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# Brain and Blade: The World of Neurosurgery

## Mini-Elective

Fall 2020

Course Dates: Mondays, 5-7 PM  
Dates: 9/21, 9/28, 10/12, 10/19, 11/4 (Wednesday),  
11/9, 11/18 (Wednesday), 11/23, 12/7

Maximum Students: 16

Class Year: MS-2

Course Directors: Raymond F. Sekula, Jr., MD, MBA and  
Michael McDowell, MD

Contact Information: Raymond F. Sekula, Jr., MD, MBA  
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Registration: Denise Downs ([ddowns@pitt.edu](mailto:ddowns@pitt.edu))

### Description:

This nine-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 sessions 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, 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. 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.

### 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 8 of the 9 sessions.

### Pre-requisites:

None

## **COURSE OUTLINE**

Brain and Blade: The World of Neurosurgery

Mondays, 5-7 PM

**Dates:** 9/21, 9/28, 10/12, 10/19, 11/4 (Wednesday), 11/9, 11/18 (Wednesday), 11/23, 12/7

**Didactic sessions:** Remote via ZOOM (invites will be sent by the course director)

**Practical sessions:** Anatomy Lab, 3<sup>rd</sup> floor Scaife Hall

**Course Directors:** Raymond F. Sekula, Jr., MD, MBA and Michael McDowell, MD

**Participating Faculty:** L. Dade Lunsford, MD, Robert Friedlander, MD, Bradley Gross, MD, Peter Gerszten, MD, Dr. Daniel Wecht, MD, Stephanie Greene, MD, Taylor Abel, MD, Georgios Zenonos, MD. Neurosurgery residents.

### **Course Objectives:**

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

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

### **Session 1 – Course Introduction and Lumbar Punctures**

**Instructor:** Raymond Sekula, MD

**Date:** Monday 9/21/2020

Hands-on practice session to insert. Learn about proper insertion trajectory, indications, complications, and management. Models will be used to provide realistic conditions for LPs.

**Objectives:** Students will:

- 1) Learn and understand indications, common complications, and risks of a few common procedures in neurosurgery
- 2) Practice placing lumbar punctures

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

**Student Preparation:** None

### **Session 2 – History and Practice of Stereotactic Radiosurgery**

**Instructor:** L. Dade Lunsford, MD

**Date:** Monday 9/28/2020

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 Neurosurgery. Dr. Lunsford brought GKRS to the United States after working with Lars Leksell, the inventor 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

### **Session 3 – Carotid Endarterectomy**

**Instructor:** Robert Friedlander, MD

**Date:** Monday 10/12/2020

This session will begin with an overview of surgically relevant disorders of the vasculature of the nervous system. The practical component will include exposure of the carotid as well as practice of a carotid endarterectomy.

**Objectives:** Students will:

- 1) Learn about common vascular imaging studies
- 2) Outline technological aspects and specific challenges of a carotid endarterectomy
- 3) Expose the carotid and perform arteriotomies followed by closure of arteriotomies

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

**Student Preparation:** None

### **Session 4 – Hemicraniectomies and EVDs**

**Instructor:** Bradley Gross, MD

**Date:** Monday 10/19/2020

Students will learn the basic principles guiding the management of neurosurgical emergencies related to the intracranial compartment. Hands-on practice session to insert extraventricular drains. Learn about Kocher's point, proper insertion trajectory, indications, complications, and management. Cadavers will be used to provide realistic conditions for EVDs.

**Objectives:** Students will:

- 1) Learn and understand indications, common complications, and risks of hemicraniectomy and EVDs
- 2) Practice placing extraventricular drains and performing hemicraniectomies

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

**Student Preparation:** None

### **Session 5 – ACDFs and Posterior Fusions**

**Instructor:** Peter Gerszten, MD

**Date:** Wednesday 11/4/2020

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 with spinal instrumentation.

**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 with spinal instrumentation for pedicle screw fixation

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

**Student Preparation:** None

### **Session 6 – Peripheral Nerve Disorders**

**Instructor:** Daniel Wecht, MD, MSc

**Date:** Monday 11/9/2020

Carpal tunnel syndrome is a common condition that causes pain, numbness, and a tingling sensation in the hands and fingers. It is caused by compression of the median nerve by the carpal tunnel in the wrist. In addition to carpal tunnel decompression, students will practice

ulnar nerve decompressions.

**Objectives:** Students will:

- 1) Learn about the indications, aims and potential benefits for peripheral nerve decompression
- 2) Practice performing decompression of the median and ulnar nerves
- 3) Review brachial plexus anatomy

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

**Student Preparation:** None

## **Session 7 – Chiari Decompression**

**Instructor:** Stephanie Greene, MD

**Date:** Wednesday 11/18/2020

This session will include both lecture and practical components to gain understanding of Chiari malformations, a common condition in the realm of pediatric neurosurgery. Treatment for Chiari I malformations in children is a decompressive procedure of the posterior fossa to allow release of pressure on the brainstem and improved CSF flow at the foramen magnum. Posterior fossa decompression classically involves suboccipital craniectomy, cervical laminectomy at the level of the tonsillar herniation, and a Y-shaped dural opening from the tonsillar herniation to the foramen magnum.

**Objectives:** Students will:

- 1) Become familiar with Chiari Malformation and other common pediatric neuropathologies
- 2) Practice performing Chiari Decompression with duraplasty

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

**Student Preparation:** None

## **Session 8 - Temporal Lobectomies**

**Instructor:** Taylor Abel, MD

**Date:** Monday 11/23/2020

Temporal lobectomies involve removal of the temporal lobe of the brain, used as a treatment option for epilepsy resistant to anticonvulsant medications. Students will practice on the cadavers to stimulate a realistic condition.

**Objectives:** Students will:

- 1) Learn the indications and benefits of Temporal Lobectomy
- 2) Review anatomy of the temporal lobe and surrounding structures
- 3) Practice performing Temporal Lobectomies

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

**Student Preparation:** None

## **Session 9 – Skull Base Neurosurgery**

**Instructor:** Georgios Zenonos, MD

**Date:** Monday 12/7/2020

This session will elucidate the basic concepts around approaches to the base of the skull with particular emphasis on the challenges and pitfalls. Endoscopic and open approaches will be highlighted and the strengths and weakness of each will be discussed. Relevant anatomy involved with these approaches will also be discussed.

**Objectives:** Students will:

- 1) Learn about open skull base, endoscopic endonasal skull base, and pituitary surgery
- 2) Apply neuroanatomy concepts to these surgical techniques by performing orbitozygomatic craniotomies

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

**Student Preparation:** None