



University of California  
San Francisco



**UCSF MEDICAL CENTER  
DEPARTMENT OF PATHOLOGY  
NEUROPATHOLOGY UNIT**

**ORIENTATION MANUAL  
for SHORT-TERM VISITING FELLOWSHIP**

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# Table of Contents

<b>Introduction &amp; Objectives</b>	<b>3</b>
<b>Faculty &amp; Important Phone numbers</b>	<b>4</b>
<b>Schedule of Meetings &amp; Conferences</b>	<b>4</b>
<b>Learning Objectives</b>	<b>5-8</b>
<b>Teaching Sets</b>	<b>9</b>
<b>Reference Textbooks</b>	<b>9</b>
<b>Standard Procedures</b>	
<b>Frozen section procedures</b>	<b>10</b>
<b>Processing of stereotactic biopsies</b>	<b>11</b>
<b>Processing muscle/nerve biopsies</b>	<b>12</b>
<b>Reporting of Temporal lobe resections</b>	<b>13-14</b>
<b>Brain Autopsy</b>	<b>15</b>

# SHORT-TERM VISITING FELLOWSHIP IN SURGICAL NEUROPATHOLOGY

## INTRODUCTION:

*This manual is intended to orient you to your rotation in Surgical Neuropathology. Below, you will find the rotation objectives as well as information on resources, routine procedures, and our Unit. For the purposes of this document, all individuals rotating in Surgical Neuropathology for 1-2 months are identified as Short-Term Visiting Fellows. **Please contact the neuropathology administrative assistant, Mr. Joe Coloff ( [joseph.coloff@ucsf.medctr.org](mailto:joseph.coloff@ucsf.medctr.org), phone:415-476-5236) for assistance with schedules.***

*Welcome to Surgical Neuropathology!*

*The objectives of this rotation almost entirely depend on the individual and his/her aspirations. Nevertheless, we recognize four main categories:*

- 1- To develop a fundamental understanding of Neuropathology practice and mechanisms of Neurological Diseases (mostly for medical students)*
- 2- To acquire the fundamental Neuropathological competencies for the practice of Pathology, Neurology, or Neurosurgery (mostly for pathology residents and residents of Neurology and Neurosurgery departments)*
- 3- To develop advanced skills and competencies in the field of Neuropathology (for practicing pathologists or fellows).*
- 4- To pursue a specific research project in Surgical Neuropathology.*

*Pick yours!*

## Faculty, Staff & Important Phone numbers:

PERSONNEL	Office	Phone	Pager	E-mail
<b>Administrative Assistants</b>				
Joseph Coloff	M551	476-5236		<a href="mailto:joseph.coloff@ucsf.edu">joseph.coloff@ucsf.edu</a>
Helga Thordarson	Mission Ctr	502-6872		<a href="mailto:helga.thordarson@ucsf.edu">helga.thordarson@ucsf.edu</a>
<b>Faculty</b>				
Andrew W Bollen, Director	M553	502-6605	443-4030	<a href="mailto:andrew.bollen@ucsf.edu">andrew.bollen@ucsf.edu</a>
Stephen DeArmond	Mission Ctr	476-5236	443-6250	<a href="mailto:stephen.dearmond@ucsf.edu">stephen.dearmond@ucsf.edu</a>
Eric Huang	VAMC	221-4800	804-5984	<a href="mailto:eric.huang@ucsf.edu">eric.huang@ucsf.edu</a>
Marta Margeta	Mission Bay	514-0228	443-6413	<a href="mailto:marta.margeta@ucsf.edu">marta.margeta@ucsf.edu</a>
Tarik Tihan	M551	514-9332	443-1390	<a href="mailto:tarik.tihan@ucsf.edu">tarik.tihan@ucsf.edu</a>
Scott R Vandenberg	Preuss Lab	476-5236	443-4999	<a href="mailto:scott.vandenberg@ucsf.edu">scott.vandenberg@ucsf.edu</a>
<b>Fellows 2004 &amp; 2006</b>				
Han Lee (2 <sup>nd</sup> year)	VAMC	221-4800	443-4885	<a href="mailto:Han.Lee@ucsfmedctr.org">Han.Lee@ucsfmedctr.org</a>
Jose Otero (1 <sup>st</sup> year)	M551	502-6604	443-3316	<a href="mailto:joanna.phillips@ucsf.edu">joanna.phillips@ucsf.edu</a>
<b>Important Phone Numbers</b>				
Surgical Path Gross Rm	M580	353-1608		
Immunopathology	M567	353-1623		
Electron Microscopy	S568	353-2673		
Morgue	M55	353-1629		

## Schedule of Meetings & Conferences:

	Monday	Tuesday	Wednesday	Thursday	Friday
<b>8 am</b>	Resident Lecture		Resident lecture	M.O.D. Conference	Resident lecture
<b>9 am</b>		SFGH Autopsy	Moffitt/Long Autopsy <b>M55</b>	Neuroradiology Conference	Muscle-Nerve Conf
<b>10 am</b>					
<b>11 am</b>					
<b>NOON</b>			Unknown conference	Neurooncology Tumor Board (L33, 12.30 pm)	
<b>1 pm</b>					
<b>2 pm</b>					
<b>3 pm</b>					
<b>4 pm</b>					
<b>5 pm</b>					<i>Virchow Rounds</i>

## Learning Objectives for Neurology/Neurosurgery Residents:

1. Learn how the neuropathologist works
2. Learn what to expect from frozen section and when frozen section can be useful
3. Learn the grading and typing of brain tumors and learn about radiology/pathology correlation
4. Learn the basic pathological patterns in nerve and muscle biopsies
5. Learn the spectrum of clinically relevant CNS infections
6. Learn the principals of pathological findings in demyelinating diseases
7. Learn the fundamental pathological findings in neurodegenerative diseases
8. Learn how autopsy neuropathology can help discovery, research and patient care
9. Learn about the basic images that can be encountered in the neurology/neurosurgery board exams
10. Develop knowledge for neuroscience research.

**REQUIRED READING: Practical Review of Neuropathology (Fuller & Goodman) or Manual of Basic Neuropathology (Grey, DeGirolami and Poirier)** Both are excellent books to review the fundamentals of neuropathology for residents in neurology and neurosurgery.

### **Recommended Textbooks**

1. **Neuroradiology Companion (Castillo)** This is a great simple book for basic neuroradiology information. It is very helpful for medical students, pathology residents and neuropathologists. It is somewhat simplistic for rotating neurology or neurosurgery residents. In TIHAN'S OFFICE.
2. **Pathology & Genetics Tumors of the Nervous System (Kleihues & Cavenee)** This is the WHO reference book for classification and typing of CNS tumors. It is a great addition to the Neuropathologist's library. It is a good reference for Neuropathology fellows pathology residents and is somewhat extensive for rotating neurology and neurosurgery residents..
3. **Structural & Molecular Basis of Skeletal Muscle Disease (Karpati Ed.)** This is the World Federation of Neurology publication for skeletal muscle diseases with great information on the genetic aspects. It is a good reference for Neuropathology fellows pathology residents and is somewhat extensive for rotating neurology and neurosurgery residents.

## **Learning Objectives for Medical Students:**

### **To develop a basic concept on the fundamental aspects of Neuropathology**

1. How to perform a frozen section, intraoperative smear and how to proceed with an intraoperative consultation
2. How approach a surgical neuropathology specimen and develop a general algorithm in making diagnosis
3. Understand the major groups of primary brain tumors, the concept of gliomas, grading and classification of most common tumors in the WHO scheme.
4. Understanding useful stains to determine origin of tumors and correct diagnosis
5. Learn the most common entities in demyelinating disorders
6. Learn the fundamental concepts of cranial trauma, fractures, intracranial hemorrhages and herniations.
7. Learn the most common cerebrovascular disorders (aneurysm, malformations, ischemic/hypoxic encephalopathy)
8. Learn the most common (three of each) bacterial, fungal, parasitic and viral infectious agents
9. Learn the diagnostic criteria for most common neurodegenerative diseases (AD, PD, ALS)
10. Learn the 4 stages of neurodevelopment and four most common disorders at all four stages of neurodevelopment.
11. Observe the fun we have every day

### **Recommended Textbooks**

#### **1. Practical Review of Neuropathology (Fuller & Goodman)**

This is an ideal book to review the fundamentals of neuropathology for medical students and residents in neurology and neurosurgery. Although a little short on detail for pathology residents, it may be sufficient for board preparations. AVAILABLE IN HSW 408 and IN DR. TIHAN'S OFFICE FOR LOAN.

#### **2. Principle's and Practice of Neuropathology (Nelson, Parisi, and Mena)**

Concentrates on material from the AFIP Kenneth Earl review course. It's somewhat more in-depth than Fuller and Goodman's little book yet it's still very readable.

## Learning Objectives for Pathology Residents:

### **To master the basics of neuropathology practice and learn the most common disorders that can be encountered in daily surgical pathology practice**

1. Learn how to perform and interpret frozen section and smear preparations
2. Develop a fundamental understanding of brain imaging CT and MRI
3. Learn the basics of how to communicate with the Neurosurgeon and Neurooncologist
4. Understand how to diagnose and differentiate cavernous angioma and arteriovenous malformation and other common vascular pathology.
5. Understand the basic reactive processes and their routine appearance
6. Learn how to recognize, and grade meningiomas, gliomas, neuronal tumors, medulloblastoma/PNET, germ cell tumors and lymphomas
7. Recognize the most common 5 mistakes committed in surgical neuropathology and learn how to avoid them.
8. Learn to recognize a macrophage-rich disorder (demyelinating or infarctive)
9. Learn how to diagnose AD, PD, Lewy body disease, and develop an understanding on when to refer a case to a specialist.
10. Learn how to use the most common immunohistochemical stains.
11. Learn when electron microscopy is useful in Neuropathology.
12. Learn to recognize neurogenic and myopathic patterns in muscle biopsy, and learn the most common histochemical stains.
13. Learn to recognize axonal and demyelinating neuropathy and use of thick sections
14. Correctly answer most common questions asked in Anatomic Pathology Boards
15. Participate in the social activities and admire the fun we have in neuropathology

#### **REQUIRED READING :Practical Review of Neuropathology (Fuller & Goodman)**

Although a little short on detail for pathology residents, it may be sufficient for board preparations.

#### **Recommended Textbooks**

1. **Surgical Pathology of the Nervous System and its coverings (Burger, Scheithauer, Vogel)** This is an excellent book for all issues relating to Surgical Neuropathology and is a great addition to the Surgical Pathologist's library. It is a must-read for Neuropathology fellows and is a helpful reference to rotating pathology residents. .
2. **Pathology & Genetics Tumors of the Nervous System (Kleihues & Cavenee)** This is the WHO reference book for classification and typing of CNS tumors. Great for Neuropathology fellows pathology residents and is somewhat extensive for rotating neurology and neurosurgery residents..

**Learning Objectives for Pathologists/Fellows:**

**Your objectives and your goals are entirely up to you. We will do everything we can to help you achieve whatever you would like to do. Please fill out the objectives section below and pass it onto us so that we can follow up our progress in having you achieve your goals.**

**Name:\_\_\_\_\_**

**My goals are**

- 1.**
- 2.**
- 3.**
- 4.**
- 5.**

## Teaching Sets:

### **Surgical Neuropathology Teaching Set**

Located in Dr. Tihan's Office. The access is by appointment, and the slides can be checked out on a daily basis. The information for the teaching set is also available as a FileMaker document. (Note: There are also a number of neuropathology teaching slides within Surgical Pathology Teaching set kept in Pathology Administration by Christine Lin Phone: 514-3424)

Total number of cases by 2008 =360

### **Intraoperative Smear Teaching Set**

Located in Dr. Tihan's Office. The access is by appointment, and the slides can be checked out on a daily basis. The information for the teaching set is also available as a FileMaker document.

Total number of cases by 2008 = 75

### **Stereotactic Biopsy Teaching Set**

Located in Dr. Tihan's Office. The access is by appointment, and the slides can be checked out on a daily basis. The information for the teaching set is also available as a FileMaker document.

Total number of cases by 2008 = 50

### **Surgical Pathology Teaching Set**

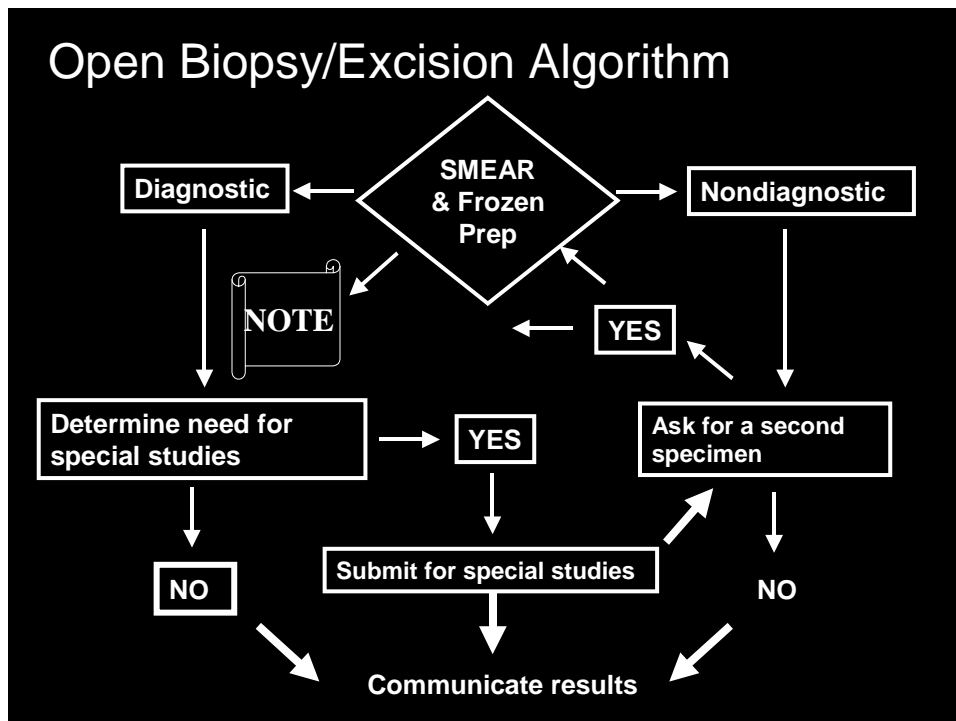
Located in the residents room in M578, the slide set includes more than 700 cases and covers most of surgical pathology excluding medical kidney and transplant pathology. To access the surgical pathology teaching set, please contact one of the chief residents.

**Reference Textbooks:** *There are numerous other books in our Unit and in the individual libraries of Drs. Bollen and Tihan. These books can be made available to rotating fellows/residents with special arrangement. The recommended references include:*

1. **Practical Review of Neuropathology (Fuller & Goodman)**
2. **Principles and Practice of Neuropathology (Nelson, Parisi, and Mena)**
3. **Surgical Pathology of the Nervous System and coverings (Burger, Scheithauer, Vogel)**
4. **Pathology & Genetics Tumors of the Nervous System (Kleihues & Cavenee 2000)**
5. **WHO Classification of CNS Tumors (Louis, Ohgaki, Cavenee, Wiestler, 2007)**
6. **Structural & Molecular Basis of Skeletal Muscle Disease (Karpati Ed.)**
7. **Pathology of Skeletal Muscle (Carpenter & Karpati)**
8. **Biopsy Diagnosis of Peripheral Neuropathy (Midroni & Bilbao)**
9. **Greenfield's Neuropathology (Graham & Lantos)**
10. **Textbook of Neuropathology (Davis & Robertson)**
11. **Neuroanatomy through Clinical Cases (Blumenfeld)**

## STANDARD PROCEDURES

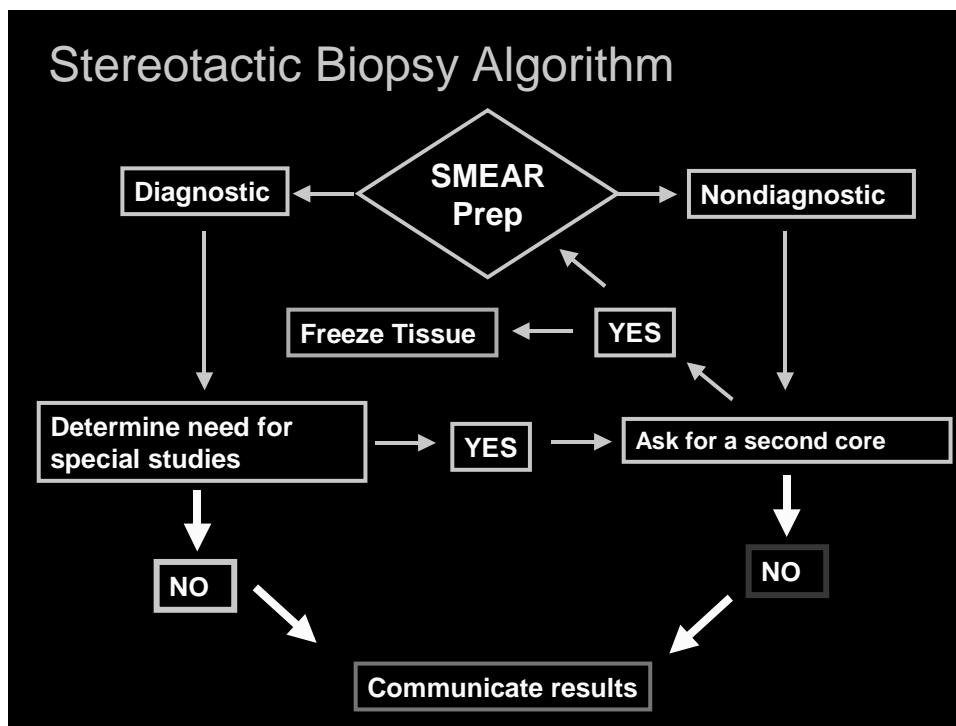
1. Frozen section procedures: Frozen sections are performed at the Surgical Pathology Suite in Room M576. The Neuropathologist on-call is paged to the suite when the resident is called from the O.R. to retrieve a frozen. You can ask the pathologists assistants to page you as well, but this has to be arranged individually since there is no strict obligation that you attend all frozen sections. It is very helpful to do so, but not practical for all rotators.
2. We need a smear and a frozen section slide for most effective intraoperative consultation decisions and you should be familiar with both of these procedures. Neuropathology fellows and Anatomic Pathology resident should be PROFICIENT in doing both.



**Note: Always Make sure that you are left with sufficient material for permanent sections for diagnosis. Subsequent samples from the patient may not be from the lesion, or still too small for diagnosis.**

## Stereotactic biopsies:

Stereotactic biopsies are small samples and should be handled with extreme care. The primary goal of interpreting the stereotactic biopsy is to provide a diagnosis for further management. The biopsy should be evaluated using an intraoperative evaluation to assess sample adequacy, and to provide a preliminary diagnosis. You should always observe caution when processing these biopsies since the tissue is almost always limited. Never forget to keep a sample for permanent sections.



## Processing Muscle/Nerve Specimens:

### Muscle and Nerve Biopsies on Evenings and Weekends:

1. Accession the specimen as an NP case.
2. Examine specimen. They are normally received fresh. Jot down dimensions and weight for the NP fellow.
2. Place a tiny sliver (~0.2 x 0.1 x 0.1 cm) in chilled glutaraldehyde and store in the refrigerator.
3. If enough tissue is available (>0.3 gm), submit a small cross-section for formalin-fixed, paraffin-embedded sections. This is particularly important if a vasculitis or inflammatory myopathy is suspected. Choose fattier/more cauterized or otherwise distorted portions for formalin-fixation: always save the best material for frozen section histochemistry.
4. If the specimen comes with some indication that the muscle biopsy is being done for metabolic, mitochondrial or biochemical workup and the specimen is >0.4 gm, snap freeze a small portion in liquid nitrogen without OCT and store this in the -80 C freezer.
5. Wrap remainder in saline-moistened gauze that has been completely wrung out (no free saline should contact the specimen or severe freezing artifacts will arise) and store in the fridge.
6. Be sure to save the best material for frozen section histochemistry.

### Nerves

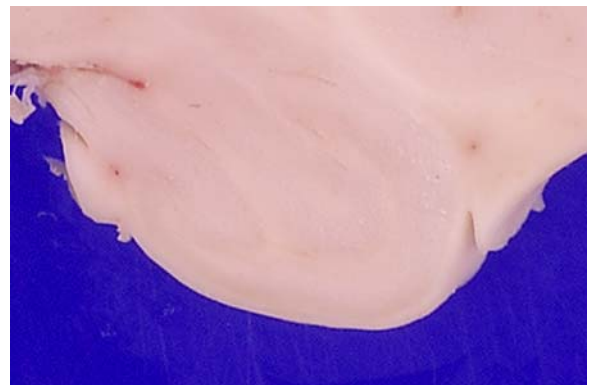
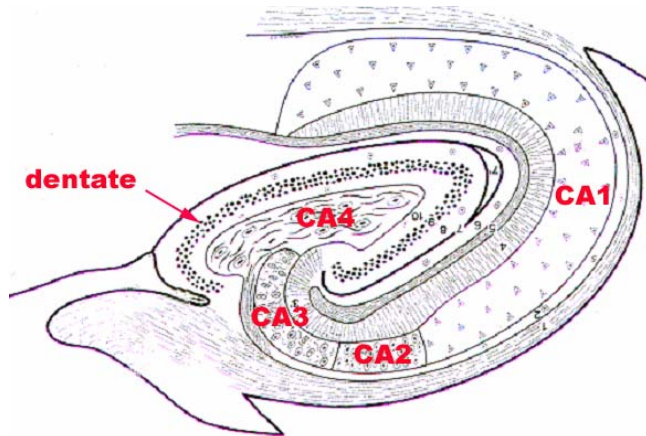
These are easier.

1. Accession the specimen as an NP case.
2. Nerves are normally received fresh. Examine the specimen. Be careful to handle it by the ends and avoid bending it, if possible. Jot down dimensions and appearance.
3. Obtain razor blade from frozen section cutting station and remove the cardboard wrapping. Make a narrow trough with the cardboard and gently drape the nerve into the trough. This provides just a little bit of tension on the nerve while it fixes. Fix the specimen on the cardboard in chilled glutaraldehyde, in the refrigerator. Alert the neuropath fellow on Monday morning and s/he will take care of it.
4. In cases where there is serious consideration of metabolic disease, it is best to contact the Neuropathology fellow to discuss appropriate processing: 443-2693.

## REPORTING OF TEMPORAL LOBE RESECTIONS:

Temporal lobe resections are often performed for the purpose of controlling seizures emanating from this region. The correct orientation and reporting of these resections are **critical** to diagnosis and subsequent management of patients. There is an optional form for reporting and processing temporal lobe resections for seizures. The form is accompanied by a set of directions for grossing these specimens. These documents can be found in the I drive within the NEUROPATHOLOGY Folder titled as “Seizures”. The form in the next page is also designed for reporting of the temporal lobe resections (see page 14)

Most temporal lobe seizure specimens contain 4 parts: -lateral temporal cortex, -temporal lobe, -amygdala, -hippocampus. Ideally, one should orient the hippocampus. This is best done with the help of the neurosurgeon or attending neuropathologist. It is also helpful to identify the ventricular surface that is often much shinier than the rest of the specimen. Cortical surfaces can also be easily identified. Coronal sections through the hippocampus will help visualize the entire anatomy microscopically (as shown below) in order to assess neuronal loss in the critical areas (dentate gyrus and Cornu Ammonis (CA)).



The specimen may come as a three dimensional tube, which you would serially cross-section (see below). The smooth, shiny aspect corresponds to the ventricular surface, which can aid in orientation.

