Brain and Blade: The World of Neurosurgery
Mini-Elective
Spring 2017

Course Dates: January 9, 23, 30, February 6, 13
Maximum Students: 13
Class Year: MS2
Course Director: Raymond F. Sekula, Jr., MD, MBA
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Description:
This five-week course will provide a unique experience in which second-year students will be exposed to the world of invasive procedures concerning the brain, spinal cord, and surrounding associated structures: neurological surgery. Students will learn key concepts and procedures from course instructors consisting of both attending neurosurgeons and residents. This setup will provide students with sources of factual and technical expertise, offer opportunities to become familiar with the department, and present different paths to practicing neurosurgery.

Offering both didactic and practical sessions, this course will allow students to learn about procedures and disorders that lie within the realm of neurological surgery. Students will attend didactics to learn about neurosurgery via lectures and case presentations, while practical sessions involving cadavers and simulation models will provide hands-on experience. Each week, a different topic will be highlighted. By the end of this course, each student will have practiced lumbar punctures, central and arterial line insertion, external ventricular drain placement, and even virtual planning of a radiosurgery procedure.

Classes in the course will cover neuroradiology, vascular neurosurgery, spinal surgery and lumbar punctures, Gamma Knife radiosurgery, and external ventricular drains and central/arterial lines. This course will also showcase the exciting neurosurgical research and innovations developed here at UPMC — students will be encouraged to develop and plan potential research projects.

Course Objectives:
1) Introduce students to central disciplines of neurological surgery.
2) Sharpen skills in clinical/radiological diagnosis, evaluation, and presentation.
3) Allow practice of simple practical procedures used in neurological surgery.
4) Increase student familiarity with the UPMC department of neurological surgery.
5) Facilitate involvement in research and foster interest in the subspecialty.

Requirements:
Students will be expected to prepare for and attend at least 4/5 sessions. Each student will be required to propose a research question related to neurosurgery and discuss with a faculty member or resident. While the proposal need not be carried through, it should be thought out and well developed with the goal of giv-
ing students the chance to interact with neurosurgery faculty/residents and create research opportuni-
ties.

**Pre-Requisites:**
Second year medical student who has an interest in neurosurgery and has previously conduct-
ed research within the Department of Neurosurgery.

**COURSE OUTLINE**

**Brain and Blade: The World of Neurosurgery**  
Mondays, 5-7 PM or 6-8 PM (TBD)  
1/9/2017, 1/23, 1/30, 2/6, 2/13

**Location:**  
Didactic sessions: Gamma Knife conference room, 1st floor UPMC Presbyterian  
Practical sessions: Anatomy Lab, 3rd floor Scaife Hall

**Course Director(s):**  
Raymond F. Sekula, Jr., MD, MBA

**Participating Faculty:**  
L. Dade Lunsford, MD,  
Barton Branstetter, MD,  
Jack Schumann, PhD  
Other staff: Gamma Knife Radiosurgery staff, neurosurgery residents

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**Texts/Required Reading:** None except as directed by session instructors.

**Session One – Course Intro & Neurosurgery/Neuroradiology Coordination**  
**Instructor:** Raymond Sekula, MD, Barton Branstetter, MD  
**1/9/2017**  
This first session will be a workshop and lecture run jointly by neuroradiology and neurosurgery. 8-10 cases of common neurosurgical illnesses (epilepsy, tumor, etc.) will be presented. Focus will be on the interdisciplinary coordination involved. For each case: first, surgeon’s clinical findings and suspicions will be presented; second, radiologist’s findings and role will be discussed; and third, surgeon’s use of the information to plan angle and method of surgical approach will be covered. Students will reinforce their localization skills and practice presenting radiologic findings in a methodical manner.

**Objectives:** Students will be able to:  
1) Recognize and describe features of key neurological imaging modalities such as CT, MRI (T1 vs. T2), FLAIR, DWI/ADC, MRA, CTA, angiography, and myelography.  
2) Understand how neurosurgeons interpret and utilize imaging to plan operations.  
3) Discuss how neurosurgeons and neuroradiologists work together in clinical practice.

**Location:** Gamma Knife Conference Room, 1st floor UPMC Presbyterian  
**Student Preparation:** None

**Session Two – History and Practice of Stereotactic Radiosurgery**  
**Instructor:** L. Dade Lunsford, MD, Gamma Knife Radiosurgery staff  
**1/23/2017**  
An introduction to the quickly-growing field of stereotactic radiosurgery, presented by UPMC Neurosurgery Program Director L. Dade Lunsford, MD, Lars Leksell Professor and Distinguished Professor of Neu-
of the technique, in Sweden. This will be a unique opportunity to learn about the specific advantages offered by radiosurgery from a leading world expert in the field. There will be a practical component in which GKRS staff will teach students the radiosurgery planning process using UPMC CME course materials.

**Objectives:** Students will:
1) Learn about the history and development of radiosurgery.
2) Understand the diseases for which GKRS is indicated and its risks vs. benefits.
3) Gain experience in the Gamma Knife planning process with software used by UPMC for its radiosurgery CME courses.

**Location:** Gamma Knife Conference Room, 1st floor UPMC Presbyterian

**Student Preparation:** None

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**Session Three – Cerebrovascular Disorders**

**Instructor:** Michael McDowell, MD, Greg Weiner, MD, David Panczykowski, MD

**1/30/2017**

This session will begin with an overview of surgically relevant disorders of vasculature of the nervous system. Normal vascular anatomy, angiography, CTA, and MRA will be reviewed. Students will learn about neurosurgical management of commonly encountered vascular illnesses: aneurysms, AVMs, dural fistulas, and strokes.

**Objectives:** Students will be able to:
1) Describe and interpret common vascular imaging studies.
2) Name and describe common surgical approaches for cerebrovascular surgery.
3) Outline technological aspects and specific challenges of cerebrovascular surgery.

**Location:** Gamma Knife Conference Room, 1st floor UPMC Presbyterian

**Student Preparation:** None

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**Session Four – Practical Workshop: Spine Pathology, Spine Surgery, and Lumbar Punctures**

**Instructor:** Jack Schumann, PhD, Michael McDowell, MD, Nitin Agarwal, MD, Raymond Sekula, MD

**2/6/2017**

This class will cover the anatomy and radiology of the spine, with a neurosurgical slant. Concepts will be illustrated using patient cases: cervical and lumbar disc herniation, stenosis, fractures, etc. Students will learn about common spine neurosurgery techniques, approaches, and assessment. Finally, there will be hands-on practice performing lumbar punctures.

**Objectives:** Students will:
1) Review spinal anatomy and radiology, with emphasis on structures encountered during surgical approaches.
2) Become familiar with common spinal pathologies and their respective surgical and non-surgical treatments, including some surgical approaches.
3) Practice lumbar punctures, a common diagnostic tool in neurosurgery and neurology.

**Location:** Gamma Knife Conference Room, 1st floor UPMC Presbyterian, and Anatomy Lab, 3rd floor Scaife Hall

**Student Preparation:** Review Youtube videos on lumbar puncture technique

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**Session Five – Practical Workshop: Extraventricular Drains and Central/Arterial Lines**

**Instructor:** Michael McDowell, MD, David Panczykowski, MD, Nitin Agarwal, MD

**2/13/2017**

Hands-on practice session to insert LPs, extraventricular drains, central and arterial lines. Learn about Kocher’s point, proper insertion trajectory, indications, complications, and management. Cadavers will be used to provide realistic conditions for EVDs and lines.

**Objectives:** Students will:
1) Learn and understand indications, common complications, and risks of a few common procedures in neurosurgery.
2) Practice placing central lines, arterial lines, and extraventricular drains.

**Location:** Anatomy Lab, 3rd floor Scaife Hall

**Student Preparation:** Review videos on insertion of EVDs and lines