PLEASE NOTE: All program details are preliminary and subject to change/completion.

PRELIMINARY PROGRAM AT-A-GLANCE

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<th>Thursday</th>
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PLEASE NOTE: THIS SCHEDULE IS SUBJECT TO CHANGE.
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**Thursday, January 14, 2016**

**Neuroimaging Bootcamp for Advanced Practice Providers and Junior Physicians**

**CME:** 4.75 hours
1:00 pm – 6:00 pm, Thursday, January 14, 2016

**Course Directors** Ryan Hakimi, DO, MS and Emma Fields APRN-CNP

**Course Description**
This course will address normal brain anatomy, vascular lesions (strokes, arteriovenous malformation, and cerebral aneurysms), CNS neoplasms, and demyelinating lesions. Case-based learning will be utilized to present correlation of clinical findings and various neuroimaging modalities (MRI/CT/CTA). We will also introduce Transcranial Doppler and carotid ultrasound imaging principles and their clinical applications for both inpatient and outpatient settings.

**Learning Objectives**
- Identify ischemic versus hemorrhagic lesions on head CT and MRI studies
- Be able to appropriately use neuroimaging studies (CT/CTA/MRI/TCD/Carotid Duplex) to evaluate patients with neurological symptoms
- Be able to interpret/link the patients’ clinical neurologic findings in relation to the lesions on the neuro-imaging.

**Schedule**
1:00 pm – 1:30 pm  Introduction to CT and CTA Imaging Principles
1:30 pm – 2:00 pm  Introduction to MRI /MRA Imaging Principles
2:00 pm – 2:30 pm  Introduction to TCD and Carotid Duplex Principles
2:30 pm – 3:00 pm  Hemorrhagic lesions as seen on Head CT/MRI
3:00 pm – 3:30 pm  Ischemic lesions as seen on Head CT/MRI
3:30 pm – 3:45 pm  Break
3:45 pm – 5:50 pm  Putting it all together: Case-Based Learning 25 minutes each.
   - Case 1: Acute Ischemic Stroke
   - Case 2: Hypertensive Intracranial Hemorrhage
   - Case 3: Aneurysmal Subarachnoid Hemorrhage
   - Case 4: Glioblastoma Multiforme
   - Case 5: Demyelinating Disease
5:50 pm – 6:00 pm  Questions

**The Full-Speed MRI Project**

**CME:** 1 hour
7:30 pm – 8:30 pm, Thursday, January 14, 2016

**Keynote Lecture** James G. Pipe, PhD
PLEASE NOTE: All program details are preliminary and subject to change/completion.

Friday, January 15, 2016

Concurrent Breakfast Seminar: A Practical Approach to Understanding MRI and CT Physics
CME: 1.5 hours
7:00 am – 8:30 am, Friday, January 15, 2016

Course Director  Joseph Fritz, PhD

Course Description
The purpose of this course is to provide a foundation for how MRI and CT images are created, and extend on basic principles to describe the manipulations that are used to create the extensive varieties of tissue contrast and visualization.

Learning Objectives
- Understanding of MRI Fundamentals. Review the underlying physics of imaging generation using magnetic resonance, and summarize parameters used to define standard and advanced brain and spine MRI protocols, including T1, T2, IR/FLAIR/STIR, SE vs FE vs SWI, EPI, DWI, MRA, Perfusion, fMRI, Spectroscopy and DTI. Be able to appropriately use neuroimaging studies (CT/CTA/MRI/TCD/Carotid Duplex) to evaluate patients with neurological symptoms
- Understanding of CT Fundamentals. Review the underlying physics of current generation CT equipment, including parameters that are used to control tissue contrast, resolution, speed. CT Angiography, CT Perfusion, Metal Artifact Reduction and visualization techniques will also be discussed.
- Recognize and mitigate artifacts. The cause of artifacts in both MRI and CT will be reviewed and techniques that mitigate them will be presented.
- Understand safety considerations related to CT radiation dose and MRI magnetic field affects.

Concurrent Breakfast Seminar: Applied Principles of Ultrasound Physics and Fluid Dynamics
CME: 1.5 hours
7:00 am – 8:30 am, Friday, January 15, 2016

Course Director  Andrei Alexandrov, MD, RVT

Course Description
This seminar is being offered to review ultrasound physics and fluid dynamics, demonstrate typical imaging artifacts and waveforms that interpreting physicians and sonographers need to identify and correct and to interact with the audience and answer questions about these typical findings. Course faculty will discuss applied principles of ultrasound physics and fluid dynamics using a set of approximately 50 typical images/waveforms. Discussion format includes brief case/symptom presentation and an ultrasound image. Faculty will ask the audience to interpret the image and engage in discussion of differential diagnosis and common pitfalls that are linked to ultrasound physics and fluid dynamics.

Learning Objectives
- Review most common ultrasound imaging artifacts and spectral waveforms.
PLEASE NOTE: All program details are preliminary and subject to change/completion.

- Learn key principles of applied ultrasound physics and fluid dynamics that are responsible for these findings.
- Learn how to differentiate, optimize, and interpret typical ultrasound imaging artifacts and spectral waveforms.

Concurrent Session: Current Topics in MR/CT Part I
CME: 4.75
9:00 am - 3:00 pm, Friday, January 15, 2016

Course Directors John Bertelson, MD and Gabriella Szatmary, MD, PhD

Course Description
This course will review a variety of neuroimaging topics of particular interest to the practicing neurologist.

Learning Objectives
- New insights into the latest neuroimaging technologies
- New insights into the pathophysiology of a wide range of neurological disorders
- Gain the ability to better apply neuroimaging technologies to the bedside differential diagnosis of various neurological disorders

Schedule

Role of Neuroimaging in Brain Recovery
Ramy El Khoury, MD

Use of Newer MRI Sequences in Clinical Practice
Bijal Mehta, MD, MPH

Neuro-Oncology (TBD)
Laszlo Mechtler, MD, FAAN

Critical Care Imaging
Joshua P. Klein, MD, PhD

Epilepsy Imaging
Joshua P. Klein, MD, PhD

Dementia or Pediatric Neuroimaging (TBD)
TBD
PLEASE NOTE: All program details are preliminary and subject to change/completion.

Concurrent Session: Current Topics in Neurosonology Part I
CME: 4.75
9:00 am - 3:00 pm, Friday, January 15, 2016

Course Directors  Zsolt Garami, MD and Alex Razumovsky, PhD, FAHA

Course Description
This course will highlight basics of Transcranial Doppler (TCD) and carotid ultrasound physics as well as techniques of examinations, their clinical applications, and interpretations. This course is for individuals seeking basic knowledge of Neurosonology.

Learning Objectives
- Demonstrate a basic knowledge of the extra- and intracranial arterial vascular anatomy, physiology, and pathophysiology.
- Recognize characteristic patterns of blood flow in the extra- and intracranial vessels.
- Identify proper techniques for performing comprehensive carotid and TCD studies. Relate normal and abnormal blood flow patterns to clinical presentation.
- Recognize and interpret carotid and TCD ultrasound findings. Understand clinical usefulness and limitations of the carotid and TCD ultrasound evaluations.

Schedule
9:00 am – 12:00 pm  TBD
TBD
12:00 pm – 1:00 pm  Break
Presidential Address Luncheon
1:00 pm – 1:30 pm  Classification of extracranial carotid artery stenosis
Charles Tegeler, MD
1:30 pm – 2:00 pm  Classification of intracranial stenosis
Andrei Alexandrov, MD, RVT
2:00 pm – 3:00 pm  TBD
TBD

Advocacy and Business of Neuroimaging
CME: None
3:00 pm – 4:00 pm, Friday, January 15, 2015

Course Director  Joseph Fritz, PhD

Course Description
There are quality of care and business advantages to operating advanced imaging within a clinical practice. Tomographic imaging is an important diagnostic tool that is regularly used by all neurologists. A growing number of neurologists are considering ways to form larger groups that can mitigate increasing overhead through economies of scale. Such groups should be able to justify operating imaging in-house. This course aims to clarify the business and regulatory issues involved in operating in-house imaging services. An update will be given on advocacy efforts through the American Academy of Neurology, the Coalition for Patient Centered Imaging, and the American Society of Neuroimaging.
Learning Objectives

- Understand the pro forma analysis to justify the purchase of imaging equipment and identify strategies to improve profitability.
- Review regulatory and accreditation requirements.
- Discuss future trends in imaging authorization and appropriate use criteria, and the impact of MACRA on maintaining the in-office ancillary exemption.

Schedule

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<td>Business of Neuroimaging</td>
<td>Joseph Fritz, PhD</td>
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<td>3:30 pm – 4:00 pm</td>
<td>Advocacy in Neuroimaging Update</td>
<td>Vernon D. Rowe, MD</td>
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Symposium: Imaging of Stroke

CME: 2 hours
4:00 pm – 6:00 pm, Friday, January 15, 2016

Course Director

Nerses Sanossian, MD

Course Description

Learning Objectives

Concurrent Session: MRI Workshop

CME: 3 hours
7:00 pm – 10:00 pm, Friday, January 15, 2016

Course Directors

Eduardo Gonzalez-Toledo, MD and Patrick Capone, MD, PhD

Course Description

Learning Objectives

Concurrent Session: Neurosonology Workshop

CME: 3 hours
7:00 pm – 10:00 pm, Friday, January 15, 2016

Course Directors

Andrei Alexandrov, MD, RVT and Zsolt Garami, MD

Course Description

This workshop will provide structured hands-on and question and answer sessions in carotid/vertebral duplex and specific transcranial Doppler techniques complete testing, emboli detection, right-to-left shunt detection and assessment of vasomotor reactivity. Both the beginner and experienced users are encouraged to attend. The workshop will also provide an opportunity to try the latest equipment, to meet experts, and to discuss
various aspects of Neurosonology in small groups. The workshop is designed to meet the need for basic and advanced knowledge of insonation techniques, technological advances, and practical aspects of cerebrovascular testing.

Learning Objectives
- Review complete scanning protocols for diagnostic carotid/vertebral duplex and TCD examinations, vasomotor reactivity, emboli detection, right-to-left shunt testing, and monitoring procedures (thrombolysis, head-turning, peri-operative testing), and IMT measurements.
- Review equipment and expertise requirements in performing selected tasks with faculty using hands-on, instructional video, or real-time case recordings.

Saturday, January 16, 2016

Concurrent Breakfast Seminar: Diagnostic and Interventional Fetal Neurology
CME: 1.5 hours
7:00 am – 8:30 am, Friday, January 15, 2016

Course Director Adnan I. Qureshi, MD

Course Description
Antenatal diagnosis of neurological disorders such as spina bifida, hydrocephalus, or intraventricular hemorrhage is currently possible using fetal ultrasound and magnetic resonance imaging (MRI). In utero treatment of myelomeningocele in fetuses with spina bifida may preserve neurologic function by preventing spinal cord exposure to amniotic fluid, reverse hindbrain herniation, and diminish the need for post-natal ventriculoperitoneal shunt placement as shown in the Management of Myelomeningocele Study’ (MOMS) trial. While fetal cardiology is a well-developed subspecialty within pediatric cardiology, involvement of neurologists and particularly neuroimagers is required to develop the field of fetal neurology. Currently, both cardiologists and family medicine physicians have a pathway for certification for performing fetal ultrasound. The symposium will lead to recognition and awareness among the neurology community to establish formal certification processes.

Learning Objectives
- To review unique aspects of fetal ultrasound and MRI principles in regards to fetal neuroimaging.
- To review antenatal neuroimaging findings in normal fetuses and in diseases such as spina bifida, hydrocephalus, intraventricular hemorrhage, Chiari malformation, and cortical dysgenesis syndromes.
- To review recent data on imaging of cerebral arteries and veins in fetuses.
- To provide introduction into prenatal interventional procedures with emphasis on minimally invasive spina bifida closure.
Concurrent Breakfast Seminar: TCD in the ICU – TCD for early detection of vasospasm and ICP tailored management

CME: 1.5 hours
7:00 am – 8:30 am, Friday, January 15, 2016

Course Director            Gregory Kapinos, MD, MS

Course Description
The lecturer will cover the basics of transcranial Doppler (TCD) for early detection of vasospasm after SAH, as well as TCD-directed therapy for intracranial pressure (ICP). Beyond standard vasospasm detection, treating all patients with ICP elevation with the same best one-shot therapy, above a certain threshold of mean ICP, has been proven to have limited impact on outcomes after acute cerebral injury. Reducing ICP or elevating mean arterial pressure (MAP) to conserve cerebral perfusion pressure (CPP) has been debated by opposite schools of thoughts (Lund and Robertson). Vasoreactivity, cerebral autoregulation and brain compliance are also distinctive issues complicating ICP management.
This course will reveal that a certain group of patients at risk of raised ICP can benefit from ICP reduction by osmotherapy alone, another distinct group can benefit from MAP augmentation alone and finally a third select group usually benefits better from dual-targeted treatment, while a fourth group could receive no treatment. (Table)

The scholar will explain how to manage vasospasm according to TCD results. He will also teach how to ascertain separately with TCD if the preponderant pathophysiologic issue for one particular patient is decreased cerebral compliance or if the issue is more inadequate cerebral perfusion. The lecturer will cover robust data supporting TCD use for detection of vasospasm, as well as preliminary data suggesting that segregating patients based on their different cerebral physiologic parameters with TCD as a proxy can indeed help allocate judicious therapeutic nuanced therapy in the neuro-ICU and ER.

This course will cover technical aspects on how to obtain systolic velocities, pulsatility index, resistivity index and end-diastolic velocities by TCD using a dedicated TCD machine or a regular Sonosite Turbo Echo machine, which also enable clinicians to visualize the circle of Willis and select the insonated vessel.

This course then teaches how to use the results in all acute neurologic injuries at risk of cerebral edema and/or ischemia in order to tailor/individualize the vasospasm and ICP treatment for that particular patient in the ER or Neuro-ICU.

The last part is left open to forum discussion in order to ameliorate the robustness of the surrogate/proxy parameters and enhance these two novel therapeutic paradigms for vasospasm and brain compliance loss.

Learning Objectives

- Understand why brain compliance is more important than true ICP. Understand why Lund and Robertson’s concepts on treatment of ICP seem to clash but can be reconciled, once heterogeneity of victims pathophysiology is grasped.
- Learn how to obtain peak systolic velocities, end-diastolic velocities, calculate pulsatility and resistivity index, with classic TCD machines as well as with transcranial echography from regular ICU ultrasound machines. Learn how optic nerve sheath diameter can help refine these assessments of compliance and perfusion.
PLEASE NOTE: All program details are preliminary and subject to change/completion.

- Learn how to interpret these results to guide the therapeutic selection for vasospasm as well as for ICP elevation (precision medicine for cerebral ischemia with a novel 4-tier tailored ICP therapy): not all accelerations on TCD deserve a lot of fluids after SAH and certain types of patients may be better suited to mannitol than hypertonic saline for osmotherapy and mechanical ventilation as well as vasopressors can be adjusted to the needs of one particular patient, based on the TCD results for ICP abnormality.

Schedule
7:00 am – 8:00 am  
TCD for management of vasospasm
8:00 am – 8:30 am  
TCD for management of ICP

Concurrent Session: Current Topics in MR/CT Part II
CME: 4.75
9:00 am – 3:00 pm, Saturday, January 16, 2016

Course Directors  
John Bertelson, MD and Gabriella Szatmary, MD, PhD

Course Description
This course will review a variety of neuroimaging topics of particular interest to the practicing neurologist.

Learning Objectives
- New insights into the latest neuroimaging technologies
- New insights into the pathophysiology of a wide range of neurological disorders
- Gain the ability to better apply neuroimaging technologies to the bedside differential diagnosis of various neurological disorders

Schedule
- Intracranial Cysts  
  John Bertelson, MD
- Vascular TBD  
  TBD
- Spine Imaging  
  Patrick Capone, MD, PhD
- Imaging in Patients with Visual Complaints  
  Gabriella Szatmary, MD, PhD
- Imaging of Toxic-Metabolic Disorders  
  Dara G. Jamieson, MD

Case Presentation  
DENT Fellows
Please note: All program details are preliminary and subject to change/completion.

Concurrent Session: Current Topics in Neurosonology Part II
CME: 4.75
9:00 am – 3:00 pm, Saturday, January 16, 2016

Course Director: Alex Razumovsky, PhD, FAHA

Course Description
This course will highlight basics of Transcranial Doppler (TCD) and carotid ultrasound physics as well as techniques of examinations, their clinical applications, and interpretations. This course is for individuals seeking basic knowledge of Neurosonology.

Learning Objectives
- Demonstrate a basic knowledge of the extra- and intracranial arterial vascular anatomy, physiology, and pathophysiology.
- Recognize characteristic patterns of blood flow in the extra- and intracranial vessels.
- Identify proper techniques for performing comprehensive carotid and TCD studies. Relate normal and abnormal blood flow patterns to clinical presentation.
- Recognize and interpret carotid and TCD ultrasound findings. Understand clinical usefulness and limitations of the carotid and TCD ultrasound evaluations.

Schedule
9:00 am – 10:30 am TCD and Carotid Duplex Studies Interpretations
Charles Tegler, MD and faculty
10:30 am – 10:45 am Break
10:45 am – 12:00 pm TCD and Carotid Duplex Studies Interpretations (cont.)
Charles Tegler, MD and faculty
12:00 pm – 1:00 pm Break
Industry-Sponsored Lunch
1:00 pm – 1:20 pm From carotid intima-media thickness to plaque: consensus and new developments
Tatjana Rundek, MD, PhD
1:20 pm – 2:00 pm TCD in the Out Patient and Ambulatory Settings
Mark Rubin, MD
2:00 pm – 2:20 pm Specific TCD applications for Patients with acute stroke
Andrei Alexandrov, MD, RVT
2:20 pm – 2:40 pm Specific TCD Applications for Patients after Traumatic Brain Injury
Alex Razumovsky, PhD, FAHA
2:40 pm – 3:00 pm TCD Monitoring during invasive cardiovascular procedures
Zsolt Garami, MD
Self Assessment Exam
CME: 1.5
3:00 pm – 4:30 pm, Saturday, January 16, 2016

Course Director
Dara G. Jamieson, MD

Course Description
The Neuroimaging Self-Assessment Examination (SAE) is intended to be a Neuroimaging self-assessment tool, providing participants with a structured opportunity to gain insight into their own personal strengths and weaknesses relative to their peers in the provision and clinical evaluation of Neuroimaging studies. Knowledge and skills to be assessed in this setting will include identification of normal anatomical structures, accuracy in the identification of specific pathologies on MRI and CT studies, formulation of Neuroimaging differential diagnoses, basic MRI and CT physics knowledge, and the ability to correlate imaging findings with clinical history. Subject matter covered by the SAE will include diagnostic neuroimaging of common neurological disorders such as cerebrovascular disease, multiple sclerosis, CNS trauma, tumors and cysts, infections, toxic/metabolic disorders and diseases of the spinal cord and surrounding tissues. Knowledge of basic MRI and CT physics principles essential for protocol design, safety, recognition of artifact and differentiation of tissue types based upon CT density and MRI signal characteristics will also be assessed. The SAE will be presented in a multiple choice PowerPoint format projected on a screen to the audience with 1.5 minutes allotted per question. The subject matter will span 35 clinical neuroimaging cases and 15 questions related to imaging physics and technology. Each question will consist of a short text passage describing a clinical vignette or set of specific imaging-related parameters, accompanied by images or diagrams, followed by five answer options in multiple-choice format. Attendees will mark the single best answer to each question on a provided answer sheet, which will be passed in for grading at the end of the course period. Clinical cases will incorporate detailed, high-resolution MRI and CT images of the brain and spine (including MR and CT angiography). Exam scores will be kept confidential. Each examinee will be able to access a personal score report online or via email within 6 weeks of the exam. Anonymized scores will be statistically analyzed by the course directors for validation and exam improvement purposes. None of the material to be used in this self-assessment exercise shall have been previously copyrighted.

Learning Objectives
• Become more familiar with personal strengths and weaknesses in the identification of normal versus abnormal imaging findings.
• Become more familiar with personal strengths and weaknesses in formulating a differential diagnosis pertaining to specific imaging presentations.
• Achieve greater levels of confidence in acquiring and interpreting MRI and CT studies in the assessment of common neurological disorders such as MS, stroke, tumor and trauma.
• Be able to identify areas of future study to increase levels of competence in the interpretation of diagnostic Neuroimaging cases.
• Be able to identify areas of future study to increase levels of competence in MRI and CT physics.
PLEASE NOTE: All program details are preliminary and subject to change/completion.

Symposium: Current Clinical Nuclear Neurology with PET, SPECT, and Scintigraphy

CME: 1 hour
4:30 pm – 5:30 pm, Saturday, January 16, 2016

Course Director       Robert Miletich, MD

Course Description
Although most in the neurology and clinical neuroscience communities have some familiarity with positron emission tomography (PET) and single photon emission computed tomography (SPECT), knowledge of the practical utilization of these modalities for clinical patients is not as prevalent. This lack of knowledge of applied Nuclear Neurology extends to what clinical questions can be addressed by PET, SPECT and scintigraphy, what radiopharmaceuticals are clinically available (ie. approved by FDA) and what types of studies can be performed. This course focuses on practical, present day, clinical application of Nuclear Neurology, presenting some basic science, but illustrating concepts and applications through clinical material from the speaker’s daily clinical practice. The capacity of Nuclear Neurology to address management questions which arise in multiple disease states will be discussed. Radiopharmaceuticals available clinically will be presented. Imaging indications in the disease states of dementia, neurodegenerative disease, neuro-oncology, epilepsy, parkinsonism, movement disorders, cerebrovascular disease, neuropsychiatric disorders and other less common settings will be reviewed. Many third-party payers currently make reimbursements based on these indications. Standard and newly developed imaging techniques will be discussed. Finally, government-mandated training requirements for Nuclear Neurology will be presented. By measuring some aspect of nervous system function, Nuclear Neurology provide information that often is unobtainable from other sources, thus facilitating more rationale and cost-effective management.

Learning Objectives
• Know what kind of Nuclear Neurology studies are currently available to help manage patients, including which radiopharmaceuticals are FDA-approved.
• Understand what clinical questions can be addressed in different neurologic disease states by clinically available PET, SPECT and scintigraphy.
• Decide how best to incorporate Nuclear Neurology into clinical practice, either through collaboration with other physician groups or pursuing government-mandated nuclear training.

Symposium: Imaging in Teleneurology

CME: 2 hours
6:00 pm – 8:00 pm, Saturday, January 16, 2016

Course Director       Neeraj Dubey, MD, FAAN

Course Description
The purpose of this course is to integrate imaging and teleneurology. Teleneurology is increasingly becoming an important tool in community hospitals to evaluate patients with acute neurological events and the role of imaging in teleneurology is substantial. The treating teleneurologist has to rely on wide-ranging radiological services, including CT CTA, MRI, MRA, EEG, and Doppler studies to provide prompt, effective, and meaningful acute care. The role of teleneurologists in assessing patients with stroke, cord compression, epilepsy, neuro ICU care, change in mental status, etc. depends largely on being able to confidently read images, make meaningful interpretation, and direct care.
Learning Objectives

- Role of imaging in teleneurology consults
- Challenges in imaging and management of patients with teleneurology services

Schedule

Time – Time
University of Pittsburg Medical Center Review – Teleneurology and Imaging
Maxim D. Hammer, MD

Time – Time
Private Practice Teleneurology – Management of ICH and Acute Stroke, Case Reviews
Leonard D. DaSilva, MD