

Penrose-St. Francis Health Services Pathology Residency Manual

Program Overview

The Penrose Hospital Department of Pathology has had a Residency Training Program in pathology since 1947. Initially two years of anatomic pathology training, the program expanded in 1959 to combined anatomic and clinical pathology.

The Penrose-St. Francis Health Services (PSFHS) Pathology Residency is managed by the Centura Health Physician Group. It consists of four years of training in Anatomic and Clinical Pathology to prepare the resident for certification by the American Board of Pathology. The program is focused on core rotations in AP and CP with elective time for focusing on sub-specialty areas. Core rotations are distributed throughout the four years to facilitate recognition of interests the resident may wish to pursue via electives and/or post-residency fellowship. The program prepares graduates for both private and academic practice settings.

Goals and Objectives

PSFHS provides an educational program with guidance and supervision of its residents, facilitating their professional and personal development while ensuring safe and appropriate patient care. Upon successful completion of the training program, residents will demonstrate competence to enter practice without direct supervision, be capable of passing their ABP certification examinations, and meet requirements to practice pathology in the United States.

Sponsoring Institution

PSFHS conducts Graduate Medical Education (GME) training programs in accordance with the policies and requirements of the Accreditation Council for Graduate Medical Education (ACGME). The ACGME is a private, non-profit council that evaluates and accredits medical residency programs in the United States. The mission of the ACGME is to improve the quality of health care in the United States by ensuring and improving the quality of GME for physicians in training. The ACGME established national standards for GME by which it approves and continually assesses the educational programs under its purview.

Accreditation for Patient Care

Institutions sponsoring or participating in ACGME-accredited programs should be accredited by the Joint Commission if such institutions are eligible. PSFHS is accredited by the Joint Commission.

Institutional Commitment to GME

PSFHS is committed to providing the essential leadership, organizational structure, and resources to support GME. A written statement, reviewed and signed by representatives of PSFHS administration and GME leadership, is maintained and documents PSFHS commitment to provide the necessary educational, financial, and human resources to support GME.

Educational Administration

The Director of Medical Education (DME) is the Designated Institutional Official (DIO) for liaison with the ACGME. The DME and GMEC collaborate to develop and lead an organized administrative system to oversee all ACGME-accredited GME programs sponsored by PSFHS. The GMEC also adjudicates all due process issues for residents.

Master Affiliation Agreements

Per ACGME guidelines, a master affiliation agreement is maintained with all major participating institutions where PSFHS residents rotate, such as the El Paso County Coroner's Office and Children's Hospital Colorado. This agreement defines the relationship between the participating institution and PSFHS GME program and serves as the legal agreement for purposes of malpractice liability. The PSFHS GME office and Program Director (PD) establish master affiliation agreements; these must be approved by the GMEC before residents may rotate.

Program Letters of Agreement

When resident education occurs at a participating site, PSFHS continues to have responsibility for the quality of the educational experience and retains authority over resident activities. ACGME guidelines require that residency training programs have established Program Letters of Agreement with their participating sites in compliance with the specialty's program requirements. These agreements are in addition to the Master Affiliation Agreements. The PLA should identify the faculty who will assume both educational and supervisory responsibilities for residents; specify their responsibilities for teaching, supervision, and formal evaluation of residents; specify the content of the educational experience; and state the policies and procedures that will govern resident education during the assignment. A PLA should be no older than 5 years and are to be signed by the PD and the director at the participating site. The PD is responsible for preparing and assuring the currency of PLAs.

Work Environment

The PSFHS system will provide services that ensure an appropriate educational environment while at the same time accomplishing the most appropriate and cost-effective patient care. These items include meal service, parking, security, office space, and appropriate office and ancillary service support. Concerns about the work environment may be communicated confidentially to the PD or the GMEC. The PD will review all faculty and approve their position prior to participation in residency program education. The PD will have the authority to remove faculty and supervising residents from education and /or interactions in the learning environment if necessary to maintain an appropriate work environment. Lactation facilities will be made available in the department when necessary. Call rooms are available for any resident required to stay overnight during call.

Patient Safety

The PSFHS system and residency program will strive to prepare residents to provide the highest level of clinical care with a continuous focus on safety. The hospital, residency staff and residents will work with other health care professionals to achieve organizational patient safety goals. Adequate supervision of all resident activities is essential to ensure patient safety. Formal

educational activities to promote patient safety will be presented. Residents will be educated on reporting, investigating and following-up on adverse events. Residents will attend the laboratory personnel's daily safety huddle to get experience and information on daily safety related issues affecting the laboratory. Residents will be assigned to hospital-wide safety teams and participate on any projects that these teams begin. Finally, the residents will get didactics from hospital staff regarding Quality Improvement. Residents will participate in on-going hospital and laboratory quality improvement projects with guidance from the QI staff.

Informatics

Computers provide ancillary tools that are critically important in the medical education process. The PSFHS Pathology Residency has no formal informatics rotation; however, computers are an integral part of pathology practice at PSFHS and are used to proficiently file, sort, search, and report data. The pathology resident will be proficient with the use of the laboratory computers to assist with the care of patients, and learn to utilize computers in order to access educational material. They will be trained to use the digital photomicroscope and ancillary software to help create quality photos for conferences. They are expected to become familiar with regulatory entities related to medical informatics (CAP, FDA, HIPAA). Additional projects or in depth study of informatics related issues (including topics such as computer basics, hardware, software, networks, internet based technologies, in-depth LIS functions, data standards, software development and/or testing, and evaluation and implementation of new systems) will be encouraged for the interested resident.

Residency Reduction or Closure

If the decision is made to reduce the size or to close an ACGME-accredited residency program, PSFHS will notify each resident in writing as soon as possible. Such notification shall include, at a minimum, the date of the expected reduction or closure. PSFHS will either allow residents already in the program to complete their education or assist the residents in enrolling in an ACGME-accredited program in which they can continue their education.

Social Media

Residents should recognize that content posted on the internet must be assumed to be permanent, public, and even if deleted may still exist in an archive, database, or download format. Information may prove to be damaging to an individual's reputation among colleagues and patients and may affect future relationships and employment. Privacy settings are relatively easy to circumvent and should not be relied upon to protect postings from public disclosure. Respect for patient confidentiality is essential, as federal and state confidentiality laws apply to social media sites. Even de-identified discussion of patients and specific medical cases on social media sites should be avoided. Proper use of social media and of the internet is a key professionalism issue. Therefore, photographs are permitted exclusively for educational purposes. Any violation or concern brought forth regarding a resident's use of the internet and/or social media will fall under the purview of the GME in conjunction with the program director.

Resident Eligibility and Selection

Eligible applicants for residency training in the PSFHS system include graduates of medical schools in the United States and Canada accredited by the Liaison Committee on Medical Education or the American Osteopathic Association. Graduates of medical schools outside the U.S. and Canada are also eligible if they have a full and unrestricted license to practice medicine in a U.S. licensing jurisdiction. In the latter situation, the applicant must be eligible for a Colorado training medical license at the end of the first year of graduate medical education training within the PSFHS system.

The PSFHS system through the Pathology department will provide each resident applicant invited for an interview with a written summary of the terms, conditions, and benefits of employment.

Selection of resident candidates from among eligible applicants will be based on preparedness, ability, aptitude, academic credentials, communication skills, and personal qualities such as motivation and integrity. The residency selection process will not discriminate with regard to sex, race, age, religion, color, national origin, disability, veteran status or any other applicable status protected by law.

Financial Support and Benefits for Residents

Resident salaries are established by the PSFHS system. Salaries are derived from a review of residency training programs within Centura and throughout the United States. Additional benefits provided to residents in the PSFHS system include paid time off, professional leave and one-time reimbursement for medical education, annual book allowance, professional liability insurance, and health insurance. Each resident is covered by the PSFHS liability insurance; this policy is underwritten by First Initiatives Insurance, Ltd and the premium is paid by PSFHS. The coverage limits are 10 million dollars per occurrence and 85 million dollars per aggregate.

Agreement of Appointment

PSFHS will provide residents with a written contract outlining the terms and conditions of their appointment to an educational program. This contract will be in effect, unless otherwise stipulated, for the duration of the resident's training program.

Grievance Procedures

The PD, GMEC, and Human Resources Department address resident grievances. Residents are not medical staff members, and their pathway of grievance differs from that of medical staff members. Residents should initially direct grievances to the PD. The PD or resident may request involvement of the GMEC or Human Resources Department as appropriate. The former will primarily address grievances related to the educational program and the latter will primarily address grievances related to hospital policy and employment policy. Fairness and confidentiality will be maintained to the extent practical.

Remediation and Extension of Residency Due to Academic Deficiencies

Residency remediation and/or extension can occur for various reasons. Remediation or extension of residency may occur with or without academic probation.

A resident who is in disagreement with a residency remediation or extension may follow the Centura Policy on Alternative Dispute Resolution.

A medical leave may necessitate an extension of residency training to meet American Board of Pathology training requirements. The expected graduation date will be updated in a memo that is signed by the resident and the Program Director and placed in the resident file.

The Program Director and/or the faculty may have concern that a resident needs additional supervision or that the resident is not ready to safely assume the roles and responsibilities of the next PGY level. The concern will be discussed with the faculty and the Program Director at a faculty meeting and a decision will be made regarding the next appropriate step. If there is concern about safe advancement to the next PGY level, residency training may be extended to accommodate the additional time needed for evaluation and remediation. The resident will be notified immediately of a residency extension. A Remediation Plan will be started as per the following guidelines:

- Identify the specific concern(s) or issue(s) that need to be improved.
- Define expectations to be achieved, along with clear goals and objectives.
- Detail how the goals/objectives will be evaluated, assessed, or measured and who will be involved in reviewing the resident's performance and progress.
- Establish a clear and reasonable timeline for completion of the remediation as well as the frequency (or specific dates) for any progress meetings with the Program Director.
- Clearly detail the consequences for not successfully completing the remediation (including possible dismissal or nonrenewal of contract).
- Assist the resident in identifying support networks (employee health assistance programs, faculty or resident mentor, resident ombudsperson, study aids or courses, etc.).
- Put the remediation plan in writing (signed by the resident and Program Director) and document (in writing) the initial and all subsequent progress meetings with the resident and maintain all documents and evaluations in the resident's permanent file.
- Discuss with the resident any future consequences of verbal or written warnings, incident reports, documentation of poor performance, remediation, probation, or dismissal.

Dismissal

Grounds for dismissal include but are not limited to: documented professional inadequacy; dereliction of responsibility; failure to comply with hospital and/or medical staff rules, regulations, and standards of conduct; willful negligence, misrepresentation, or falsification of laboratory work or results; failure to comply with remediation; commission of any act or acts of "unprofessional conduct" as defined in the Colorado Medical Practices Act; and failure to comply with probation.

If the PD and/or CCC conclude that dismissal should be considered, the GMEC will convene to discuss and review all relevant information. The GMEC or PD will notify the resident of the proposed dismissal and provide the resident the opportunity to appear before the GMEC to

present their case and answer questions in a hearing format described below. The resident must request to appear before the GMEC within one week from date the proposed dismissal is delivered. If the resident elects to appear, a hearing will be scheduled within a reasonable timeframe, typically within 10 days of the resident's request to appear. If the resident does not request to appear, the right to a hearing is waived, and dismissal shall be final.

Following receipt of a timely request for hearing, the Chair of the GMEC shall appoint an impartial, ad hoc hearing panel of 3 members of the GMEC of PSFHS ("the Panel"), who have not otherwise participated in any review of the event or events leading to the dismissal of the resident. The Program Director will be a non-voting Panel member in this process. The GMEC Chair may, if reasonable grounds exist, appoint Panel members from the medical staff who are outside of GMEC. Unless otherwise agreed with the resident, the Panel shall commence a hearing within two weeks of the date of filing the request for hearing. The Chair shall provide the resident with at least one week's notice of the time and place of the hearing.

The GMEC Chair shall appoint one of the Panel members as the Chairperson of the Panel, who shall control the proceedings, rule on motions in evidence and maintain decorum in the proceedings. The resident shall have the right at the hearing to be accompanied by an attorney or other advisor and shall have the right to cross-examine witnesses supporting termination, the right to present evidence, and to provide a written summary argument. The Panel Chairperson may consider, but is not bound by, any rules of evidence, except relevance and fairness. Following the completion of the hearing, the Panel shall meet, prepare, and tender to the GMEC Chair, within one week of the hearing, a written decision advising whether or not the grounds for the dismissal of the resident are supported by substantial evidence and are not arbitrary and capricious. PSFHS has the burden of providing substantial evidence to support the grounds for dismissal.

The Panel shall maintain a record of the hearing by either a shorthand reporter or a tape recording. The party requesting a shorthand recorder shall bear the expense of the shorthand reporter's presence at the hearing. Any party requesting preparation of the transcript of the proceedings shall bear the expense of the preparation of that document. The Panel may, but shall not be required to, order that oral evidence be taken only on oath or affirmation.

The failure, without good cause, of the resident to appear and proceed at the noticed hearing shall be deemed to constitute voluntary acceptance of the recommendation or actions involved, which shall become final and effective immediately. The Chairperson, acting on behalf of the Panel, may permit postponements and extensions of time beyond the times expressly permitted in this plan on a showing of good cause.

The GMEC Chair or PD shall provide a copy of the Panel's report to the resident, and the decision of the Panel shall be final, subject to the following right to appeal.

Appeal

Within ten (10) days after receipt of decision of the Panel, either party to the hearing may request in writing an appellate review by a board of appeals which is composed of, at a minimum, the DIO, the PSFHS Chief Medical Officer, and Senior Site Administration of the

PSFHS system or their designee(s). The PD will not be a member of this appeals board. The request for appellate review shall be served upon the PD, who will notify the appeals board. The written request for review shall include a brief statement as to the reason for the appeal. The grounds for appeal for the hearing shall be (1) the substantial failure of the Panel to comply with the procedures required by this plan and the conduct of hearings and in rendering its decision so as to deny fair procedure; and/or (2) the decision was not supported by substantial evidence.

Each party shall have the right to submit a written statement in support of its position on appeal. There shall be no right or personal appearance by either party before the appeals board. The appeals board may affirm, modify, or reverse the decision of the Panel, or take the matter under advisement for further review and recommendations. Within ten (10) days after the conclusion of the review proceedings, the appeals board shall render a final decision in writing and shall deliver copies of it to all parties in person or by certified or registered mail. The appeals board decision is final.

Resident's wellness

The residency program in conjunction with PSFHS will promote the wellness of all residents and provide resiliency education. The program will monitor for physician wellness, burnout, depression, and other serious conditions related to stress in the resident. A multi-prong approach to wellness will be implemented. Didactics directed to physician resiliency and burnout will be given. With our small program, most residents align themselves with a staff member who acts as a mentor. The DIO and program director have an open-door policy. The residents are encouraged to approach the program director with any professional or personal problems. Throughout the year, the residents and staff get together socially with their spouses to encourage an extended support system for the resident. The wellness of the resident will be monitored biannually by administering the Physician Well Being Index Survey. Intervention and possible referral to counseling will occur for any resident scoring >5 on the survey.

Mentor Program

Mentorship has been shown to play a crucial role in the academic success, professional growth and development of a resident. To that end, we have a near-peer mentor program within our residency. We pair 1st with 3rd year and 2nd with 4th year residents. The mentor residents will have an "open-door" policy and schedule meetings to address any stresses or issues the mentee is experiencing. The mentor will give timely and constructive feedback to the mentee. If needed, the mentor can assist with career advice and networking. The program director is to oversee the mentor program. If necessary, a staff physician will be assigned to assist the near-peer mentor pair.

Counseling and Support Services

PSFHS policies applicable to hospital employees will be followed for issues of behavior or substance abuse. Residents will have access to the Employee Assistance Program, which provides a wide range of in-house counseling and support services. These can be accessed either directly by the resident or through referral by the PD and Chairman of the department. Residents also have free access to the Colorado Physician Health Program. This confidential service for residents offers services to assist with emotional, psychological or medical problems that residents may incur during training.

Duty Hours

The educational goals of the program and learning objectives of the residents must not be compromised by excessive reliance on residents to fulfill service obligations. Duty hours reflect the fact that responsibilities for continuing patient care are not automatically discharged at any given hour of the day or any particular day of the week.

Duty hours are defined as all clinical and academic activities related to the residency program, administrative duties related to patient care, the provision for transfer of patient care, time spent in-house during call activities, and scheduled academic activities such as conferences. Duty hours do not include reading and preparation spent away from the duty site.

Duty hours must be limited to 80 hours per week, averaged over a four week period, inclusive of all in-house call activities. Residents must be provided with 1 day in 7 free from all educational and clinical responsibilities, averaged over a four week period, inclusive of call. One day is defined as one continuous 24-hour period free from all clinical, educational, and administrative activities. Adequate time for rest and personal activities must be provided. This should consist of a 10-hour time period provided between all daily duty periods and after in house call.

PSFHS supports the ACGME duty hour limitations and will not permit exceptions to the 80-hour limit. The PD will monitor resident call schedules and duty hours and make changes necessary to address excessive service demands and/or resident fatigue. Duty hour compliance will be reported to the GMEC quarterly and the medical executive committee of the PSFHS annually, or more frequently if necessary.

Moonlighting

Moonlighting consists of professional and patient care activities that are external to the educational program. Residents are not required to engage in moonlighting. Residents must obtain prospective, written permission to moonlight from the PD that is made part of the resident's file. The program director will monitor the residents' performance and adverse effects may lead to withdrawal of permission. Moonlighting that occurs within the residency program and/or the PSFHS (internal moonlighting) will be counted toward the 80-hour weekly limit on duty hours.

Core Competencies

Penrose-St. Francis Health Services (PSFHS) Pathology residency abides by the ACGME six core competencies across all areas of pathology. These embody specific knowledge, skills, behaviors, and attitudes that are required of residents to complete Graduate Medical Education (GME) programs. They are universal across all medical disciplines. Each resident is evaluated and guided on his/her progress in each of the individual competencies listed below.

Patient Care

Residents must be able to provide patient care that is compassionate, appropriate and effective for the treatment of health problems and the promotion of health. Examples in the field of pathology include:

- Developing a diagnostic plan based on specific clinical questions and relevant clinical and pathologic information.
- Functioning as part of a multidisciplinary healthcare team in developing a therapeutic plan.
- Serving as a consultant in a multidisciplinary conference.
- Gathering essential and accurate information about patients using all relevant available modalities.
- Acting as a skilled consultant to other clinicians.

Medical Knowledge

Residents must be able to demonstrate knowledge of established and evolving biomedical, clinical, epidemiological, and social-behavioral sciences as well as the application of this knowledge to patient care. Examples in the field of pathology include:

- Using and evaluating evidence-based information in evaluating and presenting findings.
- Critically reviewing peer-reviewed journals for use in patient care.
- Maintaining a knowledge base in the basic and clinical sciences that provides for the necessary consultative role of a pathologist.
- Acquiring sufficient knowledge to determine clinically optimal yet cost-effective diagnostic and therapeutic strategies.
- Defining testing turnaround time and in-house vs referral diagnostic testing strategies.
- Understanding statistical laboratory methods and application to quality control (QC) and quality assurance.
- Demonstrating awareness and understanding of general and test-specific standards for method development and evaluation, such as those promulgated by the Clinical Laboratory Standards Institute, CAP, and similar organizations.
- Demonstrating awareness and understanding of proficiency programs, such as those provided by CAP and similar organizations.
- Demonstrating knowledge of the principles of clinical research design, implementation, and interpretation. Understand the various levels of evidence in medicine and their translation into evidence-based practice.
- Designation of study design and research methodologies and parameters of clinical utility for the implementation and continuing use of new evidence-based analytes.

Practice-Based Learning and Improvement

Residents must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence and to continuously improve patient care based on constant self-evaluation and lifelong learning. Examples in the field of pathology include:

- Maintaining a self-awareness of one's progress and track across the Milestones.
- Expressing a commitment to lifelong learning through seeking knowledge of evidence-based medicine.
- Critically appraising the scientific literature..
- Effectively incorporating information technology, to optimize and support patient care decisions.
- Developing personal strategies for the identification and remediation of own gaps in medical knowledge.
- Using laboratory problems and clinical inquiries to identify process improvements to increase patient safety.
- Maintaining awareness of continual competency assessment for both pathologists as well as laboratory personnel.
- Using proficiency programs to improve laboratory practices.

Interpersonal and Communication Skills

Residents must be able to demonstrate interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families and health professionals. Examples in the field of pathology include:

- Demonstrating the ability to write an articulate, legible, and comprehensive yet concise consultative role.
- Providing clear and informative pathology reports including a precise diagnosis whenever possible, a differential diagnosis when appropriate, and recommended follow-up or additional studies as appropriate.
- Demonstrating a direct communication line for the referring physician or appropriate clinical personnel when interpretation of a laboratory assay reveals an urgent, critical, or unexpected finding and document this communication in an appropriate fashion.
- Conducting him/herself at presentations and multidisciplinary conferences in a focused, clear, and concise manner.
- Demonstrating an ability to communicate the service role of the pathologist to other clinicians as well as to other healthcare personnel and administrators.
- Navigating multiple communication modes effectively including: listening, nonverbal, explanatory, questioning, face-to-face, telephone, email, and written as appropriate.
- Demonstrating the necessary skills in obtaining informed consent, including effective communication to patients about procedures, alternative approaches, and possible complications.
- Interacting with medical technologists in the day-to-day laboratory environment.
- Demonstrating the ability to educate non-pathology clinicians and other healthcare workers, including pharmacists, nurses, residents, medical students, and others.

Professionalism

Residents must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles. Examples in the field of pathology include:

- Demonstrating compassion in the care of patients, their families, and the faculty and physicians caring for them.
- Interacting with all in the workplace without discriminating on the basis of religious, ethnic, sexual, or educational differences.
- Demonstrating consistently positive work habits, including punctuality, dependability, and a professional appearance.
- Demonstrating a responsiveness to the needs of patients and society that supersedes one's own self-interest.
- Maintaining the highest standards of patient confidentiality with all information transmitted both during and outside of a patient encounter.
- Staying current in one's knowledge of regulatory issues pertaining to the use of human subjects in research.
- Staying committed to excellence and ongoing professional development.
- Striving for high standards in interpersonal skills as a professional member of a multidisciplinary healthcare team.

Systems-Based Practice

Residents must demonstrate an awareness of the larger context and system of healthcare, as well as the ability to call effective on other resources in the system to provide optimal healthcare. Examples in the field of pathology include:

- Demonstrating an understanding of the role of the pathologist in the healthcare system.
- Recognizing resource utilization and management in diagnostic plans as part of the best practices approach to patient care in collaboration with other clinicians.
- Maintaining a working knowledge of basic healthcare reimbursement methods.
- Demonstrate knowledge of the laboratory regulatory environment, including licensing authorities; federal, state, and local public health rules and regulations; regulatory agencies such as the Centers for Medicare and Medicaid Services and the US Food and Drug Administration; and accrediting agencies such as the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), CAP.
- Striving for an understanding of accreditation agencies of Graduate Medical Education (ACGME).
- Seeking to continually improve patient safety as they relate to clinical laboratory testing at all level.

Supervision and Graduated Responsibility

PSFHS will ensure appropriate supervision and increasing responsibility of residents commensurate with each resident's education, ability, and experience. The teaching staff will determine the level of responsibility for each resident. Faculty schedules will be structured to ensure continuous resident supervision and consultation during all duty hours, including on-call. PSFHS Pathology residents have the following graduated responsibilities:

PGY-1 Junior Residents

PGY-1 residents are primarily responsible for the care of patients under the guidance of the attending physician and senior residents. They should generally be the point of first contact when questions or concerns arise. However, when questions or concerns persist, supervising residents and/or the attending physician should be contacted in a timely fashion. PGY-1 residents are initially directly supervised and when merited will progress to being indirectly supervised with direct supervision available. Direct supervision will apply to at least the first three autopsies, gross dissections of any given specimen, frozen section preparations, and FNA adequacies. Before the PGY-1 resident takes weekend grossing duties with indirect supervision, they must complete the gross room checklist with competency which will be evaluated directly by a staff physician.

PGY-2 Intermediate Residents

Intermediate residents may be directly or indirectly supervised by an attending physician or senior resident but will provide all services under supervision. They may supervise PGY-1 residents and/or medical students; however, the attending physician is ultimately responsible for the care of the patient.

PGY-3 and PGY-4 Senior Residents

Senior residents may be directly or indirectly supervised. They may provide direct patient care, supervisory care or consultative services, with progressive graded responsibilities as merited. They must provide all services ultimately under the supervision of an attending physician. Senior residents should serve in a supervisory role of medical students and residents in recognition of their progress towards independence, as appropriate to the needs of each patient and the skills of the senior resident; however, the attending physician is ultimately responsible for the care of the patient.

Promotion and Graduation Requirements

Promotion of PSFHS Pathology residents to the next PGY level of responsibility and salary is based upon rotation evaluations, in-training examinations, 360 degree evaluations, and any other pertinent information. In conjunction with the Program Director, the CCC makes recommendations as to resident promotion. Every effort will be made to notify a resident if their promotion is potentially delayed. Promotional criteria include, but are not limited to, the items detailed below:

For promotion to PGY-2:

- 'Satisfactory' status for promotion as determined by the CCC
- Sit for USMLE Step III
- Conference attendance $\geq 70\%$
- Complete the following rotations *during PGY1*: Blood Banking (1 month), Cytology (1 month), Hematology (1 months), and Surgical Pathology (3 months)
- Completion of 48 weeks of training

For promotion to PGY-3:

- 'Satisfactory' status for promotion as determined by the CCC
- Pass USMLE Step III
- Conference attendance $\geq 70\%$
- Complete the following rotations *during PGY2*: Cytology (1 months), Hematology (1 month), and Surgical Pathology (2 months)
- Completion of 96 weeks of training

For promotion to PGY-4:

- 'Satisfactory' status for promotion as determined by the CCC
- Conference attendance $\geq 70\%$
- Complete the following rotations *during PGY3*: Cytology (1 month), Hematology (1 month), and Surgical Pathology (2 months)
- Completion of 144 weeks of training

For graduation:

- 'Satisfactory' status for graduation and board certification as determined by the CCC
- Conference attendance $\geq 70\%$
- Complete the following rotations *during PGY4*: Hematology (1 month) and Surgical Pathology (1 month)
- Completion of Grand Rounds Presentation
- Completion 192 weeks of training
- Meet requirements to sit for board certification set by the American Board of Pathology (attendance, autopsy/cytology/surgical case numbers, etc)

Graduate Medical Education Committee (GMEC)

GMEC Composition and Meetings

Graduate medical education programs within PSFHS are under the jurisdiction of the GMEC of the hospital system. This committee has the responsibility of monitoring and advising on all aspects of residency education. Membership of the committee includes the director of the residency-training program, other faculty, residents, the director of medical education for the hospital system, and the Chief Medical Officer. The committee will meet quarterly with minutes kept by the residency coordinator. Meetings may be convened at any time to address specific problems. GMEC responsibilities include, but are not limited to:

- Establishment of general policies that affect all residency programs regarding the quality of education and the work environment of residency training.
- Determination and recommendation of appropriate and equitable residency salaries, including benefits and support services.
- Establishment of formal policies and procedures governing resident duty hours.
- Assure provision of appropriate supervision for all residents consistent with proper patient care, the educational needs of residents, and the applicable program requirements.
- Assure there is curriculum and an evaluation system to ensure that residents demonstrate achievement of the six general competencies as defined in each set of program requirements.
- Establishment and implementation of institutional guidelines and policies for the selection, evaluation, promotion, and dismissal of residents.
- Regularly review all ACGME program accreditation letters and monitor action plans for the correction of concerns and areas of noncompliance.
- Regularly review the sponsoring institution's letter of report from the internal review committee and develop and monitor action plans for the correction of concerns and areas of noncompliance.
- Review and approve prior to submission to the ACGME the following:
 - Changes in resident complement.
 - Major changes in program structure or length of training.
 - Additions and deletions of participating institutions used in a program.
 - Appointments of new program directors.
 - Progress reports requested by any review committee.
 - Responses to all proposed adverse actions.
 - Requests for increases or any change in resident duty hours.
 - Requests for inactive status or to reactivate a program.
 - Requests for an appeal of an adverse action.
 - Appeal presentation to a board of appeal or the ACGME.
- Monitor the pathology residency training program to ensure that it is in compliance with requirements established by the ACGME and its review committees and institutional policies. Key to this effort is the Program Director's annual, systematic evaluation of the educational effectiveness of his/her program. The program must monitor and track each of the following areas:
 - Resident performance

- Faculty development.
- Graduate performance, including performance of program graduates on the certification examination.
- Program quality, specifically:
 - Residents and faculty must have the opportunity to evaluate the program confidentially and in writing at least annually.
 - The program must use the results of residents' assessments of the program together with other program evaluation results to improve the program.

GMEC Representation

Typically, Residency Review Committees (RRCs)/ Program Evaluation Committees (PEC) require that representative program personnel (i.e., at least the Program Director, representative faculty, and one resident) must be organized to review program goals and objectives, and the effectiveness with which they are achieved. Systemic evaluation of the curriculum will be done. This group must conduct a formal, documented meeting at least annually for this purpose. In the evaluation process, the group must take into consideration written comments from the faculty and the residents' annual confidential written evaluations. The volume/variety of case material, sufficiency of resident supervision and resident performance on the yearly ASCP RISE and American Board of Pathology examination will be reviewed. If deficiencies are found, the group should prepare an explicit plan of action, which should be approved by the faculty and documented in the minutes of the meeting. The minutes of the meeting will be forwarded to the DIO for review. The DIO shall review the program director's report and monitor areas of noncompliance or that need improvement until the program resolves them. Institutional issues and problems common to multiple programs will be forwarded to the GMEC for review.

While most RRCs/PECs expect that at least one resident will take part in program review, many RRCs/PECs allow the inclusion of other key personnel beyond those specifically required by the RRC/PEC. For example, nurses, administrators, or faculty from other clinical departments who interact with and educate your residents may be included.

Based on the above consider inviting the following personnel to attend meetings at which the improvements identified through the annual program review are discussed: The Director of Medical Education, faculty from an external site that is used for training, administrative personnel who have contact with residents, a representative from PSF's Performance Improvement Council, a representative from PSF's Patient Representative Office, a representative from PSF's Quality Services Division.

Program Evaluation Committee

The program evaluation committee is composed of at least two program faculty members and at least one resident. The PEC will help plan, develop and implement educational activities for the program. Annually, the PEC will review the curriculum goals and objectives and make recommendations for any changes. The PEC will address any areas of non-compliance with ACGME standards. The PEC will review annual evaluations of faculty and residents. The PEC will follow and track resident performance, faculty development, graduation performance, and board passing rates. Based upon annual, confidential program and faculty evaluations, the

PEC will make recommendations for improvement to program curriculum and faculty teaching. The PEC will review the previous year's action plans and see where changes have progressed and reevaluate the changes for success. The PEC will prepare a written plan of action to improve performance in any areas of the curriculum that are felt to be lacking. Definitive ways to measure and monitor the changes will be delineated. Possible ways to measure improvement will be based upon biannual milestone evaluations, RISE scores, board passing performance, and evaluations by faculty and residents. The action plan will be approved by the teaching faculty and documented in the meeting minutes.

Clinical Competency Committee

The Clinical Competency Committee (CCC) is a group of pathologists and laboratory employees appointed to confidentially review each resident's progress biannually and make recommendations to the program director on milestone reporting data for each resident. They also serve as an early warning system to identify residents requiring remediation and to evaluate and make recommendations for all other trainees regarding promotion.

The CCC serves in an advisory role to the PD in preparing and assuring the reporting of Milestone recommendations to the program director on milestone reporting data for each resident. The CCC also serves to make recommendations requiring remediation and to evaluate and make recommendations for all other trainees regarding promotion, remediation, and dismissal.

Twice yearly, the PD enters Milestone data on each resident to the ACGME via the Milestones tracking system (ADS). Annually, the residents are each asked to evaluate themselves across the milestones.

ACGME Outcome Project

It is incumbent upon educational programs to demonstrate their effectiveness and to be held accountable for their work. The ACGME Outcome Project is dedicated to achieving that purpose.

The Outcome Project is a long-term initiative by which the ACGME is increasing emphasis on educational outcomes in the accreditation of residency education programs. The ACGME initiated the Outcome Project in keeping with its mission to ensure and improve the quality of GME. Rather than concentrating only on assessment of a program's potential to educate through its compliance with existing requirements, the future for GME accreditation envisioned by the ACGME Outcome Project emphasizes a program's actual accomplishments through assessment of program outcomes. The ACGME's emphasis on educational outcomes assessment is reflected in changes to Program and Institutional Requirements that require programs to:

- Identify learning objectives related to the ACGME's general competencies.
- Use increasingly more useful, reliable, and valid methods of assessing residents' attainment of these competency-based objectives.

- Use outcome data to facilitate continuous improvement of both resident and residency program performance.

Another major activity of the Outcome Project is the identification and development of measurement tools for programs to use as part of their overall evaluation system. The ACGME and the American Board of Medical Specialties (ABMS) have collaborated to develop the *Assessment Toolbox*, which includes descriptions and examples of methods and instruments recommended for use by programs as they assess the outcomes of their educational efforts.

The *Toolbox of Assessment Methods* may be accessed at URL:

<http://www.acgme.org/Outcome/assess/Toolbox.pdf>. Then take time to review the

Competencies/Outcome Project RSVP webpage:

<http://www.acgme.org/outcome/implement/rsvp.asp>.

The ACGME has developed a web-based learning module entitled “*Educating Physicians for the 21st Century*” that is designed to provide program directors and faculty with foundational information on the Outcome Project. It contains additional links, resources, and practical examples to help programs implement the competencies, implement an assessment system, develop an ACGME competency-based curriculum, and develop a program evaluation plan.

This educational resource may be accessed at the following website:

http://www.acgme.org/outcome/e-learn/e_powerpoint.asp.

The Outcome Project is now in Phase 3, which involves full integration of the competencies and their assessment with learning and clinical care. Programs are expected to use resident performance data as the basis for improvement and begin to use external measures, e.g., clinical quality indicators, patient surveys, employer evaluations of graduates, national or specialty standardized measures, to verify resident and program performance levels.

The Milestone Project

The ACGME initiated the Milestone Project in 2008 as an effort to move toward competency-based education. The milestones consist of clear, specific accomplishments relevant to the specialty that residents must achieve at specific times during their education. The measure of a fully competent physician ready for entry into practice would be the completion of all education milestones in the specialty. Resident progress across the Milestones is tracked by levels. The Milestones and the levels are the foundation for all rotational and other types of evaluations utilized by the PSFHS Pathology Residency Program. The levels of achievement are described below:

Level 1: The resident is a graduating medical student/experiencing first day of residency.

Level 2: The resident is advancing and demonstrating additional milestones.

Level 3: The resident continues to advance and demonstrate targets set for residency and is demonstrating “aspirational” goals which might describe the performance of someone who has been in practice several years.

Level 4: The resident has advanced so that he or she now substantially demonstrates the milestones targeted for residency. *This level is designed as the graduation target.*

Level 5: The level has advanced beyond performance targets set for residency and is demonstrating “aspirational” goals which might describe the performance of someone who has been in practice for several years. It is expected that only a few exceptional residents will reach this level.

Program Director Responsibilities

Program directors must assess for deficiencies, knowledge, skills, attitudes required in the sphere of the six ACGME competencies as well as consider behaviors and actions pertaining to professionalism. Program directors are responsible for compliance with the requirements prescribed in this due process policy and to ensure that:

- A training file is maintained for each resident.
- A contract is maintained for each resident in the resident's training file.
- The residency program has an effective system and structure to assist in management and improvement of the program and (assess the performance of the residents and develop remediation recommendations for residents who are not meeting standards.
- Residents are provided with written educational goals and objectives specific to each training year to outline the knowledge, skills, and attitudes that are expected of the resident in each of the six ACGME competencies.
- The program has an evaluation system in place that identifies as early as possible residents with deficiencies in knowledge, skills, and attitudes in each of the ACGME's six competencies. The evaluation system must ensure that residents are given competency-based written performance evaluations using reliable evaluation tools at appropriate intervals that document whether or not the resident is achieving the educational goals of the program. The frequency of the written evaluations must satisfy the requirements of the program's Residency Review committee, but at a minimum they must be performed semiannually.
- A Remediation Plan is initiated when a resident with significant deficiencies in knowledge, skills, attitudes, and behaviors is identified.

Resident Responsibilities

Residents should submit to the program director at least annually confidential written evaluations of the faculty and of the educational experience. Take full advantage of this GME training opportunity. Stay committed to patient care and personal education during residency and work to acquire as much knowledge, skill, and competence as possible. Commit to improving the residency program and help bring about changes that will not only help you, but will also help those that come behind you. Know your specialty's program requirements. You need to know what is expected and required of an accredited program so you can work with faculty to improve the curriculum. Work with the PD and faculty to ensure continuous compliance with ACGME resident duty hour requirements. Compliance is essential for ongoing accreditation. To do this, please log your duty hours into the New Innovations residency management software on a weekly basis to ensure compliance. Every resident should visit the ACGME website at www.ACGME.org and routinely review the information that is made available to residents.

Chief Resident Responsibilities

The Chief Resident position is shared between the PGY-4 residents and runs from January through December. The Chief Resident will be responsible for monthly rotation schedules; monitoring attendance at conferences; orientation of new residents, externs and Family Practice residents; resident representation on the Hospital GMEC as a voting member; and other duties as assigned.

Conference Responsibilities

There are conferences held in the Pathology department and interdepartmental MDC conferences held throughout the hospital. Unless otherwise noted, attendance is required for on-site residents and they are excused from service obligations in order to attend. A 70% attendance rate is expected from every resident at required conferences. Residents are assigned to selected conferences for six month periods as outlined below. When covering a conference, residents work with the assigned faculty to present cases or brief didactics as necessary.

Laboratory Administration: Once per month

Review Management and Administration of Laboratories lectures from Oakstone Publishing, LLC., as a group. Answer review questions individually.

Breast MDC: 2nd Monday 1200

This conference is assigned to a PGY-1, who is the only resident required to attend. They will put together short presentations over cases as requested by the clinicians. If requested, photographs will be taken.

Dermatopathology Slide Review: Select Tuesdays 0730

The Chief Resident works with Dr. Mayes to schedule dates when he is available to review slides.

Gross Conference: 3rd Thursday 0900

The Pathology Assistant provides didactic lectures and hands-on gross specimen review.

Medical Lung MDC: 2nd Tuesday 0700

This conference is assigned to a PGY-2.

Autopsy Conference: 2nd Tuesday 1000

Residents rotate presenting the pertinent findings from autopsy cases with assigned faculty.

Forensics Conference: 2nd Tuesday 1200

This conference consists of didactic lectures provided by Dr. Kelly from the EPCC.

Malignant Hematology MDC: 3rd Tuesday 1200

This conference is assigned to a PGY-2.

Clinical Conference: 4th Tuesday 0900-1000

Clinical Call Log is reviewed. Residents on non-hematology CP rotations present 15 minute didactics.

Thoracic MDC: 1st Wed 0700

This conference is assigned to on-call resident for a presentation on the first Wednesday of the month. On-call resident attends the conference on other Wednesdays.

Hematology Conference: 3rd Wednesday 0730

Hematopathologist reviews interesting cases at the multihead scope.

Surgical Pathology Unknown Conference: Every Wednesday 1200

Slides are available for review prior to conference. Residents are required to submit answers for all unknown slides at the start of conference.

Urology MDC: 1st Friday 0700

This conference is assigned to a PGY-1.

CNS MDC: 3rd Friday 0700

All residents attend this conference.

Journal Club: 4th Friday 1200

An article is selected by the assigned faculty and resident and is distributed for review one week prior to conference.

Sternberg Reading Quiz: Every other Friday 1200

PGY-2 and PGY-3 residents read Sternberg's Diagnostic Surgical Pathology over the course of two years. A reading schedule is distributed with a quiz over the assigned subject every two weeks.

Quality Assurance and Performance Improvement

All residents shall participate alongside faculty in institutional quality assurance and performance improvement functions to include medical records review, timely dictation for

transcription, and filing of incident reports. Program directors must ensure residents are participating in quality assurance and performance improvement activities at the program level during such regular activities as departmental quality assurance and performance improvement meetings, in-services, grand rounds, and through individual or group instruction by attending staff and Quality Services Division and Risk Management staff. Residents are encouraged to participate in quality-related functions such as process action teams and clinical pathway development. Their clinical practice – like that of staff providers – is assessed in the course of formal performance improvement reviews.

Hospital Committees

Each resident will participate in at least one hospital-wide committee for at least one year; participation will begin as a PGY-2. Residents will work with the PD to determine which committee they will participate in.

Call Responsibilities

ACGME Guidelines

In-house call is defined as those duty hours beyond the normal workday when residents are required to be immediately available in the assigned institution. At-home pager call is defined as call taken from outside the assigned institution.

Continuous on-site duty, including house call, must not exceed 24 consecutive hours and must occur no more frequently than every third night, averaged over a four week period. Residents may remain on duty for up to six additional hours to participate in didactic activities, transfer care of patients, conduct outpatient clinics, and maintain continuity of care as defined in the individual program requirements.

The frequency of at-home call is not subject to the every third night limitation. However, at-home call must not be so frequent as to preclude rest and reasonable personal time for each resident. Residents taking at-home call must be provided with one day in seven completely free from all educational and clinical responsibilities, averaged over a four week period. When residents are called into the hospital from home, the hours residents spend in-house are counted toward the 80-hour limit. The program director and the faculty must monitor the demands of at-home call and make scheduling adjustments as necessary to mitigate excessive service demands and/or fatigue.

Clinical Pathology Pager Handoff Policy

Residents are required by the ACGME to perform and document proper handoffs of the clinical pathology pager. As noted elsewhere, the person required to carry the clinical pathology pager during the day is the resident that is on the blood bank rotation. If no resident is on the blood bank rotation, the most junior resident on a clinical pathology rotations (excluding hematopathology rotation) is required to carry the pager. There are two handoffs on Monday through Friday. The procedure is outlined below.

CP Resident: Resident responsible for carrying the CP page during the day.

Call resident: Resident covering call.

Evening Handoffs

The call resident will be responsible for forwarding the pager to themselves between 1630 to 1700. At this time, the call resident will inform the CP resident that the pager has been forwarded. The CP resident will let the call resident know if there are any outstanding issues and then document this handoff on the "Resident Call Log".

Morning Handoffs

The CP resident will be responsible for forwarding the pager to themselves between 0730 to 0800. At this time the CP resident will inform the call resident that the pager has been forwarded. The call resident will let the CP resident know if there are any outstanding issues and then document this handoff on the "Resident Call Log".

Working Hours

The clinical pager is shared equally amongst residents assigned to non-hematology CP rotations from 0800-1700 Monday - Friday. The resident carrying the clinical pager fields calls from anyone needing assistance from pathology (laboratories without an assigned resident, central receiving, clinicians, etc). A call summary, to include how the issue was handled and any relevant outcomes, must be documented in the Clinical Call Log. This log is reviewed monthly at the Clinical Conference.

Example: Starting at 0800, the resident rotating in microbiology handles calls related to microbiology. If a different resident is carrying the clinical pager, they handle all non-microbiology calls. At 1700, the clinical pager is forwarded to the evening/weekend call resident until the following working day at 0800.

Evenings, Weekends, and Holidays

Call coverage assigned in seven day blocks, from 1700 Friday until 0800 the following Friday. The coverage is evenly distributed amongst the PGY-2, PGY-3, and PGY-4 residents, with approximately 8-9 weeks of call per resident each year. The schedule is completed in six month blocks (January-June and July-December); weeks are selected on a rotating basis based on seniority. No one is permitted two consecutive weeks on-call. If conflicts arise that interfere with a resident's assigned call week, that resident is responsible for finding call coverage and must notify the PD and transcription office of changes.

At 1700 the clinical pager is forwarded to the on-call resident. This resident is responsible for assisting in the gross room with small specimens (nothing larger than a gallbladder). Primary grossing responsibility remains with the resident assigned to that service, the on-call resident is not expected to gross later than that person or handle complex cases. If the on-call resident is unable to assist in the gross room at 1700 (due to service obligations, frozen sections, etc), they are expected to notify the gross room of their delayed assistance. The on-call resident also handles clinical questions, frozen sections, stat procedures (bone marrow biopsies, FNAs), critical laboratory values, etc until 0800 the following working day.

Most calls can be handled from home with occasional issues requiring the resident to return to the hospital. Residents are encouraged to consult the on-call attending staff any time they have a question while on call.

On Saturdays, the on-call resident is responsible for the slide reviews from hematology (including peripheral smears, malaria smears, and body fluids) and grossing any accessioned specimens. On Sunday, additional specimens are not accessioned for grossing, but slide reviews must be completed. On hospital-recognized holidays, the on-call resident will follow the same duties as outlined for evening/weekend call duties for that specific day.

Time Off

The ABP issued the following statement regarding leave during residency:

“One year of approved training credit toward ABP certification requirements must be 52 weeks in duration, and the resident must document an average of 48 weeks per year of full-time pathology training over the course of the training program, and any additional leave must be made up. Unused vacation and other leave time may not be accumulated to reduce the overall duration of training.”

It is the resident’s responsibility to monitor their time off so that they are in compliance with the ABP. Regardless of the amount of PTO accrued, the resident must not miss more than an average of 20 working days per year. This includes sick days, vacation, and leaves of absence.

An excused absence requires notification of supervising faculty, the PD, and the PC at least 24-hours beforehand. Communications with anyone other than those listed will not be accepted as valid notification of absence, and the absence will be considered unexcused. Excessive absences, unexcused or excused, are grounds for corrective action up to and including dismissal. The PD or designee, at their sole discretion, will determine whether the reason for a resident’s absence is valid, whether there was proper and timely notification of the absence, and whether the absenteeism is excessive.

Residents who report late for work must check in with the PD or PC. An explanation for the tardiness is expected. Frequent tardiness may, at the discretion of the program director or designee, result in corrective action, up to and including dismissal.

Educational Leave

Three work days of educational leave (excused absences, no PTO used) are allowed annually for attending or presenting at medical meetings.

Holidays

Residents receive five holidays (excused absences, no PTO used) per year, including New Year’s Day, Memorial Day, July 4th, Thanksgiving Day, and Christmas Day. The on-call resident is required to carry out their normal call-related duties on these days.

Paid Time Off

PTO is accrued over time and is used for sick leave and vacation.

Sick leave may only be used for medically-related issues of the resident or a dependent. As this is usually unplanned leave, the resident is to notify their supervising faculty, the PD, and the PC as soon as possible. The program and/or employee health reserves the right to request a physician statement releasing a resident to return to work after any absence for medical reasons.

Vacation leave must be requested in advance and appropriate coverage of duties must be arranged prior to request for approval of leave by the PD. Residents must adhere to the different rotation requirements regarding vacation. All leave approval is at the discretion of the

PD. Resident performance as well as needs of the program may be considered in decisions regarding approval.

Leave of Absence

Residents missing work for an extended period of time are required to request a leave of absence. This enables the program to arrange for coverage during the resident's absence and may entitle the resident to Family and Medical Leave benefits. For this and other types of leave, including military leave, refer to the PSFHS policy.

Rotation Descriptions

Completion of the rotations outlined below is required for graduation. The resident schedule is also included. See the individual rotation descriptions for a detailed overview of each. Rotations are scheduled in calendar months (the month a week belongs to is determined by what month Wednesday falls on).

Anatomic Pathology (22 months):

- General Surgical Pathology – 14 months
- Forensic Pathology – 1 month
- Cytopathology – 5 months
- Renal Pathology – 1 month
- Pediatric Pathology – 1 month

Clinical Pathology (20 months):

- Chemistry – 4.5 months
- Toxicology – 0.5 month
- Blood Banking – 3 months
- Hematology – 5 months
- Microbiology – 4 months
- Coagulation – 1 month
- Cytogenetics/Molecular – 1 month
- Flow Cytometry – 1 month

Cross Disciplinary (6 months):

- Research – 1 month
- Electives – 5 months

Resident Schedule:

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
PGY 1-A	SP (1)	SP (2)	SP (3)	HEM E (1)	CHEM (1)	BB (1)	SP (4)	SP (5)	CYTO (1)	HEM E (2)	CHEM (2)	MICRO (1)
PGY 1-B	HEM E (1)	CHEM (1)	BB (1)	SP (1)	SP (2)	SP (3)	HEM E (2)	CHEM (2)	MICRO (1)	SP (4)	SP (5)	CYTO (1)
PGY 2-A	CYTO (2)	SP (6)	SP (7)	BB (2)	ELECTIVE	CHEM (3)	CYTO (3)	SP (8)	SP (9)	MICRO (2)	FORENSICS	HEME (3)
PGY 2-B	BB (2)	ELECTIVE	CHEM (3)	CYTO (2)	SP (6)	SP (7)	MICRO (2)	FORENSICS	HEME (3)	CYTO (3)	SP (8)	SP (9)
PGY 3-A	SP (10)	ELECTIVE	ELECTIVE	PEDS	HEME (4)	MICRO (3)	SP (11)	CYTO (4)	SP (12)	CHEM (4)	FLOW	RESEARCH
PGY 3-B	PEDS	HEME (4)	MICRO (3)	SP (10)	ELECTIVE	ELECTIVE	CHEM (4)	FLOW	RESEARCH	SP (11)	CYTO (4)	SP (12)
PGY 4-A	SP (13) EXTRA	SP (14) EXTRA	HEME (5)	CHEM (5)/TOX	MICRO (4)	CYTO (5)	RENAL	MOLECULAR/CG	BB (3)	COAG	ELECTIVE	ELECTIVE
PGY 4-B	CHEM (5)/TOX	MICRO (4)	CYTO (5)	SP (13) EXTRA	SP (14) EXTRA	HEME (5)	COAG	BB (3)	MOLECULAR/CG	RENAL	ELECTIVE	ELECTIVE

General Surgical Pathology

Overall Goals

The primary goal of the rotation is to offer the resident experience in general practice diagnostic surgical pathology so that by the end of the program the resident will be able to perform independently as a surgical pathologist. This will include becoming proficient in processing, managing, and diagnosing frozen sections in conjunction with the staff pathologist

Patient Care Objectives

- Assess the accuracy and relevance of clinical histories that accompany surgical pathology specimens and assess whether additional information is needed to complete the pathologic review
- Gather appropriate and accurate clinical information
- Interpret diagnostic information and test results within the clinical context for accurate diagnosis and case management
- Use clinical decision-making concepts and techniques in interpreting results
- Advise clinicians on the choice of clinically appropriate, cost-effective tests
- Advise clinicians on appropriate follow-up for unexpected test results

Medical Knowledge Objectives

- Knowledge of common clinical and diagnostic procedures, including ultrasound-guided needle core biopsy; breast, kidney, bladder, gastrointestinal, lung, neuroendocrine, head and neck, GYN resection; endoscopy, percutaneous and transjugular liver biopsy, endoscopic ultrasound, endoscopic fine needle aspiration biopsy, four-phase computerized tomography of the liver, and abdominal MRI, and their medical application and correlation with pathology specimens.
- Knowledge of specialized diagnostic procedures including special staining techniques, electron microscopy, immunofluorescence and immunochemistry, flow cytometry, molecular diagnosis, as well as common special stains pertinent to GI and liver pathology, PAS, PAS-D, reticulin, trichrome, H&E, Alcian blue, and liver stains, and stains for microorganisms
- Knowledge of major hereditary disorders of the breast, kidney, GYN, soft tissue, GI and liver system, including appropriate tests
- Knowledge of molecular biology as it pertains to mutational analyses of lung, breast, kidney, and GI-related solid tumor
- Ability to collect and evaluate medical evidence in the workup and diagnosis of diseases
- Ability to develop a differential diagnosis for polyps, neoplasms, metabolic and inflammatory conditions, including appropriate grading and staging systems
- Ability to use a variety of resources to investigate clinical questions
- Development of a personal strategy to maintain and update medical knowledge, including routine use of primary references and appropriate monographs in preparation of diagnostic reports, with citations, when appropriate, including use of references in preparation for weekly interdepartmental conferences
- Regular participation and presentation in scheduled conferences and Tumor Boards

Interpersonal /Communication Skills Objectives

- Ability to formulate succinct and accurate written diagnoses using accepted terminology and staging systems, where appropriate
- Ability to write clear microscopic descriptions
- Consistent legible handwriting, when not using computer for word documents
- Ability to write comments to final diagnoses, where appropriate, conveying qualifications or nuances that may enhance the information conveyed in the diagnosis
- Ability to communicate verbally and in writing with clinicians and pathologists who send case material as consultations and referrals
- Ability to make verbal presentations regarding pathology case material at intradepartmental and interdepartmental conferences
- Ability to function effectively as a member of the clinical care team with clinicians, nursing and laboratory staff, and administrative personnel
- Ability to use appropriate modes of communication (direct, telephone, e-mail, written) in a timely manner with attention to appropriate documentation and protection of patient confidentiality
- Ability to discuss diagnostic disagreements, or problems related to quality, with the appropriate and responsible personnel, with attention to quality assurance and to quality improvement

Practice Based Learning and Improvement Objectives

- Ongoing identification and remediation of gaps in personal medical knowledge
- Understanding of and ability to apply the principles of quality control and quality assurance
- Ability to identify process improvements that may minimize opportunities for medical errors
- Accurate documentation of quality issues that are discovered in preparation of cases for sign-out and for interdepartmental and intradepartmental conferences, and ability to transmit and to report the issues to the appropriate laboratory supervisor or managing pathologist

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to pathology.

Professionalism Objectives

- Integrity in all aspects of work product, including forthright acknowledgement of any errors, of absence of knowledge, or of personal factors that might hamper timely delivery of high quality care.
- Awareness of personal role in health care delivery team, communicating to other members of the team in a timely fashion regarding issues or concerns regarding specific cases, laboratory procedures, personnel matters, or personal issues that may affect care or that may require alternate coverage arrangements

- Knowledge and understanding of ethical and confidential issues affecting patient care, including behavior that demonstrates consistent stewardship of patient confidentiality
- Respectful behavior towards all patients and medical personnel, including punctuality and courtesy
- A professional demeanor in appearance and in interactions with others, including acceptance of responsibility, responding effectively to feedback
- Ability to provide respectful feedback to medical students, residents, clinicians, laboratory personnel and attending pathologists with attention to quality improvement and to provision of timely patient care

Educational Resources

- Sternberg's Diagnostic Surgical Pathology, 5th Edition
- Rosai and Ackerman's Surgical Pathology, 9th Edition
- Personal and resident library textbooks
- Web-based articles and journals

Teaching Methods

- Direct and indirect sign-out with staff physician
- Weekly surgical pathology conferences and unknown conferences
- Sternberg reviews and tests
- Daily responsibilities (surgical grossing and frozen sections)

Evaluation Strategies

- Focused observation and evaluation
- Simulated practice at weekly surgical pathology conference

Logistics

- Primary Supervising Pathologist: Dependent on rotating surgical pathology schedule.
- This core rotation is at Penrose Hospital, 0730 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- Resident will perform grossing/frozen section coverage alternating with next-day sign-out with assigned staff pathologist.
- Duration: Average 1 month at a time.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Not allowed during the rotation.
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Surgical Pathology Elective

Overall Goals

To allow the resident to obtain in-depth training in a specific area or subspecialty within anatomic pathology,

Patient Care Objectives

- Understand mechanics of specimen processing, times required for analysis, and report generation.
- Develop in-depth diagnostic competency within the specific area of choice.

Medical Knowledge Objectives

Demonstrate an in-depth knowledge within a specific area of choice.

Interpersonal /Communication Skills Objectives

Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and the laboratory staff.

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients.
- Recognize own level of competence in handling the grossing and sign-out of surgical specimens and the need for further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to pathology.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).

Educational Resources

- Personal and resident library textbooks
- Web-based articles and journals
- Textbooks specific for area of study
- Study sets and slide collections

Teaching Methods

- Direct and indirect sign-out with staff physician

- Weekly surgical pathology conferences and unknown conferences

Evaluation Strategies

Direct feedback and supervisor evaluations.

Simulated practice at the weekly surgical pathology conference

Logistics

- Primary Supervising Pathologist: determined by rotating surgical pathology sign-out schedule.
- This core rotation is at Penrose Hospital, 0730 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- Resident is assigned cases relevant to their elective month specialty.
- Resident independently dictates the cases and presents the case to the assigned staff for review.
- Duration: 1 month for each elective.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Allowed during the rotation (up to 25% of the rotation).
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Forensic Pathology

A one-month rotation in forensic pathology is required. This rotation is performed at The Office of the Coroner for El Paso County, Colorado. This rotation is arranged ahead of time and coordinated by the resident, residency program director, and the Coroner's office.

OBJECTIVES:

1. Observe and participate in forensic autopsies. This generally includes approximately 20 autopsies during the one-month rotation.
2. Observe scene investigations to the legal extent possible.
3. Study forensic toxicology and its relationship to the forensic autopsy.
4. Study the patterns of physical injury induced by firearms and different forms of penetrating injury and blunt trauma.
5. Become familiar with the legal chain of evidence.
6. Observe courtroom forensic testimony.
7. Become familiar with the common and important issues in the investigations of child abuse, homicide, suicide, and accidental death.

Overall Goals

The resident will gain familiarity with the operation of a medicolegal death investigation system and the vital role that pathologists play in such operations. The resident will also accompany staff pathologists to court and observe expert witness testimony to better understand the role of the pathologist as expert witness.

Patient Care Objectives

- Understand mechanics of specimen processing, times required for analysis, and report generation.
- Generating appropriate differential diagnoses based upon gross examination of the specimen and the clinical and medicolegal questions in the case
- Understanding what ancillary studies are needed in particular cases (pediatric deaths, homicides), such as cultures, metabolic screens, radiographs, DNA testing, and toxicology
- Demonstrating an understanding of the role that the circumstances of death play and the cause and manner of death

Medical Knowledge Objectives

- Demonstrating an ability to glean from the detective and medicolegal investigators' reports, the pertinent clinical and medicolegal questions to be addressed during the autopsy

- Understanding the clinical and medicolegal significance of the diagnosis being made, including implications for family, treating physicians, law enforcement, and district attorneys.
- Understanding the data elements which need to be included in the pathology report to provide the treating clinicians, police, family, and district attorney with the information they need for the subsequent medicolegal issues
- Recognizing and describing types of injury, cause, and manner of death definitions and determinations, time of death issues, and interpretation of toxicology results

Interpersonal /Communication Skills Objectives

- Demonstrating an ability to prepare and present cases at agency working conferences
- Being available for court proceeding to observe medical examiner's testimony

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients, family, police, and district attorney
- Recognize own level of competence in handling the grossing and sign-out of surgical specimens and the need for further assistance as appropriate.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Collaborating with other members of the death investigation team to improve patient care, public health, and assist the legal system in relevant medicolegal issues.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).
- Understanding religious autopsy objection law and demonstrate sensitivity to family diversity during death investigation.

Educational Resources

- Forensic Pathology, Second Edition (Practical Aspects of Criminal and Forensic Investigation Series), DiMaio, VJ and DiMaio, D.

Teaching Methods

- Daily interaction during the forensic rotation with the Coroner for El Paso County., Colorado.
- Monthly didactic lectures by the Assistant Coroner for El Paso County, Colorado.

Evaluation Strategies

Direct feedback and supervisor evaluations.

Logistics

- Primary Supervising Pathologist: Leon Kelly, MD.

- This core rotation is at the Office of the Coroner for El Paso County, Colorado.
- The rotation duration is one month.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Not allowed during the rotation.
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is not expected to attend all required conferences during the rotation.

Cytopathology

Overall Goals

The resident will gain basic knowledge and skills in the collection, processing, and interpretation of cytologic material, both gynecologic and non-gynecologic. The resident will also acquire skills and experience in fine needle aspiration.

Patient Care Objectives

- Perform and interpret FNAs, including assessment of adequacy, immediate diagnosis, and proper specimen preparation techniques under the supervision of an attending or cytotechnologist.
- Effectively utilize the different slide preparations, i.e. air-dried Diff-Quik-stain, alcohol-fixed Pap-stain, ThinPrep, and formalin-fixed cell blocks.
- Effectively use special studies including immunoperoxidase stains, flow cytometry, and HPV analysis on cytology specimens.

Medical Knowledge Objectives

- Develop basic skills in exfoliative and FNA cytology.
- Resident will screen cases and designate as adequate, but limited by, or unsatisfactory/non-diagnostic.
- Resident will learn to diagnose cases as benign, reactive, atypical, suspicious, or malignant.
- Resident will learn correctly to diagnose lesions as non-neoplastic vs neoplastic.
- Resident will list the differential diagnoses of specific morphologic patterns and lesions in specific sites.
- Effectively screen specimens from each organ system.
- Effectively utilize the different slide preparations.
- Efficiently and rapidly interpret specimens obtained through radiologically guided FNA.
- Perform and interpret FNAs.
- Effectively use special studies in specimen workup.

Interpersonal /Communication Skills Objectives

- Effectively and professionally communicate with patients when performing fine needle aspirations.
- Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and the laboratory staff.

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients.
- Recognize own level of competence in handling the grossing and sign-out of surgical specimens and the need for further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.
- Study key issues of laboratory management, administration, government regulations, QA and QC procedures.

- Accumulate graduated responsibilities including independent participation and assessment of adequacy of fine needle aspirations.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Study key issues of laboratory management, administration, government regulations, and QA/QC procedures.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).

Educational Resources

- DeMay, M. (2007). *Practical Principles of Cytopathology*. Chicago, IL: American Society for Clinical Pathology.
- Ali, S. Z., & Cibas, E.S. (Eds.). (2010). *The Bethesda System for Reporting Thyroid Cytopathology: Definitions, Criteria and Explanatory Notes*. Springer US.
- Solomon, D., & Nayar, R. (Eds.). (2004). *The Bethesda System for Reporting Cervical Cytology: Definitions, Criteria, and Explanatory Notes* (2nd ed.). Springer US.

Teaching Methods

- Direct and indirect supervision by staff pathologist and cytotechnologist in preparation and performance of FNA and interpretation of prepared cytologic specimens.
- Bi-monthly conference covering interesting cases given by chief cytotechnologist.
- Independent study of study sets.
- Participate in CAP proficiency surveys.
- Teleconferences.

Evaluation Strategies

Direct feedback and supervisor evaluations.

Simulated practice at cytopathology conference.

Logistics

- Supervising Pathologists: Determined by rotating pathologist schedule.
- This core rotation is at Penrose Hospital, 0800 to 1700 Mon-Fri.
- The resident is responsible for contacting the cytology department prior to the first day of the rotation to plan a general schedule and arrange the flow of cases.
- Residents are taught proper FNA technique of superficial palpable masses and slide preparation in the first week with direct supervision.

- With graduated responsibility, resident will perform all superficial FNAs and determine specimen adequacy.
- Resident may render a preliminary diagnosis with assistance from staff pathologist.
- Resident will preview and dictate all abnormal GYN and non-GYN cytology cases before passing on to staff pathologist.
- Resident will determine adequacy of all specimens performed by interventional radiologist and other clinicians.
- Resident will review all cell blocks associated with their cytologic specimens and correlate with any surgical pathology specimens submitted on the same patient.
- If no resident is scheduled on cytology, junior-level residents will perform and evaluate FNAs for adequacy.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Allowed during the rotation (up to 25% of the rotation).
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Renal Pathology

Overall Goals

The resident will study all aspects of medical renal pathology from Penrose previous case files. This includes light microscopy evaluation of renal biopsies, immunofluorescence studies and electron microscopy. This was a moderate-volume medical renal biopsy service and the full spectrum of cases are on file. Also, resident is expected to follow all current renal biopsies that are sent to Arkana Laboratories. The resident can review the light microscopy, IF and EM images with the full surgical reports via a link to Arkana Laboratories.

Patient Care Objectives

- Understand mechanics of specimen processing, times required for analysis, and report generation.
- Understands electron microscopic techniques and their application to anatomic pathology.
- Residents are expected to learn the use and interpretation of ancillary modalities for the diagnosis of medical renal disease in biopsy specimens, including immunofluorescent detection of immunoglobulin, complement and fibrinogen, immunohistochemistry, and special histological status (PAS, silver, and trichrome).

Medical Knowledge Objectives

- Can effectively integrate clinical, morphologic, and ultrastructural data to reach a pathologic diagnosis.
- Demonstration of familiarity with the clinical presentations and manifestations of various common renal diseases.
- Describe the method of handling and appropriate dividing of renal biopsy tissue for light microscopy and immunofluorescent studies.
- Demonstrate the ability to examine renal biopsies using light microscopy, immunofluorescence, and the electron microscope.
- Interpret the special histologic stains used to examine renal biopsies.
- Recognize common renal diseases based on their histopathologic, immunofluorescence, and ultrastructural findings.
- Demonstrate the ability to correlate relevant clinical information with renal pathology findings.
- Describe renal transplant pathology, including types of graft rejection, drug toxicity, and allograft infections.

Interpersonal /Communication Skills Objectives

Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and the laboratory staff.

Practice Based Learning and Improvement Objectives

Develop tools to help meet the needs of patients.

- Recognize own level of competence in handling the grossing and sign-out of renal specimens and the need for further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to renal pathology.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).

Educational Resources

- Penrose-St. Francis biopsies sent to Arkana Labs, study sets and previous cases.
- Lecture guide with slides: Columbia University's 37th Annual Postgraduate Medicine Course, Renal Biopsy in Medical Diseases of the Kidney.
- Diagnostic Pathology of Kidney Diseases, Colvin, Chang et al., 1st Edition, 2011, Amirsys, Inc.
- The Renal Biopsy, Striker/Striker/D'Agati, 3rd Edition, 1997.
- Didactic lectures from board certified nephropathologists from Arkana Laboratories.
- Link to our current cases being examined at Arkana Laboratories with photos.

Teaching Methods

- Didactic slide review by primary supervising pathologist and Arkana Lab nephropathologists.
- Review current biopsies via link to Arkana Laboratories.
- Independent study of Columbia University lecture guide and study sets/previous cases.

Evaluation Strategies

Direct feedback and supervisor evaluations.

Logistics

- Primary Supervising Pathologist: Dr. Leslie Torgerson.
- This core rotation is at Penrose Hospital, 0800 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule and obtain study set.
- Resident will daily review current cases, study sets, textbooks, and lecture series.
- Duration: 1 month.
- Call: Alterations to the standard call schedule are not required for this rotation.

- Vacation: Allowed during the rotation (up to 25% of the rotation).
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Pediatric Pathology

Overall Goals

The goal of the rotation is exposure to the major areas of surgical and autopsy pediatric pathology, with involvement in other departments as time permits.

Patient Care Objectives

- Participate in the performance, analysis, and reporting of pediatric autopsies.
- Be involved in the daily sign-out of pediatric surgical case material.
- Review of pediatric hematology cases.
- Correlation of relevant clinical laboratory information with anatomic findings.
- Exposure to common pediatric neoplastic diseases.
- Exposure to diseases of the neonatal and perinatal period.

Medical Knowledge Objectives

- Describe the clinical characteristics and recognize the morphologic features of the major entities in pediatric surgical pathology.
- Understand the application of molecular diagnostics and electron microscopy for “small blue cell tumors of childhood.”
- List the most common causes of deaths in infants, older children, and adolescents.
- Recognize the morphologic features of abnormal cells in cerebrospinal fluid.

Interpersonal /Communication Skills Objectives

- Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and the laboratory staff.
- Participate in intradepartmental conferences and describe pertinent pathologic findings to colleagues.
- Participate in teaching medical students.
- Generate concise and accurate diagnoses for autopsy and surgical cases in preparation for case sign-out with staff pathologist.
- Elicit relevant clinical information from clinicians via telephone or direct conversations.

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients.
- Recognize own level of competence in handling the grossing and sign-out of surgical specimens and the need for further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.
- Utilize information technology to support their own education.
- Obtain and utilize appropriate scientific references during the work-up of surgical and autopsy cases.

- Render reasonable and complete differential diagnoses for pediatric autopsies and surgical pathology cases based on the available clinical information, gross and microscopic features, and current published information.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to pathology.
- Achieve rapid turnaround time for pathology reports and timely communication of results to clinicians in order to expedite patient treatment and discharge from the hospital.
- Use available information technology to support work-up and diagnosis of autopsy and surgical pathology specimens.
- Attendance/presentation at morbidity and mortality meetings.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).
- Be responsive and accountable and responsive to the needs of patients, their families, and clinicians.

Educational Resources

- See Children’s Hospital’s list of recommended textbooks and journal subscriptions available in their department.

Teaching Methods

- Direct and indirect sign-out with staff physician
- Slide sets and conferences

Evaluation Strategies

Direct feedback and supervisor evaluations.

Logistics

- Primary Supervising Pathologist: Dr. Jennifer Black.
- This core rotation is at Children’s Hospital in Aurora, 0800 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- Duration: 1 month during 3rd or 4th year.
- The resident will be reimbursed for mileage for commuting to Children’s Hospital in Denver according to the mileage rates established by the hospital system.
- Call: Residents should not be scheduled for weekly call at Penrose St Francis Hospital during this rotation. Resident may be expected to stay late on weeknights in Denver to help with pediatric pathology call responsibilities.

- Vacation: Not allowed during the rotation.
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is excused from Penrose Hospital conferences during this rotation but is expected to participate in any conferences required by the University of Colorado Pediatric Pathology Department.

Chemistry

Overall Goals

The Pathology resident is expected to gain a working knowledge of analytic biochemistry, instrumentation, and quality control techniques, as applied in the clinical chemistry laboratory.

Patient Care Objectives

- Gather appropriate and accurate clinical information from all available sources
- Interpret laboratory test results within the clinical context
- Develop a diagnosis or differential diagnosis, based on laboratory results and clinical information
- Use information technology to support patient care decisions and education of practitioners
- Use evidence-based medicine and clinical decision-making concepts to interpret results and to make informed decisions
- Advise clinicians on the choice of clinically appropriate, cost-effective tests
- Advise clinicians on appropriate follow-up for unexpected test results
- Work with health care professionals and teams to provide patient-focused care

Medical Knowledge Objectives

- Knowledge of common clinical chemistry tests and their medical application and correlation
- Knowledge of the effects of disease, drugs, matrix and preanalytical variables on chemistry test results
- General knowledge in the basic and clinical sciences necessary for effective consultation in laboratory medicine
- Knowledge of the principle and practice of laboratory management
- Ability to collect and evaluate medical evidenced regarding the utility of laboratory tests
- An investigative and analytical approach to laboratory and clinical questions
- Ability to use a variety of resources to investigate clinical questions
- Development of a personal strategy to regularly maintain and update medical knowledge

Interpersonal /Communication Skills Objectives

- Ability to work with others as part of a health care team
- Ability to communicate clearly and effectively with clinicians, medical technologists, and other medical personnel
- Ability to use appropriate modes of communication (listening, non-verbal, explanatory, questioning)
- Ability to choose and use appropriate communication mechanisms (face-to-face, telephone, e-mail, written)

Practice Based Learning and Improvement Objectives

- Ability to find, evaluate and assimilate evidence from scientific studies
- Application of statistical and study design principles in evaluation of evidence
- Ongoing identification and remediation of gaps in personal medical knowledge

- Understanding of and ability to apply the principles of quality control and quality assurance
- Ability to evaluate current and proposed testing methods for analytical performance, clinical utility and cost-effectiveness
- Development of a personal strategy to regularly maintain and update medical knowledge

Systems Based Practice Objectives

- Understanding of the role of the laboratory in the health care system, and the importance of reliable, cost-effective and timely laboratory results in clinical decision-making
- Understand the developing role of laboratories in preparedness for biological and chemical terrorism
- Ability to work with clinicians, administrators and others to determine the role of the laboratory in specific situations to optimize patient safety and outcomes
- Understanding of CLIA, CAP AND JCAHO requirements for clinical laboratories
- Understanding of basic laboratory reimbursement mechanisms and regulatory requirements, including kickbacks and compliance with Medicare/Medicaid “fraud and abuse” avoidance requirements
- Ability to do cost analysis of laboratory tests

Professionalism Objectives

- Respect, compassion and integrity
- Responsiveness to the needs of patients and society that supersedes self-interest
- Knowledge and understanding of ethical privacy issues affecting the clinical laboratory
- Maintenance of confidentiality of patient information
- Consistent performance of all duties in a timely, dependable, and responsible manner
- Prompt and courteous response to all pager and telephone calls
- Regular, punctual attendance and participation in rounds, conferences, meetings and rotation responsibilities
- Commitment to excellence and ongoing professional development

Educational Resources

- Clinical Chemistry. Techniques, Principles, Correlations. 6th edition, 2010, Bishop et. al.
- Contemporary Practice in Clinical Chemistry, 2nd edition, 2011, Clarke.
- Tietz Fundamentals of Clinical Chemistry, 6th edition, 2008, Burtis et. al.
- Biological Variation: From Principles to Practice, 2001, Fraser.

Teaching Methods

- Required reading
- Daily responsibilities in clinical lab
- One-on-one lectures with Dr. Franquemont
- Appendix A: Chemistry Curriculum for detailed information

Evaluation Strategies

Direct feedback and supervisor evaluations.

Logistics

- Primary Supervising Pathologist: Dr. Franquemont.
- This core rotation is at Penrose Hospital, 0730 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- The resident will be the first individual responsible for the investigation and handling of all chemistry-related problems and quality assurance activities. This will include all daily sign-outs of crystal and urine microscopic identifications and review of all method evaluations, linearity studies, proficiency surveys, and reference interval studies.
- The resident will investigate all technologist and clinician requests for consultation.
- Complete all case studies and designated reading in Bishop and submit to Dr. Franquemont.
- Complete all chapter review questions and designated reading in Bishop and submit to Dr. Franquemont.
- Review all CAP surveys, calibration verification with Dr. Franquemont.
- Duration: 1 month per rotation.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Allowed during the rotation (up to 25% of the rotation).
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Toxicology

Overall Goals

The Pathology resident will observe the collection and analysis of toxicologic specimens and the interpretation of the results in the setting of cause and manner of death determination.

Patient Care Objectives

Understand mechanics of specimen processing, times required for analysis, and report generation.

Medical Knowledge Objectives

Bioanalysis to provide definitive identification and quantification of toxins and drugs.

Interpersonal /Communication Skills Objectives

Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and law enforcement.

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients, families and law enforcement.
- Recognize own level of competence in handling I specimens and the need for further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).

Educational Resources

- Levine, B. Principles of Forensic Toxicology, 3rd Edition

Teaching Methods

Direct interaction with laboratory professionals at Coroner's office.

Evaluation Strategies

Direct feedback and supervisor evaluations.

Logistics

- Primary Supervising Pathologist: Werner Jenkins, MS.

- This core rotation is at Penrose Hospital, 0730 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- Resident shadows toxicology lab personnel and learns ELISA screening , mass spectrometry and gas chromatography techniques.
- Duration: Two weeks at the El Paso County Office of the Coroner
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Not allowed during the rotation.
- Supervision: Supervising toxicologist will be asked to complete evaluations of performance.
- Conferences: The resident is not expected to attend all required conferences during the rotation.

Blood Banking and Transfusion Medicine

Overall Goals

Three months are spent on blood banking (1 month during the first six months of residency). The resident is responsible for determining appropriateness of blood product requests from clinical teams, evaluating requests for therapeutic apheresis, and investigating transfusion reactions. The resident will also be involved with component coordination, daytime technical call, daily rounds, review of daily worksheets and reference cases, and making in-service presentations. One week at the HLA typing lab and hematopoietic progenitor cell laboratories in Denver (Clinimmune) will be done. At the end of this HLA rotation, the resident will have (1) mastered the fundamental concepts, procedures, and protocols in immunohematology; (2) learned the organizational aspects of a hospital-based transfusion service; (3) obtained a working knowledge of the laboratory's procedures and policies; (4) come to display sound clinical and technical judgment; and (5) developed self-confidence and effective communication skills with all healthcare personnel.

Patient Care Objectives

- Perform antibody screen and identification.
- Perform and evaluate transfusion reaction workup and RhoGAM workup.

Medical Knowledge Objectives

- Understand basic immunology as applicable to Transfusion Medicine: antigens, antibodies, and complement; immune reactions, involving blood cells and blood constituents, both in vivo and in vitro.
- Be conversant with blood group serology and genetics; including red cell, leukocyte, and platelet antigens; their respective antibodies; and the serologic techniques necessary for their demonstration.
- Be able to follow workflow through the laboratory, including: specimen acceptability and patient identification; accessioning and test ordering; ABO/Rh typing and antibody screening; antibody identification; resolution of discrepancies; component preparation and inventory management.
- Be familiar with the blood donation process, including the preparation and storage of blood cells and components, including hematopoietic stem cells; be able to evaluate the suitability of allogeneic and autologous donors; understand the principles of donor deferral and counseling, and be able to state all regulatory and voluntary requirements.
- Be familiar with blood component therapy; including knowledge of the coagulation mechanism, evaluation and treatment of coagulation disorders, and advantages and disadvantages of specific blood components.
- Be conversant with principles of tissue transplantation and blood transfusion; including red cell compatibility testing; histocompatibility testing, rejection phenomena; and hazards of blood transfusion, including transfusion reactions and disease transmission.

- Be able to evaluate patients for therapeutic apheresis procedures. Be able to communicate with clinicians regarding indications and contraindications.
- The resident will become sufficiently skilled in blood banking techniques (donor room, compatibility testing and antibody identification).
- The resident will develop sufficient clinical judgment in transfusion therapy to assess its risk/benefit balance, to recognize unreasonable or inappropriate demands for blood products and, when indicated, to recommend appropriate blood or component therapy.
- Describe the AABB standards for blood banks and transfusion services.
- Define the process of ABO/Rh typing and crossmatch.
- Demonstrate the processes and reasons for filtering, washing, and freezing blood.
- Explain the requirements for special components (CMV negative, washed, leukocyte reduced, irradiated).
- Identify the indications for therapeutic apheresis.
- Discuss donor screening and eligibility criteria, and peripheral blood stem cell collection and processing techniques.

Interpersonal /Communication Skills Objectives

- Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and the laboratory staff.
- Provide consultation to physicians regarding appropriate utilization of blood components.

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients.
- Recognize own level of competence in handling of blood products and the need for further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to blood banking.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).

Educational Resources

AABB Technical Manual, "Modern Blood Banking and Transfusion Practices," Harmening, D.

Mais. Quick Compendium of Clinical Pathology, 4th edition, 2018.

Web-based learning modules. www.bbguy.com

Teaching Methods

- Didactics
- Intensive study, including medical practice, web lectures and reading assignments
- Hands-on instruction in serology and component preparation by an SBB-qualified medical technologist

Evaluation Strategies

Direct feedback and supervisor evaluations.

360 evaluations

On-call review with staff pathologist

Logistics

- Primary Supervising Pathologist: Dr. Mayes.
- This core rotation is at Penrose Hospital, 0730 to 1700 Mon-Fri. (One week per residency done in Denver at Clinimmune Labs.)
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- This rotation is of increasing responsibility with direct consultation with Dr. Mayes in the beginning to making independent decisions by the end of the residency.
- Residents will carry the clinical pager and answer any calls from donor and transfusion staff.
- Resident is expected to counsel volunteer blood donors with positive infectious disease test results.
- Resident serves as consultant to medical staff regarding appropriate use of blood components and transfusion reactions.
- Resident will generate all transfusion reactions and antibody consultation reports.
- Resident will be familiar with the performance and interpretation of pretransfusion compatibility testing including blood typing, crossmatching, and antibody screening and identification.
- Call: Alterations to the standard call schedule are not required for this rotation. (Except when in Denver)
- Vacation: Allowed during the rotation (up to 25% of the rotation). (Not allowed on Denver rotation)
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Hematopathology

Overall Goals

The Pathology resident is to be expected to learn all aspects of hematopathology from the performance of bedside bone marrow aspirations/biopsies to reviewing bone marrow and lymphoma work-ups and issuing comprehensive reports that integrate all of the morphologic and ancillary studies of flow cytometry, immunohistochemistry, cytogenetics, fluorescent in situ hybridization and molecular assays performed. Additional evaluation of peripheral blood smears, peripheral blood flow cytometry, body fluid smears, body fluid/tissue flow cytometry and DNA ploidy studies are performed on a daily basis.

Patient Care Objectives

- Gather essential and accurate patient information and incorporate it into pathologic interpretations.
- Perform, interpret, and write up bone marrow aspirate and biopsies including all necessary ancillary testing.
- Interpret and write-up peripheral blood smear consults, and lymphoma cases including all necessary ancillary testing.
- Consult on interpretation or follow-up of unusual or unexpected test results.
- Order appropriate special testing when appropriate.
- Relate the techniques, use and interpretation of flow cytometry in lymphoproliferative disorders, acute leukemias, myelodysplasia and PNH.
- Recall the techniques for, and interpretation and use of, FISH in hematopoietic malignancies.
- Restate the basic principles, methods, and applications of the assays used in molecular hematopathology.

Medical Knowledge Objectives

- Interpret and write up bone marrow aspirate and biopsies, including all necessary ancillary testing.
- Interpret and write up peripheral blood smear consults and lymphoma cases, including all necessary ancillary testing.
- Relate the techniques, use, and interpretation of flow cytometry in lymphoproliferative disorders, acute leukemias, myelodysplasia, and PNH.
- Recall the techniques for and interpretation and use of FISH in hematopoietic malignancies.
- Restate the basic principles, methods, and applications of the assays used in molecular hematopathology.

Interpersonal /Communication Skills Objectives

- Participate as an expert in Hematopathology at multidisciplinary conferences.
- Demonstrate the ability to write a comprehensive and coherent report in hematopathology.
- Demonstrate the ability to communicate clear diagnoses to the referring physician or appropriate clinical personnel.
- Educate colleagues and other health care professionals.

- Obtain informed consent and clearly explain the bone marrow procedures to patients.

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to pathology.
- Practice cost-effective health care and resource allocation that does not compromise quality of care, understanding the need for and cost of special studies, extended testing, and send-out testing.
- As senior residents, attend the CP QA committee meetings to be able to explain how to partner with the administrative and technical staff to assess, coordinate, and improve health care and know how these activities can affect system performance.
- Review the CAP checklist and perform mock inspection for the Hematology section.

Professionalism Objectives

- Demonstrate compassion, understanding of and respect for patients, their families, and the staff and physicians caring for them.
- Model positive work habits, including punctuality, dependability, and professional appearance.
- Self-identification of the resident as the case physician, taking initiative to advance cases.
- Demonstrate principles of confidentiality with all information transmitted both during and outside a patient encounter.

Educational Resources

Residents should follow up on findings by reading pertinent chapters in standard hematology textbooks and discussion with the attending pathologist.

Teaching Methods

- Slide study set to include numerous smears and bone marrows.
- Hematology Check Samples by the ASCP.
- Direct interaction with laboratory technicians and staff pathologists.
- Personal and hospital-based library resources.
- Web-based articles and journals.

Evaluation Strategies

Direct feedback and supervisor evaluations.

Simulated practice at hematopathology conference

360 evaluations

Logistics

- Primary Supervising Pathologist: Dr. Sciotto.
- This core rotation is at Penrose Hospital, 0730 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- Peripheral blood differentials, normal cell morphology, and specific abnormal cell morphology.
- Bone marrow differentials.
- Bone marrow biopsy and aspirate techniques. Learn how to triage a bone marrow biopsy specimen to optimize diagnostic utility.
- Understand basic coagulation tests employed in the lab and their use in the work-up of coagulation problems. As cases present, this may also include special coagulation tests and platelet aggregation studies.
- Learn the basics of the Hematology analyzer methodology. Understand how the parameters are calculated and what interferes with the values.
- Review twice a day the slides for review with the abnormal hematology computer-generated printout. Initially become familiar with the unusual hematologic cases - review of the chart and recent bone marrow is suggested for better understanding of the process. Discuss and review abnormal cases with the attending pathologist and write abnormal slide review reports as appropriate. Phone calls to attending physicians may also be needed as indicated at the time of review.
- Learn the normal and abnormal morphology of body fluids.
- Review the bone marrow slides with the staff pathologist. Learn how to recognize bone marrow cells for 500 cell differential counts. Learn the differences in stains used for the various slides prepared from a bone marrow biopsy including those utilized for acute leukemia diagnosis.
- Learn the crisis values and normal ranges of routine hematologic tests. This information is in the Pathologists/Residents Hematology Procedures in the laboratory.
- Once the basics of hematology are learned, the resident is encouraged to develop skills in the interpretation of bone marrows and establish a differential diagnosis of abnormal smears. Review of patient charts is encouraged, taking note of the major disease process, past history, pertinent physical findings, laboratory data and medications.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Allowed during the rotation (up to 25% of the rotation).
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Microbiology

Overall Goals

The goal of the four-month Microbiology rotation is to provide a broad-based training program in laboratory microbiology, which includes all subspecialties of that discipline. The focus of the training program is laboratory diagnosis of infectious diseases and clinical interpretation of microbiologic results.

Patient Care Objectives

- Understand mechanics of specimen processing, times required for analysis, and report generation.
- Perform and interpret Gram Stains
- Screen and identify pathogenic bacteria in clinical specimens
- Mycobacterial culture identification
- Identify parasites in routine specimens
- Be able to routinely use information systems to obtain patient data and scientific information
- Advise laboratory users of how to best identify an unknown organism
- Review tests for referral testing and provide clinicians with advice on usefulness, turnaround times and potential findings

Medical Knowledge Objectives

- Develop knowledge of basic disease processes
- Demonstrate appropriate knowledge and basic skills in interpreting laboratory data in all areas of microbiology
- Demonstrate familiarity with microbiology literature
- Describe potential infectious agents potentially used in bioterrorism
- Become familiar with microbiological safety policies within the laboratory and patient care locations
- Understand the principles and requirements for molecular testing
- Correlate the findings of histology examination with microbiologic culture when appropriate

Interpersonal /Communication Skills Objectives

- Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and the laboratory staff.
- Lead microbiology presentations

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients.
- Recognize own level of competence in handling microbiology specimens and the need for further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.
- Actively participate in quality programs in microbiology
- Assimilate regulatory and medical-legal information and limit risks

- Review scientific literature to identify potential microbiology laboratory improvements
- Participate in implementation of laboratory operating procedure for bioterrorism

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to pathology.
- Review microbiology operating procedures and make suggestions for improvement

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).
- Attend and participate in infection control committee meeting

Educational Resources

- Murray. Medical Microbiology, 8th edition, 2016.
- Mais. Quick Compendium of Clinical Pathology, 3rd edition, 2014.
- Leonard. Quick Compendium Companion for Clinical Pathology.
- Slide sets.

Teaching Methods

- Intensive reading and answering required questions from Leonard's Compendium Companion.
- Bench work with microbiology laboratory technicians.
- Slide set review.
- Daily responsibilities in clinical laboratory and coverage of clinical pager.

Evaluation Strategies

Direct feedback

Supervisor evaluations

360 evaluations.

Slide set reviews.

Logistics

- Primary Supervising Pathologist: Dr. Derek Seaquist.
- This core rotation is at Penrose Hospital, 0730 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.

- Put name and pager number on white board in microbiology department at the start of the rotation.
- See Addendum for detailed curriculum and slide set review.

Coagulation

Overall Goals

The Pathology resident is to be exposed to the laboratory section of coagulation over a four-week rotation. The goals of the coagulation rotation are to provide the resident with an analytical and clinical knowledge base in this discipline, to include an overview of the operation and management of these areas of the laboratory. Upon completion of the rotation, the resident will be familiar with how various types of tests are performed, the interpretation and correlation of results with patients' conditions, and communication of the latter to requesting physicians.

Patient Care Objectives

- Understand mechanics of specimen processing, times required for analysis, and report generation.
- Understand the role of the Pathologist in evaluating patients with coagulopathy.
- Understand how to clearly communicate with clinical colleagues and give them the needed information for selection and interpretation of coagulation tests.

Medical Knowledge Objectives

- Develop an approach to clinical and laboratory evaluation of coagulation.
- General coagulation testing methodology and turn-around times.
- Understand which tests are offered in our laboratory versus the reference laboratory.

Interpersonal /Communication Skills Objectives

Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and the laboratory staff.

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients.
- Recognize own level of competence in handling coagulation cases and the need for further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to pathology.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).

Educational Resources

- Lichtin, A. (2014). *The Coagulation Consult: A Case-Based Guide*. New York, NY: Springer. Available in the Resident Library.
- *Flow Cytometry in Evaluation of Hematopoietic Neoplasms: A Case-Based Approach*. Available in the Resident Library.
- Lefkowitz, J.H. (2015). *Anatomic Pathology Board Review* (2nd ed.). Philadelphia, PA: Saunders. Available in the Resident Library.

Teaching Methods

- CP conference presentation at the end of the month.
- Self-Directed Learning: read the recommended coagulation books.
- Coagulation bench work: prepare and analyze routine patient samples (1 'special coag' day).
- Handle any coagulation consults from clinicians.

Evaluation Strategies

Direct feedback, supervisor evaluations, and 360 evaluations.

Logistics

- Primary Supervising Pathologist: Dr. Okal
- .
- This four week core rotation is at Penrose Hospital, 0800 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to obtain educational material and plan a general schedule for the month.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Allowed during the rotation (up to 25% of the rotation).
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Flow Cytometry

Overall Goals

The Pathology resident is to be exposed to the laboratory section of flow cytometry over a four-week rotation. The goals of the flow cytometry rotation are to provide the resident with an analytical and clinical knowledge base in this discipline, to include an overview of the operation and management of this area of the laboratory. Upon completion of the rotation, the resident will be familiar with how various types of tests are performed, the interpretation and correlation of results with patients' conditions, and communication of the latter to requesting physicians.

Patient Care Objectives

- Understand mechanics of specimen processing, times required for analysis, and report generation.
- Understand how to clearly communicate with clinical colleagues and give them the needed information for selection and interpretation of flow cytometry tests.

Medical Knowledge Objectives

- Learn the role of this ancillary technique in the evaluation of benign and malignant hematologic processes.
- General flow cytometry testing methodology, including preparation, analysis, and interpretation.
- Develop competency in interpreting and generating reports for straightforward flow cytometry cases.

Interpersonal /Communication Skills Objectives

Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and the laboratory staff.

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients.
- Recognize own level of competence in handling flow cytometry cases and the need for further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to pathology.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.

- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).

Educational Resources

- Lichtin, A. (2014). *The Coagulation Consult: A Case-Based Guide*. New York, NY: Springer. Available in the Resident Library.
- *Flow Cytometry in Evaluation of Hematopoietic Neoplasms: A Case-Based Approach*. Available in the Resident Library.
- Lefkowitz, J.H. (2015). *Anatomic Pathology Board Review* (2nd ed.). Philadelphia, PA: Saunders. Available in the Resident Library.

Teaching Methods

- CP conference presentation at the end of the month.
- Self-Directed Learning: read the recommended flow cytometry books.
- Flow cytometry bench work: prepare and analyze routine patient samples and complete study cases in the lab (3 days).
- Flow cytometry interpretation: Analyze, review, and prepare reports for routine patient cases (7 days).

Evaluation Strategies

Direct feedback, supervisor evaluations, and 360 evaluations.

Logistics

- Primary Supervising Pathologist: Dr. Merboth.
- This four week core rotation is at Penrose Hospital, 0800 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to obtain educational material and plan a general schedule for the month.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Allowed during the rotation (up to 25% of the rotation).
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Cytogenetics and Molecular Pathology

Overall Goals

Upon completion of training, the resident is expected to appreciate how integration of the disciplines of cytogenetics and molecular pathology with standard morphologic and immunohistochemical findings is used to aid in definitive diagnosis of certain disease states. It is critical for pathology residents to understand the language, techniques, and applications of molecular pathology testing and results.

Patient Care Objectives

- Understand mechanics of specimen processing, times required for analysis, and report generation.
- Understand how molecular testing methods to neoplasms for patient diagnostic, prognostic, and therapeutic decision making.
- Gather accurate clinical and genetic information to generate an appropriate family pedigree.
- Explain genetic counseling principles.
- Demonstrate the ability to identify family members in need of further testing.

Medical Knowledge Objectives

- Describe basic molecular biology concepts and language.
- Identify the different techniques for identifying DNA and RNA.
- Explain the different sample types, their preparation, and appropriate storage for molecular biology tests.
- Recognize the most common cytogenetic abnormalities and common clinical conditions.
- Define the language and techniques used in cytogenetic testing and result interpretation.
- Describe the requirements and structure of QA and QC in the cytogenetics and molecular labs.

CYTOGENETICS ROTATION

- Understand the principles of chromosome analysis and become familiar with wet lab procedures and karyotype software.
- Become familiar with frequent chromosome abnormalities associated with hematologic cancers including ALL, AML, MDS, MPD and certain NHL.
- Become familiar with fluorescence in situ hybridization (FISH) procedures and learn to determine when FISH analysis is most indicated.
- Learn acceptability standards and storage conditions for various chromosome and FISH specimens.
- Demonstrate ability to research results and associated diseases using internet and printed references.

MOLECULAR ROTATION

- Understand specimen collection and DNA extraction procedures for use in molecular testing.
- Understand principles of various molecular techniques employed in the lab.

- Become familiar with and understand the principals associated with B-cell and T-cell monoclonality studies. Demonstrate competence in interpreting data in the study set.
- Become familiar with the procedures of detecting HFE mutations associated with hereditary hemochromatosis. Demonstrate understanding of techniques employed and competence in interpreting results in the study set.

Interpersonal /Communication Skills Objectives

- Effectively interpret and clearly report molecular results in association with pathologic and laboratory findings and clinical history to reach a final diagnosis.
- Acquire the ability to construct clear, accurate, and properly formatted cytogenetic reports.
- Correctly interact with physicians and other clinical support staff to obtain clinical information and discuss cytogenetic test results.

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.
- Function as a consultant in clinical service.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to pathology.
- Review the literature to evaluate new molecular markers of disease.
- Develop the expertise in the use of web-based genomic data bases.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).
- Recite the legal, ethical, and social implications of genetic testing.
- Demonstrate knowledge of HIPAA issues pertaining to the use of genetic testing in human research and clinical molecular practice.

Educational Resources

- Dewald G, et al. Cytogenetics Studies in Neoplastic Hematologic Disorders. *In* McClatchey K, ed. *Clinical Laboratory Medicine. 2nd Edition*, Chapter 32. Lippencott Williams and Wilkins. 2003.
- Heim S, Mitelman F. *Cancer Cytogenetics, 2nd Edition*. Wiley-Liss. 1995
- McKinlay Gardner R, Sutherland G. *Chromosome Abnormalities and Genetic Counseling, 3rd Edition*. Oxford University. 2004
- Dunn B, Mouchrani P, Keagle M, eds. *The Cytogenetic Symposia. 2nd Edition*. Association of Genetic Technologists. 2005

- Barch M, Knutsen T, Spurbeck J. eds. *The AGT Cytogenetics Laboratory Manual. 3rd Edition*. The Association of Genetic Technologists. Lippencott-Raven. 1997.
- Atlas of Genetics and Cytogenetics in Oncology and Haematology: <http://AtlasGeneticsOncology.org>
- Mitelman Database of Chromosome Aberrations in Cancer: <http://cgap.nci.nih.gov/Chromosomes/Mitelman>
- NCBI Cancer Chromosomes: <http://www.ncbi.nlm.nih.gov/sites/entrez?db=cancerchromosomes>
- Online Medelian Inheritance in Man: <http://www.ncbi.nlm.nih.gov/sites/entrez?db=omim>
- [Study set binder](#)

Teaching Methods

- Didactics, study set binder and internet study modules
- Intensive study, including bench work, medical practice, and reading assignments

Evaluation Strategies

Direct feedback and supervisor evaluations.

360 evaluations

Logistics

- Primary Supervising Pathologist: Dr. Merboth.
- This core rotation is at Penrose Hospital, 0730 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Allowed during the rotation (up to 25% of the rotation).
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Research

Overall Goals

Residents are encouraged to become involved in research. One month is given for research training or in-depth study in a subspecialty area. However, at any given point in training, a resident may collaborate with a member of the staff to investigate a clinical or basic science topic, using spare time during regularly scheduled rotations.

Educational Resources

- Personal and resident library textbooks
- Web-based articles and journals

Teaching Methods

One-on-one interaction with supervising supervising pathologist(s).

Evaluation Strategies

Direct feedback and supervisor evaluation(s).

Logistics

- Primary Supervising Pathologist: Dependent upon area of research.
- This core rotation is at Penrose Hospital, 0730 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Allowed during the rotation (up to 25% of the rotation).
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Electives

Overall Goals

The Pathology resident is to be exposed to in-depth review of certain surgical or clinical pathology subjects.

Patient Care Objectives

- Understand mechanics of specimen processing, times required for analysis, and report generation.

Medical Knowledge Objectives

- Demonstrate in-depth knowledge within a specific area of choice.

Interpersonal /Communication Skills Objectives

- Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and the laboratory staff.

Practice Based Learning and Improvement Objectives

- Develop tools to help meet the needs of patients.
- Recognize own level of competence in handling the grossing and sign-out of surgical specimens and the need for further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.
- Develop an understanding of coding and billing relevant to pathology.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).

Educational Resources

- Personal and resident library textbooks.
- Web-based articles and journals.
- Textbooks for specific area of study.
- Study sets and slide collections

Teaching Methods

- Direct and in direct sign out with staff physician.
- Interaction with appropriate lab professionals.

Evaluation Strategies

- Direct feedback
- Supervisor evaluations

Logistics

- Primary Supervising Pathologist: Determined by elective chosen.
- This core rotation is at Penrose Hospital, 0730 to 1700 Mon-Fri.
- The resident is responsible for contacting the supervising pathologist prior to the first day of the rotation to plan a general schedule.
- Call: Alterations to the standard call schedule are not required for this rotation.
- Vacation: Allowed during the rotation.
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.
- Conferences: The resident is expected to attend all required conferences during the rotation.

Autopsy

There is no pre-determined autopsy rotation. Penrose Hospital performs numerous autopsies each year which range from full hospital autopsies without restrictions to restricted autopsies in which a single organ dissection is performed, i.e. “brain-only neurodegenerative disease work-up.”

For the first 24 months of residency, the PGY-1 and PGY-2 residents are responsible for performing each autopsy, unless they are grossing that day or on vacation. The PGY-1 and PGY-2 residents will amass approximately 20 adult (>18 years) autopsies during this time. The remaining required autopsy numbers are obtained through autopsies on fetuses greater than 20 weeks’ gestational age, infants (up to 12 months), children (1-12 years), and adolescents (13-18 years), as well as any forensic autopsies performed during the 1-month El Paso County Coroner’s Office forensic pathology rotation.

As the autopsies are ordered throughout the academic year, the autopsies are assigned to residents and staff pathologists on a rotating basis depending on the clinical service the assigned resident is performing.

At the beginning of the academic year, each PGY-1 resident performs 3 autopsies side-by-side with direct attending supervision and is essentially taught how to perform an autopsy.

After the initial 3 autopsies, the PGY-1 resident is deemed competent to perform autopsies independently, while taking into account each attending’s autopsy comfort level with the resident and autopsy dissection preferences.

After the initial 3 autopsies, the PGY-1 or PGY-2 resident is teamed up with a senior resident (PGY-3 or PGY-4) to help answer any questions and generally review the autopsy with the junior resident to the point of sign-out. This relationship varies depending on the junior resident’s comfort level, skill, and complexity of the case.

Overall Goals

The Pathology resident will learn to perform all aspects of autopsies, including prosection, selection of blocks for slides, review of gross and histologic findings, and writing reports.

Patient Care Objectives

Understand the clinical relevance of autopsies and the importance of report deadlines to the clinical team and patient family.

Medical Knowledge Objectives

- Integrate all safety related aspects of autopsy pathology and practice them accordingly.
- Recognize when the medical examiner’s office needs to be contacted before an autopsy is performed.
- Identify when special methods are needed in autopsy performance.

Interpersonal /Communication Skills Objectives

Communicate effectively and convey information in a clear and concise manner to medical technologists, pathologists, other health professionals, and the laboratory staff.

Practice Based Learning and Improvement Objectives

- Recognize own level of competence in handling the performance and sign-out of autopsies seek further assistance as appropriate.
- Facilitate learning of medical students, residents, and other health care professionals to encourage quality improvement in patient care.

Systems Based Practice Objectives

- Incorporate considerations of cost awareness and risk-benefit analysis in patient care.
- Advocate for quality patient care and optimal patient care systems.

Professionalism Objectives

- Provide compassionate and high quality care to all patients regardless of gender, age, culture, race, religion, disabilities, sexual orientation or socioeconomic class.
- Behave in a professional manner when interacting with patients or other health care providers (integrity, respect, accountability, punctuality).

Teaching Methods

- The first three autopsies performed by the resident will be directly supervised by the attending pathologist.
- Subsequent autopsies will be supervised by a senior resident who will assist as needed in the prosection, histologic evaluation, and report generation.
- Pertinent autopsy findings will be presented to the department at subsequent autopsy conferences.

Evaluation Strategies

Direct feedback and supervisor evaluations.

Logistics

- Supervising Pathologist: determined by the pathologist autopsy rotation schedule.
- Autopsies are performed as they arise and are assigned to the resident based on the autopsy rotation schedule.
- The only services excluded from the rotation schedule are off-site rotations (forensics, pediatric pathology, toxicology, and some electives) and the resident assigned to grossing.
- PGY3 and PGY4 residents that have already completed their required number of autopsies for ABP certification are excused from the rotation schedule, but still serve as supervising residents on cases.
- The resident is responsible for contacting the supervising pathologist prior to performing the autopsy to review the case and make any arrangements necessary.
- Supervision: Supervising pathologist(s) will be asked to complete evaluations of performance.

Laboratory Management

Overall Goals

Practicing pathologists must understand and respond to the larger context and system of health care, and they must utilize system resources to provide pathology services that are of optimum value. This requires pathologists to interface with clinicians, patients, technologists, system and hospital administrators, inspectors, and payers to ensure proper patient care within the laboratory. This curriculum was developed to provide pathology residents with the essential knowledge and skills required to achieve these goals.

Educational Objectives

- Residents must understand how their professional practice affects other health care professionals, the health care organization, and the larger society, and how these elements of the system affect their own practice.
- Residents must know how types of medical practices and delivery systems differ from one another, including methods of controlling health care costs and allocating resources.
- Residents must practice cost-effective health care and resource allocation that does not compromise quality of care.
- Residents must be advocates for quality patient care and assist patients in dealing with system complexities.
- Residents must know how to partner with health care managers and health care providers to assess, coordinate, and improve health care and know how these activities can affect system performance.

Educational Resources

- Text: Laboratory Administration for Pathologists, CAP Press, 2011.
- DVD Series: Management and Administration of Laboratories, Oakstone 2015.

Teaching Methods

- Independent study of education resources.

Evaluation Strategies

- Staff pathologist feedback during lecture and discussion
- Case studies from Oakstone DVD series

Logistics

- Primary Supervising Pathologist: Determined by Lab Management lecture schedule.
- Review independently Laboratory Administration textbook.
- Monthly conferences reviewing Management and Administration of Laboratories lectures from Oakstone Publishing, LLC. and answer case study questions as given.

Appendix A: Chemistry Rotations

The general goal in the four and one-half months of clinical chemistry will be acquisition of a working knowledge of analytic biochemistry, instrumentation, and quality control techniques, as applied in the clinical chemistry laboratory. Specifically, the program will provide:

- A. A review of basic chemical concepts and principles.
- B. Knowledge of the chemical and physical basis for assays that are typical of those most commonly encountered in clinical chemistry.
- C. An understanding of the principles and operation of basic analytical systems and instrumentation.
- D. Experience in performing typical assay procedures and working with, maintaining, calibrating, and troubleshooting the instruments employed.
- E. An appreciation of the factors inherent in an analytic method or system (such as chemical specificity and sensitivity, susceptibility to interference, accuracy and precision) that must be taken into account in correctly interpreting chemistry measurements.
- F. An appreciation of the factors that must be controlled in various tests to ensure reliability, i.e., timing, temperature, specimen handling, etc.
- G. Experience in calculating results, the statistical analysis of laboratory data, estimating errors, and determining confidence limits.
- H. Experience in methods evaluation and comparison.
- I. Experience in reference interval determination.

The overall training goals in chemical pathology can be related to the three general functions of the clinical pathologist:

- A. Technical director of the laboratory.
 - 1. Principles of analytic procedures (rather than technical details).
 - 2. Applications of analytic procedures in manual methods or in automated instruments.
 - 3. Technical sensitivity, specificity, accuracy, and precision.
 - 4. Proper specimen collection and storage prior to analysis.

- B. Clinical consultant to other physicians.
 - 1. Pathophysiologic basis of laboratory testing.
 - 2. Analysis of and solving of clinical problems.
- C. Administrator of the laboratory.
 - 1. Cost analysis of test procedures and instrumentation.
 - 2. Personnel management.
 - 3. State and federal regulations affecting laboratory operations.
 - 4. Requirements for accreditation.

OBJECTIVES:

The rotation in clinical chemistry is inclusive of 18 weeks of time during the core program of the residency training. Throughout these weeks, the following objectives will be met by the required reading, responsibilities, and lectures detailed in the Clinical Chemistry Curriculum.

Basic Principles And Practices

- Convert results from one unit format to another using the SI and traditional systems.
- Describe classifications used for reagent grade water.
- Identify the varying chemical grades used in reagent preparation and indicate their correct use.
- Define primary standard, SRM, secondary standard.
- Describe the following terms that are associated with solutions and, when appropriate, provide the respective units: percent, molarity, normality, molality, saturation, colligative properties, redox potential, conductivity, and specific gravity.
- Define a buffer and give the formula for pH and pK calculations.
- Use the Henderson-Hasselbalch equation to determine the missing variable when given either the pK or pH or the pK and concentration of the weak acid and its conjugate base.
- List and describe the types of thermometers used in the clinical laboratory.
- Classify the type of pipet when given an actual pipet or its description.
- Describe two ways to calibrate a pipetting device.
- Define a desiccant and discuss how it is used in the clinical laboratory.
- Describe how to properly care for and balance a centrifuge.
- Identify and describe the types of samples used in clinical chemistry.
- Outline the general steps for processing blood samples.
- Apply Beer's law to determine the concentration of a sample when the absorbance or change in absorbance is provided.
- Identify the preanalytic variables that can adversely affect laboratory results.

Laboratory Safety And Regulations

- Discuss safety awareness for clinical laboratory personnel.

- List the responsibilities of employer and employee in providing a safe workplace.
- Identify hazards related to handling chemicals, biologic specimens, and radiologic materials.
- Choose appropriate personal protective equipment when working in the clinical laboratory.
- Identify the classes of fires and the type of fire extinguishers to use for each.
- Describe steps used as precautionary measures when working with electrical equipment, cryogenic materials, and compressed gases and avoiding mechanical hazards associated with laboratory equipment.
- Select the correct means for disposal of waste generated in the clinical laboratory.
- Outline the steps required in documentation of an accident in the workplace.

Method Evaluation And Quality Management

- Define the following terms: quality assurance, quality control, accuracy, precision, descriptive statistics, reference interval, random error, sensitivity, specificity, systematic error, confidence intervals, Six-Sigma performance.
- Calculate the following: sensitivity, specificity, efficiency, predictive value, mean, median, range, variance, and standard deviation.
- Understand why statistics are needed for effective quality management.
- Understand the types, uses, and requirements for reference intervals.
- Understand the basic protocols used to verify or establish a reference interval.
- Appreciate how the test cutoff affects diagnostic performance.
- Evaluate laboratory data using multi-rules for quality control.
- Graph laboratory data and determine significant constant or proportional errors.
- Describe the preanalytic and postanalytic phases of quality assurance.
- Determine if there is a trend or a shift, given laboratory data.
- Discuss the processes involved in method selection and evaluation.
- Discuss proficiency-testing programs in the clinical laboratory.
- Describe how a process can be systematically improved.
- Explain why quality management is important for patients and the laboratory.

Analytical Techniques

- Explain the general principles of spectrophotometry, electrochemistry, electrophoresis, chromatography, mass spectrometry, proteomics, osmometry, and point of care testing.
- Discuss the limitations of each analytic technique.
- Compare and contrast the various analytic techniques.
- Discuss existing clinical applications for each analytic technique.
- Describe the operation and component parts of the following instruments: spectrophotometer, atomic absorption spectrometer, fluorometer, gas chromatograph, osmometer, ion-selective electrode, and pH electrode.
- Outline the quality assurance and preventive maintenance procedures involved with the following instruments: spectrophotometer, atomic absorption spectrometer, fluorometer, gas chromatograph, osmometer, ion-selective electrode, and pH electrode.

Principles Of Clinical Chemistry Automation

- Define the following terms: automation, channel, continuous flow, discrete analysis, dwell time, flag, random access, and throughput.
- Discuss the history of the development of automated analyzers in the clinical chemistry laboratory.
- List four driving forces behind the development of new automated analyzers.
- Name three basic approaches to sample analysis used by automated analyzers.
- Explain the major steps in automated analysis.
- Provide examples of commercially available discrete chemistry analyzers and modular systems.
- Compare the different approaches to automated analysis used by instrument manufacturers.
- Discriminate between an open versus a closed reagent system.
- Relate three considerations in the selection of an automated analyzer.
- Explain the concept of total laboratory automation.
- Differentiate the three phases of the laboratory testing process.
- Discuss future trends in automated analyzer development.

Immunoassays

- State the principle of each of the following methods:
 - Double diffusion
 - Radial immunodiffusion
 - Immunoelectrophoresis
 - Immunofixation electrophoresis
 - Nephelometry
 - Turbidimetry
 - Competitive immunoassay
 - Noncompetitive immunoassay
 - Immunoblot
 - Direct immunocytochemistry
 - Indirect immunocytochemistry
 - Immunophenotyping by flow cytometry
- Compare and contrast the general types of labels used in immunoassays.
- Classify an immunoassay, given its format, as homogeneous or heterogeneous, competitive or noncompetitive, and by its label.
- Explain how the concentration of the analyte in the test sample is related to the amount of bound-labeled reagent for competitive and noncompetitive immunoassays.
- Describe the three methods used to separate unbound-labeled reagent from bound-labeled reagent.
- Describe the dose-response curves in the classic competitive radioimmunoassay.
- Compare and contrast EMIT, DELFIA, MEIA, RIA, FPIA, ELISA, CEDIA, ICON, and OIA methodologies.

Molecular Theory And Techniques

- Explain the principles of hybridization.
- State the principles of each of the following methods:
 - DNA sequencing
 - Polymerase chain reaction
 - Transcription-based amplification system
 - Southern blot
 - In situ hybridization
 - Restriction fragment length polymorphism
- Describe the three types of amplification assays and list examples of each type of assay.
- Describe the process of dideoxy sequencing.
- Describe the principle of fluorescence resonance energy transfer as it is used in a real-time polymerase chain reaction assay.

Point Of Care Testing

- Define point-of-care testing (POCT).
- Explain what basic structure is required to manage a POCT program.
- Explain the process of implementing a POC test.
- State the basic principles behind these common POC applications:
 - POC glucose
 - POC chemistries and blood gases
 - POC hematology
 - POC coagulation
 - POC connectivity

Amino Acids And Proteins

- Describe the structures and general properties of amino acids and proteins, including both conjugated and simple proteins.
- Outline protein synthesis and catabolism.
- Discuss the general characteristics of the aminoacidopathies, including the metabolic defect in each and the procedure used for detection.
- Briefly discuss the function and clinical significance of the following proteins:
 - Prealbumin
 - Albumin
 - α_1 -antitrypsin
 - α -fetoprotein
 - Haptoglobin
 - Ceruloplasmin
 - Fibrinogen
 - C-reactive protein
 - Immunoglobulin
 - Troponin
- Discuss at least five general causes of abnormal serum protein concentrations.

- List the reference intervals for total protein and albumin and discuss any nonpathologic factors that influence the levels.
- Describe and compare methodologies used in the analysis of total protein, albumin, and protein fractionation. Include the structural characteristics or chemical properties that are relevant to each measurement and the clinical usage of each.
- Recognize and name the fractions, interpret any abnormality in the pattern, and associate these patterns with common disease states given a densitometric scan of a serum protein electrophoresis.
- Differentiate the types of proteinuria on the basis of etiology and type of protein found in the urine, and describe the principle of the methods used for both qualitative and quantitative determination and identification of urine proteins.
- Describe the diseases associated with alterations in cerebrospinal fluid proteins.

Nonprotein Nitrogen Compounds

- List the nonprotein nitrogen components of the blood and recognize their chemical structures and relative physiologic concentrations.
- Describe the biosynthesis and excretion of urea, uric acid, creatinine, creatine, and ammonia.
- Describe the major pathologic conditions associated with increased and decreased plasma concentrations of urea, uric acid, creatinine, creatine, and ammonia.
- State the specimen collection, transport, and storage requirements necessary for determinations of urea, uric acid, creatinine, creatine, and ammonia.
- Discuss commonly used methods for the determination of urea, uric acid, creatinine, creatine, and ammonia in plasma and urine. Identify sources of error and variability in these methods and describe the effects on the clinical utility of the laboratory measurements.
- Recognize the reference intervals for urea, uric acid, creatinine, and ammonia in plasma and urine. State the effects of age and gender on these values.
- Describe the use of the urea nitrogen/creatinine ratio in distinguishing between prerenal, renal, and postrenal causes of uremia.
- Relate the solubility of uric acid to the pathologic consequences of increased plasma uric acid.
- Explain the use and limitations of serum creatinine for calculations of estimated glomerular filtration rate.
- Describe the toxic effects related to an increased plasma ammonia concentration.
- Suggest possible clinical conditions associated with test results, given patient values for urea, uric acid, creatinine, and ammonia and supporting clinical history.

Enzymes

- Define the term *enzyme*, including physical composition and structure.
- Classify enzymes according to the International Union of Biochemistry (IUB).
- Discuss the different factors affecting the rate of an enzymatic reaction.
- Explain enzyme kinetics, including zero-order and first-order kinetics.
- Explain why the measurement of serum enzyme levels is clinically useful.

- Discuss which enzymes are useful in the diagnosis of various disorders, including cardiac, hepatic, bone and muscle disorders, malignancies, and acute pancreatitis.
- Discuss the tissue sources, diagnostic significance, and assays, including sources of error, for the following enzymes: CK, LD, AST, ALT, ALP, ACP, GGT, amylase, lipase, cholinesterase, and G-6-PD.
- Evaluate patient serum enzyme levels in relation to disease states.
- Discuss the clinical importance for detecting macroenzymes.
- Discuss the role of enzymes in drug metabolism.

Carbohydrates

- Classify carbohydrates into their respective groups.
- Discuss the metabolism of carbohydrates in the body and the mode of action of hormones in carbohydrate metabolism.
- Differentiate the types of diabetes by clinical symptoms and laboratory findings according to the American Diabetes Association (ADA).
- Explain the clinical significance of the three ketone bodies.
- Relate expected laboratory results and clinical symptoms to the following metabolic complications of disease:
 - Ketoacidosis
 - Hypersmolar coma
- Distinguish between reactive and spontaneous hypoglycemia.
- Describe the principle, specimen of choice, and advantages and disadvantages of the glucose analysis methods.
- Describe the three commonly encountered methods for glycated hemoglobin, specimen of choice, and source of error.
- Describe the use of glycosylated hemoglobin in the long-term monitoring of diabetes.
- Discuss the methods of analysis and the advantages and disadvantages for ketone bodies.

Lipids And Lipoproteins

- Explain lipoprotein physiology and metabolism.
- Describe the structure of fatty acids, phospholipids, triglycerides, cholesterol, and the various types of lipoprotein particles.
- Describe the laboratory tests used to assess lipids and lipoproteins, including principles and procedures.
- Identify common lipid disorders from clinical and laboratory data.
- Discuss the incidence and types of lipid and lipoprotein abnormalities.
- Identify the reference ranges for the major serum lipids.
- Relate the clinical significance of lipid and lipoprotein values in the assessment of coronary heart disease.
- Describe the role of standardization in the measurement of lipids and lipoproteins.

Electrolytes

- Define electrolyte, osmolality, anion gap, anion, and cation.

- Discuss the physiology and clinical significance of sodium, potassium, chloride, bicarbonate, magnesium, calcium, phosphate, and lactose.
- Calculate osmolality, osmolal gap, and anion gap and discuss the clinical usefulness of each.
- Discuss the analytic techniques used to assess electrolyte concentrations.
- Correlate the information with disease state, given patient data.
- Identify the reference ranges for sodium, potassium, chloride, bicarbonate, magnesium, and calcium.
- State the specimen of choice for the major electrolytes.
- Discuss the role of the kidney in electrolyte excretion and conservation in a healthy individual.
- Discuss the usefulness of urine electrolyte results: sodium, potassium, calcium, and osmolality.

Blood Gases, Ph, And Buffer Systems

- Describe the principles involved in the measurement of pH, pCO₂, pO₂, and the various hemoglobin species.
- Outline the interrelationship of the buffering mechanisms of bicarbonate, carbonic acid, and hemoglobin.
- Explain the clinical significance of the following pH and blood gas parameters: pH, pCO₂, pO₂, actual bicarbonate, carbonic acid, base excess, oxygen saturation, fractional oxyhemoglobin, hemoglobin oxygen (binding) capacity, oxygen content, and total CO₂.
- Determine whether data are normal or represent metabolic or respiratory acidosis or metabolic or respiratory alkalosis using the Henderson-Hasselbalch equation and blood gas data. Identify whether the data represent uncompensated or compensated conditions.
- Identify some common causes of metabolic acidosis and alkalosis, respiratory acidosis and alkalosis, and mixed abnormalities. State how the body attempts to compensate (kidney and lungs) for the various conditions.
- Describe the significance of the hemoglobin-oxygen dissociation curve and the impact of pH, 2,3-diphosphoglycerate (2,3-DPG), temperature, pH, and pCO₂ on its shape and release of O₂ to the tissues.
- Discuss problems and precautions in collecting and handling samples for pH and blood gas analysis. Include syringes, anticoagulants, mixing, icing, and capillary and venous samples as well as arterial samples in the discussion.
- Describe approaches to quality assurance, including quality control, proficiency testing, and delta checks to assess analytic quality.
- Discuss the reasons for possible discrepancies, given oxygen saturation data calculated by the blood gas analyzer and measured by the cooximeter.

Porphyrins And Hemoglobin

- Describe the chemical nature and structure of porphyrins and hemoglobin.
- Relate the role of porphyrins in the body.
- Outline the biochemical pathway of porphyrin and heme synthesis.
- Discuss the clinical significance of the porphyrias.

- Compare and contrast the porphyrias with regard to enzyme deficiency, clinical symptoms, and clinical laboratory data.
- Explain the principles of the basic qualitative and quantitative porphyrin tests, to include PBG, ALA, uroporphyrin, coproporphyrin, and protoporphyrin.
- Describe the degradation of hemoglobin.
- Discuss the clinical significance and laboratory data associated with the hemoglobinopathies and thalassemias.
- Identify the tests used in the diagnosis of hemoglobinopathies and thalassemias.
- Discuss the structure and clinical significance of myoglobin in the body.

General Hormone And Pituitary Function

- Describe the functions of the anterior and posterior pituitary.
- Define the anatomic relationship between the pituitary and hypothalamus.
- Understand the concept of open-loop negative feedback and relate this to the function of the various hypothalamic-pituitary-endocrine target gland loops.
- Understand the effects of pulsatility and cyclicity on the results of hormone measurements.
- Differentiate between tropic and direct effector in relationship to pituitary hormones.
- Discuss the regulation of prolactin secretion.
- State the non-neoplastic causes of prolactin secretion.
- State the non-neoplastic causes of prolactin elevation.
- Understand the difference between primary and secondary endocrine deficiency states.
- Describe the clinical features of the excess and deficiency states for growth hormone, prolactin, and vasopressin.
- Relate the physiology underlying the strategies used for screening and definitive testing for suspected disorders of growth hormone.

Adrenal Function

- Explain how the adrenal gland functions to maintain blood pressure, potassium, and glucose homeostasis.
- Describe steroid biosynthesis, regulation, and actions according to anatomic location within the adrenal gland.
- Discuss the pathophysiology of adrenal cortex disorders, namely Cushing's syndrome and Addison's disease.
- Differentiate the adrenal enzyme deficiencies and their blocking pathways in establishing a diagnosis.
- Describe the synthesis, storage, and metabolism of catecholamines.
- State the most useful measurements in supporting the diagnosis of pheochromocytoma.
- List the clinical findings associated with hypertension that suggest an underlying adrenal etiology is causing high blood pressure.
- List the appropriate laboratory tests to differentially diagnose primary and secondary Cushing's syndrome and Addison's disease.

Gonadal Function

- Discuss the biosynthesis, secretion, transport, and action of the sex steroids and gonadotropins.
- Describe the hypothalamic-pituitary-ovarian and hypothalamic-pituitary-testicular axes and how they regulate sex steroid and gonadotropin hormone production.
- Explain the principles of each diagnostic test for pituitary-gonadal axes dysfunction.
- Correlate laboratory information with regard to suspected gonadal disorders, given a patient's clinical data.
- Describe the appropriate laboratory testing protocol to effectively evaluate or monitor patients with suspected gonadal disease.

Thyroid gland

- Discuss the biosynthesis, secretion, transport, and action of the thyroid hormones.
- Describe the hypothalamic-pituitary-thyroid axis and how it regulates thyroid hormone production.
- Explain the principles of each thyroid function test.
- Correlate laboratory information with regard to suspected thyroid disorders, given a patient's clinical data.
- Describe the appropriate laboratory thyroid function testing protocol to use to effectively evaluate or monitor patients with suspected thyroid disease.

Calcium Homeostasis And Regulation

- Describe the endocrine and organ physiology of calcium metabolism.
- Discuss the laboratory tools used to evaluate calcium metabolism.
- Apply the laboratory tools to clinical disease states of calcium metabolism.

Liver Function

- Diagram the anatomy of the liver.
- Explain the following functions of the liver: bile secretion, synthetic activity, and detoxification.
- List two important cell types associated with the liver and state the function of each.
- Define jaundice and classify the three different types of jaundice.
- Discuss the basic disorders of the liver and which laboratory tests may be performed to diagnose them.
- Evaluate liver-related data and correlate those data with normal or pathologic states.
- Compare and contrast how total and direct bilirubin measurements are performed.
- List the enzymes most commonly used to assess hepatocellular and hepatobiliary disorders.
- Describe the various types of hepatitis, to include cause, transmission, occurrence, physiology, diagnosis, and treatment.

Cardiac Function

- Diagram the anatomy of the heart.
- Explain the origin of six general symptoms of cardiac disease.
- Discuss the etiology and physiologic effects of the following cardiac conditions:

- Congenital heart disease
- Hypertensive heart disease
- Infectious heart disease
- Coronary heart disease
- Congestive heart failure
- Identify nine risk factors for coronary heart disease.
- List six features of an ideal cardiac marker.
- List and briefly describe three novel markers of inflammation currently under investigation.
- Compare and contrast the specificity and sensitivity of the most commonly used serum cardiac markers.
- Assess the clinical utility of the various cardiac markers to assess myocardial infarction.
- Analyze the role of the clinical laboratory in the assessment of a patient with cardiac disease.
- Assess the usefulness of point-of-care cardiac markers and the role of the clinical laboratory in the use of these methods.

Renal Function

- Diagram the anatomy of the nephron.
- Describe the physiologic role of each part of the nephron: glomerulus, proximal tubule, loop of Henle, distal tubule, and collecting duct.
- Describe the mechanisms by which the kidney maintains fluid and electrolyte balance in conjunction with hormones.
- Discuss the significance and calculation of glomerular filtration rate and estimated glomerular filtration rate using estimation equations.
- Relate the clinical significance of total urine proteins, urine albumin, microalbuminuria, serum β 2-microglobulin, and cystatin C.
- List the tests in a urinalysis and microscopy profile and understand the clinical significance of each.
- Describe diseases of the glomerulus and tubules and how laboratory tests are used in these disorders.
- Distinguish between acute and chronic renal failure.
- Discuss the therapy of chronic renal failure with regard to renal dialysis and transplantation.

Pancreatic And Gastrointestinal Function

- Discuss the physiologic role of the pancreas in the digestive process.
- List the hormones excreted by the pancreas, together with their physiologic roles.
- Describe the following pancreatic disorders and list the associated laboratory tests that would aid in diagnosis: acute pancreatitis, chronic pancreatitis, pancreatic carcinoma, cystic fibrosis, and pancreatic malabsorption.
- Describe the physiology and biochemistry of gastric secretion.
- List the tests used to assess gastric and intestinal function.
- Explain the clinical aspects of gastric analysis.
- Evaluate a patient's condition, given clinical data.

Body Fluid Analysis

- Describe the physiologic purpose of amniotic fluid, cerebrospinal fluid, sweat, synovial fluid, pleural fluid, pericardial fluid, and peritoneal fluid.
- Discuss the clinical utility of testing amniotic fluid, cerebrospinal fluid, sweat, synovial fluid, pleural fluid, pericardial fluid, and peritoneal fluid.
- Interpret a patient's status, given the results of a TDxFLM II test, L/S ratio, lamellar body count, CSF protein analysis, and sweat chloride test.
- Differentiate between a transudate and an exudate.

Therapeutic Drug Monitoring

- Discuss the characteristics of a drug that makes therapeutic drug monitoring essential.
- Identify the factors that influence the absorption of an orally administered drug.
- Relate the factors that influence the rate of drug elimination.
- Define drug distribution and the factors that influence it.
- Calculate volume of distribution, elimination constant, and drug half-life.
- Relate the concentration of a circulating drug to pharmacokinetic parameters.
- Name the therapeutic category of common drugs.
- Describe the major toxicities of common drugs.
- Identify the features of a drug that may influence its serum concentration.

Toxicology

- Define the term *toxicology*.
- List the major toxicants.
- Define the pathologic mechanisms of common toxicants.
- Discuss the laboratory methods used to evaluate toxicity.
- Explain the difference between quantitative and qualitative tests in toxicology.
- Critically evaluate clinical laboratory data in poisoning cases and provide recommendations for further testing.
- Define the role of the clinical laboratory in the evaluation of exposure to poisons.

Circulating Tumor Markers

- Discuss the incidence of cancer in the United States.
- Explain the role of tumor markers in cancer management.
- Identify the characteristics or properties of an ideal tumor marker.
- State the major clinical value of tumor markers.
- Name the major tumors and their associated markers.
- Describe the major properties, methods of analysis, and clinical use of AFP, CA-125, CEA, beta-hCG, and PSA.
- Explain the use of enzymes and hormones as tumor markers.

Nutritional Assessment

- Discuss the contribution of individual nutrient classes to human metabolism.
- Discuss therapeutic nutrition support by enteral and parenteral routes.
- List biochemical parameters used to monitor nutritional status.

- Describe the biochemical roles of vitamins.
- Correlate alterations in vitamin status with circumstances of increased metabolic requirements, age-related physiologic changes, or pathologic conditions.
- Describe drug-nutrient interactions that influence vitamin status.
- Delineate laboratory procedures used in the assessment of vitamin status.
- Discuss the role of the laboratory in nutritional assessment and monitoring.
- List the populations at risk for malnutrition.
- Identify the plasma protein changes as a result of stress.
- Describe some of the electrolyte and mineral abnormalities associated with TPN.

Geriatric Testing

- Define aging, apoptosis, atherosclerosis, free radical, geriatrics, gerontology, homeostasis, menopause, and osteoporosis.
- Discuss the impact of geriatric patients on the clinical laboratory.
- Describe the current theories of aging.
- Appraise the physiologic changes that occur with the aging process.
- Identify the age-related changes in clinical chemistry analysis.
- Explain the problems associated with establishing reference intervals for the elderly.
- Describe the effects of medication on clinical chemistry results in the elderly.
- Discuss the effects of exercise and nutrition on chemistry results in the elderly.
- Correlate age-related physiologic changes and laboratory results with pathologic conditions.

Pediatric Testing

- Define the adaptive changes that occur in the newborn.
- Describe the developmental changes that occur throughout childhood.
- Discuss the problems associated with collecting blood from small children.
- Understand the role of point-of-care testing in pediatric settings.
- Summarize the changes that occur in children with regard to electrolyte and water balance, endocrine function, liver function, and bone metabolism.
- Explain how drug treatment and pharmacokinetics differ between children and adults.
- Discuss the procedures used to diagnose inherited metabolic diseases.
- Describe the development and disorders of the immune system.

Pathology Resident Clinical Chemistry Curriculum

Every Rotation

- Complete all case studies in designated reading in Bishop and submit to Dr. Franquemont.
- Review electrophoresis and immunofixation with Dr. Franquemont or other staff.
- Review all CAP surveys, linearity studies, calibration verification, etc. with Dr. Franquemont.
- Review laboratory procedures correlating with daily reading. Pay particular attention to assay
- principles used on automated analyzers.

- Serve as primary consultant for technologist and clinician questions.

Month 1

Spend one night observing instrument calibration- must complete QC reading first; coordinate with medical technologists.

Spend one morning observing Siemens Vista/Centaur and track system operation.

Spend one week on urinalysis bench.

Spend one week in electrophoresis laboratory observing and assisting with procedures.

Complete Month 1 quiz given by program coordinator.

Lectures: Biologic Variation and Autoverification, Reference Interval Determination

Month 2

Spend one morning observing Siemens Vista/Centaur and track system operation.

Spend one day per week on urinalysis bench.

Complete Month 2 quiz given by program coordinator.

Lectures: Method Evaluation, Immunoassay

Month 3

Spend one half day in ED observing POC operation.

Spend one morning observing Siemens Vista/Centaur and track system operation.

Spend one day per week on urinalysis bench.

Complete Month 3 quiz given by program coordinator.

Lectures: Point of Care Testing, Capital Purchasing

Month 4

Spend one night observing instrument calibration- coordinate with medical technologists.

Spend one morning observing Siemens Vista/Centaur and track system operation.

Spend one day per week on urinalysis bench.

Complete Month 4 quiz given by program coordinator.

Lectures: Your choice!

Supplemental reference material

- Tietz Textbook of Clinical Chemistry.
- Soldin: Pediatric Reference Intervals.
- Osler lectures and notes for Clinical Chemistry.
- Preanalytical Variation, Chapter 1, Clarke.
- The Nature of Biological Variation, Chapter 1, Fraser.
- Basic Principles and Practices, Chapter 1, Bishop.
- Method Evaluation and Quality Management, Chapter 4, Bishop, pp. 88-107, 116-125, problems 4-1, 4-2, 4-3, 4-7, 4-8, 4-9.
- Basic Lessons in Laboratory Quality Control, online tutorial,
- <http://www.qcnet.com/QCWorkbookBasicLessonsinLaboratoryQC/tabid/6520/language/en-US/Default.aspx>.
- Submit printed copies of all self-examinations from tutorial to Dr. Franquemont.
- Quality Control Procedure from PSF Procedure Manual.
- Electrophoresis and Chromatography, Chapter 5, Bishop, pp.145-153.
- Amino acids and Proteins, Chapter 10, Bishop.
- Lipids and Lipoproteins, Chapter 14, Bishop.
- Myoglobin, Chapter 18, Bishop, pp. 440-441.
- Cardiac Function, Chapter 25, Bishop.
- Biomarkers for Coronary Artery Disease and Heart Failure, Chapter 23, Clarke.

- Urinalysis, Chapter 31, Clarke.
- Body Fluid Analysis, Chapter 28, Bishop.
- Method Evaluation, Chapter 4, Bishop, pp.108-115, problems 4-4, 4-5, and 4-6.
- Spectrophotometry, Photometry, and Electrochemistry, Chapter 5, Bishop, pp. 130-145.
- Mass Spectrometry, Proteomics, and Osmometry, Chapter 5, Bishop, pp.154-160.
- Immunoassays, Chapter 7, Bishop.
- Principles of Immunochemical Techniques, Chapter 10, Tietz.
- Laboratory Safety and Regulations, Chapter 3, Bishop.
- Regulatory Issues, Chapter 14, Clarke.
- Electrolytes, Chapter 15, Bishop.
- Blood gases, pH, and Buffer Systems, Chapter 16, Bishop.
- Nonprotein Nitrogen Compounds, Chapter 11, Bishop, pp.266-276.
- Renal Function, Chapter 26, Bishop.
- GFR Estimating Equations, Chapter 28, Clarke, pp.364-366.
- Principles of Clinical Chemistry Automation, Chapter 6, Bishop.
- Evidence-Based Laboratory Medicine, Chapter 16, Clarke.
- Point of Care Testing, Chapter 9, Bishop.
- Analytic Techniques for Point of Care Testing, Chapter 5, Bishop, pp.163-165.
- Enzymes, Chapter 12, Bishop.
- Liver Function, Chapter 24, Bishop.
- Ammonia, Chapter 11, Bishop, pp.277-280.
- Carbohydrates, Chapter 13, Bishop.
- Pituitary Function, Chapter 19, Bishop.
- Gonadal Function, Chapter 21, Bishop.
- Thyroid Gland, Chapter 22, Bishop.
- Calcium Homeostasis and Hormonal Regulation, Chapter 23, Bishop.
- Pregnancy and Reproduction, Chapter 35, Clarke.
- Molecular Theory and Techniques, Chapter 8, Bishop.
- Porphyrins and Hemoglobin, Chapter 18, Bishop, pp.424-440.
- Adrenal Function, Chapter 20, Bishop.
- Pancreas and Gastrointestinal Function, Chapter 27, Bishop.
- Tumor Markers, Chapter 31, Bishop.
- Nutritional Assessment, Chapter 32, Bishop.
- Geriatric Patients, Chapter 33, Bishop.
- Pediatric Patients, Chapter 34, Bishop.
- Infectious Diseases, Chapter 44, Clarke.
- Pharmacokinetics, Chapter 40, Clarke.
- Therapeutic Drug Monitoring, Chapter 29, Bishop.
- Toxicology, Chapter 30, Bishop.

Appendix B: Microbiology Rotations

Areas of Knowledge

Bacteriology, virology, mycology, parasitology, mycobacteriology, infection control, hospital/medical epidemiology, statistics/study design, stool evaluation, serology, international health.

Put name and pager number on white board in microbiology department at start of each rotation

Month 1

Objectives

Introduction to microbiology, general principles and basic concepts.

Bacteriology, part 1.

Gram Stains.

Develop a basic knowledge of the appropriate collection of microbiologic specimens and the rationale for the culture setup techniques.

Develop and understanding of classification, identification, and associated diseases of bacteria.

Activites

Set ups.

Procedures for plates 1.

Procedures for plates 2.

SLIDE SETS

Gram stains box #1.

Gram stains box #2.

Reading

Medical Microbiology 8th ed. Chapters 1-4, 7-16, 18-21 and 23-29

Compendium of Clinical Pathology, 3rd ed. Pages 125-148

Compendium Companion for Clinical Pathology Questions 160-214

Month 2

Objectives

Bacteriology, part 2.

Antibiotic/ sensitivity testing/ bacterial resistance.

MicroScan – ID and antibiotic sensitivity.

Mycobacteriology.

Introduction to molecular and serologic testing.

Continued understanding of classification, identification, and associated diseases of bacteria and mycobacteria.

Become familiar with antibiotics.

Learn the methodologies used for bacterial antibiotic sensitivity testing including disc diffusion, MIC, and E-test.

Develop a basic knowledge of the techniques of automated bacteriologic identification and antibiotic sensitivity testing as performed on the MicroScan platform.

Become familiar with resistant bacterial strains.

Develop knowledge of the methods used for the immunologic diagnosis of disease.

Work on the serology benches and become familiar with semiautomated EIA testing performed on the Mago and Athena instruments.

Review mycobacterial setup, plate reading, Auramine and Kenyon staining.

Activities

MicroScan basic operation

MRSA PCR.

Mycobacterial culture ID.

Serology procedure.

Bacterial unknowns for work-up.

Reading

Medical Microbiology 8th ed. Chapters 5, 6, 17, 22, 30-35

Compendium of Clinical Pathology, 3rd ed. Pages 148-150

Compendium Companion for Clinical Pathology Questions 215-218

Month 3

Objectives

Virology

Review the common RNA and DNA viruses pathogenic in humans, the best specimens and diagnostic methods for each, and antiviral therapies. Study the methods of roll tube culture, shell vial growth, PCR, and serology.

Clinical Syndromes

Develop an overview of infections by body site and age, focusing on the most common organisms by site and age.

Infection Control

Acquire familiarity with the scope and activities of hospital infection control.

Agents of Bioterrorism

Become familiar with potential bioterrorism agents. Review the bioterrorism policy and procedure manual (PPM @ myvirtualworkplace.org).

Activities

Spend one day with hospital infection prevention team

Attend Infection Control Committee meeting

Reading

Medical Microbiology 8th ed. Chapters 36-56

Compendium of Clinical Pathology 3rd ed. Pages 76-93

Compendium Companion for Clinical Pathology Questions 1-90

Month 4

Objectives

Parasitology

Become familiar with the important groups of pathogenic human parasites.

Stool studies

Become familiar with methods of fecal analysis, including fecal occult blood testing, stool ova and parasite examination, and stool culture for bacterial and viral pathogens.

Mycology

Understand the common clinical fungi and their growth requirements.

Legal Reporting by county, state, CDC/NHIS

Understand the legally required disease reporting of identified infectious organisms to the county, state, and federal level. Gain an understanding of why and how infectious disease surveillance has been developed in the U.S.

Review the infectious disease surveillance reports generated by each of the government agencies at the county, state, and federal level; including El Paso County Department of Health, Colorado Health Department www.cdphe.state.co.us/dc; CDC *Morbidity and Mortality Weekly Report (MMWR)* www.cdc.gov

Review the prevalence and incidence of infectious diseases in the developing world. Review the seasonal influences on these diseases.

Lab Administration

Review the CAP Inspection Checklist for Microbiology and Serology.

Special Project

Choose one of the two:

Develop a Power Point presentation on an organism of your choice to include: organism classification and characteristics; microbiologic identification; geography, distribution, ecology; transmission and life cycle; diseases; treatment; control; infection control precautions; public health control; and biohazard issues.

Research the comparative microbiologic/serologic laboratory methods for a disease or organism. This can either be a topic of current interest and relevance to the microbiology lab for testing implementation or one of interest to you.

Activities

Spend one day on the fungal bench

Participate in fecal occult blood testing

Familiarize yourself with the O&P procedure

Parasite unknown slides

Reading

Medical Microbiology, 8th ed. Chapters 57-78.

Compendium of Clinical Pathology, 3rd ed. Pages 94-125.

Compendium Companion for Clinical Pathology Questions 91-159