SAINT LOUIS UNIVERSITY DEPARTMENT OF PATHOLOGY

HEMATOPATHOLOGY/IMMUNOLOGY ROTATION

I. GOALS AND OBJECTIVES

During Immunopathology/Hematopathology Laboratory rotations, pathology residents develop an understanding and acquire knowledge of diagnostic hematopathology. Emphasis is placed on diagnosis of the various types of leukemia/lymphoma by surface marker expression in conjunction with morphologic analysis. The integration of additional information (clinical, cytogenetic and molecular data) is stressed. Residents are responsible for comprehensive sign-outs of all bone marrow biopsies and aspirates and malignant lymph node biopsies and other biopsies submitted for evaluation for lymphoma. Residents will also understand the laboratory principles and procedures using immunologic technique in diagnostic hematopathology, e.g., immunoperoxidase, enzyme cytochemistry and flow cytometry. During the elective rotation, research in ongoing projects in lymphoma/leukemia, and bone marrow transplantation is available. Basic knowledge of computer applications can be gained with computers available and used for data gathering and collation.

II. DURATION OF THE EXPERIENCE

The hematopathology/flow rotation is three months in length, two months initially with one additional month later. One to six month elective rotations are also available.

III. DUTIES AND RESPONSIBILITIES

A. SERVICE

1. Sign out all cases daily in required turn around times (24-48 hours) with attending.

   - All diagnostic hematopathology cases
   - All lymphomas including morphology, flow cytometry, immunoperoxidase stains
   - All leukemia including smears, touch preps, enzyme cytochemistries, flow cytometry
   - Flow cytometry studies with monoclonal Abs
   - Correlate results of EM, molecular and cytogenetic findings into final reports
   - Bone marrow harvest and peripheral stem cell collection
   - Comprehensive sign-outs of bone marrow biopsies from SLUH (See attached Bone Marrow Worksheet)

2. Communicate daily with referring physicians and pathologists; assure prompt reporting of results.

3. Participate in administration of laboratory, quality assurance and laboratory computer applications.
4. Perform adequate number of bone marrow aspirations/biopsies under the supervision of Dr. Petruska to have proficiency of a beginning practitioner.

Adult Bone Marrow Biopsies – The SLUH lab contacts the Flow Lab regarding scheduling of bone marrow biopsy. The pathology resident goes to patient room at scheduled time, accompanying the lab technologist to Hematology-Oncology exam room. The resident observes Dr. Petruska or Heme/Onc fellow during first procedure and then participates in performing subsequent bone marrow biopsies. The number of procedures performed by the resident depends upon his/her interest, proficiency, and number of procedures during rotation. All residents perform bone marrow aspiration and biopsy techniques at the bedside.

B. RESEARCH - For Senior Residents  Senior residents have all of the above duties and responsibilities and in addition complete a research project.

1. Presentation at national meeting and manuscript preparation is encouraged and funded. See resident handbook for details regarding meeting attendance and funding.

2. One or more of the following subjects can be studied in depth using case material available in the Division of Hematopathology:

- Myeloproliferative Disorders
- Myelodysplastic Syndromes
- Acute Myelogenous Leukemias
- Acute Lymphoblastic Leukemias
- Other types of acute leukemia
- Hodgkin’s Disease
- Non-Hodgkin’s Lymphomas
- Post-transplant lymphoproliferative disorders
- Chronic Myelogenous Leukemia
- Chronic Lymphocytic Leukemia
- Chronic T-cell Lymphoproliferative Processes
- Natural Killer Cell Disorders
- Histiocytic Disorders

C. COMPETENCIES (Listed for skill level; I: first rotation, II: Second rotation and electives).

Medical Knowledge
Skill Level 1
Flow Cytometry
Understand clinical indications for flow cytometric evaluation of blood, bone marrow, body fluid, and solid tissue
Understand physical components and physical principles of a flow cytometer
Understand QC procedures unique to flow cytometry
Understand principles of routine flow cytometry evaluation of leukocytes including both surface and intracellular markers and recognition of clonal abnormalities
Understand principles of tests designed to evaluate DNA content and cell cycle
Understand diagnostic and prognostic information provided by flow cytometry
Understand principles of lymphocyte subset analysis including knowing commonly used antigens to define T-cell, B-cell and NK-cell subsets
Observe/perform lymphoma/leukemia panels on blood, bone marrow and solid tissue (lymph node, spleen, other)
Recognize patterns of antigen expression for common neoplastic and reactive conditions (AML, ALL, common non-Hodgkin lymphomas)
Interpret CD34 counts for stem cell transplant
Interpret specific flow cytometric abnormalities associated with immunodeficient states

Lymph Nodes
Understand principles of gross examination of lymph nodes including indications, procedures for specimen preparation for special studies
Recognize normal and abnormal lymph node and spleen morphology
Understand the normal patterns of lymph node development and activation

Bone Marrow
Understand the clinical indications for bone marrow biopsy
Understand the diagnostic limitations of bone marrow aspiration and biopsy
Learn technical aspects of performing and analyzing bone marrow aspiration and biopsy
Identify sites of acquisition in adults and children
Learn handling and interpretation of bone marrow specimens including special stains
Accurately assess bone marrow cellularity and M:E ratio
Recognize effects of chemotherapy and growth factor stimulation on blood and bone marrow
Understand common drug effects leading to cytopenias
Accurately identify storage iron
Understand hematopoiesis and distinguish the stages of maturation in each cell series
Know the major hematopoietic regulatory factors/cytokines
Recognize normal WBC, RBC, and platelet maturation as well as dysplasia

Skill Level II
Flow Cytometry
Evaluate and Interpret results of flow cytometry in conjunction with cytochemistry, immunocytochemistry, immunohistochemistry,
morphology, cytogenetic and molecular data as related to hematopoietic and lymphoproliferative disease
Understand the characteristic clinical, morphologic, immunophenotypic, cytochemical, cytogenetic/molecular features of acute myeloid leukemia, myelodysplastic syndrome, plasma cell dyscrasia (multiple myeloma, MGUS), Hodgkin and Non-Hodgkin lymphoma, chronic lymphoproliferative disorders, posttransplant lymphoproliferative disorders
Understand the principles for minimal residual disease analysis

Lymph Node
Recognize and be able to diagnose lymphomas, lymphoproliferative disorders
Understand the relative value of different diagnostic modalities
Recognize and diagnose reactive and autoimmune lymphadenopathies, storage disorders
Recognize the presence of metastatic disease in a lymph node

Bone Marrow
Understand pathophysiology, clinical finding, etiology and expected bone marrow findings for vitamin deficiency, hemoglobinopathies, leukemias, myeloproliferative disorders, myelodysplastic syndromes, plasma cell dyscrasias, and mast cell diseases
Integrate bone marrow morphology, cytochemistry, immunophenotypic/molecular/cytogenetic analysis in the differential of acute and chronic leukemia, lymphomas, myeloproliferative and myelodysplastic disorders
Integrate peripheral blood smear and bone marrow findings to render a preliminary diagnosis
Know post-therapy findings seen after treatment for leukemia and temporal relationships to marrow regeneration post-therapy
Recognize the bone marrow manifestations of infections

Patient Care (All Skill Levels)
Gather essential and accurate historical and clinical data relevant to the current cases
Develop a plan of analysis to evaluate the current specimen
Understand therapeutic implications of diagnosis Understand procedural aspects of bone marrow aspiration and biopsy
Understand different types of stem cell transplants

Practice Based Learning and Improvement (All Skill Levels)
Demonstrate ability to critically assess scientific literature
Demonstrate knowledge of evidence based medicine and apply its principles in diagnosis

Interpersonal Communication Skills (All Skill Levels)
Demonstrate ability to construct a complete, concise, articulate report including clear diagnosis.
Demonstrate ability to provide direct communication with referring physician when an urgent, critical or unexpected finding is encountered
Choose effective modes of communication
Demonstrate skills in educating colleges and other healthcare professionals including but not limited to residents, medical technologists and transcriptionists. Participate in and present cases at the required conferences listed below.

Professionalism (All Skill Levels)
Demonstrate compassion and respect for patients, their family and staff
Interact with others without discriminating
Demonstrate positive work habits including punctuality, dependability and responsibility
Demonstrate principles of confidentiality with all information transmitted
Demonstrate a commitment to professional excellence

Systems-Based Practice (All Skill Levels)
Demonstrate understanding of role of flow cytometry laboratory in patient management
Demonstrate ability to design effective diagnostic plans
Demonstrate knowledge of basic healthcare reimbursement issues
Demonstrate knowledge of laboratory regulatory agencies and their rules and regulations, including HIPPA regulations
Understand policies to continually improve patient care

IV. TEACHING STAFF
Leonard Grosso, M.D., Ph.D., Professor, Department of Pathology, 3rd Floor Cancer Center, Saint Louis University, office phone: 577-8482, and Saint Louis University Medical School, 4th Floor, office phone: 977-7875.

Richard Hoover, M.D., Professor, Department of Pathology, 3rd Floor Cancer Center, Saint Louis University, office phone: 577-8784

V. REQUIRED CONFERENCES AND ROUNDS
Attendance is required at all general Department of Pathology conferences including. Surgical Pathology Unknown Conference, Laboratory Medicine Rounds, Chairman's Rounds, and Autopsy Conference. Additionally the resident will attend Hemostasis Conference and Leukemia/Lymphoma Conference. The resident is responsible for presenting at least two cases at weekly Laboratory Medicine Rounds and at least two cases at Friday Surgical Pathology Unknown Conference.

VI. MANNER OF SUPERVISION AND EVALUATION
Residents are primarily supervised and evaluated throughout their rotation by the attending pathologist and the hematopathology fellow (if present). Residents are evaluated based on their diagnostic and technical ability, their problem solving skills and participation in laboratory activities. Residents will be evaluated using the standard pathology resident evaluation form.
An exam is taken at the completion of the rotation. The evaluation will be completed and discussed with the resident at the end of the rotation.

Residents are responsible for obtaining an evaluation of competence to perform bone marrow biopsies from a hematologist. All residents must have demonstrated competence in bone marrow biopsy procedure before completing the pathology residency.

VII. OUTCOME ASSESSMENT METHODS

Documentation of outcome testing: The method used to objectively assess the resident is by the ASCP in-service examination. In addition at the conclusion of the rotation, residents are given a written examination (that may include unknown slides/cases) by the attending hematopathologist.

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