



Chemical Pathology

Objectives for Six General Competencies in Clinical Chemistry

1. Patient Care

The resident, working with the Director of Chemistry and Toxicology, and Medical Technologists, will interpret laboratory tests, interact with clinicians, gather patient information, and participate in quality control and performance improvement activities. Specifically, the resident will be expected to:

1. Gather patient information, with guidance from the resident's attending physician, in order to elucidate unusual laboratory tests or test patterns. This process may include any or all of the following: 1) discussing the case with the clinicians, including attending physicians, residents, and nurses; 2) reviewing the chart; and 3) researching patient information available in the medical record; 4) discussing particular laboratory findings with the Medical Technologists
2. Prepare accurate and concise interpretive reports, with guidance from the resident's attending physician, including: 1) serum and urine protein electrophoresis; 2) serum and urine immunofixation electrophoresis; 3) cerebrospinal fluid (CSF) isoelectric focusing (multiple sclerosis panel), and other tests, as appropriate.
3. Participate, when possible, in the intraoperative parathyroid hormone testing procedure.
4. Contact and discuss, with help from the resident's attending physician, clinicians and other health care professionals concerning specimen problems, unusual results, the appropriateness of STAT test requests, requests for esoteric/send-out tests and other issues requiring input from the clinical laboratory.
5. Review "delta-check" printouts from General Chemistry once per week to assess cases for possible sample mix-ups and to locate interesting cases for investigation and cases with identifiable patterns (i.e. diabetic ketoacidosis).
6. Review quality control data (Levy-Jennings charts, etc.) once per rotation.

Methods of Evaluation

1. Oral examination
2. Observation (see checklist)
3. Written examination

2. Medical Knowledge

The resident is expected to have the necessary knowledge in medical physiology and the pathogenesis of disease to competently interact with clinicians, and use this knowledge as a



base upon which to learn the concepts of laboratory clinical chemistry. The resident will rotate through all areas of the chemistry laboratory, including General (automated) Chemistry, Special Chemistry, and Toxicology.



Reading Assignments:

1. Optimizing Laboratory Workflow and Performance	Henry, pp. 13-23
2. Preanalysis	Henry, pp. 24-36
3. Analysis: Principles of Instrumentation	Henry, pp. 37-63
4. Analysis: Clinical Laboratory Automation	Henry, pp. 64-72
5. Laboratory Statistics	Henry, pp. 109-118
6. Quality Control	Henry, pp. 119-134
7. Analytical Method Validation	Kyle Handouts
8. Clinical Laboratory Informatics	Henry, pp. 135-141
9. Evaluation of Renal Function, Water, Electrolytes...	Henry, pp. 169-190
10. Biochemical Markers of Bone Metabolism	Henry, pp. 193-209
11. Carbohydrates	Henry, pp. 210-225
12. Lipids and Dyslipoproteinemia	Henry, pp. 226-248
13. Cardiac Injury, Atherosclerosis, and Thrombotic Disease	Henry, pp. 249-258
14. Laboratory Accreditation	CAP Chemistry Checklist
15. Specific Proteins	Henry, pp. 259-272
16. Serum Protein Electrophoresis	Kyle Handouts
17. Clinical Enzymology	Henry, pp. 273-295
18. Evaluation of Liver Function	Henry, pp. 296-311
19. Laboratory Diagnosis of Gastrointestinal and Pancreatic...	Henry, pp. 312-328
20. Toxicology and Therapeutic Drug Monitoring	Henry, pp. 329-364
21. Evaluation of Endocrine Function	Henry, pp. 365-401
22. Reproduction Function and Pregnancy	Henry, pp. 402-416
23. Laboratory Tests in Pregnancy	Compendium, pp. 34-40

Bibliography:

Clinical Diagnosis and Management by Laboratory Methods, 22nd Edition, John Bernard Henry, M.D.; Elsevier Saunders Company, 2011

Quick Compendium of Clinical Pathology, 2nd Edition, Daniel D Mais, ASCP Press, 2009

Methods of Evaluation

1. Oral exam
2. Case Studies
3. Written exams (chapter quizzes and end of month exam)

3. Practice-Based Learning and Improvement

The resident will develop a systematic and methodical approach to the investigation and evaluation of clinically relevant lab testing. The resident will be expected to:



1. Attend and participate in the monthly Clinical Laboratory Performance improvement meeting.
2. Be familiar with the current quality assurance monitors in general and special chemistry.
3. Attend and participate in lab section meetings as requested.
4. Review the CAP inspection checklists for toxicology, general and special chemistry, and perform a “mock” inspection of one of these labs, and understand the regulatory requirements of the clinical chemistry laboratory (CAP, CLIA '88).
5. Review procedure manuals to familiarize themselves with the tests performed as well as the proper procedure format.
6. Locate interesting cases through interaction with clinicians, medical technologists, and review of "delta check" printouts, and investigate these cases through effective scientific literature searches using library, web-based and other educational resources.
7. Effectively use the laboratory information system (LIS) to enter, research, and track patient results, and use the intranet resources to obtain pertinent patient information.
8. Prepare and present interesting cases to fellow residents and attending physicians at the monthly interesting case conference.
9. Observe operations in each area of the laboratory, and be familiar with the different instruments and the platforms upon which each is based.

Methods of Evaluation

1. Oral exam
2. Observation (see checklist)
3. Written exam

4. Interpersonal and Communication Skills

Recognizing that the accurate and timely dissemination of information to coworkers and clinicians in both verbal and written form is of vital importance to the work of a pathologist and to patient care, the resident will be expected to:

1. Demonstrate the ability to communicate clearly, effectively and efficiently, both verbally and in writing.
2. Prepare accurate, succinct, and effective reports in the form of electrophoresis interpretative reports (serum, urine, and CSF), as well as written responses to clinician inquiries.
3. Present interesting cases to fellow residents, attending physicians, and clinicians in a clear and informative manner.
4. Demonstrate active listening skills.
5. Demonstrate the ability to independently prepare and deliver effective presentations using a variety of media including presentation graphics, slides, and overheads.
6. Demonstrate the ability to prepare photomicrographs with both film and digital methods, and successfully integrate the images into presentations.

Kyle

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8. Effectively and tactfully resolve conflicts.

Methods of Evaluation

1. Review of portfolio including electrophoresis reports, presentations, photomicrographs, written communications, and documentation of verbal interactions with clinicians
2. Oral exam
3. Observation (see checklist)

5. Professionalism

The resident will exhibit professional behavior while carrying out duties in the Clinical Chemistry rotations. Specifically, the resident will be expected to:

1. Demonstrate respectful behavior toward patients and health care professionals.
2. Dress in a professional manner with a clean white full-length lab coat.
3. Maintain strictest patient confidentiality with all clinical and personal information.
4. Respond promptly and courteously to all pages and calls.
5. Regularly and punctually attend conferences, meetings, and other obligations, particularly the weekly required Clinical Pathology Conference.
6. Demonstrate compassion and empathy when dealing with patients.
7. Demonstrate a commitment to professional development by keeping abreast of developments in the medical literature by independent reading and research.
8. Assume responsibility commensurate with level of training, and, when in doubt, seek help from attending physicians, medical technologists, and senior residents.

Methods of Evaluation

1. Observation (see checklist)
2. Oral exam

6. Systems-Based Practice

The resident will understand how clinical chemistry and toxicology relate and integrate into the health care system as a whole. The resident will be expected to:

1. Demonstrate awareness and understanding of the role of the clinical laboratory in the health care system and the importance of reliable, cost-effective, and timely laboratory data in clinical decision making
2. Demonstrate familiarity with different models of health care delivery and the impact on laboratory reimbursement



3. Attend the monthly clinical laboratory performance improvement meeting where performance monitors, problems, needs, and budgetary items are discussed.
4. Demonstrate an understanding of budgeting, inventory management, purchasing of consumables as well as capital assets (instruments), and depreciation.
5. Understand the methods of equipment acquisition, i.e. purchase vs. reagent rental, and the benefits and drawbacks of each method

Methods of Evaluation

1. Oral exam
2. Observation (see checklist)
3. Written exam



CHEMISTRY ROTATION CHECKLIST

- _____ Read and understand rotation objectives and assignments
- _____ Observe operations in each area of the laboratory
- _____ Prepare accurate and concise interpretive electrophoresis reports
- _____ Participate in intraoperative parathyroid hormone testing whenever possible
- _____ Review “delta check” results once per week
- _____ Review monthly quality control data
- _____ Complete reading assignments and open-book questions
- _____ Attend monthly clinical laboratory performance improvement meeting
- _____ Review CAP checklists
- _____ Perform mock inspection of either general chemistry, automated chemistry or toxicology (Chemistry 2)
- _____ Review procedure manuals
- _____ Participate in the end of the month Clinical Pathology Conference
- _____ Attend weekly clinical pathology conferences
- _____ Complete a comprehensive written exam