CLINICAL PERFORMANCE OBJECTIVES IN HEMATOLOGY
DEPARTMENT OF MEDICAL AND RESEARCH TECHNOLOGY
UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE
SPRING 2008

Upon completion of the Hematology clinical rotation, the MT student will be able to:

I. SPECIMEN HANDLING AND PROCESSING/LABORATORY SAFETY

1. Comply with the standard operating procedure for specimen handling and distribution.

2. Follow departmental protocol, demonstrate safe work practices by:

    - Wearing personal protective equipment (PPE) as required.
    - Handling and disposing of contaminated materials according to standard precautions.
    - Handling chemicals according to safety procedures.

3. Accept only specimens that meet standard laboratory protocol.

4. Describe corrective measures for samples that are lipemic, icteric or contain paraproteins.

5. Describe corrective measures for samples that are rejected due to quantity not sufficient, wrong anticoagulant, cold agglutinin, clotted, hemolyzed, improper patient identification, or improper tube collected.

II. QUALITY CONTROL, QUALITY ASSURANCE, REGULATORY ISSUES

1. Evaluate Quality Control results according to criteria established for each test.

2. Describe the various periodic (daily, weekly) maintenance routine for each piece of equipment used during clinical rotations.

3. Observe basic computer applications where relevant.

4. Document instrument maintenance and quality control.

5. Complete all work within established turn around time.

6. Report critical and discrepant results to clinical instructor/supervisor.

7. State the confidentiality policy of the facility during testing procedures and reporting according to HIPPA guidelines.

8. Describe the process used to implement a new lot number of control material.

III. Technical Procedure for Hematology

1. Operate automated hematology instrumentation with minimal supervision and within acceptable ranges.
2. Perform non-automated hematology testing with minimal supervision and within acceptable ranges.

3. Using the automated hematology analyzer, perform a minimum of 40 CBC's and differentials.

4. Recognize abnormal flags on automated instrumentation.

5. Recognize all critical values and/or discrepant results on CBC's and differentials.

6. Report all critical values and/or discrepant results on CBC's and differentials to the clinical instructor.

7. Identify the corrective actions necessary for abnormal automated results.

8. Differentiate between normal and abnormal scattergram (plot) patterns.

9. Identify normal (reference) values for the following routine assays:

   - WBC count
   - RBC count
   - Hemoglobin
   - Hematocrit
   - RBC indices
   - platelet count
   - Sedimentation rate
   - Reticulocyte count

10. Demonstrate proper technique in preparing peripheral smears for microscopic examination to the satisfaction of the clinical instructor.

11. Evaluate a minimum of *20*-25 peripheral blood smears for acceptable cellular distribution and staining to the satisfaction of the clinical instructor.

12. Perform a minimum of *20*-25 peripheral smears with a combination of normal and abnormal results with 95% proficiency.

13. Prepare (or discuss performance of) manual WBC and platelet counts according to standard operating procedure with 95% proficiency, where applicable.

14. Perform (or discuss performance of) manual WBC and platelet counts using the hemacytometer method and with 95% accuracy.

15. Identify abnormal red cell morphologies to include: microcytes, macrocytes, ovalocytes, spherocytes,target cells, sickle cells, schistocytes, burr cells, teardrops, acanthocytes, and rouleaux.

16. Grade abnormal red cell morphologies according to laboratory guidelines.

17. Identify qualitative white cell inclusions to include: toxic granulation, toxic vacuolization, Döhle bodies, Auer rods.

18. Identify red cell inclusions to include: Howell Jolly bodies, Pappenheimer bodies, basophilic stipling, siderotic granules, Heinz bodies.
19. Grade hypochromia and polychromasia according to laboratory guidelines.

20. Given a peripheral smear or kodachrome slide, identify the stages of immature white cells.

21. Given a peripheral smear or kodachrome slide, identify the stages of immature red blood cells.

22. Correct the WBC count for nucleated red blood cells according to laboratory guidelines.

23. Given a peripheral smear or kodachrome slide, recognize, but not speciate, malarial forms.

24. Recognize abnormal platelet morphology.

25. Perform or discuss reticulocyte counts. If performed, the results should be within 20% of technologist-recorded result.

26. If available, prepare a minimum of 5 manual platelet counts according to the standard operating procedure.

27. If available, perform a minimum of 5 manual platelet counts using the hemacytometer method and with 90% accuracy.

28. Explain the principle of the ESR and factors which might interfere with accurate results.

29. Perform the ESR with minimum supervision and within acceptable ranges.

30. Describe or perform a sickle cell screen (solubility test).

31. Discuss the interpretation a sickle cell screen according to laboratory guidelines.

32. Associate abnormal hematological results with possible pathology.

33. Given electrophoretic patterns, recognize the normal and abnormal hemoglobin patterns on electrophoresis at pH 8.6 (A, F, S, C, A_2, E, H, Barts, Lepore).

34. Assist in the proper preparation, staining, and review of bone marrow aspirate.

35. Discuss the use of cytochemistry for classification of acute leukemias.

36. Discuss the use of flow cytometry in the classification of acute leukemias.

37. Compare and contrast the chronic and acute leukemias in terms of onset and major cell type.

38. Discuss the myleoproliferative and myelodysplastic disorders with reference to FAB and WHO classification, and hematologic lab findings.

39. Perform (or discuss performance of) one (1) body fluid manual cell count and differential.

40. Recognize cells specific to each body fluid type to include:

- Histiocytes,
- Mesothelial cells
- Malignant cells
- Macrophages with inclusion
- Crystals
- Bacteria
- Yeast

IV. TECHNICAL PROCEDURES FOR COAGULATION

1. Perform a minimum of 10 Prothrombin times and Partial thromboplastin times.

2. Discuss the principles of the following procedures and the reagents used:

- PT
- PTT
- Thrombin time
- Quantitative fibrinogen
- FSP
- D-dimer

3. Describe or perform:

- quantitative fibrinogen
- thrombin time
- FSP
- D-dimer matching technologist results.
- describe the laboratory testing used to monitor anticoagulant therapy

4. Describe possible pathologic complications of anticoagulant therapy.

5. Describe the intrinsic and extrinsic coagulation pathways.

6. Propose appropriate laboratory test to identify factor deficiencies.

7. Describe the appropriate steps taken when the QC is out of range.

8. Identify common pre-analytic variables that may adversely impact patient results, including:
   - Sample selection
   - Storage (***PT vs APTT samples***)
   - ***Instrument check (Ph , temperature)***

- type of anticoagulant
- short draw
- clotted sample
- Hematocrit >55
- lipemia
- hemolysis
- type of tube(glass vs plastic)

9. Correlate common coagulation and platelet disorders with available patient history, information and coagulation test results.

10. Describe possible pathologic complications of anticoagulant therapy, ***including LMWH, heparin, coumadin, and other market available anticoagulants.***

11. When given patient history and coagulation test results, correlate thrombotic disorders with available patient history and coagulation test results.

12. In addition to the procedures listed above, discuss the principle, clinical significance, and reagents used for the following coagulation tests:

    - Factor assays
    - Mixing studies
    - Lupus anticoagulant (anticardiolipin assay)
    - Factor 5 Leiden
    - Protein S
    - Protein C (this should be included for MLT also)
    - Antithrombin assay

V. PROFESSIONAL QUALITIES

1. Arrive at the laboratory on time.

2. Adhere to the established student uniform policy.

3. Notify the clinical supervisor of any unavoidable absences prior to the scheduled arrival time and make arrangements to make up the time on a mutually convenient date.

4. Demonstrate the ability to follow verbal and written instructions.

5. Communicate in a constructive, professional manner (i.e. polite, considerate, pleasant and unhurried) with members of the laboratory and hospital staff, peers and patients.

6. Organize work in a logical sequence.

7. Complete work and assignments within established deadlines.

8. With the approval of the clinical instructor, demonstrate the initiative to perform tasks without being reminded.

9. Demonstrate constructive utilization of all training time by examining available study materials during periods of time not devoted to instruction.

10. Demonstrate flexibility in changes to the scheduled daily learning activities due to laboratory staffing, emergencies, etc.

11. Demonstrate the ability to recognize and admit mistakes or discrepancies and take appropriate corrective measures, including seeking help when needed.

12. Demonstrate the ability to accept professional constructive criticism regarding work.

13. Maintain the confidentiality of all patient information when questioned by patients or other unauthorized individuals.

14. Adhere to all published safety regulations in the laboratory.

15. Demonstrate professionalism in attitude, appearance and work ethic 100% of the time.