

HEMATOLOGY, COAGULATION & MEDICAL MICROSCOPY LABORATORY ROTATION

Rotation Director: Neil S. Harris, M.D., Associate Professor

1. Description: This rotation consists of one-on-one daily meetings between the resident and the attending staff. Each session is ~60 minutes. The purpose of these sessions is to discuss pertinent cases, methodologies, disease states, test ordering and test interpretation. The resident is expected to take part in the consultative activities of the service including laboratory hematology, coagulation, and medical microscopy (body fluids). Training is facilitated through a mix of didactic materials, laboratory exercises, on-call responsibilities, and management experiences. The residents will be trained in general and specialized hematology, and blood coagulation.

The remainder of the day is dedicated to independent study part of which can be dedicated to a research project or a project oriented towards solving a laboratory problem. As appropriate to the individual case or consultation under review, the ethical, medicolegal, and cost-containment issues are reviewed and discussed. As well, research design, statistics and critical review of the literature are discussed

2. Goals of the Rotation: The resident will be able to: 1) describe principles, limitations, interference and quality control criteria for automated complete blood count; 2) interpret abnormal scattergrams of automated CBC and select appropriate follow-up procedures 3) evaluate peripheral blood smears associated with quantitative and qualitative abnormalities in red cells, leukocytes and platelets 4) describe principles, limitations, interference and quality control for various coagulation instruments and assays; 5) determine underlying causes for various abnormal coagulation test results 6) describe laboratory diagnosis of hemoglobinopathies including electrophoretic methods, hemoglobin solubility, red cell morphology and red cell indices; 7) recognize commonly encountered cells in CSF, pleural and peritoneal samples; 8) recognize commonly encountered crystals in synovial fluid. 9) Be aware of important management issues, medical/legal issues, and cost containment and test utilization.

3. Duration of the rotation: 4 weeks

4. Duties and responsibilities of residents: The resident will interpret and provide consultative reports on abnormal blood counts, differential counts, coagulation tests, hemoglobin analysis, red cell functional studies, platelet function studies, cellular and crystal analysis of body fluid. The resident will be involved in approval of off-hour requests for complex tests. Complicated cases will be assigned to the resident for study, assessment, and presentation. This provides graduated responsibility.

5. Teaching staff: Neil S. Harris, M.D.; Glen Hortin, M.D.; William E. Winter, M.D

6. Resident Supervision: Initially, the resident will be closely supervised by the attending pathologist. By the end of the rotation, the resident should be able to assume responsibility of the attending pathologist under minimal supervision (graduated responsibility). Reports are generated in concert with the attending faculty and signed out by the attending faculty. Calls are discussed and reviewed during call report.

Core Curriculum List for Hematology Lab Rotation

Our residents are expected to become familiar with the following core curriculum subjects during the Hematology Lab. Rotation.

A) **Quality Control, Basic Statistics, Method Validation, Proficiency Studies. Laboratory Information Systems (LIS)**

B) **Automated CBC, ESR, Manual Differential, and Blood Cell Morphology: Methodology and Clinical Correlation**

C) **Anemia:** Classification, Diagnosis, and Morphology

D) **Red Cell Functional Testing:**
Osmotic fragility, G6PD screen

E) **Hemoglobin Analysis and Hemoglobinopathies:** Clinical features, diagnosis and management.

F) **Biochemistry and Biology of Hemostasis**

i. Biology of Coagulation and anti-coagulation Systems, Endothelial cells and Platelets

ii. Coagulation Tests: Assay methods and principles, Pre-analytical variables, PT, aPTT, TT, mixing studies, fibrinogen assay, one-stage coagulation factor assays, coagulation factor inhibitor assays, D-dimer assay, antithrombin assay, protein C assay, protein S assay, von Willebrand factor (vWF) assay, ristocetin-cofactor assay, vWF multimer assay, platelet functional assays, lupus anticoagulant activity; heparin and LMW heparin assay (ant-Xa assay), anti-phospholipid antibodies, anti-cardiolipin antibodies, heparin-platelet factor 4 antibodies.

iii. Bleeding Disorders: Pathophysiology, clinical features, diagnosis and management.

iv. Hypercoagulability: Pathophysiology, clinical features, diagnosis and management.

v. Quantitative and Qualitative Platelet Disorders: Clinical features, diagnosis and management.

vi. Heparin Induced thrombocytopenia: Pathophysiology and diagnosis

vii. Anticoagulation therapy and laboratory monitoring.

G) **Compensated polarized light microscopy and examination of synovial fluid**

Hematology Laboratory Goals:

1. Receive instruction from the technical specialists on the basic set-up, maintenance, layout and LIS connection of the main hematology and coagulation analyzers
2. Review of peripheral blood smears, cytopspins of body fluids
3. Interpret abnormal cells seen on examination of peripheral smear (confirm blasts, immature cells, etc.)
4. Interpretation of functional platelet aggregation responses.

5. Resolve discrepant results.
6. Approval of factor assays, *stat* hemoglobin analysis, correction of mislabeled samples.
7. Interpret synovial fluid for crystals.
8. Work up of abnormal coagulation test results.
9. Unexpected technical or medical problems (e.g. platelet clumping; no detectable clot; discrepant RBC count and Hb result)

REFERENCES

1. *Hematology: Clinical Principles and Applications*. 3rd Edition 2007. Rodak, BF, Fritsma GA and Doig, K. Saunders/Elsevier.
2. *Quick Compendium of Clinical Pathology* 2nd Edition 2008. Mais DD. American Society for Clinical Pathology
3. *Henry's Clinical Diagnosis and Management by Laboratory Methods*. 21st Edition 2007 McPherson RA, Pincus MR.(Eds) Saunders/Elsevier
4. *Color Atlas Of Hematology*. Glassy, E.F. (Editor). 1998. CAP Hematology & Clinical Microscopy Resource Committee. College of American Pathologists (CAP) 2003. 325 Waukegan Road, Northfield IL 60093-2750.
5. *Hemoglobinopathy Diagnosis*. Bain BJ.Blackwell Science Ltd. 2001. Oxford, London, Edinburgh (UK), Malden MA (USA).
6. *Color Atlas of Hemoglobin Disorders. A compendium based on proficiency testing*. Hoyer JD and Kroft SH (Eds). College of American Pathologists (CAP) 2003. 325 Waukegan Road, Northfield IL 60093-2750.