

Hematology and Oncology Fellowship
Curriculum
Revised 3/21/12

Inpatient Oncology- 6 months:

General Expectations

Fellows will be under direct supervision of an attending physician. Their role will be to round with the inpatient team which includes a senior resident and an intern. The fellows primary teaching responsibility on this rotation will be to the internal medicine housestaff; medical students may be assigned as well. Fellows will oversee the management of the inpatients and assist in the diagnostic evaluation of each admitted patient; and be available for questions the housestaff may have.

Fellows will also run family meetings when treatment decisions are addressed or when decisions about palliative care may be necessary. Attendings will be present during these discussions as well and will give fellows feedback on this important area of communication so critical to oncology.

After discussion with the attending; the fellow will complete orders for chemotherapy administration. Once orders are completed the fellow should review them with an attending who will then making any changes and then finalize and sign the orders. Chemotherapy cannot be ordered without attending co-signature. Fellows are expected to obtain consent prior to chemotherapy administration.

In addition, fellows are responsible for evaluating all oncology consults received before 5 PM. A thorough consultation requires a detailed history, past medical history, physical exam and review of imaging and pathology. Fellows should come up with their own differential diagnosis and management recommendations. Fellows will then present the patient to the oncology attending who will evaluate the consult personally and give feedback to the fellow on the fellow's work-up. The attending will then finalize any management recommendations. Fellows must communicate recommendations to the primary team.

Oncology fellows are expected to round daily and write daily progress notes on solid tumor patients admitted on the critical care/intensive care unit. They should communicate directly to the critical care team about any management recommendations.

Medical Knowledge First Year Fellows

Complications of Malignant Disease

Management of spinal cord compression

Management of hypercalcemia

Pain control

Management of leptomeningeal meningitis

Management of paraneoplastic syndromes

Anorexia, cachexia
Coagulation disorders
DIC
Delirium
Depression
Diarrhea/constipation
Dysphagia
Dyspnea
Fatigue
Superior Vena Cava Syndrome
Malignant bowel obstruction

Complications of Chemotherapy

Management of febrile neutropenia
Management of chemotherapy induced diarrhea
Management of chemotherapy induced nausea and vomiting
Management of chemotherapy induced mucositis
Management of tumor lysis syndrome

Medical Knowledge Second Year Fellows

In addition to solidifying topics above second year fellows are expected to develop a more sophisticated understanding of the evidence based guidelines for treatment of each solid tumor based on stage (specific tumors and area for competency attached and outlined at the end of this document).

Second year fellows should understand the pivotal trials that led to our current therapy.

Second year fellows should understand and appreciate of when therapy may no longer be appropriate and when novel agents may need to be incorporated into treatment.

Fellows during the second year should understand the rationale behind the current large cooperative group trials.

Second year fellows will present a Grand Rounds on an oncologic disease of their choosing and develop a more advanced level of knowledge in the specific area that they choose.

Second year fellows should be able to identify questions for clinical research and identify a mentor for a research project.

Patient Care First Year Fellows

Manage complicated oncologic patients with multiple complaints
Understand the appropriate usage of colony stimulating factors
Perform diagnostic and therapeutic thoracentesis
Perform diagnostic and therapeutic paracentesis
Care of central venous access catheters

Diagnosis and management of paraneoplastic syndromes

Understand the Contributions of each different subspecialty in diagnosis, staging and treatment

Effects of age and comorbidity on treatment

Response to treatment assessment

- a. Response Evaluation Criteria in Solid Tumors (RECIST)
- b. Quality of life
- c. Other criteria

Pathology and Lab Assessment

Pathologist in cancer diagnosis

Histopathologic techniques in diagnosis

1. Immunostaining
2. Cytology
3. Fine needle aspiration
4. Cytogenetics and polymerase chain reaction (PCR)
5. Flow cytometry

Radiology

Imaging/staging techniques in diagnosis, staging, and follow-up

1. Radiographic
2. Computed tomography (CT)
3. Ultrasound
4. Magnetic resonance imaging (MRI)
5. Positron emission tomography (PET)

Endoscopic imaging techniques

Other imaging procedures

Attending must document competency of the fellow in using RECIST criteria v1.1.

Patient Care - Second Fellows

Second year fellows will continue to focus on complexity of oncologic diagnosis. They should attend weekly disease specific tumor boards and by the second year of training are expected to present management plans at these multidisciplinary discussions. By the second year fellows should be competent not only in general consent of chemotherapy but also in the consenting of patients for participation in clinical trials.

Professionalism – First Year Fellows

1. Interact with consultants
2. Show respect for all members the patient care team
3. Work with nursing staff to provide comprehensive patient care
4. Respect patient confidentiality

Professionalism – Second Year Fellows

In addition to continued competence in the above areas; second year fellows are expected to understand physician conflict of interest and the legal and ethical issues regarding conflict of interest.

Communication- First Year Fellows

- Compassionately and clearly explain patient diagnosis and prognosis to both patients and their families
- Consent patients for chemotherapy and procedures
- Display understanding of patient's wishes
- Understand cultural differences in communication styles
- Use bilingual interpreter or interpreter phone to communicate with patients who don't speak English

Communication- Second Year Fellows

Demonstration of continued competency in the above areas is required. Second year fellows are expected to focus on continued improvement in communication with patient and families around diagnosis, prognosis and treatment decisions.

Systems Based Learning First Year Fellows

- Learn to facilitate patient discharge
- Work effectively with social workers, chaplains, physical therapists and nutritionists to improve patients function and quality of life
- Understand outpatient resources available to support patients and families
- Practice cost effective medicine

Systems Based Learning -Second Year Fellows

In addition to demonstrating continued competency in the above areas; second year fellows are expected to recognize current oncology quality goals; and to help the practice improve in quality performance measures. They will develop an improvement project around a quality measure (such as prevention of venous thrombosis, medication reconciliation, prevention of line infections).

Practice Based Learning- First Year Fellows

- Use evidence based medical resources to diagnose and treat patients
- Understand clinical trial design and application to specific patient populations.
- Utilize available Information Systems
 - a. *A. Patient Resources*
 - b. *B. Health Care Professional Resources*

- c. *C. The World Wide Web*
- d. *D. ASCO on the Web*
- e. *E. Locating an Oncologist*
- f. *F. Locating Clinical Trials*

Practice Based Learning- Second Year Fellows

Provide teaching sessions for resident staff on medical care of patients with malignant disease

Second year fellows will have results of their in service exam taken during the first year and are expected to focus their reading around areas of deficiency highlighted on the in-service exam

Hematology Consultation Service- 4 Months

General Expectations

Fellows run the hematology consult service under the direct supervision of a benign hematology attending. Fellows are responsible for evaluating all hematology consults received before 5 PM. A thorough consultation requires a detailed history, past medical history, physical exam, review of imaging and review of peripheral smear and bone marrow aspirate (as indicated). Fellows should come up with their own differential diagnosis and management recommendations. Fellows will then present the patient to the attending who will evaluate the consult personally, review the peripheral smear with the fellow, and give feedback to the fellow on the fellow's work-up. The attending will then finalize any management recommendations. Fellows must communicate recommendations to the primary team. Daily follow-up on hematology consultations is generally required and will be at the discretion of the attending.

The hematology fellow on the consult service also has primary responsibility for hemophilia and bleeding disorder patients admitted to the hospital for bleeding or for procedures. Hematology fellows are required to attend the multi-disciplinary hemophilia clinic at Wednesday afternoons. Fellows are strongly encouraged to attend thrombophilia clinic on Wednesday mornings.

Medical Knowledge- First Year Fellows

Understand normal hematopoiesis.

Stem cell plasticity, embryology and differentiation

Erythropoiesis and erythropoietic growth factors

Hemoglobin synthesis, structure and function

Leukocyte differentiation, maturation and trafficking

Basics of lymphocyte biology

Thrombopoiesis and the role of thrombopoietin and other platelet growth factors.

Red Blood Cell Disorders

Anemias

-understand what the RBC indices represent and what leads to their abnormality, demonstrate the ability to interpret and recognize all morphologic variations of RBCs

Understand the role of B12 and folate in hematopoiesis

Diagnosis and treatment of anemia of chronic disease

-Cause of red cell aplasia and hypoplasia and treatment with immunologic modifiers

Pathophysiology and management of sideroblastic anemias

Hemoglobinopathies

Thalassemias

Sickle cell anemia and variant sickle cell syndromes- genetics, complications and management

Other congenital hemoglobinopathies

Hemolytic anemias

- Autoimmune hemolytic anemias- diagnosis and treatment
- Metabolic enzyme deficiency hemolytic anemias and biochemical pathways
- Paroxysmal nocturnal hemoglobinuria (PNH)
- RBC membrane disorders
- Microangiopathic hemolytic anemias (MAHA)
- Non-autoimmune, acquired hemolytic anemias

Porphyrias

Hemochromatosis

- interpret molecular diagnosis assays, including those that identify the C282Y and H63D mutations of the hemochromatosis gene (HFE)
- complications of hemochromatosis on systemic organ systems
- Medical management

White Blood Cell Disorders

Granulocyte Dysfunction Disorders

Granulocytopenia- mechanisms, diagnosis and management

Lymphopenia and Lymphocyte Dysfunction Syndromes

- common variable immunodeficiency, severe combined immunodeficiency, adenosine deaminase deficiency, Wiskott-Aldrich syndrome, ataxia-telangiectasia, DiGeorge anomaly, selective immunoglobulin deficiencies, Omenn syndrome, reticular dysgenesis

Leukocytosis

Platelet and Megakaryocyte Disorders

Hereditary Platelet Disorders

- von Willebrand's disease, Bernard-Soulier syndrome (glycoprotein Ib-IX deficiency or defect), platelet collagen receptor deficiency, Glanzmann thrombasthenia (glycoprotein IIb-IIIa deficiency), gray platelet syndrome (α -granule deficiency, α -storage pool disease), dense granule deficiency (δ -storage pool disease), primary secretion defects and platelet procoagulant activity disorders, among others. .

Acquired Platelet Function Disorders

Thrombocytopenia

Decreased Platelet Production.

Increased Destruction or Consumption of Platelets

- hypersplenism, immune etiologies, drug effects, heparin-induced thrombocytopenia, microangiopathic disorders, disseminated intravascular coagulation (DIC), infections, bleeding and cardiopulmonary bypass.
- immune thrombocytopenic purpura (ITP).

Thrombocytosis- Diagnosis and management

- Anti-platelet function drugs aspirin, ticlopidine/clopidogrel, dipyridamole, GP IIb/IIIa inhibitors, etc).

Medical Knowledge- Second Year Fellows

Bone Marrow Failure States

Inherited and congenital forms of bone marrow failure

Chemical and infectious

Aplastic Anemia- diagnosis and therapy

Pancytopenia .

Hemostasis and Bleeding Disorders

pathophysiologic mechanisms of hemostasis.

von Willebrand's disease diagnosis of subtypes and management

Hemophilias A and B, and other inherited factor deficiency states.

Interpret platelet function studies, bleeding time, coagulation factor assays, and coagulation factor inhibitor screens and assays.

Thrombotic Disorders and pathophysiology

Genetic testing for risk of thrombosis

Prophylaxis of thrombosis

Heparin-Induced Thrombocytopenia

Antiphospholipid Syndrome

Pharmacologic Manipulation of Bleeding and Thrombosis

heparins, warfarin, anti-thrombins, anti-platelet agents, fibrinolytic agents, factor replacement products, inhibitor "bypass" products, antifibrinolytic agents, and the role of blood products for the management of bleeding disorders

Patient Care First Year Fellows

Perform diagnostic bone marrow aspiration and biopsy- Attending must document competency

Interpretation of blood smears indicative of common red cell, white cell and platelet disorders

Management of anticoagulation

Management of venous thrombosis prophylaxis

Management of blood product and factor replacement

Attend weekly multidisciplinary hemophilia clinic

Diagnostic approach and management of patients with thrombophilia

Patient Care Second Year Fellows

Management of patients undergoing leukopheresis

Management of patients receiving plasmapheresis

Long term care of patients with sickle cell anemia

Preoperative assessment and clearance for patients with bleeding disorders

Interpretation of blood smears and marrow aspirates for common hematologic diseases

Design an appropriate diagnostic approach to diagnose disorders of hemostasis and thrombosis

Professionalism- First and Second Year Fellows

Interact with primary teams seeking hematology consultation
Show respect for all members the patient care team
Respect patient confidentiality

Communication- First and Second Year Fellows

Communicate diagnosis to patients and families
Understand cultural differences in communication styles
Use bilingual interpreter or interpreter phone to communicate with patients who don't speak English
Communicate with a referring physician and assuming an appropriate level of responsibility for the care of the patient.

Systems Based Learning First and Second Year Fellows

Learn to facilitate patient care
Work effectively with social workers, chaplains, physical therapists and nutritionists to improve patients function and quality of life
Understand outpatient resources available to support patients and families
Arrange appropriate post discharge follow-up care and instructions

Practice Based Learning First and Second Year Fellows

Use evidence based medical resources to diagnose and treat patients
Understand clinical trial design and application to specific patient populations.

Stem Cell Transplantation/Leukemia: 4 months

General Expectations

Fellows will work on the transplant team with both an attending and a mid level physician extender. Fellows are responsible for admitting all patients to the service. Admission should include a detailed history, physical, review of database, assessment and plan. After discussion with the attending, the fellow should do admission orders. Fellows are required to admit all patients on the transplantation service who reach their room prior to 5 PM. After 5 PM, the on call fellow is responsible for admissions to this service. Fellows attend daily patient care rounds and are expected to know the details of all patients on the service. At discharge, fellows dictate a hospital discharge summary for review by the attending. Fellows are available to help teach physician extenders and to answer nursing questions and concerns regarding transplant patients. Fellows will manage any acute changes in patients on the transplant and facilitate any transfers to the intensive care unit. At 5 PM the SCT fellow signs out patients to the fellow on call. Under the supervision of the SCT attending, fellows on the transplant service are also expected to round daily on intensive care unit patients with hematologic malignancies.

While on the SCT rotation, the fellow also is responsible for evaluating newly diagnosed leukemic patients admitted to the hematology service. The fellow is expected to be familiar with the patient's history, laboratory and exam findings. Under direction of the attending, the fellow leads the diagnostic evaluation of these patients including bone marrow biopsy. The fellow should review the bone marrow aspirate and flow cytometry. Fellows should formulate a diagnostic assessment and treatment plan to review with the hematology service attending. Follow careful discussion the fellow will initiate chemotherapy and consent patients to treatment. The fellow is not required to be involved in the day to day care of the new leukemics once a diagnosis is established and treatment is started.

Medical Knowledge- First Year Fellows

Objectives of Stem cell Transplantation

Role of SCT in management of refractory lymphoma and relapsed or high risk leukemia

Understand the differences between autologous, full intensity allogeneic, low intensity allogeneic and tandem BMT/SCT

Understand conditioning regimens, SCT collection, stem cell infusion, and immunosuppression

Complications of Stem Cell Transplantation

Diagnosis and management:

infections in the immunocompromised host

chemotherapy induced diarrhea

chemotherapy induced nausea and vomiting

chemotherapy induced mucositis

graft versus host disease- both acute and chronic

engraftment failure

veno-occlusive disease

Medical Knowledge Second Year Fellows

In addition to above, the second year fellow should have a basic science understanding of the cellular and molecular biology of hematopoiesis and BMT/SCT, tumor immunology and the biologic and immunologic relationships between a donor's hematopoietic cells and the host.

Patient Care-First Year Fellow

- Management of blast crisis
- Understand the role of leukopheresis
- Understand HLA typing
- Perform diagnostic bone marrow aspiration and biopsy
- Care of central venous access catheters
- Understand transfusion and transfusion associated complications.
- Recognize and treat ATRA syndrome

Patient Care Second Year Fellow

Second year fellows should have an understanding of the pharmacologic and environmental approaches to preventing infectious diseases, the use of immunosuppressive therapies to prevent or decrease graft-versus-host disease, the effects of different approaches of “pre-treating” the stem cells (e.g. T-cell depletion) prior to transplantation, and the proper use of blood products while awaiting engraftment of the transplanted hematopoietic stem cells.

Be familiar with the role of the National Marrow Donor Program (NMDP) in identifying unrelated stem cell donors.

Professionalism First Year Fellows

- Interact with consultants
- Show respect for all members the patient care team
- Work with nursing staff to provide comprehensive patient care
- Supervise and teach physician extenders caring for transplant patients
- Respect patient confidentiality

Professionalism Second Year Fellows

- Interact with consultants
- Show respect for all members the patient care team
- Work with nursing staff to provide comprehensive patient care
- Supervise and teach physician extenders caring for transplant patients
- Respect patient confidentiality

Communication First Year Fellows

- Communicate prognosis to patients and families
- Consent patients for chemotherapy and procedures
- Display understanding of patient's wishes
- Understand cultural differences in communication styles
- Use bilingual interpreter or interpreter phone to communicate with patients who don't speak English
- Communicate hand off of patients to the physician extenders caring for patients after hours

Communication Second Year Fellows

Second year fellows are expected to be able to run family meetings. They should be able to initiate discussions on end of life and goals of care. They are expected to display compassion for their patients and should be able to build rapport with families.

Systems Based Learning First Year Fellows

- Learn to facilitate patient discharge
- Work effectively with social workers, chaplains, physical therapists and nutritionists to improve patients function and quality of life
- Understand outpatient resources available to support patients and families-

Systems Based Learning Second Year Fellows

- Understand the function and role of the outpatient day hospital in the daily care of outpatients who have recently gone through SCT
- Understand the challenges for patients post stem cell transplant

Practice Based Learning- First Year Fellows

- Use evidence based medical resources to diagnose and treat patients
- Enroll patients on clinical trials when appropriate
- Attend weekly leukemia and lymphoma tumor board

Practice Based Learning Second Year Fellows

Second year fellows should identify a quality improvement project regarding the care of the stem cell transplant patient either pre or post transplant.

Outpatient Clinics: 4 months

Medical Knowledge

Chemotherapeutic treatment of both advanced and localized solid tumors and hematologic malignancies

- Breast Cancer
- Colon Cancer
- Small Cell lung cancer
- Non small Cell Lung Cancer
- Cancer of Unknown Primary
- Cancer of the gastrointestinal and biliary tract
- Cancer of the urogenital tract
- High Grade lymphoma
- Low grade lymphoma
- Myeloproliferative Disease
- Myelodysplastic Disease
- Chronic Leukemias
- Multiple Myeloma
- Head and Neck Cancer
- Melanoma

Patient Care

Management of the following complications of malignancy and chemotherapy:

- Fatigue
- Depression
- Hot flashes
- Pain control
- Chemotherapy induced nausea, vomiting, and diarrhea
- Chemotherapy extravasation
- Premedications for Chemotherapy
- Bone metastases
- Adrenal Insufficiency
- Alopecia
- Bleeding and thrombosis
- Cardiac toxicity
- Catheter management
 - a. Infection
 - b. Thrombosis
 - c. Extravasation

- Drug extravasation
- Hepatotoxicity
- Hypersensitivity

- Hypothyroidism I
- Infertility/sterility/sexuality
- Lymphedema
- Nephrotoxicity
- Myelosuppression
- Nausea and vomiting
- Neurotoxicity
- Oral complications
 - d. Mucositis
 - e. Xerostomia

- Pulmonary toxicity
- Second malignancy
- Skin toxicity

Professionalism

- Interact respectfully with nursing staff, scheduling staff, patients and families
- Respect patient confidentiality

Communication

- Communicate prognosis, test results and treatment plan to patients
- Consent patients for the risk and benefits of chemotherapy
- Effectively communicate end of life decisions and options with patients and family
- Attend monthly Schwartz Rounds

Systems Based Learning

- Understand the role of hospice and palliative care in patient management
- Understand visiting nurse services available for home chemotherapy infusions
- Understand the financial implications of chemotherapy for the patient
- Understand the role and availability of patient support groups
- Understand patient “survivorship” and the impact of survivorship on patients financial and psychosocial situations

Practice Based Learning

- Present newly diagnosed patients at multidisciplinary tumor board (disease specific)
- Refer and accrue patients to appropriate clinical trials: understand the rationale and background for current trials
- Use information technology to enhance patient care

Perform a quality improvement project to improve your patient care. This is required of all fellows yearly. Final Projects should be submitted by June 30th to Drs. Cream and Harvey. If you are having trouble coming up with a project please meet with Dr. Cream.

Continuity Clinic: ½ day per week for 3 years
This is a 6 month continuity rotation in each of 6 major disease groups
which fellows complete over the three years of fellowship. Each fellow is
assigned one attending for the 6 months.

Medical Knowledge

Breast Cancer

G. Breast Cancer

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates

2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Premalignant
 - (2) Malignant
 - (a) Histologic types

 - b. Genetics
 - (1) *BRCA-1*
 - (2) *BRCA-2*
 - (3) Other genetic syndromes
 - (4) Counseling and testing

 - c. Assessment of risk
 - (1) Family history
 - (2) Lifestyle factors
 - (3) Hormone replacement therapy
 - (4) Gail, Claus, and other models

3. Prevention
 - a. Lifestyle changes
 - b. Chemoprevention
 - (1) Tamoxifen and other SERMs
 - (2) Other agents

 - c. Prophylactic bilateral mastectomies
 - d. Prophylactic bilateral oophorectomy

4. Screening
 - a. Mammography
 - b. Other imaging techniques
 - (1) Ultrasound
 - (2) MRI

- c. Breast examination
 - (1) Self-examination
 - (2) Examination by a health-care provider
 - d. Ductal lavage
 - e. Genetic screening
- 5. Diagnosis
 - a. Management of a palpable mass
 - b. Management of nonpalpable, image-detected abnormalities
 - c. Biopsy techniques
 - (1) Fine-needle aspiration
 - (2) Core, excision, and needle localization biopsy
 - d. Axillary dissection
 - (1) Complete
 - (2) Sentinel node
- 6.
- 7. Staging and prognostic factors
 - a. TNM system
 - b. Histologic type
 - c. Estrogen and progesterone receptors
 - d. Other biologic and molecular markers
 - e. Staging recommendations
- 8. Treatment by stage
 - a. Premalignant
 - (1) Atypical hyperlasia
 - b. Carcinoma-in-situ
 - (1) Lobular
 - (2) Ductal
 - c. Early-stage invasive carcinoma
 - (1) Primary lesion
 - (a) Surgery
 - (b) Radiation
 - (c) Chemotherapy
 - i. Preoperative
 - ii. Postoperative
 - (d) Endocrine
 - iii. Preoperative

iv. Postoperative

- (e) Trastuzumab and other biologic therapy
- (f) Estimating the benefits of systemic adjuvant therapy

d. Locally advanced and inflammatory breast cancer

- (1) Multimodal therapy

e. Locally recurrent

- (1) In breast recurrence
- (2) Chest wall recurrence
- (3) Surgery
- (4) Radiation therapy
- (5) Systemic therapy

f. Metastatic breast cancer

- (1) Surgery
- (2) Radiation therapy
- (3) Systemic therapy
 - (a) Endocrine therapy
 - (b) Chemotherapy
 - (c) Single-agent Versus combination therapy
 - (d) Monoclonal antibody therapy

9. Follow-up

- a. ASCO and other guidelines

10. Supportive care

- a. Psychosocial issues and support groups
- b. Lymphedema
- c. Bisphosphonates for bone metastases
- d. Menopausal symptoms
- e. Health maintenance for premature menopause

- (1) Bone health

- f. Sexuality and fertility
- g. Cognitive dysfunction
- h. Surgical reconstruction

11. Other/Special issues

- a. Special problems in breast cancer management

- (1) Male breast cancer
- (2) Breast cancer in pregnancy
- (3) Breast cancer in elderly women
- (4) Breast cancer in very young women

- (a) Oophorectomy
- (5) Breast cancer presenting as axillary metastases
- (6) Phyllodes tumors
- (7) Paget's disease of the nipple

GI Malignancies-

R. Hepatocellular Cancer

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates

2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Histologic variants
 - (2) Grade

 - b. Genetics and molecular markers
 - (1) Hemachromatoses
 - (2) Wilson's disease
 - (3) Alpha1-antitrypsin deficiency

 - c. Viral factors
 - (1) Hepatitis B
 - (2) Hepatitis C

 - d. Chemical exposure
 - (1) Alcohol
 - (2) Aflatoxin

 - e. Cirrhosis

3. Prevention
 - a. Hepatitis B vaccination
 - b. Alcohol cessation
 - c. Tobacco cessation

4. Screening
 - a. Alpha-fetoprotein

5. Diagnosis
 - a. Clinical signs and symptoms
 - b. Imaging
 - c. Biopsy
 - d. Tumor markers

6. Staging and prognostic factors
 - a. TNM staging
 - b. Histologic features
 - c. Grade
 - d. Fibrosis score
 - e. Alpha-fetoprotein
7. Treatment
 - a. Resectable disease
 - (1) Surgery
 - (2) Liver transplantation
 - b. Unresectable liver-only disease
 - (1) Ablative procedures
 - (2) Hepatic arterial embolization
 - (3) Chemotherapy
 - c. Metastatic disease
 - (1) Chemotherapy

Anal Cancer Colorectal Cancer

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - b. Genetics and genetic syndromes
 - (1) Familial adenomatous polyps
 - (2) Hereditary nonpolyposis colorectal cancer
 - (3) Other
 - c. Pathogenesis
 - d. Assessment of risk
 - (1) Family history
 - (2) Dietary factors
 - (3) Lifestyle factors
 - (4) Medical history
 - (a) Inflammatory bowel disease
 - (b) Diabetes mellitus

Prevention

- e. Lifestyle changes
- f. Chemoprevention
 - (1) Anti-inflammatories

- g. Colectomy
3. 4. Screening
 - a. Rectal examination
 - b. Fecal occult blood test
 - c. Colonoscopy surveillance (general population)
 - d. Virtual colonoscopy
 - e. High-risk populations
 - (1) Inflammatory bowel disease
 - (2) Genetic abnormalities
 - (3) Use of risk criteria and models
 4. Diagnosis
 - a. Clinical signs and symptoms
 - b. Imaging
 - c. Endoscopic biopsy
 5. Staging and prognostic factors
 - a. TNM system
 - b. Histology and grade
 - c. Genetic and molecular abnormalities
 6. Treatment
 - a. Treatment by stage
 - (1) Cancer in a polyp
 - (2) Stage II colorectal cancer
 - (a) Surgery
 - (b) Chemotherapy
 - (c) Radiation therapy
 - (3) Stage III colorectal cancer
 - (a) Surgery
 - (b) Chemotherapy
 - (c) Radiation therapy
 - (4) Metastatic and recurrent colorectal cancer
 - (a) Surgery
 - i. Resectable regional metastases
 1. Liver only
 2. Lung only
 3. Liver plus lung
 - ii. Anastomotic recurrence
 - (b) Chemotherapy
 - iii. Regional perfusion of chemotherapy

- iv. Chemoembolization
- v. Chemotherapy

(c) Radiation therapy

(5) Special surgical issues

- (a) Laparoscopy
- (b) Sentinel node biopsy
- (c) Total mesorectal excision in rectal surgery

- 7. Follow-up after curative resection
 - a. ASCO and other guidelines
- 8. Supportive care
 - a. Treatment-related toxicities
 - (1) Ostomy care
 - (2) Radiation proctitis
 - (3) Diarrhea

L. Esophageal Cancer

- 1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
- 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Squamous cell
 - (2) Adenocarcinoma
 - b. Assessment of risk
 - (1) Barrett's esophagus
 - (2) Gastroesophageal reflux disease
 - (3) Smoking and alcohol use
 - c. Genetic and molecular abnormalities
- 3. Prevention
 - a. Lifestyle changes
- 4. Diagnosis
 - a. Clinical signs and symptoms
 - b. Endoscopy and biopsy
 - c. Imaging
- 5. Staging and prognostic factors
 - a. TNM staging

6. Treatment
 - a. Local-regional disease
 - (1) Surgery
 - (2) Radiation therapy
 - (3) Chemotherapy
 - b. Recurrent and metastatic disease
 - (1) Chemotherapy
 - (2) Radiation therapy
 - (3) Surgery
7. Supportive care
 - a. Management of obstruction
 - (1) Endoscopic stenting
 - (2) Other
 - b. Supportive management

M. Gallbladder Cancer

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - b. Risk factors
 - (1) Inflammatory bowel disease
 - (2) Gallstones (cholesterol-type)
 - (3) Chronic inflammation
3. Diagnosis
 - a. Clinical signs and symptoms
 - b. Imaging
 - c. Surgery
 - d. Cholangiography
 - e. Bile cytology
4. Staging and prognosis
 - a. TNM
5. Treatment by stage
 - a. T1/T2 tumors
 - (1) Surgery
 - b. T3/T4 tumors
 - (1) Surgery
 - (2) Radiation therapy

(3) Chemotherapy

c. Evaluation after laparoscopic cholecystectomy

(1) Surgery

d. Recurrent or metastatic disease

(1) Chemotherapy

(2) Radiation therapy

6. Supportive care

a. Biliary drainage

N. Gastric Cancer

1. Epidemiology

a. Incidence rates

b. Mortality rates

2. Pathogenesis, pathology, and tumor biology

a. Pathology

b. Genetic and molecular factors

(1) Precursor lesions

(2) Adenomatous and gastric polyps

c. Nutritional factors

(1) Vitamin B12/pernicious anemia

(2) Other

d. Lifestyle

(1) Tobacco use

(2) Occupational exposure

(3) *Helicobacter pylori* and other infections

3. Screening

a. Endoscopy

b. Imaging

4. Diagnosis

a. Clinical signs and symptoms

b. Imaging

c. Endoscopy and biopsy

5. Staging

a. TNM staging

6. Treatment

a. Resectable

(1) Surgery

- (2) Chemotherapy
 - (3) Radiation therapy
 - (4) Laparoscopy
 - (5) Combined modality
- b. Unresectable and metastatic
 - (1) Chemotherapy
 - (2) Radiation therapy
1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Premalignant lesion
 - (2) Histology
 - (a) Cloacogenic
 - (b) Squamous cell
 - b. Risk factors
 - (1) HPV infection
 - (2) Sexual activity
 - (3) Condylomata
 - (4) HIV infection
 - c. Assessment of risk
 - (1) Lifestyle factors
 - (2) HIV infection
 3. Prevention
 - a. Lifestyle changes
 4. Screening
 - a. Anal Papanicolaou tests
 5. Diagnosis
 - a. Physical examination
 - b. Biopsy
 - c. Anoscopy/proctoscopy
 - d. Transrectal ultrasound
 - e. Aspiration of palpable inguinal nodes
 6. Staging and Prognostic factors
 - a. TNM system

- b. Symptoms
- 7. Treatment by stage
 - a. Stage 1
 - (1) Surgery
 - b. Local disease
 - (1) Combined modality
 - c. Positive inguinal nodes
 - (1) Combined modality
 - d. Recurrent or residual disease
 - (1) Surgery
 - (2) Radiation therapy
 - (3) Chemotherapy
 - e. Metastatic disease
 - (1) Chemotherapy
- 8. Follow-up
- 9. Special issues
 - a. Anorectal melanoma

D. Biliary Tree Cancer

- 1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
- 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - b. Risk factors
 - (1) Primary sclerosing cholangitis
 - (2) Gallstones
 - (3) Choledochal cysts
- 3. Diagnosis
 - a. Clinical signs and symptoms
 - b. Imaging
 - c. ERCP
 - d. Endoscopic biopsy
- 4. Staging and prognostic factors
 - a. TNM
 - b. Histologic grade
- 5. Treatment by stage

- a. Resectable disease
 - (1) Surgery
 - (2) Radiation therapy
 - b. Unresectable disease
 - (1) Liver transplantation
 - c. Advanced or recurrent disease
 - (1) Chemotherapy
 - (a) Intravenous
 - (b) Hepatic infusion
 - (2) Radiation therapy
- 6. Supportive care
 - a. Biliary drainage

X. Neuroendocrine (carcinoid) Tumors

- 1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
 - c. Hereditary syndromes
 - (1) MEN
 - d. Second neuroendocrine tumor
- 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Defined by amine precursor uptake and decarboxylation (APUD) cell of origin
 - (2) Classification by site of primary
 - (a) GI tract
 - i. Foregut
 - ii. Midgut
 - iii. Hindgut
 - (b) Lung
 - (c) Pancreas
 - (d) Thymus
 - (3) Histochemistry and products
 - (a) Serotonin
 - (b) Calcitonin
 - (c) Gastrin
 - (d) VIP
 - (e) Glucagon
 - (f) Insulin
 - (g) Other

- b. Genetic factors
 - (1) MEN
- 3. Prevention
 - a. Genetic counseling
- 4. Diagnosis
 - a. Clinical signs and symptoms
 - (1) Symptoms related to hormone produced
 - (2) Carcinoid syndrome
 - (3) Carcinoid crisis
 - b. Biopsy
 - (1) Positive staining for chromogranin and neuron-specific enolase
 - c. Measurement of secretory product
 - (1) 24-hour 5-hydroxy-indole acetic acid
 - d. Imaging
 - e. Endoscopy as appropriate by site
 - f. Radiolabeled octreotide for somatostatin receptor scintigraphy
- 5. Screening and prognostic factors
 - a. No standard staging
 - b. Prognostic factors
 - (1) 5HIAA levels
 - (2) Primary site
 - (3) Liver metastases
 - (4) Histologic features
- 6. Treatment
 - a. Observation
 - b. Surgery
 - c. Somatostatin analog
 - d. Chemotherapy
 - e. Palliation of symptoms
 - (1) Diarrhea
 - (2) Bronchospasm
 - (3) Cardiac disease
 - f. Interferon
 - g. Liver directed therapy
- 7. Follow-up
 - a. No standard follow-up

AA. *Pancreatic Cancer*

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates

2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - b. Progression from ductal epithelial dysplasia
 - c. Genetic and molecular factors
 - (1) p16 mutations
 - (2) Other

 - d. Pancreatic cystic neoplasms

3. Risk factors
 - a. Tobacco use
 - b. Pancreatitis
 - c. Genetic factors
 - (1) BRCA2
 - (2) Familial pancreatic cancer
 - (3) MEN
 - (4) Others

4. Prevention
 - a. Smoking cessation
 - b. Genetic counseling

5. Diagnosis
 - a. Clinical signs and symptoms
 - b. Endoscopy and biopsy
 - (1) ERCP

 - c. Laparoscopy
 - d. Imaging
 - e. Imaging-directed biopsy
 - f. Surgery

6. Staging and prognostic factors
 - a. TNM

7. Treatment
 - a. Resectable disease-surgery
 - (1) Observation
 - (2) Chemotherapy
 - (a) Preoperative
 - (b) Postoperative

- (3) Radiation therapy
 - (a) Postoperative
- (4) Combined radiation therapy/chemotherapy
 - b. Unresectable disease
 - (1) Radiation therapy and chemotherapy
 - (2) Chemotherapy
 - c. Metastatic and recurrent disease
- 8. Follow-up after curative resection
- 9. Supportive care
 - a. Pain
 - (1) Celiac block
 - b. Obstruction
 - (1) Biliary stenting
 - (2) Endoscopic stenting of gastric outlet obstruction
 - c. Malabsorption

Hematologic Malignancies

Chronic Myeloproliferative Diseases

Chronic Myelogenous Leukemia

bcr/abl translocation (Philadelphia chromosome) in the "phases" of CML disease progression and the associated prognoses associated with these.

pharmacologic agents (including tyrosine kinase inhibitors), immunologic agents and biologic agents (e.g. interferon- α) used in the treatment

Polycythemia Rubra Vera

role of phlebotomy, pharmacologic agents and radioactive phosphorous in the treatment of polycythemia rubra vera.

Chronic Idiopathic Myelofibrosis (Agnogenic Myeloid Metaplasia/Myelofibrosis)

epidemiology, risk factors, clinical presentation and natural history of patients with chronic idiopathic myelofibrosis, therapy and prognosis.

Essential Thrombocythemia

risks of bleeding and thrombosis.

role of platelet pheresis, hydroxyurea, and anagrelide

Acute Myeloid Leukemias

Leukemogenesis

Diagnosis

Classification of AML as per the WHO (and the historically used FAB) classification, morphologic analysis, immunohistochemical stains, cytogenetics, flow cytometry, fluorescence in situ hybridization (FISH), RT-PCR and real-time PCR. Secondary vs primary AML

Prognosis

Treatment- anthracyclines and cytarabine chemotherapy agents, of induction therapy, consolidation therapy and maintenance.

Management of relapsed and refractory disease

Use of growth factors

Treatment of elderly patients

Acute promyelocytic leukemia (APL)

use of all-trans retinoic acid, arsenic trioxide,

anthracyclines and cytarabine

monitoring of minimal residual

classical and non-classical APL and

retinoic acid syndrome

management of coagulopathy

Myelodysplastic Syndrome (MDS) Disorders

pathophysiologic mechanisms

diagnosis, natural history and therapy of MDS disorders

International Prognosis and Staging System (IPSS) classification

genetic abnormalities associated with MDS

utility of cytogenetics in the diagnosis, management and assessment

Treatment

B-cell Neoplasms

Lymphoblastic Leukemia/Lymphoma

Classification

Diagnosis- bcr/abl and CNS disease

Treatment and need for prolonged therapy consisting of multiple phases of treatment.

Lymphoplasmacytic Lymphoma (Waldenström's Macroglobulinemia)

Management, including hyperviscosity syndromes

Chronic Lymphocytic Leukemia/Small Lymphocytic Lymphoma

staging systems (e.g. Rai and Binet) and role and use of cell surface marker analysis (e.g. flow cytometry,

immunohistochemical stains) in the diagnosis and differential diagnosis of CLL/SLL and entities that are often confused with

CLL/SLL (e.g. hairy cell leukemia, marginal zone lymphoma, splenic lymphoma with villous lymphocytes, large granular

lymphocyte proliferative disorder, adult T-cell

leukemia/lymphoma, prolymphocytic

manage the paraneoplastic events that often accompany CLL/SLL.

Treatment of CLL/SLL

Hairy Cell Leukemia

the use of morphologic analysis, flow cytometry, immunohistochemistry staining and, specifically, tartrate resistant alkaline phosphatase (TRAP) staining for making the diagnosis of hairy cell leukemia.

Plasma Cell Disorders

Plasma Cell Myeloma (Multiple Myeloma), Plasmacytomas and Other Plasma Cell Disorders

diagnosis and therapy of less common plasma cell disorders including, but not limited to, nonsecretory multiple myeloma, plasma cell leukemia and POEMS syndrome.

Amyloidosis

Diagnosis and characterization of the variety of amyloid proteins

Castleman's Disease

B-cell Lymphomas

Diagnosis and Staging

precursor B-lymphoblastic leukemia/lymphoma, splenic marginal zone lymphoma including mucosa-associated lymphoid tissue (MALT) lymphoma, nodal marginal zone B-cell lymphoma, follicular lymphoma, mantle cell lymphoma, diffuse large B-cell lymphoma, mediastinal (thymic) large B-cell lymphoma, intravascular large B-cell lymphoma, primary effusion lymphoma, Burkitt's lymphoma/leukemia, angiocentric lymphoma, and anaplastic large cell lymphoma.
imaging studies (e.g. CT, MRI, PET, gallium scans, and others), molecular diagnostics, and cytogenetics

Treatment

Including immunotherapy and radioimmunotherapy

B-cell Proliferations of Uncertain Malignant Potential

Post-transplantation Lymphoproliferative Disorders

understanding of the histologic and clonal versus non-clonal variants of PTLD
implications of PTLD and its treatment on the transplanted organ.

T-cell and NK-cell Neoplasms

Adult T-cell Leukemia/Lymphoma

Diagnosis and role of HTLV-I in the pathogenesis of this disorder.

Mycosis Fungoides, Sezary Syndrome and Cutaneous T-cell Lymphoma

T-cell Large Granular Lymphocytic Leukemia

associated affects on hematopoiesis, presumed to be due to cytokines.

T-cell Lymphomas

peripheral T-cell lymphoma, angio-immunoblastic T-cell lymphoma, precursor T-lymphoblastic leukemia/lymphoma, nasal T/NK-cell lymphoma, intestinal T-cell lymphoma and anaplastic large cell lymphoma

Hodgkin's Disease

role of the Reed Sternberg cell in the malignant process.
demonstrate knowledge of the historical approaches to diagnosing and managing patients with Hodgkin's disease
Ann Arbor Staging System

Histiocytic and Dendritic Cell Neoplasms

Langerhans cell histiocytosis and the other histiocyte disorders.
Mastocytosis

Head and Neck/Lung

Lung Cancer

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates

2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - b. Non-small-cell histology and biology
 - (1) Adenocarcinoma
 - (a) Bronchioalveolar

 - (2) Squamous cell
 - (3) Large-cell
 - c. Small-cell histology and biology
 - d. Risk factors
 - (1) Lifestyle
 - (a) Active and passive smoking

 - (2) Environmental
 - (a) Asbestos
 - (b) Radon
 - (c) Other

 - e. Genetic and molecular markers

3. Prevention
 - a. Smoking cessation
 - b. Chemoprevention

4. Screening
5. Diagnosis
 - a. Clinical signs and symptoms
 - b. Sputum cytology
 - c. Imaging
 - d. Biopsy
 - e. Immunohistochemistry
6. Staging and prognostic factors
 - a. Non-small-cell lung cancer (NSCLC)
 - (1) TNM system
 - b. Small cell lung cancer (SCLC)
 - (1) TNM system and/or limited versus extensive
7. Treatment
 - a. Non-small-cell lung cancer
 - (1) Preoperative evaluation
 - (2) Carcinoma-in-situ
 - (3) Early-stage disease (stage I, II, III, N0-1)
 - (a) Surgery
 - (b) Radiation therapy
 - (c) Chemotherapy
 - (4) Stage IIIA and IIIB
 - (a) Combined chemotherapy and radiation therapy
 - (b) Surgery
 - (5) Stage IIIB (with pleural effusion) and stage IV
 - (a) Chemotherapy
 - i. First-line
 - ii. Second-line
 - iii. Third-line and beyond
 - (b) Biologic agents
 - (c) Isolated metastases
 - Small-cell lung cancer
 - (1) Limited stage
 - (a) Combined chemotherapy and radiation therapy
 - (b) Prophylactic brain irradiation
 - (c) Solitary pulmonary nodule
 - (2) Extensive disease
 - (a) First-line chemotherapy
 - (b) Second-line treatment
 - (c) Treatment of brain metastases

8. Follow-up
 - a. ASCO and other guidelines
 9. Supportive care
 - a. Pulmonary rehabilitation post resection and/or radiation therapy
 10. Other/Special issues
 - a. Bronchoalveolar carcinoma
 - b. Pancoast tumors
- V. *Mesothelioma (pleural)*
1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Epithelioid
 - (2) Sarcomatoid
 - (3) Mixed
 - b. Risk factors
 - (1) Asbestos
 3. Prevention
 - a. Decrease occupational exposure
 4. Diagnosis
 - a. Signs and symptoms
 - b. Imaging
 - c. Cytology
 - (1) Effusion
 - d. Biopsy
 - (1) Thoracoscopy
 5. Staging and prognostic factors
 - a. International Mesothelioma Interest Group
 6. Treatment by stage
 - a. Stage I
 - (1) Extrapleural pneumonectomy
 - (2) Adjuvant chemotherapy
 - (3) Adjuvant radiation therapy
 - b. Unresectable disease
 - (1) Radiation therapy
 - (2) Chemotherapy

- (3) Combination chemoradiotherapy
 - c. Recurrent and metastatic disease
 - (1) Chemotherapy
 - (2) Radiation therapy
- 7. Supportive care
 - a. Management of effusions
- 8. Special issues
 - a. Peritoneal mesothelioma
 - (1) Presentation and diagnosis
 - (2) Pathology
 - (3) Treatment

Benign mesotheliomas

Q. Head and Neck Cancers

- 1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
- 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Squamous cell
 - (2) Adenomatous
 - (3) Other
 - b. Genetic and molecular factors
 - (1) First-degree relatives
 - c. Lifestyle
 - (1) Tobacco
 - (2) Alcohol
 - d. Field cancerization
 - e. Viral factors
 - (1) HPV
 - (2) EBV
- 3.
- 4. Prevention
 - a. Tobacco cessation
 - b. Alcohol cessation
- 5. Screening
 - a. Oral examination

6. Diagnosis
 - a. Clinical signs and symptoms
 - (1) Head and neck examination
 - (a) Oral examination
 - b. Endoscopy and biopsy
 - (1) Primary lesion
 - (2) Nodal sites
 - c. Imaging
7. Staging and prognostic factors
 - a. TNM system
8. Treatment
 - a. General principles
 - (1) Surgery
 - (a) Organ preservation strategies
 - (b) Postradiation neck dissection
 - (2) Radiation therapy
 - (3) Chemotherapy
 - (4) Combined modality
 - b. Specific sites
 - (1) Hypopharynx
 - (2) Larynx
 - (3) Nasal cavity
 - (4) Nasopharynx
 - (5) Oral cavity
 - (6) Oropharynx
 - (7) Paragangliomas
 - c. Nasopharyngeal tumor
 - d. Locally recurrent disease
 - e. Nodal presentation
 - f. Metastatic disease
9. Follow-up
 - a. Second malignancies
10. Supportive care
 - a. Dental care
 - b. Enteral and parenteral nutrition
 - c. Radioprotectants

(1) ASCO clinical practice guidelines

d. Rehabilitation

(1) Speech

(2) Swallow

(3) Voice

e. Disfigurement and dysfunction

AG. Thymomas and Thymic Cancer

1. Epidemiology

a. Incidence rates

b. Mortality rates

2. Pathogenesis, pathology, and tumor biology

a. Pathology

3. Risk factors

4. Diagnosis

a. Clinical signs and symptoms

(1) Associated systemic syndromes

(a) Autoimmune/immune (ie, myasthenia gravis)

(b) Endocrine

(c) Other

b. Imaging

c. Biopsy

5. Staging and prognostic factors

a. TNM system

b. Resectable versus nonresectable

c. Prognostic factors

6. Treatment by stage

a. Localized disease

(1) Surgery

(2) Radiation therapy

(3) Chemotherapy

(4) Combined-modality therapy

b. Recurrent or metastatic disease

(1) Surgery

(2) Radiation therapy

(3) Chemotherapy

AH. Thyroid Cancer

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates

2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Papillary carcinoma
 - (2) Follicular carcinoma
 - (3) Anaplastic carcinoma
 - (4) Medullary carcinoma

 - b. Genetics and genetic syndromes
 - (1) Familial medullary cancer/multiple endocrine neoplasia (MEN)
 - (2) RET proto-oncogene in medullary thyroid cancers
 - (3) K-ras in radiation therapy-induced cancers

 - c. Assessment of risk
 - (1) Family history
 - (a) MEN syndromes
 - (b) Familial adenomatous polyposis
 - (c) Cowden's Disease

 - (2) Radiation exposure

3. Diagnosis
 - a. Evaluation of a thyroid nodule
 - b. Imaging studies
 - c. Biopsy
 - (1) Use of FNA

 - d. Calcitonin stimulation testing

4. Screening
 - a. Genetic testing for medullary thyroid cancer
 - b. Calcitonin stimulation of high-risk family members

5. Staging
 - a. TNM staging

6. Treatment
 - a. Well-differentiated cancers
 - (1) Partial or complete thyroidectomy with/without lymph node
 - (2) Role of I¹³¹ (iodine 131)

 - b. Anaplastic cancers
 - (1) Thyroidectomy and lymph node dissection

- (2) Surgery for maintenance of airway
- (3) Doxorubicin and external beam radiation therapy
- c. Medullary thyroid cancer
 - (1) Thyroidectomy and lymph node dissection
 - (2) Resection guided by venous sampling after calcitonin stimulation
- 7. Follow-up
 - a. Determination of thyroid hormone status
 - b. Hypocalcemia after total thyroidectomy
- 8. Supportive care
 - a. Thyroid and calcium supplementation

AI. Unknown Primary Site

- 1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
- 2. Pathogenesis, pathology, and tumor biology
 - a. Histologic types
 - (1) Undifferentiated malignancy
 - (2) Undifferentiated carcinoma
 - (3) Small blue cell tumor
 - (4) Adenocarcinoma
 - (5) Squamous cell carcinoma
 - (6) Germ cell tumor
 - b. Diagnostic techniques
 - (1) Immunohistochemical stains
 - (2) Molecular pathology
 - (3) Electron microscopy
 - c. Metastatic patterns predictive of potentially curable diseases
- 3. Diagnostic evaluation
 - a. History and physical examination
 - (1) Source of the unknown primary
 - b. Laboratory
 - (1) Sensitivity and specificity of tumor markers in predicting the source of an unknown primary tumor
 - c. Imaging
 - (1) PET
 - (2) MRI
 - (3) CT

(4) Nuclear medicine

- d. Specific tumor characteristics that suggest the primary site

4. Treatment

- a. Surgery
- b. Chemotherapy-responsive tumors
- c. Radiation therapy

GU/Skin/Sarcoma/CNS Tumors

H. Central Nervous System Malignancies

1. Epidemiology

- a. Incidence rates
- b. Mortality rates

2. Pathogenesis, pathology, and tumor biology

- a. Histologic types

- (1) Progression from low-grade to high-grade tumors
- (2) Cell type
- (3) WHO grading system

- b. Genetic syndromes
- c. Environmental factors

3. Diagnosis

- a. Clinical symptoms and signs
- b. Imaging

- (1) CT/MRI
- (2) Magnetic resonance spectroscopy
- (3) PET/single-photon emission computed tomography

4. Staging and prognostic factors

- a. Staging

- (1) Radiographic
- (2) CSF evaluation

- b. Prognostic factors

- (1) Functional neurologic status
- (2) Tumor histology
- (3) Patient age
- (4) Extent of tumor resection
- (5) Tumor location
- (6) Biogenetic markers

5. Treatment of primary CNS tumors

- a. Low-grade astrocytoma

- (1) Surgery

- (2) Observation
- (3) Immediate treatment
 - (a) Astrocytoma
- (4) Radiation therapy
 - b. Malignant astrocytomas
 - (1) Surgery
 - (2) Radiation therapy
 - (3) Chemotherapy
 - (a) Systemic
 - (b) Intracavitary
 - c. Malignant oligodendrogliomas
 - (1) Surgery
 - (2) Chemotherapy
 - (a) Predictive factors
 - (3) Radiation therapy
 - d. Meningiomas
 - (1) Observation
 - (2) Surgery
 - (3) Radiation therapy
 - (4) Other
 - e. Primary CNS lymphomas
 - (1) Stereotactic biopsy
 - (2) Chemotherapy
 - (a) Intrathecal
 - (b) Systemic
 - (3) Radiation therapy
 - f. Medulloblastoma
 - (1) Surgery
 - (2) Neuraxis radiation therapy
 - (3) Chemotherapy
 - g. Ependymoma
 - h. Pinealoma
 - i. Metastases to CNS
 - (1) Brain
 - (a) Whole brain radiation therapy
 - (b) Focal brain radiation therapy

- (c) Surgery
- (d) Chemotherapy

(2) Leptomeninges

- (a) Radiation therapy
- (b) Chemotherapy

- i. Intrathecal
 - 1. Access devices
- ii. Systemic

6. Follow-up

- a. Serial imaging

7. Supportive care

- a. Corticosteroids
- b. Anticonvulsants
- c. Deep vein thrombosis
- d. Pneumocystis carinii pneumonia prophylaxis
- e. Radiation toxicity

(1) Neurocognitive

(2) Radionecrosis

O. Germ Cell Tumors

1. Epidemiology

- a. Incidence rates
- b. Mortality rates

2. Pathogenesis, pathology, and tumor biology

- a. Pathology

(1) Seminoma

(2) Nonseminoma

- b. Genetics and molecular characteristics

(1) Klinefelter's syndrome

- c. Risk factors

(1) Cryptorchism

- d. Location

(1) Testes

(2) Pineal

(3) Mediastinum

(4) Retroperitoneum

3. Diagnosis
 - a. Clinical signs and symptoms
 - b. Imaging
 - c. Molecular markers
 - d. Biopsy
 - e. Serum markers

4. Staging and prognostic factors
 - a. TNM, International Germ Cell Consensus Classification, other systems
 - b. Histologic type
 - c. Serum markers
 - d. Clinical Versus surgical staging

5. Treatment
 - a. Management of testicular mass
 - (1) Inguinal orchiectomy
 - b. Seminoma
 - (1) Stage 1 disease
 - (a) Surgery
 - (b) Radiation therapy
 - (2) Stage II disease
 - (a) Surgery
 - (b) Radiation therapy
 - (c) Chemotherapy
 - (3) Stage III disease
 - (a) Surgery
 - (b) Radiation therapy
 - (c) Chemotherapy
 - (4) Metastatic or recurrent disease
 - (a) Chemotherapy
 - (b) Surgery
 - c. Nonseminoma
 - (1) Stage 1 disease
 - (a) Surgery
 - (2) Stage II disease
 - (a) Chemotherapy
 - (3) Stage III disease
 - (a) Chemotherapy

- (4) Metastatic or recurrent disease
 - (a) Chemotherapy
- (5) Late relapse
 - d. Management of residual disease
 - e. Observation
 - f. Surgery
 - g. Radiation therapy
- 6. Follow-up
 - a. Tumor markers
 - b. Imaging studies in patients treated by observation
- 7. Supportive care
 - a. Fertility and sexuality issues
 - b. Gynecomastia
- 8. Special issues
 - a. Growing teratoma
 - b. False-positive serum markers
 - c. Tumor sanctuary sites (CNS, testes)
 - d. Secondary malignancies
 - e. Non-germ cell testicular tumors

AB. Penile Cancer

- 1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
- 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - b. Human papilloma virus (HPV)
 - c. Circumcision
 - d. Premalignant lesions
 - e. Lifestyle factors
- 3. Prevention
 - a. Lifestyle changes
 - (1) Sexual practices
 - b. Circumcision
- 4. Screening
 - a. Identify premalignant lesions

5. Diagnosis
 - a. Clinical signs and symptoms
 - b. Biopsy
6. Staging
 - a. TNM system
 - b. Prognostic factors
7. Treatment by stage
 - a. Treatment of the primary lesion
 - (1) Surgery
 - (2) Surgery with radiation therapy
 - b. Management of regional nodes
 - (1) Sentinel node evaluation
 - c. Metastatic or recurrent disease
 - (1) Chemotherapy
8. Supportive care
 - a. Sexuality
 - b. Ureteral stenosis

AC. Prostate Cancer

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
 - c. Differences among ethnic groups
 - d. Genetic abnormalities
 - e. Age distribution
2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Prostatic intraepithelial neoplasia
 - b. Genetic factors
 - (1) Family history
 - c. Risk factors
 - (1) Established risk factors
 - (2) Dietary factors
3. Prevention
 - a. Chemoprevention
 - (1) Finasteride
 - b. Dietary factors

4. Screening
 - a. PSA
 - (1) PSA velocity
 - (2) Free PSA
 - b. Digital rectal examination
 - c. Transrectal ultrasound
5. Diagnosis
 - a. Clinical signs and symptoms
 - b. Digital rectal examination
 - c. PSA versus modifications of PSA (ie, free PSA)
 - d. Transrectal ultrasound guided biopsy
 - e. Imaging
6. Staging and prognostic factors
 - a. TNM system
 - b. Prognostic factors
 - (1) Gleason grading
 - (2) DNA analysis by flow cytometry
 - (3) PSA
 - (4) Predictive models for organ-confined versus nonorgan confined disease
7. Treatment by stage
 - a. Organ confined
 - (1) Observation
 - (2) Radiation therapy
 - (a) External beam
 - (b) Brachytherapy
 - (c) Radioactive seeds
 - (3) Surgery
 - (4) Cryosurgery
 - (5) Hormonal therapy
 - (a) Neoadjuvant
 - (b) Adjuvant
 - Rising PSA level
 - (1) Guideline - prostate specific antigen working group
 - Locally recurrent
 - (1) Surgery
 - (2) Radiation therapy
 - (3) Hormonal therapy
 - b. Metastatic disease
 - (1) Surgery
 - (2) Radiation therapy

- (3) Hormonal therapy
 - (a) Early versus delayed
 - (b) Antiandrogen
 - (c) Gonadatrophin releasing hormone agonists
 - (d) "Maximal" androgen blockade
 - (e) Other
- (4) Chemotherapy
- (5) Bisphosphonates
- (6) Radiopharmaceuticals
- 8. Follow-up
 - a. PSA
 - b. Imaging techniques
 - (1) Bone scan
 - (2) Proscint scan
- 9. Supportive care
 - a. Sexual function
 - b. Urinary incontinence
 - c. Proctitis/diarrhea
 - d. Urinary frequency
 - e. Osteoporosis
 - f. Hot flashes
- 10. Special issue
 - a. Small-cell carcinoma

AD. Renal Cell Cancer

- 1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
- 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Chromosomal abnormalities
 - (2) Von Hippel-Lindau
 - (3) Li-Fraumeni
 - c. Risk factors
 - (1) Family history
 - (2) Tobacco use
 - (3) Environmental exposures
 - (4) Occupation exposures

3. Prevention
 - a. Lifestyle changes
 - (1) Smoking cessation
 - b. Monitoring of those at increased risk
 - (1) First-degree relatives
 - (2) Genetic syndromes
4. Screening
 - a. Familial and genetic aspects
 - b. Increased detection on CT scans performed for other purposes
5. Diagnosis
 - a. Classic signs and symptoms
 - b. Imaging
 - c. Surgery
6. Staging and prognostic factors
 - a. TNM system
 - b. Prognostic factors
 - (1) Histology
 - c. Prognostic factors with metastatic disease
7. Treatment by stage
 - a. Localized disease
 - (1) Surgery
 - (2) Management of vena cava involvement
 - b. Metastatic disease
 - (1) Surgery
 - (2) Biologic response modifiers
 - (a) Interleukin-2
 - (b) Interferon
 - (c) Newer cytokines
8. Follow-up
9. Supportive care
10. Other/special issues
 - a. Bilateral renal tumors
 - b. Wilms' tumor
 - c. Oncocytoma
 - d. Collecting system tumor
 - a. Unresectable/locally advanced disease
 - b. Metastatic disease

2. Other/special issues
 - a. Paraneoplastic syndromes
 - (1) Pure Red Cell Aplasia
 - (2) Myasthenia Gravis

AF. Soft Tissue Sarcomas

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates

2. Pathogenesis, pathology, and tumor biology
 - a. Histologic subtypes
 - (1) Fibrosarcoma
 - (2) Leiomyosarcoma
 - (3) Rhabdosarcoma
 - (4) Angiosarcoma
 - (5) GIST (gastrointestinal stromal tumors)
 - (6) Other

 - b. Cytogenetics

3. Risk factors
 - a. Genetic syndromes
 - (1) Li-Fraumeni syndrome
 - (2) Neurofibromatosis type I
 - (3) Retinoblastoma
 - (4) Gardner's syndrome
 - (5) Werner's syndrome
 - (6) Gorlin's syndrome

 - b. Environmental exposure
 - (1) Vinyl chloride
 - (2) Radiation

 - c. Lymphedema
 - d. Human herpes virus

4. Diagnosis
 - a. Clinical signs and symptoms
 - b. Biopsy
 - c. Imaging
 - d. Chromosomal signatures/gene mutations

5. Staging and prognostic factors
 - a. AJCC staging system
 - b. Prognostic factors
 - (1) Histologic subtype

- (2) Patient age
 - (3) Primary site
 - (4) Molecular markers
6. Treatment
- a. Localized primary disease
 - (1) Surgery
 - (a) General issues
 - (b) Amputation
 - (c) Combined modality limb-sparing treatment
 - (2) Radiation therapy
 - (a) Essential elements in treatment planning
 - (b) Preoperative
 - (c) Postoperative
 - (3) Chemotherapy
 - (a) Adjuvant
 - (b) Neoadjuvant
 - (c) Intraarterial administration
 - (d) Hyperthermia and limb perfusion
 - b. Local recurrence
 - (1) Surgery
 - (a) Dermatofibrosarcoma protuberans
 - c. Metastatic disease or distant recurrence
 - (1) Surgery
 - (2) Chemotherapy
 - (a) Single agent
 - (b) Combination
 - (3) Radiation therapy
7. Follow-up
8. Other/special issues
- a. GIST

E. Bladder and Other Urothelial Cancers (ureter, renal, pelvis)

- 1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
- 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - b. Lifestyle and environmental exposures

- (1) Cigarette smoking
 - (2) Phenacetin
 - (3) Schistosomiasis infection
 - (4) Chemical exposure
 - c. Field change in urothelium
 - d. Genetic and molecular abnormalities
3. Prevention
 - a. Smoking cessation
 - b. Environmental (OSHA) protection
 - c. Monitoring medication use
 4. Screening
 - a. Urine cytology
 - b. CT/MRI
 5. Diagnosis
 - a. Urine cytology
 - b. Cystoscopy and biopsy
 - c. CT/MRI scanning
 6. Staging and prognostic factors
 - a. TNM system, tumor grading
 - b. Localized versus invasive disease
 - c. Histologic type
 7. Treatment by stage
 - a. Superficial bladder cancer
 - (1) Intravesical
 - b. Early-stage and locally advanced
 - (1) Surgery
 - (2) Radiation therapy
 - (3) Chemotherapy
 - (a) Neoadjuvant
 - (b) Adjuvant
 - (4) Combination therapy for organ preservation
 - c. Recurrent and metastatic
 - (1) Surgery
 - (2) Radiation therapy
 - (3) Chemotherapy
 - (a) Neoadjuvant
 - (b) Adjuvant

(c) Concurrent with radiation

Follow-up

- d. Urine cytology
- e. Cystoscopy
- f. Imaging

- 8. Supportive care
 - a. Urinary diversion
 - (1) Ileal conduit
 - (2) Continent urinary diversions
- 9. Special issues
 - a. Urachal carcinoma

F. Bone Sarcomas

- 1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
- 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Histologic types
 - (a) Osteosarcoma
 - (b) Chondrosarcoma
 - (c) Ewing's
 - (d) Other
 - b. Cytogenetics and genetic syndromes
 - (1) Li-Fraumeni syndrome
 - (2) Retinoblastoma
 - (3) Chromosomal signatures/gene mutations
 - c. Radiation
- 3. Diagnosis
 - a. Clinical presentation
 - b. Radiologic-pathologic correlations
 - c. Biopsy
 - d. Special considerations
- 4. Staging and prognostic factors
 - a. Staging: TNM and tumor grade
 - b. Prognostic factors
 - c. Radiographic evaluation
 - d. Restaging after preoperative chemotherapy

5. Treatment
 - a. Localized primary disease
 - (1) Osteosarcoma
 - (2) Chondrosarcoma
 - (3) Ewing's
 - (4) Other
 - (5) Limb sparing treatment
 - b. Local recurrence
 - c. Metastatic disease
 - (1) Clinical presentation
 - (2) Surgical resection
 - (3) Chemotherapy
6. Follow-up
 - a. Radiographic evaluation

U. Melanoma

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - (1) Dysplastic nevi
 - (2) Melanoma in situ
 - (3) Invasive melanoma
 - b. Risk factors
 - (1) Skin type
 - (2) Precursor lesions
 - (3) Sun exposure
 - (4) Family history (affected relatives)
 - c. Genetics - p16 mutations
 - (1) CDKN2A, MTS-1
 - (2) CDK4
 - (3) FAMM (DNS)
3. Prevention
 - a. Lifestyle changes
 - (1) Sun avoidance
 - b. Use of sunscreen
4. Screening
 - a. Skin examination

- b. Genetic testing and genetic counseling
- 5. Diagnosis
 - a. Clinical signs and symptoms
 - (1) ABCD of melanoma identification
 - b. Biopsy of suspicious lesion (excisional versus incisional versus shave)
 - c. Imaging
- 6. Staging and prognostic factors
 - a. TNM system
 - b. Location of primary
- 7. Treatment by stage
 - a. Melanoma in situ
 - (1) Surgery
 - b. Invasive melanoma
 - (1) Surgery
 - (a) Wide local excision
 - (b) Sentinel node mapping
 - (2) Adjuvant therapy
 - (a) Interferon
 - (b) Vaccines
 - (3) Estimating the benefits of adjuvant therapy
 - c. Regional nodal metastasis/in-transit metastasis
 - (1) Surgery
 - (2) Adjuvant therapy
 - (a) Interferon
 - (b) Other
 - (c) Limb perfusion
 - d. Metastatic disease
 - (1) Surgical resection (solitary metastasis)
 - (2) Chemotherapy
 - (3) Biologic therapies
 - (a) Interferon
 - (b) Interleukin-2
 - (4) Biochemotherapy
 - (5) Radiation therapy

8. Follow-up
 - a. National Comprehensive Cancer Network (NCCN) guidelines
9. Supportive care
 - a. Lymphedema
10. Other/special issues
 - a. Unknown primary
 - b. Mucosal primary
 - (1) Oral
 - (2) Anorectal
 - (3) Vaginal/vulvar
 - c. Ocular primary

Patient Care

Management of chemotherapy

1. Indications and goals
 - a. Primary cancer
 - b. Recurrent cancer
2. Pharmacology
 - a. Pharmacokinetics
 - b. Pharmacodynamics
 - c. Metabolism and clearance
 - d. Pharmacogenomics
 - e. List of drugs
3. Dose and schedule
 - a. Metronomic
 - b. Dose-density
 - c. Dose-intensity
 - d. High-dose
 - e. Other
4. Cancer drug development and testing
5. Drug resistance
6. Predicting response and toxicity

Hormonal Therapy

1. Estrogens
2. Selective estrogen response modifiers
3. Progestins and antiprogestins
4. Aromatase inhibitors

5. Androgens and antiandrogens
6. Gonadotropin-releasing hormone analogs
7. Glucocorticoids
8. Miscellaneous agents

Biologic and Targeted Therapy

1. Basic concepts of targeted molecular therapies
2. Monoclonal antibodies
3. Tumor vaccines
4. Cellular therapy
5. Antiangiogenic agents
6. Cytokines
7. Gene-directed therapy

Management of the following complications of malignancy and chemotherapy:

- Fatigue
- Depression
- Neuropathy
- Hot flashes
- Pain control
- Chemotherapy induced nausea, vomiting, and diarrhea
- Chemotherapy extravasation
- Premedications for chemotherapy
- Infusion reactions
- Bone metastases

Professionalism

Interact respectfully with nursing staff, scheduling staff, patients and families
Respect patient confidentiality

Communication

Prognosis
Treatment options
Patient's goals of care
Cancer recurrence
Shifting treatment goals

Delivering Bad News

1. Patient's coping skills
2. Support to family
3. Preference for end-of-life care
 - a. Explaining advanced directives

Cross Cultural Issues

.Multidisciplinary Teams
Communicating within the team

Systems Based Learning

Understand the role of hospice and palliative care in patient management
Understand visiting nurse services available for home chemotherapy infusions
Understand the financial implications of chemotherapy for the patient

Practice Based Learning

Present newly diagnosed patients at multidisciplinary tumor board (disease specific)
Understand what clinical trials are available for a given patient
Use information resources and technology to enhance patient care

Laboratory Hematology

Faculty coordinator M. Elaine Eyster, MD

Michael Bayerl, MD in Surgical Pathology (Bone marrows and flow cytometry), Keri Donaldson, MD in Clinical Pathology (Peripheral smears, automated CBCs and thrombosis testing), Melissa George DO (Blood component therapy and compatibility testing), Elaine Eyster MD (coagulation assays)

Goals:

The hematology fellow must become proficient in 1) morphologic evaluation of peripheral blood smears and bone marrow aspirates. 2) principles of flow cytometry and interpretation of leukemia, lymphoma, myeloma and PNH panels 3) interpretation of hematology and coagulation/thrombosis tests. 4) selection of appropriate hematology and coagulation/thrombosis tests. 5) technical evaluation of test methods in hematology and coagulation/thrombosis. 6) collection and preparation of bone marrow biopsies and aspirates, 7) Blood component therapy and the technical aspects and interpretation of red cell compatibility testing, antibody identification and recognition of transfusion reactions.

In addition, the hematology fellow must gain sufficient knowledge of laboratory hematology, coagulation/thrombosis, and transfusion medicine sufficient for satisfactory performance of the Hematology Board examination.

The above goals will be met by 2 one- month rotations focusing on the technical aspects of 1) general hematology tests and interpretation of peripheral smears and bone marrow aspirates/biopsies. 2) Assays and procedures typically performed in the Coagulation/Thrombosis and Special Hematology laboratories and the Blood Bank, 3) Clinical decision making utilizing test results..

Specific learning objectives:

- 1) The principles and methods of electronic blood cell counting, and the parameters measured.
- 2) The interpretation of bone marrow aspirates and peripheral blood smears.
- 3) The principles of flow cytometry and the interpretation of leukemia, lymphoma and PNH panels.
- 4) The PTT-based clotting assays and mixing studies.
- 5) The Xa –based assay and the indications for its use
- 6) The tests which are used to detect a lupus anticoagulant.
- 7) The prothrombin time, how the INR is calculated, and the reasons for its use.
- 8) The tests used to detect intravascular coagulation, and in particular, the principles and use of the D-dimer and FDP tests.
- 9) The tests used to evaluate thrombophilia
- 10) Sickle cell solubility testing
- 11) Hemoglobin electrophoresis
- 12) Immunofixation and measurement of quantitative immunoglobulins
- 13) P2Y12 ADP receptor assay for clopidogrel inhibition

- 14) ABO and Rh typing, red cell compatibility testing and antibody identification
- 15) Workup of warm auto antibodies and positive Direct Antihuman Globulin Test (DAT)
- 16) Principles of blood component therapy

The fellow is responsible for attending bone marrow sign out rounds with Dr. Bayerl or his associate and for scheduling instruction for the following laboratory procedures at the following locations. He/she should gain an understanding of the technical aspects of each procedure. The fellow should observe each of the following procedures, and perform those marked with an *. He/she should become technically expert in the performance of bone marrow aspirations and biopsies, and in the preparation of peripheral blood and bone marrow aspirate smears.

Main clinical laboratory (section supervisor, Victoria Smalls)

- CBC by automated cell analyzer
- Platelet count (automated and manual)
- Reticulocyte count (automated and manual)
- Leukocyte differential (automated and manual)
- Prothrombin time (and INR), and partial thromboplastin time
- Fibrinogen level
- Coagulation factor assays
- Anti Xa heparin assay
- Antithrombin assay
- Protein C and S assays
- Activated Protein C Resistance assay
- Factor V Leiden and Prothrombin G20210A assays (Dr. Donaldson)
- D-Dimer assay
- Thromboelastograph
- Sickle solubility (prep)
- Hemoglobin electrophoresis (Dr. Castellani)
- Hemoglobin quantitation by HPLC (Dr. Castellani)
- Immunofixation and quantitation of immunoglobulins (Dr. Castellani)
- Red Cell Osmotic fragility assay (send out test)

The fellow observes each of the above procedures and should gain an understanding of the technical aspects of each.

Special Heme Lab (C6609) (section supervisor Jeff Sanders)

- Clotting factor inhibitor assays*
- Clotting factor inhibitor assays*
- Von Willebrand factor assays *
- PFA-100 closure time*
- Platelet aggregation*
- Preparation of peripheral smears and bone marrow aspirates (technical proficiency required)
- PNH flow cytometry

Educational challenges of the accuracy and usefulness of diagnostic tests in clinical decision making.

* hands-on performance

He/she should contact Dr. Donaldson (HG 150 x 5660, pager 3384) to arrange to be instructed in the interpretation of thrombophilia/thrombosis tests, and Dr. Eyster (room C6606) for interpretation of coagulation and platelet tests.

At the conclusion of the **first rotation**, he/she will be expected to complete

- 1). A practical examination by performing a factor VIII and IX assay on the STAGO instrument in the SHL
- 2). The case studies provided
- 3). The educational challenge of the accuracy and usefulness of diagnostic tests in clinical decision making.

At the conclusion of the **second rotation**, he/she will be expected to successfully complete the on line examinations

Clinical Hematology lab and Heme/Path Elective **Schedule**

Rotation #1

8:00– 11:00 SHL and Clin Heme lab regularly when procedures are performed, as needed to achieve goals and objectives.

11:00 –12:00 daily –CBC and slide review; coagulation and thrombosis discussions – Dr. Donaldson

2:00-5:00PM daily – Hemepath review with Dr. Bayerl in microscope room

Rotation #2

Mornings in the Blood Bank under supervision of Dr. Melissa George.

Afternoons in the SHL on special projects, flow cytometry core lab and Hemepath review with Dr. Bayerl

Revised 1-26-12

Hematopathology

The faculty coordinator for this part of the rotation is Michael Bayeryl, MD

The fellow should attend daily bone marrow sign out sessions with review of morphology and flow cytometry in C 6618 from 2-5 PM daily with Dr. Michael Bayerl or his designee.

Medical Knowledge

Fellows are expected to review bone marrow biopsies and aspirates, and flow cytometry results daily and formulate a diagnosis which is to be written in pencil on the diagnosis sheet. Fellows will then review the cases with hematopathology attending and residents in the scope room from 2-5PM.

Patient Care

Fellows should examine charts of patients' whose bone marrows they are evaluating to incorporate clinical data into the diagnosis.

Fellows should recognize leukemia, dysplasia, fibrosis, infiltration on bone marrow biopsy

Fellows should recognize acute and chronic leukemia, hemolysis. TTP, sickle cell, megaloblastic anemia

Professionalism

Interact respectfully with pathology staff

Respect patient confidentiality

Communication

Fellows should communicate marrow and flow cytometry results to the treating physician.

Systems Based Learning

Understand the preparation of bone marrow biopsy specimens and special staining techniques. Understand the principles of flow cytometry

Practice Based Learning

References for hematopathology are attached. They have been purchased for use by the fellow on hematopathology and are available in Dr. Cream's office.

Major Reference: WHO Classification of Tumours. Pathology and Genetics. Tumours of Haematopoietic and Lymphoid Tissues. Jaffee ES, Harris NL, Stein H and Vardiman JW. IARC Press

Laboratory Hematology – Routine, Coagulation and Special Tests

Faculty coordinators M. Elaine Eyster, MD and Keri Donaldson, MD

Medical Knowledge

- Develop and maintain a knowledge base in automated hematology testing, peripheral blood analysis, flow cytometry analysis of blood and bone marrow aspirates as they relate to RBC disorders, platelet disorders, leukemias, lymphoproliferative disorders, inflammatory disorders, and disorders of coagulation and thrombosis.
- Effectively examine and interpret peripheral blood smears
- Effectively analyze and interpret coagulation and thrombosis testing.
- Develop and maintain a knowledge base in the basic and clinical sciences necessary for effective consultation in Laboratory Hematology that includes automated hematology testing, peripheral blood analysis, and disorders of coagulation and thrombosis.
- Understand the various levels of evidence in medicine and their translation into evidence-based practice.

Patient Care

Gather essential and accurate information about patients using all relevant available modalities and incorporate into pathologic interpretations.

- Effectively examine and interpret bone marrow biopsies and aspirates, incorporating flow cytometry and molecular/cytogenetic information.
- Understand and become proficient in the procedural aspects of bone marrow aspiration and biopsy.
- Effectively consult on interpretation of tests of disorders of coagulation and thrombosis.
- Effectively consult on interpretation or follow-up of unusual or unexpected hematologic test results.
- Effectively participate in laboratory hematology at multidisciplinary conferences.

Professionalism

- Demonstrate compassion: be understanding and respectful of patients, their families, and the staff and physicians caring for them.
- Interact with others without discriminating based on religious, ethnic, sexual, or educational differences.
- Demonstrate positive work habits, including punctuality, dependability, and professional appearance.

- Demonstrate responsiveness to the needs of patients and society that supersedes self-interest.
- Demonstrate principles of confidentiality with all information transmitted both during and outside a patient encounter.
- Demonstrate a commitment to excellence and ongoing professional development.
- Demonstrate interpersonal skills in functioning as a member of a multidisciplinary health care team.

Interpersonal and communication skills

- Demonstrate the ability to write an articulate, legible, and comprehensive yet concise consultation note; provide a clear and informative report, including when appropriate a precise diagnosis, a differential diagnosis, and recommended follow-up or additional studies.
- Effectively participate and present at multidisciplinary conferences in focused, clear, and concise fashion.
- Use effective modes and mechanisms of communication.

Systems-based practice

- Demonstrate the ability to design resource-effective diagnostic plans based on knowledge of best practices in collaboration with other clinicians.
- Demonstrate knowledge of the laboratory regulatory environment.
- Understand policies and systems to continually improve patient safety as they relate to
- Hematology and coagulation/thrombosis testing.

Practice-based learning and improvement

- Demonstrate knowledge of evidence-based medicine and apply its principles in practice.
- Develop personally effective strategies for the identification and remediation of gaps in medical knowledge needed for effective practice.
- Use laboratory problems and clinical inquiries to identify process improvements to increase patient safety.

Specific Skills in Patient Care and Medical Knowledge Required to Achieve These Competencies

Red Blood Cells:

1. Describe the morphology and physiology of RBC production.
2. Understand the principles of laboratory methods used to measure and/or calculate RBC indices including: RBC count, Hb concentration, HCT, MCV, MCH, MCHC.

3. Be familiar with the normal ranges for Hb concentration and HCT, and how these vary with: age, gender, hydration status, local elevation, handling and storage of specimen, etc.
4. Accurately identify polychromatophilic RBC on a blood smear. Understand the principles of laboratory measurement of reticulocyte counting, physiologic corrections and interpretation of results.
5. Identify normal and abnormal RBC morphology on a blood smear and generate differential diagnoses based on common abnormalities such as: hypo/hyperchromatic cells, macro/microcytes, polychromasia, elliptocytes/ovalocytes, spherocytes, burr/spur cells, dacrocytes, target cells (leptocytes), schistocytes, sickle cells, Howell-Jolly bodies, Pappenheimer bodies, bite cells, normoblasts, etc.
6. Describe the laboratory methods, interpretation and limitations of measuring ESR.

Granulocytes:

1. Describe the morphology and physiology of myelopoiesis (neutrophilic, monocytic, eosinophilic and basophilic lineages). Describe the concept of the marginated pool of neutrophils and its physiologic/pharmacologic regulation.
2. Describe the laboratory methods, limitations and interpretation of counting leukocytes in the blood and generating a leukocyte differential. Explain why our clinical laboratory does not report "bands."
3. Generate a differential diagnosis for quantitative leukocyte disorders..Specifically define neutropenia, degrees of severity and clinical consequences. Know the major hereditary neutropenic disorders.
4. Identify the major, qualitative, disorders of neutrophils. Correlate the clinical syndromes associated with these disorders.
5. Differentiate neoplastic from non-neoplastic myeloid disorders.

Lymphocytes:

1. Correctly request and interpret flow cytometric and immunoperoxidase immunophenotyping on bone marrow aspirates for diagnosis and prognosis as related to lymphoproliferative disorders.
2. Correctly request and interpret molecular and cytogenetic testing prognosis as related to lymphoproliferative disorders.
3. Apply 1. through 6. to differentiate physiologic from neoplastic lymphoid proliferations.
4. Recognize non-neoplastic lymphoid patterns with specific clinical correlates. Correctly classify lymphoid neoplasm based on the WHO 2001 classification, including clinical, morphologic, immunologic and molecular correlates.

Platelets:

1. Describe normal megakaryopoiesis, physiologic control and morphology.
2. Describe normal platelet functions.

3. Develop a differential diagnosis for thrombocytopenia and an algorithm for diagnosing specific etiologies.
4. Develop a differential diagnosis for thrombocytosis and an algorithm for diagnosing specific etiologies.
5. Describe the pathophysiology of specific platelet function disorders.
6. Describe the underlying principles, interpretation and limitations of specific platelet tests:
 1. Platelet / Megakaryocyte morphology
 - Platelet morphology in blood film
 - Platelet granules by EM
 2. Platelet counting
 - Visual platelet estimate
 - Hemocytometer phase contrast
 - Automated
 3. Platelet function testing
 4. PFA 100 Closure time
 5. Platelet aggregation and release
 6. Antiplatelet antibody testing

BLOOD BANK ROTATION: Melissa George DO>Specific Learning Objectives:

- To understand the role of the transfusion medicine service and how to appropriately utilize the resources of this service for optimal patient care.
- To be able to interpret basic blood bank testing.

Medical Knowledge

Fellows must demonstrate knowledge about established and evolving best practices in transfusion medicine and apply them to the practice of transfusion medicine services.

Fellows are expected to:

- Observe blood bank procedures at the bench and understand the immunohematologic principles behind the testing. The recommended procedures to observe are outlined in the checklist below:
 - Specimen handling
 - ABO/Rh typing
 - Antibody screens
 - Antibody identification (and special techniques to aid this process)
 - Workup of warm autoantibodies and positive DATs
 - Workup of transfusion reactions
 - Observation of apheresis procedures
 - Observe blood donor screening and collection (whole blood and apheresis components)

- Read recommended scientific literature and protocols provided in the blood bank rotation guide and discuss their content during regular, informal meetings with the medical director or attending of the day.

Patient Care

Fellows are expected to:

- Learn the scope and limitations of immunohematology tests and be able to discuss them with requesting and interpreting physician staff.
- Learn to interpret relevant lab results and integrate patient history into the diagnosis and make appropriate recommendations regarding the administration and selection of blood components and appropriateness of apheresis therapy.
- Learn to evaluate transfusion reactions and adverse blood donor and apheresis patient reactions.

Professionalism

Fellows must conduct themselves in a professional manner when interacting with patients, donors, laboratory personnel, nurses, and medical staff. They must be committed to fulfilling their professional responsibilities abiding by ethical principles and sensitivity to diverse patient populations. Fellows are expected to:

- Demonstrate a commitment to excellence and ongoing professional development
- Adhere to ethical principles pertaining to confidentiality of patient information, informed consent and business practices at all times
- Adhere to guidelines and regulations set forth by regulatory and accrediting agencies
- Demonstrate compassion and integrity in all interactions with patients, their families, faculty, other trainees, technologists, and other staff
- Practice positive work habits; punctuality, dependability, and professional appearance
- Attend all required conferences and actively participate in them to enhance individual and group learning
- Be respectful of patients, and those involved in their care
- Be an active listener
- Be able to identify deficiencies in peer performance and address them in a constructive manner to ensure appropriate patient care and safety
- Demonstrate sensitivity and responsiveness to ethnicity, diversity, age, gender, sexual orientation, and disabilities of patients, colleagues, and staff and interacting with them without discrimination
- Demonstrate responsiveness to the needs of patients that supersedes self-interest

Interpersonal and communication skills

Fellows must be able demonstrate interpersonal and communication skills that result in effective information exchange and learning with other health care professionals, patients and patients' family or other representatives. Fellows are expected to:

- Exhibit effective listening skills, follow verbal instructions and written standard operating procedures
- Interact with laboratory staff, departmental faculty, fellow house staff and other health care providers and administrators in an effective and professional manner
- Work effectively as a team member with other health care professionals and staff
- Answer questions pertaining to blood components, blood testing, apheresis procedures and to utilize appropriate resources to make appropriate recommendations to clinicians, including

Systems-based practice

Fellows must be aware of the importance of transfusion medicine in the larger context of the health care system and be able to call on system resources to help respond to needs as they emerge ensuring appropriate transfusion medicine services to provide optimal patient care. The fellow is expected to:

- Approach blood banking/transfusion medicine in the greater context of the particular patient's medical care and hematologic needs
- Understand the optimization of workflow in the laboratory and computer information systems and EMR as a means to efficiently and accurately obtain clinical information
- Demonstrate understanding of the role of the clinical laboratory in the health care system
- Demonstrate the ability to design resource-effective diagnostic plans based on knowledge of best practices in collaboration with other clinicians to provide cost-effective services without compromising patient care
- Demonstrate knowledge of the laboratory regulatory environment
- Understand policies and systems to continually improve patient safety as they relate to clinical laboratory testing at all levels acting as an advocate for quality patient care

Practice-based learning and improvement

Fellows must demonstrate the ability to evaluate and improve clinical practices based on new and evolving scientific evidence. Fellows are expected to:

- Use the current scientific literature and apply consensus recommendations to patients undergoing apheresis and blood component therapy

- Utilize library, web-based, and other education sources for self-study, troubleshooting and to help answer clinical/technical questions
- Participate in clinical conferences, be aware of new testing being introduced into the laboratory
- Serve as consultants to requesting physicians regarding applications of transfusion medicine to optimize patient outcomes
- Arrange for effective clinical care efficiently according to established protocols
- Utilize performance evaluations to improve practice
- Engage in “lifelong” learning through critical review and assimilation of scientific studies related to specific transfusion medicine challenges
- Facilitate learning of medical students, residents and fellows (within and outside the Pathology department), and other health care professionals with regard to blood banking and transfusion medicine services

Specific Topics and Reading Assignments

- **The basic core reading** for the rotation is **Transfusion Medicine and Hemostasis: Clinical and laboratory Aspects**. Hillyer CD, Shaz BH, Zimring JC and Abshire TC. Elsevier Press 2009.
- **Selected reading on erythrocytes, granulocytes, lymphocytes and platelets**
Henry, JB. Clinical Diagnosis and Management by Laboratory Methods (20th Ed.). Philadelphia: Saunders, 2001, Chapters 19, 24-28
- Klein HG, Anstee, DJ (Ed): *Mollison’s Blood Transfusion in Clinical Medicine* (11th Ed.), Blackwell, 2005.

1-26-12

EE

Palliative Care: 1 month

Medical Knowledge

Pain Control

Comprehensive assessment

Location and severity

(1) Objective scale

(a) Numeric

(b) Thermometer

Management

World Health Organization analgesic pain ladder

Acetaminophen

Nonsteroidal anti-inflammatory agents

Opioids

Pharmacology

Legal and regulatory issues

Anticonvulsants

Anxiolytics

Patient Care

Understand effective supportive care and symptom management

Pain Control

(1) Radiation therapy

(2) Surgery

(3) Radiopharmaceuticals

(4) Epidural anesthesia

Nutrition

Dietary assessment and counseling

Enteral nutrition

Parenteral nutrition

Pharmacologic interventions

Stages of Grief

Professionalism

Interact and effectively communicate with all members of the multidisciplinary care team

Physician coping mechanisms and supportive resources for physicians

Communication

Patient assessment

Stopping treatment

The bereavement process

Managing anxious and difficult family members

Systems Based Learning

Demonstrate an understanding of the types of end-of-life care that can be delivered by different health care models, including in-home hospice, residential hospice and other nursing services and settings. taking into account cultural, ethnic and religious biases of the patient and their family.

Practice Based Learning

Fellows are expected to present a noon conference lecture to the internal medicine residents about a supportive care topic of their choice

Palliative Care Rotation at the Lebanon VA

Competency-based Objectives:

Patient Care

- Provides compassionate, age-appropriate, and effective patient care
- Demonstrates comprehensive patient and family assessment addressing physical, cognitive/intellectual, functional, psychological and spiritual domains
- Participates in interdisciplinary care planning, management, coordination and follow up of patients with life-threatening illness.
- Understands the role, function and development of the interdisciplinary team, and its component disciplines, in the practice of palliative care
- Provides patient- and family-centered care that optimizes quality of life by anticipating, preventing and treating suffering

Medical Knowledge

- Demonstrates and applies knowledge of clinical and psychosocial sciences to patient care
- Proficient in the management of common co-morbidities and complications in patients with life-threatening illnesses
- Demonstrates skill of prognostication in advanced disease
- Adequately assesses the functional capability or capacity of the patient
- Assesses and appropriately addresses the psychological, social, and spiritual issues of palliative care patients and their families
- Develops knowledge and communication skills pertaining to a diverse patient population, with differences in age, gender, race, socioeconomic status, religion and culture

Practice-Based Learning and Improvement

- Assimilates evidence-based medicine with interpretation of the literature into practice of palliative medicine
- Continuously improves patient care based on constant self-evaluation and life-long learning

Interpersonal and Communication Skills

- Displays effective communication skills with patients, families, and professional colleagues
- Communicates effectively with patients and families across a broad range of socioeconomic and cultural backgrounds
- Works effectively as a member of an interdisciplinary team
- Demonstrates the ability to educate patients and families about the medical, social and psychological issues associated with life-limiting illness
- Maintains comprehensive, timely and legible medical records
- Masters the skill of discussing topics like artificial hydration and nutrition, breaking bad news, and goals of care in family meetings

Professionalism

- Demonstrates a commitment to carrying out professional responsibilities and adherence to ethical principles
- Demonstrates integrity, compassion and respect for others
- Is accountable to patients, families, society and the profession
- Respects issues of confidentiality, informed consent, autonomy and business practices
- Exhibits self-directed learning
- Completes assigned tasks without reminders, responds to pages promptly, is punctual and follows up on patient care issues without prompting

Systems-Based Practice

- Advocates for quality patient care and patient safety
- Evaluates and implements systems improvement based on clinical practice, personal practice, team practice and within institutional settings
- Understands the economic and regulatory aspects of palliative medicine, including health policy issues and financing mechanisms

Oncology Fellow Bibliography (given as handouts)

Week 1- Palliative Care, Pain management

A Qualitative Study of Oncologists' Approaches to End-of-Life Care, Vicki A. Jackson, M.D., M.P.H.; Jennifer Mack, M.D.; Robin Matsuyama, Mathew D. Lakoma, Amy M. Sullivan, Ed.D.; Robert M. Arnold, M.D.; Jane C. Weeks, M.D., M.Sc.; and Susan D. Block, M.D., *Journal of Palliative Medicine*, Volume 11, Number 6, 2008

Does Palliative Care Improve Outcomes for Patients with Incurable Illness? A Review of the Evidence, Areej El-Jawahri, MD, Joseph A. Greer, PhD, and Jennifer S. Temel, MD, Volume 9, Number 3, May/June 2011, www.SupportiveOncology.net

Facilitating Hospice Discussions: A Six-Step Roadmap, Jennifer Shin, MD, and David Casarett, MD, MA, Volume 9, Number 3, May/June 2011, www.SupportiveOncology.net
Early Palliative Care for Patients with Metastatic Non-Small-Cell Lung Cancer, Jennifer S. Temel, M.D., Joseph A. Greer, Ph.D., Alona Muzikansky, M.A., Emily R. Gallagher, R.N., Sonal Admane, M.B., B.S., M.P.H., Vicki A. Jackson, M.D., M.P.H., Constance M. Dahlin, A.P.N., Craig D. Blinderman, M.D., Juliet Jacobsen, M.D., William F. Pirl, M.D., M.P.H., J. Andrew Billings, M.D., and Thomas J. Lynch, M.D., *The New England Journal of Medicine*, August 19, 2010

Self-care of Physicians Caring for Patients at the End of Life, "Being Connected... A Key to My Survival", Michael K. Kearney, MD, Radhule B. Weininger, MD, PhD, Mary L.S. Vachon, RN, PhD, Richard L. Harrison, PhD, Balfour M. Mount, MD, 2009 American Medical Association, (Reprinted) *JAMA*, March 18, 2009 – Vol. 301, No. 11

Week 2- Non-pain symptom management

Agitation and Delirium at the End of Life – "We Couldn't Manage Him", William Breitbart, MD, Yesne Alici, MD, *JAMA*, December 24/31, 2008 – Vol. 300, No. 24
Non-pain Symptom Management in the Dying Patient, Paul Rousseau, MD, *Hospital Physician*, February 2002

Post-traumatic Stress Disorder at the End of Life, David B. Feldman, Ph.D and Vyjeyanthi S. Periyakoil, MD, *Journal of Palliative Medicine*, Volume 9, Number 1, 2006

Comfort Care for Terminally Ill Patients, The Appropriate Use of Nutrition and Hydration, Robert M. McCann, MD; William J. Hall, MD; Annmarie Groth-Juncker, MD, *JAMA*, October 26, 1994 – Vol. 272, No. 16

Week 3- Communication skills

"I'm Not Ready for Hospice": Strategies for Timely and Effective Hospice Discussions, David J. Cassarett, MD, MA, and Timothy E. Quill, MD, *Annals of Internal Medicine*, Volume 146, Number 6, March 20, 2007

Beyond Advance Directives, Importance of Communication Skills at the End of Life,
(Reprinted) JAMA, July 20, 2005 – Vol. 294, No. 3
Quality End-of-Life Care – Patients’ Perspectives, Patients’ Perspectives, Peter A.
Singer, MD, MPH, FRCPC, Douglas K. Martin, PhD., Merrijoy Kelner, PhD, JAMA,
January 13, 1999 – Vol. 281, No. 2
Spiritual Issues in the Care of Dying Patients.....It’s Okay Between Me and God, Daniel
P. Sulmasy, OFM, MD, PhD, JAMA, September 20, 2006 – Vol. 296, No. 11

Week 4- Ethical Issues

Ten Myths about Decision-Making Capacity, A Report by the National Ethics Committee
of the Veterans Health Administration, September 2002

Ethics & Law in End of Life Care in the VHA, Education in Palliative and End of Life
Care for Veterans module, Northwestern University, 2011.

Radiation Oncology: 1 month

Contact Information: Please call Eugenia Bartolome, Administrative Secretary, *ahead of time* at 531-1523 and tell her when you will be rotating in the division. She will give you a copy of the physician template and vacation schedule. She will arrange a meeting with you and Dr. Heath Mackley, the educational liaison, at the beginning of your rotation, and the schedule of your rotation will be designed at that point to meet your educational needs.

Purpose: Introduce rotating fellows to the scope of clinical Radiation Oncology.

Educational Goals: By the time a trainee has completed the rotation, he/she will have been exposed to as many of the following aspects of Radiation Oncology as feasible:

Medical Knowledge

1. Principles of radiation biology
2. Normal tissue tolerance and toxicity
3. Interactions
 - a. Chemotherapy
 - b. Hormone therapy
 - c. Biologic therapy
 - d. Sequencing of therapy
4. Fractionation and dosing
5. Brachytherapy
6. Focused radiation therapies
 - a. Gamma knife
 - b. Intensity-modulated radiation therapy (IMRT)
 - c. Other ablative techniques
7. Potentiation and protection
 - a. Host and other physical factors
 - b. Pharmacologic agents

Patient Care

Patient evaluation

- * Consultation with a Radiation Oncologist
- * Multidisciplinary Radiation Oncology Clinical Elective Overview tumor board meetings
- * Friday case conference with all division clinical personnel

Patient simulation (external beam radiation)

- * Four dimensional computed tomography simulation
- * Three dimensional computed tomography simulation
- * Fluoroscopic simulation
- * Clinical set-ups without the use of a simulator

Treatment planning

- * Target delineation and prescription, and organ-at-risk delineation and choice of dose constraints with a Radiation Oncologist
- * Treatment planning with a Dosimetrist
- * Evaluation of a treatment plan with a Radiation Oncologist
- * Quality assurance of a treatment plan with a Medical Physicist
- * Block check at the fluoroscopic simulator

Systems Based Learning

Treatment delivery

- * Patient set-up with a Radiation Therapist
- * Image acquisition on the treatment couch and couch adjustment with a
- * On treatment evaluation with a Nurse and Radiation Oncologist

Practice Based Learning

1. Radiobiologic Principles. *Textbook of Radiation Oncology 2nd Edition*, edited by Steven A. Leibel and Theodore L. Phillips. Elsevier, 2004.
2. Principles of Radiation Physics. *Textbook of Radiation Oncology 2nd Edition*, edited by Steven A. Leibel and Theodore L. Phillips. Elsevier, 2004

Professionalism

Interact respectfully with the treatment team, patients and families

Communication

Attend Multidisciplinary Radiation Oncology tumor board meetings to discuss cases with pathology, surgery and medical oncology

Gynecologic Oncology and Cancer Genetics: This is a combined one month rotation

James Fanning, MD and Maria Baker PhD

Fellows are expected to attend gyn/onc clinic on Wednesday mornings and Monday afternoon. Please contact Ann Gelder LPN at the beginning of the rotation to confirm clinic schedules (x6218). You should also contact Dr. Baker at x 1631 or by email to make arrangements to see patients with her 1-2 days per week.

Objectives Cancer genetics:

- 1) Draw a 3 generation family tree using standard pedigree nomenclature
- 2) Appreciate the constellation of cancers associated with various cancer predisposition syndromes so as to develop a differential diagnosis to guide genetic testing
- 3) Understand the risks, benefits, and limitations of genetic testing and how test results may impact medical decision-making
- 4) Interpret genetic test results, including variants of uncertain clinical significance and genetic variants suspected to be deleterious. Appreciate the difference between true negative and uninformative negative test results.
- 5) Dispel misperceptions about cancer predisposition testing (lack of coverage for genetic testing, genetic discrimination, etc.)

Medical Knowledge

Uterine Cancer

1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates
 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - b. Genetics and genetic syndromes
- (1) HNPCC
- Assessment of Risk
- (1) Unopposed estrogens and tamoxifen
 - (2) Obesity
 - (3) Diabetes mellitus
 - (4) Hypertension
- Diagnosis
- c. Postmenopausal and abnormal vaginal bleeding
 - d. Imaging

- (1) Ultrasonography
- (2) MRI
 - Endometrial biopsy
- Staging
 - e. FIGO surgical staging
 - f. Lymph node sampling
- Treatment by stage
 - g. Stage I
 - (1) Curative surgery
 - Positive lymphovascular space and deep myometrial invasion
 - (1) Radiation therapy
 - FIGO stages III and IV
 - (1) Chemotherapy and radiation therapy
- Other/special issues
 - h. Uterine sarcoma
 - (1) Leiomyosarcoma
 - (a) Diagnosis/history
 - (b) Adjuvant therapy
 - (c) Local therapy
 - (d) Recurrent disease
 - (2) Mixed mesodermal tumor
 - (a) Diagnosis
 - (b) Histology
 - (c) Adjuvant therapy
 - (d) Recurrent disease
 - (3) Other sarcomas
 - Gestational trophoblastic disease
 - Diagnosis, Low-risk disease, High-risk disease, Recurrent disease
 - Complications
- 1. Vulvar and Vaginal Cancers
 - Epidemiology
 - a. Incidence rates
 - b. Mortality rates
- 2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - b. Pathogenesis
 - (1) Infection with specific HPV types, and molecular sequelae
 - Assessment of risk
 - (1) Exposure to specific HPV types
 - (2) Immunosuppression
 - (3) Tobacco use
- Diagnosis
 - c. Gynecologic examination
 - d. Biopsy

3. Staging
 - a. Clinical FIGO staging
4. Treatment by stage
 - a. Microinvasive stage I
 - (1) Techniques for excising
 - Early stages
 - (1) Surgery for locally advanced stages
 - (1) Surgery with or without chemotherapy and radiation therapy
 - Other/special issues
 - b. Lymphedema
 - c. Vaginal stenosis

Ovarian Cancer

Incidence rates & Mortality rates

Pathogenesis, pathology, and tumor biology

Pathology

(1) Histologic variant (WHO classification)

(1) BRCA1

(2) BRCA2

(3) Family history

(4) Hereditary nonpolyposis colorectal cancer syndrome

Prevention

Prophylactic oophorectomy in high-risk women

Chemoprevention

Oral contraceptives

Others

Screening

No standard

Clinical guidelines for women at high-risk

Diagnosis

Clinical signs and symptoms

Imaging

Endovaginal ultrasound with Doppler

Diagnostic laparoscopy and biopsy

Surgery

Serum marker

CA-125

Prognostic factors

Histologic factors

Postoperative residual disease volume

Patient age

Uterine Cancer

Staging and prognostic factors

International Federation of Gynecology and Obstetrics (FIGO)

stage

- Clinical
- Pathologic
- Treatment by stage
 - a. Stage I
 - (1) Surgery
 - (2) Chemotherapy
 - (3) Radiation therapy
 - All stages except FIGO stage IA, well-differentiated cancers
 - (1) Surgery
 - (2) Chemotherapy
 - (a) Induction
 - (b) Consolidation
 - (c) Maintenance
 - (3) Radiation therapy
 - External beam
 - Intraperitoneal
 - Secondary surgical procedures
 - Second-look surgery
 - Recurrent or metastatic disease
 - (1) Chemotherapy
 - (2) Radiation therapy
 - (3) Hormonal therapy
 - Follow-up
 - Supportive care
 - b. Treatment-related toxicities
 - c. Refractory ascites
 - d. Intestinal and ureteral obstruction
 - (1) Premature menopause
 - (2) Neuropathy
- Other/special issues
 - Nonepithelial cancer
 - Stromal
 - (a) Diagnosis
 - (b) Biology
 - (c) Chemotherapy
 - Germ cell tumors
 - Diagnosis
 - Therapy
 - Low-malignant potential cancers (borderline)
 - Fallopian tube tumors
 - Primary peritoneal tumors

I. Cervical Cancer

- 1. Epidemiology
 - a. Incidence rates
 - b. Mortality rates

2. Pathogenesis, pathology, and tumor biology
 - a. Pathology
 - b. HPV and oncogenic types
 - c. Immunosuppression/HIV
 - d. Lifestyle factors
 - (1) Tobacco use
 - (2) Dietary
 - (3) Sexual history
3. Prevention
 - a. Education on sexually transmitted diseases
 - b. Treat precursor (cervical intraepithelial neoplasia) lesions
 - c. HPV vaccines
4. Screening
 - a. Cytology (routine Papanicolaou tests, Bethesda system, other)
5. Diagnosis
 - a. Pelvic examination
 - b. Cytology
 - c. Colposcopy and biopsy
 - d. Radiographic imaging
6. Staging and prognostic factors
 - a. Clinical FIGO staging
 - b. Surgical staging
 - c. Histologic factors
7. Treatment by stage
 - a. Microinvasive stage I
 - b. Other stage IA
 - c. Stage IB-IIA
 - (1) Surgery
 - (2) Radiation therapy
 - d. Locally advanced stages
 - (1) Surgery
 - (2) Radiation therapy
 - (3) Chemotherapy
8. Recurrent and metastatic disease
 - a. Chemotherapy
 - b. Radiation therapy
 - c. Surgery
9. Supportive care

- a. Treatment-related complications
 - (1) Lymphedema
 - (2) Vaginal stenosis
 - (3) Premature menopause
 - (4) Other
 - b. Ureteral obstruction
10. Other/special issues
- a. Cervical cancer during pregnancy

Lebanon VA Medical Center: 4 months
Preceptor Dr. Suhail Ali 717-272-6621

Third year fellows are expected to attend the VA oncology and hematology clinic every Tuesday for 4-6 months.

Medical Knowledge

Chemotherapeutic treatment of both advanced and localized solid tumors and hematologic malignancies

- Breast Cancer
- Colon Cancer
- Small Cell lung cancer
- Non small Cell Lung Cancer
- Cancer of Unknown Primary
- Cancer of the gastrointestinal and biliary tract
- Cancer of the urogenital tract
- High Grade lymphoma
- Low grade lymphoma
- Myeloproliferative Disease
- Myelodysplastic Disease
- Chronic Leukemias
- Multiple Myeloma
- Head and Neck Cancer
- Melanoma

Patient Care

Management of the following complications of malignancy and chemotherapy:

- Fatigue
- Depression
- Hot flashes
- Pain control
- Chemotherapy induced nausea, vomiting, and diarrhea
- Chemotherapy extravasation
- Premedications for Chemotherapy
- Bone metastases
- Adrenal Insufficiency
- Alopecia
- Bleeding and thrombosis
- Cardiac toxicity
- Catheter management
 - a. Infection
 - b. Thrombosis
 - c. Extravasation

Drug extravasation
Hepatotoxicity
Hypersensitivity
Hypothyroidism I
Infertility/sterility/sexuality
Lymphedema
Nephrotoxicity
Myelosuppression
Nausea and vomiting
Neurotoxicity
Oral complications
 d. Mucositis
 e. Xerostomia

Pulmonary toxicity
Second malignancy
Skin toxicity

Professionalism

Interact respectfully with nursing staff, scheduling staff, patients and families
Respect patient confidentiality

Communication

Communicate prognosis, test results and treatment plan to patients
Consent patients for the risk and benefits of chemotherapy
Effectively communicate end of life decisions and options with patients and family

Systems Based Learning

Understand the role of hospice and palliative care in patient management
Understand visiting nurse services available for home chemotherapy infusions
Understand the financial implications of chemotherapy for the patient
Understand the difference in the VA medical care system and how veterans navigate this system

Practice Based Learning

Use information technology to enhance patient care

Third Year Fellows

Medical Knowledge- Third Year Fellows

In addition for solidifying the medical knowledge required during the first and second year of training. Fellows should master:

A. Cancer Biology and Genetics

1. Biology of normal cells and the basic processes of carcinogenesis
2. Genomics
 - a. Gene structure
 - b. Organization
 - c. Expression
 - d. Regulation
3. Cell cycle
 - a. Mechanisms
 - b. Control by oncogenes
 - c. Interactions with therapies
4. Receptors and signal transduction
5. Tumor cells
 - a. Kinetics
 - b. Proliferation
 - c. Programmed cell death
6. Cell proliferation and apoptosis
7. Tumor invasion and metastases
8. Angiogenesis
9. Molecular techniques
 - a. Polymerase chain reaction (PCR)
 - b. Chromosomal analyses and cytogenetics
 - c. Tissue microarray analysis
 - d. Other techniques of molecular and tumor cell biology

B. Carcinogenesis

1. Inherited and acquired genetic abnormalities
2. Environmental, chemical, and physical factors

C. Tumor Immunology

1. Cellular and humoral components of the immune system
2. Immune system recognition of substances including normal and malignant cells as "self" and "nonself"
3. Regulatory action of cytokines on the immune system
4. Interrelationship between tumor and host immune systems
 - a. Tumor antigenicity
 - b. Immune-mediated antitumor cytotoxicity
 - c. Direct effect of cytokines on tumors

D. Epidemiology of Cancer

1. Cancer statistics
 - a. Incidence rates
 - b. Mortality rates
 - c. International differences in incidence and mortality rates for different cancers

2. Staging of cancer
 - a. Tumor-node-metastasis (TNM) system
 - b. Other systems for specific tumor types

3. Epidemiologic methods

Patient Care- Third Year Fellows:

Third year fellows choose three clinics and three clinical mentors. They can focus on a single disease site or choose to have a more varied exposure to multiple disease sites. In addition their half day continuity clinic continues. Third year fellows provide comprehensive assessment of new patients and review assessment and treatment plans with attendings.

Third year fellows are expected to attend two tumor boards per week of their choosing.

Communication Third Year Fellows

Third year fellows focus communication competency on presentation skills. They are expected to present at grand rounds, internal medicine noon conference and do teaching sessions for medical students. In addition, they often present their work at scientific conferences during the third year of training.

Professionalism Third Year Fellows

During the third year, fellows expand their professional role to help with some of the administrative functions of the fellowship. As senior fellows, they are expected to help mentor the first year fellows and help them adjust to fellowship. The program directors meet frequently with the third year fellows to help guide their transition from fellowship to practice; ensuring that they understand the various career options and details of choosing a position and signing a contract.

Systems Based Learning Third Year Fellows

Third year fellows are expected to interact with all members of the patient care team to ensure that their patients have continuity of care across the inpatient and outpatient settings.

Practice Based Learning Third Year Fellows:

Practice based learning for third year fellows is focused on their research project. From the first year of fellowship Dr. El-Deiry meets with each fellow semi-annually to help develop a research focus, identify mentors and to ensure that each fellow is making appropriate progress..

In addition, they should master the following research fundamentals:

A. Design of Phase I, II, and III Trials

1. Protocol development and implementation
 - a. Defining trial objectives and outcomes (response criteria)
 - b. Defining patient populations
 - c. Use of surrogate end points
 - d. Toxicity assessment and grading
 - e. Quality of life assessment and end points
 - f. Reporting responsibilities
 - g. Data collection
 - (1) Data capture and database development
 - (2) Maintaining quality and integrity
 - h. Statistical analysis
 - (1) Sample size determination
 - i. Early stopping roles

Meta-Analysis

2. Ethical, regulatory, and legal issues
 - a. Institutional Review Board
 - b. Informed consent
 - c. Conflict of interest
 - d. Other groups in trial development
 - (1) National Cancer Institute and cooperative groups
 - (2) Cancer centers
 - (3) Industry

B. Tumor Assessment

1. Measurement of masses
2. Imaging
 - a. CT
 - b. MRI
 - c. Nuclear medicine
 - d. Other imaging
3. Surrogate end points
 - a. biomarkers/pharmacodynamic end points

Assessment of Competence
Attending signature and date required to verify
competence

Must be completed by the end of the second year of training

Obtain informed consent for chemotherapy administration_____

Perform bone marrow aspirate and biopsy _____

Preparation/staining of blood smear, bone marrow aspirate and touch prep_____

Interpretation of blood smear, bone marrow aspirate and touch prep_____

Perform complete blood count by manual and automated technique_____

Interpret complete blood count by manual and automated technique_____

Intrathecal administration of chemotherapy via Ommaya_____

Intrathecal administration of chemotherapy via lumbar puncture_____

Tumor serial measurements using RECIST criteria v1.1_____

Tumor assessment by CT, PET, MRI, and nuclear imaging techniques_____