DIVISION OF HEMATOPATHOLOGY

HEMATOPATHOLOGY HANDBOOK FOR RESIDENTS

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General Outline for Hematopathology Rotations

Core Rotation for Residents

The approximately four-month core hematopathology rotation offers the resident an **introduction** to the many facets of this complex field. The rotation is divided into It is hoped that the resident will begin to become familiar with the multiparameter approach to adult and pediatric diagnostic hematopathology (bone marrows and lymph nodes) as well as with techniques used in general and special hematology laboratories, and the flow cytometry laboratory. Finally he/she will learn about major neoplastic and non-neoplastic disease entities that involve the hematopoietic and lymphoid cell lineage. If interested, more advanced subsequent rotations can be arranged in one or more areas within the division. It is fully recognized that the resident cannot fully achieve all of the objectives listed within a period of four months. The different sections within the rotation are usually, but not always carried out in the order they are listed here. The educational resources noted below are located in rooms 330 (conference room), 334 (bone marrow sign-out room) and 344 (lymph node sign-out room) depending on their subject matter. Cytogenetics is a separate rotation, but residents will learn how cytogenetic data is used in diagnostic hematopathology.

Procedures

Hematology/Special Hematology laboratory procedures may be viewed at:
http://www.medialabinc.net/ (See division coordinator for specific usernames and passwords)

- First, under “Viewing”, select “PUH CP”.
- Select “View Documents & Manuals” Tab
- Choose Manuals under left hand menus for “View Documents & Manuals”
- Then choose appropriate manual
- “Automated Testing Laboratory” for Hematology manual or
  “Special Hematology” for bone marrow, lymph node, and flow cytometry related manuals and procedures.

Syllabus Statement Concerning Students with Disabilities

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact Dr. Swerdlow, Dr. Bailey, or their designate prior to your rotation so reasonable accommodations can be made.

Elective Rotations

This handbook also serves as a resource for upper level resident rotations that can concentrate on any of the areas in hematopathology.

Fellow Rotations

This handbook also is a major supplement to the fellow handbook as they also follow the basic procedures outlined here for the rotations that overlap with hematopathology resident rotations. The expectations are greater for the fellows in terms of their knowledge base, clinical skills and ability to utilize multiple resources to make specific diagnoses. Accordingly they are given enhanced responsibilities.

Hematopathology Core Resident Rotation

First Rotation	
Week	**Activities**
1	Orientation with Dr. Bailey or designee. Laboratory hematology/Clinical marrow experience/Flow lab rotation
2	Pediatric marrow/ATL
3	Adult marrow

4	Adult marrow
5	Pediatric marrow/ATL
6	Lymph node
7	Lymph node
8	Lymph node

Second Rotation	
Week	**Activities**
1	Lymph node
2	Lymph node
3	Lymph node
4	Pediatric marrow/ATL
5	Adult marrow
6	Adult marrow
7	Adult marrow
8	Flow cytometry service/ATL

1. Lymph Node Pathology (~ 6 weeks across 2 rotations)

1. Lymph Node Sign Out.
2. Review of educational materials (See Lymph Node Experience section).

Goals and Objectives:

1. Learn the use of multiparameter approach to diagnostic lymph node pathology as well as extranodal hematopoietic/lymphoid proliferations.

2. Learn normal nodal histology and basic reactive patterns.

3. Begin to develop a basic understanding of Hodgkin's Lymphoma, the non-Hodgkin's lymphomas and reactive lymphoid hyperplasias. Be able to diagnose straightforward cases of the above.

4. Complete lymph node rotation checklist.

2. Pediatric Hematopathology and General/Special Hematology Laboratory Experience (~ 3 weeks across 2 rotations)

Trainees should report to the pathologist signing out CHP bone at the start of the rotation. This period should also be used to review the ASCP image series on normal and abnormal peripheral blood and bone marrow examinations.

Pediatric Hematopathology Experience

1. Introduction to basic bone marrow/peripheral blood interpretation.

2. Pediatric Bone Marrow Sign out.

3. Observation of pediatric marrow examination procedures.

4. Review pediatric material from Automated Testing Laboratory and Flow Cytometry Laboratory.

5. Review of educational materials (See Pediatric Hematopathology Experience section).

Goals and Objectives:

1. Develop basic skills in the interpretation of peripheral blood, bone marrow and fluid evaluations.

2. Develop familiarity with issues unique to pediatric hematopathology, both pathologic and clinical.

3. Develop basic skills in hematopathologic ancillary studies.

4. Complete pediatric hematopathology checklist.

5. Complete pediatric bone marrow observation form.

3. General/Special Hematology Laboratory Experience (Monday-Tuesday of first rotation week).

Understanding general laboratory hematology testing is a critical part of the hematopathology rotation experience. This component of the rotation will be at the ATL laboratory in the CLB.

1. Automated Testing Laboratory Experience.

2. Special Hematology Testing Experience.

3. Review of educational materials.

Goals and Objectives:

1. Learn the major aspects of non-neoplastic hematology including red blood cell, white blood and platelet abnormalities and the way in which the laboratory helps in the diagnosis and follow-up of hematologic/lymphoid neoplasms.

2. Understand the principles of urinalysis and how it is used to help diagnose renal and systemic disorders.

3. Understand automated hematology and urinalysis instrumentation.

4. Develop understanding of how a large complex patient-oriented clinical laboratory facility is managed. This includes an appreciation of the scope of the testing, testing methodology and documentation of test accuracy.

5. Learn the scope and practices of “Special Hematology” testing and how it is utilized to diagnose hematologic disorders.

6. Complete general/special hematology experience checklist.

4. Clinical experience in Hematology/Performance of Bone Marrows (with Hematology/Oncology Division) (1 day, Wednesday of first rotation week)

Trainees are expected to understand how to perform bone marrow aspirations and biopsies. They should aim to observe several marrows. For residents, there is no

requirement that they perform bone marrow biopsy procedures themselves. Be sure to complete the BM observation form.

NOTE: Appropriate dress is required to see patients (white coat, men need to wear a tie).

Goals and Objectives:

1. Gain experience performing bone marrow aspirates and biopsies.

2. Learn more about clinical implications of hematopathology diagnoses and impact on patients as a person.

3. Provide opportunities to perform bone marrow examinations.

4. Learn what type of consultations clinicians expect from hematopathologists.

5. Complete the bone marrow performance form.

5. Flow Cytometry Laboratory Experience (2 days,Thursday-Friday of first rotation week)

Understanding of flow cytometric immunophenotypic techniques and interpretation of the resultant data is an integral part of all the bone marrow and lymph node rotations. In addition, however there is a brief concentrated exposure to the flow cytometry laboratory including the technical aspects of flow cytometry and the basic operation of a flow cytometry laboratory. The resident should report to Ruth Bates in the flow laboratory or her designee.

Goals and Objectives:

1. Understand sample preparation; basic flow cytometry, quality control, gating on specific cell populations, and determination of positive versus negative staining and methods of data presentation.

2. Know indications for testing, taking into account cost effective medicine

3. Complete flow cytometry checklist.

5. Adult Bone Marrow Experience (~ 5 weeks, across 2 rotations)

A. Limited Sessions with Adult Bone Marrow Technologist.

B. Responsibility for review of selected cases prior to sign-out.

C. Participation in sign-out with staff.

D. Review of educational materials (See Adult Bone Marrow Experience section).

Goals and Objectives:

1. Learn normal and abnormal blood cell morphology.

2. Learn basic approach to bone marrow aspirate, biopsy and particle preparation interpretation.

3. Begin to become familiar with the use of ancillary studies used in the diagnosis of bone marrow examinations.

4. Begin to develop a basic understanding of the more common neoplastic and non-neoplastic disorders which involve the marrow: acute and chronic leukemias, myelodysplasias, myeloproliferative disorders, anemias, thrombocytopenias, leukopenias, thrombocytosis, leukocytosis, infections (including HIV), and metastatic neoplasms. Be able to diagnose straightforward cases of the above.

5. Complete bone marrow rotation checklist.

6. Flow cytometry service experience/ATL

The resident should report to the pathologist on the flow cytometry service. This stand-alone service allows the resident to experience a different case mix than that seen on prior services, including specimen types with limited cellularity (CSFs) and will give the resident increased exposure to non-neoplastic flow cytometry studies, such as those for PNH and neutrophil oxidative burst testing. The resident will also be expected to review the slides on the ATL service.

Hematopathology Progressive Goals and Objectives

Competency	Core Rotation - 1st to 3rd Year Resident Beginning of Rotation	Core Rotation – 1st to 3rd year Resident Later in Rotation	Elective Rotation - 3rd and 4th year Resident	Fellow First Year	Fellow Second Year Post Fellowship Experience
Professionalism	Reliable, punctual, appropriate appearance, ethical behavior, sensitive to issues of diversity, HIPAA compliant	Same as near beginning of rotation but projects more confidence and handles difficult situations with greater ease.	In addition to elements already noted, can help advise more junior trainees and serve as a more senior role model.	In addition to elements noted for residents, functions so that others perceive fellow more like a junior faculty member. Create a professional CV. Conduct a successful job search if not continuing as a fellow.	In addition to prior accomplishments, interacts with other faculty and clinicians like a more confident junior faculty member, able to construct and maintain professional c.v. and biosketch
Patient Care	Preview marrow aspirate smears with direct faculty guidance. Review cases, record observations, formulate differential diagnosis.	Preview marrow aspirate smears semi-independently, directly interact with technologists. Review cases, record observations, formulate more complete differential diagnosis	Write and dictate reports for most routine cases.	Independently work-up and complete the majority of cases.	Able to provide a complete diagnostic report to attending faculty with minimal required changes.
	Formulate list of immunohistochemical stains, cytochemical stains, flow antibody combinations to resolve differential diagnosis. Review data	Formulate more educated list of immunohistochemical stains, cytochemical stains, flow antibody combinations to resolve differential	Independently order ancillary studies in a resource conscious way on most routine cases.	Independently order ancillary studies in a resource conscious way on routine and most complex cases.	Independently order ancillary studies in a resource conscious way on virtually all cases.

Competency	Core Rotation - 1st to 3rd Year Resident Beginning of Rotation	Core Rotation – 1st to 3rd year Resident Later in Rotation	Elective Rotation - 3rd and 4th year Resident	Fellow First Year	Fellow Second Year Post Fellowship Experience
	from ancillary studies and record interpretation.	diagnosis. Review data from ancillary studies and record more complete interpretation.			
	Gross specimens for lymphoma work-up with directed supervision.	Gross specimens for lymphoma work-up with supervision as needed (after consulting fellow or appropriate faculty).	Gross specimens for lymphoma work-up with limited supervision and select ancillary testing independently for most routine cases.	Gross specimens for lymphoma work-up with very limited supervision and select ancillary testing independently for the majority of cases. Be able to help instruct junior trainees.	Able to gross and triage specimens independently and to supervise and instruct more junior trainees.
	With explicit directions, interact with clinicians and support staff.	With less explicit directions, interact with clinicians and support staff.	Function as a critical consultant to clinical physicians and support staff with some supervision.	Independently function as a critical consultant to clinical physicians.	Able to supervise more junior trainee's presentations and provide guidance for preparation.
	Be able to provide basic review of peripheral blood and interpret most common hematology tests.	Be able to provide basic review of peripheral blood, fluids and urines and interpret most standard hematology tests.	Provide consultative/laboratory report for general and special hematology tests, peripheral blood and fluid reviews working with faculty on more complex cases and with limited assistance on less complex cases.	Provide consultative/laboratory report for general and special hematology tests, peripheral blood and fluid reviews on simple and complex cases relatively independently but with final approval by faculty member.	Provide consultative/laboratory report for general and special hematology tests, peripheral blood and fluid reviews in all cases with only limited supervision.

Competency	Core Rotation - 1st to 3rd Year Resident Beginning of Rotation	Core Rotation – 1st to 3rd year Resident Later in Rotation	Elective Rotation - 3rd and 4th year Resident	Fellow First Year	Fellow Second Year Post Fellowship Experience
	Observe how others handle laboratory management issues.	Participate with faculty/senior technical staff in laboratory management issues.	Get directly involved in laboratory management issues with supervision.	Get involved in laboratory management issues with more limited supervision.	Participate in continuing education of technologists and support staff to improve patient care.
	Present at inter-departmental CPC conferences with extensive supervision.	Present at inter-departmental CPC conferences with less direct supervision.	Present at inter-departmental CPC conferences with limited supervision.	Independently present at inter-departmental CPC conferences.	Presents cases at clinical CPC conferences without supervision.
Medical Knowledge	Knowledge of morphology and immunophenotype of normal lymph node, spleen, bone marrow and peripheral blood. Knowledge of multiparameter approach to diagnosis of hematologic disorders.	Know criteria for major neoplastic and non-neoplastic hematopathologic entities. Know specific approach used to diagnose major neoplastic and non-neoplastic hematologic entities.	Know criteria for some of the less common hematopathologic entities in addition to those for major entities.	Have an extensive knowledge of broad range of neoplastic and non-neoplastic hematopoietic/lymphoid disorders and other disorders that involve or affect the hematolymphoid system including the pathologic and clinical aspects of these disorders.	Further increase hematopathology knowledge base in terms of rare entities and variations within more common entities. Learn more about the type of cases that lack a definitive diagnosis. Demonstrates ability to apply and discuss knowledge learned from instructional workshops or conferences attended.
	Recognize some of the more common neoplastic and non-neoplastic disorders. Know basic immunophenotypic/ genotypic/cytogenetic	Recognize additional common neoplastic and non-neoplastic disorders and know ways in which specific entities are further subdivided. In addition to basic	Recognize most common and some uncommon neoplastic and non-neoplastic disorders of the hematolymphoid system and know the immunophenotypic, cytogenetic and genotypic characteristics.	Recognizes broad range of hematologic disorders and recognizes when a definitive diagnosis cannot be rendered or where consultative help may be required.	Demonstrates an appreciation of the limitation(s) of current diagnostic schemes/classification systems (i.e. shows recognition for “gray zones” in diagnosis).

Competency	Core Rotation - 1st to 3rd Year Resident Beginning of Rotation	Core Rotation – 1st to 3rd year Resident Later in Rotation	Elective Rotation - 3rd and 4th year Resident	Fellow First Year	Fellow Second Year Post Fellowship Experience
	features where appropriate.	ancillary data features, know pathophysiologic features of major entities. Complete greater than 80% of resident version of rotation checklist.	Completes more of appropriate checklists and sees more entities previously encountered through reading. Complete greater than 90% of resident version of rotation checklist.	Complete "extended version" of all rotation checklists.	
	Know basic components of complete blood count and how they are obtained.	Know basic components of complete blood count and other major hematology tests and how they are obtained including major pitfalls. Also know basic principles of fluid and urinalysis interpretations. Know disease entities where diagnosis is based in large part on hematology laboratory testing.	Know full armamentarium of hematology testing, the purpose of each test and how to interpret combinations of tests. Know new developments in hematology instrumentation.	In addition to resident accomplishments, know details of more esoteric testing and what is on the horizon for laboratory hematology. Know how to evaluate new instrumentation.	Be able to teach others about laboratory hematology including factual and interpretive elements.
Practice-based Learning	Become familiar with basic hematopathology educational resources.	Search literature for information pertaining to cases and apply it to diagnostic	Critically analyze literature and other sources of new information pertaining to cases.	Have a broad knowledge of the hematopathology resources and literature and be able to apply this	Master all skill expectations listed for more junior residents and first year fellow. Use information

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		appraisals at sign-out and at conferences.		information to daily practice including dealing with unusual cases	independently to alter personal practice.
	Start to develop diagnostic differentials for some of the more common neoplastic and non-neoplastic disorders with significant faculty input. Construct reports based on others' examples.	Knows the differential diagnoses to consider for more commonly encountered neoplastic and non-neoplastic disorders. Improve reports based on comments received back from the faculty.	Able to construct more extensive differentials and apply knowledge by deciding what stains and ancillary testing would aid in distinguishing amongst the diagnostic possibilities being considered. Produce reports based on comments received back from the faculty who require few, if any, changes.	Demonstrates ability to use textbooks and medical literature to construct a differential diagnosis for most cases and decide what ancillary testing would be useful. Develop complete reports that reflect divisional style based on continued input from faculty, integrating the best suggestions from varied individuals. Independently use other colleagues and faculty as learning resources.	Demonstrates ability to apply knowledge from medical literature in constructing a diagnostic differential or choosing an appropriate work-up strategy of stains, ancillary testing, etc. Have established style for producing final reports that reflects an integration of input from varied faculty and integrate additional suggestions received on reports. Demonstrates ability to utilize other professional colleagues as learning resource(s).
	Present with clarity in conference settings	Present with clarity in conference settings			

Competency	Core Rotation - 1st to 3rd Year Resident Beginning of Rotation	Core Rotation – 1st to 3rd year Resident Later in Rotation	Elective Rotation - 3rd and 4th year Resident	Fellow First Year	Fellow Second Year Post Fellowship Experience
Interpersonal/ Communication Skills	with significant faculty guidance.	with minimal faculty assistance.			
	Works well with technologists and support staff and learns from them.	Greater interaction with technologists, including demonstrating an ability to teach them.	Can serve as a greater resource for technical staff.	Demonstrates the ability to present information to technologists and junior residents at levels appropriate for the audience.	Able to educate technologists and residents with ease in more impromptu settings as appropriate. Proactively seeks opportunities to educate others.
	Contact clinicians to obtain clinical and other information.	Able to convey straightforward information to clinicians.	Discuss preliminary reports and diagnoses with clinicians with ease. Able to convey more complex information to clinicians and consulting pathologists.	Able to convey complex information to clinicians and consulting pathologists and can answer questions about diagnoses or work-up. Also able to discuss clinical implications of diagnoses in depth.	Able to function as a junior faculty in terms of providing consultative information to staff pathologists at UPMC and elsewhere as well as with clinicians.
System based Practice	Know and utilize basic aspects of resources available in health system i.e. computer systems (CoPath, MARS), laboratories (hematology, molecular diagnostics, cytogenetics, histology), grossing,	Know and more fully utilize resources available in health system.	Learn about outside regulatory agencies/organizations. Develop an appreciation of basic healthcare/pathology related financial issues. Perform a mock CAP inspection, if possible.	Learn about the administrative and technical functions of running the Division of Hematopathology. Perform a mock CAP inspection, if possible.	Demonstrates understanding of more complex personnel management issues. Understands the various components of a diagnostic hematopathology service and the interaction with other related, but separate

Competency	Core Rotation - 1st to 3rd Year Resident Beginning of Rotation	Core Rotation – 1st to 3rd year Resident Later in Rotation	Elective Rotation - 3rd and 4th year Resident	Fellow First Year	Fellow Second Year Post Fellowship Experience
	bone marrow laboratories.				services, such as cytogenetics and molecular laboratories). Has basic understanding of hospital budgetary issues that may be specific to hematopathology or pathology in general.

RESIDENT EVALUATION METHODS AND DOCUMENTATION in the Division of Hematopathology

A) **Hematopathology Test for Residents:**

1. Subject Material:
   - Images, glass slides and/or laboratory data from areas of rotation that have been completed:
     - Bone marrow
     - Laboratory hematology
     - Lymph node
2. Evaluation Method:
   - Review information provided
   - Examine glass slides and/or images with other laboratory/clinical data provided
   - Select best diagnosis from list of choices
3. Dates administered – Approximately 1½ weeks prior to completion of core hematopathology rotation blocks.

B) Completion of **Checklists** according to rotation service (Bone Marrow, Lymph Node, Pediatric Hematopathology, Laboratory Hematology)

C) Department of Pathology **Resident Evaluation Forms** (covering multiple competencies)

D) Documentation of Observation and Performance of Bone Marrow Aspirates and Biopsies by Completion of **Bone Marrow Performance Form**

E) Documentation of **Conference Attendance** at Journal Club, Interesting Case Conference, Wednesday morning Hematopathology Conference

F) **Faculty and staff observation of performance** in conferences and sign-out and general observations regarding interpersonal relationships, communication skills and professionalism, including utilization of departmental and extra-departmental resources

G) Personal **Meeting with Director** or designate at end of core rotation segments

CONFERENCE SCHEDULE AND RESPONSIBILITIES

CONFERENCE SCHEDULE

Monday	12:00pm	Seminars in Laboratory Medicine*	Weekly	CLB Room 1021
Tuesday	7:00am	AP Didactic Conference/Unknown Surgical Pathology Slide Conference *	Weekly	Totten Room, Scaife 618
	11-12pm	Hematopathology Flow Conference**	~Every other week (see schedule)	CLB Room 9018
	12:00pm	Hematopathology Journal Club*, ***,###	1st week of month (see schedule)	Hill Building 330
	12:00pm	Patient Safety & Risk Management in Hematopathology Conference*, ###	Typically 2nd, 4th, 5th weeks of month (see schedule)	Hill Building 344
	12:00pm	Research meeting*	Typically 3rd week of month	Hill Building 330
Wednesday	7:00 am	CP Didactic Conference*	Weekly	CLB Room 1021
	8:30am	Hematopathology Conference (case presentation)* ***, ###	1st-3rd, 5th Week of the month	Hill Building 330
	8:30am	Molecular/ Hematopathology Conference	4th week of the month	Hill Building 330
	10:30am	Hematology Lab Operations++	Bi-Weekly (see schedule)	CLB 6th Floor Room 6032
	12:00pm	Department Research Seminar+	Weekly	PUH 11th Floor
Thursday	8:00 am	Leukemia/Lymphoma conference**	Bi-weekly (see schedule)	Shadyside (varies, usually West Wing auditorium)
	12:00pm	Anatomic Pathology Grand Rounds *	Weekly	Room 1104 A & B Scaife Hall
	4:00pm	CHP Tumor Board+++, *** Leukemia Conference	1st Thursday of the month	Rangos Res. Bldg - Lawrenceville
Friday	1:00pm-2:30pm	Molecular QA Conference	Weekly	CLB 8th Fl conference room

* Attendance for residents required either based on this rotation or departmental expectations.
** Attendance at this conference is strongly encouraged for trainees (but not required).
*** The trainees will be expected to present at these conferences.
**** Attendance is strongly encouraged when hematopathology cases are being presented (be sure you are getting email notifications).
\+ Attendance optional.
++ Attendance is required for residents on laboratory medical rotation.
+++ Attendance is expected for trainees doing pediatric hematopathology.
\# See description concerning attendance obligations.
Attendance required when on laboratory hematology rotation and encouraged when on other parts of hematology rotation. One presentation required (see schedule).
Attendance required for fellows

RESIDENT AND FELLOW CONFERENCE RESPONSIBILITIES

MONDAY

12:00PM (Weekly)

Seminars in Laboratory Medicine are case presentations/lectures by residents, fellows and faculty. See Conference Schedule from Laboratory Medicine Office for topics.

TUESDAY

7:00AM

The **AP Didactic Conference/Unknown Surgical Pathology Slide Conference** takes place on Tuesdays from 7:00 to 9:00 AM in the Totten Room. The slides and clinical history for the conferences when they occur will be available at PUH, Shadyside and Magee for preview at least one week prior to the conference. The schedule is available on the resident website (http://residents.pathology.pitt.edu/default.aspx). Fellows may attend; however it is not required and hematopathology duties take precedence. Breakfast is served.

11:00AM (several times/month)

The **Flow Cytometry Conference** is a time when interesting flow cytometry cases selected by the technologists are reviewed and discussed by one of the hematopathologists. Some conferences are used for didactic presentations on a specific topic. Generally, other hematopathologists, residents and fellows attend. No preparation is required. **See schedule for dates of conference.** (CLB, Room 9018)

12:00PM

Approximately once per month, residents doing Hematopathology will be asked to select one (1) current journal article for presentation at our **Journal Club** (see separate schedule). The selection should be of interest to the presenter and others in the group and needs to be approved by the faculty member or fellow responsible for that date **(see schedule for dates and trainee/faculty assignments).** If requested, the faculty member can also offer suggestions for appropriate articles or offer additional advice in making a selection. The faculty person or fellow will also choose and present an article. The articles should be emailed to the hematopathology secretary, Christine Welsh, no later than Thursday preceding the Journal Club.

In terms of presentation, it is important to provide enough background information to help explain why the study was done and /or may be important and how it relates to what is already known. Any detailed discussion of methodology that may be required should be done when the results are presented. When presenting the results, it is important to go over the various tables and figures in the paper and also point out any problems that may be presented in the data or methodology. Finally, the ultimate significance of the study given the results found should be discussed. PowerPoint presentations are not at all necessary and are discouraged!

Everyone attending should also be prepared to comment on the above issues so that a lively discussion will ensue.

On all other Tuesdays, there will be a **Patient Safety and Risk Management Conference** or divisional research meeting (see separate schedules). Cases are presented and discussed that could potentially raise patient safety and risk management issues. For example, cases that are particularly prone to diagnostic errors or cases of entities seen so infrequently that pathologists might not be familiar with them would be of particular

interest. Cases where there have been any types of errors made within or outside our institution would also be of particular value. Trainees, along with faculty members, may bring cases to show.

WEDNESDAY

7:00AM

CP Didactic Conference is a set of lectures covering all of laboratory medicine, some pertinent to hematopathology. The schedule is available on the resident website. (http://residents.pathology.pitt.edu/default.aspx).

8:30AM

The **Hematopathology Conference** is entirely the responsibility of our division. The purpose is to provide a forum to go over morphologic, immunophenotypic, karyotypic, and genotypic issues together with their clinical correlates. We present 5 cases each week at conference, ideally 3-bone marrow (including Children's cases) and 2 lymph nodes. The conference responsibilities include:

Trainees on the adult bone marrow service will consult with faculty signing out marrows no later than Friday and choose 3 interesting and /or educational marrows. As at least one pediatric marrow should be presented if there is a trainee on the service, trainees on the adult marrow service need to consult with the pediatric service to be sure that 3 bone marrows/PB/ATL cases are being presented. Please do not add additional cases if there are already 5.

A. **After cases are selected, please sign-up by giving name and number to the bone marrow technologist or leaving a voicemail message on the Audix line (802-3273). NAMES MUST BE SUBMITTED BY THE END OF MONDAY.**

   The trainees will take images using one of the digital camera set-ups in the Division of Hematopathology (room 330 conference room or 344 lymph node sign-out room) and find out the case history from the physician or the chart. The images should be imported into a PowerPoint presentation. At the conference, the trainees will present the case including a brief history, any prior material and any ancillary studies at the conference. In addition, some interesting aspects of the case may be discussed **briefly** (e.g. implications of an unusual morphologic appearance, significance of unusual phenotype). Don't give a lecture. Cytogenetics will be presented by the cytogenetics laboratory faculty or by a trainee rotating in Cytogenetics. Fellows are expected to present their own cytogenetic findings as long as the laboratory emails them the karyotypes/FISH images to show and a cytogeneticist can assist when needed. Genotypic results are usually presented by the Division of Molecular Diagnostics. If no trainee is on the service, the cases are presented by the faculty member. Case presentations including all ancillary studies should be less than 8 minutes to allow time for discussion.

B. Trainees on the lymph node service will consult with the faculty member signing out lymph nodes and select two lymph node cases to present. In the absence of appropriate current cases, older educational cases may be selected. The trainees will take images of the case and if at all possible get the history from the chart or physician. At the conference, using PowerPoint the trainee will present the case including a brief history, the pathology and any ancillary studies.

C. Remember case presentations must be relatively brief, to the point and interesting both to pathology trainees and clinicians. If possible try to present cases in an interactive fashion. (Totten Room, Scaife 618)

D. If there is >1 trainee on a service, the presenting obligations should be shared.

Guidelines for PowerPoint Presentations

1. Keep the presentation simple. Your time is better spent reading about the case rather than having multicolored images flying around.
2. Try to limit the number of images shown- make sure that each image makes a point.
3. Photomicrographs should occupy the entire screen.
4. Please use images that are in focus.
5. No more than two flow histograms should be on a single screen (or just use the electronic overhead projector).
6. Up to 4 immunostains may be presented in a single screen. It is unnecessary to illustrate all immunostains- you need to choose critical ones or ones that are necessary to make your point. For example, please don't show a series of 5 negative stains.
7. Laboratory results can either be discussed or, if presented on a screen, must have not only the numerical results, but also the units and preferably the normal ranges. The lab results that are presented visually do not need to include every single laboratory test that was done on the patient.
8. In at least most cases, there is no need to present a written bone marrow differential.

THURSDAY

8:00AM

UPMC-Shadyside Tumor Board. Cases are presented by a hematopathology faculty member at the request of a clinician. (Shadyside West Wing Auditorium). Residents are encouraged to attend.

A **Pediatric Bone Marrow Case Conference** is held via teleconference to the Children's Hospital, Lawrenceville except for the first Thursday of the month. This is attended primarily by the pediatric hematology/oncology fellows, and the pathology trainees on the pediatric bone marrow service. The bone marrow technologists will collect the cases from the prior week to be presented by the attending hematopathologist on service. Fellows may be expected to present the cases. Complete instructions for using Go-To-Meeting are in the pediatric bone marrow signout room 330.

12:00PM

Residents doing hematopathology are expected to attend **Anatomic Pathology Grand Rounds**.

4:00PM

Pediatric Leukemia Tumor Board is held the first Thursday of the month from 4:00 to 5:00 in Conference Rooms B123 and B124, Floor B, at Children's Hospital of Pittsburgh. The hematopathologists and bone marrow technologists are notified by e-mail the week of the

conference as to which cases are to be presented. The bone marrow technologists will collect the cases for the trainees. The trainees will capture images and prepare a PowerPoint presentation. The presentations should be brief and succinct and include 1 slide of peripheral smear, 1-2 slides of aspirate, and 1-2 slides of biopsy as well as any pertinent cytochemical or immunohistochemical stains. Flow images can also be presented – please check with attending regarding specific images to present. Pertinent results from the cytogenetics and/or molecular studies should be summarized in 1-2 slides. The presentation should be approved by the attending prior to presentation.

Pediatric Hematopathology and General/Special Hematology Laboratory Experience

Pediatric Hematopathology and General/Special Hematology Laboratory Experience

Trainees should report to the pathologist signing out CHP bone marrows. The pathologist covering the general hematology laboratory ("ATL" service) is usually the same person; if this person is different from the one signing out CHP bone marrows, then contact him or her also.

Pediatric Hematopathology Experience

1. **Review Blood Cell Morphology.** (*Published by the ASCP*). RBC, WBC, Normal and Abnormals (Binders with CDs available in room 350 and slides are also on resident's shared drive, under "CP Didactic Lectures\Previous CP Didactic Lectures\Hemepath\ASCP Hematology Images." Each set is a separate PowerPoint file and the key and reading material for all 6 sets of images are in the PDF).
2. **In the first week, touch base with the lead technologist Celina Fortunato to schedule a teaching session with the bone marrow technologists (typically Tuesday afternoon is best) to review peripheral blood and bone marrow aspirate smears**

3. **Pediatric Bone Marrow Sign out.**

   A. Preview and sign out cases with hematopathology faculty in a fashion analogous to procedures followed with adult bone marrows.

      - Meet with faculty on service to coordinate these activities.
      - See also "Policy for sign-out of CHP marrows that have biopsies".

4. **Review of specimens from Automated Testing Laboratory and Flow Cytometry Laboratory**

   A. Preview and sign out pediatric and adult abnormal peripheral blood films and body fluid slides sent for review with ATL faculty hematopathologist. Gather relevant clinical and pathology information (such as cytology results) prior to sign-out.

   B. If there is a case with interesting findings, please give the slide and copy of the ATL review sheet to Dr. Djokic in order to contribute to the study sets.

5. **Review of educational materials**

   A. Swerdlow SH, Collins RD Pediatric Hematopathology, Churchill Livingstone, 2001.

   B. Nathan, DG and Orkin, SH, Nathan and Oski's Hematology of Infancy and Childhood, 7th Edition, WB Saunders, 2009.

   C. Penchansky L, Pediatric Bone Marrow, Springer, 2004.

   D. Glassy EF. Color Atlas of Hematology, CAP 1998

E. Peripheral smear and fluid slide study sets are available for checkout from Office Secretary – 350.

F. Chromogram information for hemoglobinopathy information (in supplemental materials)

G. Bain BJ. Haemoglobinopathy Diagnosis, 2nd ed. Blackwell, 2006.

H. Schuman GB, Friedman SK. Wet Urinalysis, ASCP, 2003.

I. Galagan, K. Color Atlas of Body Fluids: An Illustrated Field Guide Based on Proficiency Testing.

J. Proytcheva, M.A. (Ed), Diagnostic Pediatric Hematopathology, 2011.

6. Review results of ancillary procedures performed on marrows you have reviewed and read addenda faculty have issued.

Policy for sign-out of CHP marrows that have biopsies

1. Hematopathology signs out biopsies on hematologic disease cases including non-Hodgkin lymphomas. CHP surgical pathology signs out the biopsies on tumor cases.

2. On all cases with a biopsy, the histologic section must be reviewed by the hematopathologist even if it is not a case where the hematopathologist is signing out the biopsy. This is to ensure that it does not conflict with the aspirate smear evaluation.

3. In all cases with a biopsy, where CHP is signing out the biopsy the hematopathologist should correlate with the CHP pathology report to make sure that the two diagnoses will not conflict. In some cases, this may involve contacting the CHP pathologist and jointly reviewing the case.

Policy for Assignment of Marrow Cases without Biopsies

Marrow sign-out is the responsibility of the faculty/trainee on the service when the marrow biopsy typically would come out. However, all cases done on Friday must be pre-reviewed by those on the service that day. In addition, all marrows, pediatric or adult, with or without flow cytometry that do not have a biopsy and are received before noon on a Friday, must be signed out by those on the service that week. They are not the responsibility of those on the following week. Children's bone marrow aspirates with biopsies for metastatic tumor evaluation received on Friday will be the responsibility of the pathologist on service the following week, even though we are only signing out the aspirate.

General/Special Hematology Experience

1. See checklist for specific activities and educational resources.

Clinical Experience in Hematology

Performance of Bone Marrow Aspirations & Biopsies

Performance of bone marrow aspirations and biopsies (with hematology/oncology division)

Trainees are expected to understand how to perform bone marrow aspirations and biopsies. They should aim to observe 5 marrows. It is recognized that this goal may not be met. The remainder should be done later in their training (See below).

A. The trainee will be able to observe marrows as part of the clinical experience in hematology (see "Clinical Experience in Hematology").

- The trainee is required to keep a record of each marrow observed including the name of the patient, bone marrow number and diagnosis, using the Bone Marrow Aspirate Biopsy Form.

For the bone marrows actually performed, the person supervising the procedure needs to sign off on the form. In addition, the aspirate smear and biopsy obtained must be reviewed by a faculty member to assess and document their adequacy. The form should be completed at the end of the rotation and given to Christine Welsh in room 354. There is also a hard copy of this form in the red packet.

Residents have the opportunity to perform bone marrow aspirates and biopsies at the VA hospital later in their training.

Flow Cytometry Laboratory Experience

Introduction to flow cytometry

Understanding of flow cytometric immunophenotypic techniques and interpretation of the resultant data is an integral part of all the bone marrow and lymph node rotations. In addition, however there is a brief concentrated exposure to the flow cytometry laboratory including the technical aspects of flow cytometry and the basic operation of a flow cytometry laboratory.

1. Meet with the Flow Cytometry Lab lead technologist or designate for orientation.

2. Become familiar with instrumentation and procedures in laboratory under the guidance of the lead technologist.

    - Immunostaining.
    - Acquisition and analysis using flow cytometry.
    - Quality control/quality assurance.
    - Operation of a large clinical flow cytometry laboratory

3. Complete checklist.

4. Educational materials available:

    - Flow Cytometry First Principles. Alice L. Givan.
    - Flow Cytometry in Clinical Diagnosis. 4rd edition, editors: D. Keren, J.P. McCoy and J.L. Carey.
    - Flow cytometric immunophenotyping for hematologic neoplasms. Blood 111(8)3941-3967, 2008.

Adult Bone Marrow Experience

1. **Adult Bone Marrow Sign Out**

   A. Sessions with Adult Bone Marrow Technologists -- if not already done during pediatric marrow rotation (eg AP only residents), please set up a time to review peripheral blood and bone marrow aspirate smears with technologists during your first week.(typically Tuesday afternoon is best)

   B. Participation in sign-out with staff**.** Inform Hematopathologist on BM #1 Service that you are starting the rotation and review expectations in terms of bone marrow preview, sign-out, dictation, and proofing (see "Trainee Responsibilities during Bone Marrow Rotation").The trainee should discuss with the faculty the optimal number of cases to evaluate prior to sign-out. .The number of cases the resident is expected to evaluate will increase progressively during the rotation.

   C. Review results of ancillary procedures performed on marrows you have reviewed and read addenda that faculty issue (see Special Procedure Review by Resident/Fellow in CoPath).

   D. Review of educational materials.

   - Blood Cell Morphology. (*Published by the ASCP*). If not already done during pediatric marrow rotation (ie AP only residents).. review the RBC, WBC, Normal and Abnormals Binders with CDs in Hematopathology library (344) or images and PDF key are also on shared resident drive, under "CP Lecture Material\Hemepath\ASCP Hematology Images"

   - A teaching set of peripheral blood and body fluid smears is available for check-out from the medical secretary (350)

   - A set of cytochemical stains and pb/bm smears is available from the bone marrow technologists. Individual faculty members also have teaching slides.

   - Foucar, K. Bone Marrow Pathology, 2nd Edition, ASCP Press, 2001.

   - Foucar, K, Viswanatha DS, Wilson S (Eds). Non-neoplastic disorders of bone marrow. Atlas of non-tumor pathology. AFIP, 2008.

   - Swerdlow, S.H., Campo, E., Harris, N.L., Jaffe, E., Pileri, S.A., Stein, H., Thiele, J., Vardiman, J. (Eds.): WHO Classification of Tumours Pathology of Haematopoietic and Lymphoid Tumours, IARC, Lyon, 2008.

   - Keren DF, McCoy JP Jr, Carey JL (Eds.): Flow Cytometry in Clinical Diagnosis, 4rd Edition, ASCP, 2007.

   - Bain, BJ, Clark, DM, Lampert, IA, Wilkins, BS. Bone Marrow Pathology, 3rd Edition, Blackwell Science, 2001.

   - Kjeldsberg CR: Practical Diagnosis of Hematologic Disorders, 4th Edition, ASCP, 2006.

   - Leonard, D Diagnostic Molecular Pathology (Volume 41 in the series "Major Problems in Pathology"), Saunders, 2003.

- Stramatoyannopoulos M, Perlmutter V. Molecular Basis of Blood Diseases, 3rd Edition, W.B. Saunders, 2001.
- Additional Resources:
  - Knowles DM. Neoplastic Hematopathology, 2nd Edition, Lippincott Williams & Wilkins, 2000.
  - Peterson LC and Brunning RD. Chapter 37. Bone Marrow specimen Processing, pp1391-1406.
  - Li C-Y and Yam LT. Chapter 38. Cytochemical, Histochemical and Immunohistochemical Analysis of the Bone Marrow

See list of web-based resources at end of manual.

NOTE: Reading is an important component of this rotation. It is recognized that not all of the above resources can be used nor can most be read in entirety. Use of electronic and other resources to find and read up-to-date journal articles is also critical.

General Trainee Responsibilities during Bone Marrow Rotation

Adequate preparation of a bone marrow prior to sign out includes:

1. Aspirate smears are usually available the day before the biopsy is processed (i.e. the day before sign-out). Ideally cases should be scanned the day before sign-out in order to select appropriate cases in which trainees will be expected to assume a greater degree of responsibility – please coordinate with your attending. On these cases, please do your own differential counts to see how they compare with the technologists' counts on the next day. Particularly once you have some experience, the differentials should be on the more interesting/difficult cases. Contact physician if necessary (e.g., if after review with staff pathologists, a new acute leukemia is seen). **Trainees will have increasing responsibility for independent preview, as they are more experienced.**

2. Obtain sufficient history from computer, chart or physician's office to understand reason for marrow being performed and to understand any coexistent disease process, drug usage, exogenous toxins, etc. which might affect bone marrow interpretation. Look up any appropriate laboratory data such as folate, B12, and iron (plus TIBC) in anemias or macrocytosis, results of SPEP, UPEP, and immunofixation in evaluation of plasma cell disorders. If possible, this should be obtained prior to initial review with staff pathologist. The technologist's history may or may not be sufficient.

3. Preview of peripheral blood smear, marrow aspirate smears and biopsies on all assigned cases.

4. Gather and interpret any ancillary studies which have been performed such as flow cytometry.

5. Review prior marrow and surgical pathology specimens where appropriate (e.g. leukemic marrow case where looking for residual/recurrent disease, extent of prior disease in follow-up of plasma cell neoplasia).

6. Write down description and diagnosis in pencil on template or indicate agreement or disagreement with technologist's comments with a check mark or other notation. .Discuss the format of bone marrow report with the staff pathologist on service.

7. In consultation with staff pathologist, dictate reports either upon completion of sign-out or after each case. Please use whatever method will get the cases out ASAP. See specific guidelines on next page.

8. The staff pathologist may ask you to proof and correct the reports you have dictated. If you will be doing this, ask the secretary not to send the report to the pathologist's queue (i.e. do not "final" the report). Trainee should final the report once it is proofed.

9. With increasing experience, fellows will have a more independent role in bone marrow evaluations with increasing responsibility as designated by faculty.

10. Bone marrow report:
    - Peripheral blood smear should focus on morphologic features of (1) red blood cells, (2) leukocytes and (3) platelets. Any abnormal or atypical features should be described in detail.

    - Morphologic description of bone marrow should address the following features:
        - Cellularity

        - Presence of abnormal infiltrates (lymphoid aggregates, clusters of immature myeloid cells, granuloma, metastatic tumor infiltrates, etc.)

        - Myeloid-to-erythroid ratio

        - Maturation of megakaryocytic, erythroid and granulocytic precursors

        - Presence (and severity) of dysplasia

        - Bone trabeculae

Specific Guidelines for Residents and Fellows on Bone Marrow Service

I. Previewing

a. Urgent cases that faculty should be informed about without delay:
   i. New acute leukemias.
   ii. Day 14 status post chemotherapy induction for acute myeloid leukemia.

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b. Please designate number of cells to be counted; generally 500 cell count if there is any suspicion for a myeloid neoplasm, 300 cell count for lymphoma/myeloma staging cases.

c. An iron stain should be ordered if there is anemia, microcytosis, macrocytosis, ***or*** elevated RDW.
   i. Please order it on the aspirate smears unless there are no spicules.
   ii. If there are no spicules, order it on the touch imprint or core biopsy.
   iii. Exception: An iron stain is likely not needed for anemia or abnormal indices during induction or consolidation for acute leukemia.

II. Preparation prior to sign-out

a. When applicable, **have the most recent bone marrow report and diagnostic bone marrow report printed out.**
b. If available, diagnostic and most recent bone marrow slides should be pulled out and reviewed and reports printed
c. When applicable, review the prior diagnosis, pertinent immunophenotype and cytogenetics.
d. Preview the case, including the flow cytometry.
   i. Arrange a time to sign-out with a faculty member so that you will have enough time for previewing, which is very important in resident education.
   ii. Be ready to discuss the case and ask questions.

III. Immunohistochemistry and other studies

a. Order 5-10 blanks to be cut ***whenever*** immunohistochemistry studies are ordered on our bone marrow cases.
b. Order stains through the bone marrow technologists (Audix stain line 412-802-3273)
c. Please use the table for dictating the results of the immunohistochemistry studies.
   i. Transcriptions know how to format the results in the table
   ii. Quick text = “HISTRPT.”
d. Please remember to justify why immunohistochemistry has been performed if flow has also been performed.

Quick text choices: FLOW/IHC1 or FLOW/IHC2.

IV. Quality assurance is very important
   a. Assess the adequacy of aspirate smears and core biopsy: Adequate, suboptimal, or inadequate, using the following criteria below:

<u>Bone Marrow Adequacy Criteria:</u>

Biopsy (trephine):

Adequate	(**A**)	15 mm gross length, at least 10 partially preserved intertrabecular areas (40x)
Suboptimal	(**S**)	less than 15 mm length, at least 5 partially preserved intertrabecular areas
Inadequate	(**I**)	less than 5 mm, fewer than 5 partially preserved intertrabecular areas

Particle/clot:

Adequate	(**A**)	at least 10 partially preserved marrow particles/areas (40x)
Suboptimal	(**S**)	at least 5 partially preserved marrow particles
Inadequate	(**I**)	fewer than 5 partially preserved marrow particles

Aspirate:

Adequate	(**A**)	3 or more spicules, 300 or more cells
Suboptimal	(**S**)	1 or 2 spicules, 100 or more cells
Inadequate	(**I**)	no spicules, BM diff. cannot be performed (less than 100 cells)

Touch imprint:

Adequate	(**A**)	300 or more cells
Suboptimal	(**S**)	100 or more cells, less than 300
Inadequate	(**I**)	BM diff. cannot be performed (less than 100 cells)

V. Dictations, proof reading, and final sign-out
   a. After the initial review of a case with the hematopathologist, please dictate the report to the best of your ability. Additional studies and final diagnosis can be added later.
   b. After you have dictated the final report, proof read it, and then arrange with the faculty how they wish you to proceed. Some would like the slides and paperwork.

VI. Wednesday 8:30 am conference
   a. The ***trainee on the adult bone marrow service is responsible*** for 2 cases for the Wednesday conference for the following week after sign-out with the faculty member on BM#1 service.
   b. If there is a trainee on the pediatric/ATL bone marrow service, then ***the trainees should determine*** if that trainee is presenting a pediatric or ATL case.
   c. If the trainee(s) cannot meet this expectation, ***it is his, her or their responsibility to make arrangements with someone***, such as the faculty member, so that 2 cases get presented.
   d. Discuss the last minute details of your cases to be presented with the responsible faculty member on Monday, two days before the conference. Determine if the faculty member needs to review the digital images or any other details.

VII. Going off service
   a. Please make it clear to the responsible faculty member what the status of a case is, what is pending, and where you have put it.
   b. At the beginning of this last week on service, discuss with the responsible faculty member who will be presenting at Wednesday 8:30 am conference. In most

cases, you will still be able to present your cases even if on another hematopathology service.

Policy for Review of Bone Marrow Aspirates, Particle Preparations and Biopsies

Technologists will screen all smears; assess quality of specimen and quality of stain.

Technologist will inform Trainee or if no trainee, faculty when new marrow aspirates with acute leukemia or day 14 S/P chemotherapy are ready to be reviewed. A worksheet with the CBC data and morphology comments written in should be printed and made available for the review with the aspirate smear and PB smear. In addition a working draft that includes previous cases will be attached. In other cases check review bin in the sign-out room.

Trainee/Pathologist will review aspirate smears/cases together with the history and other clinical data on day they are received in the laboratory.

Clinicians performing marrows may also request a marrow differential or iron stain. This will have been noted by the technologist on the form that is used to record what special studies are being requested.

Other useful information

1. To order additional immunohistochemical stains, FISH molecular orders and all other non stat requests on bone marrow cases call the Audix stain line **412-802-3273** and leave a message. These are routinely picked up during normal working hours.

2. Prior slides:

    - Bone marrow slides from part of 2009-present are in room 335
    - Bone marrow slides from unknown-part of 2008 are at Iron Mountain.(see table below)
    - In the Hematology Lab, the peripheral blood slides are kept for 2 weeks and are filed by accession number. The CBC results are in Sunquest/Mysis.
        - Slides to preview for bone marrow service #1 are placed in 334. There is also a bin for the cases ready for the technologist. Cases ready for sign out are also placed in 334.

Flow reports are tubed to the bone marrow room 335 up to 5:15pm. After that, urgent cases are delivered directly to the pathologist

Lymph Node Experience

Lymph Node Pathology Experience

Lymph Node Sign Out

A. "On call" for processing of fresh lymph node biopsies.

NOTE: One of the lymph node assistants are available to help gross from 9-5:30/6 pm. The lymph node assistant pager number is 412-958-7432. They will independently gross most specimens but may require help either over the telephone with images that can be seen using our gross imaging "telepathology" or you may need to help them in person in the CLB (Room 9032). If you get called during these hours, be sure to page the lymph node assistant if they are not already in or on their way to the grossing area in the flow cytometry laboratory (CLB 9032). After 5:30 pm and until 9 pm, the Hematopathology fellow or resident on an extended day shift (see Hematopathology Schedule) can help. On occasion, one of the lymph node assistant should be able to gross in lymph nodes or help out until 6:00 pm.

- Become familiar with detailed lymph node protocol, spleen protocol and consult procedures.

B. Sign out of both fresh and consult lymph nodes and related material with staff. Be sure to meet with hematopathologist on lymph node service to review organizational aspects of this rotation. Become familiar with role of the lymph node assistant, use of hematopathology case worksheet, established procedure for organization of sign-out materials, reviewing flow cytometry and guidelines for dictating reports.

C. Review of educational materials.

- Checkpath (images, histories and explanations of faculty CME program for Hematopathology) (PUH 334 and in Dr. Swerdlow's coordinator's office).
- Teaching/conference sets of glass slides of marrows, lymph nodes, etc. (Dr. Swerdlow's office).
- Lymph node chapter in Sternberg.
- Swerdlow, S.H., Campo, E., Harris, N.L., Jaffe, E., Pileri, S.A., Stein, H., Thiele, J., Vardiman, J. (Eds.): WHO Classification of Tumours Pathology of Haematopoietic and Lymphoid Tumours, IARC, Lyon, 2008.
- Ioachim, HL Medeiros, LJ. Ioachim's Lymph Node Pathology, 4th edition, 2009.
- Jaffe ES, Harris NL, Vardiman J, Campo E, and Arber D. Hematopathology, 2010
- Web-based resources.

D. Review results of ancillary studies procedures performed on lymph nodes you have reviewed and read addenda that faculty issue.

Policy for solid tissue specimens sent to rule out lymphoma that overlaps with other Centers of Excellence

In certain circumstances, specimens that fall into a non-Hematopathology Center of Excellence will either be designated “rule out lymphoma” by the surgeon or have a potential lymphoma discovered either when a frozen section is performed or when a fresh specimen is examined grossly. For example, a salivary gland may be removed and a frozen section of a mass demonstrate a dense lymphoid proliferation without evidence of a carcinoma.

If an intraoperative consultation is requested, the specimen should be handled by the surgical pathology resident/fellow/pathologist on call at the hospital where the specimen has been removed.

In all cases, following completion of any required intraoperative consultation, both the resident/fellow/pathologist on service for the Center of Excellence and the Hematopathology “lymph node” resident/fellow/pathologist should be notified that the specimen is in the gross room. A joint decision should be made at that time by both parties as to whom the primary pathologist should be based on factors such as the likelihood of other pathology being present or any concern that a hematopathology protocol would compromise any aspect of the pathologic examination.

In cases where the Center of Excellence is not located at UPMC-Presbyterian Hospital, the decision as to whether the specimen should be handled in whole or in part by the Division of Hematopathology should be made at the originating hospital. This should either be done by members of the Center of Excellence (for example, if there is a GU specimen at UPMC-Shadyside) or after telephone agreement with the appropriate AP-related COE pathologist. This will eliminate the possibility of specimens being sent first to one hospital and then another. The resident/fellow/faculty on lymph node service should be consulted if questions occur.

The Hematopathology “lymph node” resident/fellow/pathologist will be prepared to accept the responsibility for processing the entire specimen, for taking a portion of the specimen for a hematopathology workup with the remainder of the specimen grossed in by an anatomic pathology bench or functioning solely as a consultant if special procedures are deemed unnecessary (for example, if suspicion for a lymphoma is low and the tissue sample is very limited).

In cases where the initial triaging to either Hematopathology or one of the AP benches seems inappropriate after sections are reviewed or ancillary studies become available, if agreeable to all parties, the primary pathologist will be switched to the pathologist on the more appropriate service. This may involve a Center of Excellence pathologist signing out a case not accessioned at their Center of Excellence, and ordering stains that need to be sent by inter-hospital courier.

This model should be applied to all other Centers of Excellence where faculty, fellows or residents should act to facilitate processing.

Instructions for Fresh Tissue Biopsies Received from Outside Institutions

[Revised 10/2013]

Sometimes tissue specimens from outside institutions are sent to our Flow Cytometry Laboratory for cell suspension immunophenotypic studies or complete workup. In these cases, as long as sufficient tissue is available, we try to do a complete lymph node protocol on them, except that tissue is not sent to the molecular diagnostics or cytogenetics laboratory (except for cases from UPMC-Shadyside, Magee Women's or other complete case workups that also get material sent for DNA extraction and, if appropriate, for cytogenetic studies). One must remember that if the tissue has been sent here for flow cytometric studies, sufficient tissue must be retained specifically for making a cell suspension. If the tissue submitted is very small, at a minimum, a touch imprint should be performed, and if possible, a small portion snap frozen. On cytologic specimens, if material has been retained at the referring institution, do NOT do touch preps unless there is a lot of material (several good cores) and send the entire specimen to the flow cytometry laboratory. Run the lymphoma protocol in CoPath but be sure to delete all the items that do not apply. You don't need a CMB/DNA block unless molecular is sent. If there are any questions on a given case, please contact the pathologist covering lymph node biopsies.

Cases from CHP where we are not the primary pathologists traditionally are not sectioned (CHP sections are reviewed prior to sign-out). Cases from other divisions for flow cytometry may have a section taken if there is sufficient tissue and if acceptable to the division (to better know what we are actually doing the flow cytometry on).

All fresh tissue cases from UPMC-Shadyside will arrive in the Flow Cytometry lab and accessioned as UPMC- Presbyterian cases. All other cases from UPMC hospitals (and rare non-UPMC hospitals) should be accessioned as UP consults UNLESS we have the entire specimen (with or without a frozen section). If we have the entire specimen it should be accessioned as a UPMC- Presbyterian case.

Immunohistochemistry

Immunostains/In-Situ Hybridization Laboratory and Ordering Information

Immunostain Turnaround Time

IHC Routine runs: All orders received before 10:00am should be sent out the same day by 5:30pm (i.e. Monday through Friday) provided the laboratory has the block (or slides). There are a few stains (e.g. EBER, SV40, TdT, and antibody reactions on frozens) that require longer incubations and these may be delayed by one day. Orders received after 10:00am will be out the following morning by the 8:30am courier.

The Immunohistochemistry Laboratory is located at the CLB and personnel can be reached at 647-7663.

A list of the antibodies we use most frequently and a complete list with codes are included in the manual.

ORDERING OF IMMUNOSTAIN PANELS

It is strongly recommended that the Audix voicemail (412-803-3273) is utilized when ordering stains in order to facilitate delivery to Hematopathology.

If ordering after hours, the stain panels must now be ordered as Stain/Process Group Protocols (see separate list).

(Unlike a Histology Protocol, a Stain/Process Group Protocol will not write over stains that have been previously ordered on the same part)

To order one of the protocols:

1. If you are ordering the panel using the “Accession Entry/Edit” or “Histology Entry/Edit” activities:

- Go to the Histology tab.
- Select the part (and/or block) on which you wish to order the panel.
- Then click on the “Run Stain/Process Group…” button.
- Enter the abbreviation for the Protocol in the “Select Protocol” field on the “Run Stain/Process Group Protocol” pop up window.
- Hit tab (on your keyboard). Then hit Enter (on your keyboard) or click the OK button in the “Run Stain/Process Group Protocol” pop up window.

2. If you are ordering the panel using the "Stain/Process and Block Edit" activity:

- Select the part (and/or block) on which you wish to order the panel.
- Click on the "Add Stain/Process…" button.
- Clinical on the "Run Stain/Process Group…" button.
- Enter the abbreviation for the Protocol in the "Select Protocol" field on the "Run Stain/Process Group Protocol" pop up window.
- Hit tab (on your keyboard). Then hit Enter (on your keyboard) or click the OK button in the "Run Stain/Process Group Protocol" pop up window.

In the comment field enter" Please deliver to Hematopathology" – otherwise the slides may end up in your mailbox!!

If you have any questions, please contact AP User Support via e-mail or at 647-9170

ORDERING EXPERIMENTAL STAINS (ANTIBODIES NOT YET IN COMPUTER)

If being done in the routine immunohistology laboratory, order under ABNKNC. Specify desired stain in the comment of ABNKNC.

If being done in the in situ laboratory order 2 blanks (IBNKNC) and write in comment to sent to insitu laboratory for_____.

Reporting of Immunostains/in-situ hybridization

The template should always be utilized and follows the general microscopic description.

CoPath and Dictation Pointers

COPATH Related Instructions for Dictation of Final Reports

1. At time of dictating any report, the patient name, the CoPath pathology report number, the medical record number should be stated in all instances except the occasional consult in which this information is not available. With the exception of the other cases, the number put in the dictaphone should be the MR number. At the end of the dictation, state that this is the end of the dictation on _____ (given patient's name).

2. The trainee dictating at the end of the final diagnosis can state "do not mark this case complete." In this instance, the transcriptionist will not finalize the case by marking it "complete" during the transcription process. If the report is dictated before noon, within two hours it will be available for correction by the trainee. If it is dictated afternoon, four hours later, the report will be available for corrections. In all instances, reports dictated before the four o'clock cut-off would be transcribed on the same day. The trainee then can go into the report and edit the final diagnosis and microscopic (as well as the gross and clinical history they choose) and when finished they must mark the case as "complete" which will then sent to the physician's electronic sign-out queue. During this process the trainee is to verify that the final diagnosis matches that written on the hard copy during sign-out. If a report is not ready, contact the secretarial supervisor. The trainee should then give the paperwork including a printed final copy to the staff pathologist.

The trainee should ask the faculty person if the above is what they want. If not, be sure to given the faculty person all paperwork.

3. All "UP" cases (white or yellow sheet consults) must have a billing code dictated. These consult cases have either a white or yellow sheet on the folder containing the consult case. Blue sheet consults (usually performed at request of clinician) do not need a billing code dictated.

4. Cut off times:
   - ❖ Cases dictated by 5:00 PM Monday – Friday will be typed that day
   - ❖ Cases dictated after 5:00 PM Monday – Friday will be typed by 10:00 AM the next day
   - ❖ Saturday: cases dictated by 12 Noon will be typed that day

BILLING CODES FOR "UP" CASES ("WHITE" OR "YELLOW" SHEET CONSULTS)

BC#	Consultation Type
1	**Level I Consult (very simple review, no extra stains)**
2	**Level II Consult (greater than 4 H&E, or up to 3 IHC stains)**
3	**Level III Consult (4-7 IHC stains)**
4	**Level IIII Consult (complex with 8-11 IHC stains)**
5	**Level V Consult (complex with ≥12 IHC stains)**
6	**Lymph Nodes with Flow Cytometry and No Immunostains**
14	**No Charge (including VA flows)**
15	**Stains, only**

Division of Hematopathology

Dictating & Proofing Tissue Reports*

(Suggestions for trainees)

Patient history:

- Look at prior cases in CoPath worksheet, outside reports, requisitions, MARS (if patient is or has been at UPMC), letter (if consult) for historical information and be sure to include in report since, in part, some or all of this information may be very hard to find at a later date. This is OUR responsibility. For bone marrow cases, the technologists often enter a clinical history, but it is up to us to verify the accuracy and completeness.

- Be sure pre-op, post-op diagnoses and procedure have been entered.

Diagnosis:

- Be sure to use standard format
    - Tissue type, tissue site, procedure (and if consult, Outside slide number "OSS…., institution")- diagnosis using terminology of WHO (if malignant)
- NEVER use "consistent with" in a diagnostic line. This is departmental policy.
- If more than one specimen on a consult, the different parts should be in chronological order.
- Abbreviations should be avoided; if used in a report, the full term should be provided the first time it is used.

Comment:

- Be sure that the comment includes the methods used to arrive at the diagnosis. Phenotypic aberrancies that might be useful to follow up on in any subsequent specimens are useful to include here. Ask the attending pathologist if there is any question about what should be included in the comment.
- The comment should stress the major diagnosis first and must be consistent with the diagnoses listed above (i.e.: it should not "back-track" on a definitive diagnosis).
- The comment does not necessarily have to follow the same order as the specimens listed in the diagnosis (i.e., a definitive diagnosis might be dealt with first).
- Be sure at least the comment, if not the diagnosis, clearly indicates any studies still pending at the time of signout. These should not come as a surprise to the physician receiving the report.

Microscopic description

- Microscopic descriptions should "conjure up" and clearly convey an image that is consistent with the diagnosis. "Buzz words" can be used to help achieve brevity and, while it is best to avoid using descriptions to make conclusions, there is no need to describe all the features of obviously reactive follicles or T-zone nodules.
- Microscopic descriptions in general should start with a statement concerning the tissue type, the low magnification architectural features and then the relevant cytologic features. Special stains should then follow and then the IHC/ISH template (if any such stains have been performed).
- IHC tables should follow the part that has been described in multipart specimens – easiest way so it's clear what they refer to.
- Cases with flow cytometric studies and immunostains MUST HAVE a FLOW/IHC1 or 2 comment at the end of this section.

- On consult cases with prior flow cytometric studies, the outside flow reports should at least be summarized including a statement as to which laboratory did the studies. Place after (or before) the IHC/ISH results.
- On "UP" consult cases, be sure to dictate a billing code at the end. Cases with flow plus just H&E sections get BC6. Our other UP cases with 4-7 special stains will be BC3, more complex cases will be BC4 (8-11 special stains), with the most complex cases with greater than 12 stains getting BC5.

Synoptic reports

- A synoptic should be added to all bone marrow and solid tissue reports when a hematopathologic/lymphoid neoplasm is being diagnosed. Currently on the bone marrows, these are being added on first-time diagnoses only, although they do not need to be limited to those cases.
- There are currently four (4) synoptics used in Hematopathology.
    - Bone Marrow/Peripheral Blood Hematopoietic/Lymphoid Disorders Synoptic
    - Gastrointestinal Lymphoma Resection Synoptic
    - Hodgkin Lymphoma Biopsy/Staging Synoptic
    - Non-Hodgkin's Lymphoma Biopsy/Resection Synoptic
- Synoptic reports may be dictated using the templates included this manual. A hard copy is available in rooms 334 and 344. Alternatively, they can be manually entered in CoPath after case dictation.
- Instructions for the use of synoptics are available online. The CoPath user guide is posted on the CoPathPlus website http://copath.upmc.com under the link for CoPathPlus Training Resources. The Synoptic Data Entry and Reporting Chapter is Chapter 24.

Proofreading

- Proofread reports carefully and MAKE SURE that what is written not only is what was intended at sign out but that it makes sense. If proofing prior to giving to a faculty member and something doesn't make sense, at least communicate that to them.
- Be sure to proof numbers that have been included (including in the flow reports)
- Be sure that immunostain designations are what you intended (i.e., sometimes CD45RO/UCHL1 gets entered instead of CD45/LCA).
- Be sure singular/plural forms of words are correct, reports say "and" where you meant "and" and not "in", "intra-"and "inter-"are used appropriately.
- Be sure the templated tables don't have capital letters in the middle of a sentence.
- Unless directed otherwise, give the faculty member a printed out final version of your final report – not something with handwriting or a draft.
- Be sure to make an arrangement with the faculty member to see what changes were made in what you considered to be a final report.

[Revised 10/2013]

Web-Based Resources

WEBSITE EDUCATIONAL RESOURCES & CALL SCHEDULES

Division of Hematopathology Intranet website (Hematopathology schedules/paging and general information)

1. http://path.upmc.edu/divisions/hematopath.html

UPMC Pathology Residents Server (includes on call schedule for AP and CP)

1. https://pathologyresidents.shp.upmc.com/SitePages/Home.aspx

Hematological Malignancies Program

1. http://www.upmccancercenter.com/portal_hema/overview.cfm

For general pathology (Hematopathology, Dermatopathology and others)

1. http://www-medlib.med.utah.edu/WebPath/webpath.html
2. www.uscap.org (numerous teaching resources)
3. http://www.pathologyoutlines.com

HEMATOPATHOLOGY

Atlas

1. http://www.ashimagebank.org/

Virtual Slide Set

1. https://epssecure.upmc.com/hematopathology/index.cfm (or link via residents web page http://pathologyresidents.shp.upmc.com/SitePages/Home.aspx -- the link to Hematopathology virtual slide set is on the right hand side (direct link to virtual slide set Division of Hematopathology UPMC Presbyterian)
2. http://cclcm.ccf.org/vm/VM_cases/lymphoid_main.htm
   (Virtual Hematopathology slides (and other fixed images) from Cleveland Clinic)
3. www.uscap.org (Virtual Slide Box at USCAP)

General

1. http://www.sh-eahp.org/
2. http://medmark.org/hem/
3. http://www.cancer.gov/ (treatment of leukemias/lymphoma)

Case Studies

1. http://path.upmc.edu/cases.html
2. http://teachingcases.hematology.org/

USCAP Hematopathology Evening Session Cases

1. http://www.uscap.org/

Societies

1. http://www.hematology.org/
2. http://www.aspho.org/
3. http://www.blacksci.co.uk/uk/society/bsh/default.htm
4. http://www.leukemia.org/

Educational Site

1. http://www.cyto.purdue.edu/index.htm
2. http://flowcyt.cyto.purdue.edu/flowcyt/educate/pptslide.htm
3. http://enjoypath.com/

Cases and Tests

1. http://www.madsci.org/~lynn/VH/APIII/CPflow.html

Societies

1. http://www.cytometry.org/
2. http://www.isac-net.org/

Books

1. http://www.cyto.purdue.edu/cdroms/cyto2/14/pucl/flowcyt/refclin.htm
2. Multiparameter Flow Cytometry in the Diagnosis of Hematologic Malignancies

CYTOGENETICS

1. http://www.pathology.washington.edu/galleries/Cytogallery/main.php

Flow Cytometry

1. http://www.bloodjournal.org/content/bloodjournal/111/8/3941.full.pdf

NOTE: IF THERE ARE ANY SITES YOU FEEL SHOULD BE ADDED TO THIS LIST OR DEFUNCT SITES, PLEASE LET DR. BAILEY KNOW

Online Conference Access for Pathology Faculty and Residents

- Visit Department of Pathology Conference Access for Pathology Faculty and Residents
- http:/pathologyconference.upmc.edu

Weekly Conference includes:

- Anatomic Pathology Grand Rounds conference
- Departmental Seminar (Archived)

These LIVE and archived conferences are only accessible through the UPMC network.

Note: Additional non-web based resources are in rooms 330, 350, 334 and 344.