

SYLLABUS
HCS 6374.001 ACN 6374.001 INTRAOPERATIVE
NEUROPHYSIOLOGICAL MONITORING PART II
FALL 2016

Instructor: Aage R. Møller Ph.D.

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Office hours by appointment

Some lectures will be given by Tod Sloan, MD, MBA

Class room: GR4.301

Friday 2:30-3:15PM and 3:30-4:15 PM

Start: August 26, 2016

Class cancelled:

Labor day: September 5

Fall Break: 11/21-11/23

Thanksgiving holidays: 11/24-11/26

Class text: Aage R. Møller: Intraoperative Neurophysiologic Monitoring.

Third Edition, 2011

The softcover (paper) version of the book can be purchased for \$25:00 through the UTD library service (with your ID as a student at UTD). An electronic version is also available through the Library, free of charge.

Second text: A Koht, T Sloan, JR Toleikis, (Eds) Neuromonitoring for the anesthesiologist, Springer-Verlag, New York, 2012.

The electronic version of the book is free of charge through the library.

PDFs of all the slides we show during lectures, voice recordings of my lectures and supplementary material will be available on E-Learning.

Supplementary reading:

Brodal P. The Central Nervous System 4th edition

New York, Oxford University Press, 2010, ISBN 978-0-19-538115-3

Grading:

Midterm Exam (obligatory):

Take home exam

Posted: October 2nd

Due: October 10th

Final Exam:

Take home exam

Posted: December 2nd

Due: December 9th

Course purpose: The purpose of this course is to further develop the understanding of the anatomical and functional basis for Intraoperative neurophysiological monitoring of the peripheral and central nervous system. The course will provide understanding of the special techniques that are used in the operating room for intraoperative monitoring. The course will include reading assignments from a book.

General objectives:

Students will:

1. Understand the anatomical and physiological basis for monitoring the integrity of nerves and the central nervous system during surgical manipulations
2. Understand the anatomical and physiological basis for pathologies of peripheral nerves.
3. Understand how to detect changes in function that are signs of injuries.
4. Specifically understand the organization of normal motor system.
5. Understand how to monitor the motor system in operations of the spinal cord.
6. Understand the normal function of cranial nerves and their disorders.
7. Specifically understand how to monitor the function of cranial nerves during operations of the skull base.
8. Understand the choice and role of anesthetic agents in intraoperative monitoring.

Course layout

Intraoperative neurophysiologic monitoring makes it possible to detect surgically induced injuries before they reach a level where permanent neurologic deficits occur and that can reduce the risk of neurological deficits as complications to operations that involve nervous tissue. This course is part II of the course that concerns the anatomical and physiological basis for Intraoperative neurophysiologic monitoring (IONM). The course has two parts; Part II covers basics about intraoperative neurophysiological monitoring, the operating room environment, education and certification. Interpretation of the recordings that are the basis for intraoperative monitoring requires knowledge about the physiology and anatomy of the systems involved, and how the recorded electrical potentials change as a result of injuries. Considerable time of this course is devoted to basic neurophysiology and discussion about how pathologies manifest in recordable electrical potentials. The anatomy and physiology of cranial nerves, motor and sensory systems are also covered in detail to build the basis for monitoring of these systems. Recordings of evoked potentials from different systems are described. Techniques of mapping of structures in the brain and the spinal cord are describes and it is

discussed how electrophysiological techniques can be used to guide the surgeon in an operation.

The course includes the basis for generation of neuroelectric potentials and it describes the practical aspects of recording and interpreting neuroelectric data in the operating room.

OUTLINE

1. Introduction

- a. General about neurophysiological monitoring
- b. Interpretation of recorded evoked potentials
- c. Non-pathologic causes of changes.
- d. Artifacts.
- e. False positives and false negatives.
- f. Education and certification
- g. The operating room environment
- h. How to relate to the surgeon
- i. How to relate to other members of the operating room team
- j. Equipment used for IONM
- k. Writing the final report
- l. Legal aspects of intraoperative monitoring

2. Development of IONM

3. Nearfield and farfield evoked potentials

- a. Near field potentials recorded from a long nerve
- b. Effect of injuries to a long nerve
- c. Near field potentials recorded from a nucleus
- d. Farfield potentials from nerves and nuclei
- e. Recovering of weak signals in noise using signal averaging.
- f. Filtering

4. Peripheral nerves

- a. Nerve conduction studies in the operating room
- b. Principles of nerve conduction studies
- c. Possible problems related to conduction measurements

5. Monitoring structures in the brainstem

- a. Cranial nerves, anatomy, physiology and disorders
- b. Monitoring the facial nerve in operations in the cerebellopontine angle

- c. Monitoring extraocular muscles
 - d. Microvascular decompression operations (hemifacial spasm)
 - d. Monitoring the auditory nerve
 - e. Auditory evoked potentials for monitoring brainstem manipulations
6. Mapping structures in the brain and the spinal cord
- a. Mapping the eighth cranial nerve
 - b. Mapping peripheral nerves
 - c. Use of collision techniques for mapping the spinal cord
 - d. Mapping the intracranial portion of the trigeminal nerve
 - e. Mapping the floor of the fourth ventricle
 - f. Localizing speech areas of the brain
 - g. Mapping the thalamus and basal ganglia for deep brain stimulation
7. Intraoperative recordings that can guide the surgeon in an operation.
- a. Localization of specific neural tissue.
 - b. Hyperactive motor disorders.
 - c. Guiding implantation of thalamic electrodes (deep brain stimulation)
8. Research in the operating room
- a. Historical overview of research on patients undergoing surgical operations
 - b. How to perform research in the operating room
 - c. Benefits from research on patients undergoing neurosurgical operations
- 9. Role of Anesthesiology**
- a. Choice and management of anesthetic agents**
 - b. Positioning issues during surgery**
 - c. Physiological considerations of patient management**

SCHEDULE:

8/26/16 MOLLER CHAPTER 1 INTRODUCTION

9/2/16 SLOAN WORKING IN THE OPERATING ROOM

9/9/16 MOLLER CHAPTER 2 HISTORY AND DEVELOPMENT OF IONM

9/16/16 SLOAN HISTORY OF SURGERY AND ANESTHESIA

9/23/16 MOLLER CHAPTER 3 NEAR AND FAR FIELD POTENTIALS AND SIGNAL ANALYSIS

9/30/16 MOLLER CHAPTER 4 PERIPHERAL NERVES

10/7/16 MOLLER CHAPTER 5 MONITORING STRUCTURES IN THE BRAINSTEM

10/14/16 SLOAN OPERATIONS IN THE HEAD

10/21/16 MOLLER CHAPTER 6. MAPPING

10/28/16 MOLLER CHAPTER 7 RECORDINGS THAT CAN GUIDE THE SURGEON

11/4/16 MOLLER CHAPTER 8. RESEARCH IN THE OPERATING ROOM

11/11/16 SLOAN ANESTHESIA AND WHAT IS NEW

11/18/16

12/2/16 SLOAN & MOLLER EXAM QUESTIONS

Student Conduct & Discipline

The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UTD publication, *A to Z Guide*, which is provided to all registered students each academic year.

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the *Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3*, and in Title V, Rules on Student Services and Activities of the university's *Handbook of Operating Procedures*. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

A student at the university neither loses the rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating the standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings.

Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). *This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.*

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. The university encourages all official student email correspondence be sent only to a student's U.T. Dallas email address and that faculty and staff consider email from students official only if it originates from a UTD student account. This allows the university to maintain a high degree of confidence in the identity of all individual corresponding and the security of the transmitted information. UTD furnishes each student with a free email account that is to be

used in all communication with university personnel. The Department of Information Resources at U.T. Dallas provides a method for students to have their U.T. Dallas mail forwarded to other accounts.

Withdrawal from Class

The administration of this institution has set deadlines for withdrawal of any college-level courses. These dates and times are published in that semester's course catalog. Administration procedures must be followed. It is the student's responsibility to handle withdrawal requirements from any class. In other words, I cannot drop or withdraw any student. You must do the proper paperwork to ensure that you will not receive a final grade of "F" in a course if you choose not to attend the class once you are enrolled.

Student Grievance Procedures

Procedures for student grievances are found in Title V, Rules on Student Services and Activities, of the university's *Handbook of Operating Procedures*.

In attempting to resolve any student grievance regarding grades, evaluations, or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originates (hereafter called "the respondent"). Individual faculty members retain primary responsibility for assigning grades and evaluations. If the matter cannot be resolved at that level, the grievance must be submitted in writing to the respondent with a copy of the respondent's School Dean. If the matter is not resolved by the written response provided by the respondent, the student may submit a written appeal to the School Dean. If the grievance is not resolved by the School Dean's decision, the student may make a written appeal to the Dean of Graduate or Undergraduate Education, and the dean will appoint and convene an Academic Appeals Panel. The decision of the Academic Appeals Panel is final. The results of the academic appeals process will be distributed to all involved parties.

Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations.

Incomplete Grade Policy

As per university policy, incomplete grades will be granted only for work unavoidably missed at the semester's end and only if 70% of the course work has been completed. An incomplete grade must be resolved within eight (8) weeks from the first day of the subsequent long semester. If the required work to complete the course and to remove the incomplete grade is not submitted by the specified deadline, the incomplete grade is changed automatically to a grade of F.

Disability Services

The goal of Disability Services is to provide students with disabilities educational opportunities equal to those of their non-disabled peers. Disability Services is located in room 1.610 in the Student Union. Office hours are Monday and Thursday, 8:30 a.m. to 6:30 p.m.; Tuesday and Wednesday, 8:30 a.m. to 7:30 p.m.; and Friday, 8:30 a.m. to 5:30 p.m.

The contact information for the Office of Disability Services is:

The University of Texas at Dallas, SU 22

PO Box 830688

Richardson, Texas 75083-0688

(972) 883-2098 (voice or TTY)

Essentially, the law requires that colleges and universities make those reasonable adjustments necessary to eliminate discrimination on the basis of disability. For example, it may be necessary to remove classroom prohibitions against tape recorders or animals (in the case of dog guides) for students who are blind. Occasionally an assignment requirement may be substituted (for example, a research paper versus an oral presentation for a student who is hearing impaired). Classes enrolled students with mobility impairments may have to be rescheduled in accessible facilities. The college or university may need to provide special services such as registration, note-taking, or mobility assistance.

It is the student's responsibility to notify his or her professors of the need for such an accommodation. Disability Services provides students with letters to present to faculty members to verify that the student has a disability and needs accommodations. Individuals requiring special accommodation should contact the professor after class or during office hours.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities for the travel to and observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, Tax Code, Texas Code Annotated.

The student is encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment. The student, so excused, will be allowed to take the exam or complete the assignment within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the chief executive officer of the institution, or his or her designee. The chief executive officer or designee must take into account the legislative intent of TEC 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

8/22/13