

Western Neurosurgical Society



American
Association of
Neurological
Surgeons

Jointly Provided by AANS

CALENDAR OF EVENTS

Thursday, September 10, 2015

12:00pm – 4:00pm	Executive Board Meeting	Grand Boardroom
12:30pm – 5:00pm	Registration	Grand Promenade 2
6:00pm – 9:00pm	Opening Reception	Ilima Garden (<i>Weather Backup Grand Ballroom 3/4/5</i>)

Friday, September 11, 2015

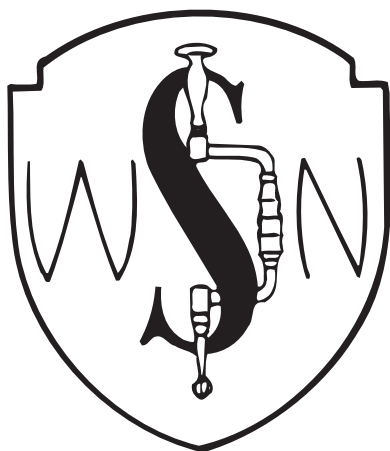
6:30am – 12:00pm	Registration	Grand Promenade 2
6:00am – 12:30pm	Exhibitors	Grand 2
6:00am – 7:30am	Members/Professional Guest Breakfast	Grand 2
7:30am – 12:00pm	Scientific Session	Grand 1/6/7
9:55am – 10:00am	Break – Visit Exhibitors	Grand 2
8:00am – 10:00am	Guest/Spouse Breakfast	Dondero's Restaurant
1:00pm – 6:00pm	Golf	Poipu Bay Golf Course
2:00pm – 5:00pm	Tennis	Grand Hyatt Tennis Center
1:30pm – 5:15 pm	Botanical Gardens	Meet in Lobby Porte Cochere
6:30pm – 9:30pm	Western Night	Shipwreck Lagoon

Saturday, September 12, 2015

6:30am – 12:00pm	Registration	Grand Promenade 2
6:30am – 8:00am	Members Business Breakfast	Dondero's Restaurant
6:30am – 12:30pm	Exhibitors	Grand 2
6:30am – 8:00am	Professional Guests Breakfast	Grand 2
8:00am – 10:00am	Guest/Spouse Breakfast	Tidepools Restaurant
8:00am – 12:30pm	Scientific Session	Grand 1/6/7
9:15am – 9:40 am	Break – Visit Exhibitors	Grand 2
1:00pm – 6:00pm	Golf	Poipu Bay Golf Course
2:00pm – 5:00pm	Tennis	Grand Hyatt Tennis Center
1:30pm – 5:00pm	Kauai Helicopter Tour	Meet in Lobby Porte Cochere
1:30pm – 5:30pm	Ocean Snorkeling	Meet in Lobby Porte Cochere
4:00pm – 10:00pm	Camp Hyatt (children 3- 12)	Camp Hyatt
6:00pm – 7:00pm	Reception	Grand Garden/Promenade
7:00pm – 10:00pm	Banquet	Grand Ballroom 3/4/5

Sunday, September 13, 2015

6:30am – 12:00pm	Registration	Grand Promenade 2
6:00am – 7:30am	Members/Professional Guests Breakfast	Grand 2
6:00am - 12:00pm	Exhibitors	Grand 2
7:30am – 12:00pm	Scientific Session	Grand 1/6/7
9:30am – 10:00am	Break – Visit Exhibitors	Grand 2
8:00am – 10:00am	Guest/Spouse Breakfast	Dondero's Restaurant



Western Neurosurgical Society

61st Annual Meeting
2015 Learning Objectives

The purpose of this meeting is to provide an update in the basic and clinical sciences underlying neurosurgical practice through lectures, discussions, interactive sessions with neurological surgeons, neurologists, neuroradiologists, and other allied health personnel.

Upon completion of this program, participants should be able to:

1. Increase the understanding of the difficulties and ethics facing the neurosurgeon and their patients with life-threatening intracranial pathology and the choices available for treatment.
2. Increase the understanding of the difficulties and ethics facing the neurosurgeon and their patients with life-altering spinal pathology and the choices available for treatment.
3. Increase the overall competence in the care of spinal disorders.
4. Increase the overall competence in the care of intracranial pathology.



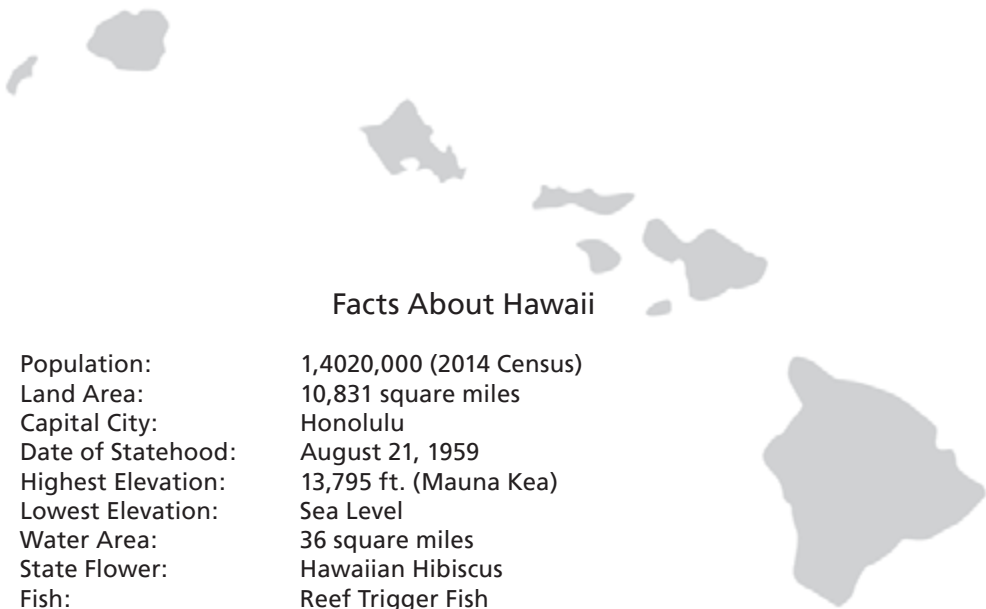
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The Western Neurosurgical Society would like to thank
Michi Wohns Carlson
2015 Exhibitor Coordinator



Facts About Hawaii

Population:	1,402,000 (2014 Census)
Land Area:	10,831 square miles
Capital City:	Honolulu
Date of Statehood:	August 21, 1959
Highest Elevation:	13,795 ft. (Mauna Kea)
Lowest Elevation:	Sea Level
Water Area:	36 square miles
State Flower:	Hawaiian Hibiscus
Fish:	Reef Trigger Fish
Gem:	Black Coral
Dance:	Hula
Motto:	Ua Mau ke Ea o ka 'ina i ka Pono "The life of the land is perpetuated in righteousness"
Nickname:	The Aloha State

2015 Officers and Committees

OFFICERS

President - Gary Steinberg
President Elect - Linda Liau
Vice President - Thomas Scully
Secretary-Treasurer - Deborah Henry
Historian - Moustapha Abou – Samra
Past President - Richard Wohns

EXECUTIVE COMMITTEE

Gary Steinberg, MD, PhD, President, Chair
Linda Liau, MD, PhD, President-Elect
Thomas Scully, MD Vice President
Deborah Henry, MD, Secretary-Treasurer
Richard Wohns, MD, JD, MBA, Past President
Moustapha Abou-Samra, MD Historian

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PROGRAM COMMITTEE

Martin Weinand, Chair
Deborah Henry
Andrew Little
Marco Lee
Joel MacDonald
John McVicker

CME COMMITTEE

Deborah Henry, Chair
Jay Morgan
Marshal Rosario
Charles Nussbaum

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Deborah Henry
Martin Weinand

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Odette Harris
Larry Shuer
Carter Beck

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Jeff Rush
Jay Morgan
Laighanm Sekhar

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Jeff Chen
Michael McDermott
Ciara Harraher
Mark Hamilton

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Deborah Henry
Patrick Rhoten
Mark Belza
Charles Nussbaum

BY-LAWS COMMITTEE

Tom Scully, Chair
Moustapha Abou-Samra
Ben Blackett
Andrew Little
Mike Lemole
Austin Colohan
Brian Andrews

AWARDS COMMITTEE

Linda Liau, Chair
Martin Weiss
David Newell
Don Prolo

COMMUNICATIONS AND WEBSITE

Randall Smith, Chair
Moustapha Abou-Samra
Bill Louden
Ciara Harraher
Rick Chua

EXHIBITORS

PLATINUM SUPPORT

Medtronic Spine

<http://www.medtronic.com/for-healthcare-professionals/products-therapies/spinal/>

GOLD SUPPORT

Philips Health

<http://www.usa.philips.com/healthcare>

SILVER SUPPORT

LDR

<http://www.ldr.com>

Zimmer Biomet

<http://www.zimmerbiomet.com>

Brain Lab

<http://www.brainlab.com>

Carl Zeiss Meditec

http://www.zeiss.com/meditec/en_us/home.html

Codman Neuro

<http://depuysynthes.com/hcp/codman-neuro>

Depuy Synthes

<http://www.depuysynthes.com/about/depuy-synthes-spine>

KLS Martin LP

<http://klsmartinnorthamerica.com>

Monteris Medical

<http://www.monteris.com>

Southern Spine

<http://southernspine.net>

Spine Wave

<http://www.spinewave.com>

Stryker

<http://www.stryker.com>

Synaptive Medical

<http://synaptivemedical.com>

Varian Medical Systems

<http://www.varian.com>

EDUCATIONAL GRANT

The Western Neurosurgical Society thanks the following company for their educational grant for the 2015 Annual Meeting.

Arbor Pharmaceutical

<http://www.arborpharma.com>



Hawaii include some of the Earth's largest mountains, raising from the oceanic depths of greater than 18,000 feet to a height above sea level of nearly 14,000 feet. Mauna Loa on the Big Island are volcanic mountains with a total relief of nearly 32,000 feet.

2015 Guests

Achal Singh Achrol	Resident Award, Basic Science
Sharyn Brekhus	Sponsor Deborah Henry
Abraham Boskowitz	Sponsor Moustapha Abou-Samra
Terry C. Burns	Resident Guest
Peter Carmel	Society-Guest Speaker
Colleen Carter	Society-Guest
Samuel Cheshier	Member Candidate
Michelle Clarke	Society-Guest Speaker
Andrew Dailey	Member Candidate
Elias Dakwar	Society-Guest Speaker
Daniel Donovan	Sponsor Deborah Henry
Dario J. Englot	Resident Guest
Jonathon Forbes	Sponsor Deborah Henry
Michael Finn	Member Candidate
Melanie Hayden Gephart	Member Candidate
Mark Gerber	Member Candidate
Samer Ghostine	Sponsor Moustapha Abou-Samra
Gary B. Goplen	Member Candidate
Theodore Hole	Sponsor Moustapha Abou-Samra
Udaya Kumar Kakarla	Member Candidate
Lewis Z. Leng	Member Candidate
Gordon Li	Sponsor Clara Harraher
Edward Oldfield	Cloward Award Recipient
Dave Piepgras	Society-Ablyn Speaker
Wouter I. Schievink	Member Candidate
Mark Sedrak	Sponsor Mark Vanefsky
Joseph Serrone	Sponsor Charles Nussbaum
Jesse Skoch	Resident Award, Clinical Science
Christine N. Smith	Member Candidate
Laura Snyder	Member Candidate
Christopher Taylor	Member Candidate
John Vangilder	Sponsor Moustapha Abou-Samra
Gary Vercruysse	Society-Guest Speaker
Elizabeth (Libby) Wright	Society-Guest
Isaac Yang	Member Candidate



The islands of Hawaii were one of the last places on Earth discovered and occupied by humans. There is little or no evidence of human contact of any kind before about 100 A.D. The first significant colonies, made by ocean voyage in Polynesians, were not established until around 400 to 600 A.D. Modern contact was not made until only 220 years ago when Captain James Cook first encounter Kauai on January 19, 1778.

CONTINUING MEDICAL EDUCATION ACCREDITATION

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the AANS and Western Neurosurgical Society. The AANS is accredited by the ACCME to provide continuing medical education for physicians.

The AANS designates this live activity for a maximum of 11.75 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Joint Providership Disclaimer

The material presented at the 61st annual meeting of the Western Neurosurgical Society has been made available by the WNS and the AANS for educational purposes only. The material is not intended to represent the only, nor necessarily the best, method or procedure appropriate for the medical situations discussed, but rather it is intended to present an approach, view, statement, or opinion of the faculty, which may be helpful to others who face similar situations.

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 of the views presented, the products used, or the materials exhibited by the WNS and jointly provided by the AANS, or its Committees, Commissions, or Affiliates.

Neither the AANS nor the WNS makes any statements, representations or warranties (whether written or oral) regarding the Food and Drug Administration (FDA) status of any product used or referred to in conjunction with any course, seminar or other presentation being made available as part of the annual 60th meeting of the Western Neurosurgical Society. Faculty members shall have sole responsibility to inform attendees of the FDA status of each product that is used in conjunction with any course, seminar or presentation and whether such use of the product is in compliance with FDA regulations.



The state of Hawaii is composed of 132 islands reefs and shoals that extend for over 1,500 miles across the central North Pacific Ocean from the "Big Island" of Hawaii to Midway and Kure Atolis.

DISCLOSURE INFORMATION

The AANS controls the content and production of this CME activity and attempts to ensure the presentation of balanced, objective information. In accordance with the Standards for Commercial Support established by the Accreditation Council for Continuing Medical Education (ACCME), speakers, paper presenters/authors and staff (and the significant others of those mentioned) are asked to disclose any relationship they or their co-authors have with commercial interests which may be related to the content of their lecture. The ACCME defines "relevant financial relationships" as financial relationships in any amount occurring within the past 12 months that create a conflict of interest.

Speakers, paper presenters/authors and staff (and the significant others of those mentioned) who have disclosed a relationship* with commercial interests whose products may have a relevance to their presentation are listed below.

Name	Disclosure	Type of Relationship
Andrew Dailey	Biomet K2M	Grants/Research
	Biomet	Consultant
	Medtronic	Consultant
	Depuy-Synthes	Honorarium
	A O North America	Honorarium
Elias Dakwar	Nuvasive, RTI	Consultant
	Depuy Synthes	Speakers Bureau
Michael Fink	K2M	Consultant, Honorarium, Speakers Bureau
Gary Goplen	Medtronic	Stock Sharehold
	Johnson and Johnson	Stock Shareholder
Jaime Henderson	CircuitTherapeutics	Consultant
	Neuvo Corp	Stock Shareholder
	CircuitTherapeutics	Stock Shareholder
	Enspire DBS	Stock Shareholder
	Neuropace	Honorarium
Udaya Kakarla	Globus	Honorarium
Issac Lang	Brain Lab	Honorarium
Linda Liau	Northwest Biotherapeutics	Grants/Research
Andrew Little	Kogent	Stock Shareholder
G. Michael LeMole	Olympus Medical Systems	Consultant
	Fiduciary Position	Board Member Yet2.com
Stephen Ritland	Medtronic	Consultant, Honorarium, Speakers Bureau
Gary Steinberg	Medtronic	Consultant
	Qool	Stock Shareholder
	NIH, NINDS, CIRM	University Grants
Martin Weinand*	Medtronic	Grant/Research

*Relationship refers to receipt of royalties, consultantship, funding by research grant, receiving honoraria for educational services elsewhere, or any other relationship to a commercial interest that provides sufficient reason for disclosure.

Speakers, paper presenters/authors and staff (and the significant others of those mentioned) who have reported they do not have any relationships with commercial interests:

Achal Achrol	Marco Lee	Laura Snyder	Mark Gerber
Kenneth Blumenfeld	Joel MacDonald	Chris Taylor	Peter Carmel
Dario Englot	Katy Meyer*	Gary Vercruyse	Michelle Clark
Melanie Gephart	Edward Oldfield	Sameul Cheshier	Wouter Schievink
Brian Hanah	David Piepgras	Lewis Leng	Terry Burns
Deborah Henry*	Jessie Skoch	Christine Smith	

***educational content planner of this meeting**



Dr. George Ablin

1923-1999

In 2000, the members of the Western Neurosurgical Society inaugurated a new lectureship designed to honor, in a tangible and enduring manner, one of the Society's most outstanding members. In its long history, the Society has had no more devoted contributor than Dr. George Ablin. He brought to the group stunning ability and experience, especially in matters of local, national, and international organization, in which he had few peers. He contributed through service in many areas including a memorable term as President. He was a wise and thoughtful counselor whose advice concerning many professional and personal questions always included a careful analysis, given with words of encouragement. There was no more active and engaged participant in all of the Society's affairs.

George Ablin was raised in Chicago, received his BS and MD from the University of Michigan, interned at Charity Hospital, New Orleans, Louisiana, did his residency at the University of Wisconsin, later was Instructor at the University of Michigan, and also became a Clinical Professor at California State University, Bakersfield. Dr Ablin was Board Certified in Neurological Surgery, a Fellow of the American College of Surgeons, and a Diplomat of the National Board of Medical Examiners.

Dr Ablin began practice in neurosurgery in Bakersfield, California, in 1953, was President of the Kern County Medical Society in 1984, and was very active in the California Medical Association in various leadership positions. He was Treasurer of the California Medical Review Board and received Distinguished Service awards from the Congress of Neurological Surgeons and the American Association of Neurological Surgeons. He was named Honorary President of the World Neurological Society and in 1989 he was selected as the Kern County Physician of the Year. George was the devoted father of seven children, three of whom became physicians.

George combined an exceptionally perceptive understanding of others, including hundreds of fellow neurosurgeons, with warmth and gentleness and lively humor. He loved his colleagues and friends, and he loved this Society. With this permanent lectureship, the members of the Western Neurosurgical Society honor George Ablin and his cherished wife, Millie.



David Piegras, MD

Dr. Piegras was born in Minnesota and completed his Bachelor of Arts and Medical degrees from the University of Minnesota. After internship in New Hampshire, three years of military service and one year of general surgery residency, his neurosurgical residency was completed at Mayo Clinic. He remained in the department thereafter, being named Professor in 1988 and serving as Chair from 1992-2004.

David has been very active in organized Neurosurgery, serving on various committees in the CNS and AANS. He was president of the AANS joint section of Cerebrovascular surgery from 1990-1991. He held the position as President of the American Academy of Neurological Surgery from 2002-2003 and the Society of Neurological Surgeons ("Senior Society") from 2003-2004. He served on the RRC for Neurological Surgery and the American Board of Neurological Surgery, including Chair from 2002-2003.

Dr. Piegras' research and clinical interests include the surgical treatment and epidemiology of occlusive cerebrovascular disease and the management of arteriovenous malformations and intracranial aneurysms. He has extensively studied the natural history of unruptured intracranial aneurysms, including being Co-investigator on the sentinel study funded by the NINDS. David has published over 200 peer-reviewed journal articles, multiple book chapters and has served as a reviewer for Neurosurgery, Stroke and The New England Journal of Medicine. He has been an invited speaker and held many visiting professorships all over the world.

David and his wife Jane have three sons, Jeffery, Andrew and Colin and six grandchildren. We look forward to welcoming him to the Western Neurosurgical Society annual meeting as our Ablin Lecturer.

Ablin Lectures

- 2000 Arthur L. Day, MD, Professor of Neurosurgery, University of Florida
"Unruptured Intracranial Aneurysms and Sports Medicine in Neurosurgery"
- 2002 Tom Campbell, JD, PhD, Professor of Law, Stanford University
Former Congressman
"Is Freedom Possible in Medicine"
- 2003 Frederic H. Chaffee, PhD, Director, WM Keck Observatory, Hawaii
"The WM Keck Observatory at the Dawn of the New Millennium"
- 2004 Gerald Kooyman, PhD, Research Professor, Scripps Institute of Oceanography, San Diego
"Emperor Penguins: Life at the Limits"
- 2005 Lt. Col. Rocco Armonda, MD, Neurological Surgeon, U.S. Army Bethesda, Maryland
"The Modern Management of Combat Neurotrauma Injuries: Battlefield to the Medical Center"
- 2006 August Turak, Spiritual and Business Consultant
"Spirituality and the Neurosurgeon"
- 2007 Donald Trunkey, MD, Internationally Renowned Trauma Surgeon
"The Crisis in Surgery with Particular Emphasis on Trauma"
- 2008 Michael Bliss, PhD, Emeritus Professor, University of Toronto
"Working Too Hard and Achieving Too Much? The Cost of Being Harvey Cushing"
- 2009 Michael A. DeGeorgia, MD, Professor of Neurology
Case Western Reserve University, Cleveland, Ohio
"Struck Down: The Collision of Stroke and World History"
- 2010 Chris Wood, PhD, Vice President for Administration, Santa Fe Institute
"What Kind of Computer Is The Brain?"
- 2011 Volker Sonntag, MD, Vice Chairman, Division of Neurological Surgery
Barrow Neurological Institute, Phoenix, Arizona
"Cervical Instrumentation: Past, Present & Future"
- 2012 Robert Schrier, MD, Professor of Medicine, University of Colorado
"Illnesses in the US Presidents in the 20th Century: Potential Impact on History"
- 2013 Samuel Eric Wilson, MD, Professor, Department of Surgery,
University of California, Irvine
"Between Scylla and Charybdis: Can Academic Surgery Survive?"
- 2014 Jon H. Robertson, MD, Professor of Neurosurgery, University of Tennessee
"The challenge of the Future Neurosurgical Education"

Cloward Award

- 2003 George Ojemann, MD, Professor of Neurosurgery
University of Washington
"Investigating Human Cognition during Epilepsy Surgery"
- 2005 Donald Prolo, MD, Clinical Professor of Neurosurgery
Stanford University
"Legacy Giants in the Treatment of Spinal Disorders: Ralph Cloward and Marshall Urist"
- 2006 Martin Weiss, MD, Professor of Neurosurgery
University of Southern California
"A Historical Walk through Pituitary Surgery"
- 2007 Charles Wilson, MD, Past Chairman, Department of Neurosurgery
University of California, San Francisco
"The Future of Neuroscience"
- 2008 Peter Jannetta, MD, Past Professor and Chairman
Department of Neurosurgery, University of Pittsburgh
"Vascular Compression in the Brainstem: Main Streaming Neurosurgery"
- 2009 L. Nelson Hopkins, MD, Professor and Chairman of Neurosurgery
University at Buffalo, State University of New York
"Neurosurgeons and Stroke: From Prevention to Treatment"
- 2010 Sean Mullan, MD, Professor Emeritus of Neurosurgery
University of Chicago
"Some Neurosurgical Fossils"
- 2011 John A. Jane, Sr., MD, PhD, Professor of Neurosurgery
University of Virginia Health System
"Anterior vs Posterior Approaches to the Cervical Spine"
- 2012 John R. Adler, Jr., MD
Stanford University
"Stepping-Out of the OR: A Surgeon's Foray into Entrepreneurship"
- 2014 Andres M. Lozeno, MD, Professor of Neurosurgery, University of Toronto
"Taming Dysfunctional Brain Circuits"



Ralph B. Cloward 1908-2000

In 2002 the Western Neurosurgical Society established a Medal and Lecture to honor one of its most innovative and pioneering members, Ralph Bingham Cloward. With the gracious support of the Cloward family, this award honors Ralph and his devoted wife Florence, our former president and first lady, both treasured friends who have enriched the Western.

Ralph Cloward was born in Salt Lake City, Utah, in 1908. He completed his undergraduate studies at the Universities of Hawaii and Utah, and his medical education subsequently at the University of Utah and Rush Medical School in Chicago. He interned at St. Luke's Hospital, Chicago, and then trained to become a neurosurgeon under Professor Percival Bailey at the University of Chicago. He began practicing neurology and neurosurgery in the Territory of Hawaii in 1938.

His academic accomplishments include Professor and Chair of Neurosurgery at the University of Chicago, 1954-55, and visiting professorships at the University of Oregon, University of Southern California, and Rush Medical School. He served long-term as Professor of Neurosurgery at the John A. Burns School of Medicine at the University of Hawaii. He authored numerous papers and book chapters.

Dr. Cloward's inspired, pioneering quantum leaps encompassed many areas of neurosurgery, but his enduring interest was the spine, where he devised three major operations. He first performed the posterior lumbar interbody fusion in 1943, reporting the operation at a meeting of the Hawaiian Territorial Medical Association in 1945 and publishing it in the *Journal of Neurosurgery* in 1953. His unique approach for treating hyperhydrosis was reported in 1957. Independently he conceived an anterior approach to the cervical spine, devised instruments for its implementation, and published his classic paper in the *Journal of Neurosurgery* on anterior cervical discectomy and fusion in 1958. He designed over 100 surgical instruments, which continue to be used today by practicing neurosurgeons.

Throughout his career he educated the international community of neurosurgeons in the operations he devised. He performed them throughout the United States and in 41 cities within 27 countries of the world and in the process healed patients of their painful conditions. Hundreds of thousands of patients benefited both directly and indirectly from his creativity, technical genius, insight and enthusiasm as a teacher and medical evangelist.

In first recognizing all lesions of the spine to be in the province of neurosurgeons, Dr. Cloward engendered controversy and endured severe criticism from upsetting the environment of establishment neurosurgeons by his pioneering breakthroughs. He demonstrated that even in a complex technological world with large research efforts, budgets, and bureaucracies, the individual is key. Engraved on the Medal are words the Cloward legacy epitomizes, which honors recipients "For Epochal Innovation and Pioneering Application."



Edward H. Oldfield, MD

Edward Oldfield was born in Mt. Sterling, Kentucky. He completed three years of undergraduate education before graduating from medical school at the University of Kentucky in 1973. He completed a basic surgical residency at Vanderbilt University 1973-75, and then spent a year as Visiting Registrar in Neurology and Neurosurgery at The National Hospital for Nervous Disease, Queen Square, London, England. He completed his neurosurgical training at Vanderbilt University in 1980.

After a year in private practice in Lexington, KY, he joined the National Institute of Neurological Disorders and Stroke (NINDS) at the National Institutes of Health (NIH) as a Senior Staff Fellow, and completed a 2-year intramural NIH fellowship in cellular immunology of tumors. In 1984, he became Chief of the Clinical Neurosurgery Section, Surgical Neurology Branch, NINDS, and from 1986-2007 served as the Chief of the Surgical Neurology Branch, NINDS, NIH. At the NIH, he led laboratory and clinical research efforts in the areas of brain and pituitary tumors, syringomyelia, von Hippel-Lindau disease, spinal arteriovenous malformations, pathophysiology and therapy of cerebral vasospasm after subarachnoid hemorrhage, and development of new drug delivery approaches for the central nervous system.

He joined the Department of Neurosurgery at the University of Virginia in 2007 where he leads a multidisciplinary effort in the treatment of pituitary tumors and contributes to the research program in the Department of Neurosurgery. He holds the Crutchfield Chair in Neurosurgery and is a Professor of Neurosurgery and Internal Medicine.

His contributions to academic and organized neurosurgery include membership on the Editorial Board of Neurosurgery 1992-94, the Editorial Board of The Journal of Neurosurgery 1994-2002, serving as Co-Chairman 2001-2002. In 2005-2006, he was elected Vice President of the Society of Neurological Surgeons, and served as its President in 2007.

Dr. Oldfield has received numerous accolades and awards during his career, including the Grass Medal for Meritorious Research in Neurological Science in 1995, Farber Award of the American Association of Neurological Surgeons "for leadership, vision, and dedication, and for scholarly contributions to the field of Brain Tumor Research" in 1999, and the Distinguished Alumnus Award, University of Kentucky Medical Alumni Association in 2006. He is the author of over 400 original scientific and clinical contributions to the medical literature and the co-inventor of patents on convection-enhanced drug delivery and genetic therapy. Many of his former fellows hold positions in academic medicine, including several departmental chairmen.

WNS 2015 SCIENTIFIC PROGRAM
Grand Hyatt, Kauai, Hawaii, September 11-13, 2015

Friday, September 11, 2015 • Day I, Session I

- Moderators: Debbie Henry, Marco Lee
- 7:30-7:35 **Welcome, Gary Steinberg, WNS President 2015**
- 7:35-7:50 1 ***“Monitoring leptomeningeal metastasis treatment response using tumor cell free DNA from cerebral spinal fluid”***
Melanie Hayden Gephart, Stanford, CA
(Member Candidate)
- 7:50-7:55 Discussion
- 7:55-8:10 2 ***“Matching neurosurgical care to the needs of patients in British Columbia: A unique challenge”***
Gary B. Goplen, Kelowna, BC
(Member Candidate)
- 8:10-8:15 Discussion
- 8:15-8:30 3 ***“Endoscopic endonasal transphenoidal surgery for recurrent pituitary adenomas with cavernous sinus invasion after microscopic resection”***
Lewis Z. Leng, San Francisco, CA
(Member Candidate)
- 8:30-8:35 Discussion
- 8:35-8:50 4 ***“Digital subtraction myelography for the identification of spontaneous CSF-venous fistulas”***
Wouter I. Schievink, Los Angeles, CA
(Member Candidate)
- 8:50-8:55 Discussion
- 8:55-9:10 5 ***“Recognition memory signals in the human hippocampus as revealed by single-unit recordings from depth electrodes in epilepsy patients”***
Christine N. Smith, San Diego, CA
(Member Candidate)
- 9:10-9:15 Discussion
- 9:15-9:30 6 ***“Cochlear radiation dose is associated with decreased hearing preservation for vestibular schwannoma patients treated with radiosurgery”***
Isaac Yang, Los Angeles, CA
(Member Candidate)
- 9:30-9:35 Discussion

WNS 2015 SCIENTIFIC PROGRAM

9:35-9:50	7	<i>“An intracortical brain-computer interface for the restoration of motor function and communication”</i> Jaimie M. Henderson, Stanford, CA (Member)
9:50-9:55		Discussion
9:55-10:30		Break - Visit Exhibits

Friday, September 11, 2015 • Day I, Session II

Moderators:		Joel MacDonald, Andrew Little
10:30-10:45	8	<i>“Endoscopic Transsphenoidal Surgery is Not Less Invasive than Direct Endonasal Microscopic Transsphenoidal Surgery for Pituitary Adenomas: Results of a Multicenter Prospective Cohort Study”</i> Andrew S. Little, Phoenix, AZ (Member)
10:45-10:50		Discussion
10:50-11:05	9	<i>“Adult Neural Stem Cells Are Irreplaceable”</i> Terry C. Burns, Stanford, CA (Resident)
11:05-11:10		Discussion
11:10-11:25 <i>patients</i>	10	<i>“Mapping functional connectivity in focal epilepsy and implications for surgical treatment”</i> Dario J. Englot, San Francisco, CA (Resident)
11:25-11:30		Discussion
11:30-11:45 <i>Elective</i>	11	<i>“Vitamin D Levels and One-Year Fusion Outcomes in Spine Surgery: A Prospective Observational Study”</i> Andrew Dailey, Salt Lake City, UT (Member Candidate)
11:45-11:50		Discussion
11:50-12:05	12	Special Lecture <i>“Neurosurgical practice in Hawaii”</i> Mark Gerber, Honolulu, HI (Member Candidate)
12:05-12:10		Discussion

WNS 2015 SCIENTIFIC PROGRAM

Saturday, September 12, 2015 • Day 2, Session III

6:30AM-8:00AM Business Meeting

Moderators: Martin Weinand, Andrew Little

8:15-8:30	13	Resident Award - Basic Science <i>“Radiogenomic mapping reveals distinct brain regions of tumor formation influencing molecular subtypes of human glioblastoma”</i> Achal Singh Achrol, Stanford, CA
8:30-8:35		Discussion
8:35-8:50	14	Resident Award – Clinical Science <i>“Cortical Gene Expression Associated with Seizure Outcome Following Temporal Lobectomy with Amygdalohippocampectomy”</i> Jesse Skoch, Tucson, AZ
8:50-8:55		Discussion
8:55-9:10	15	Special Lecture <i>“Health Care Reform: Perspective of a Neurosurgeon”</i> Peter Carmel
9:10-9:15		Discussion
9:15-9:40		Break - Visit Exhibits



The eight main high islands of the Hawaiian Archipelago include Hawaii, Maui, Oahu, Kauai, Molokai, Niihau and Kahoolawe (listed in order of size) extended for only 350 miles at the south-eastern end of the volcanic mountain island chain.

WNS 2015 SCIENTIFIC PROGRAM

Saturday, September 12, 2015 • Day 2, Session IV

Moderators:	Martin Weinand, Andrew Little
9:40-9:45	Introduction of Ablin Lecturer Gary Steinberg
9:45-10:35	Ablin Lecture <i>“Frontier Surgery: Lessons for Today from Beaumont and St. Martin”</i> Dave Piegras
10:35-10:40	Introduction of Cloward Award Recipient Linda Liao
10:40-11:30	Cloward Award Lecture <i>“The origin of concepts in neurosurgery: One neurosurgeon’s perspective”</i> Ed Oldfield
11:30-11:35	Marco Lee Introduction of WNS President
11:35-12:30	Presidential Address <i>“The Future of Cerebrovascular Surgery”</i> Gary Steinberg



Hawaii became the 50th State on August 21, 1959.

WNS 2015 SCIENTIFIC PROGRAM

Sunday, September 13, 2015 • Day 3, Session V

Moderators: Debbie Henry, Marco Lee

7:30-9:30 **Mini Symposium - Advances in Spinal Neurosurgery**

Introduction of Speakers

“Neuroanatomic aspects of minimally invasive spine surgery”

Steve Ritland

“Minimally invasive spine surgery”

Laura Snyder

“Surgical access to the spine”

Gary Vercruyse

“Neurosurgical treatment of adult scoliosis”

Kumar Kakarla

“Neurosurgical treatment of Pediatric Deformity”

Elias Dakwar

9:30-10:00 Break - Visit Exhibits



An underwater portion of the Hawaiian Volcanic Ridge and Emperor Seamounts extend to the northwest and north for another 1600 miles to make the entire Hawaiian-Emperor Volcanic Chain over 3100 miles long. It contains 107 volcanic mountains and represents in volcanism that has been going on for over 70 million years as the Earth's Pacific Tectonic Plate has moved across the Hawaiian Magmatic Hot Spot at a rate of about 3.5 inches per year.

WNS 2015 SCIENTIFIC PROGRAM

Sunday, September 13, 2015 • Day 3, Session VI

Moderators: Joel MacDonald, Martin Weinand

10:00-12:00 **Mini Symposium – Ethical Considerations in Neurosurgery**

Introduction of Speakers

“Neurosurgeon-Patient Relationship”

Chris Taylor

“End of life considerations in neurosurgery”

Ken Blumenfeld

“Palliative Neurosurgery - Brain”

Mike LeMole

“Palliative Neurosurgery - Spine, Two Perspectives”

Michelle Clarke

Michael Finn

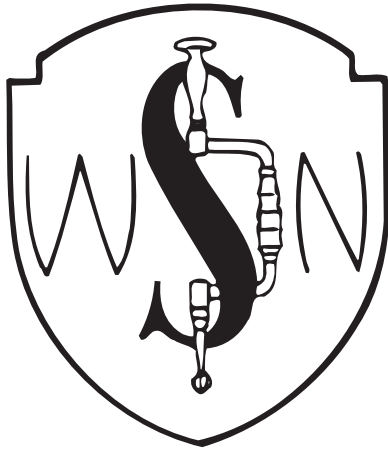
“Ethical considerations in pediatric neurosurgery”

Samuel Cheshier

12:00 Meeting Adjourn

**62nd Annual Meeting to be held September 9-12, 2016
Park Hyatt Aviara Resort, Carlsbad, California**

Abstracts



Kauai is geographically the most mature of the main Hawaiian Islands with extensive development of broad, lush erosional valleys and coastal features such as fringing coral/algal reefs and sandy beaches. Spectacular Waimea Canyon, at over 2,500 feet deep is Hawaii's largest erosional valley. Nearly 50% of Kauai's 111 miles of coastline are lined with beautiful beaches, derived mainly of wave erosion of reef producing coral and algae. Only about one-third of Oahu's coastline consists of beaches.

1. ***“Monitoring leptomeningeal metastasis treatment response using tumor cell free DNA from cerebral spinal fluid”***

Presenting Author & Institution or City/State:

Melanie Hayden Gephart, MD, MAS

Stanford University

Stanford, CA

Background:

Cerebral Spinal Fluid (CSF) from brain tumor patients contains tumor cell free DNA (cfDNA), which may provide a non-invasive and routinely accessible method to obtain tumor genomic information. This “liquid biopsy” method would prove considerably less morbid compared to an open removal of tumor tissue from the brain. **Methods:** A patient who presented with elevated intracranial pressure from metastatic melanoma to the leptomeninges underwent serial therapeutic lumbar punctures, approximately every two weeks over a period of three months. CSF was obtained through an informed consent, IRB approved protocol. The primary melanoma tumor was known to have a BRAF mutation 1799T>A (V600E). cfDNA was isolated from the CSF, and sequenced to confirm the presence of this same tumor-specific BRAF mutation. Droplet Digital PCR (ddPCR) quantified the mutant DNA amount and fraction in CSF. These results were compared to the clinical cytology results from the same sample.

Results:

Six time points were collected over 61 days. Tumor cfDNA was detectable in the first five time points. Mutant DNA fraction decreased from 53% to almost zero. The total amount of mutant DNA decreased from 220 copies per ml of CSF to 4 copies per ml of CSF. This result was concordant with the patient’s clinical response to therapy.

Conclusion:

Tumor cfDNA was found in CSF from a cancer patient with leptomeningeal metastases. Both the mutant fraction and total copies of mutant DNA corresponded with the patient’s response to systemic therapy. This non-invasive method may provide a powerful tool for identifying and monitoring the genetic fingerprint of brain metastases.

2. ***“Matching Neurosurgical Care to the Needs of Patients in British Columbia: A Unique Challenge”***

Gary B. Goplen M.D. F.R.C.S.(c)

Kelowna General Hospital, Kelowna, British Columbia

There are countless models for delivery of neurosurgical care. The province of British Columbia is particularly challenging because it is one and a half times the area of France with a population less than Scotland. The geography ranges from small communities not accessible by road to dense urban centers. There are four distinct areas: Coastal, Island, Interior, and North. Each area has faced historical challenges to providing neurosurgical care as a result of differences in transport time, critical mass of specialty care, waiting lists, bed availability and budgets. Recent scrutiny is being cast upon the ongoing accreditation and expertise of specialists, initiated by the recent Cochrane Report. There have been great efforts to provide solutions and improve quality of care. The following topics will be elaborated:

- Transport and communication mechanisms
- Trauma and Cancer centers.
- Neurosurgical subspecialty sites
- Cochrane Report: documentation and currency of expertise.
- Prioritization of waiting lists
- Emergence of private care

I will touch on our successes and challenges in each of these areas.

3. ***“Endoscopic endonasal transsphenoidal surgery for recurrent pituitary adenomas with cavernous sinus invasion after microscopic resection”***

Lewis Z. Leng, MD and Aditi H. Mandpe, MD

California Pacific Medical Center, San Francisco, CA

Background:

Recurrent pituitary adenomas after surgical resection may be managed with observation, radiosurgery or re-resection. Recurrent tumor is often located in the cavernous sinus after prior microscope based transsphenoidal surgery. We report the outcomes of endoscopic endonasal transsphenoidal surgery in combination with neuronavigation for the treatment of recurrent pituitary tumors with cavernous sinus invasion after microscopic resection.

Methods:

Retrospective review of 31 endoscopic endonasal transsphenoidal surgeries for pituitary adenomas including 5 cases for recurrent pituitary adenomas after prior microscope-based transsphenoidal surgery. Patients preoperatively underwent endocrinologic and ophthalmologic evaluation. Patients preoperatively underwent MR and CT imaging. Fully endoscopic endonasal approach was undertaken for all cases with neuronavigation. A vascularized nasal-septal flap was harvested in all cases.

Results:

60% of recurrent pituitary adenomas had cavernous sinus invasion at the time of recurrence. Knosp grade for recurrent tumors were grade 1 (20%), grade 2 (20%),

grade 3 (20%), and grade 4 (40%). 80% of cases presented with progressive growth on serial follow-up imaging. 20% presented with visual deficits. 20% presented with panhypopituitarism. Gross total resection (GTR) was achieved in 80% of cases. Near total resection was achieved in 20% of cases. GTR for initial resections of pituitary adenoma over the same period of time was 84%. One patient developed a postoperative CSF leak requiring lumbar drainage. One patient developed worsened vision postoperatively requiring return to OR. No new postoperative hypopituitarism was noted. There was 0% vascular injury rate and 0% rate of new cranial nerve palsy.

Conclusions:

Endoscopic endonasal transsphenoidal surgery is a safe, effective treatment option for select recurrent pituitary adenomas with cavernous sinus invasion after microscopic resection.

4. “Digital subtraction myelography for the identification of spontaneous spinal CSF-venous fistulas”

Wouter I. Schievink, M.D.

Department of Neurosurgery, Cedars-Sinai Medical Center, Los Angeles, California

Reason of Study:

Spontaneous intracranial hypotension has become a well-recognized cause of headaches. In most patients a spinal CSF leak can be found, but in a small number of patients no CSF leak can ever be demonstrated in spite of extensive spinal imaging. This failure to localize a CSF leak can limit treatment options. We recently reported the fortuitous discovery of CSF-venous fistulas in patients with spontaneous intracranial hypotension. We now report on the yield of digital subtraction myelography (DSM) in patients with spontaneous intracranial hypotension but no CSF leak identifiable on conventional spinal imaging.

Methods:

The patient population consisted of a consecutive group of 53 patients with spontaneous intracranial hypotension who underwent DSM, but had no spinal CSF leak identifiable (i.e., the presence of extradural CSF) on conventional spinal imaging.

Results:

The mean age of the 33 women and 20 men was 53.4 years (range, 29 to 71 years). A CSF-venous fistula was demonstrated in ten (19%) of the 53 patients. We were not able to identify any factors associated with an increased likelihood of finding a CSF-venous fistula on DSM. CSF-venous fistulas were found in nine (27%) of 33 women and in one (5%) of 20 men, but this was of only borderline statistical significance ($p=0.0697$). One patient was successfully treated with percutaneous fibrin sealant injection directed at the site of the CSF-venous fistula. Nine patients underwent surgery for the fistula. Surgery resulted in complete resolution of symptoms in eight patients (follow-up: 5 to 21 months) while in one patient symptoms recurred after four months.

Discussion: In this study, we were able to demonstrate CSF-venous fistulas in approximately one-fifth of patients with spontaneous intracranial hypotension but no CSF leak identifiable on conventional spinal imaging. We suggest that DSM should be considered in this patient population.

5. ***“Recognition memory signals in the human hippocampus as revealed by single-unit recordings from depth electrodes in epilepsy patients”***

Christine N. Smith, Ph.D., Department of Psychiatry, University of California San Diego; Veterans Affairs San Diego Healthcare System

According to findings from memory-impaired patients with damage to the hippocampus, the hippocampus supports memory for fast, one-trial learning. We asked how memory for single-trial learning is represented by neurons in the human hippocampus by using single unit recordings from depth electrodes implanted in the hippocampus and amygdala of epilepsy patients. Unlike traditional depth electrodes, the electrodes were also equipped with 9 microwires at their tips that are capable of recording single-unit activity. Nine patients studied a list of 32 unrelated words (duration=2000ms each, with a 750-ms inter-item interval). Ten minutes later, a recognition test was administered. During the recognition test, patients were presented with the 32 words from the list (“old” items) intermixed with 32 new items, and each word was presented one at a time for a recognition decision (“old” or “new”). While the subjects were performing the recognition memory task, we recorded the activity of neurons in the hippocampus and amygdala bilaterally. We first asked whether spikes recorded during the recognition test (when averaged across all neurons in the hippocampus or amygdala) differentiated the old and new items. We found that the hippocampus ($p < 0.01$), but not the amygdala ($p = 0.30$) could differentiate old and new items. Next, we asked how neural discrimination of old and new items was related to behavioral discrimination of old and new items. We found that behavioral discrimination was correlated with neural discrimination in the hippocampus ($r = 0.86$, $p < 0.01$), but not in the amygdala ($r = 0.12$). Thus, the stronger the memory, the stronger the signal in the hippocampus. These findings show that the neural recordings capture the memory signal in the hippocampus. Furthermore, they illuminate how memory is represented in the brain and the nature of memory impairment observed after surgery to relieve temporal lobe epilepsy.

6. ***“Cochlear Radiation Dose is associated with Decreased Hearing Preservation for Vestibular Schwannoma Patients treated with Radiosurgery”***

Lawrance K. Chung, Nolan Ung, Brittany Voth, Winward Choy, Marko Spasic, Panayiotis Pelargos, Kimberly Thill, Alessandra Gorgulho, Stephen Tenn, Nader Pouratian, Tania Kaprealian, Michael Selch, Antonio De Salles, Quinton Gopen, Isaac Yang

Introduction

Radiation therapy has emerged as an effective alternative treatment method for vestibular schwannomas (VS) to achieve tumor control and hearing preservation. The purpose of this study was to evaluate the radiation delivered to the cochlea during stereotactic radiosurgery (SRS) and stereotactic radiotherapy (SRT) and to determine its effect on hearing preservation.

Methods

Patients receiving SRS or SRT treatment for VS at UCLA from 2009 to 2013 were analyzed for clinical and hearing outcomes. The dosimetric data to the cochlea volume was associated with the hearing outcome of patients. Patients treated with SRS received a marginal dose of 12 Gy and patients treated with SRT received a marginal dose of 50.4

Gy delivered through 28 fractions. Statistical analysis was completed using 2-tailed, Mann-Whitney U test with a significance level of 0.05.

Results

40 patients underwent either SRS or SRT for vestibular schwannoma with a mean follow-up of 23.2 months. The mean total radiation dose delivered to the cochlea volume ranged from 4.0 to 11.9 Gy (median: 8.7 Gy) for SRS treatment and 30.2 to 51.4 Gy (median: 44.8 Gy) for SRT treatment. Hearing was preserved in 60% of SRS patients and in 63% of SRT patients. The cochlea received statistically significantly more radiation in patients with decreased hearing in SRS ($p=0.031$), but not in SRT ($p=0.097$).

Conclusions

Our data suggests that increased cochlear radiation dose is significantly associated with decreased rates of hearing preservation following SRS treatment, but not with SRT treatment. Irradiation of cochlear structures may be a critically important aspect of radiosurgery treatment that warrants careful evaluation in the radiation treatment of vestibular schwannomas. Future prospective studies with randomization may further validate this data.

7. *“An intracortical brain-computer interface for the restoration of motor function and communication”*

Jaimie M. Henderson, Stanford University

Brain-computer interfaces (BCIs) have the potential to restore motor function and communication in people who have lost these abilities due to injury or neurological disease. We present our experience with implantation of a high-density intracortical microelectrode array into the motor cortex of a 52-year-old woman with ALS (BrainGate2 Pilot Clinical Trial, ClinicalTrials.gov NCT00912041). Neural population activity was recorded during attempted or imagined hand movements and decoded using advanced algorithms developed in primate studies to achieve full, unrestricted two dimensional control of a computer cursor. A “mouse click” signal was generated by decoding contralateral attempted or imagined hand squeeze with a hidden Markov model (HMM) state decoder. Using an optimized keyboard layout, our research participant was able to use this “point-and-click system” to type at speeds averaging 31.6 ± 8.7 correct characters per minute, more than triple the fastest typing speed previously reported. Ongoing experiments are aimed at investigating the utility of this interface for generalized computer use and control of external effectors such as robotic limbs.



8. “Endoscopic Transsphenoidal Surgery is Not Less Invasive than Direct Endonasal Microscopic Transsphenoidal Surgery for Pituitary Adenomas: Results of a Multicenter Prospective Cohort Study”
Andrew S. Little, Barrow Neurological Institute, Phoenix, AZ

Object:

Despite the widespread adoption of endoscopic transsphenoidal surgery for pituitary adenomas and claims that it represents a minimally invasive option for transsphenoidal surgery, the sinonasal quality of life (QOL) and health status in patients who have undergone this technique have not been compared with patients who have undergone the traditional direct microsurgical technique. In this study, the authors compared the sinonasal QOL and patient-reported health status after use of these two surgical techniques.

Method:

Adult patients with sellar pathology and planned transsphenoidal surgery were screened at four pituitary centers in the United States. The primary endpoint of the study was postoperative patient-reported sinonasal QOL as measured by the Anterior Skull Base Nasal Inventory-12 (ASK Nasal-12). Secondary endpoints included patient-reported health status, estimated by the Short-Form (SF)-8 and EuroQol (EQ)-5D-5L instruments, and sinonasal complications. Patients were followed for 6 months after surgery.

Results:

Two hundred thirty-five patients were enrolled in the study, and 218 were analyzed (111 microsurgery patients, 107 endoscopic surgery patients). Demographic and tumor characteristics were similar between groups ($p > 0.12$ for all comparisons). The most common complication in both groups was sinusitis (7% in the microsurgery group, 13% in the endoscopic surgery group, $p = 0.15$). Endoscopic technique patients were more likely to have postoperative nasal debridements ($p < 0.001$). ASK Nasal-12 and SF-8 scores worsened substantially for both groups at 2 weeks after surgery, but then returned to baseline at 3 months. At 3 months after surgery, endoscopic patients reported statistically better sinonasal QOL compared with microscopic patients ($p = 0.03$), but there were no significant differences at any of the other postoperative time points.

Conclusions:

This is the first multicenter study to examine the impact of transsphenoidal surgical technique on sinonasal QOL and health status. The study showed that sinonasal QOL and complications were not different between the two surgical techniques.

9. *“Adult Neural Stem Cells Are Irreplaceable”*

Terry C. Burns, Stanford University, CA.

Background:

Quiescent tumor-initiating with neural stem cell-like properties are resistant to therapy and enable tumor recurrence. As such, quiescent tumor stem cells are increasingly targeted by novel anti-tumor therapies. Quiescent neural stem cells (NSCs) are extremely similar to tumor stem cells and may be targeted by these therapies. The capacity of the quiescent NSC niche to recover following ablation remains unknown.

Methods:

Nestin-creERT2::diphtheria toxin reporter (DTR) mice were induced to express DTR on NSCs with 3 days 150mg/kg i.p. tamoxifen. Ablation and control mice were treated with 100ug/kg diphtheria toxin DT or vehicle, respectively. Proliferative cells were labeled with BrdU prior to sacrifice. For cell replacement experiments, embryonic stem cell (ESC)-derived NSCs were stereotactically implanted into the dentate gyrus and lateral ventricle.

Results:

Ablation caused 50-80% reduction of quiescent NSCs and BrdU+ within 10 days. NSC loss persisted for at least 2 months, and was accompanied by 48% loss of neurogenesis at 2 months ($p < 0.01$), suggesting inability of the partially vacated neurogenic niche to be repopulated over time by surviving NSCs. ESC-derived NSCs increased proliferation of endogenous NSCs though only modestly impacted the quiescent NSC pool size. Implanted NSCs also differentiated into neurons with appropriate morphology and projections but failed to engraft long term into the quiescent NSC niche.

Conclusions:

We demonstrate for the first time that adult NSCs are unable to repopulate the quiescent NSC niche after partial ablation of quiescent NSCs, even though surviving NSCs remain functional and responsive to proliferative stimuli. Primitive ESC-derived NSC also appear unable to engraft into the quiescent vacated niche. These findings suggest that loss of quiescent NSCs irreversibly decreases niche size. Given the importance of neurogenesis for cognition and memory, the potentially irreversible impacts of novel stem cell-targeted antitumor therapies on quiescent NSC pool size should be carefully evaluated.

10. *“Mapping functional connectivity in focal epilepsy patients and implications for surgical treatment”*

Dario J. Englot, M.D., Ph.D., Resident in the Department of Neurological Surgery, University of California, San Francisco

Introduction:

Intractable focal epilepsy is a devastating disorder with profound effects on cognition and quality of life. Epilepsy surgery can lead to seizure freedom in patients with focal epilepsy, however, sometimes it fails due to an incomplete delineation of the epileptogenic zone (EZ). Brain networks in epilepsy can be studied with resting-state functional connectivity (RSFC) analysis, yet previous investigations using functional MRI or electrocorticography have produced inconsistent results. Magnetoencephalography (MEG) allows noninvasive whole-brain recordings, and can be used to study both long-range network disturbances in focal epilepsy and regional connectivity at the EZ.

Methods:

In MEG recordings from presurgical epilepsy patients, we examined: i) global functional connectivity maps in patients versus controls, and ii) regional functional connectivity maps at the region of resection, compared to the homotopic non-epileptogenic region in the contralateral hemisphere.

Results:

Sixty-one patients were studied, including 30 with mesial temporal lobe epilepsy and 31 with focal neocortical epilepsy. Compared to a group of 31 controls, epilepsy patients had decreased RSFC in widespread regions, including peri-sylvian, posterior temporo-parietal, and orbitofrontal cortices ($p < 0.01$, t-test). Decreased mean global connectivity was related to longer duration of epilepsy and higher frequency of consciousness-impairing seizures ($p < 0.01$, linear regression). Furthermore, patients with increased regional connectivity within the resection site ($n = 24$) were more likely to achieve seizure post-operative seizure freedom (87.5% with Engel I outcome) than those with neutral ($n = 15$, 64.3% seizure free) or decreased ($n = 23$, 47.8% seizure free) regional connectivity ($p < 0.02$, chi-square).

Conclusions:

Widespread global decreases in functional connectivity are observed in patients with focal epilepsy, and may reflect deleterious long-term effects of recurrent seizures. Furthermore, enhanced regional functional connectivity at the area of resection may help predict seizure outcome and aid surgical planning.

11. "Vitamin D Levels and One-Year Fusion Outcomes in Elective Spine Surgery: A Prospective Observational Study"

Andrew Dailey, MD, University of Utah, Salt Lake City, UT

Objective:

To investigate the association of perioperative vitamin D levels and nonunion rates and time to fusion in patients undergoing elective spine fusion.

Background: Although there is a clear link between bone mineral density and the risk of osteoporosis, it is unclear whether low vitamin D levels affect rates and timing of spinal fusion.

Methods:

Serum 25-OH vitamin D levels were measured perioperatively in adults undergoing elective spinal fusion between 2011 and 2012. Vitamin D levels <20 ng/mL were considered deficient. Univariate and multivariate logistic regression were performed to identify independent predictors of pseudarthrosis/nonunion within a minimum follow-up period of 12 months. Kaplan-Meier analysis was used to compare time to fusion between groups.

Results:

Of the 133 patients, 31 (23%) demonstrated vitamin D deficiency. Mean patient age was 57±13 years; 44% were female and 94% were Caucasian. The cervical spine was fused in 49%, the lumbar spine in 47%, and the thoracic spine in 4%. Mean construct length was 2 levels (range 1–16). At 12-month follow-up, 112/133 (84%) patients demonstrated fusion (median time to fusion 8.4 months). Nonunion at 12 months was associated with vitamin D deficiency (20% of patients with adequate vitamin D level vs. 38% of vitamin D–deficient patients, $p=0.063$). Kaplan-Meier survival analysis demonstrated time to fusion was significantly longer in the vitamin D–deficient group (12 vs. 6 months, $p=0.001$). On multivariate analysis, vitamin D deficiency was an independent predictor of nonunion (OR 3.449, $p=0.045$) when adjusted for age, sex, obesity, fusion length, location, graft type, smoking, and bone morphogenetic protein use.

Conclusions:

Vitamin D levels may affect nonunion rate and time to fusion. These results offer insight into the importance of the metabolic milieu for bony fusion as well as a potential avenue for therapeutic intervention.



The entire island of Hawaii, with its five large volcanoes of Kohala, Mauna Kea, Hualalai, Mauna Loa and Kilauea, and new submerged volcano of Loihi, is less than 450,000 years old

12. “Neurosurgical practice in Hawaii”

Mark Gerber, Honolulu, HI

13. “Radiogenomic Mapping Reveals Distinct Brain Regions of Tumor Formation Influencing Molecular Subtypes of Human Glioblastoma”

Achal S. Achrol MD, Tiffany T. Liu PhD, Debashis Sahoo PhD, Hannes Vogel MD, Lex A. Mitchell MD, Robert Tibshirani PhD, Erick M. Westbroek MD, Joshua J. Loya MD, Scott A. Rodriguez MD, Abdullah H. Feroze MD, Steven D. Chang MD, Gary K Steinberg MD PhD, Daniel L. Rubin MD and Griffith R. Harsh IV MD.

Presenting Author / Institution: Achal Singh Achrol, M.D. Stanford
Neurosurgery Resident PGY-6

Purpose:

Recent ex vivo genomic analyses demonstrate the existence of several molecular subtypes of glioblastoma, though factors influencing the formation of these subtypes remain unclear. We hypothesized different brain regions may give rise to brain tumors that differ in molecular profiles and clinical characteristics.

Materials and Methods:

We developed a new radiogenomic method—Voxel-based Neuroanatomic Genomic Mapping (VNGM)—to identify distinct brain regions of tumor formation across N=576 patients and characterize region-specific molecular features associated with each cluster of tumor formation. MR-based voxel-level annotations of tumor formation were made, and a voxel matrix constructed containing comprehensive voxel-wise data on patterns of tumor formation across all 576 individuals. Hierarchical clustering identified common individuals with shared common voxels of tumor involvement. Integrating genomic analysis with neuroanatomic clustering, region-specific molecular features associated with each cluster of tumor formation were characterized.

Results:

VNGM identified three distinct brain regions of glioblastoma formation. Molecular subtype was influenced by brain region of tumor formation (chi square, $P=0.0002$). Region 1, developing in vicinity of the temporal dentate gyrus and hippocampus, was more likely to develop proneural/neural tumors (OR: 6.8, $P<0.0001$). Region 2, arising adjacent to posterior peri-atrial subventricular zone, was more likely to develop mesenchymal/classical tumors (OR: 4.0, $P<0.0001$). Pathway analysis revealed Region 2 to be distinctly enriched in NF-kappa B, innate stromal immune responses, response to wounding, extracellular matrix formation and coagulation. Region 1 distinctly enriched in synaptic transmission, with upregulated glutamate receptor signaling and calcium channel activity, and fetal neurodevelopmental gene expression pathways. Neuroanatomic clusters differed in resulting tumor histopathology, necrosis, invasion, patient age at onset and overall survival.

Conclusion:

Radiogenomic VNGN analysis detected otherwise covert relationships among grossly distinct-appearing tumors in identifying three distinct brain regions of tumor formation, and may hold promise for uncovering region-specific influences Cortical

FIGURE LEGENDS

Figure 1. Voxel-based neuroanatomic genomic mapping (VNGM)

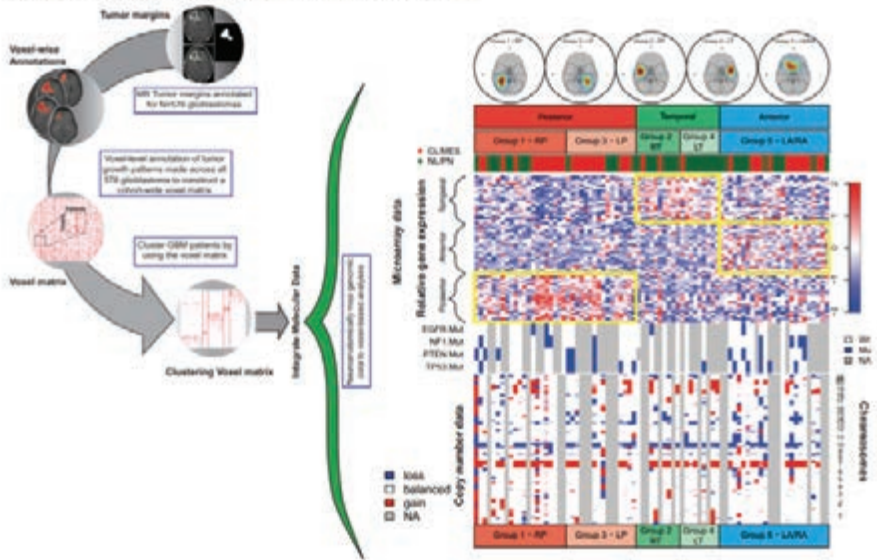


Figure 1: Overview of MR voxel-based neuroanatomic clustering to define distinct brain regions of tumor formation. Glioblastomas arising in the temporal brain region develop proncural and neural molecular profiles and display distinctive gene expression patterns characteristic of synaptic transmission and the developing nervous system. Bulk tumor tissue from this temporal cluster contain cells characteristic of oligodendrocytes and neurons. Taken together, these observations may suggest a lineage-biased cell-of-origin could influence development of tumors in this brain region. Overexpression of glutamate and calcium ion channel synaptic transmission pathways among tumors of this region may also suggest novel targets for therapeutic intervention for tumors of this brain region. In contrast, tumors of the posterior brain region develop mesenchymal and classical molecular profiles, and engender robust inflammatory responses, including pro-inflammatory IKK-dependent activation of NF-kappa B and upregulation of wound healing and coagulation pathways. Bulk tumor tissue from this posterior cluster contain cells characteristic of astroglial cells, but not of mature astrocytes. These astroglial cells differ from mature astrocytes in having gene expression patterns enriched in immune system activation genes, as seen in the reactive astrocytes of the gliotic response to damage to the central nervous system. Taken together, these observations may suggest that tumors of this region may arise from a distinct etiology in the context of a gliotic response to brain injury.

14. *“Gene Expression Associated with Seizure Outcome Following Temporal Lobectomy with Amygdalohippocampectomy”*

Jesse Skoch MD – University of Arizona, Banner University Medical Center, Tucson, AZ

Co authors: Matthew J Gallek PhD; Tracy L. Ansay MD; Martin E. Weinand MD

Introduction:

Whole genome analyses were performed to test the hypothesis that temporal cortical gene expression differs between patients rendered seizure-free and non-seizure-free following anterior temporal lobectomy with amygdalohippocampectomy (TL/AH). Four genes not previously associated with epilepsy were found to predict a seizure-free outcome if expression levels were relatively down-regulated.

Methods:

Twenty-four patients underwent TL/AH to treat medically intractable seizures of temporal lobe origin (mean age 36 years, mean follow up 42 months). RNA was isolated from the lateral temporal cortex and gene expression analysis was performed on Affymetrix chips. Whole genome data were analyzed for prognostic value for seizure-free outcome following TL/AH by logistic regression (<0.05 , >0.90 area under the receiver operating characteristic curve (AUC)). A leave-out analysis to assess for outliers that could skew results eliminated no probes (Figure 1).

Results:

Gene expression associated with seizure-free outcome included relative down-regulation of Zinc Finger 852 (ZNF852) ($p<0.000001$, $AUC=0.958$), CUB (Complement, uEGF, Bmp1) Domain Containing Protein 2 (CDCP2) ($p<0.001$, $AUC=0.941$), Proline-rich Transmembrane Protein 1 (PRRT1) ($p<0.001$, $AUC=0.916$), and Hypothetical LOC440200 (FLJ41170) ($p<0.001$, $AUC=0.908$) (Figure 2).

Conclusions:

This study suggests a predictive value in temporal cortical gene expression for seizure outcome after TL/AH. Four genes were found to be associated with seizure-free outcome after TL/AH if their levels were relatively down-regulated (Figure 3). None of these genes currently have well defined functional roles, and none have been previously tied to epilepsy. Future prospective investigation of these or other genes in blood leukocytes and cell-free RNA is underway and could establish novel biomarkers predictive of seizure outcome following TL/AH.



The Hawaiian Islands are the Earth's most isolated parcels of land lying in the middle of the North Pacific Ocean some 2400 miles from both the nearest continental and land mass, North America, and other islands of Polynesia in the South Pacific Ocean



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William Hyman	Edward Zapanta
O. W. Jones	Michael Robbins
Alexander Johnson	Peter Allen
John C. Kennady	Deane B. "Skip" Jacques
Peter A. Lake	Charles Needham
James Lansche	Michael Mason
Lester B. Lawrence	Sam Assam
Grant Levin	Benjamin L. Crue, Jr.
Frank W. Lusignan	
John S. Marsh	

PAST SECRETARY-TREASURERS

Herbert. Crockett*	1955, 1956, 1957
Ernest W. Mack*	1958, 1959, 1960
Samuel W. Weaver*	1961, 1962, 1963
James R. St. John*	1964, 1965, 1966
Robert W. Porter	1967, 1968, 1969
William A. Kelly	1970, 1971, 1972
John S. Tytus	1973, 1974, 1975
Theodore S. Roberts*	1976, 1977, 1978
Ulrich Batzdorf	1979, 1980, 1981
John A. Kusske	1982, 1983, 1984
W. Ben Blackett	1985, 1986, 1987
Francis E. LeBlanc	1988, 1989, 1990
Melvin L. Cheatham	1991, 1992, 1993
Grant E. Gauger	1994, 1995, 1996
Randall W. Smith	1997, 1998, 1999
Moustapha Abou-Samra	2000, 2001, 2002
Hector E. James	2003
Austin R. T. Colohan	2004, 2005, 2006
Jeffery L. Rush	2007, 2008, 2009
Charles E. Nussbaum	2010, 2011, 2012, 2013
Deborah C. Henry	2014, 2015

PAST HISTORIANS

Henry M. Cuneo*	1962-1966
Ernest W. Mack*	1967-1971
Donald B. Freshwater*	1972-1976
George Ablin*	1977-1982
Gale C. Clark*	1983-1984
Robert Rand*	1985-1990
Frank P. Smith*	1991-1995
John C. Oakley*	1996-1999
John P. Slater	1999-2002
John T. Bonner	2002-2008
Randall Smith	2009-2013
Moustapha Abou-Samra	2014-2015

PAST MEETINGS OF THE SOCIETY

1. Biltmore Hotel, Santa Barbara, CA Nov 25-26, 1955
2. Timberline Lodge, OR Dec 9-11, 1956
3. Holiday Hotel, Reno, NV Sept 29-Oct 1, 1957
4. Del Monte Lodge, Pebble Beach, CA Oct 19-22, 1958
5. La Valencia Hotel, La Jolla, CA Sept 27-30, 1959
6. Del Monte Lodge, Pebble Beach, CA Oct 23-26, 1960
7. Bayshore Inn, Vancouver, BC Oct 29-Nov 1, 1961
8. Camelback Inn, Phoenix, AZ Oct 28-31, 1962
9. El Mirador Hotel, Palm Springs, CA Oct 20-23, 1963
10. Fairmont Hotel, San Francisco, CA Oct 18-21, 1964
11. Olympic Hotel, Seattle, WA Oct 3-6, 1965
12. Hotel Utah, Salt Lake City, UT Nov 6-9, 1966
13. Kona Kai Club, San Diego, CA Oct 15-18, 1967
14. Mauna Kea Beach Hotel, Kamuela, HI Nov 16-19, 1968
15. Del Monte Lodge, Pebble Beach, CA Oct 15-18, 1969
16. Bayshore Inn, Vancouver, BC Oct 4-7, 1970
17. The Broadmoor, Colorado Springs, CO Oct 31 -Nov 3, 1971
18. The Skyline Country Club, Tucson, AZ Oct 29-Nov 1, 1972
19. Airport Marina Hotel, Albuquerque, NM Sept 16-19, 1973
20. Santa Barbara Biltmore Hotel, CA Oct 27-30, 1974
21. Mauna Kea Beach Hotel, Kamuela, HI Sept 28-Oct 1, 1975
22. Harrah's Hotel, Reno, NV Sept 26-29, 1976
23. La Costa Resort Hotel, Carlsbad, CA Sept 18-21, 1977
24. The Lodge, Pebble Beach, CA Oct 8-11, 1978
25. Camelback, Inn, Scottsdale, AZ Sept 23-26, 1979
26. Mauna Kea Beach Hotel, Kamuela, HI Sept 21-24, 1980
27. The Empress Hotel, Victoria, BC Sept 20-23, 1981
28. Jackson Lake Lodge, Jackson Hole, WY Sept 12-15, 1982
29. Hotel del Coronado, Coronado, CA Oct 2-5, 1983
30. The Broadmoor, Colorado Springs, CO Sept 9-12, 1984
31. Silverado Country Club & Resort, Napa, CA Sept 22-25, 1985
32. Maui Intercontinental, Wailea, Maui, HI Sept 28-Oct 1, 1986

PAST MEETINGS OF THE SOCIETY

33. Banff Springs Hotel, Banff, AB	Sept 6-9, 1987
34. The Ritz-Carlton, Laguna Niguel, CA	Sept 11-14, 1988
35. The Lodge, Sun Valley, ID	Sept 10-13, 1989
36. Mauna Lani Bay Hotel, Kawaihae, HI	Sept 9-12, 1990
37. The Pointe, Phoenix, AZ	Sept 22-25, 1991
38. The Whistler, Whistler, BC	Sept 20-23, 1992
39. Mauna Lani Bay Hotel, Kawaihae, HI	Sept 19-22, 1993
40. Le Meridien Hotel, San Diego, CA	Sept 18-21, 1994
41. Salishan Lodge, Gleneden Beach, OR	Sept. 9-12, 1995
42. Manele Bay, Island of Lanai, HI	Sept 14-17, 1996
43. Ojai Valley Inn, Ojai, CA	Sept 20-23, 1997
44. Silverado Resort, Napa, CA	Sept 12-15, 1998
45. Coeur d'Alene Resort, Coeur d'Alene, ID	Sept 18-21, 1999
46. Mauna Lani Bay Hotel, Hawaii, HI	Sept 9-11, 2000
47. Ocean Pointe Resort, Victoria BC (Cancelled)	Sept 15-18, 2001
48. Delta Victoria Resort, Victoria, BC	Oct 12-15, 2002
49. Hapuna Beach Prince Hotel, Kamuela, HI	Sept 20-24, 2003
50. Rancho Bernardo Inn, San Diego, CA	Sept 11-14, 2004
51. Squaw Creek Resort, Lake Tahoe, CA	Sept. 17-20, 2005
52. Semiahmoo Resort & Spa, Blaine, WA	Sept. 16-19, 2006
53. Mauna Lani Bay Hotel, Kawaihae, HI	Sept. 8-11, 2007
54. Hotel Captain Cook, Anchorage, AK	Aug. 16-19, 2008
55. Sun River Resort, Bend, OR	Sept. 11-14, 2009
56. Eldorado Hotel, Santa Fe, NM <i>In Memory of L. Philip Carter</i>	Oct. 8-11, 2010
57. The Grand Hyatt Kauai Resort & Spa, Island of Kauai, HI	Sept. 10-13, 2011
58. Broadmoor Hotel, Colorado Springs, CO	Sept. 7-10, 2012
59. Ritz Carlton Half Moon Bay, Half Moon Bay, CA	Sept. 15-18, 2013
60. The Lodge, Sun Valley, ID	Aug. 16-19, 2014

FUTURE MEETINGS

Park Hyatt Aviara Resort, Carlsbad, CA	September 9-12, 2016
Fairmont Banff Springs Hotel, Banff, Alberta, Canada	September 7-11, 2017
Fairmont Orchid Resort, Kohala Coast, HI	September 14-17, 2018

PAST VICE-PRESIDENTS

John Raaf*	1955	George A. Ojemann	1984
Frank Turnbull*	1956	Gale C. Clark*	1985
Howard A. Brown*	1957	Robert Weyand	1986
Rupert R. Raney*	1958	Robert Florin	1987
Edmund J. Morrissey*	1959	John A. Kusske	1988
C. Hunter Sheldon*	1960	Basil Harris*	1989
Ernest W. Mack*	1961	W. Ben Blackett	1990
Hale A. Haven*	1962	Ronald F. Young	1991
Frank M. Anderson*	1963	Edward Reifel	1992
Edwin B. Boldrey*	1964	Grant E. Gauger	1993
Herbert C. Crockett*	1965	Ralph F. Kamm	1994
Karl O. Von Hagen*	1966	Steven L. Giannotta	1995
Samuel W. Weaver*	1967	Randall W. Smith	1996
Chester B. Powell*	1968	Gail A. Magid	1997
Peter O. Lehman*	1969	Donald Prolo	1998
Charles W. Elkins*	1970	Lawrence Shuer	1999
Nathan C. Norcross*	1971	John C. Oakley*	2000
James R. St. John*	1972	L. Philip Carter*	2001, 2002
Edward K. Kloos*	1973	William L. Caton III	2003
Ralph B. Cloward*	1974	Gerald Silverberg	2004
Thomas K. Craigmile*	1975	Kim Burchiel	2005
Lyman Maass*	1976	John Adler	2006
Gale C. Clark*	1977	Philip Weinstein	2007
William A. Kelley	1978	Betty MacRae	2008
Byron C. Pevehouse	1979	Linda Liao	2009
Robert W. Rand*	1980	David W. Newell	2010
Theodore S. Roberts*	1981	J. Paul Muizelaar	2011
Ulrich Batzdorf	1982	Richard Wohns	2012
George Ablin*	1983	Marc Vanefsky	2013
		Marvin Bergsneider	2014

*deceased

PAST PRESIDENTS

David L. Reeves*	1955	Thomas K. Craigmile*	1984
John Raaf*	1956	Ulrich Batzdorf	1985
Frank Turnbull*	1957	Gale C. Clark*	1986
Howard A. Brown*	1958	Lyman Maass*	1987
Rupert R. Raney*	1959	Gordon B. Thompson	1988
Edmund G. Morrissey*	1960	George Ablin*	1989
C. Hunter Sheldon*	1961	Robert Weyand	1990
Ernest W. Mack*	1962	Basil Harris*	1991
Hale A. Haven*	1963	W. Ben Blackett	1992
Frank M. Anderson*	1964	Francis E. LeBlanc	1993
Edwin B. Boldrey*	1965	Ronald F. Young	1994
John R. Green*	1966	John A. Kusske	1995
Arthur A. Ward, Jr.*	1967	Melvin L. Cheatham	1996
Lester B. Lawrence*	1968	Robert Florin	1997
John D. French*	1969	Frank P. Smith*	1998
Chester B. Powell*	1970	Ralph F. Kamm	1999
Robert W. Porter	1971	Steven L. Giannotta	2000
Henry M. Cuneo*	1972	Donald J. Prolo	2001, 2002
Charles W. Elkins*	1973	Grant E. Gauger	2003
Edward K. Kloos*	1973	Randall W. Smith	2004
W. Eugene Stern	1974	John P. Slater	2005
Ralph B. Cloward*	1975	Moustapha Abou-Samra	2006
James R. St. John*	1976	Kim Burchiel	2007
Eldon L. Foltz*	1977	Gerald Silverberg	2008
John Tytus*	1978	Lawrence Shuer	2009
Donald B. Freshwater*	1979	L. Philip Carter*	2010
William A. Kelly	1980	David W. Newell	2010
Byron C. Pevehouse*	1981	Austin R.T. Colohan	2011
Robert W. Rand*	1982	John T. Bonner	2012
Theodore S. Roberts*	1983	Jeffery L. Rush	2013
		Richard Wohns	2014

*deceased

PAST RESIDENT AWARD RECIPIENTS

Ralph Kamm, OHSU**	1966
Jerry Greenhoot, UW	1968
L. Philip Carter, BNI**	1971
Ronald J. Ignelzi, U. of Colorado	1972
Henry G. Fieger, Jr., U. of Colorado	1973
Peter F. Schlossberger, UCLA	1974
Paul Steinbok, UBC	1975
Arden F. Reynolds, Jr., UW	1976
John W. Hutchison, UCI	1977
Kim J. Burchiel, UW**	1978
Roy A.E. Bakay, UW	1979
Herbert Fried, UCLA	1980
Linda M. Liau, UCLA **	1997
Sean D. Lavine, USC	1998
SooHo Choi, USC	1999
Michael Y. Wang, USC	2000
Odetta Harris, Stanford**	2001
Raymond Tien, OHSU	2002
Michael Sandquist, OHSU	2003
Iman Feiz-Erfan, BNI**	2004
Johnathan Carlson, OHSU	2005
Mathew Hunt, OHSU	2005
Kiarash Golshani, OHSU	2006
Edward Chang, UCSF	2006
Jonathan Miller, OHSU	2007
Kenneth Liu, OHSU	2007
Justin Cetas, OSHU	2008
Edward Chang, UCSF	2008
Zachary Litvack, OHSU	2009
Kiran Rajneesh, UCI	2009
Justin Dye, UCLA	2010
Isaac Yang, UCSF	2010
Terry Burns, Stanford	2011
Gabriel Zada, USC	2011
Walavan Sivakumar, U. of Utah	2012
David Stidd, U. of Arizona	2012
Allyson Alexander, Stanford	2013
Anand Veeravagu, Stanford	2013
Terry Burns, Stanford	2014
Karam Moon, BNI	2014

**WNS Member

Western Neurosurgical Society
62nd Annual Meeting
September 9 -12, 2016



Park Hyatt Aviara Resort
Carlsbad, California

