



CNS

2019 ANNUAL
MEETING



SAN FRANCISCO
CALIFORNIA
OCTOBER 19-23, 2019

**PRELIMINARY
PROGRAM**

Advance Registration
Deadline:
September 18, 2019

WHAT'S **NEW** IN 2019

There's so much fresh content coming to the 2019 CNS Annual Meeting,
and we think you'll like what we have to offer!



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.





WELCOME MEMBERS:

The most formidable weapon against errors of every kind is Reason. I have never used any other, and I trust I never shall.
—Thomas Paine, *The Age of Reason*, 1794

Though they were written more than two centuries ago, American founding father Thomas Paine's words on free rational inquiry are more relevant than ever. Christopher Hitchens wrote "in a time ... when both rights and reason are under several kinds of open and covert attack, the life and writing of Thomas Paine will always be part of the arsenal on which we shall need to depend."

Paine's writings came during a time of great change, particularly in medicine. Bloodletting was still common practice. An understanding of how pathogens lead to disease was rudimentary. The practice of surgery on the nervous system would not exist for another 100 years. As time has passed, we have relied on solid medical evidence to advance medicine, and in particular, neurosurgery. Evidence-based practice has helped us to advance medical science in ways Paine could not have imagined. However, despite remarkable progress, we are still susceptible to practicing medicine in ways that are unsupported by data. Neurosurgery is no exception; we are under increased scrutiny for indications and outcomes for the procedures we perform. Reason and critical thinking are what have allowed medical technology to progress and will ensure that we continue to practice medicine in ways that are supported by evidence.

I am inviting you to join me at the 2019 CNS Annual Meeting in San Francisco to celebrate reason. In a world of "fake news" and falsehoods that spread quicker than the truth, we in the medical community must remain pillars against misinformation. This year's Annual Meeting theme, *The Age of Reason for Neurosurgery*, is intended to be provocative. We will highlight speakers who have challenged us to reconsider the way we do things based on current evidence.

This Preliminary Program will help you get the most out of your week at the CNS Annual Meeting. You can depend on joining other leaders in neurosurgery to find cutting-edge science and get hands on with the latest technology. We're bringing back live surgery in the Presentation Theater and book signings with our incredible special speakers.

But 2019 is going to hold so much more. In order to provide attendees with the most CME at the best value, we are pleased to introduce 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 will offer an abstract category on operative technique in order to highlight novel surgical strategies for treating neurological disease across all disciplines.

On behalf of the Congress of Neurological Surgeons Executive Committee, the Scientific Program Committee, and the 2019 Honored Guest Raymond Sawaya, MD, I welcome you to attend this year's CNS Annual Meeting in San Francisco, California, October 19–23.

Sincerely,
Ganesh Rao, MD
CNS President



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.

Who should attend: Neurological surgeons, neurosurgery nurses, physician assistants, orthopedic surgeons, primary care physicians, gerontologists, radiologists, hospital administrators, oncologists, neurologists, pediatricians, psychiatrists, and infectious disease specialists are welcome and encouraged to attend the 2019 CNS Annual Meeting.



2019 International Partner Society Japanese Congress of Neurological Surgeons


President's Message		Scientific Program	
1	President's Message	25	Saturday
2	Annual Meeting At-a-Glance	31	Sunday
4	Honored Guest	39	Monday
5	Featured Speakers	53	Tuesday
5	Featured Speakers	63	Wednesday
12	Annual Meeting Leadership	68	Continuing Medical Education
16	Annual Meeting Committee	70	General Information
18	Subspecialty Session Highlights	72	Registration Information
		73	Hotel Information
		76	Exhibitors

2019 AT-A-GLANCE

SATURDAY, OCTOBER 19

8:00 am–4:15 pm	 Symposia (SYM1–SYM9)
4:15–5:15 pm	Resident Social
5:30–7:00 pm	International Reception San Francisco Marriott Marquis
6:30–8:30 pm	Dinner Seminar

SUNDAY, OCTOBER 20

8:00 am–4:15 pm	 Symposia (SYM10–SYM20)
1:00–3:00 pm	Resident SANS Challenge Preliminary Rounds
4:30–6:30 pm	General Scientific Session I
6:30–8:30 pm	Opening Reception

MONDAY, OCTOBER 21

7:00–8:30 am	Guidelines Sessions
7:00–8:30 am	Sunrise Science and Late Breaking Abstracts Sessions
8:40–9:40 am	General Scientific Session II
9:30 am–4:00 pm	Exhibit Hall Open
9:40–10:40 am	Beverage Break in the Exhibit Hall
10:00–10:30 am	Live Surgery in the Exhibit Hall
10:40 am–12:10 pm	General Scientific Session II, continued
12:15–1:45 pm	Luncheon Seminars
1:45–2:45 pm	Beverage Break in the Exhibit Hall
1:45–2:45 pm	Special Session: Navigating the Regulatory Landscape for Medical Devices: An FDA Road Map
2:00–2:30 pm	Live Surgery in the Exhibit Hall
2:45–4:15 pm	Section Sessions and Oral Presentations
4:15–5:45 pm	Operative Techniques and Case- based Discussion Sessions
5:45–7:15 pm	 International Symposia
7:30–9:30 pm	Dinner Seminars

Don't see your favorite Practical Course? Look no further!

This year, we are offering the most value out of your attendance by introducing specialized, intensive half- and full-day symposia bundles which include industry-sponsored breakout sessions and lunch.

See details on page 25–28 and 31–35

TUESDAY, OCTOBER 22

7:00–8:30 am	Guidelines Sessions
7:00–8:30 am	Sunrise Science and Late Breaking Abstracts Sessions
8:40–9:40 am	General Scientific Session III
9:30 am–3:00 pm	Exhibit Hall Open
9:40–10:40 am	Beverage Break in the Exhibit Hall
10:00–10:30 am	Live Surgery in the Exhibit Hall
10:40 am–12:10 pm	General Scientific Session III, continued
12:15–1:45 pm	Luncheon Seminars
1:00–2:00 pm	NEUROSURGERY® Publications: Meet the Editors
1:45–2:45 pm	Resident SANS Challenge Championship Round
1:45–2:45 pm	Beverage Break in the Exhibit Hall
2:00–2:45 pm	Annual Business Meeting
2:45–4:15 pm	Section Sessions and Oral Presentations
4:15–5:45 pm	Operative Techniques and Case-based Discussion Sessions
5:45–7:15 pm	NEW Interactive Multimedia Research Presentation Session
7:30–9:30 pm	Dinner Seminar

WEDNESDAY, OCTOBER 23

7:00–8:30 am	Guidelines Sessions
7:00–8:30 am	Sunrise Science and Late Breaking Abstracts Sessions
8:40–9:40 am	General Scientific Session IV
9:30 am–2:00 pm	Exhibit Hall Open
9:40–10:40 am	Beverage Break in the Exhibit Hall
10:00–10:30 am	Live Surgery in the Exhibit Hall
10:40 am–12:10 pm	General Scientific Session IV, continued
12:15–1:45 pm	Luncheon Seminars
1:45–3:15 pm	NEW Abstract Sessions
1:45–4:45 pm	Advanced Endoscopic and Exoscopic Neurosurgery Seminar



#2019CNS

CONNECT WITH THE CNS. Follow us on Twitter, Facebook, and LinkedIn for the most up-to-date information and meeting updates.



HONORED GUEST

Raymond Sawaya, MD

Professor and Founding Chair of the Department of Neurosurgery, and the Ann C. Brooks & Anthony D. Bullock III Distinguished Chair in Neurosurgery at The University of Texas MD Anderson Cancer Center



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 earned his medical degree from St. Joseph University of Beirut, Lebanon, and completed a surgical internship at Beekman Downtown Hospital in New York City. Multiple residencies followed: in general surgery at Upstate Medical Center State University of New York, in pediatric neurosurgery at Children's Hospital Medical Center in Cincinnati, and in neurosurgery at the University of Cincinnati College of Medicine. In 1980, he accepted the position of chief resident in neurosurgery at Johns Hopkins Hospital and then held a fellowship at the National Institutes of Health (NIH) as a Fogarty International fellow. At NIH, he found his career focus: brain tumors and, in particular, glioblastomas. He was recruited back to the University of Cincinnati in 1982, where he spent eight years building that institution's brain tumor program.

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 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. Sayawa at the following sessions:

MONDAY, OCTOBER 21

General Scientific Session II 12:15–1:45 pm
9:13–9:40 am Honored Guest Luncheon
Honored Guest Seminar: Leadership
Presentation: Role of Engagements
Resection for Glioblastoma: *Advanced registration*
Can Technology Overcome *recommended.*
Biology?

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

TUESDAY, OCTOBER 22

General Scientific Session III 8:50–9:12 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

5:59–6:30 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 #1 New York Times 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, she 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.

Vedantam is the author of the non-fiction book, *The Hidden Brain: How our Unconscious Minds Elect Presidents, Control Markets, Wage Wars and Save Our Lives*. The book, published in 2010, describes how unconscious biases influence people.

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.



FEATURED 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 Prizewinning 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 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*; and 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

9:12 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.

Carl Zimmer is the author of 13 books about science. His newest book is *She Has Her Mother's Laugh: The Power, Perversions, and Potential of Heredity*. His column, *Matter*, appears each week in the New York Times.

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 this Carl Zimmer please visit www.prhspeakers.com*



Bret Stephens

U.S. Foreign Policy and the World

TUESDAY, OCTOBER 22

General Scientific Session III

11:37 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.

Mr. 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.

Mr. 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.

Mr. 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.

In 2014 Penguin published his book *America in Retreat: The New Isolationism and the Coming Global Disorder*.

Mr. 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.




JOHN THOMPSON HISTORY OF MEDICINE LECTURE

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 a 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.



FEATURED SPEAKERS

Aaron Carroll

Healthcare in the U.S.

WEDNESDAY, OCTOBER 23

General Scientific Session IV

11:27 am–12:10 pm

Meet Aaron Carroll in the CNS Xperience Lounge immediately following the conclusion of this session!

Aaron E. 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.





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Thank You

The Congress of Neurological Surgeons gratefully acknowledges our Industry Allies Council Partners for their continued support.

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Industry Engagement Highlights



Join Us in the Exhibit Hall

DAILY LIVE SURGERY PRESENTATIONS HAVE EXPANDED

Join us Monday through Wednesday in the CNS Xperience Lounge during your morning and afternoon break. Surgeons from top institutions will operate live via telemedicine, giving you the opportunity to observe and ask questions of the operating surgeon.

DEVICE INNOVATION SHOWCASE

These quick, 10-minute sessions in the Xperience Lounge, will feature an expert on an educational topic to update you on the latest from or industry leaders.



Interact Outside of the Exhibit Hall

SPONSORED LUNCH SYMPOSIA WITH INDUSTRY LEADERS

Enjoy a complimentary lunch-and-learn session covering important clinical topics. Choose one on Monday and Tuesday from 12:15–1:45 pm.

HANDS-ON CADAVER EXPERIENCE

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. Brought to you by our industry sponsors.



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.



The CNS Exhibit Hall is the best place to discover the cutting-edge technology to enhance your practice. Check out in-booth demonstrations with subspecialty experts and gain hands-on experience with the latest devices—all brought to you by over 150 of our industry partners. For a complete list of exhibitors, see page 76 or visit cns.org/2019.

EXHIBIT HALL HOURS

Monday, 9:30 am–4:00 pm
Tuesday, 9:30 am–3:00 pm
Wednesday, 9:30 am–2:00 pm

EXHIBIT HALL BEVERAGE BREAKS

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

Immerse Yourself in the CNS Xperience Lounge

RELAX on one of our cozy couches or connect with your colleagues. Grab a drink at the CNS Espresso Bar and see what's next on your agenda. Join us afternoons for complimentary snacks and wine, beer, and smoothies!

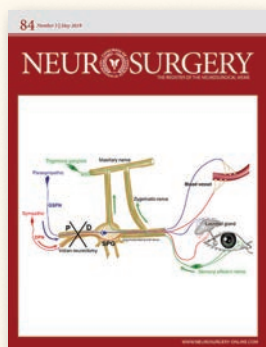


MEET and interact with featured speakers and Honored Guest, **Raymond Sawaya, MD**. Books by our Featured Speakers will be available for purchase, so don't miss a chance to get yours signed.



SEE presentations from the Innovator of the Year finalists. On Tuesday, attend a special presentation and book signing by **Gary Simonds** and enjoy a Wellness Afternoon. Stop by any time to view **digital posters**.

EXPERIENCE live surgery via telemedicine technology, **Educational Update Sessions**, and more on the Presentation Stage!



ASK any **membership questions** you might have and get answers from staff members.

NEUROSURGERY® Publications will be in the Xperience Lounge! Stop by to pick up the latest copy of the journal, watch demos of the Surgeon's Armamentarium, listen to *Neurosurgery Speaks!* or chat with journal staff.

NVIDIA: Artificial Intelligence for Neurosurgeons—A Hands-on Demo

Don't miss a one-hour demonstration of AI potential and take a test drive of the Nvidia Deep Learning Institute Tuesday morning.



ANNUAL MEETING LEADERSHIP

PRESIDENT

Ganesh Rao, MD

Ganesh Rao is a Professor of Neurosurgery at The University of Texas MD Anderson Cancer Center. He is also the Residency Program Director for the Baylor College of Medicine Neurosurgery Program.

Dr. Rao attended Medical School at the University of Arizona and completed neurosurgery residency at the University of Utah. He was a fellow in neurosurgical oncology at MD Anderson and then joined the faculty. His clinical practice includes the management of cranial and spinal neoplasms.

In addition to a busy clinical practice, Dr. Rao directs an NIH-funded laboratory investigating causes of malignant progression glioma. He has been active in clinical research as well and is the principal investigator of various clinical trials. He has published work in Cell, Lancet Oncology, The Journal of the National Cancer Institute, Neurosurgery and the Journal of Neurosurgery.

Dr. Rao has been an active member of the Executive Committee of the Congress of Neurological Surgeons since 2007. His roles have included Member-at-Large, Treasurer, and chair of several committees.

Dr. Rao and his wife Lorelei live in Houston, Texas with their twin sons, Kiran and Zain.



PRESIDENT-ELECT

Steven N. Kalkanis, MD



Steven N. Kalkanis, MD, is Professor and Chair of the Department of Neurosurgery, and co-director of the Neuroscience Institute, at Henry Ford Health System in Detroit, Michigan. Since Dr. Kalkanis became chair in 2014, the Department has grown to 32 faculty with two residents per year, and with a total of seven NIH R01 grants currently in Neurosurgery. Dr. Kalkanis also serves as Medical Director of the Henry Ford Cancer Institute (HFCI). Under his leadership, HFCI has grown to a \$1.2 billion enterprise with 1,425 employees treating more than 8,000 new cancer patients each year.

Dr. Kalkanis joined Henry Ford in 2004 after completing his neurosurgical training at Massachusetts General Hospital. He

graduated with highest honors from Harvard University with the John Harvard Award, and then Harvard Medical School, where he served as Class Marshal and received the Linnane Prize for highest academic achievement.

In 2009, Dr. Kalkanis led a multidisciplinary team of experts to publish the largest set of guidelines to date on the treatment of metastatic brain tumors. He was the founding chair of the Congress of Neurological Surgeons (CNS) Guidelines Committee where he helped to spearhead ten clinical practice guidelines in a myriad of topics, and he is the vice-Chair of the AANS/CNS Joint Guidelines Review Committee. He also is a past president of the Michigan Association of Neurological Surgeons.

Dr. Kalkanis served as Chair of the AANS/CNS Section on Tumors from 2016-2018. In 2018, he was named a Director of the American Board of Neurological Surgery. Elected to the CNS Executive Committee in 2009, Dr. Kalkanis has served in numerous leadership roles, including Scientific Program Chair, Secretary, and now President-Elect.

With the goal of refining personalized medicine treatment protocols, and as the Mark Rosenblum Endowed Chair in Neurosurgery, Dr. Kalkanis runs an NIH-funded translational research laboratory investigating molecular genetic differences between short- and long-term glioma survivors. Specializing in brain tumor surgery, he has been involved in numerous clinical trials and has authored over 135 peer-reviewed publications.

Steve and his wife, Laurel, especially enjoy traveling with and cheering on their three children, Nicholas (15), Connor (13) and Grace (9), in multiple sporting, scouting, and musical activities.

ANNUAL MEETING CHAIR**Alexander A. Khalessi, MD**

Alexander A. Khalessi is the Professor and Chairman of Neurological Surgery at the University of California, San Diego. Dr. Khalessi completed undergraduate and Master of Science degrees with honors from Stanford University and MD from the Johns Hopkins University School of Medicine. He completed his neurosurgical residency at the University of Southern California and CAST-certified endovascular fellowship at SUNY Buffalo. Recently, he received a Master of Business Administration from the MIT Sloan School of Management.

Dr. Khalessi is a recognized thought leader in the microsurgical and endovascular treatment of cerebral aneurysms, arteriovenous malformations, carotid disease, intracranial hemorrhage and ischemic stroke. He is responsible for more than 135 peer reviewed papers and 180 abstract presentations, and served as principal or co-investigator of more than 25 clinical trials.

He lives in La Jolla, California with his wife Sara, a lawyer, and their sons Wilder and Pierce.

**SCIENTIFIC PROGRAM CHAIR****Nader Pouratian, MD, PhD**

Nader Pouratian is a professor and vice-chair of academic affairs of neurosurgery at the University of California, Los Angeles, where he also serves on the faculty of radiation oncology, neuroscience, and biomedical engineering. He also serves as the chair of the Faculty Executive Committee at the David Geffen School of Medicine.

Dr. Pouratian attended medical school at the David Geffen School of Medicine at UCLA where he completed the Medical Scientist Training Program, earning his PhD in neuroscience in addition to his MD. He completed his neurosurgery residency under the mentorship of John Jane Sr., MD, training with neurosurgical leaders such as Edward Laws, MD, Edward Oldfield, MD, and Chris Shaffrey, MD. During his residency, he completed an enrolled fellowship in functional neurosurgery with Jeff Elias, MD. After completing residency, he joined the faculty of the UCLA Department of Neurosurgery. His clinical practice focuses on functional and stereotactic, pain, and peripheral nerve surgery.

In addition to his clinical practice, Dr. Pouratian has an active NIH-funded laboratory with five active grants. His research and academic interest integrate advanced imaging and invasive brain mapping techniques to investigate human physiology of motor control, pathophysiological mechanisms underlying Parkinson disease and treatment-resistant depression, and neuroprosthetic development for the blind. All work is aimed at developing next generation brain-computer interface therapeutics.

Dr. Pouratian and his wife Talia live in Los Angeles, California with their children: Lylah (10), Noa (9), and Ari (7).

Bring Your Family to San Francisco!

Spouse registration is **complimentary** if registered before September 18

- Join us for the General Scientific Sessions and hear our Featured Speakers, including **Doris Kearns Goodwin, Shankar Vedantam, Lucy Kalanithi, Rebecca Skloot**, and more!
- Enjoy food, beverages, and entertainment at the CNS Opening Reception on Sunday evening.
- Start your day with breakfast in the Spouse Hospitality Suite at the San Francisco Marriott Marquis on Monday, Tuesday, and Wednesday.
- Stop by the CNS Xperience Lounge for complimentary espresso drinks, beer, wine, and smoothies throughout the conference.



What our attendees are saying:

“The CNS Annual Meeting is innovative, state of the art, and provides what neurosurgeons need to know now and in the future. CNS is committed to delivering education, training, leadership, and services to its members.”

“I attend because it is a great opportunity to catch up with old friends, colleagues, and mentors. I also always leave the meeting with at least one new thing I’ve learned to improve my practice.”

“I attend the CNS Annual Meeting because it gives me an opportunity to get a sneak peek into cutting edge science as it relates to neurosurgery.”

“The CNS Annual Meeting is a great way to see the latest research highlights, catch up with old colleagues, and meet new collaborators!”

The Congress of Neurological Surgeons Welcomes

2019 International Partner The Japanese Congress of Neurological Surgeons



Yukihiro Sonoda
Japanese CNS President



Association
of Neurosurgical
Physician
Assistants

ANSPA



CNS

ANSPA ANNUAL FALL CME MEETING:

Presented in Collaboration with the CNS

Sunday, October 20 | 8:00 am–4:15 pm

The ANSPA Annual CME Meeting is created specifically for PAs and NPs working in, or interested in, neurosurgery. To register, select ANSPA Annual Meeting in the Symposia section on the Annual Meeting registration site. It is complimentary with your registration!

THANK YOU



Manish K. Aghi
Section on Tumors—Chair



Ellen L. Air
Women in Neurosurgery



Ashok R. Asthagiri
Symposia Captain



Julian E. Bailes Jr.
*Section on Neurotrauma
and Critical Care—Chair*



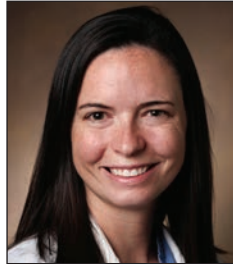
Lissa C. Baird
*Section on Pediatric
Neurological Surgery*



Garni Barkhoudarian
Luncheon Seminars Captain



Erica F. Bisson
*Section on Disorders of the
Spine and Peripheral Nerves*



Lola B. Chambless
Dinner Seminars Captain



Zoher Ghogawala
*Section on Disorders of the
Spine and Peripheral Nerve
—Chair*



Robert E. Gross
*Section on Stereotactic and
Functional Neurosurgery
—Chair*



Ramesh Grandhi
*Section on Neurotrauma &
Critical Care*



**Constantinos G.
Hadjipanayis**
Section on Tumors



Todd C. Hankinson
*Section on Pediatric
Neurological Surgery*



Daniel J. Hoh
*Section on Disorders of the
Spine and Peripheral Nerves*



Line G. Jacques
Peripheral Nerves



Christopher P. Kellner
*Section on Cerebrovascular
Surgery*



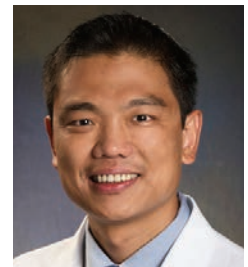
Albert H. Kim
Section on Tumors



Mark D. Krieger
*Section on Pediatric
Neurosurgery—Chair*



Amy Lee
*Section on Pediatric
Neurological Surgery*



Yi Lu
*Section on Disorders of the
Spine and Peripheral Nerves*



Mark A. Mahan
Peripheral Nerves



Jonathan Miller
*Section on Stereotactic and
Functional Neurosurgery*

TO OUR SCIENTIFIC PROGRAM COMMITTEE CONTRIBUTORS



Alon Y. Mogilner
Section on Stereotactic and Functional Neurosurgery



Sean J. Nagel
Section on Pain



Brian V. Nahed
Scientific Program Committee—Vice Chair
Program Engagement—Captain



Joshua W. Osbun
Section on Cerebrovascular Surgery



Julie G. Pilitsis
Section on Stereotactic and Functional Neurosurgery



Elias B. Rizk
Section on Pediatric Neurological Surgery



Analiz Rodriguez
Council of State Neurological Societies



Joshua M. Rosenow
Council of State Neurological Societies—Chair



Clemens M. Schirmer
International Liaison—Captain
Council of State Neurological Societies



Sameer A. Sheth
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Scott D. Simon
Section on Cerebrovascular Surgery



Walavan Sivakumar
Section on Tumors



Hesham M. Soliman
Section on Disorders of the Spine and Peripheral Nerves



Martina Stippler
Section on Neurotrauma & Critical Care



Jennifer A. Sweet
Guidelines/Sunrise Science—Captain
Section on Pain Women in Neurosurgery—Chair



Khoi D. Than
Section on Disorders of the Spine and Peripheral Nerves



Luis M. Tumialan
Section on Disorders of the Spine and Peripheral Nerves



Anand Veeravagu
Council of State Neurological Societies



Babu G. Welch
Section on Cerebrovascular Surgery—Chair



Sarah Woodrow
Women in Neurosurgery



Joseph C. Zacko
Section on Neurotrauma & Critical Care

SUBSPECIALTY SESSION HIGHLIGHTS

SP SPINE

SATURDAY

8:00 am–4:15 pm

- **SYM1: Spine Trauma and Spinal Cord Injury Symposium**

8:00 am–4:15 pm

- **SYM5: Advanced Topics in Spinal Operative Techniques**

SUNDAY

8:00 am–4:15 pm

- **SYM13: Spine Biomechanics and Deformity Symposium**

12:45–4:15 pm

- **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**

12:15–1:45 pm

- **M4: Cervical Spondylotic Myelopathy—Anterior Versus Posterior**

12:15–1:45 pm

- **M5: Spinal Tumor Surgery: Case-based Management**

2:45–4:15 pm

- **Section on Disorders of the Spine and Peripheral Nerve: Spine Section Update**

4:15–5:45 pm

- **Spinal Deformity and MIS Surgery: Operative Techniques and Case-based Discussions**

5:45–7:15 pm

- **All International Symposia**

7:30–9:30 pm

- **DIN3: Navigation and Robotics: Fad or Future?**

TUESDAY

7:00–8:00 am

- **Sunrise Science and Late Breaking Abstract Session**

12:15–1:45 pm

- **T13: Peak Performance: Optimizing the Spine Surgical Patient from Pre-op to Post-op**

12:15–1:45 pm

- **T14: Controversies in Spinal Deformity Surgery**

1:45–2:45 pm

- **Navigating the Regulatory Landscape for Medical Devices: A FDA Road Map**

2:45–4:15 pm

- **Section on DSPN—Spine Update: The Evidence**

4:15–5:45 pm

- **Cervical and Thoracolumbar Trauma: 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

- **W23: Novel Techniques for Management of Lumbar Spondylolisthesis**

1:45–3:15 pm

- **Oral Abstract Presentation Session**

1:45–4:45 pm

- **Advanced Endoscopic and Exoscopic Neurosurgery Seminar**

CV 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**

8:00 am–4:15 pm

- **SYM12: Advanced Techniques in Assessment and Treatment of Intracranial Aneurysms**

MONDAY

7:00–8:30 am

- **Sunrise Science and Late Breaking Abstract Session**

12:15–1:45 pm

- **M3: Is Intracerebral Hemorrhage a Surgical Disease?**

2:45–4:15 pm

- **Section on Cerebrovascular Surgery—Artificial Intelligence in Cerebrovascular Neurosurgery**

4:15–5:45 pm

- **Treating Cerebral Vascular Malformations: Operative Techniques and Case-based Discussions**

5:45–7:15 pm

- **The International Cerebrovascular Symposium**

7:30–9:30 pm

- **DIN2: Multi-modality AVM Treatment in the Past, Present, and Future**

TUESDAY

12:15–1:45 pm

- **T12: Carotid Artery Disease: Symptomatic/Asymptomatic/Stent/CEA**

1:45–2:45 pm

- **Navigating the Regulatory Landscape for Medical Devices: A FDA Road Map**

2:45–4:15 pm

- **Section on Cerebrovascular Surgery: Future Training of the Cerebrovascular Surgeon**

4:15–5:45 pm

- **Treating Cerebral Aneurysms: Operative Techniques and Case-based Discussion**

5:45–7:15 pm

- **Interactive Multimedia Research Presentation Session**

WEDNESDAY

7:00–8:30 am

- **Cerebrovascular Guidelines: Aneurysms, Arteriovenous Malformations, and Acute Ischemic Stroke**

12:15–1:45 pm

- **W21: Middle Meningeal Artery Embolization for Subdural Hematoma Treatment**

12:15–1:45 pm

- **W22: Contemporary and Practical Management of and Enigmatic Process: Cerebral Vasospasm (Delayed Cerebral Ischemia)**

1:45–3:15 pm

- **Cranial Oral Abstract Presentation Session**

1:45–4:45 pm

- **Advanced Endoscopic and Exoscopic Neurosurgery Seminar**

SF STEREOTACTIC AND FUNCTIONAL

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**

4:15–5:45 pm

- **Section on Stereotactic and Functional Neurosurgery: The Future of Preoperative Functional Mapping**

4:15–5:45 pm

- **Challenging Cases in Epilepsy Surgery: Operative Techniques and Case-based Discussions**

5:45–7:15 pm

- **The International Functional Neurosurgery Symposium**

TUESDAY

12:15–1:45 pm

- **T17: Clinical Trials in Movement Disorder Surgery**

1:45–2:45 pm

- **Navigating the Regulatory Landscape for Medical Devices: A FDA Road Map**

2:45–4:15 pm

- **Section on Stereotactic and Functional Neurosurgery: Stereotactic and Functional Neurosurgery Update**

5:45–7:15 pm

- **Interactive Multimedia Research Presentation Session**

WEDNESDAY

7:00–8:30 am

- **Sunrise Science and Late Breaking Abstract Session**

12:15–1:45 pm

- **W27: Clinical Trials in Epilepsy Surgery**

1:45–3:15 pm

- **Cranial Oral Abstract Presentation Session**

1:45–4:45 pm

- **Advanced Endoscopic and Exoscopic Neurosurgery Seminar**

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

12:15–1:45 pm

- **M1: Honored Guest Luncheon**

5:45–7:15 pm

- **All International Symposia**

TUESDAY

5:45–7:15 pm

- **Interactive Multimedia Research Presentation Session**



SUBSPECIALTY SESSION HIGHLIGHTS

SE SOCIOECONOMIC

SATURDAY

12:45–4:15 pm

- **SYM9: Appropriate Coding, ICD, and CPT 2019 Update**

6:30–8:30 pm

- **DIN1: How Do I Avoid Getting Penalized—ICD-10, CPTs, MACRA, ACOs, and APMs?**

MONDAY

12:15–1:45 pm

- **M2: So You've Been Sued... Medical Practice 2019 Update**

2:45–4:15 pm

- **Council of State Neurosurgical Societies: Achieving High Quality**

4:15–5:45 pm

- **CSNS: How to Build a Spine Center**

5:45–7:15 pm

- **All International Symposia**

TUESDAY

2:45–4:15 pm

- **Council of State Neurosurgical Societies—What is Value**

4:15–5:45 pm

- **CSNS: Patient Safety in Neurosurgical Practice**

5:45–7:15 pm

- **Interactive Multimedia Research Presentation Session**

WEDNESDAY

7:00–8:30 am

- **Sunrise Science and Late Breaking Abstract Session**

12:15–1:45 pm

- **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**

8:00 am–4:15 pm

- **SYM15: Emerging Technologies in Neurosurgery**

12:45–4:15 pm

- **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**

12:15–1:45 pm

- **M9: Acoustic Neuromas: Current Management Strategies**

12:15–1:45 pm

- **M10: Harness the Immune System to Treat Brain Tumors**

2:45–4:15 pm

- **Section on Tumors—Complications in Tumor Surgery: Navigating the Unexpected**

4:15–5:45 pm

- **Challenging Skull Base Tumors: Operative Techniques and Case-based Discussions**

5:45–7:15 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**

12:15–1:45 pm

- **T19: Malignant Gliomas: Advances in Surgery and Adjuvant Therapy**

2:45–4:15 pm

- **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**

12:15–1:45 pm

- **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

SUNDAY

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**

2:45–4:15 pm

- **Section on Neurotrauma and Critical Care Session**

4:15–5:45 pm

- **Challenging Cases in ICP Management: Operative Techniques and Case-based Discussions**

5:45–7:15 pm

- **All International Symposia**

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**

2:45–4:15 pm

- **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

PA PAIN

SUNDAY

8:00 am–4:15 pm

- **SYM16: Pain and Peripheral Nerve Symposium**

MONDAY

7:00–8:30 am

- **Guidelines for DBS for Parkinson's Disease and Neuroablation for Pain**

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

- **All International Symposia**

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**

PE 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**

5:45–7:15 pm

- **All International Symposia**

TUESDAY

7:00–8:00 am

- **Sunrise Science and Late Breaking Abstract Session**

2:45–4:15 pm

- **Post-hemorrhagic Hydrocephalus in Premature Infants: 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**



PN PERIPHERAL NERVES

SUNDAY

8:00 am–4:15 pm

- **SYM16: Pain and Peripheral Nerve Symposium**

MONDAY

12:15–1:45 pm

- **M06: 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**

5:45–7:15 pm

- **All International Symposia**

TUESDAY

5:45–7:15 pm

- **Interactive Multimedia Research Presentation Session**

WINS 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

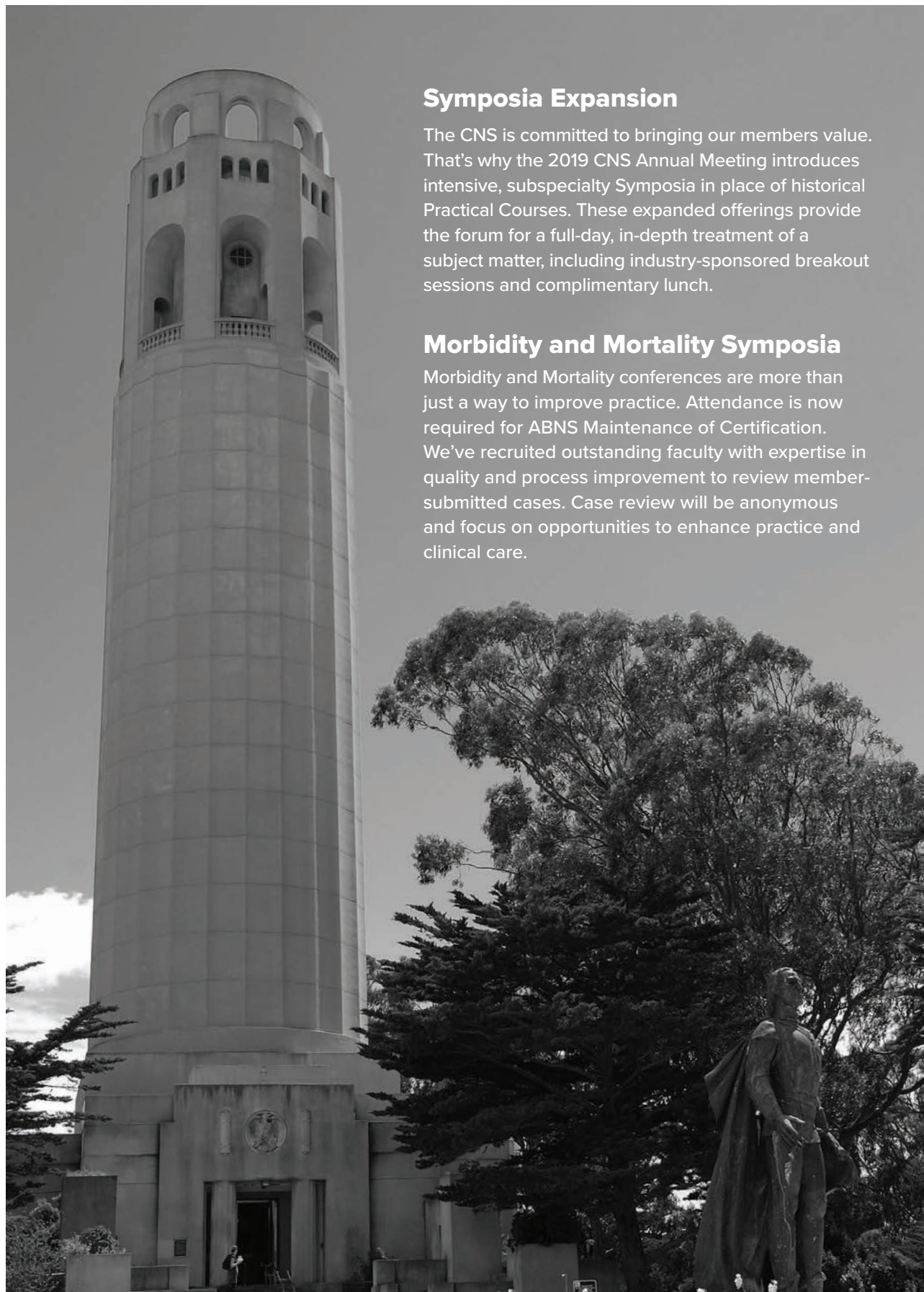
(SP) SPINE

(SF) STEREOTACTIC AND FUNCTIONAL

(TU) TUMOR

(WINS) WINS

NEW THIS YEAR



Symposia Expansion

The CNS is committed to bringing our members value. That's why the 2019 CNS Annual Meeting introduces intensive, subspecialty Symposia in place of historical Practical Courses. These expanded offerings provide the forum for a full-day, in-depth treatment of a subject matter, including industry-sponsored breakout sessions and complimentary lunch.

Morbidity and Mortality Symposia

Morbidity and Mortality conferences are more than just a way to improve practice. Attendance is now required for ABNS Maintenance of Certification. We've recruited outstanding faculty with expertise in quality and process improvement to review member-submitted cases. Case review will be anonymous and focus on opportunities to enhance practice and clinical care.

(SP) (TR) 8:00 am–4:15 pm

SYM1: Spine Trauma and Spinal Cord Injury Symposium

CNS

SANS

Lifelong Learning

Course Directors: Sanjay S. Dhall, Michael G. Fehlings, James S. Harrop, Eve C. Tsai**Faculty:** Paul M. Arnold, Mohamad Bydon, D. Kojo Hamilton, Gregory W. Hawryluk, Zachary L. Hickman, Daniel J. Hoh, Paul K. Kim, Allan D. Levi, Daniel C. Lu, David O. Okonkwo, Kristine O'Phelan, Ann M. Parr, Patrick R. Pritchard, Richard B. Rodgers, Martina Stippler, Jefferson R. Wilson**Course Description:** The morning will provide an update on ongoing SCI research and robotics. Clinical management pearls for SCI and spine fracture and spine clearance will be reviewed. The long-term outcome and recovery potential after SCI will be reviewed. Spine trauma cases will be reviewed and discussed by experts and the audience will vote on management. The afternoon will use case-based learning to describe the diagnosis and treatment of cervical, thoracic and lumbar trauma, and spinal cord injury.**Learning Objectives:** Upon completion of this symposium, participants will be able to:

- Demonstrate competency in SCI management
- Discuss long-term outcome and rehabilitation potential in SCI
- List new and emerging science in SCI and robotics
- Discuss techniques and approaches to treat spinal trauma
- Identify and avoid common complications associated with treatment of spinal trauma and spinal cord injury
- Discuss current research and novel strategies for management of spinal cord injury

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 columns fractures
- Non-operative and operative management to maximize outcomes, including timing, hemodynamics, and prognostication
- Timing of surgery for spinal trauma and spinal cord injury

(SF) 8:00 am–4:15 pm

SYM2: Functional Neurosurgery Update: Emerging Concepts**Course Directors:** Ellen L. Air, Casey H. Halpern, John D. Rolston**Faculty:** Aviva Abosch, Raag Airan, Nicholas M. Barbaro, Stephan Chabardes, Edward F. Chang, Shabbar F. Danish, W. Jeffrey Elias, Robert S. Fisher, Kelly D. Foote, Wayne Goodman, Paul S. Larson, Andres M. Lozano, Mohammed Maarouf, Kai J. Miller, Francisco A. Ponce, Robert M. Richardson, Michael Schulder, Sameer A. Sheth, Peter A. Tass**Course Description:** Technological developments have led to a rapid evolution of functional neurosurgery applications with potential treatments for a wide variety of disorders.

This symposium will be a forum in which participants can obtain information about recent ideas that impact delivery of current therapies and development of new approaches. The course will cover the latest developments in stereotactic targeting, electrode implantation, surgical treatment of movement disorders and epilepsy, the renaissance of stereotactic lesions, and the frontier of restorative neurosurgery for a variety of disorders that have no other therapeutic options. In a series of breakout sessions, participants will have an opportunity to learn about cutting-edge technical developments.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Explain the difference in outcome for each target used for deep brain stimulation and identify the appropriate targets for clinical indications that are amenable to this treatment
- List the advantages, drawbacks, and limitations of the various strategies for intracranial electrode placement, including awake versus "asleep" deep brain stimulator implantation
- Describe the role of therapeutic lesions, including MR guided focused ultrasound, in the management of movement and other disorders
- Review recent developments in the surgical treatment of epilepsy, including minimally-invasive approaches

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



CNS

SANS

Lifelong Learning

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

(RE) 8:00 am–4:15 pm

SYM3: Maximizing Your Neurosurgical Employment Opportunities *Non-CME*

Course Directors: Mohamad Bydon, Lola B. Chambless, Jennifer A. Sweet

Faculty: John A. Braca, Andrew R. Conger, Russell R. Lonser, Timothy H. Lucas, Michael W. McDermott, Brian V. Nahed, Judy Rosman, Justin A. Singer, Anand Veeravagu

Course Description: This is a symposium for senior neurosurgery residents and graduating fellows who are in the process of interviewing for employment. The symposium will cover topics relevant to job applicants from the perspective of chairmen, program directors, and recruiters. Job applicants will also have an opportunity to have their resumes reviewed and to get interview tips from experts in this area.

Learning Objectives: *Upon completion of this symposia, participants will be able to:*

- Discuss the basics of different practice settings and reimbursement models
- Identify several negotiation tactics
- Identify basics of how practices (private, hospital, and academic) assess value

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

(CV) 8:00 am–4:15 pm

SYM4: Cerebrovascular Symposia: Stenting and Bypasses Bundle

Comprised of 2 sessions: SYM4A & SYM4B. Select this option to take both at a discounted rate.

(CV) 8:00 am–12:00 pm

SYM4A: New Era in Stenting

Course Director: Andrew W. Grande

Faculty: Felipe Albuquerque, Grahame C. D. Gould, Brian T. Jankowitz, Demetrius K. Lopes, Justin G. Santarelli, Raymond D. Turner, Henry H. Woo

Course Description: The next generation of intracranial stents continue to increase the number, shape, and type of cerebral aneurysms that can be treated endovascularly. This course will introduce neurosurgeons to the latest approved devices and allow to practice deploying them.

Learning Objectives: *Upon completion of this symposium, participants will be able to:*

- Identify the indications for placement of low profile and next generation stents
- Identify the technical tips for placement of low profile and next generation stents
- Practice deploying stents on simulators

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

(CV) 12:45–4:15 pm

SYM4B: Bypass Techniques in Cerebrovascular Surgery

Course Director: Sepideh Amin-Hanjani

Faculty: Adib A. Abila, Amir R. Dehdashti, Michael T. Lawton, Leonardo Rangel-Castilla, Jonathan Russin, Laligam N. Sekhar, Gregory J. Zipfel

Course Description: Hear the latest indications and techniques for extracranial to intracranial bypass. Practice anastomosis on turkey wings.

Learning Objectives: *Upon completion of this symposium, participants will be able to:*

- Identify the most current data on treating symptomatic and asymptomatic disease including review of literature
- Review the status of the most current trials and registries
- Obtain practical experience on cadavers and flow models

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

(SP) 8:00 am–4:15 pm

SYM5: Advanced Topics in Spinal Operative Techniques Bundle

Comprised of 2 sessions: SYM5A & SYM5B. Select this option to take both at a discounted rate.

(SP) 8:00 am–12:00 pm

SYM5A: 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, Roger Hartl, Langston T. Holly, John Pollina, Khoi D. Than, Juan S. Uribe

Course Description: This course is intended for surgeons with an interest in minimally invasive spinal surgery. Experts in the field will discuss operative

nuances, complication avoidance, and patient selection in the context of a case-based course.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Identify appropriate indications for minimally invasive surgery
- Determine which patients may benefit from minimally invasive surgery and which approach (TLIF, ALIF, transpsoas)
- Discuss strategies for complication avoidance and management of complications once they occur

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

(SP) 12:45–4:15 pm

SYM5B: Cervical Spine Case Management: When to Preserve Motion and When Not To—The Evidence in the Age of Reason

Course Directors: Andrew T. Dailey

Faculty: Kurt M. Eichholz, R. John Hurlbert, Sheng-fu L. Lo, Mark E. Oppenlander, Srinivas K. Prasad, Wilson Z. Ray

Course Description: This course will review the evidence behind motion preservation techniques, present application of these technologies indications and outcomes for anterior and posterior approaches in a case-based format.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Discuss indications for surgical treatment of cervical spine pathologies
- Discuss decision-making strategies for selecting the appropriate surgical approach for cervical spine pathologies
- Identify and avoid common complications associated with cervical spine surgery

Agenda Highlights

- Member-submitted case-based discussion of management options and approaches of degenerative cervical spine disease
- Review of indications: Knowing when to operate
- Surgical approach: Anterior versus Posterior
- Surgical approach: Fusion versus Motion preservation
- Complication avoidance and management in cervical spine surgery

(TU) 8:00 am–4:15 pm

SYM6: Brain Tumor Update Bundle

Comprised of 2 sessions: SYM6A & SYM6B. Select this option to take both at a discounted rate.

(TU) 8:00 am–12:00 pm

SYM6A: Brain Tumor Update: Advanced and Minimally Invasive Techniques for Resection of Malignant Brain Tumors

Course Directors: Manish K. Aghi, Andrew E. Sloan

Faculty: Kaisorn L. Chaichana, Nader Sanai, Jason P. Sheehan, Michael A. Vogelbaum, Jeffrey S. Weinberg

Course Description: This course will review standard of care guidelines in the management of malignant brain tumors, followed by a discussion and demonstration of innovative techniques which may become standard of care in the future. Attendees will have an opportunity to view and practice various techniques at vendor-supported tables.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Formulate treatment plans for malignant brain tumors, particularly high-grade gliomas, based on evidence-based guidelines
- Discuss the role of neuro-monitoring in improving functional outcomes after surgery for gliomas
- Review basic principles of stereotactic radiosurgery when used to treat malignant tumors

Agenda Highlights

- Awake Craniotomy with Motor and Language Mapping
- Intra-Operative MRI (iMRI) to optimize Tumor Resection
- Fluorescent-Guided Microsurgery using 5-ALA and other fluorophores
- Minimally Invasive approaches using Exoscopes and Tubular Retractors
- Laser Interstitial Thermotherapy/Stereotactic Laser Ablation (LITT/SLA)
- Convection Enhanced Delivery (CED)
- Stereotactic Radiosurgery

(TU) 12:45–4:15 pm

SYM6B: Brain Tumor Update: Benign Brain Tumors

Course Director: Ian F. Dunn, Koji Yoshimoto

Faculty: Mustafa K. Baskaya, Anand V. Germanwala, Albert H. Kim, John Y. K. Lee, James K. Liu, Jacques J. Morcos, Mitsutoshi Nakada, Akash J. Patel, Walavan Sivakumar

Course Description: This course will discuss the appropriate use of radiosurgery and surgery for benign central and peripheral nervous system tumors.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Discuss contemporary management of benign tumors by microsurgery and endoscopy
- Review contemporary management of benign tumors by radiosurgery
- Identify contemporary management of specific tumor histologies, including skull base meningiomas, pituitary adenomas, acoustic neuromas, chordomas, peripheral nerve tumors, and pediatric tumors

- Apply these treatment strategies or refer appropriate patients in their practice for surgery or radiosurgery therapy

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

(GE) 8:00 am–12:00 pm

SYM7: Morbidity and Mortality

Limited availability—register early!

Course Director: Mark E. Shaffrey

Faculty: Won Kim, Kristen O. Riley, Philipp Taussky

Course Description: This course will fulfill the ABNS requirement for quarterly morbidity and mortality requirement. Participants will submit cases and review cases in an anonymized manner to identify opportunities for improvement in practice. The session will focus on maximizing practice improvement and learning how to critically analyze complications without assigning blame.

Learning Objectives: *Upon completion of this symposium, participants will be able to:*

- Identify opportunities for practice improvement via review of submitted participant cases
- Identify the process for critical review and practice improvement
- Discuss optimal complication management to minimize impact on patient outcomes

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

(WINS) 12:45 pm–4:15 pm

SYM8: Residency Program Update & Training the Trainers

This program is designed for Program Directors and Program Coordinators

Course Director: Sarah Woodrow

Faculty: Ellen L. Air, Lawrence S. Chin, Judy Huang, Catherine A. Mazzola, Alan M. Scarrow, Warren R. Selman,

Nathan R. Selden, Stacey Q. Wolfe, Gregory J. Zipfel

Course Description: Greater emphasis in graduate surgical education is being placed on curriculum structure and competencies. This course is designed to provide both a theoretical and practical foundation to neurosurgical faculty and senior trainees to enhance their roles as educators.

Learning Objectives: *Upon completion of this symposium, participants will be able to:*

- Use adult learning theory to enhance surgical training
- Identify different models for providing feedback
- Discuss and apply principles of managing trainees in difficulty

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

(SE) 12:45–4:15 pm

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

Course Description: This course will include brief primers on CPT coding for various neurosurgical procedures and an update on any new CPT codes recently passed by the AMA. The course will also provide an overview of ICD-10 and some data on how the implementation has affected neurosurgical practices.

Learning Objectives: *Upon completion of this symposium, participants will be able to:*

- Discuss the basics of CPT coding and how various codes are selected for specific cases
- Summarize the update on new CPT codes recently passed
- Implement these coding changes in their own practices to ensure accuracy and reimbursement

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

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

INTERNATIONAL RECEPTION

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



Join your colleagues from around the world at the 2019 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.

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

\$190 (includes three-course dinner and beverages)

(SE) DIN1: How Do I Avoid Getting Penalized—ICD-10, CPTs, MACRA, ACOs, and APMs?

Moderator: John K. Ratliff

Faculty: Atman Desai, Rachel Groman, Kim Pollock, Luis M. Tumialan

Seminar Description: This newly updated dinner seminar will review critical updates in health care systems and requirements, including diagnosis and procedural coding, MACRA requirements and implementation, and how these changes may affect your practice and reimbursement. Discussion will be facilitated by discussions of specific examples to help attendees integrate the concepts presented into the optimization of their own practice.

Learning Objectives: *Upon completion of this seminar, participants will be able to:*

- Identify the 2019 MACRA Requirements
- Describe the issues related to MACRA implementation
- Identify how MACRA effects your practice



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.

NEW THIS YEAR

Bring Your Family to the 2019 CNS Annual Meeting!

Spouse registration is complimentary before September 18, and there is so much to enjoy! See Featured Speakers like Doris Kearns Goodwin, Rebecca Skloot, and more at the General Scientific Sessions. There will also be complimentary beverages in the CNS Xperience Lounge, the exciting opening reception, plus all that San Francisco has to offer!

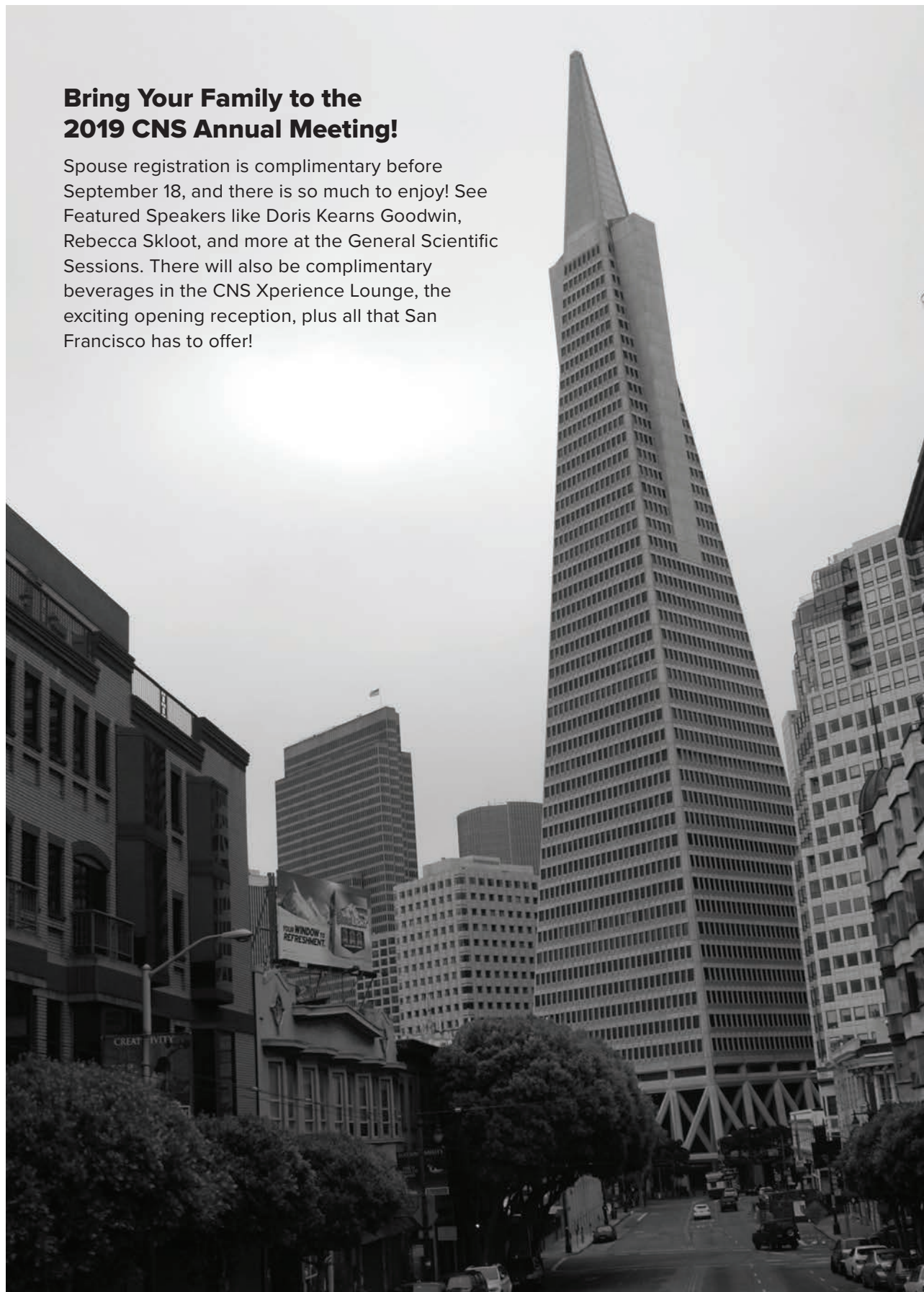
SATURDAY

▲ SUNDAY

MONDAY

TUESDAY

WEDNESDAY



Full Day and Discounted Bundles (includes lunch):

Physician \$400, Nurse/NP/PA \$300, Resident/Medical Student \$175

Half Day: Physician \$250, Nurse/NP/PA \$200, Resident/Medical Student \$125

CV 8:00 am–4:15 pm

SYM10: Acute Stroke Care: Guidelines Review and Future Directions**Course Directors:** Mohammad A. Aziz-Sultan, Mandy J. Binning, R. Webster Crowley**Faculty:** Andrei V. Alexandrov, Sepideh Amin-Hanjani, Issam A. Awad, Jan-Karl Burkhardt, Geoffrey P. Colby, Robert J. Dempsey, Justin F. Fraser, Mark R. Harrigan, Christopher P. Kellner, Demetrius K. Lopes, Grace K. Mandigo, J D. Mocco, Maxim Mokin, Thomas Oxley, Eric C. Peterson, Gustavo Pradilla, Matthew Reynolds, Robert H. Rosenwasser, Lauren Sansing, Alejandro M. Spiotta, Fernando Testai, Michael Tymianski, Stacey Q. Wolfe**Course Description:** This full-day symposium will comprehensively review the latest evidence and best practices for delivering optimal stroke care. Topics to be discussed by nationally and internationally recognized experts include management from pre-hospital to the operating room and the endovascular suite. Topics to be discussed include stroke systems of care, which will guide attendees in developing and optimizing stroke centers at their local hospitals. Didactic sessions will additionally focus of emergent large vessel occlusion, surgical management of stroke, thrombectomy tools and techniques, management of intracerebral hemorrhage, and an overview of translational science in the field of stroke.**Learning Objectives:** Upon completion of this symposium, participants will be able to:

- Describe current guidelines on acute ischemic and hemorrhagic stroke management
- Describe current guidelines and future directions in the pre-hospital triage of acute stroke
- Describe ongoing clinical trials in acute stroke
- Describe innovations in stroke intervention
- Describe innovations in hemorrhagic stroke treatment

Agenda Highlights

- Guidelines for the Pre-hospital Triage of Patients with Acute Stroke
- 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

TR 8:00 am–4:15 pm

SYM11: Neurotrauma Update

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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**Course Description:** Practical update for neurosurgeons taking neurotrauma call. A combination of clinical and research topics will be presented. All presentations will be case-based.**Learning Objectives:** Upon completion of this symposium, participants will be able to:

- Identify evidence-based guidelines in neurotrauma
- Define practical aspects of caring for neurotrauma patients
- Identify emerging trends in multimodality monitoring

Agenda Highlights

- Severe TBI and Advanced Neuromonitoring
- 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

CV 8:00 am–4:15 pm

SYM12: A Comprehensive and Evidence-based Guidelines Review for the Treatment of Intracranial Aneurysms**Course Directors:** Peter Kan, Stacey Q. Wolfe**Faculty:** Adib A. Abula, Sepideh Amin-Hanjani, Adam S. Arthur, Mandy J. Binning, Aaron S. Dumont, W. Christopher Fox, David M. Hasan, Babak S. Jahromi, Peter Kan, Louis J. Kim, Michael T. Lawton, R. Loch Macdonald, Adel M. Malek, Charles C. Matouk, J D. Mocco, Deanna M. Sasaki-Adams, Adnan H. Siddiqui, Michelle J. Smith, Robert M. Starke, Alejandro M. Spiotta, Richard W. Williamson**Course Description:** This comprehensive symposium will consider all aspects of management of unruptured and ruptured aneurysms with an emphasis on recent updates in the cutting edge management, including epidemiology, imaging, alternative treatment strategies, and the management of vasospasm. To maximize learning and clinical relevance and integration, didactic sessions will also separately focus on multidisciplinary and multimodal management of aneurysms in the internal carotid artery distribution, bifurcation aneurysms, and posterior circulation aneurysms. In the final session, complex management issues will be discussed. All sessions are led by nationally and internationally recognized experts in cerebrovascular surgery.**Learning Objectives:** Upon completion of this symposium, participants will be able to:

- Outline recent literature regarding management



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- strategies for unruptured intracranial aneurysms
- Describe recent literature and management strategies for patients with aneurysmal subarachnoid hemorrhage
- Describe endovascular techniques for the treatment of intracranial aneurysms including new and emerging device technology
- Describe surgical techniques for the treatment of intracranial aneurysms
- Select the optimal and individualized treatment of different intracranial aneurysms based upon a comprehensive review of surgical and endovascular techniques

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

(SP) 8:00 am–4:15 pm

SYM13: Spine Biomechanics and Deformity Symposium

Comprised of 2 sessions: SYM13A & SYM13B. Select this option to take both at a discounted rate.

(SP) 8:00 am–12:00 pm

SYM13A: Spinal Biomechanics for the Practicing Neurosurgeon: What I Need to Know for My Practice

Course Directors: Joseph S. Cheng, Tyler R. Koski

Faculty: Nader S. Dahdaleh, Aruna Ganju, Ajit A. Krishnaney, Christopher M. Maulucci, Cameron M. McDougall, Rani Nasser, Zachary A. Smith, Jay D. Turner, Michael S. Virk, Rishi K. Wadhwa

Course Description: Evaluate the impact of biomechanics on spine surgery ranging from degenerative to trauma to deformity.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Incorporate biomechanics into surgical planning for degenerative to trauma to deformity cases
- Discuss the application of biomechanical principles to various spinal constructs
- Identify and avoid common complications associated with a failure to understand the role of biomechanics in spinal constructs

Agenda Highlights

- Relevance of biomechanics in the management of degenerative, traumatic, and deformity-related spine disease
- Integrating biomechanics into surgical reconstructive plans
- Which biomechanical measures matter and how much
- Selecting spinal constructs based on biomechanical insights

- Complication avoidance and management based on an understanding of optimal biomechanical principles of spine alignment

(SP) 12:45–4:15 pm

SYM13B: Thoracolumbar Spinal Deformity for the Non-deformity Spine Surgeon

Course Directors: Dean Chou, Christopher I. Shaffrey

Faculty: Ian G. Dorward, Kai-Ming G. Fu, D. Kojo Hamilton, Paul Park, Justin S. Smith, Lee A. Tan

Course Description: This course will use case-based learning to describe the diagnosis and treatment of thoracolumbar deformity, including pearls for complication avoidance.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Describe appropriate measures for diagnosis and classification of thoracolumbar spinal deformity
- Describe surgical approaches and techniques for correction of thoracolumbar spinal deformity
- Discuss common complications and management strategies for thoracolumbar deformity surgery

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

(TU) 8:00 am–4:15 pm

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.

(TU) 8:00 am–12:00 pm

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



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SANS exam available to accompany this course.

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. Sughrue, Phiroz E. Tarapore

Course Description: This is a course that will outline in detail the management strategies for removing tumors in eloquent or functional areas utilizing the technique of functional brain mapping.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Review decision making for surgical management of tumors in eloquent regions
- Discuss the use of functional mapping and imaging for removing functional area tumors
- Identify the use of functional mapping to expedite extent of resection and outcome for brain tumors in functional regions

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

(TU) 12:45–4:15 pm

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**Course Description:** This course will review relevant surgical neuroanatomy using 3D stereoscopic projection. The areas to cover will be cortical and white matter anatomy, cerebrovascular, and skull base anatomy. Master surgeons will illustrate the importance of surgical neuroanatomy for clinical practice with surgical cases and HD/3D video illustrations.**Learning Objectives:** Upon completion of this symposium, participants will be able to:

- Review the complex anatomy of the fiber tracts and the application of HDFT in clinical practice
- Identify the key surgical anatomy for accessing the ventricles, basal cisterns, and anterior circulation aneurysms
- Discuss the different routes through the anterior skull base, middle fossa, and cavernous sinus, including endoscopic endonasal and transcranial approaches

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

(SF) (PE) 8:00 am–4:15 pm

SYM15: Emerging Technologies in Neurosurgery*Comprised of 2 sessions: SYM15A & SYM15B. Select this option to take both at a discounted rate.*

(SF) (PE) 8:00 am–12:00 pm

SYM15A: Intraoperative Technological Adjuncts: Indications and Techniques for Laser Therapy, Robotics, and Exoscopes**Course Director:** Daniel Curry**Faculty:** David D. Gonda, Jeffrey S. Raskin, Scellig S. D. Stone, Garnette R. Sutherland, Jon T. Willie**Course Description:** The utilization of robotics, exoscopes, and laser ablation is expanding within neurosurgery. This course will review indications, techniques, and barriers for neurosurgeons considering the addition of these adjunct technologies to their practice.**Learning Objectives:** Upon completion of this symposium, participants will be able to:

- List the indications for utilization of robotics, laser therapy, or an exoscope within neurosurgical care
- Describe the barriers and challenges associated with implementing specific technologies into practice
- Apply technological skills required for the safe utilization of robotics, laser therapy, and exoscopes during practice

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

(SF) 12:45–4:15 pm

SYM15B: Virtual and Augmented Reality: Science and Clinical Applications**Course Directors:** Walter C. Jean, Cameron C. McIntyre**Faculty:** Harith Akram, Joshua B. Bederson, Mark Griswold, Raphael Guzman, Alfred M.C. Illoreta, Robert G. Louis, Nader Pouratian**Course Description:** This course will provide an in-depth review of technologies and applications of novel and advanced visualization technologies.**Learning Objectives:** Upon completion of this symposium, participants will be able to:

- Identify the technologies currently available for pre- and intraoperative brain anatomy and pathology visualization
- Apply visualization techniques to daily practice
- Identify the science, techniques, and the associated limitations and opportunities of these visualization techniques

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

(PA) (PN) 8:00 am–4:15 pm

SYM16: Pain and Peripheral Nerve Symposium*Comprised of 2 sessions: SYM16A & SYM16B. Select this option to take both at a discounted rate.*

(PA) (PN) 8:00 am–12:00 pm

SYM16A: Non-spinal Targets for Pain: Nerve, DRG, and Brain**Course Directors:** Sean J. Nagel, Jennifer A. Sweet**Faculty:** Tipu Z. Aziz, Ausaf A. Bari, Milind S. Deogaonkar, Steven M. Falowski, Andre Machado, Julie G. Pilitsis, Ahmed M. T. Raslan**Course Description:** A fresh look of pain pertaining to brain circuitry, novel clinical investigations and treatment

strategies, such as DBS and MR/FUS for pain, and the ethical implications of such interventions.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Identify brain circuitry and surgical targets for pain
- Identify the ethical implications of such interventions
- Report about clinical trials and other investigations on novel techniques for pain, such as DBS, MR/FUS, RF, and future direction for treatment of pain

Agenda Highlights

- History & Review of Targets
- Recent Clinical Trials & DBS for Pain
- DRG for pain
- Peripheral Stim for pain
- MRgFUS for pain
- Radiofrequency ablation for pain
- DBS and Future Treatments for pain

(PA) (PN) 12:45–4:15 pm

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 L. Wilson, Eric L. Zager

Course Description: Using a combination of didactic lectures and case-based discussion, the faculty will provide learners with fundamental knowledge in peripheral nerve evaluation, surgical exposure and management of common surgical nerve conditions.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Describe surgical exposures and techniques for common peripheral nerve pathologies
- Determine appropriate diagnostic workup and diagnosis of patients with peripheral nerve entrapment
- Identify and avoid common complications associated with peripheral nerve surgery

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

(AP) (GE) (RE) 8:00 am–4:15 pm

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: William C. Broaddus, Zoher Ghogawala, Elizabeth B. Habermann, Frank E. Harrell, John J. Knightly, Nathan R. Selden, Mark E. Shaffrey, Jonathan Slotkin

Course Description: This course will critically evaluate quality from a neurosurgical perspective. Speakers will highlight traditional quality metrics, but also identify neurosurgical quality measures that document excellent care, including from the patient perspective. Discussions will include the role of registries, national benchmarking, and innovative trial designs to measure and implement quality in neurosurgery.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Define Quality Care from Neurosurgical Perspective and differentiate it from traditional quality metrics.
- Define the value, utility, and implementation of patient reported outcomes in assessing quality.
- Critically appraise the value of evidence-based medicine, registry participation, national benchmarking, and trial design in improving quality of care
- Identify novel strategies for increasing revenue using quality data
- Apply these data collection methods and quality outcomes assessment in their own practice

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: John F. Magnotti, Eric K. Oermann

Faculty: Lola B. Chambless, Jason Davies, Mona Flores, Elizabeth B. Habermann, Joseph Lehar, Fei-Fei Li, Timothy R. Smith

Course Description: Data science is a rapidly evolving field which impacts neurosurgeons in every aspect of their careers by changing the way scientific discoveries are made and the way healthcare is delivered. In this course, a diverse group of speakers with backgrounds in neurosurgery, statistics, imaging, and industry will provide a framework to understand how advanced data science techniques can be employed to improve study design, patient outcomes, and practice management.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Identify common data science strategies, resources, and databases useful for healthcare practitioners
- Define key terms including Natural Language Processing, Machine Learning, Computer Vision, and Artificial Intelligence
- Explore solutions to a problem in a large sample dataset in a workshop format
- Identify how to use pooled neurosurgical practice data to enhance individual practice management
- Identify methods of collaborating with industry and scientific partners to solve neurosurgical research questions using advanced data science techniques

Agenda Highlights

- Machine learning overview
- Deep neural networks
- Analysis of Administrative Datasets
- Analysis of registry data
- Descriptive analytics
- Translating big data into practice

GE 8:00 am–12:00 pm

SYM18: Morbidity and Mortality

Limited availability—register early!

Course Directors: Mark E. Shaffrey

Faculty: Matthew G. Ewend, Judy Huang, Philip V. Theodosopoulos

Course Description: This course will fulfill the ABNS requirement for quarterly morbidity and mortality requirement. Participants will submit cases and review cases in an anonymized manner to identify opportunities for improvement in practice. The session will focus on maximizing practice improvement and learning how to critically analyze complications without assigning blame.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Identify opportunities for practice improvement via review of submitted participant cases
- Identify the process for critical review and practice improvement
- Discuss optimal complication management to minimize impact on patient outcomes

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

SP 12:45–4:15 pm

SYM19: My Worst Spinal Complication: Lessons Learned

Course Directors: Daniel K. Resnick, Luis M. Tumialan

Faculty: Mark H. Bilsky, Richard G. Fessler, Michael W. Groff, Shekar N. Kurpad, Gerald E. Rodts, Hesham M. Soliman, Michael P. Steinmetz, Michael Y. Wang, Eric J. Woodard

Course Description: This course will have speakers present and discuss some of their most recent complications and the management of those complications to provide insights into advanced clinical care of patients with spinal disorders.

Learning Objectives: Upon completion of this symposium, participants will be able to:

- Identify and avoid complications commonly encountered in spine surgery
- Discuss the role of complication avoidance in the delivery of quality health care
- Incorporate technique of complication avoidance into clinical practice

Agenda Highlights

- Case-based discussion of recent complications
- Complication avoidance in spine surgery
- Complication management in spine surgery

TU 12:45–4:15 pm

SYM20: Modern Approaches to SRS

Course Directors: Gordon Li, Jason P. Sheehan

Faculty: John R. Adler, Iris C. Gibbs, Douglas Kondziolka, John Y. K. Lee, Michael W. McDermott, Hirofumi Nakatomi, Masaaki Yamamoto

Course Description: This course will feature leading surgeons in the field of radiosurgery who will discuss the

current and emerging strategies for the use of radiosurgery in neurosurgery patients. Participants should expect to finish the course with a current understanding of standard and emerging treatment strategies available for neurosurgeons using different radiosurgery devices.

Learning Objectives: Upon completion of this symposium, participants will be able to:

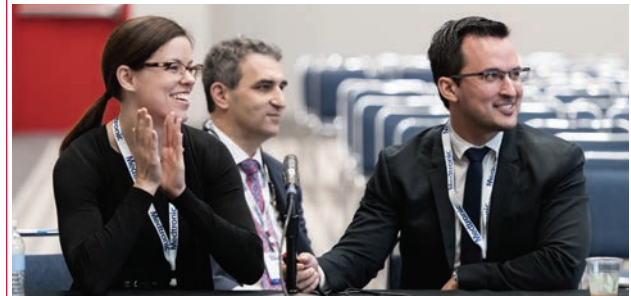
- Explain what radiosurgery is and what the different radiosurgery devices are as well as their advantages and disadvantages
- Identify appropriate diseases that can be treated with radiosurgery
- Apply existing evidence for radiosurgery

Agenda Highlights

- Stereotactic Radiosurgery for Acoustic Neuromas
- Stereotactic Radiosurgery for Meningiomas
- Stereotactic Radiosurgery for Trigeminal Neuralgia and Other Functional Indications
- Stereotactic Radiosurgery for Brain Metastasis
- Stereotactic Radiosurgery: Guidelines and What the Evidence Supports
- Stereotactic Radiosurgery: Evolutions in the field and the Role of Neurosurgeons

1:00–3:00 pm

RESIDENT SANS CHALLENGE PRELIMINARY ROUND



AP 8:00 am–4:15 pm

Complimentary to registered ANSPA members, Nurse/PA registrants

Association of Neurosurgical Physician Assistants (ANSPA) Fall 2019 CME Meeting Presented in Collaboration with Congress of Neurological Surgeons (CNS)

Course Description: This course is specifically designed by the Association of Neurosurgical Physician Assistants for Physician Assistants and Nurse Practitioners that are practicing in, or interested in neurosurgery.

Learning Objectives: Upon completion of this session, participants will be able to:

- Identify and discuss diagnoses and treatment options related to neurosurgical pathology
- Conduct patient work up to diagnose and treat patients with neurosurgery-related conditions
- Demonstrate application of neurosurgical principles in advanced practitioner practice of patient triage and treatment

EXPANDED PROGRAMMING



Combined Operative Neurosurgery Techniques and Case-based Discussion Sessions

Monday and Tuesday afternoon

Interactive Multimedia Research Presentation Session

Tuesday evening

Three International Symposia:

- The International Masters Symposium on Brain Tumor Surgery
- The International Cerebrovascular Symposium
- The International Functional Neurosurgery Symposium

Monday evening



Updated Guideline Sessions Return!

Monday–Wednesday

Can't Get Enough? Expanded CME Educational Content!

Advanced Endoscopic and Exoscopic Neurosurgery Seminar

Wednesday afternoon

GENERAL SCIENTIFIC SESSION I

Presiding Officer: Ganesh Rao

Moderators: Lola B. Chambless, Alexander A. Khalessi

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify the evidence supporting chronic traumatic encephalopathy and the implications for clinical care
- Summarize key evidence-based advances in neuro-oncological and spinal surgical care
- Describe how critical illness affects our understanding and management of patients

4:30–4:41 pm

**Welcome to the 2019 CNS
Annual Meeting**
Ganesh Rao

4:41–4:49 pm

**Neurosurgery Update: Cutting Edge
in NeuroOncology**
Mitchel S. Berger

4:49–4:57 pm

**Neurosurgery Update: Cutting Edge
in Spinal Surgery**

4:57–5:03 pm

Operative Neurosurgery Highlight
Michael T. Lawton

5:03–5:07 pm

Introduction of Controversy: CTE
Joseph C. Maroon

5:07–5:25 pm

**Controversies: The Evidence for CTE
is Overwhelming**

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 pm–5:56 pm

Brain Tumor Guha Award

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



Lucy Kalanithi

will be signing copies of the
book *When Breath Becomes
Air* immediately following the
conclusion of her lecture.



JOIN US AT THE OPENING RECEPTION

6:30–8:30 pm

Moscone West Convention Center

NEW THIS YEAR



Hands-on Cadaver Experiences

Surgery is not a spectator sport. Take the conversation beyond the Exhibit Hall and get first-hand experience with the latest in industry partner technology in our Hands-on Cadaver Experiences. Availability is limited. Stay tuned for technology slots and sign up for a chance to participate in this cadaver experience as you explore opportunities to introduce these advances into your practice.

International Symposia

Gain novel surgical insights from unique international perspectives. These Monday evening sessions bring together international experts in brain tumor surgery, cerebrovascular surgery, and functional and stereotactic surgery

GUIDELINES AND SUNRISE SCIENCE

TU SUNRISE SCIENCE AND LATE BREAKING ABSTRACT SESSION

Moderators: Maryam Rahman, Nader Sanai

CV SUNRISE SCIENCE AND LATE BREAKING ABSTRACT SESSION

Moderators: Jan-Karl Burkhardt, Joseph C. Serrone

7:00–8:30 am

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Analyze the findings of novel neurosurgical studies, critique the design and methodology
- List important areas for further knowledge development and research
- Identify the most important ongoing clinical trials
- Apply lessons of ongoing research to neurosurgical care of patients

SP 7:00–8:30 am

Guidelines for the Management of Metastatic Disease to the Spine: The Evidence

Moderators: Sanjay S. Dhall, John E. O'Toole

Speakers: Kurt M. Eichholz, Benjamin D. Elder, Langston T. Holly, Todd D. McCall, Timothy C. Ryken, Daniel M. Sciubba, Nicholas J. Szerlip

Session Description: This seminar will assess the existing evidence-based guidelines for the management of metastatic disease to the spine. Concepts regarding minimally invasive approaches, separation surgery, the need for stabilization and the role and timing adjuvant therapy will be reviewed. The impact that each of these approaches have on patient outcome will be assessed and the guidelines for management reviewed.

Learning Objectives: *Upon completion of this session participants will be able:*

- Identify those circumstances where separation surgery with adjuvant therapy would be appropriate for the management of metastatic disease to the spine
- Assess current evidence-based literature on the diagnosis and treatment of metastatic disease to the spine
- Become familiar with the criteria for those circumstances where stabilization of the spine is needed in addition to decompression in the management of metastatic disease

7:00–7:06 am

Introduction

Timothy C. Ryken

7:06–7:20 am

Role of Radiotherapy and Radiosurgery in the Treatment of Patients with Metastatic Spine Disease

Nicholas J. Szerlip

7:20–7:34 am

Role of Combination Surgery and Radiotherapy in the Treatment of Patients with Symptomatic/Asymptomatic Metastatic Spinal Cord Compression

Langston T. Holly

7:34–7:48 am

Preoperative Embolization for the Management of Patients with Metastatic Spinal Disease

Kurt M. Eichholz

7:48–8:02 am

Spinal Instability and Risk of Pathological Fracture for Patients with Metastatic Spine Disease

Benjamin D. Elder

8:02–8:16 am

Non-chemotherapeutic Medical Treatment for the Management of Patients with Metastatic Spinal Disease

Daniel M. Sciubba

8:16–8:30 am

Role of Vertebral Augmentation in Patients with Metastatic Spine Disease

Todd D. McCall

PA SF 7:00–8:30 am

Guidelines for DBS for Parkinson's Disease and Neuroablation for Pain

Moderators: Clement Hamani, Ahmed M.T. Raslan

Speakers: Aviva Abosch, Clement Hamani, Julie G. Pilitsis, Anand I. Rughani, Jason M. Schwalb

Session Description: We will review recently published guidelines for deep brain stimulation for Parkinson's disease as well as neuroablative procedures for pain, including the evidence basis and the rationale for choosing one approach over another.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Discuss the indications for DBS for PD and the relative advantages of each DBS target
- Identify the range of targets and surgical approaches for neuroablation for pain
- Discuss the evidence level of the various approaches for the functional and pain procedures discussed
- Identify the relevant lesioning procedures to treat cancer pain
- Review the indications for one lesioning technique over another

- Identify the CNS Guideline recommendations for the treatment of cancer pain

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

Aviva Abosch

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

(TR) 7:00 am–8:30 am

Neurotrauma Debates

Moderators: Odette Harris, David O. Okonkwo

Speakers: Bizhan Aarabi, Ryan S. Kitagawa, Patricia B. Raksin, Christian B. Ricks, Jamie S. Ullman

Session Description: This sunrise session will explore key debates in the management of traumatic brain injury, including arguments for and against each critical issue. Participants will acquire critical knowledge to improve their informed management of brain injury. Hot topics to be discussed include the role of MRI in spinal cord injury, the importance of hemicraniectomy in managing head injury, and the role of hypothermia in brain and spinal cord injury management.

Learning Objectives: Upon completion of this session, participants will be able to:

- Discuss the pros and cons of decompressive craniectomy in severe TBI patients
- Evaluate the need of an MRI in patients with acute SCI
- Decide the utility of hypothermia in severe TBI patients

7:00–7:30 am

An MRI is Necessary in Acute Management of SCI

7:00–7:10 am

Yes

Bizhan Aarabi

7:10–7:20 am

No

Christian B. Ricks

7:20–7:25 am

Rebuttal Supporting the Notion

Bizhan Aarabi

7:25–7:30 am

Rebuttal Opposing the Notion

Christian B. Ricks

7:30–8:00 am

Decompressive Hemicraniectomy is Here to Stay

7:30–7:40 am

Yes

Jamie S. Ullman

7:40–7:50 am

No

Ryan S. Kitagawa

7:50–7:55 am

Rebuttal Supporting the Notion

Jamie S. Ullman

7:55–8:00 am

Rebuttal Opposing the Notion

Ryan S. Kitagawa

8:00 am–8:30 am

Hypothermia is Dead

8:00–8:10 am

Yes

Patricia B. Raksin

8:10–8:20 am

No

Ryan S. Kitagawa

8:20–8:25 am

Rebuttal Supporting the Notion

Patricia B. Raksin

8:25–8:30 am

Rebuttal Opposing the Notion

Ryan S. Kitagawa

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

GENERAL SCIENTIFIC SESSION II

Presiding Officer: Steven N. Kalkanis

Moderators: Nader Pouratian, Martina Stippler

Learning Objectives: Upon completion of this session, participants will be able to:

- Identify the key concepts of leadership
- Describe how to communicate neurological and neurosurgical disease to the public
- Delineate the importance of evidence and reason in an era prone to hype and misinformation

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

10:00–10:30 am
LIVE SURGERY
IN THE EXHIBIT HALL

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

10:46–10:53 am
K12/Getch Award Presentation

10:53–11:00 am
CNS Resident Award Presentation

11:00–11:03 am
Introduction of CNS President
Adam S. Arthur




11:03–11:23 am
Presidential Address
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.

MONDAY, OCTOBER 21 | 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, medical students, and advance practice providers)

(RE) M1: Honored Guest Luncheon: Leadership Engagements

Advanced registration recommended. Complimentary for Resident and International Vista Resident Members!

Speaker: Raymond Sawaya

Learning Objectives: *Upon completion of this seminar, participants will be able to:*

- Identify key elements of success in academic medicine
- Define the role of organized neurosurgery in advancing the science of clinical practice
- Describe the evolution of brain tumor surgery throughout the honored guest's career

(SE) M2: So You've Been Sued... Medical Practice 2019 Update

Moderators: Bharat Guthikonda, Rishi K. Wadhwa

Faculty: Deborah L. Benzil, Ajith J. Thomas, James T. Tran, Richard N. Wohns

Learning Objectives: *Upon completion of this seminar, participants will be able to:*

- Identify physician rights
- Comprehend malpractice costs and legal presentation
- Identify the common causes of litigation

(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

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify the current status of multiple trials using new technology to evacuate intracerebral hemorrhage
- Identify new indications for clot removal
- Identify patient selection and ideal timing of surgery for clot removal



CNS

SANS

Lifelong Learning



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. Wolfla, Takao Yasuhara

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Determine which patients would benefit from anterior versus posterior approaches to treat cervical radiculopathy
- Describe common complications associated with anterior and posterior cervical spine approaches
- Identify strengths and weaknesses of anterior cervical discectomy and fusion/ arthroplasty versus posterior minimally invasive laminoforaminotomy versus laminoplasty



M5: Spinal Tumor Surgery: Case-based Management

Moderators: Joseph S. Cheng, Ziya L. Gokaslan

Faculty: Mark H. Bilsky, Dean Chou, Michelle J. Clarke, Charles Fisher, Ilya Laufer, Paul C. McCormick, Laurence D. Rhines

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Discuss techniques and approaches to treat spinal tumors
- Determine appropriate indications and treatment pathways as well as guidelines for the treatment of spinal tumors
- Identify and avoid common complications associated with treatment of spinal tumors



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Lifelong Learning



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

Learning Objectives: *Upon completion of this seminar, participants will be able to:*

- Describe a systematic approach to evaluation of patients with peripheral nerve entrapment syndromes
- Develop a non-operative or operative management strategy for these conditions
- Discuss advantages and disadvantages and expected outcomes of various surgical approaches



CNS

SANS

Lifelong Learning

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

TR **M7: Neurocritical Care: A Multidisciplinary Collaboration**

Moderator: Joshua E. Medow

Faculty: Nicholas J. Brandmeir, Kristine O'Phelan, Lori Shutter

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify the strength each specialty brings to neurocritical care management of neurosurgery patients
- Improve interdisciplinary communication skills between providers in the neurointensive care unit
- Demonstrate the value of a multidisciplinary approach to neurocritical care

PE **M8: Pediatric Concussion**

Moderator: Susan R. Durham

Faculty: Robert J. Bollo, Christopher Giza, Michael L. Levy, Carolyn Quinsey, Christina M. Sayama

Learning Objectives: *Upon completion of this seminar, participants will be able to:*

- Identify current updates and recommendations for the care of pediatric patients with concussion
- Discuss the challenges associated with concussion in the pediatric population
- Review current practice standards for management and return to play of pediatric patients and athletes suffering from concussion

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

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Discuss complication management and avoidance in surgery for acoustic neuroma
- Outline the diagnostic workup for a patient with acoustic neuroma
- Describe the treatment strategies for acoustic neuroma

TU **M10: Harnessing the Immune System to Treat Brain Tumors**

Moderator: Hideho Okada

Faculty: E. Antonio Chiocca, Gavin P. Dunn, Peter Fecci, Amy B. Heimberger, Michael Lim, Yoshitaka Narita

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Describe the relevant features of the CNS immune system in the setting of brain tumors
- Describe the mechanisms of different immune-based treatment modalities currently being trialed for brain tumors
- Explain the anti-tumor and micro-environmental changes associated with oncolytic viruses

1:45–2:45 pm

AFTERNOON BEVERAGE BREAK

Visit the Exhibit Hall

2:00–2:30 pm

**LIVE SURGERY
IN THE EXHIBIT HALL**

1:45–2:45 pm

Special Session: Navigating the Regulatory Landscape for Medical Devices: A FDA Road Map

Course Directors: Carlos Pena, Joshua Rosenow, William C. Welch

Speakers: Christopher Loftus, Philip A. Starr

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

AFTERNOON SESSIONS

SECTION SESSIONS

(SE) 2:45–4:15 pm

COUNCIL OF STATE NEUROSURGICAL SOCIETIES

Achieving High Quality

Moderators: Darlene A. Mayo, Paul L. Penar

Speakers: Anthony L. Asher, Rachel Groman, John J. Knightly

Session Description: Neurosurgeons are asked to implement high-quality care delivery models and are sometimes struggling with best practices to do so. This session will showcase several aspects of the fundamentals of quality and how to achieve it.

Learning Objectives: Upon completion of this session, participants will be able to:

- Define quality and several ways to measure it
- Identify different perspectives on quality of care
- Explain several changes in practice that can be made by all neurosurgeons to achieve quality

2:45–2:59 pm

Quality Metrics in Practice

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

3:28–4:15 pm

Oral Abstract Presentations

(CV) 2:45–4:15 pm

SECTION ON CEREBROVASCULAR SURGERY

Artificial Intelligence in Cerebrovascular Neurosurgery

Moderator: E. Sander Connolly

Speakers: Hormuzdiyar H. Dasenbrock, Johanna Fifi, Eric K. Oermann, Alejandro M. Spiotta

Session Description: Discuss ways in which AI is and will be integrated into cerebrovascular neurosurgery.

Learning Objectives: Upon completion of this session, participants will be able to:

- Survey the current challenges in training the cerebrovascular physician
- Discuss the need for post-graduate cerebrovascular training in the current era
- Discuss pros and cons between infolded and postgraduate endovascular training

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

3:25–3:30 pm

Questions and Discussion

3:30–4:15 pm

Oral Abstract Presentations

(SP) 2:45–4:15 pm

SECTION ON DISORDERS OF THE SPINE AND PERIPHERAL NERVES

Spine Section Update

Moderators: Daniel J. Hoh, Michael P. Steinmetz

Speakers: Tim E. Adamson, Regis W. Haid, Paul Park, Michael Y. Wang

Session Description: In this session, faculty will incorporate a case-based format for discussing complex spinal pathologies and assess various treatment strategies with respect to patient outcome.

Learning Objectives: Upon completion of this sessions, participants will be able to:

- Discuss current concepts regarding the management of complex spinal pathologies
- Compare various spine surgical treatment strategies with respect to patient outcome
- List important areas for further knowledge development and research

2:45–2:53 pm

Outpatient Degenerative Spine Surgery: Patient Outcomes, Realities, and Finances

Tim E. Adamson

2:54–3:02 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

(TR) 2:45–4:15 pm

SECTION ON NEUROTRAUMA AND CRITICAL CARE

Moderators: Ramesh Grandhi, Daniel B. Michael

Speakers: Richard G. Fessler, J. Marc Simard

Session Description: Basic science talk about the pathophysiology of edema in CNS Ischemia and Trauma.

Learning Objectives: Upon completion of this

session, participants will be able to:

- Identify pathophysiology in TBI—Discuss possible treatment strategies
- Discuss future research into TBI therapeutics

2:45–3:05 pm

Tator Lecture

Richard G. Fessler

3:05–3:25 pm

Edema in Traumatic Brain Injury

J. Marc Simard

3:25–4:15 pm

Oral Abstract Presentations

Ⓟ 2:45–4:15 pm

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,

Konstantin V. Slavin, Doris D. Wang

Session Description: Characterizing complex facial pain and the various surgical options to treat them.

Learning Objectives: Upon completion of this session, participants will be able to:

- Distinguish between types of facial pain
- Define various types of neuromodulation for complex facial pain
- Identify the professional practice gaps (i.e. problems in practice) that this activity will address

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

3:29–4:15 pm

Oral Abstract Presentations

Ⓟ 2:45–4:15 pm

SECTION ON PEDIATRIC NEUROLOGICAL SURGERY

Pediatric Brain Tumors: Advancements in Molecular Diagnosis and Update on Clinical Trials

Moderators: Robert Partlow Naftel, Amanda Muhs Saratsis

Speakers: Sabine Mueller

Session Description: Discussion and update on advancements in pediatric brain tumors, the molecular basis of diagnosis, current and upcoming clinical trials, and personalized medicine.

Learning Objectives: Upon completion of this session, participants will be able to:

- Discuss recent changes in the neuropathologic diagnoses in pediatric neuro-oncology
- Review the importance of molecular profiling for pediatric brain tumors and advancements in the area of personalized therapy
- Identify active clinical trials for patients with pediatric brain tumors and upcoming areas of clinical research

2:45–3:19 pm

Discussion and Update on Advancements in Pediatric Brain Tumors, the Molecular Basis of Diagnosis, Current and Upcoming Clinical Trials, and Personalized Medicine

Sabine Mueller

3:20–3:27 pm

Questions and Discussion

3:28–4:15 pm

Oral Abstract Presentations

Ⓟ 2:45–4:15 pm

SECTION ON PERIPHERAL NERVES

Peripheral Nerve Task Force

Moderators: Lukas G. Rasulic, Lynda J. Yang

Speakers: Mark A. Mahan, Wilson Z. Ray

Session Description: The peripheral nerve task force will present the latest evidence for advanced peripheral nerve procedures, including targeted re-innervation and nerve transfer for spinal cord injury. The latest updated evidence will be presented, including key limitations, obstacles, and next steps. Top abstracts in peripheral nerve surgery will be presented.

Learning Objectives: Upon completion of this session, participants will be able to:

- Describe the results of the most recent studies of nerve transfer for spinal cord injury
- Discuss the clinical utility of targeted muscle reinnervation
- Review the most recent clinical studies in the management of peripheral nerve injuries, tumors, and entrapments

2:45–3:02 pm

Nerve Transfers for Spinal Cord Injury: Results of a Prospective Trial

Wilson Z. Ray

3:03–3:20 pm

Targeted Muscle Reinnervation: Ready for Prime Time?

Mark A. Mahan

3:21–4:15 pm

Oral Abstract Presentations

Ⓟ 2:45–4:15 pm

SECTION ON STEREOTACTIC AND FUNCTIONAL NEUROSURGERY

The Future of Preoperative Functional Mapping

Moderators: Ellen L. Air, Nitin Tandon

Speakers: Raag Airan, Sven Bestmann, Dario J. Englot, Hui Ming Khoo

Session Description: The stereotactic and functional neurosurgery section session will focus on the future of preoperative non-invasive mapping using novel technologies, such as magnetoencephalography and ultrasound. Key advances and major hurdles will be addressed. Selected top abstracts in stereotactic and functional neurosurgery will be presented.

Learning Objectives: Upon completion of this session, participants will be able to:

- Discuss the current state of the art in preoperative functional mapping
- Discuss ongoing research in this field and new techniques in development
- Evaluate using cases for incorporating new technology into neurosurgical practice

2:45–2:55 pm

Wearable, Room-temperature MEG

Sven Bestmann

2:56–3:06 pm

EEG-fMRI and Network-based Mapping for Localizing Epilepsy Foci

Hui Ming Khoo

3:07–3:17 pm

Focused US for Non-invasively Probing Brain Circuits

Raag Airan

3:18–3:28

Connectivity-based Preoperative Functional Mapping to Predict Outcomes

Dario J. Englot

3:28–4:15 pm

Oral Abstract Presentations

(TU) 2:45–4:15 pm

SECTION ON TUMORS**Complications in Tumor Surgery: Navigating the Unexpected****Moderators:** Wenya L. Bi, Walavan Sivakumar**Speakers:** Frederick G. Barker, Mitchel S. Berger, William T. Couldwell, Daniel F. Kelly**Session Description:** This session will focus on complication management in the setting of skull base, glioma surgery, endoscopic surgery, and medico-legal issues.**Learning Objectives:** Upon completion of this session, participants will be able to:

- Identify common complications associated with different types of tumor surgery
- Plan strategies to manage and avoid complication in challenging brain tumor cases
- Apply these treatment strategies and approaches in their own challenging cases

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

3:28–4:15 pm

Oral Abstract Presentations**OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION SESSIONS**

(SE) 4:15–5:45 pm

CSNS: How to Build a Spine Center**Moderators:** James S. Harrop, Anand Veeravagu**Speakers:** Khalid M. Abbed, James S. Harrop, Richard N. Wohns**Session Description:** The shift to outpatient provision of services is ongoing and neurosurgeons need to understand how to position themselves in the marketplace. Spine centers are preeminent targets for integrated care and benefit from neurosurgical leadership.**Learning Objectives:** Upon completion of this session, participants will be able to:

- Discuss the components of a spine center
- Identify a strategy to engage stakeholders of a spine center
- Identify how to build a vision and outline of a spine center

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

5:01–5:40 pm

Oral Abstract Presentations

5:41–5:45 pm

Questions and Discussion

(TU) 4:15–5:45 pm

Challenging Skull Based Tumors: Operative Techniques and Case-based Discussions**Moderator:** Jacques J. Morcos**Discussants:** John G. Golfinos, Anil Nanda, Nelson M. Oyesiku**Session Description:** In this interactive event, expert surgeons will present and discuss the nuances of difficult tumor cases.**Learning Objectives:** Upon completion of this session, participants will be able to:

- Identify common challenges with a variety of cranial procedures
- Plan strategies to manage and avoid complication in challenging brain tumors
- Apply these treatment strategies and approaches in their own challenging cases

4:16–4:25 pm

Endoscopic Endonasal Transmaxillary Transsphenoidal Approach for Excision of a Superior Orbital Fissure-Cavernous Sinus Meningioma: 2-Dimensional Operative Video

Ehab El Refaee

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

Oral Abstract Presentations

5:00–5:45 pm

Case-based Discussion

CV 4:15–5:45 pm

Treating Cerebral Vascular Malformations: Operative Techniques and Case-based Discussions**Moderator:** Joshua W. Osbun**Discussants:** Daniel L. Barrow, C. Michael Cawley, Andrew F. Ducruet, Michael R. Levitt, Min S. Park, Jonathan Russin, Linda Xu, Gregory J. Zipfel**Session Description:** Pre-submitted cases will be presented and the audience will vote on diagnosis and treatment. An expert panel will then provide their individual opinions and a re-vote taken.**Learning Objectives:** *Upon completion of this session, participants will be able to:*

- Identify the role of microsurgery in AVM treatment
- Identify the role of embolization in AVM treatment
- Identify the role of radiosurgery in AVM treatment

4:16–4:25 pm

Transcallosal-transchoroidal Fissure Approach for Resection of Third Ventricle Cavernous Malformation: 3-Dimensional Operative Video

Brian P. Walcott

4:26–4:35 pm

Combination Superficial Temporal Artery-Middle Cerebral Artery Bypass and M2–M2 Reanastomosis With Trapping of a Stented Distal Middle Cerebral Artery Aneurysm: 3-Dimensional Operative Video

Jan-Karl Burkhardt

4:36–4:59 pm

Oral Abstract Presentations

5:00–5:45 pm

Case-based Discussion

SP 4:15–5:45 pm

Spinal Deformity and MIS Surgery: Operative Techniques and Case-based Discussions**Moderators:** Peter D. Angevine, Alfred T. Ogden**Discussants:** Ali A. Baaj, Tyler R. Koski, Catherine Miller, Ron I. Riesenburger, Alexander E. Ropper, Charles A. Sansur**Session Description:** This session will incorporate an interactive case-based format for discussing management strategies for cervical and thoracolumbar deformity and MIS surgery.**Learning Objectives:** *Upon completion of this session, participants will be able to:*

- Discuss various treatment options for the management of cervical and thoracolumbar deformity
- Describe common complications in cervical and thoracolumbar deformity
- Discuss techniques for minimally invasive spine surgery and complication avoidance

4:16–4:25 pm

Minimally Invasive Extraforaminal Discectomy Operative Neurosurgery Video

Joshua W. Lucas

4:26–4:35 pm

Use of an Articulating Hinge to Facilitate Cervicothoracic Deformity Correction During Vertebral Column Resection Operative Neurosurgery Video

Rajiv Iyer

4:36–4:59 pm

Oral Abstract Presentations

5:00–5:45 pm

Case-based Discussion

TR 4:15–5:45 pm

Challenging Cases in ICP Management: Operative Techniques and Case-based Discussions**Moderators:** Gregory J. Murad, Martina Stippler**Discussants:** Samuel R. Browd, Ramesh

Grandhi, Emily P. Sieg, Eve C. Tsai

Session Description: Challenging cases in the management of refractory intracranial hypertension will be discussed in detail by experts and leaders in the field, including discussion of surgical, medical, and multi-modal management. In addition, top abstracts in operative techniques for neurotrauma and neurocritical care will be presented.**Learning Objectives:** *Upon completion of this session, participants will be able to:*

- Integrate evidence for timing and techniques for surgical interventions for ICP management in head injury
- Review the evidence for non-surgical interventions for management of refractory intracranial hypertension in the setting of brain injury
- Describe key operative techniques for optimizing outcomes of patients with brain and spinal cord injury

4:16–4:39 pm

Abstract Presentations

4:40–5:45 pm

Case-based Discussion

PA 4:15–5:45 pm

The Case Against Spinal Cord Stimulation: Operative Techniques and Case-based Discussion**Moderators:** Gaddum D. Reddy, Jason M. Schwalb**Speakers:** Steven M. Falowski, Wendall B. Lake, Jason

M. Schwalb, Konstantin V. Slavin, Christopher J. Winfree

Session Description: Become familiar with the arguments against the use spinal cord stimulation, and understand complications and their avoidance, as well as the business of spinal cord stimulation and alternatives to its use.**Learning Objectives:** *Upon completion of this session, participants will be able to:*

- Discuss the arguments against spinal cord stimulation
- Identify how to avoid complications of spinal cord stimulation
- Identify the business of spinal cord stimulation and alternatives to its use

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

5:07–5:45 pm

Case-based Discussion

(PE) 4:15–5:45 pm

Recurrent Disease in Pediatric Brain Tumors Patients: Case-based Discussions and Operative Techniques

Moderator: Liliana Goumnerova

Discussants: Susan R. Durham, Eric M. Jackson, Amanda M. Saratsis, Eric M. Thompson, Zulma S. Tovar-Spinoza

Session Description: Discussion of challenging cases in pediatric recurrent brain tumor. Review of treatment options and discussion of optional paradigms for management.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Discuss treatment options for the management of recurrent pediatric brain tumor
- Review advantages and disadvantages of treatment modalities in neuro-oncology
- Demonstrate understanding of multi-modality treatment options to practice

4:16–4:25 pm

Management of Complex Pediatric Chordoma: Transnasal and Bilateral Far-lateral Approach for Resection with O-C4 Fusion: 3-Dimensional Operative Neurosurgery Video

William T. Couldwell

4:26–4:35 pm

Radical, Staged Approach to Extensive Posterior Fossa Pediatric Ependymoma: 3-Dimensional Operative Neurosurgery Video

Karol P. Budohoski

4:36–4:43 pm

Oral Abstract Presentations

5:00–5:45 pm

Case-based Discussion

(SF) 4:15–5:45 pm

Challenging Cases in Epilepsy Surgery: Operative Techniques and Case-based Discussions

Moderator: Joseph S. Neimat

Discussants: Ausaf A. Bari, Sharona Ben-Haim, Robert A. McGovern

Session Description: Faculty will present challenging epilepsy surgery cases to be discussed with the audience.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify several approaches at the disposal of an epilepsy surgeon
- Discuss pros and cons of different approaches to a clinical situation
- Evaluate incorporating new techniques into their practice, including neuromodulation (VNS, RNS, DBS), ablation (LITT, RF), and others

4:16–4:25 pm

sEEG Implant Strategies: Operative Neurosurgery Video

Jorge A. Gonzalez-Martinez

4:26–4:35 pm

Perioperative Multimodal Evaluation and Surgical Tactics of Tumor-Related Epilepsy: 2-Dimensional Operative Neurosurgery Video

Jin-song Wu

4:36–4:59 pm

Oral Abstract Presentations

5:00–5:45 pm

Case-based Discussion

(PN) 4:15–5:45 pm

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

Session Description: Peripheral nerve surgery experts will review technical nuances and provide case examples across an array of cases that are critical parts of the peripheral nerve surgeons armamentarium.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Compare techniques, risks, and outcomes of different approaches to carpal and cubital tunnel syndromes
- Discuss key techniques in the management of peripheral nerve tumors
- Review differences in outcomes for neurectomy vs decompression for merlagia parasthetica

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

INTERNATIONAL SYMPOSIA



to the 2019 Scientific Program are three International Symposia, which feature world-renowned neurosurgeons sharing their insights on these cutting-edge topics.

TU 5:45–7:15 pm

THE INTERNATIONAL MASTERS SYMPOSIUM ON BRAIN TUMOR SURGERY

Moderator: Mitchel S. Berger, George Samandouras

Speakers: Mitchel S. Berger, Helmut Bertalanffy, Paolo Cappabianca, Fred Gentili, Takeshi Kawase, George Samandouras

Session Description: This international symposium will feature operative techniques and technical pearls from master tumor surgeons from around the world. This session will emphasize operative videos, featuring speakers with expertise in glioma surgery, skull base surgery, surgery in the cavernous sinus, brain stem surgery, and endoscopic pituitary surgery.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Describe advanced operative techniques for management of skull base tumors
- Critically appraise micro-neurosurgical techniques for excision of intrinsic brain tumors
- Outline patient-specific approaches to surgical approaches for brain tumors in via distinct operative corridors

5:45–5:59 pm

USA—Mapping Techniques for Low-grade Gliomas

Mitchel S. Berger

6:00–6:14 pm

Japan—Surgery in the Cavernous Sinus

Takeshi Kawase

6:15–6:29 pm

Canada—Skull Base Meningioma Surgery

Fred Gentili

6:30–6:44 pm

Germany—Brain Stem Tumor Surgery

Helmut Bertalanffy

6:45–6:59 pm

Italy—Endoscopic Pituitary Surgery

Paolo Cappabianca

7:00–7:14 pm

UK—Surgery for Insular Gliomas

George Samandouras

7:14–7:15 pm

Questions and Discussion

CV 5:45–7:15 pm

THE INTERNATIONAL CEREBROVASCULAR SYMPOSIUM

Moderators: Miki Fujimura, Clemens M. Schirmer

Speakers: Miki Fujimura, Tomohito Hishikawa, Ichiro Nakagawa, Philipp Taussky

Session Description: This symposium will highlight the international perspective on critical issues in cerebrovascular surgery, with a focus on endovascular vs open vascular management of various cerebrovascular pathologies including aneurysms and cervical ICA disease. The role of EC-IC bypass in the management of Moya Moya disease will also be discussed prior to presentation of top international abstracts in cerebrovascular disease.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Critically compare the natural history and surgical vs endovascular management of cerebral aneurysms
- Identify the role of endovascular and open surgical approaches to the management of diseases of the cervical ICA
- Describe the role of bypass in the management of Moya Moya disease

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

6:11–6:21 pm

Management Strategy for Cervical ICA: Hybrid Surgeon's Choice

Ichiro Nakagawa

6:22–6:32 pm

Current Status of EC-IC Bypass: New Evidence in Moyamoya Disease

Miki Fujimura

6:33–7:15 pm

International Oral Abstract Presentations

SF 5:45–7:15 pm

THE INTERNATIONAL FUNCTIONAL NEUROSURGERY SYMPOSIUM

Moderators: Jorge A. Gonzalez-Martinez, Makoto Taniguchi

Speakers: Masaki Iwasaki, Hui Ming Khoo, Takaomi Taira

Session Description: This symposium will highlight the international perspective on critical issues in stereotactic and functional surgery, with a focus on critical surgical considerations in epilepsy surgery as well as the unique translational and research opportunities made possible by epilepsy surgery. The role of lesioning in the management of dystonia will also be discussed prior to presentation of top international abstracts in stereotactic and functional neurosurgery.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Critically appraise contemporary approaches to epilepsy surgery
- Identify opportunities for translational and clinical research in patients undergoing epilepsy surgery
- Describe the role of lesioning in the management of dystonia

5:45–6:00 pm

Current Status and Future Perspective of Epilepsy Surgery in Japan

Masaki Iwasaki

6:01–6:16 pm

Recent Advance in Epilepsy Research

Hui Ming Khoo

6:17–6:32 pm

Stereotactic Lesioning for Dystonia and Movement Disorders

Takaomi Taira

6:33–7:15 pm

International Oral Abstract Presentations

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

Seminar Description: Attendees will be presented with the development and current state of the art of multi-modality arteriovenous malformation treatment.

Learning Objectives: Upon completion of this seminar, participants will be able to:

- Identify the role of microsurgery in AVM treatment
- Identify the role of embolization in AVM treatment
- Identify the role of radiosurgery in AVM treatment



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

Seminar Description: This dinner seminar will cover the latest advances in robotics in spinal surgery. Faculty will discuss incorporating new robotic technology to enhance minimally invasive, spinal deformity, and tumor surgery.

Learning Objectives: Upon completion of this seminar, participants will be able to:

- Discuss the evidence basis for novel spinal robotic technology
- Evaluate how new spinal technology can be incorporated into your clinical practice
- Identify the relative strengths and weakness of new technology compared to more traditional approaches



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.

In an effort to make the best in neurosurgery more accessible to doctors and scientists around the world, the CNS is pleased to offer a discounted rate of \$150 to attendees from the following countries:

Angola	Guatemala	Pakistan
Afghanistan	Guinea	Palestine
Albania	Guinea-Bissau	Papua New Guinea
Algeria	Guyana	Paraguay
American Samoa	Haiti	Peoples Republic of China
Armenia	Honduras	Peru
Azerbaijan	India	Philippines
Bangladesh	Indonesia	Romania
Belarus	Iran	Russia
Belize	Iraq	Rwanda
Benin	Jamaica	Samoa
Bhutan	Jordan	São Tomé and Príncipe
Bolivia	Kazakhstan	Senegal
Bosnia-Herzegovina	Kenya	Serbia
Botswana	Kiribati	Sierra Leone
Brazil	Korea, Dem. People's Rep.	Solomon Islands
Bulgaria	Kosovo	Somalia
Burkina Faso	Kyrgyz Republic	South Africa
Burundi	Lao PDR	South Sudan
Cabo Verde	Lebanon	Sri Lanka
Cambodia	Lesotho	St. Lucia
Cameroon	Liberia	St. Vincent and the Grenadines
Central African Republic	Libya	Sudan
Chad	Macedonia	Suriname
Colombia	Madagascar	Swaziland
Comoros	Malawi	Syrian Arab Republic
Congo, Dem. Rep.	Malaysia	Tajikistan
Congo, Rep.	Maldives	Tanzania
Costa Rica	Mali	Thailand
Côte d'Ivoire	Marshall Islands	Timor-Leste
Cuba	Mauritania	Togo
Djibouti	Mauritius	Tonga
Dominica	Mexico	Tunisia
Dominican Republic	Micronesia, Fed. Sts.	Turkey
Ecuador	Moldova	Turkmenistan
Egypt	Mongolia	Tuvalu
El Salvador	Montenegro	Uganda
Equatorial Guinea	Morocco	Ukraine
Eritrea	Mozambique	Uzbekistan
Ethiopia	Myanmar	Vanuatu
Fiji	Namibia	Venezuela
Gabon	Nauru	Vietnam
Gambia, The	Nepal	West Bank and Gaza
Georgia	Nicaragua	Yemen
Ghana	Niger	Zambia
Grenada	Nigeria	Zimbabwe

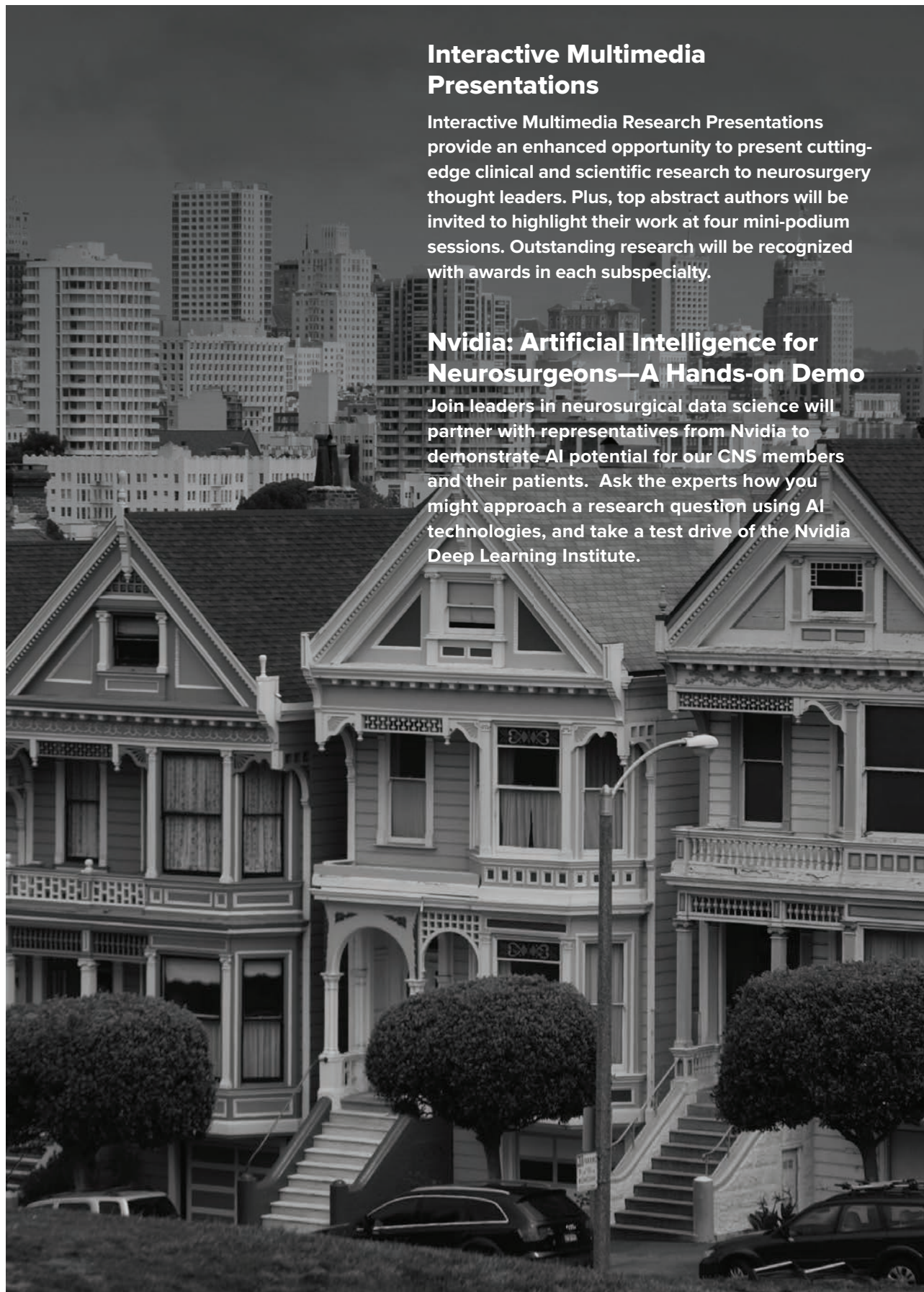
NEW THIS YEAR

Interactive Multimedia Presentations

Interactive Multimedia Research Presentations provide an enhanced opportunity to present cutting-edge clinical and scientific research to neurosurgery thought leaders. Plus, top abstract authors will be invited to highlight their work at four mini-podium sessions. Outstanding research will be recognized with awards in each subspecialty.

Nvidia: Artificial Intelligence for Neurosurgeons—A Hands-on Demo

Join leaders in neurosurgical data science will partner with representatives from Nvidia to demonstrate AI potential for our CNS members and their patients. Ask the experts how you might approach a research question using AI technologies, and take a test drive of the Nvidia Deep Learning Institute.



GUIDELINES AND SUNRISE SCIENCE

SP SUNRISE SCIENCE AND LATE BREAKING ABSTRACT SESSION

Moderators: Nathaniel P. Brooks, Kevin M. Walsh

PE SUNRISE SCIENCE AND LATE BREAKING ABSTRACT SESSION

Moderators: Bermans Iskandar, Erin N. Kiehna

SE SUNRISE SCIENCE AND LATE BREAKING ABSTRACT SESSION

Moderators: Kristopher T. Kimmell, J. Adair Prall

7:00–8:30 am

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Analyze the findings of novel neurosurgical studies and critique the design and methodology
- List important areas for further knowledge development and research
- Identify the most important ongoing clinical trials
- Apply lessons of ongoing research to neurosurgical care of patients

TU 7:00–8:30 am

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

Session Description: This morning guidelines sessions will present a critical overview of evidence-based guidelines for management of brain metastases, including discussions of the role of surgery, radiosurgery, whole brain radiation, and emerging and investigational therapies. The session will feature key thought leaders within neurosurgery and radiation oncology to guide advanced and modern care of patients with brain metastases.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Develop treatment strategies for single versus multiple mets
- Develop a treatment algorithm in deciding between SRS and WBRT
- Critically assess the new CNS metastatic tumor guidelines

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

TR 7:00–8:30 am

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

Moderators: Kathryn M. Beauchamp, Jamie S. Ullman

Speakers: Justin Davanzo, Shaun D. Rodgers, Uzma Samadani, Robert D. Truog

Session Description: Despite legal definitions of brain death, the concept of brain death remains difficult to communicate and for many to understand. In this session, we will review multidisciplinary guidelines and protocols for assessing brain death. The session will then transition to discussing our evolving understanding of disorders of consciousness and how this may impact the care we deliver. Finally, brain death in the media will be explored.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify brain death protocols and guidelines
- Demonstrate controversy that persists over the conceptual defensibility of brain death
- Discuss neuroethical implications of research challenging our understanding of MCS or permanent vegetative state

7:00–7:20 am

Status Quo of Brain Death: Guidelines and Protocols

Justin Davanzo

7:20–7:50 am

How Research Challenges Our Understanding for Disorders of Consciousness

Robert D. Truog

7:50–8:10 am

Brain Death in the Media

Uzma Samadani

8:10–8:30 am

Brain Death Determination in Pediatric Cases

Shaun D. Rodgers



TUESDAY, OCTOBER 22 | 8:40 am–12:10 pm

GENERAL SCIENTIFIC SESSION III

Presiding Officer: Brian L. Hoh

Moderators: Ashok R. Asthagiri, Jennifer A. Sweet

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Discuss key considerations regarding the importance and necessity of randomized controlled trials for new therapies
- Summarize key evidence-based advances in brain trauma and cerebrovascular neurosurgery
- Describe key elements of effectively communicating scientific and technical concepts to the non-scientists and non-clinicians

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 Paper of the Year



8:51–9:13 am

Honored Guest Presentation: Evidence-based Medicine Through Development of Home-grown Databases
Raymond Sawaya

9:13–9:15 am

Introduction of Carl Zimmer

Garni Barkhoudarian



9:15–9:40 am

FEATURED SPEAKER
A Journey to the Center of the Brain
Carl Zimmer



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.

9:40–10:40 am

MORNING BEVERAGE BREAK
Visit the Exhibit Hall

10:00–10:30 am

LIVE SURGERY
IN THE EXHIBIT HALL

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

11:07–11:13 am

Controversies: Discussion and Outcomes

Robert E. Gross

11:13–11:21 am

Neurosurgery Update: Cutting Edge in NeuroTrauma

Gregory W.J. Hawryluk

11:21–11:29 am

Neurosurgery Update: Cutting Edge in Cerebrovascular Surgery



11:29–11:33 am

Distinguished Service Award Presentation

David C. Berg

Presented by
Ashwini D. Sharan



11:33–11:37 am

Founder's Laurel Award Presentation

Daniel L. Barrow

Presented by
Ashwini D. Sharan

11:37–11:40 am

Introduction of Bret Stephens

Nicholas C. Bambakidis



11:40–12:10 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.

LUNCHEON SEMINARS

All Luncheon Seminars include a plated lunch served in the seminar room.

Luncheon Seminar fee is \$95 each (\$75 for residents, fellows, medical students, and advance practice providers)

PA 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

Learning Objectives: Upon completion of this session, participants will be able to:

- Identify the appropriate use and doses of opioids perioperatively
- Identify risks for perioperative severe pain and developing opioid and non-opioid strategies for management
- Describe issues related to advocacy in Washington related to perioperative pain management

CV 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

Learning Objectives: Upon completion of this session, participants will be able to:

- Identify data supporting carotid intervention
- Identify different indications for stenting and CEA
- Identify current investigations and emerging technology

SP T13: Peak Performance: Optimizing the Spine Surgical Patient from Pre-op to Post-op

Moderators: Neil R. Malhotra, Scott A. Meyer, Laura A. Snyder

Faculty: Christopher M. Holland, Luke Macyszyn, John K. Ratliff, Hesham M. Soliman, Robert G. Whitmore

Learning Objectives: Upon completion of this session, participants will be able to:

- Discuss approaches for identifying high risk spine surgical patients
- Describe strategies for medical optimization of spine surgical patients from prior to surgery through the perioperative period
- Discuss the impact of medical optimization on complication avoidance and improved patient outcomes

SP 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

Learning Objectives: Upon completion of this session, participants will be able to:

- Discuss techniques and approaches to treat adult spinal deformity
- Determine appropriate indications and treatment pathways for adult deformity patients
- Identify and avoid common complications associated with thoracolumbar and cervical deformity

TR T15: Is There an Outcome Worse than Death: Outcome, Palliative Care, and Ethical Considerations in Neurosurgical Care

Moderator: Martina Stippler

Faculty: Nicholas J. Brandmeir, Kimberly P. Kicielinski, Robert D. Truog

Learning Objectives: Upon completion of this session, participants will be able to:

- Identify the principle of patient goal-concordant care
- Review the principles of palliative care and how they apply to neurosurgery
- Identify neuroethical challenges in end-of-life care

TR T16: Patient Specific Goal-directed Therapy in TBI

Moderator: Julian E. Bailes Jr.

Faculty: Randall M. Chesnut, Gregory W.J. Hawryluk, Laura B. Ngwenya, Eiichi Suehiro, Lori Shutter

Learning Objectives: Upon completion of this session, participants will be able to:

- Apply patient-specific, goal-directed therapy in TBI care
- Recognize how multimodality monitoring is changing
- Help to interpret high ICP values in the context of other parameters

SF T17: Clinical Trials in Movement Disorder Surgery

Moderators: Sharona Ben-Haim, Ashwin Viswanathan

Faculty: H. Isaac Chen, John D. Rolston

Learning Objectives: Upon completion of this seminar, participants will be able to:

- Identify key trials and levels of evidence for movement disorder surgery
- Describe relative advantages and evidence supporting DBS and lesion procedures
- Identify ongoing trials and new device platforms for DBS and lesion surgery

TU T18: Management of Pituitary Adenomas and Parasellar Pathology

Moderators: Daniel F. Kelly, Pamela S. Jones

Faculty: Garni Barkhoudarian, Lola B. Chambless, Paul A. Gardner, Anand V. Germanwala, Nelson M. Oyesiku, Dimitris G. Placantonakis, Daniel M. Prevedello, Gabriel Zada

Learning Objectives: Upon completion of this session, participants will be able to:

- Describe the relevant surgical anatomy for the transsphenoidal technique
- Outline the current surgical techniques and nuances for the resection of pituitary adenomas
- Describe the indications for extended transsphenoidal and transcranial approaches for pituitary adenomas

TU 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

Learning Objectives: Upon completion of this session, participants will be able to:

- Describe multidisciplinary approaches to treating malignant gliomas
- Discuss recent guidelines for managing malignant gliomas
- Outline patient specific approaches to treating malignant gliomas

WINS T20: Beating Press Ganey

Moderator: Ellen L. Air

Faculty: Sharona Ben-Haim, Eugenie S. Kleinerman, Marcella A. Madera

Learning Objectives: Upon completion of this seminar, participants will be able to:

- Identify how Press-Ganey and other patient satisfaction surveys impact reimbursement and patient recruitment
- Negotiate to expand practice
- Explain tips for dealing with challenging patients

1:00–2:00 pm

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. Session attendees will hear from the Editors-in-Chief of leading neurosurgical journals including NEUROSURGERY® Publications, *Acta Neurochirurgica*, *World Neurosurgery*, and the Journal of Neurosurgery Publishing Group.

1:45–2:45 pm

AFTERNOON BEVERAGE BREAK
 Visit the Exhibit Hall

1:45–2:45 pm

RESIDENT SANS CHALLENGE CHAMPIONSHIP ROUND



2:00–2:45 pm

ANNUAL BUSINESS MEETING

Please plan to attend the Annual Business Meeting to hear an update on CNS business from the past year. CNS members will have the opportunity to vote on any proposed bylaws amendments.

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

AFTERNOON SESSIONS

SECTION SESSIONS

(SE) 2:45–4:15 pm

COUNCIL OF STATE NEUROSURGICAL SOCIETIES

What is Value

Moderators: Joseph S. Cheng, Deborah L. Benzil

Speakers: Deborah L. Benzil, John K. Ratliff

Session Description: Value continues to be a buzzword that seems easy to use but difficult to define. In this session we will address aspects of the basis for the value equation and delivery for the neurosurgeon.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Define the value equation
- Assess several issues with definition of value in neurosurgery
- Recount several aspects of implementing value in neurosurgical care

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

3:28–4:15 pm

Oral Abstract Presentations

(CV) 2:45–4:15 pm

SECTION ON CEREBROVASCULAR SURGERY

Future Training of the Cerebrovascular Surgeon

Moderators: Judy Huang, Murat Gunel

Speakers: Daniel L. Barrow, C. Michael Cawley, Cameron G. McDougall

Discussants: Brian L. Hoh, Louis J. Kim, Joseph C. Serrone

Session Description: The cerebrovascular scientific session will explore the gamut of training opportunities and options for the cerebrovascular surgeon of the future, including open, endovascular, and combined approaches, from leading experts in the field. After this critical discussion, the top abstracts in cerebrovascular surgery will be presented as oral presentations.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Discuss the most recent clinical and translational scientific research in the field of cerebrovascular surgery
- Compare the value of open vs endovascular vs combined training in cerebrovascular surgery for the future of cerebrovascular surgery
- Identify critical operative techniques that will enable safe and effective management of cerebrovascular pathologies

2:45–2:55 pm

Modern Open Cerebrovascular Training

Daniel L. Barrow

2:55–3:05 pm

Modern Endovascular Training

Cameron G. McDougall

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

(SP) 2:45–4:15 pm

SECTION ON DISORDERS OF THE SPINE AND PERIPHERAL NERVES

Spine Update: The Evidence

Moderators: Erica F. Bisson, John H. Chi, Eric A. Potts, John H. Shin

Speakers: Dean Chou, Zohar Ghogawala, Praveen V. Mummaneni, William R. Taylor, Juan S. Uribe

Session Description: In this session, speakers will present recent clinical and basic science research in spine surgery.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Analyze the findings of novel spine studies and critique the design and methodology
- List important areas for further knowledge development and research
- Apply results from areas of recent clinical research to their management of patients with spinal disease

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 Subsidizes 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?

Zohar Ghogawala

3:30–4:15 pm

Oral Abstract Presentations

(TR) 2:45–4:15 pm

SECTION ON NEUROTRAUMA AND CRITICAL CARE**Neuromodulation for Spinal Cord Injury****Moderators:** Ann M. Parr, Craig H. Rabb**Speaker:** Susan J. Harkema

Session Description: Dr. Susan Haravma has done outstanding work in SCI research with locomotion and epidural stimulation. Her talk will not only highlight her SCI research and outcome but also address challenges in SCI research and give an overview of other SCI research studies.

Learning Objectives: Upon completion of this session, participants will be able to:

- Identify how epidural stimulation is applied to patients with SCI
- Review the pitfalls and challenges in SCI research
- Discuss the benefit of epidural stimulation in patients with SCI

2:45–3:14 pm

Epidural Stimulation in Patients with Spinal Cord Injury

Susan J. Harkema

3:15–3:27 pm

Questions and Discussion

3:28–4:15 pm

Oral Abstract Presentations

(PA) 2:45–4:15 pm

SECTION ON PAIN**Targets Outside the Dorsal Columns for Pain****Moderator:** Nicholas Au Yong, Ashwin Viswanathan**Speakers:** Ausaf A. Bari, Nicholas M. Boulis, Andre Machado, Sameer A. Sheth, Ashwin Viswanathan

Session Description: Consider pain therapies beyond the dorsal columns for the treatment of pain.

Learning Objectives: Upon completion of this session, participants will be able to:

- Review intracranial targets for lesioning for pain
- Review intracranial targets for DBS for pain
- Identify peripheral therapies for pain

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. Boulis

3:21–3:29 pm

Future Therapies for Pain

Andre Machado

3:30–4:15 pm

Oral Abstract Presentations

(PE) 2:45–4:15 pm

SECTION ON PEDIATRIC NEUROLOGICAL SURGERY**Post-hemorrhagic Hydrocephalus in Premature Infants: Time for a Paradigm Shift?****Moderators:** Sandi Lam, Brandon G. Rocque**Speakers:** Edward S. Ahn, Samuel R. Browd

Session Description: Management of post-hemorrhagic hydrocephalus in premature infants is widely variable. New evidence may suggest a paradigm shift in timing and modality of intervention. A review and discussion of evidence and expert opinion will be held.

Learning Objectives: Upon completion of this session, participants will be able to:

- Review recent evidence related to intraventricular hemorrhage of prematurity
- Discuss benefits and risks of variable modalities of intervention for post-hemorrhagic hydrocephalus in premature infants

Post-hemorrhagic Hydrocephalus in Premature Infants: Time for a Paradigm Shift?

2:45–3:02 pm

Samuel R. Browd

3:03–3:20 pm

Edward S. Ahn

3:21–3:28 pm

Questions and Discussion

3:28–4:15 pm

Oral Abstract Presentations

(SF) 2:45–4:15 pm

SECTION ON STEREOTACTIC AND FUNCTIONAL NEUROSURGERY**Stereotactic and Functional Neurosurgery Update****Moderator:** Guy M. McKhann, Doris D. Wang

Session Description: Combined Didactic with Trauma and Oral Abstract Presentations separate.

Learning Objectives: Upon completion of this session, participants will be able to:

- Analyze the findings of novel neurosurgical studies, critique the design and methodology
- List important areas for further knowledge development and research
- Identify the most important ongoing clinical trials
- Apply lessons of ongoing research to neurosurgical care of patients

(TU) 2:45–4:15 pm

SECTION ON TUMORS**Emerging Concepts in the Management of Brain Metastases****Moderators:** Albert H. Kim, Gelareh Zadeh**Speakers:** Priscilla Brastianos, Veronica Chiang, Steven N. Kalkanis

Session Description: The tumor section session will focus on emerging concepts in the management of brain metastases. Topics to be discussed will include the evidence basis for surgery versus radiation, contemporary management of brain metastases refractory to radiation or

with radiation necrosis, and how immunotherapy affects our modern day management of brain metastases. Top abstracts in brain tumor surgery will be presented.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify common challenges with brain metastases management
- Plan strategies to manage and avoid complication in challenging cases of brain metastases
- Apply these treatment strategies and approaches in their own challenging cases

2:45–2:59 pm

Surgical Management of Mets: Surgery, SRS, WBRT

Evidence and Case-based Talk

Steven N. Kalkanis

2:59–3:13 pm

Treatment of Recurrent/Refractory Mets and Radiation Necrosis: Redo RT or SRS?

Veronica Chiang

3:14–3:27 pm

How Precision Medicine and Immunotherapy are Changing the Management of Mets

Priscilla Brastianos

3:28–4:15 pm

Oral Abstract Presentations

OPERATIVE TECHNIQUES AND CASE-BASED DISCUSSION SESSIONS

SE 4:15–5:45 pm

CSNS: Patient Safety in Neurosurgical Practice

Moderators: Zarina S. Ali, Kristopher T. Kimmell

Speakers: Wayel Kaakaji, Kristopher Kimmel, Brad E. Zacharia

Session Description: Practical patient safety requires a culture that builds on best practices rather than treating safety as an afterthought. This session will provoke discussion and thoughts by bringing up some recurring themes that most neurosurgeons are familiar with and are in need to a true best in class solution.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Discuss topics related to patient safety science and research
- Identify applications for the practice of neurological surgery
- Identify how to engage with other patient safety organizations and stakeholders

4:16–4:27 pm

Anti-coagulation Protocols

Wayel Kaakaji

4:28 pm–4:39 pm

Wrong Side, Wrong Level Protocols

Brad E. Zacharia

4:40–4:51 pm

Safety in Practice

Kristopher Kimmel

4:52–5:15 pm

Oral Abstract Presentations

5:16–5:45 pm

Case-based Discussion

TU 4:15–5:45 pm

Challenging Intrinsic Brain Tumors: Operative Techniques and Case-based Discussions

Moderators: Manish K. Aghi

Discussants: Mitchel S. Berger, Frederick F. Lang, Jack P. Rock, Marie Roguski

Session Description: In this interactive event, expert surgeons will present and discuss

the nuances of difficult tumor cases.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify common challenges with a variety of cranial procedures
- Plan strategies to manage and avoid complication in challenging brain tumors
- Apply these treatment strategies and approaches in their own challenging cases

4:16–4:25 pm

Microneurosurgical Removal of a Posterior Thalamic Glioma Via Posterior Interhemispheric Subsplenial Approach in Lateral Oblique Position: Operative Neurosurgery Video

Ugur Türe

4:26–4:35 pm

2-Dimensional Operative Neurosurgery Video

James K. Liu

4:36–4:59 pm

Oral Abstract Presentations

5:00–5:45 pm

Case-based Discussion

CV 4:15–5:45 pm

Treating Cerebral Aneurysms: Operative Techniques and Case-based Discussions

Moderator: Scott D. Simon

Discussants: Sepideh Amin-Hanjani, Geoffrey P. Colby, Sean D. Lavine, Stavropoula I. Tjoumakaris, Erol Veznedaroglu

Session Description: Pre-submitted cases will be presented and the audience will vote on diagnosis and treatment. An expert panel will then provide their individual opinions and re-vote taken.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify the role of microsurgery in aneurysm treatment
- Identify the role of embolization in aneurysm treatment
- Identify the role of balloons and stents in aneurysm treatment

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
Giuseppe Lanzino

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

4:44–4:59 pm

Oral Abstract Presentations

5:00–5:45 pm

Case-based Discussion

ⓈⓅ 4:15–5:45 pm

Cervical and Thoracolumbar Trauma: Operative Techniques and Case-based Discussions

Moderators: Daniel C. Lu, Justin S. Smith

Discussants: Victor W. Chang, Bradley Jacobs, Michele M. Johnson, Eric A. Potts, Laura A. Snyder, Cheerag D. Upadhyaya, Todd D. Vogel, Lynda J. Yang

Session Description: This session will incorporate an interactive case-based format for discussing management strategies for cervical and thoracolumbar trauma.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Discuss various treatment options for the management of cervical and thoracolumbar trauma
- Describe common complications in cervical and thoracolumbar trauma
- Discuss strategies for identifying and avoiding complications in cervical and thoracolumbar trauma

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

4:36–4:59 pm

Oral Abstract Presentations

5:00–5:45 pm

Case-based Discussion

ⓉⓇ 4:15–5:45 pm

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

Session Description: The timing of surgery for spinal cord injury remains controversial, especially in management of patients with multitrauma. This session will focus on variety of spinal cord injury cases, reviewing the evidence for timing of surgery and the operative approaches. In addition, top abstracts in operative techniques for neurotrauma and neurocritical care will be presented.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify key evidence impacting decision making regarding the timing of surgery for spinal cord injury
- Review measures that can and should be considered for non-operative management of spinal cord injury when surgery is done in a delayed fashion
- Describe key operative techniques for optimizing outcomes of patients with brain and spinal cord injury.

4:16–4:39 pm

Oral Abstract Presentations

4:40–5:45 pm

Case-based Discussion

ⓅⓂ 4:15–5:45 pm

Neurosurgery for Pain: Operative Techniques and Case Based Discussions

Moderator: Julie G. Pilitsis

Discussants: James McInerney, Joshua M. Rosenow, Jason M. Schwalb, Jennifer A. Sweet

Speaker: Ido Strauss

Session Description: Faculty will present challenging pain surgery cases to be discussed with the audience.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify several approaches at the disposal of a pain neurosurgeon
- Discuss pros and cons of different approaches to a clinical situation
- Integrate new techniques into their practice

4:16–4:25 pm

Cordotomy for Pain

4:26–4:35 pm

Cingulotomy for Pain

Ido Strauss

4:36–4:59 pm

Oral Abstract Presentations

5:00–5:45 pm

Case Based Discussion

Ⓟ 4:15–5:45 pm

Challenges in Recurrent Pediatric Epilepsy: Operative Techniques and Case-based Discussions

Moderator: Gary W. Mathern

Discussants: David F. Bauer, Daniel Curry, David D. Gonda, Jeffrey G. Ojemann, Jeffrey S. Raskin

Session Description: Discussion of challenging pediatric epilepsy cases: treatment options and best practice.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Identify advantages and disadvantages of treatment modalities in pediatric epilepsy
- Discuss challenges in the treatment of epilepsy in children
- Apply best practice paradigms to individual practice

4:15–4:45 pm

Oral Abstract Presentations

4:46–5:45 pm

Case Based Discussion

5:45–7:15 pm

NEW INTERACTIVE MULTIMEDIA RESEARCH PRESENTATION SESSION

Moderators: Sharona Ben-Haim, Erica F. Bisson, Orin Bloch, Justin M. Brown, Mohamad Bydon, Melanie Hayden Gephart, Shawn L. Hervey-Jumper, Alan S. Hoffer, Mark D. Krieger, Sandi Lam, Guy M. McKhann, Sarah T. Menacho, Scott A. Meyer, Ann M. Parr, Julie G. Pilitsis, Robert M. Richardson, Dimitri Sigounas, Scott D. Simon, Robert M. Starke, Ashwin Viswanathan

Session Description: The Interactive Multimedia Research Presentation Session aims to invigorate scientific presentation and discussion, complemented by wine and cheese. Selected abstracts will present “poster talks” in the Interactive Multimedia Research Presentation hall, highlighting key advances in each field.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Analyze the findings of novel translational and clinical neurosurgical studies, critique the design and methodology
- Identify knowledge gaps requiring additional investigation and research
- Identify the most important ongoing clinical trials and recent results impacting clinical practice
- Apply lessons of ongoing research to neurosurgical care of patients

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

\$190 (includes three-course dinner and beverages)

Ⓟ **DIN4: Advances in LITT**

Moderators: Gene H. Barnett, Shabbar F. Danish

Faculty: Robert E. Gross, Jonathan R. Jagid, Alireza M. Mohammadi, Dimitris G. Placantonakis

Seminar Description: This dinner seminar will feature focused talks on indications for LITT, current outcome data, and practical steps to establishing a LITT program.

Learning Objectives: *Upon completion of this seminar, participants will be able to:*

- Outline the various pathologies for which LITT can be utilized
- Discuss clinical efficacy and outcomes with LITT for brain tumors and epilepsy
- Describe the process for implementing a LITT program at one’s institution/hospital and current billing issues



HARRIS' THE SAN FRANCISCO STEAKHOUSE

Celebrating their 35th year, Harris' continues the rich tradition of luxurious dining in a warm, comfortable, sophisticated environment. Harris' Steakhouse has become a household name in the Bay Area. Their commitment to the classic traditions of an elegant atmosphere, exceptional service, and extraordinary cuisine have made them the San Francisco Steakhouse.

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.

NEW THIS YEAR

Advanced Endoscopic and Exoscopic Neurosurgery Seminar

The use of minimally invasive approaches is becoming more prevalent with new visualization tools, including both endo- and exo-scopes. This free Wednesday afternoon seminar features high-impact neurosurgeons providing in-depth exploration of cutting-edge technology and strategy employing endo- and exoscopic visualization. This course will highlight approaches to tumors, cerebrovascular pathologies, and spinal disease.



GUIDELINES AND SUNRISE SCIENCE

SF SUNRISE SCIENCE AND LATE BREAKING ABSTRACT SESSION

Moderators: Emad N. Eskandar, Adam N. Mamelak

PA SUNRISE SCIENCE AND LATE BREAKING ABSTRACT SESSION

Moderators: Ausaf A. Bari, Sharona Ben-Haim

7:00–8:30 am

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Analyze the findings of novel neurosurgical studies, critique the design and methodology
- List important areas for further knowledge development and research
- Identify the most important ongoing clinical trials
- Apply lessons of ongoing research to neurosurgical care of patients

CV 7:00–8:30 am

Cerebrovascular Guidelines: Aneurysms, Arteriovenous Malformations, and Acute Ischemic Stroke

Moderators: Scott D. Simon, Stavropoula I. Tjoumakaris

Speakers: Sepideh Amin-Hanjani, Mark D. Bain, Kevin M. Cockroft, Aaron S. Dumont, J D. Mocco, Clemens M. Schirmer, Babu G. Welch, Stacey Q. Wolfe

Session Description: A diverse and experienced panel of leaders in cerebrovascular neurosurgery will provide an overview of the most current guidelines in the neurosurgical treatment of brain aneurysms, brain arteriovenous malformations, and acute ischemic stroke.

Learning Objectives: *Upon completion of this session participants will be able to:*

- Identify the current guidelines for the treatment of brain aneurysms
- Identify the current guidelines for the treatment of brain AVMs
- Identify the current guidelines for the neurosurgical treatment of acute ischemic stroke

7:00–7:30 am

Guidelines for the Treatment of Cerebral Arteriovenous Malformations

7:00–7:10 am

Natural History and Management of Unruptured AVMs

Sepideh Amin-Hanjani

7:10–7:20 am

Management of Ruptured AVMs

Clemens M. Schirmer

7:20–7:30 am

Management of Dural AVFs

Stacey Q. Wolfe

7:30–8:00 am

Guidelines for the Treatment of Cerebral Aneurysms

7:30–7:40 am

Screening, Natural History, and Medical Management

Aaron S. Dumont

7:40–7:50 am

Indications and Outcomes of Surgery for Cerebral Aneurysms

Kevin M. Cockroft

7:50–8:00 am

Indications and Outcomes of Endovascular Surgery for Cerebral Aneurysms

Babu G. Welch

8:00–8:15 am

Guidelines for the Neurosurgical Treatment of Acute Ischemic Stroke

8:00–8:15 am

Update on Trials

J D. Mocco

8:15–8:30 am

Guidelines for the Neurosurgical Treatment of Spontaneous Intraparenchymal Hemorrhage

8:15–8:30 am

Update on Trials

Mark D. Bain

TU 7:00–8:30 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,

Session Description: This morning's guidelines sessions will present a critical overview of evidence-based guidelines for management of glioblastoma, including discussions of the role of surgery and the impact of extent of resection on overall management. The session will discuss potentially important adjuncts to the surgical management of glioblastoma including neuromonitoring and laser ablation. Finally, key thought leaders in neuro-oncology will review the merging field of personalized medicine and chemotherapy for glioblastoma.

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Explain the role of and safe strategies for aggressive resection in the management of patients with glioblastoma
- Critically analyze the literature supporting the use of laser ablation in the management of patients with glioblastoma
- Critically assess the evolving field of personalized medicine and chemotherapy in the management of glioblastoma

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

(TR) (SP) 7:00–8:30 am

Brain and Spine Trauma Guidelines—What you Need to Know

Moderators: Paul M. Arnold, Patricia B. Raksin

Speakers: John H. Chi, Sanjay S. Dhall, Jamshid Ghajar, R. John Hurlbert, Daniel M. Sciubba, Emily P. Sieg, Michael F. Stiefel, Eve C. Tsai

Session Description: This sunrise guidelines session will explore the latest evidence, guidelines, and management recommendations in the acute management of brain and spine trauma and neurosurgical emergencies. Critical and controversial issues in acute neurotrauma management will be discussed, including the role and timing of decompressive craniectomy, reversal of antithrombotics, operative vs non-operative management and timing of surgery for spine trauma, and the critical medical management issues for spinal cord injury.

Learning Objectives: Upon completion of this session, participants will be able to:

- Discuss severe TBI guidelines recommendations on ICP measurement and hemicraniectomy
- Evaluate use of Reversal agents of Antithrombotics in Intracranial Hemorrhage
- Apply the Guidelines for Acute Cervical and Thoracolumbar Spine Trauma

7:00–7:10 am

BTF Guidelines 4: Are They Still Useful? Next steps

Jamshid Ghajar

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

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

GENERAL SCIENTIFIC SESSION IV

Presiding Officer: Elad I. Levy

Moderators: Maya A. Babu, Praveen V. Mummaneni

Learning Objectives: *Upon completion of this session, participants will be able to:*

- Summarize the evidence and its limitations with respect to extensive resection of gliomas
- Summarize key evidence-based advances in functional neurosurgery
- Describe key elements of effectively communicating scientific and technical concepts to the non-scientists and non-clinicians

8:40–8:43 am

Introduction and Disclosures

Elad I. Levy

8:43–8:50 am

Operative Neurosurgery Highlight

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

10:00–10:30 AM

LIVE SURGERY
IN THE EXHIBIT HALL

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

Krystof S. Bankiewicz



11:19–11:27 am

Japanese CNS Presidential Address
Yukihiro Sonoda

11:27–11:30 am

Introduction of Aaron Carroll

Mohamad Bydon



11:30 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, medical students, and advance practice providers)

(CV) W21: Middle Meningeal Artery Embolization for Subdural Hematoma Treatment

Moderator: Christopher P. Kellner

Faculty: Bradley N. Bohnstedt, Gyojun Hwang, Peter Kan, Jared Knopman

Learning Objectives: Upon completion of this session, participants will be able to:

- Discuss the data available surrounding the use of MMA embolization for SDH treatment
- Identify ongoing trials evaluating this treatment strategy
- Identify patient selection for this treatment strategy

(CV) 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, David M. Hasan, R. Loch Macdonald, Matthew Reynolds

Learning Objectives: Upon completion of this session, participants will be able to:

- Identify the role of nimodipine
- Identify the role of angioplasty
- Learn about emerging therapies

(SP) W23: Novel Techniques for Management of Lumbar Spondylolisthesis

Moderators: Randy Kritzer, David O. Okonkwo

Faculty: Nathaniel P. Brooks, John H. Chi, John H. Shin, Robert G. Whitmore

Learning Objectives: Upon completion of this session, participants will be able to:

- Discuss diagnosis, classification, and indications for treatment of lumbar spondylolisthesis
- Describe various surgical techniques and approaches for neural decompression, spinal stabilization, and spondylolisthesis correction
- Identify and avoid complications in the management of lumbar spondylolisthesis

(TR) W24: TBI in the Elderly

Moderator: Daniel B. Michael

Faculty: Gary Abrams, Jack Jallo, Emily P. Sieg, Eve C. Tsai

Learning Objectives: Upon completion of this session, participants will be able to:

- Identify the barriers to patient-concordant care
- Articulate outcome in elderly patients with TBI
- Identify correct management strategies for patients with chronic SDH

(SE) W25: Neurosurgeon Entrepreneur

Moderators: John R. Adler, Jeremy T. Phelps

Faculty: Stanley Pelofsky, Edie E. Zusman

Learning Objectives: Upon completion of this session, participants will be able to:

- Identify available entrepreneurship opportunities
- List the relative pros and cons of these opportunities
- Define strategies for potential participation in entrepreneurship endeavors

(PE) W26: Chiari Malformations

Moderator: David D. Limbrick

Faculty: Ulrich Batzdorf, David M. Frim, Jeffrey R. Leonard, Karin M. Muraszko

Learning Objectives: Upon completion of this seminar, participants will be able to:

- Review the radiographic criteria and clinical findings for Chiari malformation
- Summarize the updated evidence regarding Chiari malformation and management options
- Apply updated evidence and patient selection criteria for the management of Chiari patients to current practice patterns

(SP) W27: Clinical Trials in Epilepsy Surgery

Moderator: Aviva Abosch

Faculty: Jorge A. Gonzalez-Martinez, Robert E. Gross, Timothy H. Lucas

Learning Objectives: Upon completion of this seminar, participants will be able to:

- Identify key trials and levels of evidence for resective epilepsy surgery
- Describe relative advantages and evidence supporting neuromodulation procedures, including VNS, DBS, and RNS
- Discuss evidence regarding seizure freedom and neurocognitive effects of laser ablation

(TU) W28: Update on Diagnosis and Management of Low Grade Gliomas

Moderators: Susan M. Chang, Viviane S. Taber

Faculty: Daniel P. Cahill, Jennifer A. Moliterno Gunel, Brian V. Nahed, Daniel A. Orringer

Learning Objectives: Upon completion of this session, participants will be able to:

- Describe multidisciplinary approaches to treating low-grade gliomas
- Discuss recent guidelines for managing low-grade gliomas
- Outline patient specific approaches to treating low-grade gliomas

(TU) 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

Learning Objectives: Upon completion of this session, participants will be able to:

- Outline the different modalities currently available and under investigation for visualizing brain tumors
- Explain the roles of the various imaging modalities used for brain tumors
- Describe the evidence for the biological processes being visualized by advanced imaging

Moderator: Anna Terry

Faculty: Christopher S. Graffeo, Carrie R. Muh, Faith C. Robertson, Linda Xu, Isaac Yang

Learning Objective: Upon completion of this seminar, participants will be able to:

- Identify the high-impact social media platforms for business growth
- Apply how to brand your practice
- Apply how to combat negative social media



1:45–4:45 pm

Advanced Endoscopic and Exoscopic Neurosurgery Seminar

Course Directors: William T. Curry, Brian V. Nahed
Faculty: John A. Boockvar, Charles L. Branch Jr., Christopher J. Farrell, Paul A. Gardner, Constantinos G. Hadjipanayis, John Y.K. Lee, Peter Nakaji, Shaan M. Raza, Gabriel Zada

Course Description: The use of minimally invasive approaches is becoming more prevalent. Through this seminar, we hope to explore and review the most up-to-date technologies and strategies employing endoscopic and exoscopic visualization.

Learning Objectives:

- Recognize novel methods and approaches to CSN pathology using endoscopy.
- Identify benefits, drawbacks, and the potential applications of neurosurgical visualization using exoscopic technology

1:45–3:15 pm

Cranial, Neurotrauma and Critical Care, Spine, and Late Breaking Abstract Sessions

Learning Objectives: Upon completion of this session, participants will be able to:

- Analyze the findings of novel neurosurgical studies, critique the design and methodology
- List important areas for further knowledge development and research
- Identify the most important ongoing clinical trials
- Apply lessons of ongoing research to neurosurgical care of patients

All speakers and topics are subject to change

CONTINUING MEDICAL EDUCATION

CONGRESS OF NEUROLOGICAL SURGEONS 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.

SYMPOSIA

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 half-day Symposia, a maximum of 6 *AMA PRA Category 1 Credits™* for each eligible Saturday full-day Symposia, a maximum of 3.5 *AMA PRA Category 1 Credits™* for each eligible Sunday half-day Symposia, and a maximum of 6 *AMA PRA Category 1 Credits™* for each eligible Sunday full-day Symposia. Physicians should only claim credit commensurate with the extent of their participation in the activity.

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 their AMA PRA certificate application or apply directly to the AMA for an *AMA PRA Category 1 Credits™* certificate.

Physicians may claim *AMA PRA Category 1.5 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.

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.

Disclosures will be published in the Scientific Program Book that will be distributed at the Annual Meeting.

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.

GENERAL INFORMATION

AIRLINE DISCOUNTS

The CNS is pleased to offer discounts with the following airlines. Discounts are available for flight dates between Wednesday, October 16 and Friday, October 25, 2019 to and from SFO.

American Airlines – www.aa.com

After selecting your flights, on the “Passenger Detail” page, enter code **65H9BQ** in the **Promotion Code** box at the bottom of the screen, in the “Promo codes and accounts” section. You will see your discount displayed in the “Cost Summary” section of the “Review and pay” screen.

United Airlines – www.united.com

After entering your travel information on the home page, click the **Advanced Search** link. At the bottom of this page, enter discount code **ZH39567174** into the “**Promotions and certificates**” box. All prices displayed for your flights search will now reflect the discounted prices.

Delta Airlines – www.delta.com

After entering your travel information on the home page, select the **Advanced Search** link. Enter discount code **NY2UW** in the Meeting Code (Optional) field. All prices displayed for your flights search will now reflect the discounted prices.

AIRPORT

The CNS Annual Meeting hotels and the Moscone West Convention Center are located approximately 12 miles from San Francisco International (SFO) Airport. Taxis depart from the designated taxi zones located at the roadway center islands, on the Arrival/Baggage Claim Level of all terminals. Uber and Lyft are both also available in the San Francisco area.

AMERICANS WITH DISABILITIES ACT

Wheelchairs, scooters, information booths, designated parking, TDD telephones, and other services are available for visitors with disabilities. For wheelchair or electric scooter rental, please contact either Scootaround at 877-484-5482 or www.scootaround.com or Cloud of Goods at 415-621-9757 or www.cloudofgoods.com. It is strongly suggested that you make your reservation in advance of your arrival.

Please let us know if, under the ADA, you require special accommodations or services in order to attend the 2019 CNS Annual Meeting. We want to ensure that no individual with a disability is excluded because of the absence of auxiliary aids and services. Your requirements should be sent directly to the CNS Annual Meeting Registration and Housing Center at: cns@mcievents.com or by calling 1-800-931-9543. Please provide any requests at least 30 days prior to the Annual Meeting to allow adequate time to accommodate your request.

ATTIRE

Professional attire is appropriate at the Annual Meeting and in the Exhibit Hall. Some San Francisco restaurants require coats and ties for gentlemen. Please check each restaurant's policy when making reservations.

CNS CENTRAL

Conveniently located adjacent to the CNS Registration Area, visit CNS Central with your questions on CNS membership, education, or CME. CNS staff will be available to help you navigate our website, review the case based Nexus product or download any CNS apps on your mobile devices. 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 this year's awardees and featured speakers, connect with your colleagues and mentors, view digital posters, hear unique presentations, and get your hands on new technology featured throughout the meeting. Don't miss the book signings with the Featured Speakers each day!

CHILDREN

Children over the age of 12 should register at the non-medical guest registration fee. (Please note that children under the age of 18 are not allowed in the 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 or these services. This information is provided solely to assist participants in identifying possible sources for childcare.

CLIMATE

October temperatures in San Francisco average a high of 70°F and a low of 55°F.

COURSE AGENDAS AND FACULTY

Agendas are occasionally subject to change. As we 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.

FUTURE MEETINGS

2020: Miami, Florida	September 12–16
2021: Austin, Texas	October 16–20

HOUSING INFORMATION

See pages 73-75 for detailed information.

REGISTRATION INFORMATION

Items included in registration fee:

- General Scientific Sessions
- Scientific Program to include Section Sessions, Oral Abstract Presentations, Sunrise Science and Late Breaking Abstract Sessions, Guidelines Sessions, Operative Technique Sessions, International Symposia, Interactive Multimedia Research Presentation Session and Digital Posters
- CNS Xperience Lounge
- Live Surgeries
- Exhibit Hall
- Opening Reception on Sunday

PRESS ROOM

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 onsite, 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 AND CNS CENTRAL HOURS:

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

SMOKING

The Moscone West Convention Center and official CNS hotels are non-smoking facilities.

SPEAKER READY ROOM

All speakers and abstract presenters should visit the Speaker Ready Room in room 3000 at the Moscone West Convention Center no less than two hours prior to their presentations to upload the most recent version of your presentation.

Saturday, October 19	7:00 am–4:30 pm
Sunday, October 20	7:00 am–6:30 pm
Monday, October 21	6:30 am–5:00 pm
Tuesday, October 22	6:30 am–5:00 pm
Wednesday, October 23	6:30 am–1:00 pm

SPOUSE HOSPITALITY SUITE

All registered CNS Annual Meeting spouses and guests are invited to visit the CNS Spouse Hospitality Suite at the San Francisco Marriott Marquis, Monday through Wednesday, from 8:00–10:30 am for continental breakfast. Please note that admittance to the 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.

VISA INFORMATION

The State Department of the United States encourages international participants to apply for their visas as early as possible—at least several months before the meeting. Some consulates may have backlogs in scheduling visa interviews, so applicants should first contact the consulate to find out how long the wait is for an interview. For information on the visa process, including wait times, please visit <https://travel.state.gov/content/travel/en/us-visas.html>.

WI-FI SERVICE

For your convenience, complimentary Wi-Fi service is provided throughout the Moscone West Convention Center and the San Francisco Marriott Marquis wherever CNS events are being held.

REGISTRATION INFORMATION

REGISTRATION METHODS

For your convenience, you can register and reserve your hotel room via these four methods:

ONLINE

cns.org/2019

PHONE*

800-931-9543 US & Canada
972-349-5539 International
8:00 am–6:30 pm CST

FAX*

972-349-7715

MAIL*

CNS Annual Meeting
CNS Registration and Housing Center
6100 West Plano Parkway
Suite 3500
Plano, TX 75093

*Allow five business days for registration and housing confirmation. The CNS Registration and Housing Center is not responsible for faxes not received due to mechanical failure or circumstances beyond our control.

CREDIT CARD PAYMENTS

US dollars and drawn on a US bank

- Visa
- Mastercard
- American Express

CHECK PAYMENTS

- US dollars and drawn on a US bank
- Full payment must accompany your registration form
- Any checks received from an overseas bank will be returned
- Any checks returned for insufficient funds are subject to additional charges

MATERIALS PICK-UP

All materials should be picked up on-site at the Moscone West Convention Center or on Saturday and Sunday at the San Francisco Marriott Marquis.

REGISTRATION RATES

MEMBER REGISTRANT

	ADVANCE REGISTRATION (prior to September 18, 2019)	AFTER SEPTEMBER 18, 2019
Active (Domestic, International), Associate (Non-neurosurgeons with distinction in a neurosurgically-related discipline)	\$ 750	\$ 950
Active Duty Military	\$ 0	\$ 0
Armed Forces (Guard/Reserve/Retiree)	\$ 475	\$ 675
Transitional (Residency Graduate)	\$ 750	\$ 950
Resident (Domestic)	\$ 150	\$ 250
International Vista Resident	\$ 150	\$ 250
Fellow (Domestic & International)	\$ 200	\$ 300
Senior	\$ 450	\$ 650
Medical Student (Enrolled in an accredited medical school in US or Canada)	\$ 0	\$ 200
Affiliate (Allied healthcare professionals involved in neurosurgically related patient care, teaching, or research)	\$ 350	\$ 550

NON-MEMBER REGISTRANT

Neurosurgeon, Physician (MD, DO, etc.), Non-physician (Clinical Researcher/Scientist)*	\$ 1000	\$ 1200
Neurosurgeon (Faculty)	\$ 850	\$ 1050
Resident	\$ 400	\$ 500
Fellow	\$ 450	\$ 550
Medical Student	\$ 250	\$ 450
PA/Physician Extender/Nurse/Nurse Practitioner	\$ 600	\$ 800
Corporate Representative†	\$ 1250	\$ 1450
Non-member Graduate Student/ Post-doctoral Scholar	\$ 150	\$ 250
ANSPA Member††	\$ 575	\$ 675
Program Coordinator	\$ 0	\$ 0
Developing Nation Rate (See page 53 for complete list of nations)	\$ 150	\$ 250
Attendee Spouse	\$ 0	\$ 150

*Non-member/Non-physician category is limited to scientists, engineers, etc. involved in neurosurgical research and/or product development not affiliated with an exhibiting company.

†Corporate representatives attend for education only. They must not conduct sales activities in the meeting space, nor influence content in any way. Solicitation of medical attendees is strictly prohibited.

††Includes one year of CNS Affiliate membership in 2020 for ANSPA Members only

NOT A CNS MEMBER? THERE'S NO BETTER TIME TO JOIN!

CNS Members have complimentary access to our world-class *Neurosurgery* journals, discounts on valuable self-assessment tools, access to educational online resources, and so much more.

Plus, you'll see instant savings—select “Applicant Fee” when you register for the Annual Meeting and receive \$250 off of your fees! See our full list of member benefits and apply at cns.org/membership

IMPORTANT DATES TO REMEMBER

- SEPTEMBER 18** Advance Registration Discount and Housing Deadline
- SEPTEMBER 25** Last day to cancel registration in order to receive a full refund, less a \$100 processing fee
- OCTOBER 9** Last day to make any hotel changes or cancellations through the CNS Housing provider:
Email: cns@mcievents.com
Phone: 800-931-9543
International: 972-349-5539
- OCTOBER 10** Any hotel changes or cancellations must be made directly with the hotel after October 10. Individual hotel cancellation policies can be found on your original housing confirmation.

REGISTRATION CHANGE/CANCELLATION INFORMATION

Full registration refunds, less a \$100 processing fee, will be granted if written requests for cancellation are received by 5:00 pm CST on September 25, 2019. Course and Seminar tickets will be refunded in full until September 25, 2019. No refunds of any kind will be given after this date, regardless of cause. Refunds will not be given for no-shows.

CANCELLATION REQUESTS ACCEPTED VIA:

E-mail: cns@mcievents.com
Fax: 972.349.7715
Mail: CNS Annual Meeting
CNS Registration and Housing Center
6100 West Plano Parkway
Suite 3500
Plano, TX 75093

HOTEL INFORMATION

Please contact MCI, the official CNS Annual Meeting Registration and Housing Center to reserve your guest rooms.

Hotels will not accept reservations from CNS meeting attendees directly. Reservations can be made online or via fax, phone, or mail.

Visit cns.org/2019 to make your reservation today! Be sure to complete the entire housing section on the reservation form.

Hotel reservations are only available to registered CNS attendees. Rooms are subject to availability. Reserve your room by September 18, 2019.

DEPOSIT

A deposit of one night's room and tax is due at the time your hotel reservation is made. This payment must be submitted with your registration fee and will be charged to the credit card provided. Please make checks payable to: CNS Registration and Housing Center at 6100 W. Plano Parkway, Suite 3500, Plano, TX 75093. All rooms are subject to applicable state and local taxes. A small portion of your room rate will be used to help defray the cost of registration and housing services. Hotel reservations requested without deposit will not be processed.

HOTEL CHANGE/CANCELLATION POLICY

The deadline for new reservations is September 18 based on availability. The hotel requires a deposit of one night's room and tax to reserve your room. Please make any changes or cancellations through the CNS housing bureau, MCI, through October 9. Beginning October 10, changes and cancellations must be made directly with your reserved hotel. Please refer to your housing confirmation for your individual hotel's cancellation policy.

BEGINNING OCTOBER 10, 2019

- All changes, cancellations, or questions regarding your reservation must be made directly with the hotel.
- If cancellation notice is not received according to the hotel policy, the deposit will be forfeited. Your individual hotel's cancellation policy can be found in your emailed confirmation.

COMPLIMENTARY HOUSING FOR CNS RESIDENT MEMBERS AND INTERNATIONAL VISTA RESIDENT MEMBERS

Complimentary housing at the CNS Annual Meeting is available to a limited number of CNS Resident members and International Vista Resident members on a first-come, first-served basis.

To be considered for this program, members must:

- Complete and submit the Resident member housing application by August 9. Completed applications may be submitted by email: meetings@cns.org, fax: 847-240-0804, or mail: Congress of Neurological Surgeons, 10 North Martingale Rd., Suite 190, Schaumburg, IL 60173.
- Register for the 2019 CNS Annual Meeting by August 9.
- All residents enrolled in ACGME-approved programs have been automatically given complimentary CNS Resident membership.
- If you are not a CNS Resident member or International Vista Resident member, complete your application by July 26. You may also apply for CNS membership when you register for the Annual Meeting online, and will be eligible for the Resident Member registration rate.

Residents who choose to reserve a room through the CNS Annual Meeting Registration and Housing Center and are later accepted into the CNS Resident Housing Program are responsible for cancelling their original reservation.

For complete resident housing application guidelines, please visit cns.org/2019/residents.

THANK YOU FOR YOUR CONTINUED SUPPORT OF THE CNS!

The CNS thanks you for your support in reserving your guest room through the official CNS Housing and Registration Center. The CNS, in negotiating contracts with convention centers and hotels, must commit to a minimum number of guest rooms. This commitment helps guarantee the availability of meeting space and helps control the cost of the meeting. A history of high utilization of our room block enables the CNS to negotiate better room rates for future meetings.

HOTEL ROOM RATES (All CNS hotels include complimentary guest room internet and fitness center)	Single/Double (Excludes local/state tax and fees)	Single/Double (Includes local/state tax and fees*. This is the deposit amount)
San Francisco Marriott Marquis – Headquarters Hotel	\$395.00	\$459.19
Four Seasons Hotel San Francisco	\$509.00	\$592.93
Hilton San Francisco	\$329.00	\$383.25
InterContinental San Francisco	\$389.00	\$453.15
Palace Hotel	\$445.00	\$518.38
Parc 55–A Hilton Hotel	\$329.00	\$383.25
Westin St. Francis	\$339.00	\$394.90

*Tax rates subject to change.

HOTEL INFORMATION

CONTINUE YOUR CNS SIGNATURE EXPERIENCE AT OUR PARTNER HOTELS

1 SAN FRANCISCO MARRIOTT MARQUIS— HEADQUARTERS HOTEL

780 Mission Street
San Francisco, CA 94103

Distance to Moscone West Convention Center:
1 block away

Shuttle service only provided to and from dinner seminars and social events as applicable.

Amenities Include:

- Local Restaurant Delivery Service
- Full Service Spa
- Car Rental
- Valet Dry-Cleaning
- In-Room Coffee Maker/Tea Service
- In-Room Mini Refrigerator

2 FOUR SEASONS HOTEL SAN FRANCISCO

757 Market Street
San Francisco, CA 94013

Distance to Moscone West Convention Center:
2 blocks away

Amenities Include:

- Onsite Restaurant
- Room Service Available
- Laundry and Dry-Cleaning Services
- Babysitting Services

3 HILTON SAN FRANCISCO

333 O'Farrell Street
San Francisco, CA 94102

Distance to Moscone West Convention Center:
0.5 mile away
Shuttle service provided

Amenities Include:

- Restaurants onsite
- Value Laundry Service
- Car Rental
- In-Room Mini Refrigerator
- Complimentary Shuttle to Convention Center

4 INTERCONTINENTAL SAN FRANCISCO

888 Howard Street
San Francisco, CA 94103

Adjacent to Moscone West Convention Center

Amenities Include:

- Restaurant Onsite
- Room Service Available
- Valet Dry Cleaning Service

5 PALACE HOTEL

2 Montgomery Street
San Francisco, CA 94105

Distance to Moscone West Convention Center:
1 mile away
Shuttle Service provided

Amenities Include:

- Restaurants Onsite
- Room Service Available
- Car Rental
- Valet Dry-Cleaning Service
- In-Room Coffee Maker/Tea Service
- In-Room Mini Refrigerator
- Complimentary Shuttle to Convention Center

6 PARC 55 SAN FRANCISCO—A HILTON HOTEL

55 Cyril Magnin Street
San Francisco, CA 94102

Distance to Moscone West Convention Center:
0.6 mile away
Shuttle Service provided

Amenities Include:

- Restaurants Onsite
- Valet Laundry Service
- In-Room Coffee Maker/Tea Service
- Complimentary Shuttle to Convention Center

7 WESTIN ST. FRANCIS

335 Powell Street
San Francisco, CA 94102

Distance to Moscone West Convention Center:
1 mile away
Shuttle Service provided

Amenities Include:

- Restaurant Onsite
- Valet Laundry Service
- Amenities Menu Available
- Kids Club
- Pet Friendly
- Complimentary Shuttle to Convention Center



- 1 San Francisco Marriott Marquis
780 Mission Street San Francisco / 415-896-1600
- 2 Four Seasons Hotel San Francisco
757 Market Street San Francisco / 415-633-3000
- 3 Hilton San Francisco Union Square
333 O'Farrell Street San Francisco / 415-771-1400
- 4 InterContinental San Francisco
888 Howard Street San Francisco / 415-616-6500
- 5 Palace Hotel, A Luxury Collection Hotel
2 New Montgomery Street San Francisco / 415-512-1111
- 6 Parc 55 San Francisco - A Hilton Hotel
55 Cyril Magnin Street San Francisco / 415-392-8000
- 7 The Westin St. Francis San Francisco On Union Square
335 Powell Street San Francisco / 415-397-7000

2019 EXHIBITORS



7D Surgical	JTS Surgical	Panasonic
Abbott	K2M, Inc.	Penumbra, Inc.
Ad-Tech Medical Instrument Corp.	Karl Storz Endoscopy - America, Inc.	Phasor Health LLC
Aesculap, Inc	Kelyniam Global, Inc.	PMT Corporation
American Association of Neurological Surgeons	Kirwan Surgical Products LLC	Portola Pharmaceuticals
Apex Medical, Inc.	KLS Martin Group	pro med instruments, Inc.
Arbor Pharmaceuticals, LLC	Kogent Surgical	Providence Medical Technology, Inc.
Arkis BioSciences	Koros USA, Inc.	Renishaw Inc.
Baylor Scott & White Health	Leica Microsystems	Rose Micro Solutions
Best Medical International, Inc.	Life Instrument Corporation	RosmanSearch, Inc.
Biocomposites Inc.	Med X Change	RTI Surgical
Biologica Technologies	Medical Education Research Institute	Scanlan International, Inc.
Bioplate, Inc.	Medtronic, Inc.	Shukla Medical
Boss Instruments Ltd	MicroVention	SI-BONE, Inc.
Boston Scientific	Misonix, Inc.	Siemens Healthineers
Brain Navi Biotechnology Co., Ltd.	Mizuho America, Inc.	Sophysa USA, Inc.
CTL Amedica	Mizuho OSI	Spine Wave Inc.
DePuy Synthes	Mobius Imaging, LLC	Spineology Inc.
Designs For Vision, Inc.	Monteris Medical	Stryker
DIXI Medical USA	Nadia International, Inc.	Surgical Theater
DJO	Natus Neuro	SurgiTel
elliquence	NeuroPace, Inc.	Sutter Medical Technologies USA
Elsevier, Inc.	NeuroPoint Alliance	Synaptive Medical
Fehling Surgical Instruments	Nevro	Takayama Instrument, Inc
Gauthier Biomedical	NICO Corporation	TeDan Surgical Innovations, LLC
GE Healthcare	North American Neuromodulation Society (NANS)	The Brain Aneurysm Foundation
Globus Medical	North American Spine Society	Thieme Medical Publishers, Inc. / Thieme Medical Publishing
GT Medical Technologies, Inc.	NovaBone Products LLC	Thompson Surgical Instruments, Inc.
Hayes Healthcare	Novocure, Inc.	Tobra Medical
Hemedex	NSK America Corp.	Weatherby Healthcare
Hitachi Healthcare	NuTech Spine	Wiggins Medical
IMRIS	NX Development Corp	Xoran Technologies LLC
Innovasis, Inc.	Olympus America, Inc.	Zap Surgical Systems, Inc.
Integra Lifesciences	OssDsign	Zeiss
Invenio Imaging Inc	OsteoMed	Zimmer Biomet
IRRAS	Oxford University Press	
Joimax, Inc.		
Journal of Neurosurgery		

as of May 2019



CNS

Oral Boards Review Course

October 19–20, 2019 | San Francisco, CA

**After Years of Training,
It's the Final Ascent.
The ABNS Oral Boards.
Expert Guides Can Help You
Conquer the Summit.**

**It all culminates here.
Let the CNS Oral Boards Review Course
prepare you for the last leg.**

Register with CNS today.

cns.org/oralboards

Register by September 18 to save \$200.





Congress of Neurological Surgeons

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

CNS Education Courses

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



The Basis of a Rewarding Neurosurgical Career: A Career Guide for New Attending Physicians and Fellows

August 10–11, 2019 | Rosemont, Illinois

cns.org/careerguide

Recent residency graduates or post-graduate fellows embarking on their neurosurgical career



Tumor Complications

January 25–26, 2020 | Las Vegas, Nevada



Spine Complications Course

February 7–9, 2020 | Park City, Utah



CNS Skull Base Fellows Course

August 29–30, 2019 | Cleveland, Ohio

cns.org/skullbase

Skull base fellows or early-career neurosurgeons with an interest in skull base surgery

Jointly Provided Courses



Spine Summit 2020

March 5–8, 2020 | Las Vegas, Nevada

cns.org/spine

Pain Section Meeting 2020

March 2020 | Las Vegas, Nevada



**2020
CNS Annual
Meeting**
Miami, Florida
September 12–16, 2020