American Syringomyelia & Chiari Alliance Project

BETTER *Together*

ASAP's 36th Annual Conference

JULY 16-18, 2024

DURHAM, NORTH CAROLINA
WASHINGTON DUKE INN & GOLF CLUB
HOSTED BY GERALD A. GRANT, MD

Welcome

Welcome to the 36th Annual American Syringomyelia and Chiari Alliance Project Conference! I would like to start by saying a very heartfelt thank you to our gracious host, Dr. Gerry Grant. We are thankful for and impressed by the slate of speakers, topics, and information scheduled to be shared. We are truly appreciative of the efforts of Dr. Grant and all those who have dedicated their time to be here and share their knowledge about Chiari, Syringomyelia, and their related conditions. And…isn't North Carolina beautiful?

If you'll grant me a moment, I'd like to share a personal reflection with you. In church recently, a sermon was presented about hope. A passage from one of the readings stood out to me: *"…we also glory in our sufferings, because we know that suffering produces perseverance; perseverance, character; and character, **hope**…"* (Rom. 5:3-4, emphasis mine). Suffering leads to endurance…as we push through the difficulty, the caliber of inner well-being strengthens…giving rise to steadfast hope. And what is life without hope? Hope keeps us going!

So how does this concept apply here? Well, the entire premise of these conferences and of the ASAP organization as a whole is HOPE. We—you and I—have persevered through our pain and our challenges, developed and exhibited our character, and produced HOPE for many people over the years. WE, the organizers of the conference, are deeply encouraged and edified when we hear from YOU, the attendees, about how the conference has affected you and your path in life. We want to be a continual source of HOPE for you and your loved ones as they persevere through the trials and tribulations associated with these conditions. Reach out to any one of us during our time together or drop us a line any time. Share with us your thoughts and experiences. The ASAP Conference has been providing patients, caregivers, and families HOPE and the opportunity to learn, discuss, and otherwise collaborate with people focused on the betterment of our community for 36 years. We plan to continue to do so until a cure is found, and beyond. We are here for YOU.

Many wonderful developments arise from our annual conferences: education and information; support and friendship; and, of course, ideas, vision, and HOPE. Our host Dr. Grant, presenters, Board of Directors, and ASAP staff are honored to present our 36th Annual Conference. Our aim is to uphold and further the hopeful vision the Whites had when they began ASAP.

My utmost gratitude is extended to ASAP's Board of Directors and dedicated staff, who once again have shown us that their level of commitment and love for this organization knows no bounds. The energy, resolve, and diligence this team has exhibited is truly humbling. Just in case you are unaware, our Board is made up entirely of volunteers who faithfully commit their time and talents to ensure that this organization can continue to offer education, research, and outreach to those who are affected by Chiari and Syringomyelia.

Please enjoy the conference! My personal desire is that you come away with a sense of HOPE, encouragement, and additional knowledge and support to share with others. Continue to "fight the good fight" to stay healthy and as active as you can be. And remember: *Live within your limits but live a life that is limitless!*

May HOPE spring eternal!

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Conference Agenda

Tuesday, July 16, 2024

10:00 am	Check-in and On-site Registration
11:00 am - 12:15 pm	Speaker and BOD Lunch, Support Group Lunch (Adults Only)
12:20 pm - 12:30 pm	Welcome John Caemmerer, Vice President ASAP
12:30 pm - 12:55 pm	Syrinxes Not Related to Chiari Malformations **Michael Levy, MD**
1:00 pm - 1:25 pm	Pain Profiles in Chiari Malformation and Management **John Crawford, MD**
1:25 pm - 1:40 pm	Q & A Panel - Michael Levy, MD and John Crawford, MD
1:45 pm - 2:10 pm	Dilated Central Canal and Syrinx **Herbert Fuchs, MD**
2:15 pm - 2:40 pm	Medical Marijuana - The Health Professional's Role **David Knowlton**
2:45 pm - 3:10 pm	From a Neuroradiologist's Perspective, Let's Revisit the Fundamentals of Chiari 101 and Syringomyelia **Carina Yang, MD**
3:15 pm - 3:40 pm	Clinical Diagnosis, Radiological Criteria, and Treatment of Chronic Craniocervical Instability **Fraser Henderson, MD**
3:45 pm - 4:05 pm	Q & A Panel - Carina Yang, MD; Fraser Henderson, MD; Herbert Fuchs, MD; David Knowlton
4:10 pm – 4:15 pm	Closing Remarks Eric Berning, President ASAP
5:00 pm - 8:00 pm	Dinner Reception with Entertainment – Vista Restaurant

Wednesday, July 17, 2024

7:00 am - 8:30 am	Complimentary Buffet Breakfast for all Attendees – AMB Gallery
7:45 am - 8:30 am	Support Group Meeting for Parents & Caretakers (May enjoy breakfast during meeting)
8:30 am - 8:35 am	Welcome Gerald Grant, MD
8:35 am - 9:00 am	Point: Don't Touch My Tonsils! **Robert Keating, MD**
9:00 am - 9:25 am	Counterpoint: Take Out My Tonsils! **Paolo Bolognese, MD**
9:25 am - 9:40 am	Q & A Panel - Robert Keating, MD and Paolo Bolognese, MD
9:40 am - 10:05 am	Pediatric and Adult Chiari Patients Who Need a Fusion in Addition to Decompression **Brian Dlouhy, MD**
10:05 am - 10:30 am	Evaluation and Treatment of Patients with a Small Posterior **John Heiss, MD**
10:30 am - 10:55 am	Ehlers-Danlos Syndrome **Vincent Martin, MD**
11:00 am - 11:30 am	Q & A Panel - Brian Dlouhy, MD; John Heiss, MD; Vincent Martin, MD
11:30 am - 1:00 pm	Speaker Lunch and MAB & BOD Lunch Meeting
1:00 pm - 1:25 pm	Cerebrospinal Fluid Pressure Disorders **Linda Gray, MD**
1:30 pm - 1:55 pm	Caught in the Middle: Immune Dysregulation, Connective Tissue Disease Leading to Spinal Cord Problems **Anne Maitland, MD**
2:00 pm - 2:25 pm	Chiari Center: A Simple Concept for a Complex Diagnosis **Erol Veznedaroglu, MD**
2:30 pm - 2:55 pm	Longitudinal Scoliosis Follow-up in Chiari Patients **Cormac Maher, MD**

Wednesday, July 17, 2024 Continued

3:00 pm - 3:25 pm	What Do We Currently Know About the Genetics of Chiari? **Allison Ashley-Koch, PhD**
3:25 pm - 4:00 pm	Q & A Panel – Linda Gray, MD; Anne Maitland, MD; Erol Veznedaroglu, MD; Cormac Maher, MD; Allison Ashley-Koch, PhD
4:00 pm - 4:05 pm	Closing Remarks
5:00 pm	Speaker Appreciation Dinner Free Evening for Attendees to Enjoy the City of Durham

Thursday, July 18, 2024

7:00 am - 8:30 am	Complimentary Buffet Breakfast for all Attendees – AMB Gallery
7:45 am - 8:30 am	Support Group Meeting for Patients (May enjoy breakfast during meeting)
8:35 am - 8:55 am	Chiari and Syringomyelia: Natural History **Gerald Grant, MD**
9:00 am - 9:25 am	Syrinx: When Should You Worry and When Should We Intervene? **Bermans Iskandar, MD**
9:25 am - 9:50 am	Assessment, Management, and Outcomes in Occult Tethered Cord Syndrome **Petra Klinge, MD**
9:50 am - 10:00 am	Break
10:00 am - 10:30 am	Surgical Management of the Complex Chiari Malformation: Along the Spectrum of Platybasia to Basilar Invagination **Deb Bhowmick, MD and David Hasan, MD**
10:30 am - 10:55 am	Orthostatic Dizziness, POTS and Dysautonomia **Safwan Jaradeh, MD**
11:00 am - 11:30 am	Q & A Panel - Bermans Iskandar, MD; Petra Klinge, MD; Safwan Jaradeh, MD; Deb Bhowmick, MD; David Hasan, MD; Gerald Grant, MD
11:30 am - 1:00 pm	Break for Lunch

Thursday, July 18, 2024 Continued

1:00 pm - 1:25 pm	Understanding the Relationship between Chiari Malformation and Scoliosis **Vijay Ravindra, MD**
1:30 pm - 1:55 pm	Pseudotumor and Innovative Medical Trials **Alexa Bramall, MD**
2:00 pm - 2:30 pm	Primary Spinal Syringomyelia - with Follow-up Q & A Session **Ulrich Batzdorf, MD**
2:35 pm – 2:50 pm	Hidden Motion, Novel Solution: Advanced Imaging Technologies for Chiari Malformation & Beyond **Moss Zhoa, DPhil**
2:55 pm - 3:10 pm	Q & A Panel - Vijay Ravindra, MD; Alexa Bramall, MD; Moss Zhoa, DPhil
3:15 pm - 4:05 pm	Chiari Beyond our Borders, Barriers to Care - with Follow-up Q & A Session **Jorge Lazareff, MD; Maria Jose Bugallo, MD; Juan Bosco Gonzalez Torres, MD**
4:10 pm - 4:15 pm	Closing Remarks Patrice Schaublin, Executive Director
4:45 pm - 7:45 pm	Closing Cocktail Reception – President's Terrace Gerald Grant, MD

Conference Host

Gerald A. Grant, MD

Durham, North Carolina

Chiari and Syringomyelia: Natural History

Synopsis: "I was just diagnosed with Chiari with or without a syrinx. What is the long-term risk of conservative management (no surgery)? Is surgery inevitable and should I just get it over with now while I am younger? Will Chiari shorten my lifespan? Does Chiari and or syrinx ever resolve on its own without surgery?" We will explore these questions together and learn if there is any answer based on evidence.

Dr. Gerald A. Grant, is a neurosurgeon, scientist, and chair of the Department of Neurosurgery at Duke University.

Clinically, Grant specializes in treating brain tumors, medically refractory epilepsy, Chiari malformation, and concussion. He treats pediatric patients and young adults. His research focuses on innovative ways to open the blood-brain barrier to improve the delivery of novel drugs and immunotherapy to target brain tumors. Dr. Grant is an investigator on several initiatives funded by the National Institutes of Health (NIH) relating to brain tumors, focused ultrasound, brain tumor immunotherapy and concussion. He is an author on 326 peer reviewed journal articles, holds several leadership positions nationally, and serves on multiple editorial boards in neurosurgery.

Grant received his undergraduate degree in neurosciences at Duke University and his medical degree from Stanford University. He completed his residency in neurosurgery at the University of Washington in Seattle and fellowship in pediatric neurosurgery at Seattle Children's Hospital.

After residency, Grant fulfilled his commitment to the United States Air Force. He was chief of neurosurgery at Wilford Hall Medical Center, Lackland Air Force Base in Texas and the USAF Neurosurgical Consultant for Aerospace Medicine from 2003-2006. He deployed to Landstuhl Regional Medical Center in Germany and Balad Air Base in Iraq as Chief of Neurosurgery, in support of Operation Iraqi Freedom. He attained the rank of Lieutenant Colonel and was awarded a Meritorious Service Medal prior to his separation.

In 2006, Grant joined Duke's faculty as an associate professor in the Department of Surgery. In 2013 he was recruited to Stanford as Chief of Pediatric Neurosurgery and Vice Chair of Neurosurgery. He served as Associate Dean of academic affairs at Stanford from 2021-2022. In April 2022, Grant was recruited back to Duke as Professor and Chair of the Department of Neurosurgery.

Conference Speakers

(Listed in alphabetical order)

Allison Ashley-Koch, PhD

Durham, North Carolina

What Do We Currently Know About the Genetics of Chiari?

Synopsis: Dr. Ashley-Koch will review what is currently known about the genetics of Chiari malformations, including work by her group, as well as other groups in the field.

Dr. Allison Ashley-Koch is a Professor in the Duke Molecular Physiology Institute and the Department of Medicine at Duke University Medical Center. Dr. Ashley-Koch is a genetic epidemiologist whose primary goal is the identification of genes that contribute to human genetic conditions, including the identification of gene-gene and gene-environment interactions. She uses multiple genetic and genomic approaches in her research. Dr. Ashley-Koch is currently involved in studies to dissect the genetic etiology of Alzheimer disease, anencephaly and other neural tube defects, Chiari malformations, post-traumatic stress disorder, and suicidal phenotypes. She also works on the genetic modifiers of sickle cell disease. She is passionate about training the next generation of scientists and currently serves as the Director of the Duke University Program in Genetics and Genomics, a graduate training program for PhD students.

Ulrich Batzdorf, MD

Los Angeles, California

Webcast: Primary Spinal Syringomyelia

Synopsis: Syringomyelia unrelated to Chiari abnormalities is less common and poses unique challenges to patients and physicians. Among other causes, it may occur after spine injuries, spinal infections and bleeding into the spinal canal. Obstruction of the normal spinal fluid circulation is the most common problem and treatment is directed at relieving such blockage, although this is not always possible. In such cases, shunting the fluid out of the spinal cord remains an option.

Dr. Ulrich Batzdorf is a Professor of Neurosurgery at UCLA School of Medicine. His interest in Syringomyelia dates back to 1979, when he first became involved in the care of a patient with the condition. It has remained a major focus of his clinical and academic activity, with numerous publications, including Syringomyelia: Current Concepts in Diagnosis and Treatment published in 1991. Ten years later along with doctors Tamaki and Nagashima of Japan Syringomyelia, Current Concepts in Pathogenesis and Management was published. Dr. Batzdorf's primary clinical and research focus is on the treatment of Chiari malformation and syringomyelia and spinal cord tumors. He is a coveted speaker on the disorders at medical conferences around the world.

Deb Bhowmick, MD & David Hasan, MD
Durham, North Carolina

Surgical Management of the Complex Chiari Malformation: Along the Spectrum of Platybasia to Basilar Invagination

Synopsis: Chiari malformations in adults and children vary significantly in anatomy, symptoms, and clinical history. This talk will review special cases in which adjuncts such as craniocervical fusion, skull base resections, and odontoidectomy are considered for improved outcomes. Furthermore, treatment options for previous surgical complications or clinical progression after surgery are reviewed.

Dr. Deb Bhowmick is a neurosurgeon specializing in complex spinal surgery, craniocervical junction, and congenital spinal malformation surgery at Duke University Hospital. He is an Associate Professor in the Department of Neurosurgery. Previously Dr. Bhowmick was Section Chief of Spinal Neurosurgery in the Department of Neurosurgery at the University of North Carolina at Chapel Hill. Dr. Bhowmick completed his residency in neurosurgery at the University of Pennsylvania and a fellowship in spinal surgery at the Cleveland Clinic. Dr. Bhowmick's practice is focused on the surgical treatment of adult spinal deformities, craniocervical anomalies, and adult manifestations of congenital spinal anomalies. His academic interests include the use of novel minimally invasive approaches to cervical and lumbar spinal deformities as well as tethered cord, intradural spinal cysts, CSF flow anomalies, and syringomyelia. He is board certified and is an associate editor of the journal, Operative Neurosurgery.

David Hasan, MD
Durham, North Carolina

Dr. David Hasan is a scientist neurosurgeon with extensive experience in management of cerebrovascular diseases and skull base tumors. He is a fellowship – dual trained open cerebrovascular and endovascular with a background of treating over 2500 brain aneurysms using very innovative techniques including awake surgery.

He is an international authority in cerebrovascular research with over 270 peer-reviewed PubMed publications, multiple NIH grants, and member of several editorial boards of high impact medical and surgical journals.

Paolo Bolognese, MD
Mount Sinai, New York

Webcast Counterpoint: Take Out My Tonsils!

Synopsis: In the absence of complications, all the variants of Chiari surgical decompression are helpful, but in the hands of a top specialist, aggressive techniques of Chiari decompression are linked to better degrees of anatomical and clinical outcome, than their extradural counterparts. That said, some important points need to be made:

- In the hands of top experts using very aggressive Chiari techniques, the incidence of complications is equal (or even lower) when compared to beginners using Extradural decompression.
- From a recent poll, all the top international specialist in the field of Chiari (> 900 cases performed) stated that aggressive intradural techniques (with open arachnoid, and tonsillar manipulation) were their default procedures.
- Less experienced surgeons should start with the basic Extradural techniques, and they should try to "level up" as their skill set improves and their Chiari experience increases.
- Ideally, a top Chiari surgeon should master all the technical variants of the Chiari surgical spectrum (from simple Extradural, to very aggressive tonsillar manipulation), but this pattern will probably fade into extinction, since the recent proliferation of Chiari centers has fragmented the surgical experience of each Chiari specialist.
- "Tailoring" is the name of the game for a top Chiari expert; tailoring means adapting a technique, or pieces of different techniques to the individual anatomical and clinical case which is at hand.
- The new generation of Residents (and future Surgeons) is over-reliant on technology (i.e. sealants, etc.), and less tolerant to models of delayed gratification. With this premise, they will probably tend to favor Extradural techniques, instead of slowly master more rewarding alternatives with a longer learning curve.

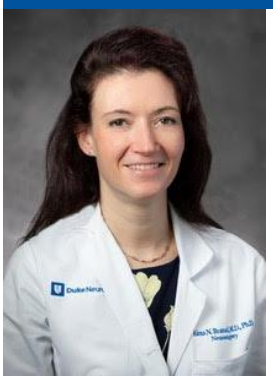
CONCLUSION

- Beginners should start from basics surgical techniques.
- Young Chiari experts in the making should strive to "level up."

Dr. Paolo Bolognese is a native of Torino, Italy, and graduated from the Medical School of the University of Turin. He trained twice in Neurosurgery, under Prof. Fasano (Turin, Italy) and under Dr. Milhorat (Brooklyn, NY). In 2001, Dr. Bolognese joined Dr. Thomas Milhorat and then co-founded The Chiari Institute. In 2014, he started the Chiari EDS Center at Mount Sinai South Nassau, along with Dr. Roger W. Kula. His Neurosurgical interests span from Chiari I Malformation to Craniocervical Instability, Tethered Cord, Styloid Hypertrophy, Idiopathic Intracranial Hypertension, and Intracranial Hypotension.

Alexa Bramall, MD
Durham, North Carolina

Pseudotumor and Innovative Medical Trials



Synopsis: This talk will review the diagnostic criteria and our current understanding of the pathophysiology of idiopathic intracranial hypertension (pseudotumor cerebri). We will discuss current medical and surgical interventions, with a particular focus on ongoing and upcoming clinical trials.

Dr. Alexa Bramall is an Assistant Professor in the Department of Neurosurgery at Duke University Hospital specializing in adult CSF flow disorders and hydrocephalus. Originally from Canada, she completed her MD and PhD at the University of Toronto, followed by residency and an enfolded fellowship in neurosurgical oncology at Duke. Dr. Bramall's academic research interests include the study of CSF regulation in the choroid plexus and the identification of novel treatments for adult hydrocephalus.

John Crawford, MD
Orange, California

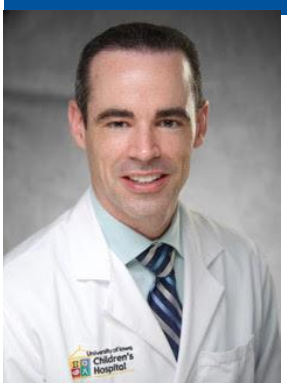
Webcast: Pain Profiles in Chiari Malformation and Management

Synopsis: In this presentation we will discuss the mechanisms of pain associated with Chiari malformations and Syringomyelia. I will discuss pharmacologic and non-pharmacologic approaches to pain management.

Dr. John Crawford is Division Chief of Child Neurology and Professor of Clinical Pediatrics at CHOC and UC Irvine. He is also Co-Medical Director of the CHOC Neurosciences Institute. Dr. Crawford is board-certified by the American Board of Psychiatry and Neurology in Neurology with Special Qualifications in Child Neurology and by the United Council for Neurology Subspecialties in Neuro-oncology. He graduated from the University of Massachusetts at Amherst with a Bachelor of Science in Biochemistry and a master's degree in Biochemistry and Molecular biology. Dr. Crawford attended medical school at the University of Massachusetts at Worcester. Following medical school, he completed his pediatrics training at Los Angeles County/University of California and child neurology and neuro-oncology training at Children's National Medical Center. Prior to his arrival at CHOC, Dr. Crawford was professor of clinical neurosciences and pediatrics at University of California San Diego and director of neuro-oncology at Rady Children's Hospital. As prior director of the Child Neurology Fellowship Program and Neuro-Oncology Fellowship Program at UCSD, Dr. Crawford has mentored dozens of neurology and oncology trainees throughout his career. Dr. Crawford's research interests are in translational pediatric neuro-oncology including molecular-guided approaches to the diagnosis and treatment of pediatric central nervous system tumors.

Brian Dlouhy, MD
Iowa City, Iowa

Pediatric and Adult Chiari Patients Who Need a Fusion in Addition to Decompression



Synopsis: Educate patients and families on whether a fusion is needed or not during surgery for Chiari malformation type I.

Dr. Brian Dlouhy is a pediatric and adult neurosurgeon at the University of Iowa Hospitals & Clinics and University of Iowa Children's Hospital in Iowa City, Iowa. He completed his neurosurgery residency at the University of Iowa working extensively under Dr. Arnold Menezes. He now works side by side with Dr. Arnold Menezes treating all disorders of the craniovertebral junction (CVJ) in children and adults. He also has an active research program studying the pathophysiology of Chiari I malformation and other conditions of the CVJ.

Herbert Fuchs, MD, PhD
Durham, North Carolina

Dilated Central Canal and Syrinx

Synopsis: Discuss the development of the spinal cord and central canal. Discuss syringomyelia and hydromyelia. Discuss the role of the central canal in normal and pathologic CSF movement.

Dr. Herbert Fuchs attended UCLA where he received his BS in Biochemistry. He then attended Duke University where he earned his MD and PhD. He attended Duke Neurosurgery for his Internship and residency, and Children's Memorial Hospital in Chicago: Pediatric Neurosurgery Fellowship. Dr. Fuchs is part of the faculty at Duke Neurosurgery and is Chief of Pediatric Neurosurgery.

Linda Gray, MD
Durham, North Carolina

Cerebrospinal Fluid Pressure Disorders

Synopsis: CSF pressure disorders were previously but are now becoming an increasingly recognized cause of headache. Secondary causes of headache are important because if identified and treated can result in headache cure. Intracranial hypotension in particular, was described in the mid 1990's but was felt to be a relatively uncommon entity. Today there is more awareness of the clinical presentation with its myriads of symptoms, the imaging findings and the treatments available. If recognized, unnecessary Chiari decompressions, subdural drainages or pituitary and dural biopsies can be avoided. Clinical symptoms, imaging findings, treatments and post treatment outcomes with associated case presentations will be presented.

Dr. Linda Gray began her career at Duke Medical Center in neuroradiology and has been on faculty at Duke in Neuroradiology for 37 years. Initially her career was occupied with running the residency-training program for a dozen years. In 2002 when CT fluoroscopy came to fruition, she initiated CT fluoroscopic guided pain management and pioneered CT interventions along the spinal axis including central cervical epidurals extending from C1-2 and throughout the cervical, thoracic and lumbar spine. In 2006, she initiated a program in CT fluoroscopic guided interventions for the treatment of spontaneous intracranial hypotension. There are now 8 faculty at Duke treating patients with CSF pressure disorders in both neuroradiology and IR. Additionally, she and her colleagues have mentored at least 40 neuroradiologists and 30 institutions throughout the United States, Europe and Australia in the performance of these procedures and has initiated the concept of cerebrospinal fluid (CSF) pressure problems as a secondary cause of migraine headaches throughout the headache community. She is now an invited speaker on the subject, giving multiple lectures throughout the year.

John D. Heiss, MD
Bethesda, Maryland

Evaluation & Treatment of Patients with a Small Posterior Cranial Fossa

Synopsis: This talk will review the typical signs and symptoms of Chiari I and its variant, Chiari O malformation. It will show how Chiari I and Chiari O malformations are associated with incomplete bone development, reduced volume and height of the posterior fossa, and compression of the cerebellar tonsils, brainstem, and cerebrospinal fluid (CSF) pathways at the foramen magnum. Finally, the talk will describe treatment options.

Dr. John Heiss is a Senior Clinician, the Head of the Clinical Unit of the Surgical Neurology Branch, and Program Director of the Neurological Surgery Residency Training Program at the National Institute of Neurological Disorders and Stroke (NINDS), National Institutes of Health (NIH) in Bethesda, Maryland. He is actively involved in clinical and translational research to improve the understanding and treatment of Chiari I malformation, syringomyelia, pain, brain tumors, and Parkinson's disease. He is board-certified in neurological surgery and an expert in supervising and conducting clinical trials for CNS disorders. Dr. Heiss received his B.S. in Biomedical Sciences and M.D. from the University of Michigan. In addition, he completed his surgical internship and residency in neurosurgery at the University of Cincinnati College of Medicine. Before joining NINDS, Dr. Heiss was Co-Director of the Neuroscience Intensive Care Unit at the University of Cincinnati.

Fraser Henderson, MD
Baltimore, Maryland

Clinical Diagnosis, Radiological Criteria, and Treatment of Chronic Craniocervical Instability

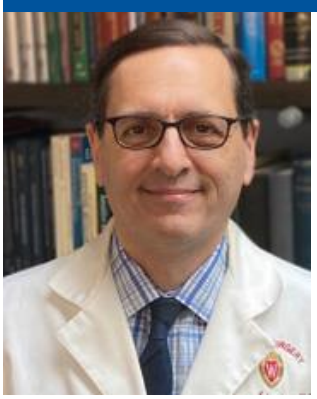
Synopsis: The criteria by which 53 patients with cervical medullary syndrome were selected for craniocervical stabilization and fusion, the surgical technique and outcomes analysis is presented. Any controversial aspects will be addressed in the following Q and A.

Dr. Fraser Henderson Sr. worked as foreman on a cattle station in the Outback of Australia before receiving his Bachelor's and Medical degrees at the University of Virginia, Charlottesville, Virginia in 1982. He served with the Multi-National Peace Keeping Force in Beirut, Lebanon, earning the Navy Commendation Medal for preparedness and treatment of mass casualties, following the terrorist bombing attack on October 23rd, 1983. After completing his residency, he returned to complete his active-duty obligation at the National Naval Medical Center, Bethesda, Maryland. He was Brigade Neurosurgeon for the 4th Marine Expeditionary Brigade in Desert Shield and Desert Storm, in the 1st Gulf War, 1990-91. In 1993 he was International Fellow for Craniospinal surgery at The National Hospitals for Neurology and Neurosurgery, Queen Square, London. He then joined Georgetown University as Director of Neurosurgery of the Spine and Craniocervical Junction. In 2005 he was promoted to Professor of Neurosurgery (Scholar tract).

Dr. Henderson entered private practice in 2008, continuing his academic affiliation with Georgetown University. Dr Henderson has published over 130 peer reviewed articles, patents and book chapters, edited numerous books and proceedings, and given over 200 invited lectures. Dr. Henderson is Adjunct Professor of Neurosurgery, University of Maryland School of Medicine, Director of The Metropolitan Neurosurgery Group, and a staff member at University Maryland Capital Regional Medical Center, and Executive Board member of the Bobby Jones CSF, a member of the Pan African Academy of Christian Surgeons and an Officer of The Order of St. John. His recently published book, "Symptomatic" describes the diagnosis and evaluation of the 75 symptoms of the patient with Ehlers Danlos Syndrome.

Bermans Iskandar, MD
Madison, Wisconsin

Syrinx: When Should You Worry and When Should We Intervene



Synopsis: I will discuss current thoughts on syringomyelia regarding when and how to intervene.

Dr. Bermans Iskandar is Professor of Neurosurgery and Pediatrics, and Director of the Pediatric Neurosurgery program at the University of Wisconsin Hospital and Clinics. His clinical interests include neuro-endoscopy, brachial plexus reconstruction, and surgery of congenital CNS malformations, especially hydrocephalus, Chiari malformations, and syringomyelia. Led by Dr. Iskandar, the Wisconsin Hydrocephalus Group (WHP) of engineers, physicists, neurologists, and neurosurgeons aims to determine the etiology of ventricular shunt malfunction and optimize the devices used to treat it. As well, Dr. Iskandar directs a translational research laboratory that has uncovered an important link between folate metabolism, epigenetic influences, and axonal regeneration after central nervous system injury. Dr. Iskandar has recently concluded his service as Chair of the AANS/CNS Section on Pediatric Neurosurgery, and Chair of the American Board of Pediatric Neurological Surgery.

Robert Keating, MD

Washington, District of Columbia

Point: Don't Touch My Tonsils!

Synopsis: The current approach to diagnosis and treatment of Chiari malformations continues to generate considerable controversy especially when this comes to the role of cerebellar tonsillar manipulation during surgical decompression. Debate surrounds the etiology of syringomyelia in this setting and many individuals advocate removing or shrinking the tonsils to open up the craniocervical CSF pathways. Nevertheless, other individuals advocate minimal manipulation of the tonsils to avoid creating additional scar at the chokepoint of CSF flow between the brain and spinal cord. Experience at Children's National Hospital (Washington DC) over two decades appears to demonstrate an increase incidence of failed surgery and need for re-do Chiari surgery when there is direct tonsillar manipulation (shrinkage/removal) when compared to the cohort where there is no direct involvement of the tonsils. We will share our experience with the audience and look forward to the inevitable lively debate.

Dr. Robert Keating is currently the McCullough Distinguished Professor of Neurosurgery and Chief of Neurosurgery at the Children's National Medical Center in Washington, DC. Dr. Keating graduated from Georgetown University Medical School in 1983 and subsequently went to New York where he did his training in Neurosurgery at the Albert Einstein and Montefiore Medical Center in the Bronx. A fellowship in Pediatric Neurosurgery as well as Craniofacial Surgery followed at Einstein / Montefiore in 1990. Subsequent to his training, Dr Keating served in the Navy and was stationed at the Oakland Naval Hospital from 1990-1994, during which time he served as the Chief from '91 to '94. He then returned briefly for 2 years to the Bronx where he was on staff at Montefiore Medical Center as well as the Bronx Municipal Hospital Center. He came back to Washington in 1996 to join the faculty at the Children's National Medical Center and later became Chief of the Division of Neurosurgery in 2003 and Professor of Neurosurgery and Pediatrics in 2008. His past appointments include the President of the Medical Staff at the Children's National Medical Center as well as Head of Credentials and he currently maintains a busy practice of pediatric neurosurgery, with an emphasis on tumors, Chiari malformations, craniofacial reconstruction, spinal dysraphism, spasticity and brachial plexus surgery. As a member of the American Society of Pediatric Neurosurgery and International Society of Pediatric Neurosurgery, he has published and presented extensively in the field.

His publications include the previous texts, "An Atlas of Orbitocranial Surgery" and "Tumors of the Pediatric Nervous System" (2nd edition published in 2013) with current work on Neurosurgical Operative Atlas, (2nd ed. Kobets A, Goodrich JT, and Keating RF, Thieme) due for publication in 2024. He is a reviewer for numerous journals, including Pediatric Neurosurgery, Neurosurgery, Pediatrics, Journal of Neuro-Oncology and is on the Editorial Board of Childs Nervous System. In addition, he is also Chair, Medical Advisory Committee on the Board of the American Syringomyelia Alliance Project as well as a founding member of the Posterior Fossa Society and maintains long-standing membership in the CNS, AANS, ASPN and is currently on the Executive Board of the ISPN.

Petra Klinge, MD, PhD
Providence, Rhode Island

Assessment, Management, and Outcomes in Occult Tethered Cord Syndrome (OCTS)

Synopsis: The lecture will discuss the diagnostic approach to the occult tethered cord syndrome based on patient reported symptoms and neurological biomarkers including the implication and assessment of co-morbidities in the management of OCTS. Also, data on complications including a presentation of retethering rates will be covered with preliminary data on long-term outcomes and the assessment.

Dr. Petra Klinge serves as an internationally renowned clinician for diagnosing and neurosurgical treatment of patients with CSF disorders working on the unifying concept of cognitive problems related pathology in Hydrocephalus of aging and pediatric patients. Her practice also includes patients with associated developmental Cerebrospinal fluid disorders, such as spina bifida, Chiari malformation, tethered cord, patients with connective tissue disorders and associated spinal fluid disorders including syringomyelia and occult tethered cord syndrome. Her research focuses on the pathophysiology and diagnosis of tethered cord and on establishing criteria and clinical biomarkers for surgical intervention in tethered cord syndromes (1-5).

In collaboration with neuroradiology in her practice at Rhode Island Hospital and the Carney-Institute and the department of bio-engineering at the Brown Medical School she develops pioneering and novel clinical and in-vivo diagnostics and pathological studies to improve the management and validation of those conditions.

In the past 2 years, Dr. Klinge has also collaborated with the University of Akron Conquer Chiari Research Center, founded by the Department of Psychology and the Department of Biomedical Engineering on the implications of ageing in Chiari as well as identifying cognitive and imaging biomarkers to support the biodynamic concept of the failure of Cerebrospinal fluid regulation at the base of the skull in adult Chiari malformation. Her research has focused on the failure of “Myodural bridges” and defunct collagen that supports the aspects of CSF circulatory failure at the base of the skull in various conditions including Chiari associated with connective tissue disease and she works on the novel concept of a “Spinal cord motion disorder” that might explain, and support occult neurosurgical pathologies associated with impaired CSF regulation and tethering of the spinal cord and brain stem. She had been appointed by the National Academy of Sciences and has served in 2022 in a committee to establish disability criteria for the neurological conditions in patients with Ehlers-Danlos-Syndrome and Marfan Syndrome as a nationally acknowledged expert for spinal cord disorders and tethered cord syndrome. *Selected Heritable Disorders of Connective Tissue & Disability | National Academies*.

David Knowlton
New Jersey

Webcast: Medical Marijuana – The Health Professional's Role

Synopsis: The last time we met, we outlined the evolution of marijuana from a substance abuse to one with medical potential. However, that potential has been mitigated by the health professional community's reluctance to embrace the therapeutic use of medical marijuana when it provides a solution/relief to patients. Additionally, marijuana is not benign; like any drug, its interactions and side effects need to be considered, especially in the context of medical treatment.

This session will discuss these issues and how health professionals can become more knowledgeable about their patient's use of medical marijuana, even if its therapeutic use is not a path they suggest.

David Knowlton retired as President and CEO of the New Jersey Health Care Quality Institute, an independent, nonpartisan organization promoting healthcare quality, safety, accountability, and cost containment.

He currently chairs the HealthWell Foundation, which helps patients afford their medications when their insurance is inadequate. Since 2004, HealthWell has awarded over $4.1 billion in copayment assistance and helped more than 930,000 patients afford their medications. In 2023, HealthWell awarded more than $1 billion in grants. From 2009 to 2010, he served as Chairman of the Leapfrog Group, a national organization promoting healthcare safety and quality, and as a board member for ten years.

David was Deputy Commissioner of Health for the State of New Jersey from 1987 until 1990 under the administration of Gov. Tom Kean. Following Governor Chris Christie's 2009 election as governor, David led the governor's transition team on health care.

David topped NJ Spotlight's "New Jersey's Top 10 Healthcare Policy Analysts and Experts" list and was listed in the annual NJBIZ "Power 50 Health Care" rankings.

He founded and currently leads the not-for-profit Cannabis Education and Research Institute (CERI) to preserve and expand access to medicinal marijuana.

David is a founding board member of America's Nurses, the nation's first nurse practitioner practice management organization. In 2021, they launched their flagship practice, Altrix Primary Care, in Nashua, New Hampshire.

David completed his baccalaureate in psychology at the University of Massachusetts in Amherst and received a master's degree from Trinity College in Hartford.

Jorge Lazareff, MD
Los Angeles, California

Chiari Beyond our Borders, Barriers to Care

Synopsis: Discussion relating to barriers of care for Chiari patients beyond our borders. Dr Bugallo will discuss personal experiences while Dr Bosco will address overall institutional problems relating to this care.

Dr. Jorge Lazareff is Emeritus Professor of Neurosurgery at the David Geffen School of Medicine, University of California, Los Angeles. Dr. Lazareff's clinical and research interest include congenital malformations of the Central Nervous System. He is currently involved in studying barriers to care for congenital diseases of the nervous system.

Maria José Bugallo, MD

Dr. Maria José Bugallo is a Pediatrician and Neonatologist at the Hospital de Interzonal de Agudos "Luisa C. de Gandulfo" Buenos Aires, Argentina. Dr. Bugallo's area of interest includes follow up clinic of high-risk infants.

Juan Bosco Gonzalez Torres, MD

Dr. Juan Bosco Gonzalez Torres is a Neurosurgeon and Coordinator of Neurosurgical Services at "Hospital Bautista," Managua. He is also a Neurosurgeon at "Hospital Vivian Pellas" Managua, Nicaragua.

Dr. Gonzalez Torres' experience includes the Pediatric Neurosurgery Department at IVSF UCLA Ronald Reagan Medical Center (2009), AANS International Visiting Surgeons Fellowship IVSF (2013), Pediatric Neurosurgery Department at Memorial Hermann-Texas Medical Center and Skull-base Department & Pediatric Neurosurgery at IVSF Cardiff medical Center, UK.

Dr. Gonzales Torres has also served as former President of Central American Association of Neurosurgery (ASOCAN) (2017-2019), Senior Delegate Nicaraguan Association of Neurosurgery (ANN), Executive member committee of Latin America Association of Neurosurgery (FLANC) and Editorial member committee in Pediatric Neurosurgery at FLANC.

Michael Levy, MD, PhD
San Diego, California

Webcast: Syrinxes Not Related to Chiari Malformation

Synopsis: In this presentation we will initially deal with the definition, location, and etiology of primary (acquired) syrinx. Examples will include syrinx's related to spinal cord tumors, secondary to trauma, and associated with spinal column abnormalities. I will also discuss the management, treatment, and follow-up required.

Dr. Michael Levy is the Professor and Division Head of the University of California San Diego Division of Pediatric Neurosurgery. Dr. Levy is also Chief of Pediatric Neurosurgery at Rady Children's Hospital-San Diego and UC San Diego School of Medicine.

In 2002, he was recruited to develop a Pediatric Neurosurgical Center of Excellence at Rady Children's and a pediatric neurosurgical fellowship at UC San Diego. Currently, Dr. Levy is the director of UC San Diego's Pediatric Neurosurgical Fellowship Training Program and its pediatric neurosurgical international fellowship.

Dr. Levy's expertise lies in the treatment of complex pediatric brain tumors and cerebrovascular malformations. He is also involved with the design and utilization of endoscopy and three- dimensional imaging technologies to facilitate surgery.

Along with his clinical expertise, Dr. Levy is actively involved in research and is widely published, with more than 200 papers appearing in peer-reviewed literature, seven books and more than 60 book chapters. Additionally, he is currently on the editorial boards of 16 peer-reviewed journals, including Neurosurgery, Journal of Health Communications, World Neurosurgery, Frontiers in Pediatrics and Journal of Neurosurgical Sciences.

Dr. Levy's professional memberships include the Society of University Neurosurgeons, the American Academy of Neurological Surgery and the American Society of Pediatric Neurosurgery, along with Alpha Omega Alpha (Medical Honor Society), the American College of Surgeons, the American Association of Neurological Surgeons, the Congress of Neurological Surgeons, Joint Section of Pediatric Neurosurgery and the WHO Global Initiative for Emergency and Essential Surgical Care.

Safwan Jaradeh, MD
Stanford, California

Orthostatic Dizziness, POTS and Dysautonomia

Synopsis: Patients with Chiari malformation and associated conditions have complex symptomatology. Among the most common symptoms are those of orthostatic intolerance, including orthostatic hypotension, postural orthostatic tachycardia syndrome (POTS), and other form of orthostatic/postural dizziness. We will review these intricate conditions and state-of-the-art approach for each.

Dr. Safwan Jaradeh is currently Professor and Director of the Autonomic Disorders Program at Stanford University School of Medicine since 2011. Prior to that, he was on the Neurology Faculty at the Medical College of Wisconsin from 1989 to 2011, where he also served as Professor and Chair of the Department of Neurology from 2000 to 2011. Dr. Jaradeh trained in Internal Medicine and Neurology in Paris and Cincinnati and completed Neuromuscular and Autonomic Fellowships at the Mayo Clinic, and Neuromuscular and Neuro-rehabilitation Fellowship at the University of Michigan. His research and clinical focus are in the areas of Autonomic Disorders, Orthostatic intolerance, Peripheral and Autonomic Neuropathies, Neuromuscular Disorders, Electromyography, Cranial and Bulbar disorders. He has won several teaching awards at both Institutions.

Cormac Maher, MD
Stanford, California

Longitudinal Scoliosis Follow-up in Chiari Patients

Synopsis: The natural history of scoliosis in the presence of CM-I is variable, though most curves remain stable. Understanding this variability is a first step toward building a prediction model for outcomes for these patients.

Dr. Cormac Maher has been named pediatric neurosurgery division chief at Stanford Department of Neurosurgery. His areas of clinical interest include the surgical treatment of Chiari Malformation, arteriovenous malformations, Moyamoya disease, cavernous malformations, pediatric brain tumors, spinal dysraphism, tethered spinal cord, and hydrocephalus.

Dr. Maher attended medical school at Georgetown University. He completed a surgical internship and neurosurgical residency at the Mayo Clinic in Rochester, Minnesota. After residency, he completed a in pediatric neurosurgery fellowship at Boston Children's Hospital under the direction of R. Michael Scott, MD. Afterward, he completed a fellowship in cerebrovascular neurosurgery at the Brigham & Women's Hospital. In 2006, Dr. Maher joined the faculty of the University of Michigan where he served as Professor of neurosurgery, Residency Program Director, and department Vice-Chair for Education.

Dr. Maher has published over 200 articles on a wide variety of neurosurgical topics in scientific journals and medical books. He has made over 230 presentations of his work at national medical meetings. He has served on the editorial board of the Journal of Neurosurgery Publishing Group including a term as co-chair of the editorial board for Journal of Neurosurgery: Pediatrics. He has served as Chair of the Accreditation Council for Pediatric Neurosurgery Fellowships and is a director of the Committee for Advanced Subspecialty Accreditation of the Society for Neurological Surgeons. He is on the executive board of the Pediatric Section of the American Association of Neurological Surgeons.

Anne Maitland, MD, PhD

New York, New York

Caught in the Middle: Immune Dysregulation, Connective Tissue Disease Leading to Spinal Cord Problems

Synopsis: Ehlers–Danlos syndrome (EDS) has been linked to several neurological problems including Chiari malformations, atlantoaxial instability (AAI), craniocervical instability (CCI), and tethered cord syndrome. Of the 11 reported variants of Ehlers-Danlos syndromes, 2 variants have been associated with dysregulation of components of the immune system: periodontal Ehlers-Danlos syndrome (pEDS) is associated with mutations within the complement system and hypermobile Ehlers-Danlos syndrome (HEDS) /hypermobile spectrum disorder (HSD) have been linked to mast cell disease. This lecture will explore their relationship between heritable disorders of connective tissue and components of the immune system, which dysregulation of the innate immune system increases the risk of spine instability and neurological compromise. This, in turn, supports the argument to screen for immune and connective tissue problems in patients with the above-mentioned neurological disorders.

Dr. Anne Maitland is board-certified in allergy & immunology and internal medicine. She previously served as the medical director of Comprehensive Allergy & Asthma Care in New York and Assistant Professor in the Department of Medicine, Allergy and Clinical Immunology at the Icahn School of Medicine at Mount Sinai.

As an allergy/immunology specialist at Metrodora Institute, Dr. Maitland's clinical and research efforts are focused on increasing access to allergy and immunology specialty care. She is also one of the country's top experts in immune-mediated disorders, including mast cell disease (MCD). She is a Fellow of the American College of Allergy, Asthma and Immunology, member of the American Academy of Allergy, Asthma and Immunology, and Vice Chair of the Allergy/Immunology Work Group of the National Medical Association.

Vincent Martin, MD

Durham, North Carolina

Ehlers-Danlos Syndrome

Synopsis: To educate clinicians on the different types of Ehlers-Danlos syndrome (EDS) as well as its clinical manifestations. We will focus on the associations between EDS and other medical disorders and how the presence of EDS might moderate the clinical presentation and management of these disorders.

Dr. Vincent Martin is the past president of the Ohio Headache Association and current president of the National Headache Foundation. He has also been a fellow of the American Headache Society and the American College of Physicians. After graduating from the University of Cincinnati College of Medicine

Dr. Martin completed a residency in internal medicine, followed by a fellowship in general internal medicine at UC. Dr. Martin was Chief Resident of the Department of Internal Medicine during his fellowship at UC.

Vijay Ravindra, MD
San Diego, California

Understanding the Relationship between Chiari and Scoliosis

Synopsis: Chiari malformations and associated Syringomyelia syndromes are complex problems. Often, additional considerations and relationships with other disease processes need to be investigated. There is a well-known relationship between Chiari malformation and thoracolumbar scoliosis. For example, the incidence of scoliosis can range from 2 to 4% in the general population but may be as high as 30% in patients with Chiari malformation type 1 and as high as 70% with spinal cord syrinx. In this discussion, we will discuss the relationship between these conditions and discuss emerging evidence regarding risk factors, diagnosis, and management of children with Chiari-related scoliosis.

Dr. Vijay Ravindra is a board-certified adult and pediatric neurosurgeon and active-duty Naval Officer currently stationed at Naval Medical Center San Diego and affiliated with Rady Children's Hospital. He completed his neurosurgery training at the University of Utah where he worked closely with Dr. Douglas Brockmeyer. He completed his pediatric neurosurgery fellowship at Texas Children's Hospital – Baylor College of Medicine. His clinical interests include disorders of the pediatric spinal column, in particular the craniocervical junction and scoliosis. Dr. Ravindra is a past recipient of ASAP's Timothy George Fellowship.

Erol Veznedaroglu, MD, FACS, FAANS, FAHA
Philadelphia, Pennsylvania

Chiari Center: a Simple Concept for a Complex Diagnosis

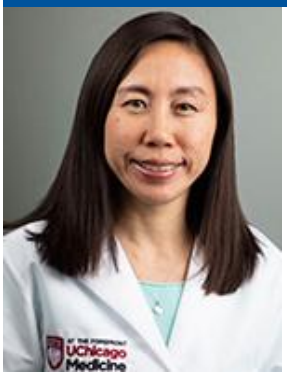
Synopsis: Chiari malformations and associated Syringomyelia syndromes are complex problems that require a multi-disciplinary team similar to other medical conditions. Correct diagnosis and treatment within an organized, dedicated, cohesive center is essential. The surgery is often the main or only focus, while other key elements are often ignored or referred out, leaving the patient without clear direction. We discuss the importance of a dedicated center to provide the best outcomes and care for the Chiari patient.

Dr. Erol Veznedaroglu, or Dr. Vez, is one of the nation's most innovative and experienced vascular, dual - trained neurosurgeons. He is director of the Drexel Neurosciences Institute and holds the Robert A. Groff Chair in Neurosurgery. Dr. Vez is also chair of Global Neurosciences Institute, LLC (GNI) leading a team of some of the nation's most experienced neurosurgeons specializing in comprehensive care including vascular, tumor, spine, and functional neurosurgery, as well as a consortium of neuroscience physicians providing subspecialty neurology and comprehensive pain management clinical services. He is board certified in neurological surgery and is a fellow of the American College of Surgeons (FACS), the American Association of Neurologic Surgeons (FAANS) and the American Heart and Stroke Association (FAHA).

Carina Yang, MD

Chicago, Illinois

From a Neuroradiologist's Perspective, Let's Revisit the Fundamentals of Chiari 101 and Syringomyelia



Synopsis: To bring Chiari imaging back to the basics, we will review common measurement techniques at the craniocervical junction and the relevant anatomy at this level. This talk will help demystify the neuroradiologist's role in the diagnosis and follow-up of Chiari and Syringomyelia.

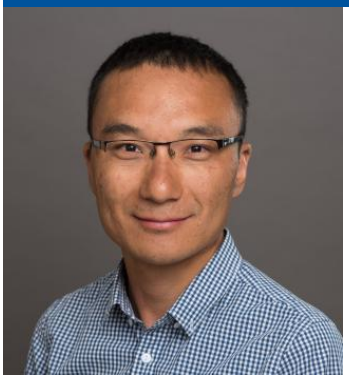
Dr. Carina Yang is a board-certified radiologist/neuroradiologist, an Associate Professor of Radiology, and has served as the Director of Pediatric Neuroradiology at the University of Chicago Medicine since 2013, with a focus on diagnosing and characterizing the full scope of head, brain, spine and neck conditions. Dr. Yang is an expert in interpretation of neuroradiological computerized tomography (CT) and magnetic resonance (MR) examinations and promotes techniques for pediatric patients to minimize radiation exposure and performing testing without the need for extended sedation. She also serves as the Vice Chair of Diversity & Inclusion for her department and is the Faculty Director for Fellowship Accreditation with the Office of Graduate Medical Education.

Dr. Yang was previously a team member for the Margaret Hackett Family Program at the University of Chicago, which aims to collaborate with physicians who advocate for the education and the advancement of knowledge pertaining to the care of patients. She is an elected member of the American Syringomyelia & Chiari Alliance Project Board. Dr. Yang is also a collaborating researcher with other pediatric neuroscience clinicians in evaluating topics including noninvasive MR of meningeal lymphatics in patients with craniosynostosis, and the potential relationship of retinopathy of prematurity to posterior reversible encephalopathy syndrome (PRES) in premature infants.

She was selected as a Senior Faculty Scholar in the Bucksbaum Institute for Clinical Excellence, as well as recently inducted as a Fellow of the University of Chicago Pritzker School of Medicine Academy of Distinguished Medical Educators. She also has great interest in promoting neuroradiology education to trainees and practicing clinicians on a global arena, with past invited visiting professorships to locations such as Newfoundland, Canada; Trinidad; Hong Kong; as well as Gwalior and New Delhi, India, in part with funding from two University of Chicago Provost's Global Faculty Awards. She was selected as the 2019 Anne G. Osborn American Society of North America International Outreach Professor to Ethiopia, and most recently traveled to Armenia for additional volunteer pediatric neuroradiology teaching. She hopes to continue to further her worldwide educational endeavors at new upcoming sites.

Moss Zhoa, DPhil
Stanford, California

Hidden Motion, Novel Solution: Advanced Imaging Technologies for Chiari Malformation & Beyond



Synopsis: In this talk, we will explore the integration of advanced imaging technologies with AI to enhance the diagnosis of brain diseases and predict neurosurgical outcomes. Highlighting recent advancements, we will demonstrate how advanced imaging techniques reveal hidden brain dynamics in patients with Chiari Malformation. We will elucidate how AI-driven imaging analysis improves diagnostic accuracy and helps identify high-risk patients. Additionally, we will discuss the implications of these innovations on patient care, treatment optimization, and future developments.

Dr. Moss Zhao is an Instructor at the Department of Neurosurgery, Stanford University. He develops cutting-edge and clinically viable imaging technologies to improve the diagnosis and treatment of cerebrovascular diseases across the lifespan. His specific areas of expertise include physiological modeling, arterial spin labeling, Bayesian inference, PET/MRI, and artificial intelligence. His scientific contributions could significantly improve the early detection of strokes and dementia as well as enrich the knowledge of brain development in the first two decades of life.

Dr. Zhao received his DPhil at St Cross College of University of Oxford under the supervision of Prof. Michael Chappell. As an alumni mentor, he supports the career development of students of his alma mater. Since 2016, he has presented his work to more than 3000 delegates at international conferences and held leadership positions in professional societies. His research and teaching are supported by the American Heart Association, the National Institutes of Health, and the European Cooperation in Science and Technology.

MEDICAL GLOSSARY

Abduction: Movement of an arm or leg away from the body.

Acute: Having rapid onset, severe symptoms, and a short course. Not chronic.

Adduction: Movement of an arm or leg toward the body.

Adhesions: Tissue surfaces which are adherent or attached to each other, either loosely or firmly, as a result of wound healing and sometimes inflammation.

Amyotrophic: Muscle wasting.

Anomaly: A deviation from the average or norm; anything structurally unusual or irregular i.e., presence of an extra finger or absence of a limb or congenital malformation.

Anterior: Pertaining to the front of the body.

Antiemetic: Medication to stop or prevent vomiting.

Apnea: Cessation of breathing. Skin color changes, pallor and/or cyanosis may ensue. There is a lack of chest wall movement; Can be caused by compression of the brainstem or lower cranial nerves.

Arachnoid: Delicate, web - like middle layer of the three membrane layers that cover the brain and spinal cord; arachnoid mater; Named after a spider web.

Arachnoiditis: Inflammation of the arachnoid membrane.

Ascending tracts: Groups of nerve fibers in the spinal cord that transmit sensory impulses upward to the brain.

Aseptic: Sterile, without bacteria; living pathogenic organisms are absent.

Aseptic meningitis: Inflammation of the membranes (meninges) that cover the brain and spinal cord. NOT an infection.

Aspiration: The act of withdrawing a fluid from the body by a suction device; the inspiratory sucking into the airways of fluid or foreign body, such as vomit.

Astrocytes: The most numerous of the neuroglial cells in the CNS derived from the neuroectoderm. Astrocytes function is fundamental for maintaining the homeostasis in the CNS. Astrocytes are part of the blood brain barrier, function as de - toxificating cells in the neuronal microenvironment and produce a variety of growth factors and mediators that contribute to the interaction between neurons and their environment (neuronal – neuroglial interaction).

Asymptomatic: Without symptoms or producing no symptoms.

Ataxia: Impaired ability to coordinate the muscles in voluntary muscular movements; symptomatic of any of several disorders of the nervous system.

Atrophy: A wasting of tissues or decrease in size of a part of the body because of disease or other influences.

Atypical: Not typical.

Autonomic nervous system: Portion of the nervous system that functions to control the actions of the visceral organs and skin; its actions are not under voluntary control.

Axon: A nerve fiber that conducts a nerve impulse away from a neuron cell body.

Barium swallow: X - ray using barium to view the act of swallowing, the esophagus or stomach. It can show if a person may be aspiring.

Basal ganglion: Mass of gray matter located deep within a cerebral hemisphere of the brain; has important functions in automatic movements of the limbs and in the control of muscle tonus.

Basilar impression: Upward displacement, particularly of the uppermost part of the cervical spine, into the region of the posterior fossa often produces compression of the brainstem and portions of the cerebellum.

Bilateral: Something that occurs or appears on both sides. A patient with equal strength bilaterally means there is equal strength on both sides of the body.

Brainstem: The portion of the brain that includes the midbrain, pons and medulla, thalamus and hypothalamus.

Calamus sciptorius: Inferior part of the rhomboid fossa; the pointed lower end of the fourth ventricle of the brain. It is shaped like a pen and lies between the restiform bodies.

Canalization neurulation: The formation of canals or passages to form the neural tube during the early stages of embryonic development.

Catheter: A tube designed for insertion into vessels, canals, passageways or body cavities to permit the injection or withdrawal of fluids or substances. It can also be used to keep a passageway open.

Caudal: Toward the lower end of the spine.

Central canal: The opening or channel normally present through the length of the spinal cord in later fetal life and early infancy. It gradually disappears throughout childhood, but segments of it may remain in adults (see also hydromyelia).

Central nervous system: The part of the nervous system consisting of the brain and spinal cord, which coordinates the entire nervous system of the body.

Cerebellar cortex: The outer layer of the cerebellum.

Cerebellar speech: Abnormal speech patterns seen in people who have a disease of the cerebellum or its connections; a slow, jerky and slurred speech that may come and go or it may be unvaried in pitch.

Cerebellar tonsils: Normal downward extensions of each cerebellar hemisphere.

Cerebellomedullary: Refers to the connections of the cerebellum and the medulla.

Cerebellum: Portion of the brain that lies in the posterior fossa and coordinates skeletal muscle movement.

Cerebral aqueduct: A narrow conduit or passage between the third and fourth ventricles located in the midbrain. CSF moves from the third ventricle through the cerebral aqueduct to the fourth ventricle.

Cerebral cortex: The outer layer of the cerebrum.

Cerebral hemisphere: One of the large paired structures that together constitute the cerebrum of the brain.

Cerebral spinal fluid: Fluid occupying the ventricles of the brain, subarachnoid space of the meninges, and the central canal of the spinal cord.

Cerebrum: Portion of the brain that occupies the upper part of the cranial cavity.

Cervical: The area of the neck made up of seven cervical vertebrae, which are counted from top to bottom. The top is C1, the first cervical vertebra, followed by C2, C3, etc.

Charcot joint: A type of diseased joint associated with varied conditions, syringomyelia among them, which involves disease or injury to the spinal cord. Because normal pain sensation of the joint is impaired, the pain mechanisms that protect the joint are diminished or absent. As a result, the joint may undergo relatively painless severe degenerative changes with deformity.

Chiari malformation: Descent of the brainstem and lower cerebellum through the foramen magnum into the cervical vertebral canal.

Choroid plexus: Mass of specialized capillaries that lie in the ventricles of the brain; these vascular tissue tufts produce cerebral spinal fluid from blood.

Chronic: Long - lasting; a disease having protracted course, not acute.

Cine MRI: Test performed in the MRI scanner that looks at the flow of CSF around the cerebellum and into the spinal canal.

Cisterna magna: One of three principal openings in the subarachnoid space between the arachnoid and pia mater layers of the meninges surrounding the brain. The openings are collectively referred to as cisterns. The cisterna magna is located between the cerebellum and the dorsal surface of the medulla oblongata. Cerebrospinal fluid produced in the fourth ventricle drains into the cisterna magna via the lateral apertures and median aperture.

Clonus: A series of alternating muscle contractions and partial relaxations that produces a jerking spasm of a limb, most often seen at the ankle, indicative of a brain or spinal cord abnormality involving motor pathways.

CM: See Chiari malformation.

CNS: See central nervous system.

Coele or cele: Related to a cavity or space.

Congenital: Existing at birth usually refers to certain mental or physical traits, peculiarities or diseases; a more general term than hereditary since congenital includes conditions due to influences arising during gestation.

Contraindicated: A medication or procedure that is not advisable i.e., tetracycline is contraindicated during pregnancy.

Contrast: The difference between two areas in an image; a substance that selectively increases the imaging signal of specific structures such as blood vessels or tumors.

Conus medullaris: The lowest end of the spinal cord.

Cranial nerves: The 12 nerves of the brain that control motor and sensory functions, including swallowing, heart rate, eye movement and smell.

Craniectomy: The excision (removal) of part of the skull.

Craniocervical instability: Occurs when the ligaments and connective tissues that support the head and neck become weakened or damaged.

CSF: See cerebral spinal fluid.

CT scan: A specialized radiographic technique in which many fine x - ray beams converge on one small target area (pixel); a computer calculates the x - ray absorption of tissue in each pixel, and converts this numerical value into a gray scale value; placing pixels of various shades of gray into anatomic arrangement results in an anatomic image.

Cyanosis: Blue or purple color to the skin and mucous membranes resulting from insufficient oxygen in the blood.

Dandy Walker syndrome: A condition characterized by hydrocephalus in infants associated with an abnormal closure of the foramina of Luschka and Magendie.

Decompression: To relieve or take pressure off.

Diencephalon: Portion of the brain in the region of the third ventricle that includes the thalamus and hypothalamus.

Diplopia: Double vision; occurs when the two eyes are unable to fix (look at) the same point.

Dissociation of sensation: Loss of pain and temperature sensation while light touch sensation is preserved.

Distal: Moving further from the midline or center of the body.

Dorsal: Posterior; pertains to the back of the body or of its parts, such as the spinal cord.

Dura mater: Tough outer layer of the membranes surrounding the brain and spinal cord.

Dysarthria: Speech that is difficult and poorly articulated; this may be caused by damage to the cerebellum or its connections, or to injury to nerves involved in speech.

Dysequilibrium: Inability to maintain proper balance.

Dyesthesia: Alteration in sensation; sensation of pins and needles, burning pain or unpleasant exaggeration of normal sensation that may occur with or without skin stimulation.

Dysmetria: An inability to accurately control the range or force of muscle movement; often seen in cerebellar disorders.

Dysphagia: Inability or difficulty in swallowing.

Dysplastic tonsil: Abnormal development of a cerebellar tonsil. Each cerebellar hemisphere has a downward extension called tonsil.

Dyspnea: Labored or difficult breathing resulting in air hunger.

Ectopia: Malposition or displacement of any organ or structure, congenital or acquired.

Edema: An excessive accumulation of fluid within tissues.

Elongated: To make or to grow longer.

Enuresis: Involuntary passage of urine, usually during sleep.

Epidural space: Space between the dura and the bone of the vertebral canal.

Esophagus: Muscular tube extending from the pharynx at the back of the throat to the stomach.

Excision: To cut away a portion.

Extremity: A limb; an arm or leg.

Fascia lata graft: A graft - covering or repair of tissue with fascia, the fibrous membrane that covers muscle over the lateral thigh.

Fasciculations: Involuntary contractions or twitching of groups of muscle fibers; a coarser form of muscle contractions than fibrillation.

Filum terminale: A long, slender filament at the end of the spinal cord.

Foramen: An opening, usually in bone or organ or membrane (plural is foramina).

Foramen magnum: Large opening in the base of the skull through which the spinal cord becomes continuous with the medulla oblongata.

Foramina of Luschka: Openings or passages for CSF on the lateral sides of the fourth ventricle.

Fossa: A depression or cavity within bone or surrounded by bone.

Fourth ventricle: Ventricle (a normal cavity) of the rhombencephalon of the brain; a cavity of irregular tent – like shape extending from the obex upward to its communication with the sylvian aqueduct, enclosed between the cerebellum and the rhombencephalic tegmentum. The ventricle of the brain that lies between the cerebellum and the brainstem, it expresses CSF into the subarachnoid space via the two lateral foramina of Luschka and the single medial foramen of Magendie.

Gait: Manner of walking.

Gliogenous: The tissue that forms the support element of cells and fibers of the nervous system.

Gliosis: Proliferation (growth by reproduction) of the neuroglial tissue in the central nervous system.

Greenstick fracture: A bone break in which the bone is bent but cracked only on the outside of the bend.

Gyrus: One of the convolutions of the cerebral hemispheres of the brain; The upraised ridges of the cerebrum.

Hemiplegia: Paralysis or severe weakness (paresis) of one side of the body, usually due to injury or disease of the brain or spinal cord.

Hemivertebrae: A congenital absence of half of a vertebra.

Horner syndrome: A condition with constriction of the pupil, partial drooping of the eyelid, recession of eyeball back into the socket, and sometimes loss of sweating over the affected side of the face, due to paralysis of the cervical sympathetic nerve trunk. It is often incomplete, i.e. not all the listed manifestations are present in one patient.

Hydro: Water, or collection of watery fluid.

Hydrocephalus: Enlargement of the normal cavities (ventricles) present in the brain. It may result from impairment in outflow of CSF normally produced within the brain ventricles. It may also result from developmental anomalies, infection, injury or brain tumors.

Hydromyelia: Accumulation of fluid in the enlarged central canal of the spinal cord.

Hyper: Prefix meaning above, excessive or beyond.

Hyperreflexia: Increase in action of the reflexes.

Hypo: Prefix meaning less than, below or under.

Hypoplasia: Defective development of tissue.

Hyporeflexia: Decrease in the action of the reflexes.

Hypotonia: Reduced tension, relaxation of arteries; loss of muscle tone.

ICP: See intracranial pressure.

Idiopathic: Pertaining to conditions without clear cause, as of spontaneous origins.

Impulse: A wave of depolarization conducted along a nerve fiber or muscle fiber.

Increased intracranial pressure: An increase in CSF production or blockage of CSF pathways resulting in pressure on the brain; the skull cannot expand to accommodate the pressure, which leads to symptoms such as headache.

Inferior: Situated below something else, pertaining to the lower surface of a part.

Insidious: A disease that develops without recognized symptoms so that the patient is unaware of the onset of the disease.

Interpedicular spaces: Space between the pedicles of the vertebrae.

Invasive procedures: A medical procedure that necessitates entrance into the body as part of the action required. Examples include needles introduced for injections or lumbar puncture and all surgical procedures.

Ipsilateral: On the same side; affecting the same side of the body. Said of findings (paralysis) appearing on the same side of the body as the brain or spinal cord lesion producing them.

Ischemia: A deficiency of blood in a part of the body.

Klippel Feil syndrome: Congenital anomaly characterized by a short wide neck, low hairline and fusion of two or more cervical vertebrae. The central nervous system may be affected.

Kyphosis: One form of abnormal curvature of the spine. The condition of kyphosis of the thoracic spine commonly called hunchback is an extreme form.

Laminectomy: The surgical removal of the posterior arch (lamina) of a vertebra.

Larynx: Structure located between the pharynx and trachea that houses the vocal cords.

Lateral: Pertaining to the side of the body.

Magnetic resonance imaging: A scanner using magnetic energy that interacts with tissue to yield clear black and white pictures, for example of the brain and spinal cord.

Medial: Toward or near the middle of the body.

Medulla oblongata: Portion of the brainstem located between the pons and the spinal cord.

Meninges: A group of three membranes that covers the brain and spinal cord. Closest to the brain and spinal cord is the pia, then the arachnoid and the outermost covering is the dura.

Meningitis: Infection or swelling of the membranes (meninges) that cover the brain and spinal cord.

Meningo: Refers to the meninges, membranes covering the brain and spinal cord.

Mesencephalon: The midbrain, one of three primitive cerebral sacs from which develop the corpora quadrigemina, the crura cerebri and the aqueduct of Sylvius.

Microgyri: Abnormally small cerebral convolutions.

Morvans chorea type: A condition with irregular uncontrollable movements.

MRI: See Magnetic resonance imaging

Myelo: Refers to the spinal cord.

Myelodysplasia: Defective formation of the spinal cord.

Myelogram: Imaging technique of the spinal cord and nerve roots by use of a radiopaque medium injected into the subarachnoid space, the fluid space surrounding the spinal cord.

Myelomeningocele: Form of spina bifida in which portions of the spinal cord and its membranes protrude through the open space in the vertebral column.

Myelotomy: Surgical incision into the spinal cord.

Necrosis: Death of cells or areas of tissue surrounded by healthy tissue.

Neurovascular bundle: Structure consisting of a group of nerves and blood vessels lying in direct contact with each other.

Nissen fundoplication: An operation of the fundus of the stomach which sutures the fundus of the stomach to the esophagus as a treatment for gastric reflux.

Nuchal rigidity: Muscle stiffness in the back of the neck.

Nystagmus: Constant, involuntary, cyclical movement of the eyeball. Movement may be in any direction, i.e. sideways, up, down or rotatory. May be present continually or only with looking in a certain direction; May be due to congenital conditions, labyrinthine irritability or neurological disease.

Obex: A thin, crescent - shaped band of tissue covering the Calamus scriptorius at the point of convergence of the nervous tissue at the lower end of the fourth ventricle. The point on the midline of the top surface of the medulla oblongata that marks the tail end of the fourth ventricle.

Occipital: The back of the head.

Occipital bone: The cup - like bone at the back of the skull. It houses the occipital lobes of the brain and the cerebellum; its lower edge makes up the back rim of the foramen magnum.

Opisthotonos: Involuntary backward arching of the head, neck or back with stiffening of the entire body.

Papilledema: Swelling of the optic nerve at the point of entrance into the eyeball. Choked disk. In general, considered a sign of increased ICP.

Paraparesis: Partial paralysis affecting the lower limbs.

Paraspinous muscles: Muscles on either side of the spine.

Paresthesia: Abnormal sensation such as numbness, prickling and tingling.

Paucity: Smallness or lower in number.

Peduncle: Stalk - like structures in the brain connecting different functioning areas.

Percutaneous aspiration: Drawing out through the skin.

Peritoneum: The membrane covering the visceral organs and lining the abdominal cavity.

Permeable: Capable of allowing passage of fluid or substances in solution.

Pia mater: The inner membrane of the meninges that encloses the brain and spinal cord.

Platybasia: A developmental anomaly of the skull or an acquired softening of the skull bones so that the floor of the posterior cranial fossa bulges upward in the region adjacent to the foramen magnum.

Pleura: The membranes covering the lungs and lining the inside of the chest cavity.

Pleural space: Space between the lungs and the inside lining of the chest cavity.

Polygyria: Excess of the normal number of convolutions of the brain.

Posterior: Toward the back of the body.

Posterior fossa: Concavity at the back of the skull wherein the cerebellum lies.

Posterior fossa angiogram: A study of the blood vessels of the back of the brain: cerebellum and brainstem.

Prone: Lying horizontal with face down.

Proprioception: The sensory modality allowing awareness of posture, movement and changes in equilibrium and the knowledge of position, weight, and resistance of an object in relation to the body.

Proximal: Closer to the midline or origin; opposite of distal.

Pseudotumor cerebri: A condition that occurs when pressure inside the skull increases for no clear reason.

Pseudomeningocele: A pocket of cerebrospinal fluid that has formed in an area of previous surgery as a result of an opening in the covering membranes of the spinal cord.

Ptosis: Drooping of the eyelid, often related to the third cranial nerve function; also applied to the drooping of the cerebellum through a large skull opening.

Queckenstedt: A sign or maneuver used for diagnostic purposes. Upon compression of the veins of the neck, unilaterally or bilaterally, CSF pressure measured by lumbar puncture rises rapidly in healthy persons and falls rapidly when pressure is released. In spinal canal block, the pressure is scarcely affected by this procedure.

Reflex: A rapid automatic response mediated by the nervous system.

Reflux: A return or backwards flow; regurgitation.

Respiratory distress: Difficulty breathing of any cause, including cardiac, pulmonary and neurological problems.

Reticular formation: Groups of cells and fibers arranged in a diffuse network throughout the brainstem. They fill and connect the tracts that ascend and descend through this area. They are important in controlling or influencing alertness, wakefulness, sleeping and some other reflexes.

Rhomboencephalon: Primary division of the embryonic brain that gives rise to the metencephalon and myelencephalon. It includes the pons, cerebellum and medulla oblongata, sometimes called the hindbrain.

Sagittal: A plane or section that divides a structure into right and left portions.

Scoliosis: A side - to - side curvature of the vertebral column.

Sensory: Pertaining to or conveying sensation (i.e. pain, touch, temperature).

Sheath: A covering structure usually elongated.

Shunt: Passage constructed to divert flow of fluid when the normal pathways for the fluid are either blocked or inadequate.

Skull series: A group of x-rays taken of the skull from various positions.

Sleep apnea: To stop breathing for brief periods while sleeping.

Somatosensory evoked potentials: An electrophysiological test often used during spinal cord surgery to help determine whether conduction of electrical signals through the sensory pathways of the spinal cord are impaired.

Spasticity: Stiffness or position that is difficult to release voluntarily.

Spina bifida: Failure of the spine to close properly during the first month of pregnancy. In severe cases, the spinal cord protrudes through the back and may be covered by only skin or a thin membrane. When there is no externally evident abnormality, referred to as spina bifida occulta.

Stenosis: A constriction or narrowing of a passage.

Stent: A device used to maintain an opening into a cavity or to hold tissues in place during healing.

Strabismus: Disorder in which the two eyes cannot be directed at the same object; when one eye fixes upon a point (sees an object), the other eye deviates to some other point; vision in the deviated eye is usually suppressed; if not, diplopia results; squint.

Stridor: A harsh sound made during respiration. It is high - pitched and sounds like the howling of the wind. It is due to constriction of the air passages.

Subarachnoid space: The space within the meninges between the arachnoid mater and the pia mater; it is normally filled with CSF.

Subcutaneous tissue: Tissue beneath the skin.

Suboccipital: Area beneath the back of the head; below the occipital bone.

Subperiosteal: Beneath the periosteum (the membrane covering of the bones).

Sulcus: A furrow, fissure or depression, especially of the brain. Many brain sulci have specific names.

Supine: Lying on the back; a position.

Sylvian aqueduct: A narrow canal connecting the third to the fourth ventricle.

Syncope: Fainting, most often the result of inadequate circulation of blood to the brain, characterized by sudden pallor, coldness of the skin and partial or complete unconsciousness.

Syringo: Prefix used to denote a procedure or process originating in a syrinx cavity (example: syringoperitoneal shunt).

Syringocoele or Syringocele: The central cavity or canal of the spinal cord continuous with the fourth ventricle of the brain stem; used synonymously with central canal; also used for the cavity in the ectopic cord in a myelomeningocele.

Syringomyelia (SM): Chronic progressive disease of the spinal cord characterized by the development of a fluid – filled cavity or cavities within the spinal cord. Cavitations can occur in any area of the spinal cord. It can involve pathways of the cord that carry impulses of pain and temperature sensations resulting in sensory losses. Pain and paresthesias also occur. Destruction of lateral and anterior gray matter in the cord causes muscular atrophy, spastic paralysis and weakness. Scoliosis is often found in association with syringomyelia.

Syringotomy: An operation to create an opening into a syrinx cavity.

Syrinx: A hollow cavity or tube. In medicine it refers to a fluid - filled cavity within the spinal cord.

Telencephalon: The embryonic endbrain or the anterior division of the prosencephalon from which the cerebral hemispheres, corpora striata and the rhinencephalon develop.

Tentorium: A tent - like structure or part. In the brain the tentorium cerebelli is the fold of the dura mater that lies between the cerebellum and the cerebrum.

Tethered cord: Abnormal attachment and scarring of the spinal cord or its coverings (meninges) can occur as the result of a developmental disorder such as a small mass of fatty tissue, a tight filum terminale or a midline bone spur. Tethering results in loss of normal tiny movements of the spinal cord inside its linings and may place tension on the cord resulting in cord injury. The spinal cord can also become adherent, i.e. tethered, by scar tissue that results from injury, surgery or disease process.

Thoracic: The area of the back between the cervical and lumbar region comprised of 12 vertebrae.

Tinnitus: A ringing, tinkling or buzzing sound in the ear.

Torticollis: A stiff neck caused by spasms of the neck muscles drawing the head to one side with the chin pointed to the other side. It may be congenital or acquired.

Trachea: Tubular organ that leads from the larynx to the bronchi.

Trachea malacia: Softening of the cartilage of the trachea.

Trophic: Concerning nourishment; applied to a type of nerve believed to control the growth and nourishment of the parts they innervate (supply).

Unilateral: Pertaining to one side.

Ventral: Pertaining to the front of the body or its parts; the belly.
Ventricle: A cavity such as those normally present in the brain that are filled with cerebrospinal fluid.
Ventriculography: An x - ray process used to visualize the size and shape of the brain's ventricles by injecting air or contrast to replace the CSF that normally fills this space.
Ventriculo - peritoneal shunt: A shunt or tube inserted into the ventricles of the brain attached to tubing that is placed into the abdominal (peritoneal) cavity to drain excess spinal fluid from the brain.

Ventriculostomy: Establishment of an opening performed in the third ventricle to relieve hydrocephalus.
Vermis: The normal midline portion of the cerebellum lying between the two cerebellar hemispheres. Its outer surface appearance reminded early anatomists of a worm.
Visceral: Pertaining to one of the organs found in the skull, chest, abdomen or pelvis (brain, lung, liver, etc.).
Weakness: Inability of muscles to perform their normal function. Weakness of the hands may result in difficulty grasping objects; weakness of the legs may result in difficulty walking; weakness of certain muscles in the pharynx may cause difficulty swallowing.

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