Anatomic (Surgical and Autopsy) Pathology, University of Minnesota Medical Center, East Bank Campus

The anatomic pathology rotation at University of Minnesota Medical Center, East Bank Campus, is designed to instruct trainees in anatomic pathology in a tertiary care, academic setting. The rotation encompasses both surgical and autopsy pathology. As they evaluate patient specimens, physicians in training are instructed in gross evaluation, microscopic evaluation, and ancillary studies. By providing residents with increasing responsibilities and duties, as their level of training progresses, the teaching faculty hope to instill in the resident the skills and tools necessary to develop a life-long course of continued professional development.

Institutional Site Director

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Teaching Faculty Members

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Training Site

University of Minnesota Medical Center, Fairview, University Campus

Duration of Rotation

3 months - 2 months surgical and 1 month autopsy pathology

Post Graduate Level of Residents Involved

PGY levels 1-4

The basic learning objectives and programmatic expectations are outlined below. This is followed by an introduction to resident activities in Surgical Pathology, the role of surgical pathology fellows, daily duties and responsibilities in surgical pathology and by the Goals and Objectives. The latter are the specific skills that you must acquire during your training. The following section highlights the basic schedule of rotations in Anatomic Pathology, the learning objectives for Anatomic Pathology and for Surgical Pathology (skill levels I and II for each). The next section highlights the opportunities for residents to function as consultants and to correlate morphology with ancillary studies. Subsequent sections address on-call duties, communication with faculty, and structured education and management of the surgical pathology laboratory. The important appendices summarize the conferences schedule, special histochemical stains and immunohistochemical stains available in our diagnostic armamentarium.

Surgical Pathology Rotation Outline

Daily Duties and Responsibilities - Surgical Pathology

Daily activities start with conferences during which, "protected" time is afforded to residents. These are intradepartmental conferences (See appendix) and all AP residents in this rotation are expected to attend. Following the conferences, residents are assigned to either gross-room activities (day 1 of cycle) or to previewing and signing biopsies and large specimens (days 2 and 3 of cycle). It is responsibility if the resident to proof-read dictations on cases to be signed out on days 2 and 3 and to obtain additional information from the electronic medical records, as necessary.

Basic Learning Objectives

1. Gain knowledge and technical skills to recognize, interpret, and explain pathologic processes in the clinical practice of anatomic pathology.
2. Effectively communicate pathologic findings to colleagues and provide consultative information regarding patient management.
3. Effectively direct and manage the pathology laboratory in all regards.

**Basic Programmatic Expectations of Residents**

1. Develop an understanding of basic pathologic processes.
2. Acquire skills needed to interpret laboratory data and make clinicopathologic correlations.
3. Communicate effectively and share expertise with peers and colleagues.
4. Develop investigative skills to better understand pathologic processes as they apply to both individual patients and the general patient population.
5. Acquire knowledge and experience in laboratory direction and management.
6. Assume leadership roles in education of other physicians and allied health professionals.

**Competencies In Pathology**

The ACGME currently requires that training programs in pathology enable residents to develop competencies in the broad areas described here.

**General Comments On Competencies**

Residents must develop competencies in the 6 areas listed here to the level expected of a new practitioner. Toward this end, each program must define the specific knowledge, skills, and attitudes that are required and provide educational experiences as needed for their residents to develop the desired competencies. The program must create and reinforce the concept of life-long learning.

1. **Patient Care.** Residents must demonstrate a satisfactory level of diagnostic competence and the ability to provide appropriate and effective consultation in the context of pathology services.
2. **Medical Knowledge.** Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognitive (e.g., epidemiological and social-behavioral) sciences and the application of this knowledge to pathology.
3. **Practice-Based Learning and Improvement.** Residents must be able to demonstrate the ability to investigate and evaluate their diagnostic and consultative practices, appraise and assimilate scientific evidence, and improve their patient care practices.
4. **Interpersonal and Communication Skills.** Residents must be able to demonstrate interpersonal and communication skills that result in effective information exchange and teaming with other health care providers, patients, and patients' families.
5. **Professionalism.** Residents must demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population.
6. Systems-Based Practice. Residents must demonstrate an awareness and responsiveness to the larger context and system of health care and the ability to call on system resources to provide pathology services that are of optimal value.

**Observations On Competencies In Pathology**

The curriculum and associated competencies delineated here relate to "core" (i.e., non-elective) training in anatomic pathology. Competencies for advanced training in specific subspecialty areas with dedicated fellowships and board examinations (e.g., hematopathology, dermatopathology) are highlighted elsewhere, in the description of fellowships.

Because of multiple individual variables, it is not practical to define competencies that are specific for year 1 or year 2 of training. Instead, competency assessment should be evaluated on an ongoing basis using as descriptors 1- "beginner (novice)", 2- "proficient (flowing smoothly)" and 3- "Proficient". It is neither realistic nor desirable to specify certain diagnoses or defined numbers of cases of a given type as elements of competency. This program fulfills ACGME requirements to provide a caseload that is both high enough and varied enough to ensure broad training.

In defining competencies in anatomic pathology, specific and critical areas in the training process are delineated, without attempting to provide excessive detail or complexity. Specific skills that must be mastered to accomplish these competencies are highlighted below as "Goals and Objectives".

1. Basic Principles
   a) Knowledge of JACHO/CAP standards/requirements for specimen submission
   b) Knowledge of JCAHO/CAP standards regarding occupational hazards/infection control
   c) Tissue fixation (including commonly used special fixatives)
   d) Tissue processing
   e) Embedding, orientation
   f) Section preparation, levels, etc.
   g) Use of special stains, immunohistology, electron microscopy, cytogenetics, etc.
   h) Storage/disposal of specimens and hazardous chemicals
   i) Basic computer skills in anatomic pathology

2. Gross Examination
   a) Specimen identification
   b) Anatomically correct dissection
   c) Accurate dictated description
   d) Specimen photography (where appropriate)
   e) Appropriate blocks for microscopic examination
f) Proper examination of margins (where appropriate)
g) Special handling of common specimens (e.g., culture, electron microscopy, cytogenetics, bone marrow)

3. Microscopic Examination Basic

   a) Accurate morphological description
   b) Reasonable diagnosis/differential diagnosis
   c) Basic elements of information required in all reports
   d) Preparation of written report
   e) Preparation/organization or sign out with senior
   f) Correlation with frozen section findings
   g) Accurate diagnosis or need for consultation
   h) Special stains/immunoperoxidase (where appropriate)
   i) Interpretation of immunostains (and associated artifacts)
   j) Knowledge/use of grading systems
   k) Synoptic reports (as appropriate)
   l) Amended/addendum reports
   m) Proper handling of consultation cases
   n) Photomicroscopy

4. Intraoperative Frozen Sections/Smears Basic

   a) Role of intraoperative diagnosis; appropriate indications
   b) Tissue sampling for intraoperative diagnosis
   c) Cutting/staining of frozen section (within 10 minutes)
   d) Precautions for handling fresh tissue or other specimens for intraoperative diagnosis
   e) Preparation/staining of smears
   f) Interpretation of frozen sections/smears
   g) Limitations of intraoperative diagnosis
   h) Communication/dialogue with treating physician

5. Autopsy

   a) Role of autopsy/indications for autopsy
   b) Autopsy permission and assignment of medicolegal status
   c) Performance of autopsy (within 4 hours)
   d) Differentiation of natural and unnatural death

6. Cytopathology (Note: Competency objectives modified with permission from the American Society of Cytopathology Taskforce on Residency Training in Cytopathology.)
a) Interpretation of cytopathology specimens from the various commonly sampled body sites by examining cases before sign out and appropriately communicating diagnostic opinions, differential diagnoses, and/or follow-up recommendations
b) Performance of superficial fine-needle aspiration biopsies in a clinical setting, with appropriate patient care and diagnostic outcomes
c) Assistance with deep fine-needle aspiration biopsies in such settings as radiology and endoscopy, with appropriate determination of specimen adequacy and the need for ancillary techniques, and collection of supplementary diagnostic materials for such techniques
d) Continuous quality assurance and regulatory compliance methodologies as they apply to the cytopathology laboratory (eg, the Clinical Laboratory Improvement Amendments of 1988)

7. Molecular Diagnostics/Cytogenetics

a) Role of these techniques in the diagnosis of neoplastic disease, particularly hematolymphoid disorders
b) Role of these techniques in the diagnosis of infectious disease
c) Role of these techniques in the diagnosis of common heritable disorders
d) Principles and limitations of polymerase chain reaction, reverse transcription-polymerase chain reaction, fluorescence in situ hybridization, Southern blot analysis, and karyotyping
e) Critical issues of quality control in using these techniques

8. Laboratory Management

a) Diagnostic coding/billing procedures
b) Basic federal law (including compliance) applicable to pathology
c) JCAHO/CAP standards for laboratory certification
d) Cost-effective practice of pathology
e) Principles of quality assurance/improvement
f) Basic risk management issues

9. General Skills

a) Use of appropriate phraseology in reports
b) Appropriate communication with clinician (or patient/family as appropriate)
c) Timeliness/turnaround time/indications to rush cases
d) Resolution of diagnostic disagreement
e) Internal/external consultation
f) Training of more junior residents

○ Ability to make an independent case presentation
Introduction to Resident Activities in Surgical Pathology

Three-day cycle:

Residents follow a three-day cycle in this rotation. The first day they are assigned to the Gross room; the second day they sign-out biopsies and the third day, they sign out large specimens, as further explained below.

See autopsy description below for details related to the autopsy service.

Teaching faculty members are physically present during standard operating hours; faculty members not physically present are rapidly available by phone or pager. At all times, a supervising faculty member is on-call at night, during week-ends and holidays (See on call duties, below). No diagnosis is communicated to the clinicians before a faculty member has evaluated the case.

Role of Surgical Pathology Fellows:

Surgical pathology fellows do not compete with residents for cases; all cases are handled by the resident. Surgical pathology fellows assist in the supervision and teaching of residents under close faculty supervision. Under staff guidance, the fellows supervise the residents in the gross room. In order to ensure a proper educational environment, review of cases with the residents is divided between one fellow and staff pathologists. Slides from all accessioned cases are reviewed by the resident, who may be assisted by a fellow. Further, any case reviewed with a fellow can also be shown to a faculty member by the resident. The teaching faculty reviews all cases before a final diagnosis is established. Resident feedback from the teaching faculty is provided directly in the gross room, during sign-out sessions and for those cases reviewed with the fellow on an ad-hoc basis, when requested by the resident, or when a faculty member considers it appropriate. If no fellows are available, all cases are reviewed directly with the staff pathologist.

Description of Daily Duties and Responsibilities - Surgical Pathology

Day 1: Gross Room- Based on their level of training residents are provided increasing autonomy with close faculty supervision. In the gross room, residents discuss each specimen as needed with the supervising faculty member prior to its dissection. This includes documentation of relevant prognostic information, the approach to the specimen, and procurement of tissues in special fixatives or frozen, if necessary. Gross room operation is supervised by the faculty members, pathologist assistants and surgical pathology fellows. The residents have the responsibility of grossing specimens received in the laboratory on their designated days. In general, residents gross in cases that require dissection; by their nature, these are more complex and have greater teaching value. Pathologist assistants in general gross in small biopsies. Gross room responsibilities include the dictation of the clinical history, gross features of the specimen, and the appropriate sampling of any lesions or surgical margins. The residents
also participate in any special procedures performed at this time, such as gross photography, sampling of tissue for electron microscopy, flow cytometry, cytogenetics, and tissue banking.

**Day 2: Biopsy sign-out session** - On the following day, the residents are required to review the microscopic findings from all cases that they grossed in and all cases grossed in by the pathologist assistants the previous day. With faculty guidance, residents are responsible for deciding what additional ancillary studies such as immunohistochemistry or special stains may be necessary in order to properly evaluate each case. In order to address patient care needs, clinician expectations and standards of the community, biopsies are signed-out the day after the specimen is received (24 hours turn-around time). Residents are expected to pre-view as many cases as possible before sign-out; however, all slides from all biopsies are reviewed with the resident.

**Day 3: Large specimen sign-out session** - In order to provide the resident an extra day to review the slides, large specimens are signed-out the following day (48 hours turn-around time). Residents are expected to preview all slides on large specimens, reach a differential diagnosis and to evaluate the need for additional ancillary studies that may be necessary in order to properly evaluate each case, before reviewing them with a fellow or faculty member. Residents are expected to preview all slides on all large cases accessioned on day 1. Advanced residents are responsible for preparing the original draft of the interpretive surgical pathology reports. During the rotation, the resident is responsible for presenting a didactic lecture on a surgical pathology topic to faculty members, technologists, or related health-care professionals.

**Goals And Objectives: Specific Skills That Apply To All Areas Of Anatomic Pathology**


**INTRODUCTION:** This should be regarded as a "live document"; it is a "Captain's log-book" through which you must continually and regularly evaluate your accomplishments. This analysis is critical in order for you to become what every surgical pathologist should be, a qualified and expert member of the clinical team. Ignoring this list of skills or considering them a simple formality will leave your training rudderless, at the mercy of chance alone. You should always keep these items in mind, and review this list at the beginning, halfway point, and at the end of each of your rotations in Anatomic Pathology at the University and at each affiliated institution. Problems in accomplishing any specific objective should be discussed with the coordinator of each rotation, the coordinator of Anatomic Pathology or with the residency director.

As you analyze these skills and objectives, you will realize that they encompass many different types of knowledge, depths of knowledge and complexity. Many of them you will acquire by reading; others by looking at cases (as many as you can) and by actually, handling the cases yourself. Some of them can be regarded as "essential" or "elementary" building blocks that you will need to master in order to accomplish the more complex goals. Some of them refer to simple knowledge; others are more complex and require a combination of knowledge, common
sense, attitudes and values. It is important to always remember that in surgical pathology, the patient is ahead of everything and everybody, including yourself. It is only when you understand the overriding value of "patients come first" that you will be worthy of being a member of the clinical team.

When you consider that you have achieved a specific objective, mark it on the left space. This is an "honors" type of evaluation; nobody will test you (don't worry! However, it will guarantee that you will pass your boards!). More importantly, your clinical colleagues and your patients will validate your achievement of these skills and objectives.

• ____ Be able to obtain pertinent information from the patient's clinical record; requires familiarity with electronic medical record (EMR).
• ____ Demonstrate knowledge of information that is necessary to provide adequate clinical history on submission forms for anatomic pathology specimens.
• ____ Demonstrate knowledge of the general principles and terminology for processing anatomic pathology specimens, including patient identification, gross examination, and dissection.
• ____ Demonstrate familiarity with the detailed organization, equipment, and techniques of the histology laboratory, including tissue processing, tissue embedding, preparation and staining of glass slides (information that histotechnologists must have to properly process tissue), and orientation of specimens.
• ____ Be able to dissect tissues in such a way as to preserve important pathologic findings and fix them so they may be used for clinicopathologic correlation as well as teaching.
• ____ Recognize normal gross anatomical landmarks.
• ____ Recognize normal histological structures.
• ____ Know when to obtain photograph from gross specimens and demonstrate the ability to take adequate gross and microscopic photographs using both film-based and digital cameras.
• ____ Demonstrate the ability to select correct pieces of tissue for sectioning and preservation, and maintenance and identification of tissue orientation during processing.
• ____ Provide adequate morphologic description of histologic slides.
• ____ Be familiar with the procedures for handling infectious specimens including HIV, hepatitis, tuberculosis, and others.
• ____ Describe the common pathogens that can be transmitted to laboratory personnel in pathology, as well as basic safety precautions to be taken in the anatomic pathology laboratory, including universal precautions for infectious agents and the role of the pathologist in institutional infection control.
• ____ Be able to recognize the limits of your abilities and know when to consult for help.
• ____ Demonstrate knowledge of the general principles and terminology for processing anatomic pathology specimens, including patient identification, gross examination, and dissection.
• ____ Be thoroughly familiar with the sampling of lesions and surgical margins in the gross room; including inking/labeling and adequacy of sampling.
• Be able to handle in a routine fashion biopsy and resection specimens of low and moderate complexity, with a degree of difficulty equal to or comparable to resections of the breast, colon, urinary bladder, prostate, larynx, lung, heart, and kidney.

• Be able to handle in a routine fashion biopsy and resection specimens of high complexity, with a degree of difficulty equal to or comparable to Whipple procedure, pelvic exenteration, eye enucleation, amputation or composite resection for tumor.

• Provide accurate and complete gross descriptions of specimens.

• Provide an adequate differential diagnosis from the gross examination of a specimen.

• Be familiar with photographic techniques for gross room specimens.

• Be familiar with different fixatives, their use, and indications: Formalin, alcohol, AZF, Glutaraldehyde, and Bouin's.

• Understand the indications for performance of frozen sections

• Be able to analyze a patient’s charts in a reasonable time during frozen sections: abstract relevant information.

• Be able to select an appropriate piece of tissue for frozen section consultation, freeze it, cut it, stain it with hematoxylin and eosin and Diff-Quick® and coverslip representative sections.

• Describe precautions to be taken against infectious and radioactive hazards in the handling of fresh tissue and during intraoperative consultations.

• Exhibit proficiency in performing special hematological studies, including touch preparations, cytospins, and blood smears.

• Exhibit proficiency in initiating routine microbiological studies, including appropriate cultures, smears, and stains, and knowledge of methods of collection and preservation, if needed.

• Interpret the majority of frozen sections in which the answer is either positive or negative, such as surgical margins (including orientation of specimen, inking of margins and ink fixation), presence of tumor, presence of metastases, or presence of ganglion cells. Be able to provide an extended differential diagnosis when appropriate.

• Be able to communicate effectively with the surgeon to obtain and transmit pertinent information during frozen sections.

• Communicate adequately with laboratory personnel to request specific studies on any given case.

• Describe the appropriate storage and disposal of tissues and fixatives, and the proper "banking" of human tissues.

• Provide a precise diagnosis for most common cases.

• Be thoroughly familiar with special histochemical stains, their indications, and interpretation, including stains for collagen fibers, elastic fibers, reticulin fibers, amyloid (congo red, crystal violet), myelin, axons, copper binding protein, PAS, mucicarmine, acid mucopolysaccharides, melanin, Jones' methenamine silver; Be familiar with the use of digestive enzymes, such as hyaluronidase, diastase. (See appendix for Histopathology Special Stain Request Form).

• Determine the general nature of a pathologic process as neoplastic or non-neoplastic.
• For the most common neoplastic lesions, using microscopic criteria, determine the benign versus malignant nature of a tumor.
• For neoplastic lesions, determine the general category of a tumor's origin (e.g., epithelial, mesenchymal, lymphoid, etc.).
• Provide a reasonable differential diagnosis for neoplastic lesions and enumerate resources available to establish a specific diagnosis.
• Be thoroughly familiar with pathological classifications of tumors (e.g., WHO, AFIP, etc.)
• Be thoroughly familiar with pathological classifications of tumors (e.g., WHO, AFIP, etc.)
• Be thoroughly familiar with staging parameters (AJCC) and histologic grading of tumors.
• Be thoroughly familiar with all elements required in the diagnosis of neoplastic and non-neoplastic diseases, including information on staging, grading, prognostic and therapeutic guidance parameters. These are included as “templates” in CoPath® and are adapted from ADASP, CAP, ASCP, and specialty societies and modified with clinician input.
• Determine general nature of non-neoplastic lesions; such as degenerative, metabolic, infectious, developmental, or inflammatory.
• Know when a case can be signed out with the material available and when additional work-up will be necessary; including additional sampling, deeper levels, electron microscopy, histochemical stains, flow cytometry, immunofluorescence, molecular diagnostics, radiologic, clinical, or laboratory correlation.
• Demonstrate knowledge of the specimens that commonly require special handling in the gross room (e.g., flow cytometry, microbiological cultures, recovery of crystals, electron microscopy, immunohistology, molecular diagnosis, tissue banking).
• Demonstrate the ability to collect and preserve appropriate tissues and fluids for immunofluorescence, electron microscopy, molecular diagnostics, flow cytometric studies and research.
• Organize surgical pathology reports to include all relevant diagnostic and prognostic information.
• Prioritize bottom line diagnoses in terms of clinical relevance.
• Provide prognostic information and be familiar with the biologic behavior of common lesions.
• Learn and understand CPT coding of specimens and special stains.
• Be thoroughly familiar with immunohistochemical panels for common diagnostic problems (e.g., small blue cell tumors, carcinoma versus mesothelioma, carcinoma versus sarcoma, differential diagnosis of spindle cell tumors, primary site of a metastatic carcinoma, differential diagnosis of melanoma, immunostains for infectious organisms, endocrine panel, germ cell tumor panel, stains for reserve cells in prostate and breast biopsies, mismatch repair proteins panel, lymphoma panel). (See appendix for Immunohistochemistry Request Form).
• Be thoroughly familiar with immunostains for prognostic and therapeutic guidance markers (e.g., EGFR, CD117, carbonic anhydrase IX, Ki67, p53, steroid receptors, etc.).
• Recognize specific bacterial infections, including Helicobacter pylori, pseudomembranous colitis, necrotizing fasciitis and others.
• Recognize common viral cytopathic effects, including herpes, CMV, RSV, polyoma, adenovirus and others.
• Recognize fungal organisms, including Aspergillus, Candida, Mucor, Histoplasma, Blastomyces, Cryptococcus and others.
• Be thoroughly familiar with histochemical stains for infectious organisms (e.g. Gram, Fite, Ziehl Neelsen, Gomori methenamine silver, periodic acid-Schiff), including indications for staining and morphologic appearance of the organism.
• Enumerate the elements of a satisfactory histological sections and stains, and to identify the possible reasons for unsatisfactory preparations.
• Know how to use micrometer (e.g. Breslow's thickness in melanomas, distance to margins, etc.).
• Be able to critically analyze information from an article in context of other available literature.
• Prepare and present cases for clinicopathologic conferences (e.g., surgery, medicine, renal, and other conferences).
• Be familiar with the ultrastructural appearance of normal organelles.
• Use of ultrastructural criteria for differential diagnosis of common infectious, neoplastic, and hereditary/metabolic diseases.
• Be thoroughly familiar with procedures used for medico-legal cases.
• Be familiar with entities that require submission of tissue samples to laboratories outside the U of M; including metabolic diseases, immunotherapy, inter-institutional protocol studies for neuroblastomas, Ewing sarcoma, melanoma, etc. and tumor chemosensitivity essays.
• Review cases with clinicians/surgeons after discussion with staff pathologist.
• Be able to interpret common "rush" transplant organ biopsies.
• Be able to present cases at conferences with clarity, completeness, and high-quality illustrations, and to reach reasonable interpretative conclusions, including literature review.
• Describe current regulations emanating from the Health Insurance Portability and Accountability Act (HIPAA) regarding protection of patient confidentiality; demonstrate knowledge of how such rules impact the pathology laboratory and means for their implementation in the handling of human tissues for diagnostic work and research.

To summarize, the items highlighted above represent a series of skills that you have to make sure that you develop or acquire during your training in Anatomic Pathology.

What follows is a description of the BASIC SCHEDULE OF ROTATIONS IN ANATOMIC PATHOLOGY; this will provide a timetable and rotation framework during which you should accomplish the above objectives. It should be evident that given the complexity of the skills and the large number if variables, acquisition of these skills can not be regimented to specific periods or places. Rather, these are skills that must be developed progressively during the training, including "core" rotations and "advanced" elective rotations in surgical pathology or in specific subspecialties.
Basic Schedule Of Rotations: Anatomic Pathology

The "CORE" anatomic pathology residency comprises 18 months. Three months are spent at the University and at each of the three affiliated institutions (HCMC, ANWH, VAMC). Three months are dedicated to cytopathology (one month each at the University, HCMC and ANWH), and one month each dedicated to forensic pathology at the Coroner's Office, neuropathology at the University and to renal pathology; the latter can be done at the University, HCMC or a combination of both institutions.

"ADVANCED ROTATIONS": Six months, they include senior elective rotations in surgical pathology or in subspecialty rotations beyond the "core". The program will attempt to accommodate individual preferences; however, availability, and individual institutional support are also taken into consideration.

(Note: Skill Level I is attached to items for which training will begin immediately on entering the AP education track; Skill Level II denotes material typically covered at a more advanced level of training in the residency program and in advanced senior elective rotations)

1. **Anatomic Pathology I** (core program: first 4 to 6 months). Includes autopsy pathology and is combined with surgical pathology training. *Skill Level I.*
2. **Anatomic Pathology, Advanced** (Core program: last 12 to 14 months and additional Senior Elective rotations: six months). *Skill Level II.*
3. **Surgical Pathology I** (Core: Three months) *Skill Level I.*
4. **Surgical Pathology II** (Core: Nine months and Advanced Senior Elective rotations: 6 months) *Skill Level II.*
5. **Cytopathology** *Skill level I* (First month).
6. **Cytopathology** *Skill Level II* (Second and third months and Cytopathology Fellowship)
7. **Neuropathology** (Core 1 month) *Skill Level I*
8. **Neuropathology** (Senior advanced elective rotations) *Skill level II*
9. **Immunohistochemistry and Electron Microscopy** (incorporated in Surgical Pathology and Autopsy). *Skill Levels I and II.*
10. **Laboratory Management** (incorporated in AP rotations). *Skill Levels I and II.*

Learning Objectives

**Anatomic Pathology I**

*Skill Level I*

1. Demonstrate competency in basic skills in anatomic pathology (see above).
2. Demonstrate competent autopsy prosection using routine techniques, completing gross examination in a period of 3 hours for uncomplicated cases or 4 hours for complicated cases.
3. Show the ability to correctly describe common abnormalities of diseased organs by gross and microscopic examination, including congenital, degenerative, inflammatory, neoplastic, and autoimmune disorders.

4. Demonstrate an ability to compose a provisional anatomic diagnostic report of autopsy findings within 24 hours of completing the postmortem examination.

5. Demonstrate an ability to compose a final autopsy report according to an approved format and within 30 days of completing the postmortem examination, including accurate and complete anatomic diagnoses, thorough gross and microscopic descriptions, and pertinent clinicopathologic correlations and mechanistic interpretations.

Recommended readings

- Stocker JT, Dehner LP (eds): Pediatric Pathology, ed 2. Philadelphia, PA, Lippincott Williams & Wilkins, 2001

Anatomic Pathology, Advanced

*Skill Level II*

1. Independently perform at least 1 adult and 1 pediatric autopsy (with the possible assistance of dieners and/or pathologist’s assistants), demonstrating:

   a) Familiarity with the laws regarding permission for autopsy and the classification of those autopsies requiring medicolegal status.
   b) Knowledge of modified autopsy techniques, such as Rokitansy-style organ removal, other en-bloc dissections, needle biopsies, aspiration of joint fluid, and procurement of spinal fluid.
   c) Ability to remove the brain and spinal cord without causing damage to either structure.
   d) Ability to remove the eyes, the epiglottis and tongue, and the inner and middle ears and to examine leg veins for thrombi, bones, and joints.
   e) Ability to identify those cases for which blood samples and vitreous eye fluid are required for biochemical tests, and to collect those samples in the proper fashion.
   f) Ability to describe those circumstances in which specimens (fluids or tissues) should be kept for toxicological studies, and knowledge of how to do so.

2. Demonstrate ability to assist Anatomic Pathology I residents in achieving basic skills in anatomic pathology (see above).

3. Take selective autopsy calls in support of Anatomic Pathology I residents.
Recommended readings

- Same as for anatomic pathology I.

Surgical Pathology I

Skill Level I

1. Demonstrate proficiency in basic anatomic pathology skills (see above).
2. Demonstrate knowledge of the standards (JCAHO, CAP) required for submitting surgical pathology specimens.
3. Demonstrate knowledge of the common and basic elements of the surgical pathology report, including:
   a) Identifiers (patient and institution)
   b) Input from the responsible pathologist
   c) Input from the responsible clinician
   d) Necessary dates and times that must be in the report
   e) Necessary clinical information
   f) Documentation of the specimens that were submitted
   g) Thorough and accurate gross description
   h) Ability to determine when a microscopic description and/or interpretation and comment are necessary, and provide such information.
4. Demonstrate competency in selecting representative tissue samples for intraoperative frozen sections, preparing the same, and staining the sections.
5. Be able to evaluate margins of tumor resection specimens using frozen sections and touch preparations.
6. Describe the procedures for reporting untoward incidents in the laboratory.
7. Demonstrate knowledge of the basic recommendations/requirements (JCAHO, CAP, regional legal requirements) pertaining to retention of pathology specimens and records.
8. Demonstrate knowledge of the basic principles of informatics in anatomic pathology, and ability to effectively utilize the local computer network.
9. Demonstrate knowledge of web-based or organization (eg, CAP, ASCP, USCAP)-related learning and CME tools in anatomic pathology.

Recommended readings

1. Demonstrate knowledge of the common situations requiring expedited processing of a pathology specimen and those that do not.
2. Demonstrate knowledge of the common indications for an intraoperative consultation.
3. Demonstrate proficiency in interpreting and reporting frozen sections within 15 minutes of receiving a specimen for that purpose in the pathology laboratory.
4. Demonstrate the ability to effectively construct a complex surgical pathology report.
5. Demonstrate knowledge of the common grading and staging systems applied to malignant neoplasms.
6. Be able to properly prepare synoptic surgical pathology reports for common malignancies.
7. Demonstrate the ability to dictate necessary amendments and/or addenda for surgical pathology reports.
8. Demonstrate knowledge of how and when to obtain external consultations in anatomic pathology and document the results appropriately.
9. Demonstrate the steps for preparing consultation reports on outside slides and/or paraffin blocks and transmitting those reports to responsible clinicians and/or referring pathologists.
10. Demonstrate the techniques for preparing intraoperative cytology smears.
11. Enumerate the indications and the limitations pertaining to examination of intraoperative frozen sections.
12. Demonstrate the ability to manage workflow in the gross room, assist junior residents with gross dissection, provide accurate gross descriptions of routine and complex specimens, use the local anatomic pathology laboratory information system, and practice safety in the pathology laboratory.
13. Explain the procedures for locating a missing specimen and resolving questions of specimen identity.
14. Be able to independently report the histopathologic aspects of routine and complex cases, including cases prepared by junior residents and/or pathology assistants, with attention to organization of diagnostic format, development of differential diagnosis, and ordering of necessary special stains and other ancillary techniques.
15. Demonstrate knowledge of quality control pertaining to histological sections and special stains, including trouble-shooting of mistakes in accessioning, labeling, and misidentification of specimens.
17. Be able to review consultation slides on referral cases with attention to pertinent clinical information, requests for additional slides or blocks, and formatting of the final consultative report.
18. Demonstrate the ability to organize, perform, and analyze a quality control review project in surgical pathology for presentation to faculty.

Recommended readings
Opportunities to Function as Consultant to Other Physicians

Residents have the responsibility, under faculty supervision, of discussing the interpretive consultative reports on surgical pathology cases and frozen sections with appropriate members of the clinical/surgical teams. Through their discussions with other clinical team members, the residents have the opportunity to directly impact patient care.

Keep in mind that communication with clinicians is a two-way street: clinicians will learn from you and you will learn from them. Never say more than you can or than you should; a pathologist's opinion is usually regarded highly by the clinical team. A pathologist who does not have the trust of other members of the team is in trouble and the patients are worse off. Trust must be developed; and if lacking, the causes must be understood and addressed.

One of the most important things that a pathologist must learn is to say "I don't know" ("I'm not sure" usually also works quite well). In such cases, explain what you see, what you understand or what you know, diagnostic possibilities and so on. This should be followed by "I'll look it up, I will ask, I need more tissue, or I will do some stains", and so on. A pathologic diagnosis made in the absence of clinical correlation is a diagnosis made in the vacuum. "No clinical information provided" is no excuse for a wrong diagnosis; you are responsible for obtaining relevant clinical information, if this has not been provided.

Opportunities to correlate morphology with ancillary studies

During the rotation the residents are exposed to laboratory correlation studies. These will include, but are not limited to, the following:

1. Correlation of fine needle aspiration studies with subsequent surgical pathology specimens.
2. Correlation of cervical PAP smear findings with cervical biopsies.
3. Correlation of ancillary studies with histology in the work-up of lymphomas and hematologic disorders.
4. Correlation of liver function tests with liver biopsies.
5. Correlation of X-rays with bone tumor biopsies.
6. Correlation of molecular diagnostics findings and histology for a variety of neoplasms.
7. Correlation of cytogenetics findings and morphology, such as HER2/neu status in breast cancer.
8. Correlation of renal function tests and renal biopsies.
9. Correlation of chest X-rays with lung biopsies.
You will realize that in many instances, correlation with ancillary studies is not only important, but critical to establish a correct diagnosis. It is your responsibility to obtain this information.

**On Call Duties**

Ordinary service activities, including grossing in and signing out cases and conferences take place from Monday to Friday. Activities that may take place during on-call time include frozen sections (nights, week-ends and holidays) and interpretation of "rush" biopsies. Frozen sections are performed and interpreted by a team that includes the resident on-call, the surgical pathology fellow on-call and the faculty on-call. "Rush" biopsies (week-ends, holidays) are signed out by the pathologist on-call. The resident is not expected to come to the department for "rush" biopsy sign out during week-ends or holidays; however, make sure that you review these cases on Monday, so that you do not miss this learning opportunity. Coordinate always with the faculty member on call. You may be paged while on call because a clinician has a question or a problem; discuss it with the pathologist on-call.

The call duties are constructed in the following fashion. The residents are on pager call every other week. The on-call periods last from 7:00 a.m. on Monday morning through the following weekend, ending at 7:00 a.m. on the subsequent Monday. While on-call, residents are supervised by a faculty member, who is available at all times, either via their office phone, pager, or home phone. On-call activities are reviewed with the residents on an on-going basis as evening and weekend calls are received. A faculty member is always present when a final diagnosis is established and at any time before, as necessary.

During the on-call period, the surgical pathology resident is responsible for coordinating clinical requests that arise during off hours, such as emergent operating room consultations, weekend rush biopsies, and questions or problems that lab personnel or clinicians may have. Always contact the pathologist on-call, use good judgment and common sense.

**Communication with Faculty**

During general working hours, on service faculty are available in person; checking the Surgical Pathology Monthly schedule will let you know individual assignments. Other faculty members are available by scheduled appointment, by phone, by pager, and most of the time, just feel free to walk into their offices. During the night, week-ends and holidays, on call faculty is continuously available either at home by phone or by pager.

**Structured Education and Management of the Surgical Pathology Laboratory**

The residents are expected to attend scheduled quality assurance, laboratory safety, and other appropriate staff meetings, as they relate to laboratory management. As opportunity provides, residents are urged to participate in CAP laboratory accreditation activities, including self-inspections and inspections of other institutions. Residents are expected to take the on-line Inspection Training Course provided by CAP.
(http://www.cap.org/apps/cap.portal?_nfpb=true&_pageLabel=home); certification of this course must be provided to the Residency Coordinator who will place in the resident's file.

**Autopsy Pathology Rotation Outline**

Prime Purpose: The prime purpose for performing an autopsy is to provide definitive information regarding a disease process which occurred during the life of the patient. The information provided may prove beneficial to the attending clinicians, to the family, and to those interested in the biology of disease. Autopsies should be performed with a sense of scientific inquiry and with specific questions in mind. The emphasis is on gaining experience in interpreting macroscopic and microscopic pathology. Residents must learn which tissues should be sampled for histology, to what extent, and what other samples should be taken e.g. for microbiological culture, cytogenetics, electron microscopy, etc. The staff pathologist will provide guidance in this regard since unnecessary tests must also be avoided. As you become more accomplished in the performance of an autopsy you will require less guidance.

- **Training Sites/Locations**
  - University of Minnesota Medical Center/East Bank Campus
    Emilian Racila, MD
  - Hennepin County Medical Center/Forensic Medicine
    Andrew Baker, MD
  - Abbott Northwestern Hospital
    John Jones, MD

- **Postgraduate Level of Residents involved in Rotation**
  PGY levels: 1-4

- **Coordinating Teaching Faculty Member**
  Rotation Director: Emilian Racila, MD e-mail: evracila@umn.edu
  Anatomic Pathology

- **Teaching Faculty Members**
  University Campus
  - Khalid Amin, MD
  - Mark Birkenbach, MD
  - Lihong Bu, MD, PhD
  - H. Brent Clark, MD, PhD
  - Molly Klein, MD
The resident's main responsibility is the performance of autopsy examinations that integrate clinical and pathological information, and result in timely and meaningful preliminary and final reports. This experience includes the initial study of the patient's chart as well as communication with the staff pathologist, attending clinicians, and anyone else relevant to a particular case. All questions should be directed to the staff pathologist prior to starting the case. The expedient and efficient conduct of the autopsy will guarantee that the resident has
more time for thinking and integrating than the physical process of the autopsy itself. There must be an organized view of the service in order that the work is done in a timely fashion while maintaining the highest level of quality. Emphasis on brevity with detail is the maxim to be followed. If an organ shows no significant abnormality, record it as such rather than giving a detailed description of its normality.

**Daily Responsibilities**

1. **Monday - Friday:**

   Each morning the resident on service (or first on the rotating list) must check with the autopsy secretary and/or with the Specimen Receiving personnel to see if a death has occurred and whether an autopsy is pending. Communication with the Pathology Assistant is essential so that the resident may begin to review the chart material, the Autopsy Consultation Request, the Authorization for a Postmortem (Autopsy) Examination, and the Report of Death Checklist. They must be able to provide the staff pathologist with a bird's-eye-view of what the case will entail. It is strongly advised that at least one clinician intimately involved with the patient's case be contacted before the autopsy is begun in order to ensure that all important aspects of the case are understood. The clinician should be asked whether s/he would like to be called when the autopsy is finished. Residents are to make certain that a valid autopsy permit has been obtained. Do not proceed until this has been accomplished. If you are not certain regarding this point, contact the attending staff pathologist and verify with him/her that you have a valid permit prior to starting the procedure.

   **Weekends and holidays:**

   Each morning on service the resident must check the Specimen Receiving pager (which they will carry) for pending autopsy pages. If the resident is paged, they must call the Specimen Receiving voice mail (directions are on the pager) to get the information concerning the pending autopsies. It is the resident's responsibility to call the staff pathologist and the autopsy technician on-call to notify them of the pending autopsy.

2. **Actual conduct of the autopsy, obtaining tissues for special studies as needed.** Photograph organs where indicated. Take samples for histology (<3 mm thick).

3. **Review of organs, tissues, and fluids with attending staff pathologist.**

4. **Prepare a preliminary anatomic diagnosis (PAD; preliminary report) within 24 hours following performance of the autopsy.**

5. **Section the formation inflation - fixed lungs.** Have lungs checked by staff pathologist. Take micro samples.

6. **Present a clear, detailed, integrated summary of the case at the 8:00 a.m., Tuesday morning Autopsy Gross Conference.**

7. **Arrange time with consulting pathologist who may need to review some of the slides prior to completion of a case.**
8. Sign-out microscopic sections with staff pathologists within 10 days of completing the gross dissection. Complete a clinical-pathological interpretation that correlates the clinical findings with the anatomic findings. Complete the final anatomic diagnosis (final report) as timely as possible.

**Reading and Pertinent Reference Material**

1. The following set of books on autopsy techniques will be loaned to you for the month you are on autopsy duty and must be returned to the Autopsy Director at the end of the month:

   d) The Medical Cause of Death. Instructions for Writing Cause of Death Statements for Deaths Due to Natural Causes. R. Hanzieck (Ed).
   e) Autopsy Performance and Reporting. G. M. Hutchins, MD. CAP

2. The following two books are recommended for additional reading:


**Goals and Learning Objectives**

1. To be aware of the historical, philosophical, political and economical considerations pertaining to the autopsy.
2. To be able to conduct a complete autopsy examination regardless of age or sex (including removal of brain and spinal cord). To learn special techniques eg. examination of the cardiac conduction system.
3. To develop integrative thinking and writing such that preliminary and final autopsy reports reflect an understanding of the relationship between structure and function and correlate the patient's symptoms and the organ pathology.
4. To learn how to individualize and innovate in the performance of the autopsy and in the preparation of tissues and reports derived from an autopsy examination.
5. To master the technique of light microscopy insofar as examination of tissue sections, selection of appropriate "special" stains and electron microscopy, distinction between autopsy tissues and surgical tissues, and recognition of abnormality in tissues of patients of age extremes.
6. To communicate verbally both formally (at Departmental and clinicopathologic conferences) and informally the significant aspects of autopsy cases. Prepare follow-up case presentations by photographing histology and reviewing the literature.

7. To develop scientific literary skills by preparing significant cases for publication in scientific and medical journals.

All of the above objectives are to be sought with the cooperation and help of staff pathologists, autopsy assistants, and interactive clinical physicians.

On-Call Duties

At home with pager unless in hospital for some other reason.

Frequency of call duties:

Staff pathologist is also on call at the same time. Case is discussed with staff pathologist before autopsy is performed by resident together with P. A. and/or technical support staff member. Pathologist checks organs with resident after autopsy is completed.

Mechanism to Insure Prompt Reliable Communication with On-Duty Faculty

Telephone/Page during the hours

Telephone/Page during on-call hours

Required Conferences/Seminars

1. Weekly (Tuesday 8:00 am) Gross Conference: Residents present history and pathology follow-up.
2. Weekly resident lecture series including two lectures on autopsy technique
3. Participate in weekly Department of Medicine Morbidity and Mortality (M & M) Meeting.

NB. Residents are encouraged to document case reports of interesting cases and analyses of large groups of autopsy cases with the help of a staff pathologist.

Description of Resident opportunities to function as a consultant to other physicians

1. Convey preliminary autopsy finding to clinicians.
2. Consult another staff pathologist for a histology opinion upon request of the checking pathologist.
3. Present cases at Department of Medicine Weekly M & M Conferences.
4. Review previous biopsy results in the light of the autopsy findings. Give feedback to pathologist who reported on the biopsy.

Pediatric Pathology and Special Techniques
A good percentage of autopsies performed are in the pediatric age group that will allow residents to gain exposure to pediatric pathology (both macroscopic and microscopic). Training will be provided in dissection of congenital heart disease (usually post-operative). In all autopsy cases appropriate use will be made of immunohistochemistry, electron microscopy, cytogenetics, etc.

**Basis for Resident Evaluation**

1. Consensus impressions of staff pathologists covering the service.
2. Ability to prepare and present cases properly for the Tuesday morning Gross Autopsy Conference.
3. Quality and timeliness of the preliminary and final autopsy reports.
4. Impressions of the Pathology Assistants and technologists insofar as the skills and willingness of residents to perform their responsibilities.

**Expectations for the Autopsy Rotation**

**First Rotation:**

At the end of the first rotation, the resident is expected to be able to accomplish the following tasks to the indicated level of proficiency (in parenthesis).

1. Be knowledgeable regarding the granting of autopsy permission and in particular, the role of the authorized designated person and the hierarchy among family signatories. (100%)
2. Be familiar with the statutes relevant to forensic cases and know how and when to contact the Hennepin County Medical Examiner 612-215-6300, or his associates. (100%)
3. Be able to review the clinical record and identify the clinical issues to be addressed by the autopsy. (90%)
4. Be able to complete the gross dissection of an uncomplicated autopsy within 3 hours with minimal technical assistance to including removal of the brain and spinal cord. (90%)
5. Be conversant with special autopsy technics (90%) to include:
   a) the handling of the heart and lungs in cases of suspected congenital heart disease,
   b) removal of the brain and spinal cord in cases of hydrocephalus,
   c) dissection of leg veins in cases of pulmonary emboli,
   d) identification and removal of parathyroids,
   e) identification of thoracic duct,
   f) en block removal of viscera,
   g) sterile sampling of heart, blood and lung in cases of suspected infection,
   h) sampling of vitreous humor,
   i) proper sampling and handling of tissue for cytogenetics, viral cultures and electron microscopy.
6. Be able to classify gross lesions as neoplastic, inflammatory or degenerative (90%) and diagnose 75% of gross lesions specifically.

7. Be able to present a case at Gross Conference in a succinct fashion to include a brief (3-5 minute) review of the clinical history without the use of notes, the logical presentation of all relevant organs, and a brief synopsis of the key clinical-morphologic correlation. (100%)

8. Be able to describe accurately all normal organs both grossly and microscopically without recourse to a protocol to include the range of normal weights for adults and full term newborns (100%); be able to describe abnormal lesions in a logical fashion such that a third party can properly identify the lesion 90% of the time from the description alone.

9. Be able to formulate a provisional list of pathologic diagnoses - beginning with the underlying cause of death with subsequent diagnoses following a logical pathogenetic sequence. (90%)

10. Be able to complete all cases with the possible exception of the central nervous system within two weeks of the gross dissection. (90%)

11. Be able to develop a final comment that represents more than a rehash of the autopsy and/or clinical findings, one that educates the reader and shows evidence of an understanding of the relevant literature. (75%)

**Second Rotation:**

At the end of the second rotation, the resident is expected to be able to accomplish the above tasks, to a greater level of efficiency as follows.

1. Autopsy permission. (100%)
2. Forensic cases. (100%)
3. Identification of clinical issues. (95%)
4. Gross dissection within 3 hours. (96%)
5. Special techniques. (100%)
6. Classification of lesions specifically. (90%)
7. Presentation at Gross Conference. (100%)
8. Description of normal (100%) and abnormal (95%)
9. Provisional pathology diagnosis. (95%)
10. Completion in 2 weeks. (96%)
11. Final comment. (90%)

In addition, the resident should be able to:

1. Present the salient features of a case to house staff and faculty of another department after appropriate faculty coaching (95%)
2. Write up an interesting case or group of cases for presentation at a national or regional meeting (50%)
3. Review a case with a group of second year medical students or first year anatomy students to emphasize morphologic abnormalities and relevant clinical-morphologic correlations (95%)

Third Rotation:

At the end of the third rotation, the resident should be able to accomplish the above tasks to a 100% level of proficiency. In addition, the resident should be able to:

1. Organize and conduct the Gross Conference.
2. Instruct a beginning resident or post-sophomore student fellow on:
   a) the mechanics of gross dissection
   b) the construction of the provisional pathology diagnosis
   c) the salient features of a world class final comment
3. Critique a presentation by a less experienced resident.

Attachments:

AP Pathology Conference Schedule