinical Classification System for the Diagnosis and Management of Bertolotti Syndrome**
Joshua Knopf, Subin Lee, Ketan R. Bulsara, Hilyar C. Onyiuke, David B. Choi, Isaac Moss

**PEDIATRICS OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS**
Room 3018

4:36–4:42 pm
**420 True FISP Cardiac Gated CSF Flow Dynamic Imaging of Chiari Malformation**
Alon Kashanian, Moise Danielpour

4:42–4:48 PM
**421 Autologous Partial Thickness Calvarial Graft Sphenocranioplasty for Congenital Transsphenoidal Encephalocele**
M. Burhan Janjua, Gopi B. Shah, Dale Swift

4:48–4:54 pm
**422 Laser and the Tuber: Thermal Dynamic and Volumetric Factors Influencing Seizure Outcomes in Pediatric Subjects with Tuberous Sclerosis Undergoing Stereoecephalography-directed Laser Ablation of Tubers**
Michael A. Stellon, Kelsey D. Cobourn, Matthew Whitehead, Nancy Elling, William McClintock, Chima Oluigbo

**STEREOTACTIC AND FUNCTIONAL OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS**
Room 3020

4:36–4:42 pm
**424 Stereotactic ROBOT-assisted Deep Brain Stimulation Workflow: Incorporating the ROSA-Brain System into the Functional Neurosurgical Practice**
Amir H. Faraji, Vasileios Kokkinos, James C. Sweat, Robert M. Richardson

4:42–4:48 pm
**425 Vagal Nerve Stimulator Lead Revision Using Needle-Tip Cautery: Case Series, Literature Review, and Technical Note**
Vyacheslav I. Makler, Erin D’Agostino, David F. Bauer

4:48–4:54 pm
**426 Robotic Orthogonal Implantation of Responsive Neurostimulation (RNS) Depth Electrodes in Patients with Unilateral Mesial Temporal Lobe Seizure Onset**
Alvin Y. Chan, Sumeet Vadera

4:54–5:00 pm
**427 Accuracy of SEEG Electrodes Implanted in Lateral Position Versus Supine Position**
Caio M. Matias, Sandeep Kandregula, Chengyuan Wu, Ashwini D. Sharan

**TUMOR OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS**
Room 3014

4:45–4:51 pm
**428 Minimally Invasive Endoscopic Keyhole Approach for Meningiomas**
Tadashi Watanabe

4:51–4:57 pm
**429 Extra-arachnoidal Dissection for Excision of Giant Vestibular Schwannomas: Improved Facial Nerve Preservation**
Sunil K. Gupta
4:57–5:03 pm

**430 Step-wise Algorithm for Skull Base Reconstruction in Endoscopic Endonasal Surgery: From the Simple to the Complex**
Maria Belen Vega, Philippe Lavigne, Vanessa Hernandez-Hernandez, Aldo Egiluz-Menendez, Eric Wang, Carl H. Snyderman, Paul A. Gardner

5:03–5:09 pm

**431 Surgical Nuances of Endoscopic Endonasal Upper Clivectomy for Radical Resection of Central Skull Base Tumors: 2-Dimensional Operative Videos**
Alhusain Nagm, Takeo Goto, Kenji Ohata

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**THE INTERNATIONAL CEREBROVASCULAR SYMPOSIUM ORAL PRESENTATIONS**
Room 3003

6:39–6:45 pm

**500 Analysis of Gene Expression in Intracranial Aneurysms**
Jia Wang

6:45–6:51 pm

**501 Comparative Effectiveness of Preventive and Treatment Interventions for Cerebral Hyperperfusion Syndrome Following Bypass Surgery**
Georgios P. Skandalakis, Aristotelis Kalyvas, Evgenia Lani, Spyridon Komatis, Despoina Chatzopoulou, Danai Manolakou, Nikos Pantazis, Georgios A. Zenonos, Constantinos G. Hadjipanayis, George S. Stranjalis, Christos Koutsarnakis

6:51–6:57 pm

**BEST INTERNATIONAL BASIC SCIENCE**

**502 Association of SOX17 Gene Polymorphisms and Intracranial Aneurysm: A Case-Control Study and Meta-analysis**
Museung Park, Yong-Jun Cho, Jin Sue Jeon

6:57–7:03 pm

**503 Clinical Significance of Conversion from Computational Fluid Dynamics to Morphology for Risk Evaluation of Aneurysm Recurrence After Coiling**
Kouichi Misaki, Iku Nambu, Takehiro Uno, Akifumi Yoshikawa, Naoyuki Uchiyama, Mitsutoshi Nakada

7:03–7:09 pm

**504 Application of Intraoperative Electrocorticography in Precise Bypass Surgery of Adult Moyamoya Disease: A Preliminary Study**
Yu Lei

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**THE INTERNATIONAL FUNCTIONAL NEUROSURGERY SYMPOSIUM ORAL PRESENTATIONS**
Room 3002

6:39–6:45 pm

**505 Mesial Temporal Lobe Epilepsy: Role of Reelin Signalling Pathway**
Tulika Gupta, Mandeep Kaur, Navneet Singla, Bishan Radotra, Sunil Kumar Gupta, Daisy Sahni

6:45–6:51 pm

**506 Asymmetric Deep Brain Stimulation Electrodes for Parkinson’s Disease: A Pilot Study of Symptom-tailored Stimulation**
Chencheng Zhang, Linbin Wang, Leonardo Almeida, Bomin Sun, Dianyou Li

6:51–6:57 pm

**507 Sex Difference in Language Processing in Patients with Malignant Brain Tumors**
Shun Yao, Einat Liebenthal, Parikshit Juvekar, Adomas Bunevicius, Matthew Vera, Laura Rigolo, Alexandra J. Golby, Yanmei Tie

6:57–7:03 pm

**508 Multi-modal Presurgical Evaluation of Refractory Localization-related Epilepsy Involving Mesial Temporal Lobe Structures**
Rui Feng, Jie Hu, Chengxin Ma, Zhen Fan, Liqin Lang, Bing Sun, Jinsong Wu, Li Pan

7:03–7:09 pm

**509 Language Localisation in Multilingual Patients – Evidence from Direct Electrical Stimulation: A Systematic Review and Single Institution Case Series**
Colin Teo Kok Ann, Dijaina Satoer, Hui Minn Chan, Marco Rossi, Tseng Tsai Yeo, Yi Ting Emily Guo, Ne Hooi Will Loh, Elke De Witte, Keija Teo
ORAL ABSTRACT PRESENTATIONS
TUESDAY, OCTOBER 22

SUNRISE SCIENCE ORAL PRESENTATIONS SESSION
Room 3016

7:00–7:06 am
320 Does Hospital For-Profit Status Affect Intracranial Hemorrhage Outcomes and Cost of Care?
Ryan G. Chiu, Blake Murphy, David Rosenberg, Amy Zhu, Ankit I. Mehta

7:06–7:12 am
321 Workplace Violence and Neurosurgical Practice: Insights from the CSNS Workplace Violence Survey
Tyler Schmidt, Samuel Tomlinson, Kristopher T. Kimmell, Joshua M. Rosenow, Jeremy T. Phelps

7:12–7:18 am
322 Factors and Trends Associated with NIH Funding for Neurosurgeons over 25 years
Ankush Chandra, Arman Jahangiri, Patrick M. Flanigan, Maxine Arnush, Jonathan W. Rick, Sarah Choi, Alvin Chou, Mitchel S. Berger, Manish K. Aghi

7:18–7:24 am
323 Variation in 90-day Postoperative Costs Among Patients Undergoing Elective Anterior Cervical Discectomy and Fusion: Insights from the OPTUM Labs Data Warehouse (OLDW)
Panagiotis Kerezoudis, Mohammed A. Alvi, Anshit Goyal, Yagiz U. Yolcu, Stephanie Payne, Lindsey Sangaralingham, Molly Jeffery, Mohamad Bydon

7:24–7:30 am
324 This Is Not Brain Surgery: Increasing Neurosurgical Knowledge and Retention in Medical Students Through Usage of a Video-Based Education Curriculum
Carl Gustaf Stefan Axelsson, William T. Curry, Michael G. Healy, Emil Petrusa, Deborah M. Rooney, Traci Wolbrink, Roy Phitayakorn

7:30–7:36 am
325 Video Recording Patient Visits to Improve Patient Satisfaction and HCAHPS Scores
Malika Bhargava, Komal Naeem, Randall W. Porter

7:36–7:42 am
326 Trends in Neurosurgical Fellowship Training in North America over Two Decades 1997-2016
Ankush Chandra, Michael G. Brandel, John K. Yue, Lauro Avalos, Michael W. McDermott, Mitchel S. Berger, Manish K. Aghi

7:42–7:48 am
327 Surgical Epilepsy Care in a Safety-Net and Private Healthcare System: A Comparative Analysis

7:48–7:54 am
328 Factors Associated with Cost of 30-day and 90-day Readmissions Following Anterior Cervical Discectomy and Fusion: Insights from the Nationwide Readmissions Database
Anshit Goyal, Archis Bhandarkar, Mohammed A. Alvi, Mohamad Bydon

7:54–8:00 am
329 Socioeconomic Impacts of Opioid Dependence on Spinal Decompression and Fusion at Any Level: Analysis of a Nationwide Database
Andrew J. Caras, William K. Miller, Weikai Qu, Jason L. Schroeder, Azedine Medhkour

8:00–8:06 am
910 Health Literacy Among Surgical Subspecialties: Readability of Online Patient Materials for Surgical Procedures
Rosemary Behmer-Hansen, Meeki Lad, Justin L. Gold, Raghav Gupta, Somnath Ganapa, Antonios Mammis

8:06–8:12 am
911 Cost Variability for Four Common Neurosurgical Procedures in the United States
Hammad A. Khan, Konrad Knusel, Joseph E. Tanenbaum, Thomas E. Mroz, Edward C. Benzel, Deborah L. Benzel, Michael P. Steinmetz, Sebastian Salas-Vega

8:12–8:18 am
912 Analysis of Variables Associated with Number of Neurosurgical Residency Interview Invitations using a Survey Database
Anthony Nguyen, Wil Coggins, Elizabeth Nyabuto, Joseph R. McFarland, Ill, Daniel Branch, Rishi R. Lall

8:18–8:24 pm
913 Reducing Neurosurgery Craniotomy Surgical Site Infections: A Quality Improvement Project
Clifford Crutcher, Adam Podet, Frank Culicchia

8:24–8:30 am
914 Implementation of an Inpatient Neurosurgical Advanced Practice Nursing Role Reduces 30-Day Readmissions and Post-operative Wound Infections
Adam Podet, Kevin D. Morrow, Anthony M. DiGiorgio, Jessica Shields, Taylor Wapshott-Girolamo, Bonnie Koepp, Gabriel C. Tender, Jason D. Wilson
▲ TUESDAY
7:42–7:48 am
337 Treatment of Adult Scoliosis Fractional Curve with Minimally Invasive Surgery: Anterior Versus Posterior Approach?

7:48–7:54 am
338 The Minimally Invasive Interbody Selection Algorithm (MIISA) for Spinal Deformity
Praveen V. Mummaneni, Christopher I. Shaffrey, Sr., Robert Eastlack, Juan S. Uribe, Richard G. Fessler, Paul Park, Leslie Robinson, Joshua Rivera, Dean Chou, Kai-Ming G. Fu, Adam S. Kanter, David O. Okonkwo, Pierce D. Nunley, Khoi Duc Than

7:54–8:00 am
339 Predictors of the Best Outcomes Following Minimally Invasive Surgery for Grade 1 Lumbar Spondylolisthesis
Andrew Kai-Hong Chan, Erica F. Bisson, Mohamad Bydon, Steven D. Glassman, Kevin T. Foley, Eric A. Potts, Christopher I. Shaffrey, Sr., Mark E. Shaffrey, Domagoj Coric, John J. Knightly, Paul Park, Michael Y. Wang, Kai-Ming G. Fu, Jonathan Slotkin, Anthony L. Asher, Michael S. Virk, Panagiotsis Kerezoudis, Mohammed A. Alvi, Jian Guan, Regis W. Haid, Praveen V. Mummaneni

8:00–8:06 am
915 Anterior Approach versus Posterior Approach in the Treatment of Cervical Spondylotic Myelopathy: A Prospective, Randomized Study
Nasser M.F. El-Ghandour, Mohamed A.R. Soliman, Ahmed A.M. Ezzat, Amr Ashraf, Mostafa Z. El-Abdeen

8:06–8:12 am
916 Large Increases in Lumbar Fusions Expected in the United States by 2060
Sean N. Neifert, Jeffrey Gilligan, Robert J. Rothrock, Jeffrey H. Zimering, John M. Caridi, Eric K. Oermann

8:12–8:18 am
917 Evaluation of Single Level Cervical Disc Arthroplasty in Advanced Degenerative Disc Disease
Nathan L. Pratt, Charles A. Sansur, Kenneth M. Crandall, George A. Crabill

8:18–8:24 am
918 Key Drivers of Patient Satisfaction in the Outpatient Spine Surgery Setting
Nicholas M. Rabah, Jay M. Levin, Robert Winkelman, Thomas E. Mroz, Michael P. Steinmetz

8:24–8:30 am
919 The Safety and Efficacy of Riluzole in Enhancing Clinical Outcomes in Patients undergoing Surgery for Cervical Spondylotic Myelopathy: Results of the CSM-Protect Double-blinded, Multi-center Randomized Controlled Trial in 300

▲ SATURDAY
7:00–7:06 am
330 A Novel Preoperative Radiographic Scoring System to Predict Postoperative Outcomes in Patients Undergoing Cervical Disc Replacement Surgery
Yahya Othman, Todd Albert, Russell Huang, Philip York, Avani Vaishnav, Steven Mcanany, Srasviths Iyer, Catherine Gang, Sheeraz Qureshi

7:06–7:12 am
331 PROMIS-29 Validity and Conversion Equation to Neck Disability Index (NDI) Using a National Sample of Cervical Spine Surgery Patients
Inamullah Khan, Jacqelyn S. Pennings, Claudia Davidson, Mohamad Bydon, Anthony L. Asher, Clinton J. Devin, Kristen Archer-Swygert

7:12–7:18 am
332 Genomic Landscape of Intramedullary Spinal Cord Tumors Suggests Distinct Genetic Origins Compared to Intracranial Histopathologic Counterparts

7:18–7:24 am
333 Surgical Treatment of Cervical Spondylotic Myelopathy Leads to Functional Improvement in Hand Strength and Dexterity: A Prospective Quantitative Study
Tyler S. Cole, Kaith K. Almeft, Jakub Godzik, Randall Hlubek, Jay D. Turner

7:24–7:30 am
334 Neuro-Spinal Scaffold™ Implantation in Patients with Acute Traumatic Thoracic Complete Spinal Cord Injury: Twenty-Four Month Results from the INSPIRE Study
Kee D. Kim, K. Stuart Lee, Jason J. Chang, Richard M. Toselli

7:30–7:36 am
335 Does ACR Result in Greater Morbidity than LLIF Alone when Treating Adult Spinal Deformity?

7:36–7:42 am
336 Anterior Lumbar Interbody Fusion (ALIF) Versus Oblique Lateral Interbody Fusion (OLIF) at L5-S1: A Comparison of Two Approaches to the Lumbosacral Junction
Zhuo Xi, Shane Burch, Chih-Chang Chang, Hui-bing Ruan, Charles M. Eichler, Praveen V. Mummaneni, Dean Chou

▲ SUNDAY
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339 A Novel Preoperative Radiographic Scoring System to Predict Postoperative Outcomes in Patients Undergoing Cervical Disc Replacement Surgery
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919 The Safety and Efficacy of Riluzole in Enhancing Clinical Outcomes in Patients undergoing Surgery for Cervical Spondylotic Myelopathy: Results of the CSM-Protect Double-blinded, Multi-center Randomized Controlled Trial in 300
7:00–7:06 am  
**340 Firearm Injuries Cause Disproportionate Mortality in Pediatric Traumatic Brain Injury**
Saksham Gupta, Blake M. Hauser, Mark M. Zaki, David J. Cote, Saef Izzy, Timothy R. Smith, Ayaz M. Khawaja

7:06–7:12 am  
**341 Exome Sequencing Defines the Molecular Pathogenesis of Vein of Galen Malformation**

7:12–7:18 am  
**342 Elbow Flexion in Neonatal Brachial Plexus Palsy: A Meta-Analysis of Graft Versus Transfer**
Muhibullah S. Tora, Nathan Hardcastle, Pavlos Texakalidis, Jeremy Wetzel, Joshua J. Chern

7:18–7:24 am  
**343 Prognostic Value of Leucocytosis in Pediatric Traumatic Brain Injury**
Soumya Mukherjee, Gnanamurthy Sivakumar, John Goodden, Atul Tyagi, P.D. Chumas

7:24–7:30 am  
**344 A Comparison of Parent and Child Evaluations of Quality of Life in Pediatric Neurosurgery**
Eric Goethe, Melissa LoPresti, Michelle Yifan Zhao, I-Wen Pan, Sandi Lam

7:30–7:36 am  
**345 Gene Mutations Related to Pathogenesis and Development of Cerebral Arteriovenous Malformations in Pediatric Populations**
Rebecca Y. Du, Melissa LoPresti, Vijay Ravindra, Ionela Iacobas, Katie Bergstrom, Eric A. Goethe, Sandi Lam

7:36–7:42 am  
**346 Traumatic Spinal Injuries Cause Disproportionate Morbidity in Sports-related Pediatric Trauma**
Blake M. Hauser, Saksham Gupta, David J. Cote, Mark M. Zaki, Edward Xu, Ayaz M. Khawaja, Yi Lu, Michael W. Groff, Timothy R. Smith, Hasan A. Zaidi

7:42–7:48 am  
**347 Early Outcome of Endoscopic Third Ventriculostomy with or without Choroid pPexus Cauterization and Ventriculoperitoneal Shunt as Primary Treatment of Hydrocephalus in Infants with Myelomeningocele**
Bamidele Oludele Adebayo, Okezie Kanu, Olufemi B. Bankole, Omotayo Ojo
COUNCIL OF STATE NEUROLOGICAL SOCIETIES ORAL PRESENTATIONS
Room 3016

3:27–3:33 pm
SAMUEL HASSENBUSCH YOUNG NEUROSURGEON AWARD
159 Simulating Costs for Episode-Based Bundled Payments for Cranial Neurosurgical Procedures
Zachary A. Medress, Beatrice Ugiliweneza, Jonathon J. Parker, Dengzhi Wang, Eric Burton, Shiao Y. Woo, Loren Baker, Maxwell Boakye, Stephen Skirboll

3:33–3:39 pm
160 The Impact of Single-Vendor Procurement of Spinal Implants: An Analysis of Cost Savings and Surgical Quality at an Academic Hospital
Collin Blackburn, Nicolas Thompson, Joseph E. Tanenbaum, Thomas E. Mroz, Michael P. Steinmetz

3:39–3:45 pm
161 Trending Racial and Socioeconomic Inequality in the Surgical Management and Outcome of Traumatic Cervical Spinal Cord Injury With Fracture In the USA from 1998-2009
Alexander Dru, Dan Neal, W. Christopher Fox, Brian L. Hoh, Daniel J. Hoh

3:45–3:51 pm
162 Association Between Interhospital Competition and Hospital Resource Use for Cranial Neurosurgery: Analysis of 513,271 Admissions
Oliver Y. Tang, Krissia M. Rivera-Perla, Steven A. Toms

3:51–3:57 pm
163 Bundle Payment, Health Care Utilization and Outcomes Following Surgery for Anterior, Middle and Posterior Cranial Fossa Skull Base Meningioma: A Market Scan Analysis
Mayur Sharma, Beatrice Ugiliweneza, Maxwell Boakye, Norberto O. Andaluz, Brian J. Williams

3:57–4:03 pm
164 Patient Reported Outcomes Following Surgery for Lumbar Disc Herniation: Comparison of a Universal and Multitier Health Care System
Oliver G.S. Ayling, Tamir T. Ailon, Nicolas Dea, Charles Fisher

4:03–4:09 pm
165 Length of Stay and Disposition of Patients Undergoing Elective Spine Surgery in Maryland: Impact of the Global Budget Revenue Program
Berje H. Shammassian, Andrew Ahn, Debraj Mukherjee

4:09–4:15 pm
166 The Cost-Effectiveness of Epilepsy Surgery and Surgical Evaluation in the United States
Shehryar R. Sheikh, Michael P. Steinmetz, Michael W. Kattan, Mendel Singer, Belinda Udeh, Lara Jehi

SECTION ON CEREBROVASCULAR SURGERY ORAL PRESENTATIONS
Room 2014

3:27–3:33 pm
167 Mechanical Thrombectomy in Acute Ischemic Stroke: A Meta-Analysis of Stent Retrievers Versus Direct Aspiration Versus a Combined Approach
Pavlos Texakalidis, Stefanos Giannopoulos, Theofilos Karasavvidis, Leonardo Rangel-Castilla, Dennis J. Rivet, John F. Reavey-Cantwell

3:33–3:39 pm
168 Percutaneous Trans-carotid Puncture for Mechanical Thrombectomy in Acute Ischemic Stroke Patients is Safe and Effective: A Large, Single-center Case Series
Branden J. Cord, Anson Wang, Fouad Chouairi, Andrew Koo, Carl Porto, Andrew Silverman, Sreeja Kodali, Sumita Strander, Guido Falcone, Kevin Sheth, Ryan M. Hebert, Lauren Sansing, Joseph Schindler, Nils Petersen, Charles C. Matouk

3:39–3:45 pm
169 A Phase I/II, Prospective Multi-Center Study of the Safety and Preliminary Efficacy of Intravenous Allogeneic Mesenchymal Bone Marrow Cells in Chronic Ischemic Stroke
Michael L. Levy, John Crawford, Nabil Dib, Lev Verkh, Nikolai Tankovich, Steven C. Cramer

3:45–3:51 pm
170 MicroRNA-26b/PTEN Signaling Pathway Mediates Glycine-induced Neuroprotection in SAH Injury
Xingping Qin

3:51–3:57 pm
171 Elucidating a Proteomic Signature for the Detection of Intracerebral Aneurysms
Dominic A. Nistal, Michael L. Martini, Trevor Hardigan, Nicolas Fernandez, Seunghee Kim-Schulze, Rui Song, Natalia Romano-Spica, Julianne Kleitsch, J D. Mocco, Christopher P. Kellner

3:57–4:03 pm
172 Bone Marrow T-cell Sequestration and Lymphopenia Accompanying Ischemic Stroke are Mediated by T-cell S1P1 Loss
Pakawat Chongsathidkiet, Cosette Dechant, Daniel Wilkinson, Haichen Wang, Hanna Kemeny, Xiuyu Cui, Selena Lorrey, Daniel T. Laskowitz, Peter E. Fecci

4:03–4:09 pm
173 Vitamin D: A New Perspective in Treatment of Cerebral Vasospasm After Subarachnoid Hemorrhage
Sepide Kashefiolasl, Matthias Leisegang, Valeska Helfinger, Christoph Schürmann, Beatrice Pflüger-Müller, Voahanginirina Randriamboavony, Andrea Estefy-Vasconez, Geert Carmeliet, Klaus Badenhoop, Gudrun Hintereder, Volker Seifert, Katrin Schröder, Juergen Konczalla, Ralf Brandes
4:09–4:15 pm
**174 Optogenetic Stimulation Reduces Neuronal Nitric Oxide Synthase Expression After Stroke**
Arjun V. Pendharkar, Daniel L. Smerin, Lorenzo Gonzales, Eric Wang, Sabrina L. Levy, Stephanie Wang, Shunsuke Ishizaka, Masaki Ito, Michelle Cheng, Gary K. Steinberg

SECTION ON DISORDERS OF THE SPINE AND PERIPHERAL NERVES ORAL PRESENTATION
Room 2016
3:29–3:35 pm
**175 Stereotactic Radiation Therapy (SBRT) Versus External Beam (EB) Radiation for Metastatic Spine Disease: Comparing Fracture Rates and Local Control**
Enrique Vargas, Steve Braunstein, Matthew Susko, Praveen V. Mummaneni, Dean Chou

3:35–3:41 pm
**176 Development of Clinical Prognostic Models for Postoperative Survival and Quality of Life in Patients with Surgically Treated Metastatic Epidural Spinal Cord Compression**
Anick Nater, Junior Chuang, Kuan Liu, Nasir A. Quraishi, Dritan Pasku, Jefferson R. Wilson, Michael G. Fehlings

3:41–3:47 pm
**177 The Safety of Per Os Naloxone and its Efficacy in Resolving Postoperative Ileus in Patients Undergoing Spine Surgery**
Karam P. Asmaro, Eric Klomparsen, Jacob A. Pawloski, Sameah A. Haider, Hesham M. Zakaria, Mathew Jones, Beverly C. Walters, Jason M. Schwalb

3:47–3:53 pm
**178 Long-term Outcomes of High-dose Single-fraction Radiosurgery for Chordomas of the Spine and Sacrum**
Jenny Jin, John Berry-Candelario, Jr., Y. Josh Yamada, Daniel Higginson, Adam Schmitt, Anne Reiner, Eric Lis, Ori Barzilai, Ilya Lauber, Mark H. Blisky

3:53–3:59 pm
**179 The Association of Intraoperative Antibiotic and Surgical Site Infection After Lumbar Spine Surgery: Analysis of the Michigan Spine Surgery Improvement Collaborative**

3:59–4:05 pm
**180 The Association Between Chronicity of Preoperative Opioid Usage Between Patient Satisfaction, Return to Work, and Achieving ODI MCID up to 2 Years After Lumbar Fusion: Analysis from the Michigan Spine Surgery Improvement Collaborative (MSSIC)**

4:05–4:11 pm
**181 Is Obtaining a CT Prior to Offering Anterior Cervical Disc Arthroplasty (ACDA) Necessary? The Results of Surgeons Predicting ACDA Candidacy from MRIs and X-Rays Alone**

4:11–4:17 pm
**182 Effect of Cage Type on Immediate Post-operative Radiographic Outcomes in Single-level Minimally Invasive Transforaminal Lumbar Interbody Fusion (MI-TLIF)**
Avani Vaishnav, Joshua Wright-Chisem, Michael Steinhaus, Steven Mccanary, Sravisht Iyer, Todd Albert, Catherine Gang, Sheeraz Quareshi
**ORAL ABSTRACT PRESENTATIONS**

**SECTION ON PAIN ORAL PRESENTATIONS**
Room 3024

3:29–3:35 pm
**190** Sex-specific Transcriptomic Differences from Human Dorsal Root Ganglia Associated with Painful Radiculopathy
Robert Y. North, Yan Li, Pradipta Ray, Laurence D. Rhines, Claudio E. Tatsui, Ganesh Rao, Yeun H. Kim, Bo Zhang, Greg Dussor, Tae H. Kim, Theodore Price, Patrick M. Dougherty

3:35–3:41 pm
**191** Protocolized High-Dose (HD) and Low-Dose (LD) Spinal Cord Stimulation (SCS) Workflow Results in Meaningful Pain and Opiate Reduction.
Sarah E. Hodges, Shervin Rahimpour, Luis A. Antezana, Abena A. Ansah-Yeboah, Rajeev Dharapamurikar, John Hatheway, Michael Warrick, Scott Berlin, Benjamin Seeman, Shivanand P. Lad

3:41–3:47 pm
**192** Internal Neurolysis With and Without Microvascular Decompression for Trigeminal Neuralgia
Victor Sabourin, Jacob Mazza, Tomas Garzon-Muvdi, Donald Y. Ye, Anthony Stefanelli, Fadi Al Saeigh, Daniel Tzou, James J. Evans

3:47–3:53 pm
**193** Earlier Radiosurgery Leads to Better Pain Relief and Less Medication Usage for Trigeminal Neuralgia Patients: An International, Multi-center Study
Monica Mureb, Danielle Golub, Carolina G. Benjamin, Ben A. Strickland, Gabriel Zada, Eric L. Chang, Ronald E. Warnick, Herwin Speckter, Skyler Eastman, Anthony M. Kaufmann, Caleb E. Feliciano, Carlos Carbini, William Leduc, David Mathieu, Yusuke Hori, Sean J. Nagel, Dusan Urogosik, Roman Liscak, Samir Patel, Yi-Chieh Hung, Jason P. Sheehan, Douglas Kondziolka

3:53–3:59 pm
**194** Effects of External Focused Ultrasound on Inflammatory Markers in Neuropathic Pain Caused by Common Peroneal Nerve Injury
Adithya Srikanthan, Teresa Maitetta, Abigail Hellman, Vraj Patel, Alicia Clum, Paul Neubauer, Emery Williams, Clif Burdette, Jiang Qian, Julie G. Pilitsis

3:59–4:05 pm
**195** Defining the Therapeutic Window (TW) for Spinal Cord Stimulation (SCS) Using Evoked Compound Action Potential (ECAP) Recordings: Results from the Evoke Study
Robert M. Levy

4:05–4:11 pm
**196** Healthcare Resource Utilization Among Patients with Non-Surgical Refractory Low Back Pain in the United States: A Retrospective Analysis of Health Insurance Claims Data
Charis Spears, Sarah E. Hodges, Musa Kiyani, Zidanyue Yang, Ryan Edwards, Alexis Musick, Christine Park, Beth Parente, Hui-Jie Lee, Shivananand P. Lad

4:11–4:17 pm
**197** The Neurosurgeons' Armamentarium for the Management of Refractory Post-Herpetic Neuralgia
Muhibullah S. Tora, Pavlos Texakalidis, Nicholas M. Boulis

**SECTION ON PEDIATRIC NEUROLOGICAL SURGERY ORAL PRESENTATIONS**
Room 3018

3:27–3:33 pm
**198** Developmental Pleiotropy of PTEN in Congenital Hydrocephalus and Autism Spectrum Disorder
Tyrone DeSpenza, Jr.

3:33–3:39 pm
**199** Predictors of Posterior Fossa Syndrome: Results from an International Multicenter Cohort Study of Molecularly Characterized Medulloblastoma Patients
Rashad Jabarkheel, Nisreen Amayiri, Derek W. Yecies, Yuhao Huang, Sebastian Toescu, Donald Mabbott, Sniya Sudhakar, Prateek Malik, Suzanne Laughlin, Geeta Chacko, Leni Mathew, Paul Fisher, Michael D. Taylor, Stefan Pfister, Kristian Aquilina, Gerald A. Grant, Kshitij Mankad, Kristen Yeom, Vijay Ramaswamy

3:39–4:05 pm
**200** Cost Comparison of Prenatal Myelomeningocele Closure Versus Postnatal Closure for both Mother and Child at 1 year of Life
Brice A. Kessler, Carolyn Quinsey, William Goodnight, Scott Elton

3:45–3:51 pm
**201** Intraoperative Injection of Intraventricular Antibiotics Is Associated with a Decreased Incidence of Infection and Revision Surgery in Pediatric Hydrocephalus Patients Undergoing Shunt Placement
Nikita Lakomkin, Constantinos G. Hadjipanayis

3:51–3:57 pm
**202** When Does an Incidental Chiari I Malformation Require Surgery? A 10-Year Prospective Study on the Evolution and Natural History
Hepzibha Alexander, Deki Tsering, John S. Myseros, Suresh N. Magge, Chima Oluigbo, Carlos E. Sanchez, Robert F. Keating
Reduced Fractional Anisotropy of Superior Cerebellar Peduncle Is Associated with Persistent Ataxia in Children Undergoing Resection of Posterior Fossa Tumors

Aditya Vedantam, Katie Stormes, Nisha Gadgil, Stephen F. Kralik, Guillermo Aldave, Sandi Lam

Opioid Prescribing Patterns for Low Back Pain Among Commercially-Insured Children

Tej D. Azad, Michael D. Harries, Daniel Vail, Yi J. Zhang, John K. Ratliff

Pediatric Anoxic Brain Injury – A Possible Locked-In Syndrome

Mariam Ishaque, Crystal G. Franklin, Mary D. Woolsey, Peter T. Fox

Action Observation and Execution Differentially Modulate Basal Ganglia-cortical Activity in Humans

Mahsa Malekmohammadi, Kathryn Cross, Jeongwoo Choi, Nader Pouratian

Resting-state SEEG May Help Localize Epileptogenic Brain Regions


Direct Targeting of the Ventral Intermediate Nucleus Using High-field Proton Density MR Imaging: Functional Outcomes and Comparison to “Indirect” Targeting

Francisco A. Ponce, Margaret Lambert

Blood-Brain Barrier Opening in Alzheimer’s Disease Using MR-guided Focused Ultrasound

Ying Meng, Zahra Shrizadi, Bradley MacIntosh, Chris Heyn, Gwen S. Smith, Isabelle Aubert, Clement Hamani, Sandra Black, Kullervo Hynynen, Nir Lipsman

Neural Control of Individual Finger Movements Using Intracortical Recordings from a Person with Tetraplegia

Ahmed Jorge, Dylan Royston, Elizabeth C. Tyler-Kabara, Michael Boninger, Jennifer Collinger

Functional Use of Directional Local Field Potentials in Parkinson’s Disease

Ilknur Telkes, Jennifer Durphy, Octavian Adam, Nataley Raviv, Julie G. Pilitsis

Risk Analysis of Hemorrhages in Stereoelectroencephalography Procedures

Robert A. McGovern, III, Paul Ruggieri, Juan Bulacio, Imad Najm, William E. Bingaman, Jorge A. Gonzalez-Martinez

A Novel Computational Approach in MATLAB to Characterize Thermal Damage Estimate in Magnetic Resonance-guided Laser Interstitial Thermal Therapy.

Allison Liang, Sean Munier, Shabbar F. Danish

Decreased Circulating Myeloid Derived Suppressor Cells at First Follow-up Predict Favorable Response to Immunotherapy in a Randomized Trial of Nivolumab and Bevacizumab in Recurrent GBM

Matthew M. Grabowski, Balint Otvos, Tyler J. Alban, Marcella Diaz, Justin D. Lathia, Gene H. Barnett, Manmeet Ahluwalia

Role of CX3CR1 Signaling in Malignant Transformation of Gliomas

Sungho Lee, Khatri Latha, Ganesh Rao

The TRIM26-SOX2 Ubiquitin Signaling Axis Regulates the Maintenance and Tumorigenicity of Glioblastoma Stem-like Cells

Tatenda Mahlokozera, Mounica Paturu, Daniel Hafez, Diane Mao, Albert H. Kim

Recapitulation of Genetic Predisposition to Medulloblastoma in Human Neuroepithelial Stem Cells

Jignesh Tailor, Miller Huang, Austin Smith, William A. Weiss

Stereotactic Radiosurgery With and Without Checkpoint Inhibition for Patients with Metastatic Non-Small Cell Lung Cancer to the Brain: A Matched Cohort Study

Matthew Shepard, Zhiyuan Xu, Joseph Donahue, Thomas E. Muttilkakil, Diogo Codeiro, Leslie Hansen, Nasser Mohammed, Ryan D. Gentzler, James Larner, Camilo Fadul, Jason P. Sheehan

A Brain Penetrating HSP90 Inhibitor NXD30001 Inhibits Glioblastoma as a Monotherapy or in Combination with Radiation

Hao Chen, Jialiang Wang, Hengli Tian
4:09–4:15 pm
**220 Survival Benefit with Resection of Brain Metastases from Renal Cell Carcinoma in the Setting of Molecular Targeted Therapy and Immune Therapy**
Mark A. Damante, Jr, Kristin Huntoon, Thomas Olenczi, Bradley Elder

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**CSNS CASE-BASED DISCUSSION ORAL PRESENTATIONS**
Room 3016

4:51–4:57 pm
**432 Safety and Costs Analysis of a “Fast-track Algorithm for Early Hospital Discharge After Brain Tumor Surgery**
Danilo Gomes Quadros, Iuri S. Neville, Francisco M. Urena, Davi J. Fontoura Solla, Willoughs S. Paiva, Manoel Teixeira

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4:57–5:03 pm
**433 A Safe Transitions Pathway for Post Craniotomy Neurosurgical Surgery Patients: High Value Care that Bypasses the Intensive Care Unit**

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5:03–5:09 pm
**434 Reducing Preventable Readmissions in a Neurosurgical Patient Population at an Academic Medical Center**
Shayan Moosa, Lindsay Bowerman, Ellen Smith, Mindy Bryant, Natalie Krovetz, Melissa Pritchett, Nancy Staton, JoAnne Wilson, Carol Wisinski, Patty Bullock, Kearby Chen, Susan Prather, Lisa Archual, Amy Johnston, Mark E. Shaffrey

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5:09–5:15 pm
**435 A Novel Protocol for Reducing Intensive Care Utilization after Craniotomy**
Arjun V. Pendharkar, Maryam N. Shahin, Allen L. Ho, Eric S. Sussman, Gordon Li, John K. Ratliff, Melanie Hayden Gephart, Amy Lu

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**CEREBROVASCULAR OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS**
Room 2014

4:44–4:50 pm
**436 Diverse Use of the WEB Device: A Technical Note on WEB Stenting and WEB Coiling of Complex Aneurysms**
Jorge A. Roa, Mario Zanaty, Sudeepa Dandapat, Edgar Samaniego, Pascal Jabbour, David M. Hasan

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4:50–4:56 pm
**437 Microcatheter Shaping for Intracranial Aneurysm Coiling Using Artificial Intelligence Assisted Technique**
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4:56–5:02 pm
**439 Early Lessons Learned from the WEB Device: Feasibility, Technique and Complications – A Real Life Experience**
Nikolaos Mouhtouris, David M. Hasan, Fadi Al Saiegh, Ahmad Sweid, Mario Zanaty, Omaditya Khanna, Nohra Chalouhi, Stavropoula I. Tjomakaris, M. Reid Gooch, Robert H. Rosenwasser, Pascal Jabbour

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**SPINE OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS**
Room 2016

4:36–4:42 pm
**BEST INTERNATIONAL OPERATIVE TECHNIQUE**
**440 Convection-enhanced Delivery of Nimustine Hydrochloride for Recurrent Spinal Cord High-grade Glioma**
Toshiki Endo, Ryuta Saito, Teiji Tominaga

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4:42–4:48 pm
**441 Complication Profile Associated with S1 Pedicle Subtraction Osteotomy Compared To Other Spinal Levels**
Darryl Lau, Vedat Deviren, Christopher P. Ames

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4:48–4:54 pm
**442 4 Year Experience of Robot-Assisted Pedicle Screw Placement: An Australian Prospective Analysis**
Jordan Cory, Mohammed A. Awad, Richard G. Bittar

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4:54–5:00 pm
**443 Single Position Lateral Lumbar Fusion Utilizing Robot Guided Screw Placement**
George V. Humphon III

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**NEUROTRAUMA OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS**
Room 3022

4:15–4:21 pm
**444 Initial Experience of Spinal Cord Perfusion Pressure Goals in Lieu of Mean Arterial Pressure Goals in Acute Traumatic Spinal Cord Injury at a U.S. Level I Trauma Center: A TRACK-SCI Study**
John K. Yue, Debra P. Hemmerle, Hansel Deng, Ethan A. Winkler, Leigh H. Thomas, Xuan Duong Fernandez, Pavan S. Upadhayayula, Nikolaos Kyritsis, Lisa U. Pascual, Vineeta Singh, Philip R. Weinstein, Jason Talbott, J. Russell Huie, Adam Ferguson, William Whetstone

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4:21–4:27 pm
**445 MRI Evidence of Therapeutic Efficacy of Timing of Decompression in AIS Grades A-C Cervical Spinal Cord Injury Patients**
Joshua R. Olexa, Bizhan Ararab, Kathikarnananthan Shanmuganathan, Noori Akhtaradanehs, Charles A. Sansur, Gary T. Schwartzbauer, Maureen Scarboro, Nick Caffes, Jeffrey Oliver, Stephen Carbine, Mori Kanami

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4:27–4:33 pm
**446 Surgery Delay Increases Length of Stay in Thoracolumbar Trauma**
4:33–4:39 pm  
**447 Early Versus Late Surgical Decompression for Central Cord Syndrome: A Propensity Score-Matched Analysis**  
Jetan H. Badhiwala, Christopher D. Witiw, Jefferson R. Wilson, Michael G. Fehlings

### PAIN OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS  
Room 3024

4:36–4:42 pm  
**448 Complications of Endoscope-Assisted Microvascular Decompression for Trigeminal Neuralgia- An Evaluation of 300 Consecutive Patients**  
Alexandra D. Baker, Melvin Field

4:42–4:48 pm  
**449 C1-C4 Unilateral Dorsal Root Entry Zone Rhizotomy (Drez) for Treatment of Refractory Post-Herpetic Occipital Neuralgia.**  
Zaid Aljuboori, Joseph S. Neimat

4:48–4:54 pm  
**450 Surgical Outcomes After Microvascular Decompression with Internal Neurolysis and Partial Neurectomy for Patients with Trigeminal Neuralgia and Negative Neurovascular Compression**  
Amanda Carpenter, James K. Liu

### TUMOR OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION ORAL PRESENTATIONS  
Room 3018

4:15–4:21 pm  
**451 Reduction Cranioplasty Using a Three-dimensional Preoperative Virtual Model for Treatment of Extreme Macrocephaly and Positional Plagiocephaly Secondary to Untreated Hydrocephalus – Case Description and Literature Review**  
Wilson R. Teixeira, Alexandre Rainha Campos, Mickael Bartikian, Claudia Faria, Lia Lucas-Neto, Maria M. Santos

4:21–4:27 pm  
**452 Moyamoya Disease in Infancy: Application of a Novel Indirect Revascularization Technique for Bihemispheric Cortical Synangiosis**  
Danielle DeBacker Dang, John V. Dang, Duaa AbdelHameid, Seth Mansinghani, Leon E. Moore

4:27–4:33 pm  
**453 Idiopathic Intracystinal Hemorrhage: A Case Report and Review of the Literature**  
Shawn S. Rai, Carlos R. Goulart, Mark R. Proctor, R. Michael Scott, Katie P. Fehnel

4:33–4:39 pm  
**454 Endovascular Super-Selective Intra-arterial Chemotherapy for Retinoblastoma: Systematic Review and Institutional Experience**  
Simon Menaker, Samir Sur, Anil Mahavadi, Stephanie H. Chen, Eric C. Peterson, Robert M. Starke

### INTERACTIVE MULTIMEDIA RESEARCH ORAL PRESENTATIONS  
Podium 1, Level 2 Lobby

5:45–5:48 pm  
**600 A Comparison of Minimally-Invasive Transforaminal Lumbar Interbody Fusion and Decompression Alone for Degenerative Lumbar Spondylolisthesis**  
▲ TUESDAY

601 Intra-operative 3D Navigation Versus Fluoroscopy: A Comparison of Time Demand, Radiation Exposure and Outcomes in Minimally Invasive Transforaminal Lumbar Interbody Fusion (MI-TLIF)
Avani Vaishnav, Steven Mcanany, Sravisht Iyer, Todd Albert, Catherine Gang, Sheeraz Qureshi

5:48–5:51 pm

602 Increased Axial Facet Angle Correlates with Poor Percutaneous Pedicle Screw Placement
Guang-Ting Cong, James Dowdell, Avani Vaishnav, Steven Mcanany, Sravisht Iyer, Todd Albert, Catherine Gang, Sheeraz Qureshi

5:51–5:54 pm

603 Anterior Column Reconstruction Versus Pedicle Subtraction Osteotomy for Severe Sagittal Plane Deformity: Early Clinical and Radiographic Outcomes Using a Hyperlordotic Expandable Lateral Interbody Device
Lara Walsh Massie, Mohamed Macki, Hesham M. Zakaria, Michelle Gilmore, Azam Basheer, Victor W. Chang, Frank La Marca

5:54–5:57 pm

604 Characterizing the Risk and Outcome Profiles of Lumbar Fusion Procedures in Patients with Opioid Use Disorders: A Step Towards Improving Enhanced Recovery Protocols for a Unique Patient Population
Michael L. Martini, Dominic A. Nistal, Brian C. Deutsch, Jeffrey Gilligan, Robert J. Rothrock, Sean N. Neifert, John M. Caridi

5:57–6:00 pm

605 Anterior Cervical Arthrodesis with Polyetheretherketone Spacers: What is the Role of the Grafting Material?
Jeffrey Pollock, Donald A. Ross, Jung U. Yoo, Ningcheng P. Li

6:00–6:03 pm

606 Reoperations Following Lumbar Discectomy are Associated with Worse Clinical Outcomes and Greater Socioeconomic Burden 3 Years after the Primary Procedure
Claudius Thomé, Ali Araghi, Jason Inzana, Jonathan Stieber, Joshua M. Ammerman

6:03–6:06 pm

607 DEXA Versus CT: Comparison of Bone Mineral Density Measurements in Predicting Postoperative Spinal Fusion Outcomes
Awaïs Vance, Alexander Mazal, Salah G. Aoun, Najib El Tecle, Matthew Thomas Davies, Tarek Youssef El Ahmadieh, Kevin C. Morrill, Carlos A. Bagley, Mazin Al Tamimi

6:06–6:09 pm

608 Perioperative Complications in Obese Patients Undergoing Anterior Lumbar Interbody Fusion: Results from 938 Patients

6:09–6:12 pm

609 Predictors of Patient Satisfaction Following One- or Two-Level Anterior Cervical Discectomy and Fusion: Insights from the Quality Outcomes Database
Panagiotis Kerezoudis, Anthony L. Asher, Clinton J. Devin, Mohammed A. Alvi, Inamullah Khan, Hui Nian, Ahilan Sivaganesan, Frank E. Harell, Kristin Archer, Mohamad Bydon

6:12–6:15 pm

610 Neuroanesthesia Guidelines for Optimizing Transcranial Motor Evoked Potentials Neuromonitoring During Deformity and Complex Spinal Surgery: A Delphi Consensus Study
Corey T. Walker, Han Jo Kim, Paul Park, Lawrence Lenke, Justin S. Smith, Daniel M. Sciubba, Michael Y. Wang, Christopher I. Shaffrey, Sr., Vedat Deviren, Praveen V. Mummaneni, Khoi Duc Than, Robert Eastlack, Gregory M. Mundis, Jr., Adam S. Kanter, David O. Okonkwo, John H. Shin, Tyler R. Koski, Steven D. Glassman, Alan H. Daniels, Jay D. Turner, Juan S. Uribe

6:15–6:18 pm

611 Impact of Dominant Symptom on 12-Month Patient Reported Outcomes for Patients Undergoing Lumbar Spine Surgery: A Quality Outcomes Database Analysis
Clinton J. Devin, Mohamad Bydon, Panagiotis Kerezoudis, Mohammed A. Alvi, Anshit Goyal, Inamullah Khan, Yagiz U. Yolcu, Anthony L. Asher

6:18–6:21 pm

612 Predictors of Non-Routine Discharge Among Patients Undergoing Surgery for Grade I Spondylolisthesis: Insights from the Quality Outcomes Database (QOD)
Mohamad Bydon, Praveen V. Mummaneni, Panagiotis Kerezoudis, Andrew Kai-Hong Chan, Steven D. Glassman, Kevin T. Foley, Jonathan R. Slotkin, Eric A. Potts, Mark E. Shaffrey, Christopher I. Shaffrey, Sr., Domagoj Coric, John J. Knightly, Paul Park, Kai-Ming G. Fu, Clinton J. Devin, Anthony L. Asher, Erica F. Bisson

6:21–6:24 pm

613 Does Positioning of Cervical Disc Arthroplasty Implant Affect Postoperative Outcome?
Yahya Othman, Todd Albert, Russell Huang, Philip York, Avani Vaishnav, Steven Mcanany, Sravisht Iyer, Catherine Gang, Sheeraz Qureshi

6:24–6:27 pm

614 Implementation of an Enhanced Recovery Pathway in Complex Spine Surgery Patients in a Multidisciplinary Center
Kristen M. Hall, Jessica R. Moreno, Luke Dosselman, Carlos A. Bagley

6:27–6:30 pm

615 SCOUT IDE Investigation: One-year Clinical Findings for a Conforming Porous Polymeric Lumbar Interbody Fusion Device
Yi Lu, Kyle Wu, Martin H. Krag, Stephane Lavoie, Mohamad Bydon, Pierce D. Nunley, John H. Chi

6:30–6:33 pm

616 Effect of Myelopathy on Outcomes After Cervical Disc Replacement: A study of a Local Patient Cohort and a Large National Cohort
Sheeraz Qureshi, Andre Samuel, Steven Mcanany, Sravisht Iyer, Todd Albert, Catherine Gang
6:36–6:39 pm  
617 Radiographic Accuracy of Percutaneous Pedicle Screw Placement in Fluoroscopic Versus CT Navigation-guided Lumbar Spine Instrumentation
Guang-Ting Cong, Avani Vaishnav, Joseph Barbera, Hiroshi Kumagai, James Dowdell, Catherine Gang, Sheeraz Qureshi

6:39–6:42 pm  
618 The Impact of NSAID Use after Lumbar Fusion Surgery on Fusion Rate and Complications: A Meta-Analysis
Yahya Othman, Avani Vaishnav, Steven Mcanany, Sravisht Iyer, Todd Albert, Catherine Gang, Sheeraz Qureshi

6:42–6:45 pm  
619 Do We Need Standing Scoliosis Films for One or Two-Level Lumbar Fusions?
Caroline Davidson, Gabriel Claudiu Tender

6:45–6:48 pm  
620 Surgical Outcomes of Dysphagia Provoked by Diffuse Idiopathic Skeletal Hyperostosis in Cervical Spine
Young Soo Chung, Ho Yeol Zhang, Yoon Ha, Jeong Yoon Park

6:48–6:51 pm  
621 Outcomes and Risks with Age in Spondylolisthesis: A Comparison of the Elderly from the Quality Outcomes Database

6:51–6:54 pm  
622 Multimodal Analgesia in Lumbar Fusion Surgery: Impact Amidst the Opioid Epidemic
Yi Lu, Erica Bertoncini

6:54–6:57 pm  
623 Incidence and Clinical Risk of Cement Extravasation in Adult Patients Undergoing Prophylactic Vertebroplasty During Surgical Spine Reconstruction
Michael Bohl, Jean-Christophe A. Leveque, Rajiv Sethi

6:57–7:00 pm  
624 Factors Associated with 12-month Return to Work Following One-level Posterior Lumbar Fusion for Grade 1 Degenerative Spondylolisthesis: An Analysis of the Quality Outcomes Database
Mohamad Bydon, Praveen V. Mummaneni, Panagiotis Kerezoudis, Andrew Kai-Hong Chan, Steven D. Glassman, Kevin T. Foley, Jonathan R. Slotkin, Eric A. Potts, Mark E. Shaffrey, Christopher I. Shaffrey, Sr., Domagoj Coric, John J. Knightly, Paul Park, Kai-Ming G. Fu, Clinton J. Devin, Anthony L. Asher, Erica F. Bisson

7:00–7:03 pm  
625 Prevalence of Cervical Stenosis and Myelopathy in Patients with Idiopathic Normal Pressure Hydrocephalus
Ryan M. Naylor, Karina Lenartowicz, Jonathan Graff-Radford, Jeremy Cutsforth-Gregory, Benjamin D. Elder

7:03–7:06 pm  
626 The Association Between PHQ-2 Screening and Patient Satisfaction and Return to Work up to 2 Years after Lumbar Fusion: Analysis from the Michigan Spine Surgery Improvement Collaborative (MSSIC)

7:06–7:09 pm  
627 Postoperative Stereotactic Radiosurgery for Spinal Metastases: Clinical Outcomes, Failures, and Analysis of Local Control
Muhamed Hadzipasic, Laura Van Beaver, Caroline M. Ayinon, Robert Koffie, Brian Winey, Thomas Botticello, Ganesh Shankar, Joseph H. Schwab, Kevin S. Oh, John H. Shin

7:09–7:12 pm  
628 Assessing the Impact of Epidural Analgesia Early Pain Management and Functional Outcomes Following Deformity Surgery: A Retrospective Review
Emmanuel Adeyemo, Umaru Barrie, Madelina Nguyen, Mahmoud Elguindy, Luke Dosselman, Kristen M. Hall, Jessica R. Moreno, Carlos A. Bagley

7:12–7:15 pm  
629 Differences in 30- and 90-day Readmission Rates After Surgical Treatment for Lumbar Degenerative Disc Disease in Elderly Patients (>65 years): A National Readmission Database Study
Aladine A. Elsamadicy, Andrew B. Koo, Megan Lee, Adam Kundishora, Joaquin Q. Camara-Quintana, Tariq Qureshi, Luis Kolb, Maxwell S.H. Laurans, Khalid M. Abbed

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630 Detection of Glioma and Prognostic Subtypes by Non-invasive Circulating Cell-free DNA Methylation Markers
Ian Yu Lee, Thais Sabedot, Tathiane Malta, James Snyder, Michael Wells, Ana DeCarvalho, Abir Mukherjee, Dhananjay Chitale, Karam P. Asmaro, Adam M. Robin, Mark L. Rosenblum, Tom Mikkelsen, Jack P. Rock, Laila Poisson, Tobias Walbert, Steven N. Kalkanis, Anavaleria Castro, Houtan Noshmehr

5:45–5:48 pm  
631 Cerebrospinal Fluid Biomarkers of Brain Metastasis
Stephanie Cheok, Anna Arnai-Estone, Azeet Narayan, Maheen Zakaria, Sarah Goldberg, Abhiji Patel, Don Nguyen, Veronica Chiang

5:48–5:51 pm  
632 The Efficacy of Pure Navigation-system Guided Biopsy with 5-ALA Induced Photodynamic Diagnosis for Malignant Brain Tumors
Naokado Ikeda, Shinji Kawabata, Yoshihide Katayama, Motomasa Furuse, Ryokichi Yagi, Naosuke Nonoguchi, Ryo Hiramatsu, Toshihiko Kuroiwa, Masahiko Wanibuchi

621 Outcomes and Risks with Age in Spondylolisthesis: A Comparison of the Elderly from the Quality Outcomes Database
5:54–5:57 pm

633 Passive Distribution of Indocyanine-Green via the Enhanced Permeability and Retention Effect Demonstrates Similar Tumor Sensitivity and Specificity Compared to Tumor-Targeting 5-Aminolevulinic Acid in Rodent Allograft and Human Brain Tumors
Steve Sungwon Cho, Saad Sheikh, Joseph F. Georges, Clare W. Teng, Jay F. Dorsey, Sunil Singhal, John Y.K. Lee

5:57–6:00 pm

634 Near Real-time Intraoperative Brain Tumor Diagnosis Using Stimulated Raman Histology and Deep Neural Networks
Todd C. Hollon, Balaji Pandian, Siri Sahib Singh Khalsa, Randy D’Amico, Michael B. Sisti, Jeffrey N. Bruce, Karin M. Muraszko, B. Gregory Thompson, Christian Freudiger, Shawn L. Hervey-Jumper, Guy M. McKhann, II, Sandra Camelo-Piragua, Peter D. Canol

6:00–6:03 pm

635 Laser Therapy Enhances Blood-Brain Barrier and Blood-Tumor Barrier Permeability in a Mouse Model of Glioblastoma
Afshin Salehi, Mounica Paturu, Matthew Caine, Robyn Klein, Albert H. Kim

6:03–6:06 pm

636 Genome Wide DNA Methylation Landscape Reveals Glioblastoma Mediated Epigenetic Modification in Tumor Infiltrating CD4+ T-cells.
Sreenivasulu Chintala, Kaleigh Fetcko, Mario Henriquez, Sheng Liu, Jun Wan, Xiaolong Xuei, Yunlong Liu, Adam T. Leiboldt, Atique Ahmed, Mahua Dey

6:06–6:09 pm

637 Enhanced B7-H4 Expression in Gliomas with Low PD-L1 Expression Identifies Cold Tumors
Di Chen, Gaopeng Li, Chunxia Ji, Qi Qi Lu, Ying Qi, Chao Tang, Ji Xiong, Jian Hu, Dave S.B. Hoon, Yan Zhang, Yu Yao, Liangfu Zhou

6:09–6:12 pm

638 Identification of Tumor Specific Lymphocytes Cells in a Murine Glioma Model
David Shin, Catherine Flores, Bayli Divita, Brandon Fernandez, Tyler Wildes, Adam Grippin, Kyle Dyson, Duane Mitchell

6:15–6:18 pm

640 A Patient-derived Glioblastoma Organoid Model Maintains Intertumoral and Intratumoral Heterogeneity for Therapeutic Testing
Ryan Salinas, Daniel Zhang, Fadi Jacob, Phuong Nguyen, Saad Sheikh, Stefan Prokop, Jay F. Dorsey, MacLean Nasrallah, Steven Brem, Donald M. O’Rourke, Guo-li Ming, Hongjun Song

6:18–6:21 pm

641 Local Delivery of the PARP-inhibitor Olaparib from a Biodegradable Paste Potentiates Radiotherapy and Prolongs Survival
Riccardo Serra, Stuart J. Smith, Jonathan Rowlinson, Noah L. Gorelick, Gareth J. Veal, Kevin Shakesheff, Richard Grundy, Henry Brem, Ruman Rahman, Betty Tyler

6:21–6:24 pm

642 NRG Oncology CC001 Neurocognitive Final Analysis: A Phase III Trial of Hippocampal Avoidance (HA) in Addition to Whole-brain Radiotherapy (WBRT) Plus Memantine to Preserve Neurocognitive Function (NCF) in Patients with Brain Metastases (BM)

6:24–6:27 pm

643 Intracranial Response of Brain Metastases to Osimertinib With or without Upfront Stereotactic Radiosurgery in TKI-Naïve Non-small Cell Lung Cancer Patients

6:27–6:30 pm

644 Melatonin Disrupts Glioblastoma Metabolism and Enhances Temozolomide Cytotoxic Effects
Beatriz Irene Fernandez Gil, Carla A. Vazquez-Ramos, Paula Schiapparelli, Rachel Sarabia-Estrada, Germaine Escam, Alfredo Quinones-Hinoja

6:30–6:33 pm

645 Stereotactic Radiosurgery Versus Stereotactic Radiotherapy in the Management of Intracranial Meningiomas: A Systematic Review and Meta-analysis
Nida Fatima, Antonio Meola, Erqi Pollo L, Scott G. Soltys, Steven D. Chang

6:33–6:36 pm

646 Outcome Analysis Among Meningioma Genomic Subgroups Identifies Decreased Recurrence Free Survival in PI3K Activated Tumors
Mark W. Youngblood, Amar Sheth, Amy Zhao, Julio D. Montejo, Jr., Daniel Duran, Chang Li, Evgeniya Tyrtova, Koray Ozduman, Daniell F. Miyagishima, Julien Boetto, Matthieu Peyre, Sacit Bulent Omay, Michel Kalamarides, Zeynep E. Omay, Murat Gunel, Jennifer A. Moliterno

6:36–6:39 pm

647 Outcomes of Single-institution Retrospective Case Series on Observation Alone Following Atypical Meningioma Resection
Lauren Stone, Hugh D. Moulding, Nimisha Deb, Charles T. Lee

6:39–6:42 pm

648 Tumor Control Rates in Patients Undergoing Stereotactic Radiosurgery for Cystic Vestibular Schwannomas: A Systematic Review and Meta-analysis
Kevin Ding, Edwin Ng, Prasanth Romiyo, Dillon Dejam, Courtney Duong, Matthew Z. Sun, Quinton Gopen, Isaac Yang

6:42–6:45 pm

The International Neurooncology Fellowship at The University of Miami – My Experience
Alexis A. Morell
Trim71 Links an Ancient MicroRNA Pathway to Neural Stem Cell Development and Human Congenital Hydrocephalus
Duy Phan, Daniel Foster, Bettina Jux, Evelyn Lake, Todd Constable, Waldemar Kolanus, Frank Slack, Kristopher Thomas Kahle

Cerebrospinal Fluid Access Devices in Pediatric Diffuse Midline Glioma Patients: Literature Review and Evaluation of Institutional Practices
Daphne Li, Wendy Stellpflug, Amanda Muhs Saratis

Patterns of Care and Age Specific Impact of Resection Extent and Adjuvant Radiotherapy in Pediatric Pineoblastoma
Michael Chuwei Jin, Laura M. Prolo, Adela Wu, Tej D. Azad, Siyu Shi, Adrian Rodrigues, Scott G. Soltys, Erqi Poliom, Gordon Li, Susan Hinker, Gerald A. Grant

Multimodality Language Mapping Using Cortical Stimulation in Pediatric Patients with Epilepsy
Sneha Sharma, Carrie R. Muh, Sandra Serafini, Naomi D. Chou, Tracy G. Spears, Sarah E. Hodges, Gregory B. Cogan, Jordan Komisarow, Gerald A. Grant

Split Cord Malformation – Spectrum of Associated Anomalies.
Natarajan Muthukumar

Endoscopic Third Ventriculostomy Versus Shunt for Pediatric Hydrocephalus: A Systematic Literature Review and Meta-analysis
Pavlos Texakalidis, Muhibullah S. Tora, Jeremy Wetzel, Joshua J. Chern

Automated Evaluation of Intracranial Vessel Morphology in Normal Versus Pediatric Moyamoya Disease
Jennifer L. Quon, Lily H. Kim, Pauline Mouches, Rashad Jabarkheel, Yi Zhang, Gary K. Steinberg, Gerald A. Grant, Michael S. B. Edwards, Kristen Yeom, Nils Forkert

Global and Intertuberal Epileptic Networks in Tuberous Sclerosis Based on Stereoelectroencephalographic (sEEG) Findings: A Quantitative EEG Analysis in Pediatric Subjects and Surgical Implications

Characteristics and Outcomes of Pediatric Glioblastoma in the Post-Temozolomide Era
Ankush Chandra, Taemin Oh, Harsh Wadhwa, Sumedh Subodh Shah, Nalin Gupta, Michael W. McDermott, Mitchel S. Berger, Manish K. Aghi

Clinical and Imaging Outcomes After Combined Direct and Indirect Bypass for Pediatric Moyamoya Disease: A Single Center Retrospective Series
Ramin A. Morshed, Daniel Murph, Jasmin Dao, Kathleen Colao, Lauro Avalos, Steven Hettis, Adib A. Abla, Christine Fox, Michael T. Lawton, Nalin Gupta

Unruptured Intracranial Aneurysm Initial Treatment and Follow-up Cost Analysis: Pipeline Flow Diverters Versus Coiling
Herschel Wilde, Spencer Twitchell, Michael Karsy, Philipp Taussky, Ramesh Grandhi

Treatment Trends and Outcome of Aneurysmal Subarachnoid Hemorrhage by Hospital Volume

Persistent Hydrocephalus and Activated Microglia Drive the Spatial Memory Decline after Intraventricular Hemorrhage in Rodents

What Size Cerebral Aneurysms Rupture? A Systematic Review and Meta-analysis of Literature
Maxim Mokin, Muhammad Waqas, Andrew Gong, Felix Chin, Hamid Rai, Kunal Vakharia, Hamidreza Rajabzadeh Oghaz, Kenneth V. Snyder, Jason Davies, Elad I. Levy, Hui Meng, Adnan H. Siddiqui

Location of Intracerebral Hemorrhage Affects Outcome after Minimally Invasive Endoscopic Hematoma Evacuation
Rui Song, Dominic A. Nistal, Jacopo Scaggiante, Alexander G. Chartrain, Natalia Romano Spica, Juliane Kleitsch, John Liang, J D. Mocco, Christopher P. Kellner

Repeat Flow Diversion for Previously Failed Flow Diversion in a Multicenter Cohort
Mohamed M. Salem, Ahmad Swied, Anna L. Kuhn, Adam A. Dmytriw, Muhammad Waqas, Nimer Adeeb, Peter Kan, Ajit S. Puri, Tom R. Marotta, Elad I. Levy, Justin M. Moore, Christopher S. Ogilvy, Pascal Jabbour, Ajith J. Thomas
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<tr>
<th>Time</th>
<th>Session Title</th>
<th>Authors</th>
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<tr>
<td>6:24–6:27 pm</td>
<td>Surgical Outcomes in Brainstem AVM: A Systematic Review and Meta-analysis</td>
<td>Anadjeet Singh Khahera, Oludotun Ogunsola, Justin Sim, Alison Clarke, E. Sander Connolly, Jr.</td>
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<td>6:27–6:30 pm</td>
<td>Managing Anterior Communicating Artery Aneurysms – Are We Doing it Right?</td>
<td>Lauren Harris, Ciaran S. Hill, Matthew Elliot, Teresa Fitzpatrick, Alejandro Feria, Anthony Ghosh, Raghu Vindlacheruvu</td>
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<td>6:39–6:42 pm</td>
<td>Somatic PDGFRB Activating Variants in Fusiform Cerebral Aneurysms</td>
<td>Joshua W. Osbun, Yigit Karasozeno, Carolina Parada, Tina Busald, Philip Tatman, Luis Gonzalez-Cuyar, Christopher Hale, Diana Alcantra, Mark O’Driscoll, William Dobyns, Mitzi Murray, Louis J. Kim, Peter Byers, Michael Dorschner, Manuel Ferreir</td>
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<tr>
<td>6:42–6:45 pm</td>
<td>Optical Coherence Tomography Imaging in Acute Ischemic Stroke: Preliminary Animal and Human Results</td>
<td>Christopher R. Pasarkovski, Leo da Costa, Joel Ramjist, Yuta Dobashi, Victor Xiao Dong Yang</td>
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<td>6:45–6:48 pm</td>
<td>Toward Optimal VTE Prophylaxis in Neurosurgery</td>
<td>H. Westley Phillips, TJ Florence, Nicholas Macaluso, Diana Babayan, Nader Pouratian, Won Kim</td>
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<td>6:51–6:54 pm</td>
<td>Higher Volume Predicts Improved Outcomes for Severe Pediatric Traumatic Brain Injury Patients at Level 1 and 2 Trauma Centers</td>
<td>Anna Kimata, Oliver Young Tang, Wael Asaad</td>
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<td>6:54–6:57 pm</td>
<td>Effect of ACS Level 1 - Trauma Center Designation on Management of Adult Severe TBI Patients</td>
<td>Matthew Helton, Austin Porter, Kevin Thomas, Jeffrey C. Henson, Mason Sifford, Hayden Scott, Analiz Rodriguez, Kevin Sexton</td>
</tr>
<tr>
<td>7:00–7:03 pm</td>
<td>Self-reported Knowledge Levels of Critical Care Nurses in Managing Neuroemergencies: A Survey Based Study</td>
<td>Karan Amlani, Sonia Nelson, Elka Riley, Zachary L. Hickman, Christopher P. Kellner, Nirit Weiss, Fawaz Almufti, Golda Bohaene, Joshua B. Bederson, J D. Mocco, Neha Dangayach</td>
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<td>7:03–7:06 pm</td>
<td>Factors Associated with Worsened Neurologic Outcomes in Traumatic Subarachnoid Hemorrhage</td>
<td>Risheng Xu, Yuanxuan Xia, Chau D. Vo, Wuyang Yang, Jason A. Liew, Ted Alban, James Feghali, Justin M. Caplan, Rafael J. Tamargo, Judy Huang</td>
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<tr>
<td>7:06–7:09 pm</td>
<td>The Protective Role of Heme Oxygenase-1 (HO-1) in Chronic Subdural Hematoma</td>
<td>Hui-Tzung Luh</td>
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7:09–7:12 pm
687 Incidence and Risk Factors for Developing Post Traumatic Hydrocephalus, Analysis of a Prospective Cohort of 402 Patients
Ezequiel Goldschmidt, Federico Angriman, Ruchira Menka Jha, Benjamin Zusman, Ava Puccio, David O. Okonkwo

7:12–7:15 pm
688 The Utility of Thromboelastography for Predicting the Risk of Posttraumatic Cerebral Infarction in Traumatic Brain Injury
Hao Chen, Hengli Tian

INTERACTIVE MULTIMEDIA RESEARCH PRESENTATION
ORAL PRESENTATIONS
Podium 4, Level 2 Lobby

5:45–5:48 pm
689 Is Biological Effective Dose (BED) Predictive of Outcomes after Radiosurgery for Cerebral Arteriovenous Malformations?
Cody L. Nesvick, Christopher S. Graffeo, Michael J. Link, Bruce E. Pollock

5:48–5:51 pm
690 Pre-operative Epilepsy Network Distribution Correlates with Seizure Recurrence Following Epilepsy Surgery
Long Di, Elliot G. Neal, Stephanie Maciver, Fernando L. Vale

5:51–5:54 pm
691 Skull Density Ratio and Treatment Outcomes in Essential Tremor Patients Treated with Transcranial MR-guided Focused Ultrasound Thalamotomy
Abdul-Kareem Ahmed, Jiachen Zhuo, Howard M. Eisenberg, Timothy R. Miller, Rao Gullapalli, Dheeraj Gandhi

5:54–5:57 pm
692 Pallidal Thermolesion Unleashes Gamma Oscillations in the Motor Cortex in Parkinson’s Disease
Doris D. Wang, Coralie de Hemptinne, Svetlana Miocinovic, Witney Chen, Jill L. Ostrem, Philip A. Starr

5:57–6:00 pm
693 Glomus Jugulare: Is Gammaknife Radiosurgery the Ideal Treatment?
Jaskaran Singh, Manmohan Singh

6:00–6:03 pm
694 Combination Targeting of Subthalamic Nucleus and Ventral Intermediate Thalamic Nucleus in Deep Brain Stimulation for Tremor-dominant Parkinson’s Disease: Experience and Outcomes
Islam Fayed, Kelsey Diva Cobourn, Gnel Pivazyan, Fernando Pagan, Steven Lo, Yasar Torres-Yaghi, Allen S. Mandir, Christopher G. Kalthorn

6:03–6:06 pm
695 Audiovisual Speech Enhancement via Cross-modal Suppression of Auditory Association Cortex by Visual Speech
Patrick J. Karas, John F. Magnotti, Zhengjia Wang, Brian A. Metzger, Daniel Yoschor, Michael S. Beauchamp

6:06–6:09 pm
696 Use of Functional MRI to Assess How Motor Phenotypes of Parkinson’s Disease Respond to DBS
Marisa D. DiMarzio, Radhika Madhavan, Suresh Joel, Ileana Hancu, Eric Fiveland, Julia Prusik, Michael Gillogly, Tanweer Rashid, Jeffrey Ashe, Ilknur Telkes, Paul Feustel, Damian Shin, Jennifer Durphy, Roy S. Hwang, Era Hanspal, Julie G. Pitts

6:09–6:12 pm
697 The Positive Allosteric Modulator of Alpha-2/3-Containing GABA A Receptors, KRM-II-81, Is Active in Pharmaco-resistant Models of Epilepsy and in Human Epileptic Tissue
Jodi L. Smith, Xingie Ping, Xiaoming Jin, Lalit K. Golani, Guanguan Li, Farjana Rashid, Rajwana Jahan, James M. Cook, Jeffrey M. Witkin

6:12–6:15 pm
698 Interneuron Transplantation Creates New Network States and Rescues Social Behavior Deficits in a Mouse Model of Autism
Derek Southwell, Helia Seifikar, Ruchi Malik, Karen Lavi, Daniel Vogt, John Rubenstein, Vikaaas Sohal

6:15–6:18 pm
699 The Durability of Pain Relief Following Endoscope-assisted MVD for Trigeminal Neuralgia
Alexandra D Baker, Melvin Field

6:24–6:27 pm
700 Management of Non-Surgical Refractory Low Back Pain in the United States: A Retrospective Analysis
Charis Spears, Sarah E. Hodges, Musa Kyani, Zidanyue Yang, Beth Parente, Hui-Jie Lee, Shivanand P. Lad

6:27–6:30 pm
703 Central Neuropathic Pain And Complex Regional Pain Syndrome Following Brachial Plexus Injury Treated Successfully with Dorsal Root Entry Zone Lesioning
Erin McCormack, Mansour H. Mathkour, Lora Wallis Kanh, Reda Tolba, Maged Guirguis, Gassan Chaiban, Daniel Denis

6:30–6:33 pm
704 Clinical Diagnosis Scale for Pain Lumbar of Facet Origin: Systematic Review of Literature and Pilot Study
Juan C. Gomez Vega, Juan C. Acevedo Gonzalez

6:36–6:39 pm
706 The Impact of Pre-Operative Opioids on Outcomes in Craniotomy Patients
Varun Shah, Nguyen Hoang, Brandon Rodgers, David L. Dornbos III, Ryan Eaton, Dante Pezzutti, Erin Hoover, Helen Duenas, Santino Cua, Shahid Mehdi Nimjee

6:39–6:42 pm
707 20 Years of Opioids Prescriptions in Spine Patients: The Experience of Two Academic Hospitals in Massachusetts
6:42–6:45 pm
**708 Sex Disparities in Outpatient Management of Post-laminectomy Syndrome**
Amy Zhu, Ryan Guan Chiu, Jeffery Zhao, Ankit Indravadan Mehta

6:45–6:48 pm
**709 Late Week Surgery Is Associated with Longer Length of Stay in Patients Undergoing Laminectomy for Degenerative Lumbar Stenosis**
Robert Winkelman, Vikram Chakravarthy, Matthew M. Grabowski, Ghaiith Habboub, Sebastian Salas-Vega, Thomas E. Mroz

6:48–6:51 pm
**710 Disparities in Rates of Fusions in Single-Level Lumbar Disc Pathologies**
Soobin Kim, James S. Ryoo, Philip B. Ostrov, Abhinav K Reddy, Ankit Indravadan Mehta

6:51–6:54 pm
**711 Global Burden of Neurosurgical Disease**
Alex Yacob, Christopher Carr, Cassidy Werner, Aaron S. Dumont

6:54–6:57 pm
**712 Postoperative Admission of Adult Craniotomy Patients to Neuroscience Floor Unit Reduces Cost and Length of Stay**
Matthew Z. Sun, Diana Babayan, Jia-Shu Chen, Maxwell Wang, Priyanka Naik, Kara Reitz, Won Kim

6:57–7:00 pm
**713 Socioeconomic Barriers Affecting Neurologic Recovery Facing the Aneurysmal Subarachnoid Population**
Ben A. Strickland, Kristine Ravina, Alexander G. Chartrain, Robert Rennert, Arun P. Amar, Jonathan Russin, Steven L. Giannotta

7:00–7:03 pm
**714 Analysis of Neurosurgery Resident Operative Experience: Training Tomorrow’s Neurosurgeon**
Shahjehan Ahmad, Bledi C. Brahimaj

7:03–7:06 pm
**715 The Neurosurgeon-Scientists NIH Funding Trends**
Karim ReFaey, Shashwat Tripathi, William D. Freeman, Hugo Guerrero-Cazares, James Meschia, Leonard Petrucelli, Fredric B. Meyer, Alfredo Quinones-Hinojosa

7:06–7:09 pm
**716 A Single-Institution’s Experience with the CMS Non-Cervical Spine Fusion Bundle Payments**
Abraham Schlauderaff, Neel T. Patel, G. Timothy Reiter

7:09–7:12 pm
**717 Neurosurgery Elective for Preclinical Medical Students With and Without a Home Neurosurgery Program**

7:12–7:15 pm
**718 Causes of Hospital Readmissions Within Seven Days from the Neurosurgical Service of a Quaternary Referral Hospital**
Enyinna L. Nwachuku

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**CNS Wellness Afternoon**

Tuesday 1:45–2:45 pm

- Meet Dr. Gary Simonds, author of “The Thriving Physician: How to Avoid Burnout by Choosing Resilience Throughout Your Medical Career”
- **Voices of Neurosurgery: The Unforgettable Moments**
- CNS sweatpants giveaway (limited quantity)
- Create Your Own Smoothie on the Blender Bike
ORAL ABSTRACT PRESENTATIONS
WEDNESDAY, OCTOBER 23

7:00–7:06 am
350 Evoked Compound Action Potentials to Guide Lead Placement: A Neuromonitoring Technique Case Series
Steven M. Falowski

7:06–7:12 am
351 Development and Validation of a Clinical Prediction Score for Poor Postoperative Pain Control Following Elective Spine Surgery
Michael M.H. Yang, Jay Riva-Cambrin, Jonathan Cunningham, Nathalie Jette, Tolulope T. Sajobi, Steven Casha

7:12–7:18 am
352 Pre-operative Radiological Finding at the Lumbar Spinal Level is a Novel Predictive Factor for Postoperative Outcome After Spinal Cord Stimulation in Patients with Failed Back Surgery Syndrome
Yusuke Hori, Andre Machado, Sean J. Nagel

7:18–7:24 am
353 Spontaneous Intracranial Hypotension and the Durability of Epidural Blood Patch
Ali Hazama, Lori John, Alexander E. Braley, Lawrence S. Chin, Satish Krishnamurthy

7:24–7:30 am
354 Stim Salvage: Case Series Reporting on the Effectiveness of SCS Salvage
Patrick Paullus, Erika A. Petersen

7:30–7:36 am
355 Spinal Cord Stimulation with Non-linear Burst Stimulation Design Improves Psychosocial Function Through the Medial Spinothalamic Tract
Steven M. Falowski

7:36–7:42 am
356 Impact of Predominant Arm Pain Versus Neck Pain on 12-Month Outcomes Following Elective Cervical Spine Surgery: Analysis from the Quality Outcomes Database (QOD)
Clinton J. Devin, Mohamad Bydon, Mohammed A. Alvi, Anshit Goyal, Panagiotis Kerezoudis, Inamullah Khan, Yagiz U. Yolcu, Anthony L. Asher

7:42–7:48 am
357 Factors Contributing Spinal Cord Stimulator Explantation
Francisco A. Ponce, Dakota Graham, Margaret Lambert, Zaman Mirzadeh
SF

SUNRISE SCIENCE ORAL PRESENTATIONS SESSION
Room 3020

7:00–7:06 am
360 Rates of Post Procedure Hemorrhage in Brain Tumor Patients on Therapeutic Anticoagulation Undergoing Gamma Knife Radiosurgery
Carlos R. Goulart, Michelle Dewitt, Gaddum D. Reddy

7:06–7:12 am
361 Real-World Outcomes Using a Novel Directional Lead From a Deep Brain Stimulation Registry for Parkinson’s Disease
Jan Vesper, Roshini Jain, Alex Wang, Heleen Scholtes, Michael T. Barbe, Steffen Paschen, Andrea Kuhn, Jens Volkmann, Monika Potter-Nerger, Günther Deuschl

7:12–7:18 am
362 Neuroanatomical Correlates of Response to Focused Ultrasound Thalamotomy in Essential Tremor
Robert Gramer, Stanley Xiangyu Li, Gavin Elias, Alexandre Bute, Jurgen Germann, Michael Schwartz, Alfonso Pasano, Andres M. Lozano

7:18–7:24 am
363 The Predictive Value of Interictal Scalp EEG Findings in Aiding the Detection of Malformations of Cortical Development in Temporal Lobe Epilepsy
Jeffrey W. Fuchs, Nathan A. Shlobin, Benjamin Hopkins, Zehra Husain, Michael Cloney, Evgeniya Tyrtova, Pue Farooque, Jessica W. Templier, S. Kathleen Bandt

7:24–7:30 am
364 Clinically weighted Probabilistic Tractography Mapping of Therapeutic Thalamic Deep Brain Stimulation for Essential Tremor
Evangelia Tsalaki, Alon Kashanian, Nader Pouratian

1:45–1:51 pm
800 Pregnancy after Cerebral Bypass for Moyamoya Disease
Ephraim W. Church, Rabia Qaiser, Theresa E. Bell-Stephens, Eric Chow, Summer Han, Yasser Y. El-Sayed, Gary K. Steinberg

7:30–7:36 am
365 Interstitial Laser Capsulotomy for Refractory Obsessive-Compulsive Disorder – Lesion Size and Energy Deposition Determine Outcome
Peter C. Warnke, Anil Mahavadi, Jon Grant

1:51–1:57 pm
801 Multiplex Profiling of Secreted Factors in the Cerebrospinal Fluid of Moyamoya Disease Patients
Kumar Abhinav, Alex G. Lee, Arjun Vivek Pendharkar, Yael Rosenberg-Hasson, Haruto Uchino, Michelle Cheng, Gary K. Steinberg

7:36–7:42 am
366 A Feedforward Mechanism for Epileptogenesis Regulated by Lactate Dehydrogenase A
Marcelle Altshuler, Alexander Ksendzovsky, Muzanbanu Bachani, Stuart Walbridge, Sara Inati, Islam Fayed, John D. Heiss, Jaideep Kapur, Kareem A. Zaghoul

2:09–2:15 pm
804 Seizure Presentation in Patients with Brain Arteriovenous Malformations Treated with Stereotactic Radiosurgery: A Multicenter Study
Ching-Jen Chen, Leah Shabo, Dale Ding, Natasha Ironside, Douglas Kondziokla, L. Dade Lunsford, Jason P. Sheehan

7:48–7:54 am
368 Evaluation of Predictive Models of Postoperative Seizure Freedom in Patients with Medically-refractory Epilepsy
Alireza Mansouri, Jerry C. Ku, Shervin Taslimi, James M. Drake, Abhaya Vivek Kulkarni, James T. Rutka, Taufik Valiante

2:00–2:06 am
930 Prefrontal Cortex Regulation of Nigral DA and Non-DA Neurons: An in Vivo Optogenetics Study in Rats
Ali R. Tafreshi, Elwood Siagian, Guofang Shen, Wei-Xing Shi

7:58–8:00 am
369 Cortical Basal Ganglia Network Interactions During Sequence Learning in Parkinson’s Disease
Doris D. Wang, Coralie de Hemptinne, Roeo Gilron, Philip A. Starr

8:06–8:12 am
931 Multi-modal Presurgical Evaluation of Refractory Localization-related Epilepsy involving Mesial Temporal Lobe Structures
Rui Feng, Jie Hu, Zhen Fan, Liqin Lang, Li Pan

8:00–8:06 am
932 Post-operative MRI Is Associated with Increased Radiographic Hemorrhage Detection after Stereoecephalography Depth Electrode Placement
Victor Sabourin, Anthony Stefanelli, Fadi Al Saiegh, Caio M. Matias, Ashwini D. Sharan, Chengyuan Wu

8:12–8:18 am
933 Laser Interstitial Thermal Therapy for Epilepsy with Periventricular Nodular Heterotopia
Alex Whiting, Justin Bingaman, Joshua Catapano, Benjamin B. Whiting, Jakub Godzik, Corey T. Walker, Kris A. Smith

8:48–7:54 pm
802 Cerebral Aqueduct CSF Stroke Volume Hydrodynamics in Chronic Communicating Hydrocephalus: Exploration of the Initial and Late Phases in an Animal Model
Tito G.M. Vivas-Buitrago, Ignacio Jusue Torres, Gabriel D. Pinilla-Monsalve, Armelle Lokossou, Jiadi Xu, Hugo Guerrero Cazares, Susumu Mori, Alfredo Quinones-Hinoja, Olivier Baledent, Daniele Rigamonti

8:24–8:30 am
934 Does Bilingualism Prognosticate a Favorable Outcome after Awake Surgery?
Karin ReFaey, Sanjeet S. Grewal, Shashwat Tripathi, Adip G. Bhargav, Erik H. Middlebrooks, David S. Sabsevitz, Adela Wu, Kaisorn L. Chaichana, Alfredo Quinones-Hinojosa

8:36–8:42 am
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936 Evaluation of Predictive Models of Postoperative Seizure Freedom in Patients with Medically-refractory Epilepsy
Alireza Mansouri, Jerry C. Ku, Shervin Taslimi, James M. Drake, Abhaya Vivek Kulkarni, James T. Rutka, Taufik Valiante

CRANIAL AFTERNOON ABSTRACT ORAL PRESENTATIONS
Room 2020

1:45–1:51 pm
800 Pregnancy after Cerebral Bypass for Moyamoya Disease
Ephraim W. Church, Rabia Qaiser, Theresa E. Bell-Stephens, Eric Chow, Summer Han, Yasser Y. El-Sayed, Gary K. Steinberg

1:51–1:57 pm
801 Multiplex Profiling of Secreted Factors in the Cerebrospinal Fluid of Moyamoya Disease Patients
Kumar Abhinav, Alex G. Lee, Arjun Vivek Pendharkar, Yael Rosenberg-Hasson, Haruto Uchino, Michelle Cheng, Gary K. Steinberg

1:57–2:03 pm
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2:09–2:15 pm
804 Seizure Presentation in Patients with Brain Arteriovenous Malformations Treated with Stereotactic Radiosurgery: A Multicenter Study
Ching-Jen Chen, Leah Shabo, Dale Ding, Natasha Ironside, Douglas Kondziokla, L. Dade Lunsford, Jason P. Sheehan
2:15–2:21 pm
805 Technical Note: Endoscopic Evacuation of Intraventricular Hemorrhage During Minimally Invasive Endoscopic Intracerebral Hemorrhage Evacuation
Jacque J. Lara-Reyna, Rui Song, Dominic A Nistal, Neha S. Dangayach, J D. Mocco, Christopher Paul Kellner

2:21–2:27 pm
806 Dynamic Structural Modeling Revealed that Nilotinib Inhibits Smoothened Signaling
Kirti Kandhwal Chahal, Jie Li, Irina Kufareva, Donald Durden, Robert Wechsler Reya, Ruben Abagyan, Clark C. Chen

2:27–2:33 pm
807 Functional Characterization of Brain Tumor-initiating Cells: Implications for Preclinical Models and Drug Development

2:33–2:39 pm
808 Preoperative MRI-based Predictive Modeling of Brain Tumor Laser Ablation
Anil Mahavadi, Walter J. Jermakowicz, Iahn Cajigas, Lia Dan, Santiago Guerra, Ghulam Farooq, Ashish H. Shah, Michael E. Ivan, Jonathan R. Jagid, Ricardo J. Komotar

2:39–2:45 pm
809 Decorin Expression Is Associated with Diffusion MR Phenotypes in Glioblastoma
Kunal S. Patel, Catalina Raymond, Jingwen Yao, Joseph Tsung, Linda M. Liu, Richard Everson, Timothy F. Cloughesy, Benjamin Ellingson

2:45–2:51 pm
810 Captopril as an Adjuvant to Temozolomide Prolongs Survival in a Rat Intracranial Gliosarcoma Model via Downregulation of Matrix Metalloproteinase-2
Leon Pinheiro, Alexander Perdomo-Pantoja, Joshua Casaos, Iddo Paldor, Veronica Vigilar, Antonella Mangraviti, Yuan Wang, Henry Brem, Betty Tyler

2:51–2:57 pm
811 Possibilities of Photodynamic Therapy in the Complex Treatment of Malignant Glomas
Artemii Y Rynda

2:57–3:03 pm
812 The Luciferase Expressing Glioma-261 Murine Models Elicit an Immune-mediated Anti-tumor Response

3:03–3:09 pm
813 Trends in Management of Cerebrospinal Fluid Leaks Among Pediatric Head Trauma Patients with Skull Base Fractures
Anthony O. Asemota, Eric B. Schneider, Gary L. Gallia

3:09–3:15 pm
814 Volume and Midline Shift as Pre-operative CT Imaging Predictors of Postoperative Chronic Subdural Hematoma Recurrence: Retrospective Review of 345 Patients with 412 Operative Subdural Sides
Laila Malani Mohammad, William H. McKay, Christine Meadows, Jacqueline O’Neill, Howard Yonas, Andrew P. Carlson

DISORDERS OF THE SPINE AND PERIPHERAL NERVES
ORAL ABSTRACT PRESENTATIONS
Room 2016

1:45–1:51 pm
815 Independent Patient Risk Factors Associated with Increased Length of Hospital Stay, Unplanned Return to OR and 30-Day Readmission Rates After Posterior Cervical Fusion for Cervical Spondylotic Myelopathy
Aladine A. Elsamadicy, Fouad Chouairi, Megan Lee, Andrew B. Koo, Adam Kundishora, Joaquin Q. Camara-Quintana, Luis Kolb, Maxwell S.H. Laurans, Khalid M. Abbed

1:51–1:57 pm
816 Combined Nucleus Pulposus Augmentation and Annulus Fibrosus Repair Prevents Intervertebral Disc Degeneration After Discectomy
Sertac Kirnaz, Stephen Sloan, Christoph Wipplinger, Franziska Anna Schmidt, Roger Hartl, Lawrence J. Bonassar

1:57–2:03 pm
Alejandro Carrasquilla, Dominic A. Nistal, John M. Caridi

2:03–2:09 pm
818 Intrathecal Riluzole for the Treatment of Patients with Amyotrophic Lateral Sclerosis
Nicholas M. Boulis

2:09–2:15 pm
819 Body Mass Index Greater than 35 is Associated with Increased Major and Radiographic Complications after Minimally Invasive Adult Spinal Deformity Surgery

2:15–2:21 pm
820 Complications in Minimally Invasive Versus Open Surgery for Intermediate to High-Grade Spondylolisthesis: A 10-year Retrospective, Multicenter Experience
Asad Mehmood Lak, Abdullah M. Abunimer, Amina Rahimi, Ian Tafel, Hasan Aqdas Zaidi

2:21–2:27 pm
821 Does a Fracture Liaison Service Program Minimize Recurrent Fragility Fractures in the Elderly with Osteoporotic Vertebral Compression Fractures?
Tariq Wasfie, Avery M. Jackson, Ill
2:27–2:33 pm  
**822 Comparative Effectiveness of Adjustable Lordotic Expandable Versus Static Lateral Lumbar Interbody Fusion Devices: Two-Year Clinical and Radiographic Outcomes**  
Yan M. Li, Richard F. Frisch, Zheng Huang, James Towner, Yan Icy Li, Jessica Riggleman, Charles Ledonio

2:33–2:39 pm  
**823 Comparing Radiographic Parameters for Single-level L5-S1 Interbody Fusion: Anterior Lumbar (ALIF) Versus Transforminal Lumbar Interbody Fusion (TLIF)**  
Caleb S. Edwards, Andrew Kai-Hong Chan, Dean Chou, Praveen V. Mummaneni

2:39–2:45 pm  
**824 Safety of Outpatient Anterior Cervical Discectomy and Fusion: A Systematic Review and Meta-analysis**  
Ketan Yerneni, John F. Burke, K. Daniel Riew, Vincent C. Traynelis, Lee A. Tan

2:45–2:51 pm  
**825 Choosing Minimally Invasive Versus Open Surgery in the Treatment of Adult Spinal Deformity (ASD): Analysis of a Prospective, Non-randomized Multi-center Study**  

2:51–2:57 pm  
**826 Fusion and Opioid-sparing with the Use of Ketorolac in Posterior Thoracolumbar Spinal Fusions: A Prospective Double-blinded Randomized Placebo-Controlled Trial**  
Evan J. Lytle, Chad F. Claus, Doris Tong, Diana Sigler, Dominick Lago, Matthew Bahoura, Amarpal Dosanjh, Michael H. Lawless, II, Dejan Slaevic, Jacob Jasinski, Robert W. McCabe, Karl Kado, Prashant Sudhir Kelkar, Clifford Michael Houseman, Peter L. Bono, Boyd F. Richards, Teck Mun Soo

2:57–3:03 pm  
**827 Predictive Model for Length of Stay Among Patients Undergoing Surgery for Grade I Spondylolisthesis: Analysis from the Quality Outcomes Database**  
Praveen V. Mummaneni, Mohamad Bydon, John J. Knightly, Anshit Goyal, Mohammed A. Alvi, Andrew Kai-Hong Chan, Jian Guan, Steven D. Glassman, Kevin T. Foley, Jonathan Slotkin, Eric A. Potts, Mark E. Shaffrey, Christopher I. Shaffrey, Sr., Regis W. Haid, Kai-Ming G. Fu, Michael Y. Wang, Paul Park, Anthony L. Asher, Erica F. Bisson

3:03–3:09 pm  
**828 Geographic Differences Is Intraoperative Neuromonitoring During Minimally Invasive Lateral Spine Surgery**  
Sheeraz Qureshi, Luke Ricci, Avani Vaishnav, Steven Mcanany, Srasviht Iyer, Todd Albert, Catherine Gang

3:09–3:15 pm  
**829 Acute Exacerbation of Symptoms After Lumbar Decompression Surgery: An Analysis Readmissions and Reoperations in 81,365 patients**  
Andre Samuel, Avani Vaishnav, Steven Mcanany, Srasviht Iyer, Todd Albert, Catherine Gang, Sheeraz Qureshi

**NEUROTRAUMA AND CRITICAL CARE ORAL ABSTRACT PRESENTATIONS**  
Room 2022

1:45–1:51 pm  
**830 Sports-Related Cervical Spine Fracture and Spinal Cord Injury: A Review of Nationwide Pediatric Trends**  
Haddy Alas, Avery Brown, Katherine Pierce, Cole Bortz, Michael Moses, Dennis Vasquez-Montes, Bassel G. Diebo, Carl Paulino, Aaron James Buckland, Michael Gerling, Peter G. Passias

1:51–1:57 pm  
**831 Micro RNA Profiles of Traumatic Brain Injury Isolated from Plasma Extracellular Vesicles**  
Ross Puffer, Luz Cumba-Garcia, Benjamin T. Himes, David O. Okonkwo, Ian F. Parney

1:57–2:03 pm  
**832 Meta-Analysis of Functional Outcomes in 5508 Patients Sustaining a Gunshot Wound to the Head**  
Georgios Maragkos, Efstatios Papavassiliou, Martina Stippler, Aristotelis Filippidis

2:03–2:09 pm  
**833 Pulmonary Embolism in Neurocritical Care – Introduction of a Novel Grading System for Risk Stratification: The Frankfurt AMBOS Score**  
Daniel Dubinski

2:09–2:15 pm  
**834 Detection of Persisting Concussion Effects on Measures of Neuromechanical Responsiveness**  
Chad J. Prusmack

2:15–2:21 pm  
**835 Clinical Course of Intracranial Bleeding in Patients Anticoagulated with Factor Xa Inhibitors without the Use of Specific Reversal Agents**  
Emmalin Nelton, Georgios Maragkos, Sven Richter, Aristotelis Filippidis, Martina Stippler

2:21–2:27 pm  
**836 Lower Mortality and Morbidity with LMWH for VTE Prophylaxis in Spine Trauma**  

2:27–2:33 pm  
**837 Anatomic Factors Affecting Size of Suboccipital Decompression**  
Courtney Pendleton, Lohit Velagapudi, Jack Jaloo

2:33–2:39 pm  
**838 Potential of Human Neural Stem Cell Transplantation to Treat Acute Subdural Hematoma**  
Lee Onn Chieng, Shoji Yokobori, Markus Spurlock, Shyam Gajavelli, Tom Hazel, Karl Johe, M. Ross Bullock
2:39–2:45 pm

839 The Accuracy of Glasgow Coma Score Documentation in a Trauma Database: Implications for Patient Care and Performance Metrics
Anthony M. DiGiorgio, Blake E. Wittenberg, Brooke Kennamer, Clifford Crutcher, Adam Podet, Jason D. Wilson, Clarence S. Greene, Jr., Gabriel C. Tender, Frank Culicchia, John Hunt

2:45–2:51 pm

840 Radiological Parameters Predicting Clinical Outcome After Decompressive Hemicraniectomy in Malignant Ischemic Stroke
Nida Fatima

2:51–2:57 pm

841 Multivariate Analysis of Acute Magnetic Resonance Imaging Predicts Neurological Improvements in Patients with Cervical Spinal Cord Injury After Early Surgical Decompression
Tomoo Inoue, Toshiki Endo, Shinsuke Suzuki, Hiroshi Ueno,are, Teiji Tominaga

2:57–3:03 pm

842 Minimally Invasive Endoscopy Versus Craniotomy for Acute Subdural Hematomas: A Retrospective Matched Cohort Study
Enzo Fortuny, Nicolas K. Khattar, Kevin John, Esther Bak, Shawn W. Adams, Kimberly S. Meyer, Emily P. Sieg, Robert F. James, Dale Ding

3:03–3:09 pm

843 Monotherapy Aspirin in Minor Traumatic Head Bleeds does not Worsen Outcome
Nasya Mendoza-Elias, Sandi Mackey, Lisa Jasak, Michael Rosenblatt, Subu N. Magge, Robert G. Whitmore, Zohar Ghogawala

3:09–3:15 pm

844 Mobile Digital Pupillometry for Rapid Triage of Patients with Severe Traumatic Brain Injury
Lynn B. McGrath, Jr., Jessica C. Eaton, Anthony Law, Alex Mariakakis, Shwetak Patel, Michael R. Levitt

LATE-BREAKING ABSTRACT SESSION
Room 3024

1:45–1:51 pm

935 Repurposing rhDNase to Improve Neurological Outcomes after Traumatic Brain Injury
Ayobami L. Ward, Molly Braun, Kumar Vaibhav, Krishnan M. Dhandapani

1:51–1:57 pm

936 Subdural Drain Versus Subdural Evacuating Port System for the Treatment of Non-acute Subdural Hematomas
N. Scott Litofsky, Michael J. Ortiz Torres, Patrick Belton, Matthew Burton, Ruben Ngnitewe

1:57–2:03 pm

937 Mortality Prediction Model for Traumatic Intracranial Hemorrhage: A National Trauma Data Bank Study
Esther Wu, Siddharth Marthi, Wael Asaad

2:03–2:09 pm

938 Neurophysiologic Composition of Fascicles Utilized for Oberlin Transfer: The Rare Presence of the FCU Fascicle
Brandon W. Smith, Nicholas Chulski, Kate Wan-Chu Chang, Ann Little, Lynda J.S. Yang

2:09–2:15 pm

939 Regional Variance in Disability and Quality of Life Outcomes following Surgery for Grade I Degenerative Lumbar Spondylolisthesis: A Quality Outcomes Database Analysis

2:15–2:21 pm

940 Repair of Brachial Plexus Injury using Direct Neurotization of the Spinal Accessory Nerve to the Superior Trunk of the Brachial Plexus: A Case Series
Sean Himel, Paul R. Clark, J. Mason Shiflett

2:21–2:27 pm

941 Anterior (ALIF), Oblique (OLIF), and Transforaminal (TLIF) Lumbar Interbody Fusions: A Comparison of Perioperative Morbidity
Caleb S. Edwards, Praveen V. Mummaneni, Anthony M. DiGiorgio, Darryl Lau, Dean Chou

2:27–2:33 pm

942 The Incidence of Adjacent Segment Degeneration after Lumbar Spine Surgery with Transpedicular Stabilization System and PEEK Rods
Luis J.L. Ulloa, Socorro Figueroa Rivera

2:33–2:39 pm

943 Medial Branch Block versus Vertebroplasty for 1-Level Osteoporotic Vertebral Compression Fracture: 2-Year Retrospective Study
Hyoung Joon Chun

2:39–2:45 pm

944 Anterior Lumbar Interbody Fusion Reduces Thecal Sac Compression in the Setting of Degenerative Spondylolisthesis
Hammad A. Khan, Nathan J. Stumpf, Kelsey A. Isbester, Samuel C. Overley, Shaleen Vira, Michael P. Steinmetz, Thomas E. Mroz

2:45–2:51 pm

945 Ultra-early DVT Prophylaxis in Intracerebral Hemorrhage
Dimitri Laurent, Olgerd Bardhi, Paul Kubilis, Brian M. Corliss, Stephanie Adamczack, Ndi Geh, Katharina Busl, W. Christopher Fox
Phase 2 Clinical Trial of Encephaloduroarteriosynangiosis (EDAS) Revascularization for Symptomatic Intracranial Atherosclerosis (ERSIAS)
Nestor R. Gonzalez, Hao Jiang, Patrick Lyden, Shlee Song, Konrad Schlick, Oana Dumitrascu, Lucas Restrepo, Neal Rao, Jason Hinman, David S. Liebeskind, Michael J. Alexander, Wouter I. Schievink, Juan F. Toscano, Raymond Liou, Steven Piantadosi, Miguel Quintero-Consuegra, Jeffrey L. Saver

Traumatic Subarachnoid Hemorrhage as a Risk Factor for Mortality in Moderate and Severe Traumatic Brain Injury Patients. Hospital Central de Maracay, 2015-2016
Sasha J. Antunez, Ivis J. Graterol, Iran J. Briceño

High Molecular Weight Amyloid-β Oligomers Level in Cerebrospinal Fluid Distinguish Idiopathic Normal Pressure Hydrocephalus from Other Neurodegenerative Diseases
Kaito Kawamura, Madoka Nakajima, Masakazu Miyajima, Chihiro Akiba, Chihiro Kamohara, Jyo Kanpyo, Wei Meng, Ikuko Ogino, Hajime Arai

Fiber Tract Anatomy of the Hypothalamus
Pelin Kuzucu, Pinar Çeltikçi, Emrah Çeltikçi, Ahmet Memduh Kaymaç, Ahmet Akbas, Serhat S. Baydın, M. Sakir Eksi, Necmettin Pamir, Abuzer Güngör
THANK YOU
INDUSTRY AMBASSADOR

FOR YOUR
VALUABLE SUPPORT!
**INTERACTIVE MULTIMEDIA RESEARCH PRESENTATION SESSION: POSTER PRESENTATIONS**

**TUESDAY, OCTOBER 22**
5:45-7:15 pm
Level 2 Lobby

**SECTION ON CEREBROVASCULAR SURGERY POSTERS**

1000 Intra-aneurysmal Signal Dropout on 3D Time-of-flight MRA is Strongly Associated with Wall Enhancement in Unruptured Cerebral Aneurysms: A Novel Biomarker of Aneurysm Instability
Corrado Santarosa, Branden John Cord, Andrew Koo, Aladine A. Elsamadicy, Xiao Wu, Seyedmehdi Payabvash, Kevin Sheth, Nilis Petersen, Guido Falcone, Ajayj Malhotra, Charles C. Matouk

1001 FMS-like Tyrosine Kinase 3 Ligand (FLT3L) Downregulation in Peripheral Blood Serves as a Biomarker for the Presence of Unruptured Intracranial Aneurysms
Dominic A. Nistal, Michael L. Martini, Trevor Hardigan, Nicolas Fernandez, Seunghee Kim-Schulze, Rui Song, J D. Mocco, Christopher P. Kellner
1002 Genome-wide Association Meta-analysis of Over 30,000 Subjects Reveals Novel Intracranial Aneurysm Risk Genes
Tanyeri Barak, Katsuhito Yasuno, Murat Gunel

1003 Transcirculation Approach in the Endovascular Treatment of Acute Ischemic Stroke, Aneurysms, Dural Arteriovenous Fistulas and Arteriovenous Malformations: A Multicenter Study
Jorge A. Roa, Guilherme Dabus, Alberto Maud, Mario Martinez-Galdamez, Diego Paez-Granda, Vladimir Kalousek, Roger Barranco Pons, Ashkan Mowla, Viktor Szedar, Pascal Jabbour, Santiago Ortega-Gutierrez, David M. Hasan, Edgar Samaniego

1004 Revascularization Versus Clipping in High Hunt & Hess Grade Aneurysmal Subarachnoid Hemorrhage Unamenable to Endovascular Treatment
Jordan Lam, Krista Lamore-Foote, Shivani Rangwala, Kristine Ravina, Jonathan Russin

1005 Predicting Perioperative Coagulopathy Via Machine Learning in Patients Requiring Emergency Neurosurgical Operations
Yirui Sun, Jinli Yu, Pengfei Fu, Hong Huang, Junyan Chen, Ying Mao

1006 The Risk Factors and Outcomes of Patients with Intra-Operative Aneurysm Rupture During Surgical Clipping
Ryan P. Palsma

1007 Evaluation of Disease Severity and Treatment Intensity as Cost Drivers for Ruptured Intracranial Aneurysms
Herschel Wilde, Spencer Twitchell, Jared C. Reese, Michael Karsy, Jian Guan, Ilyas Eli, Philipp Taussky, Ramesh Grandhi, Richard Schmidt, William T. Couldwell

1008 Pharmacogenetic and Clinical Warfarin Dosing Algorithm Assessments with Predictive Bleeding Risk Stratification
Nicholas Dietz, Elliot Antman

1009 Role of Antiplatelet and Statin Therapy in Patients with Cerebral Cavernous Malformations
Santiago Gomez-Paz, Mohamed M. Salem, Georgios Maragkos, Luis C. Ascanio, Alejandro Enrriquez-Marulanda, Kimberly Kicielinski, Justin M. Moore, Ajith J. Thomas, Christopher S. Ogilvy

1010 Dandy’s Vein Sacrifice and the Analysis of its Safety Profile in Neurosurgical Procedures
Vinayak Narayan, Amey Saverdekar, Lekshmi P. Sateesh, Anil Nanda

1011 A Nationwide Analysis of Unplanned 30- and 90-day Readmissions After Elective Cerebral Aneurysm Clipping: Causes, Predictors, and Trends
Haydn Hoffman, Matthew Protas, Lawrence S. Chin

1012 A Nationwide Analysis of 30- and 90-day Readmissions After Elective Endovascular Embolization of Cerebral Aneurysms: Causes, Predictors, and Trends
Haydn Hoffman, Matthew Protas, Lawrence S. Chin

1013 Laser Interstitial Thermal Therapy for Cerebral Vascular Pathologies
Christopher S. Hong, Branden J. Cord, Charles C. Matouk, Veronica Chiang

1014 Elevated Serum Fibrinogen Degradation Products on Admission Predicts Recurrence of Chronic Subdural Hematoma
Yusuke Hori, Toru Fukuhara

1015 Flow Diversion for the Treatment of Partially Thrombosed Aneurysms: A Multicenter Case Series
Mohamed M. Salem, Paul M. Foreman, Christoph J. Griessenauer, Adam A. Dmytriw, Nicola Limbucci, Anna L. Kuhn, Ajit S. Puri, Kimberly P. Kicielinski, Alejandro Bugarini, Clemens M. Schirmer, Christopher S. Ogilvy, Ajith J. Thomas

1016 Evaluation of a Pharmacy-mediated Antiplatelet Management Protocol in Stent-assisted Coiling of Cerebral Aneurysms
Mirja Wirtz, Clemens M. Schirmer, Oded Goren, Shamsher Dalal, Gregory Weiner, Paul M. Foreman, Christoph Johannes Griessenauer

1017 A Single Center Medical Quality Evaluation and Factor Analysis of One-staged Hybrid Operation in the Treatment of Brain Arteriovenous Malformations
Mingze Wang, Yong Cao, Shuo Wang, Jizong Zhao
1018 Occlusion Rates of Different Modalities in the Endovascular Treatment of Basilar Tip Aneurysms
Ritam Ghosh, Nikolaos Mouchtouris, Ahmad Sweid, Fadi Al Saiegh, Nohra Chalouhi, M. Reid Gooch, Robert H. Rosenwasser, Pascal Jabbour, Stavropoula I. Tjoumakaris

1019 Rebleeding Drives Poor Outcome in Aneurysmal Subarachnoid Hemorrhage Independent of Delayed Cerebral Ischemia: A Propensity Score Matched Cohort Study

1020 The Impact of Current Generation Anticonvulsant Prophylaxis on Seizure Incidence and Clinical Outcome After Primary Intracerebral Hemorrhage
Neel T. Patel, Carlton W. Christie, Lekhaj C. Daggubati, Erik B. Lehman, Kevin M. Cockroft

1021 Treatment of Cerebral Aneurysms in the Post-ISAT Era: Trends and Outcomes
Evan Luther, David J. McCarthy, Marie-Christine Brunet, Samir Sur, Dileep R. Yavagal, Eric C. Peterson, Robert M. Starke

1022 Quantitative Versus Qualitative Assessment of Aneurysm Wall Enhancement on Magnetic Resonance Vessel Wall Imaging
Corrado Santarosa, Branden J. Cord, Andrew Koo, Aladine A. Elsamadicy, Xiao Wu, Seyedmehdi Payabvash, Kevin Sheth, Nils Petersen, Guido Falcone, Ajayy Malhotra, Charles M. Matouk

1023 Predictors of Complications, Functional Outcome, and Mortality in a Large Cohort Treated with Flow Diversion
Ahmad Sweid, Nabeel Herial, Stavropoula I. Tjoumakaris, Sage Rahm, Michael Gooch, Robert H. Rosenwasser, Pascal Jabbour

1024 Flow Diversion for Small Caliber Vessel Aneurysms, Efficacy, Safety, and Functional Outcome
Ahmad Sweid, Robert M. Starke, Nabeel Herial, Robert H. Rosenwasser, Michael Gooch, Stavropoula I. Tjoumakaris, Pascal Jabbour

1025 Radiosurgical Management of Brainstem Arteriovenous Malformations: Treatment Outcomes and Predictors of Outcome
Anadjeet S. Khahera, Oluudotun Ogunsola, Justin Sim, Alison Clarke, E. Sander Connolly, Jr.

1028 Virtual Reality as an Immersive 3D Visualization Technique to Improve Surgeon Understanding of Aneurysm Anatomy
Talia L. Weiss, Christine D. Young, Kevin M. Brennan, Cristian Luciano, Laura Stone-McGuire, Fernanda Herrera, Ali Alaraj

1029 Patients Taking an Antithrombotic Medication Less Frequently Present with Ruptured Aneurysms

1030 Outcomes in Elderly Aneurysmal Subarachnoid Hemorrhage Patients in the Barrow Ruptured Aneurysm Trial (BRAT)
Joshua Catapano, Michael J. Lang, Michael T. Lawton

1031 Variations in the Subventricular Zone Population Overtime in Adult Chronic Communicating Hydrocephalus: Animal Model
Tito G.M. Vivas-Buitrago, Emily Norton, Andres Ramos, Ignacio J. Torres, Pamela Saavedra, Hugo Guerrero-Cazares, Alfredo Quinones-Hinoja, Daniele Rigamonti

1032 Valve Opening Pressure Settings in Relation to The Lumbar Puncture Opening Pressure in Patients with iNPH: A Delta Value Correlation to Over-drainage
Tito G.M. Vivas-Buitrago, Johan Heemskerk, Juan P. Herrera, Ricardo Domingo, Sanjeet S. Grewal, Ronald Reimer, Robert E. Wharen, Neil R. Graff-Radford

1033 Causes of Unfavorable Outcome in Good Grade Patients with Aneurysmal Subarachnoid Hemorrhage: Opportunities for Improvement?
Matthew E. Eagles, Madeleine P. de Lotbiniere-Bassett, Oliver Ayling, Michael K. Tso, R. Loch Macdonald

1034 Simultaneous Kissing Stent Deployment for Endovascular Treatment of Wide-necked Intracranial Aneurysms: A Case Series of 14 Patients
Kenichi Sato, Miki Fujimura, Teiji Tominaga

1035 The Fragility Index in Cerebrovascular Randomized Controlled Trials: Analysis of Robustness and Proposal of a Classification System
Nimer Adeeb

1036 Urinary Incontinence and Gait Dysfunction in Intraventricular Hemorrhage: The Role of Acute and Long-Term Cerebral Spinal Fluid Diversion

1037 The Effect of Mechanical Thrombectomy and TICI Score on the Incidence of Decompressive Hemicraniectomy in Ischemic Stroke Patients
Fadi Al Saiegh, Nikolaos Mouchtouris, Karim Hafazalla, Nohra Chalouhi, Victor Sabourin, Evan M. Fitchett, Pascal Jabbour, Stavropoula I. Tjoumakaris, M. Reid Gooch, Robert H. Rosenwasser, Fred Rincon

1038 Descending Branch of the Lateral Circumflex Femoral Artery: A Favorable Interposition Graft for Extracranial-to-Intracranial Bypass
Kristine Ravina, Ben A. Strickland, Robert Rennert, Erik M. Wolfswinkel, Joseph Carey, Jonathan Russin
1040 Maturing Institutional Experience with the Transradial Approach for Diagnostic Cerebral Arteriography: Overcoming the Learning Curve
Benjamin M. Zussman, Daniel Tonetti, Jeremy G. Stone, Bradley A. Gross, Ashutosh Jadhav, Tudor Jovin, Brian T. Jankowitz

1041 The Impact of Leptomeningeal Collaterals in Acute Ischemic Stroke: A Systematic Review and Meta-analysis
Nida Fatima

1042 Arterial Spin Labeling MR Imaging at Short Post-labeling Delay Reflects CBF/CBV Verified by 15O-PET in Cerebrovascular Steno-occlusive Disease
Hiroshi Itagaki, Yasuaki Kokubo, Yukihiko Sonoda

1043 Radial Artery Catheterization for Neuroendovascular Procedures: Clinical Outcomes and Patient Satisfaction Measures
Omaditya Khanna, Ahmad Sweid, Nikolaos Mouchtouris, Geoffrey Stricsek, M. Reid Gooch, Stavropoula I. Tjoumakaris, Robert H. Rosenwasser, Pascal Jabbour

1044 Downregulation of Signaling Components in the NO-PKG Pathway After Subarachnoid Hemorrhage: Why Current Therapeutics are Ineffective at Treating Cerebral Vasospasm?
Peter J. Morone, Colleen M. Brophy, Reid C. Thompson, Mark Does, Daniel Colvin, Joyce Cheung-Flynn

1045 Intra-arterial ICG Fluorescence Video-angiography: A Feasible Method for Intraoperative Neurosurgical Purposes?
Markus Holling, Benjamin Risse, Christof Duhme, Gregory Arnone, Helena M. Yoder, Walter Stummer, Fady T. Charbel

1046 Transradial Approach is Safe and Effective for Anterior and Posterior Circulation Mechanical Thrombectomy
Stephan Munich, Kunal Vakharia, Matthew J. McPheeters, Muhammad Waqas, Michael K. Tso, Kenneth Vincent Snyder, Elad I. Levy, Adnan H. Siddiqui, Jason Davies

1048 Multimodal Laser Angioscopy: A New Imaging Platform to Shine a Light on Structural and Biological Markers of Carotid Plaque Vulnerability
Luis E. Savastano, Reddy Adhitya, Eric Seibel, David Gordon, Thomas Wang, Jie Xu, Jifeng Zhang, Byron Gregory Thompson, Jr., Aditya S. Pandey

1049 tPA Use During Mechanical Thrombectomy: Success and Complication Rates
Risheng Xu, Jason A. Liew, Paul Choi, Sharon Pang, Sasicha Manupitpatpong, Sophie Roh, Yuanxuan Xia, Justin M. Caplan, Monica Pearl, Philippe Gailloud, Cameron G. McDougall, Ferdinand Hui

1051 Risk Factors for Restenosis Following Carotid Revascularization: A Meta-analysis of Hazard Ratios
Pavlos Texakalidis, Andreas Tzouras, Stefanos Giannopoulous, Pascal Jabbour, Leonardo Rangel-Castilla, Theofilos Machinis, Dennis J. Rivet, John F. Reavey-Cantwell

1052 Strokenomics - Bending the Cost Curve in Stroke Care
Stephan Munich, Kunal Vakharia, Adnan H. Siddiqui, Kenneth V. Snyder, Jason Davies, Elad I. Levy

1054 Mechanical Thrombectomy is Safe and Effective in Treating Acute Ischemic Stroke of Distal Intracranial Vessels
Jeffery R. Head, Ahmad Sweid, Stavropoula I. Tjoumakaris, Vivian Xu, Kavya Shivashankar, Tyler Alexander, Nabeel Herial, David M. Hasan, Maureen Deprince, Robert H. Rosenwasser, Pascal Jabbour

1055 Exceeding Personalized Blood Pressure Targets After Endovascular Stroke Therapy Is Associated with Hemorrhagic Transformation and Worse Functional Outcome
Nils Petersen, Andrew Silverman, Anson Wang, Sumita Stranger, Sreeja Kodali, Lauren Sansing, Joseph Schindler, Branden J. Cord, Ryan M. Hebert, Charles C. Matouk, Kevin Sheth

1056 Outcomes in Patients with Moyamoya Syndrome and Sickle Cell Disease: A Systematic Review
Sarah Newman, Jason H. Boulter, James G. Malcolm, Gustavo Pradilla

1057 CT Perfusion in Pediatric Moya Moya Disease: Establishing Normative Data and Utility in Surgical Planning
Vijay Ravindra, Sara Hartnett, Melissa LoPresti, Jeffrey M. Treiber, Steven Kralik, Sandi Lam

1058 Antiplatelet Therapy and Operative Risk of Decompressive Craniectomy for Ischemic Stroke
Ryan T. Kellogg, Thomas Larrew, Alejandro Spiotta, Jonathan Leary, Orgest Lajthia

1059 Higher Number of Mechanical Thrombectomy Passes does not Significantly Lower TICI Score or Neurologic Outcome
Risheng Xu, Jason A. Liew, Paul Choi, Sharon Pang, Sasicha Manupitpatpong, Sophie Roh, Yuanxuan Xia, Justin M. Caplan, Monica Pearl, Philippe Gailloud, Cameron G. McDougall, Ferdinand Hui

1061 From Stroke Onset to Reperfusion: How Much Time Can Interventionalists Save?
Risheng Xu, Yuanxuan Xia, Jason A. Liew, Paul Choi, Sharon Pang, Sophie Roh, Sasicha Manupitpatpong, Justin M. Caplan, Monica Pearl, Philippe Gailloud, Cameron G. McDougall, Ferdinand Hui

1062 Revascularization Surgery Outcomes in a North American Cohort of Moyamoya Disease vs Moyamoya Syndrome
Anadjeet S. Khaera, Justin Sim, Evangeline Reyes-Pastorella, Brandon Christophe, E. Sander Connelly, Jr.
**SECTION ON PAIN POSTERS**

Krishnakant Khandelwal, Jorge E. Alvernia, Gustavo G. Luzardo, Eddie Perkins

1065 The Yang-Gopen Scale for Superior Semicircular Canal Dehiscences
Prasanth Romiyog, Kevin Ding, Dillon Dejam, Edwin Ng, Shelby L. Willis, Courtney Duong, Tyler Miao, Taranjit Kaur, Alyssa Franks, H. Westley Phillips, Quinton Gopen, Isaac Yang

1066 Comparison of Traditional Middle Cranial Fossa Craniotomy Versus Minimally Invasive Keyhole Approach for Repair of Superior Semicircular Canal Dehiscence
Matthew Z. Sun, Dillon Dejam, Shelby L. Willis, Quinton Gopen, Isaac Yang

1067 Feasibility of Lavender Aromatherapy in an Awake Craniotomy Environment

1068 Could DBS Lead Impedance Trends Provide Objective Data on Cyst Resolution
Heather Pinckard-Dover, Patrick Paulus, Rohit Dhall, Erika A. Petersen

**SECTION ON PEDIATRIC NEUROLOGICAL SURGERY POSTERS**

1070 Pediatric Intracranial Arteriovenous Malformations and Epilepsy: A Case Series and Review of the Literature
Melissa LoPresti, Rebecca Y. Du, Marc Prablek, Eric A. Goethe, Sandi Lam

1071 Rates of In-Hospital Failure for Endoscopic Third Ventriculostomy (ETV) Compared to Shunting in Post-Hemorrhagic Hydrocephalus of Prematurity (PHHP)
Evan Luther, David J. McCarthy, Toba Niazi

1072 Analysis of Pediatric Craniofaryngioma Admissions in the United States and the Effect of Surgical Approaches on Outcomes Utilizing the Kids Inpatient Database (KID)
Mohammed A. Fouda, Coleman Riordan, David Zurakowski, Liliana Goumnerova

1073 Therapeutic Choices for Ventricular Collapse after Ventriculo-peritoneal Shunting for Pseudotumor Cerebri
Riccardo Serra, Giorgia A. Simboli, Smruti Mahapatra, Noah L. Gorelick, Lacie Manthripagada, Mark G. Luciano

1074 Radiological Evidence of a Brain-wide System for Solute Distribution in a Canine Model
Riccardo Serra, Noah L. Gorelick, Wataru Ishida, Alexander Perdomo-Pantoja, Smruti Mahapatra, Ari M. Blitz, Betty Tyler, Amir Manbachi, Mark G. Luciano

1075 Scoliosis in Loeys-Dietz Syndrome: A Case Series and Clinical Update
Abdul B. Khan, Melissa LoPresti, Rajan Patel, Rory R. Mayer, Shaine A. Morris, Sandi Lam, Vijay Ravindra

1076 Characterization of Unplanned 90-day Readmission After Pediatric Brain Tumor Resection: Readmission Rates, Reasons, and Destination
Michelle Connor, Neal H. Nathan, Li Ding, William J. Mack, Mark D. Krieger, Frank Attenello, Ill

1077 Wireless, Noninvasive Thermal Sensors for the Continuous Monitoring of Ventricular Shunt Function in Pediatric and Adult Patients
Amit Ayer, Siddharth R. Krishnan, Gurvinder Kaur, Nikhil Murthy, Matthew Ordon, Constantine L. Karras, Zachary A. Abecassis, Joshua M. Rosenow, Matthew C. Tate, Tord D. Alden, Matthew B. Potts, John A. Rogers

1078 Hydrocephalus and Spina Bifida in Toddlers: 3-month Experience in Angola at the Neurosurgical and Hydrocephalus Treatment Center
Wilson R. Teixeira, Egon E. L. Neto, Sergio Livraghi, Mayanda Inocente

1079 Long-term Parenchyma Changes in Extreme Hydrocephalus after Ventriculoperitoneal Shunting
Jesús Q. Beltrán, Carlos A. Mendoza-Garcia, David Trejo, Jose de Jesus Gutierrez-Cabrera, Elizabeth Ogando-Rivas

1080 Epidemiology of Surgical Traumatic Brain Injury in Patients Younger than 16 Years at a Single Trauma Center in a Low/Middle-income Country Urban Center
Nastassja Cury-Sales, Raphael Bertani, Barbara Pilon, Raphael Machado, Luiz F. Ribeiro, Flavia Abreu, Daniela Von Zuben, Priscila Mendes, Ruy Monteiro

1081 Results of Posterior Fossa Decompression for Patients with Both Chiari I Malformation and Hydrocephalus
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1356 Imaging Metastatic Brain Tumors Using Brain Metastasis-initiating Cell Targeting Peptides
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1358 Plasma Exosomal Biomarkers Following 5-Ala Use in Malignant Glioma
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“The Phantom CS System pivoting technology minimizes pressure on the incision and vital structures in the anterior cervical approach, while still using the same small skin incision, with better access”

Ashish Sahai, M.D., FAAOS
Spine and Orthopedic Center
Boca Raton, FL
CONTINUING MEDICAL EDUCATION

2019 ANNUAL MEETING OBJECTIVES

Our Mission
The CNS exists to enhance health and improve lives through the advancement of neurosurgical education and scientific exchange.

Our Vision
To be the premier educational organization in neurological surgery.

Our Work
Our mission drives us to cultivate great neurosurgeons. We advance the practice of neurosurgery globally by inspiring and facilitating scientific discovery and its translation to clinical practice.

The CNS CME program is designed, planned, and implemented to evaluate a comprehensive collection of activities within the subspecialty of neurosurgery. The CNS plans to yield results that not only contribute to lifelong learning, but also demonstrate change and improvement in competence.

At the conclusion of the 2019 CNS Annual Meeting participants will be able to
1. Alter their current practice patterns in accordance with the latest data.
2. Compare techniques based on findings discussed during case presentations.
3. Apply and/or perform new techniques based on best practices and current procedures.
4. Practice evidence-based, informed neurosurgical medicine.
5. Interpret newly found outcomes as a result of the scientific abstract presentations.
6. Demonstrate change in competence.

EDUCATIONAL FORMAT DESCRIPTIONS

The CNS offers sessions in a variety of formats to enhance your educational experience. Each session is open to all who have paid the general medical registration fee with the exception of optional Symposia, Luncheon Seminars, and Dinner Seminars, which are available for an additional fee.

SYMPOSIAS
Didactic and hands-on courses with expert neurosurgical educators demonstrating clinical techniques and applications via technology, models, and simulation. Hands-on Symposia provide an opportunity to improve surgical skills by applying and demonstrating learned techniques. Symposia also provide an opportunity to review case-based complex issues and discuss potential solutions.

○ Symposia are offered Saturday, October 19, and Sunday, October 20.

GENERAL SCIENTIFIC SESSION, SECTION SESSIONS, GUIDELINE SESSIONS, LUNCHEON SEMINARS, INTERNATIONAL SESSIONS, OPERATIVE TECHNIQUE SESSIONS, INTERACTIVE MULTIMEDIA RESEARCH PRESENTATION SESSION, AND DINNER SEMINARS
Expert lecturers present research, scientific evidence and associated outcomes, and demonstrate clinical techniques and applications. The basics of translational development, clinical trials, guideline review, and updated changes and evaluation of clinical experience, followed by examples of successful application, are presented in various sessions. Basic skills and information that can be applied in daily practice and professional life are also presented.

○ General Scientific Sessions, Section Sessions, Guidelines Session, International Sessions, Operative Technique Sessions, and Interactive Multimedia Research Presentation Session are offered Sunday, October 20, through Wednesday, October 23.

○ Luncheon Seminars are offered Monday, October 21, through Wednesday, October 23.

○ Dinner Seminars are offered on Saturday, October 19; Monday, October 21; and Tuesday, October 22.

OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION SESSIONS
During these sessions, the faculty presents cases to be examined, discussed, and debated by both the audience and panel. Registered attendees will have the opportunity to submit their own cases prior to the meeting to be presented at these sessions. Don’t miss these interactive sessions designed to encourage participation from everyone.

○ Operative Technique and Case-based Discussion Sessions will take place on Monday, October 21, and Tuesday, October 22.

○ Live Surgery via telemedicine technology in the Exhibit Hall will take place Monday, October 21, through Wednesday, October 23. CME is not offered for these sessions.

ORIGINAL SCIENCE PROGRAM
Scientific abstract presentations offer original science, ground-breaking research, and the best clinical and basic neurosurgical science in the CNS Original Science Program, and allows for audience questions and moderated discussions.

○ Oral Presentations by subspecialty will be presented on Monday, October 21, Tuesday, October 22, and Wednesday, October 23.

○ Interactive Multimedia Research Presentation Session will take place on Tuesday, October 22.

○ Sunrise Science Oral Presentations by subspecialty Oral Presentations will be presented on Monday, October 21, Tuesday, October 22, and Wednesday, October 23.

○ Late-breaking Abstracts will be presented on Monday, October 21, Tuesday October 22 and Wednesday, October 23.
ACCREDITATION
The Congress of Neurological Surgeons is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

CME CREDIT
The CNS designates this live activity for a maximum of 49.5 AMA PRA Category 1 Credits™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

*A maximum of 26 AMA PRA Category 1 Credits™ may be earned for general sessions only.

Additional CME Credits can be earned by attending the following:

SYMPOSIA
Attendees will receive a maximum of 3.5 AMA PRA Category 1 Credits™ for each Saturday or Sunday half-day Symposia, a maximum of 6 AMA PRA Category 1 Credits™ for each eligible Saturday or Sunday full-day Symposia.

LUNCHEON SEMINARS
Attendees will receive a maximum of one-and-a-half (1.5) AMA PRA Category 1 Credits™ for all eligible Luncheon Seminars. Physicians should only claim credit commensurate with the extent of their participation in the activity.

DINNER SEMINARS
Attendees will receive a maximum of two (2) AMA PRA Category 1 Credits™ for all eligible Dinner Seminars. Physicians should only claim credit commensurate with the extent of their participation in the activity.

INTERACTIVE MULTIMEDIA RESEARCH PRESENTATIONS
Physicians may claim a maximum of five (5) AMA PRA Category 1 Credits™ directly from the AMA for preparing a poster presentation, which is also included in the published abstracts. Physicians may claim them on theirAMA PRA certificate application or apply directly to theAMA for anAMA PRA Category 1 Credits™ certificate.

Physicians may claim 1.5 AMA PRA Category Credits™ for viewing scientific posters. Physicians should self-claim credit on their AMA PRA certificate application form. Please visit the AMA web site for details at www.ama-assn.org.

NURSING CREDIT
This continuing nursing education activity was approved by the American Association of Neuroscience Nurses, an accredited approver by the American Nurses Credentialing Center’s Commission on Accreditation.

Each attendee may only be awarded a maximum of 49.5 nursing contact hours for this educational event.

CLAIMING CME CREDIT
CME credits can be claimed through the online CME system at www.cns.org. The CME tracking system allows you to create and print a CME certificate immediately following the CNS Annual Meeting while you are still in San Francisco, or from the convenience of your home or office. Upon completion of this process, your CME certificate will be sent to you via email at the email address you provided at registration.

DISCLOSURES
The Accreditation Council for Continuing Medical Education Standards for Commercial Support requires that anyone in a position to control the content of the educational activity has disclosed all financial relationships with any commercial interest. Failure or refusal to disclose or the inability to satisfactorily resolve the identified conflict may result in the withdrawal of the invitation to participate in any of the CNS educational activities. The ACCME defines a “commercial interest” as any entity producing, marketing, reselling, or distributing healthcare goods or services consumed by, or used on, patients. It is also each speaker’s responsibility to include the FDA clearance status of any device or drug requiring FDA approval discussed or described in their presentation or to describe the lack of FDA clearance for any “off label” uses discussed. Speakers from the audience are also required, therefore, to indicate any relevant personal/professional relationships as they discuss a given topic.

See the addendum for listing of all Annual Meeting disclosures.

FDA STATEMENT
Some drugs or medical devices demonstrated at the Annual Meeting have not been cleared by the FDA or have been cleared by the FDA for specific purposes only. The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical devices he or she wishes to use in clinical practice. The CNS policy provides that “off label” uses of a drug or medical device may be described at the Annual Meeting so long as the “off label” use of the drug or medical device is also specifically disclosed. Any drug or medical device is “off label” if the described use is not set forth on the products approval label. It is also each speaker’s responsibility to include the FDA clearance status of any device or drug requiring FDA approval discussed or described in their presentation or to describe the lack of FDA clearance for any “off label” uses discussed. Speakers from the audience are also required, therefore, to indicate any relevant personal/professional relationships as they discuss a given topic.
2019 CNS ANNUAL MEETING APP
Download the 2019 CNS Annual Meeting App to access everything you need to know about the Annual Meeting in the palm of your hand. Search for course details, upcoming events, and exhibitors. You can also save your favorite sessions, send and receive messages with colleagues, take notes on sessions, and more!

Download the app by going to https://ativ.me/cns2019.

AMERICANS WITH DISABILITIES ACT
The Moscone West Convention Center and the San Francisco Marriott Marquis are in compliance with the Americans with Disabilities Act (ADA) and prepared to accommodate all visitors. For wheelchair or electric scooter rental, please contact either Scoot Around at 877-484-5482 or www.scootaround.com or Cloud of Goods at 415-621-9757 or www.cloudofgoods.com.

ATTIRE
Professional attire is appropriate at the Annual Meeting and in the Exhibit Hall. Some San Francisco restaurants require coats and ties for men. Please check each restaurant’s policy when making reservations. Business/cocktail attire is appropriate for social events, unless otherwise noted.

BADGES
CNS Annual Meeting badge colors represent the registration category of attendees:
- **Blue:** Medical attendees including CNS Members and Non-members, Associate Members
- **Gray:** Graduate Students/Post-doctoral Scholars, Medical Students, PA/Physician Extenders, Nurses, Nurse Practitioners
- **Orange:** Non Member Corporate Representatives
- **Clear:** Guests and Spouses
- **Yellow:** Exhibitors
- **Red:** Staff

BAGGAGE AND COAT CHECK
Baggage and coat check will be available at Moscone West Convention Center.
- **Tuesday, October 22:** 6:30 am–7:30 pm
- **Wednesday, October 23:** 6:30 am–5:00 pm

CHILDREN
Children may be registered as guests. (Please note that children under the age of 18 are not allowed in the CNS Exhibit Hall.) Should you require babysitting services, please contact the concierge desk at your hotel. The CNS has no control over and assumes no responsibility for the care that is provided through hotels for these services. This information is provided solely to assist participants in identifying possible sources for childcare.

CNS CENTRAL
CNS Central is conveniently located adjacent to the CNS Registration Area, in the lobby of the Moscone West Convention Center. Visit CNS Central with your questions on CNS membership, education, or CME. CNS staff will be available to assist you in navigating our new website, review our case-based Nexus product or download any apps on your mobile device. From accessing your favorite learning tools to discovering new ones, the CNS staff is here to help you with your questions about programs, products, and services.

CNS XPERIENCE LOUNGE
Immerse yourself in the best of the CNS Annual Meeting in the CNS Xperience Lounge! Get up close and personal with the featured speakers at their book signings, hear the Innovator of the Year finalists present their innovations, view digital posters, and enjoy the Voices of Neurosurgery presentations by peers while enjoying a fruit smoothie on Tuesday’s Wellness Afternoon. The CNS Xperience Lounge is a great place to connect with your colleagues and mentors and enjoy a beverage – be sure to stop by!

COURSE AGENDA AND FACULTY
Agendas are occasionally subject to change. As we continue to strive to improve the quality of your educational experience, the CNS may substitute faculty with comparable expertise when necessary.

DIGITAL POSTERS
Digital Posters are displayed electronically, Monday through Wednesday, in the CNS Xperience Lounge, located in the Exhibit Hall and can be searched by author, topic or keyword.
DISCLAIMER
The material presented at the 2019 Annual Meeting has been made available by the Congress of Neurological Surgeons for educational purposes only. The material is not intended to represent the only, nor necessarily the best, method, procedure or technique appropriate for the medical situations discussed, but rather is intended to present an approach, view, statement, or opinion of the faculty which may be helpful to others who face similar situations. The material is not meant to replace independent judgement by a physician for any given issue. Neither the content (whether written or oral) of any course, seminar, or other presentation in the program, nor the use of a specific product in conjunction therewith, nor the exhibition of any materials by any parties coincident with the program, should be construed as indicating endorsement or approval by the CNS, or by its committees or affiliates of the views presented; methods, procedures and/or techniques described or discussed; the products used; or the materials exhibited. The CNS disclaims any and all liability for injury or other damages resulting to any individual attending the Annual Meeting, and for all claims which may arise out of the use of the material, methods, procedures, and/or techniques demonstrated therein by such individuals, whether these claims shall be asserted by physicians or any other person. No reproductions of any kind, including audiotapes and videotape, may be made of the presentations at the CNS Annual Meeting. The CNS reserves all of its rights to such material, and commercial reproduction is specifically prohibited.

EXHIBIT HALL
Monday, October 21  9:30 am–4:00 pm
Tuesday, October 22  9:30 am–3:00 pm
Wednesday, October 23  9:30 am–2:00 pm
Admittance to the Exhibit Hall is by CNS name badge only. Children under the age of 18 are not allowed in the Exhibit Hall.

FACULTY REGISTRATION
All faculty should register at the Faculty Registration counter at Moscone West Convention Center to receive a special gift.

BREAKS AND LIVE SURGERY IN THE EXHIBIT HALL
Join your colleagues and exhibitors for unopposed networking in the Exhibit Hall. Presentation stage schedules will be posted in the Exhibit Hall.

Monday, October 21
Morning Beverage Break  9:40–10:40 am
Live Surgery in Xperience Lounge  10:00–10:30 am
Afternoon Beverage Break  1:45–2:45 pm
Beer and Wine Social Hour in Xperience Lounge  1:45–2:45 pm

Tuesday, October 22
Morning Beverage Break  9:40–10:40 am
Live Surgery in Xperience Lounge  10:00–10:30 am
Afternoon Beverage Break  1:45–2:45 pm
Wellness Afternoon in Xperience Lounge  1:45–2:45 pm

Wednesday, October 23
Morning Beverage Break  9:40–10:40 am
Live Surgery in Xperience Lounge  10:00–10:30 am

FUTURE MEETINGS
2020: Miami, Florida  September 12–16
2021: Austin, Texas  October 16–20

MEMBER SERVICES
Be sure to stop and visit the CNS Member Services staff in CNS Central or the CNS Xperience Lounge for demos of our most popular products, or to answer any of your questions about the CNS, your NEUROSURGERY® Publications subscriptions, and your CNS membership.

POSTERS
The CNS posters will be located on the Level 2 Lobby of the Moscone West Convention Center. Poster viewing and mini podium presentations will take place during the Interactive Multimedia Research Presentation Session on Tuesday, October 22 from 5:45–7:15 pm.

PRESS
All media representatives and journalists attending the Annual Meeting are required to register in advance. Registration, Press Room guidelines and media credentialing policies are available online at cns.org/2019 or by calling 847-240-2500. Once on-site, media are required to check in at the CNS registration area to pick up their press badges and then proceed to the Press Room to pick up their press kits.
REGISTRATION METHODS

REGISTRATION INFORMATION
Items included in registration fee:
- General Scientific Sessions, Sunday through Wednesday
- Scientific Program to include Section Sessions, Oral Abstract Presentations, Sunrise Science/Late-breaking Abstract Sessions, Guideline Sessions, Operative Technique Sessions, International Sessions, Interactive Multimedia Research Presentation Session
- CNS Xperience Lounge
- Live Surgeries
- Exhibit Hall, Monday through Wednesday
- One ticket to the Opening Reception on Sunday, October 20

REGISTRATION HOURS
Registration is located in the Level 1 Lobby of the Moscone West Convention Center.
Saturday, October 19 7:00 am–5:30 pm
Sunday, October 20 7:00 am–7:30 pm
Monday, October 21 6:30 am–6:30 pm
Tuesday, October 22 6:30 am–6:30 pm
Wednesday, October 23 6:30 am–3:15 pm

Registration will also be located in the 2nd Level Atrium at the San Francisco Marriott.
Saturday, October 19 7:00 am–5:00 pm
Sunday, October 20 7:00 am–5:00 pm
Monday, October 21 7:00 am–12:00 pm

RESTAURANT RESERVATIONS
Contact your hotel concierge in advance for assistance in securing popular restaurant reservations.

SMOKING
The Moscone West Convention Center and official CNS hotels are non-smoking facilities.

SPEAKER READY ROOM
All speakers and abstract presenters should check in at the Speaker Ready Room, located in Room 3000 at the Moscone West Convention Center, a minimum of one hour prior to the scheduled start time of their session.
Saturday, October 19 7:00 am–4:30 pm
Sunday, October 20 7:00 am–6:30 pm
Monday, October 21 6:30 am–6:30 pm
Tuesday, October 22 6:30 am–5:30 pm
Wednesday, October 23 6:30 am–3:30 pm

SPouse hospitality
All registered CNS Annual Meeting spouses and guests are invited to visit the spouse hospitality suite, Monday through Wednesday, for daily continental breakfast from 8:00–10:30 am in the 2nd Floor Atrium of the San Francisco Marriott Marquis. (Please note that admittance to spouse hospitality suite is by spouse/guest badge only.)

A representative from the San Francisco Convention and Visitors Bureau will be available in the Spouse Hospitality Suite to answer city questions, assist you with dinner reservations, and provide tour and activity recommendations.

WI-FI SERVICE
For your convenience, complimentary Wi-Fi service is provided by the CNS throughout the Moscone West Convention Center and the San Francisco Marriott Marquis wherever CNS events are being held. Please use the CNS19 network at both facilities. The password at the Marriott Marquis is sanfran19.

Hear from leading voices in scholarly publishing!

NEUROSURGERY® Publications:
Meet the Editors

Tuesday, October 22 | 1:00–2:00 pm
Room 3002 at the Moscone West Convention Center

Attendees will be treated to presentations from the Editors-in-Chief of several leading journals in neurosurgery outlining their experiences with the peer review process. Panelists will share their thoughts on how to most effectively contribute to this process and then stay for a Q&A with the audience.
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LEVEL ONE
- Registration
- CNS Central
- CNS Foundation Booth – Donate Today!

LEVEL TWO
- Sessions
- Sergeant-at-Arms (2022 Overlook)
- Resident SANS Challenge (Room 2018)
- CNS Resident Social and CSNS Young Neurosurgeons Reception (Room 2000)
- Interactive Multimedia Research Presentation Session (Level 2 Lobby)
- Opening Reception (Level Two Lobby)

LEVEL THREE
- General Scientific Sessions
- Speaker Ready Room (Room 3000)
- Sessions
SECOND LEVEL
- Committee Meetings
- Spouse Hospitality (2nd Floor Atrium)

FOURTH AND FIFTH LEVEL
- Committee Meetings
See you next year!

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