HEMATOLOGY Blueprint

For traditional, 10-year Maintenance of Certification (MOC) exam and Longitudinal Knowledge Assessment (LKA®)

ABIM invites diplomates to help develop the Hematology MOC exam blueprint

Based on feedback from physicians that MOC assessments should better reflect what they see in practice, in 2016 the American Board of Internal Medicine (ABIM) invited all certified hematologists to provide ratings of the relative frequency and importance of blueprint topics in practice.

This review process, which resulted in a new MOC exam blueprint, will be used on a periodic basis to inform and update all MOC assessments created by ABIM. No matter what form ABIM's assessments ultimately take, they will need to be informed by front-line clinicians sharing their perspective on what is important to know.

A sample of nearly 200 hematologists, similar to the total invited population of hematologists in age, gender, time spent in direct patient care, and geographic region of practice, provided the blueprint topic ratings. ABIM used this feedback to update the blueprint for MOC assessments (beginning with the Spring 2016 administration of the 10-year MOC exam).

To inform how assessment content should be distributed across the major blueprint content categories, ABIM considered the average respondent ratings of topic frequency and importance in each of the content categories. A second source of information was the relative frequency of patient conditions in the content categories, as seen by certified hematologists and documented by national health care data (described further under *Content distribution* below).

To determine prioritization of specific assessment content within each major medical content category, ABIM used the respondent ratings of topic frequency and importance to set thresholds for these parameters in the exam assembly process (described further under *Detailed content outline* below).

Purpose of the Hematology MOC Assessments

MOC assessments are designed to evaluate whether a certified hematologist has maintained competence and currency in the knowledge and judgment required for practice. The MOC assessments emphasize diagnosis and management of prevalent conditions, particularly in areas where practice has changed in recent years. As a result of the blueprint review by ABIM diplomates, MOC assessments place less emphasis on rare conditions and focus more on situations in which physician intervention can have important consequences for patients. For conditions that are usually managed by other specialists, the focus is on recognition rather than on management.

Assessment format

The traditional, 10-year MOC exam contains up to 220 single-best-answer multiple-choice questions, of which approximately 50 are new questions that do not count in the examinee's score. Examinees taking the traditional, 10-year MOC exam will have access to an external resource (i.e., UpToDate®) for the entire exam.

The LKA for MOC, is a five-year cycle in which physicians answer questions on an ongoing basis and receive feedback on how they're performing along the way. More information on how assessments are developed can be found at abim.org/about/exam-information/exam-development.aspx.

Most questions describe patient scenarios and ask about the work done (that is, tasks performed) by physicians in the course of practice:

- **Diagnosis:** making a diagnosis or identifying an underlying condition
- **Testing:** ordering tests for diagnosis, staging, or follow-up
- **Treatment/Care Decisions**: recommending treatment or other patient care
- **Risk Assessment/Prognosis/Epidemiology:** assessing risk, determining prognosis, and applying principles from epidemiologic studies
- **Pathophysiology/Basic Science:** understanding the pathophysiology of disease and basic science knowledge applicable to patient care

ABIM is committed to working toward health equity and believes that board-certified physicians should have an understanding of health care disparities. Therefore, health equity content that is clinically important to each discipline will be included in assessments, and the use of gender, race, and ethnicity identifiers will be re-evaluated.

Clinical scenarios presented take place in outpatient or inpatient settings as appropriate to a typical hematology practice. Clinical information presented may include patient photographs, radiographs, photomicrographs, and other media to illustrate relevant patient findings.

Exam tutorials, including examples of question format, can be found at abim.org/maintenance-of-certification/exam-information/hematology/exam-tutorial.aspx.

Content distribution

Listed below are the major medical content categories that define the domain for the Hematology traditional, 10-year MOC exam and LKA. The relative distribution of content is expressed as a percentage of the total assessment. To determine the content distribution, ABIM considered the average respondent ratings of topic frequency and importance. To cross-validate these self-reported ratings, ABIM also considered the relative frequency of conditions seen in Medicare patients by a cohort of certified hematologists. Informed by these data, the Hematology Approval Committee and Board have determined the medical content category targets are appropriate, as shown below.

CONTENT CATEGORY	BLUEPRINT %
Hematopoietic System	**25%**
Coagulation	**27%**
Hematologic Neoplastic Disorders	**35%**
Transfusion Medicine	**5%**
Cellular Therapy	**8%**
Total	**100%**

Assessment questions in the content areas above may also address clinical topics related to pregnancy and contraception that are important to the practice of hematology (approximately 4% of the assessment).

How the blueprint ratings are used to assemble the MOC assessment

Blueprint reviewers provided ratings of relative frequency in practice for each of the detailed content topics in the blueprint and provided ratings of the relative importance of the topics for each of the tasks described in *Assessment format* above. In rating importance, reviewers were asked to consider factors such as the following:

- High risk of a significant adverse outcome
- Cost of care and stewardship of resources
- Common errors in diagnosis or management
- Effect on population health
- Effect on quality of life
- When failure to intervene by the physician deprives a patient of significant benefit

Frequency and importance were rated on a three-point scale corresponding to low, medium, or high. The median importance ratings are reflected in the *Detailed content* outline below. The Hematology Approval Committee and Board, in partnership with the physician community, have set the following parameters for selecting MOC exam questions according to the blueprint review ratings:

- At least 65% of questions will address high-importance content (indicated in green)
- No more than 35% of questions will address medium-importance content (indicated in yellow)
- No exam questions will address low-importance content (indicated in red)

Independent of the importance and task ratings, no more than 35% of questions will address low-frequency content (indicated by “LF” following the topic description).

The content selection priorities below are applicable beginning with the Spring 2017 traditional, 10-year MOC exam and are subject to change in response to future blueprint review.

Note: *The same topic may appear in more than one medical content category.*

Detailed content outline for the Hematology traditional, 10-year MOC exam and the LKA

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HEMATOPOIETIC SYSTEM *(25% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
NORMAL HEMATOPOIESIS *(<2% of exam)*					
Normal hematopoiesis	✓	✓	✓	⊘	⊘
DISORDERS OF RED BLOOD CELLS OR IRON *(21% of exam)*					
Red blood cell production disorders *(4% of exam)*					
Nutritional deficiencies					
*Iron deficiency**	✓	✓	✓	✓	⊘
*Nutritional anemia, non–iron deficiency**	✓	✓	✓	⊘	⊘
Anemia of chronic inflammation	✓	✓	✓	⊘	✓
Red cell aplasia and hypoplasia **LF**	⊘	⊘	⊘	⊘	⊘
Sideroblastic anemia **LF**	⊘	⊘	⊘	⊘	⊘
Red blood cell destruction disorders *(15% of exam)*					
Thalassemias					
Alpha thalassemia **LF**	⊘	⊘	⊘	⊘	⊘
Beta thalassemia **LF**	⊘	⊘	⊘	⊘	⊘
Hemoglobin E disorders **LF**	⊘	⊘	✗	✗	✗

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HEMATOPOIETIC SYSTEM *continued…* *(25% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
DISORDERS OF RED BLOOD CELLS OR IRON *continued… (21% of exam)*					
Red blood cell destruction disorders *continued…*					
Sickle cell disorders *(4.5% of exam)*					
Sickle cell trait	⊘	⊘	⊘	⊘	⊘
Sickle cell anemia (hemoglobin SS disease)	✓	✓	✓	✓	⊘
Hemoglobin SC disease **LF**	⊘	⊘	⊘	⊘	⊘
Sickle cell-beta zero and sickle cell-beta plus-thalassemias **LF**	⊘	⊘	⊘	⊘	⊘
Non-sickle hemoglobinopathies **LF**	⊘	⊘	⊘	✗	✗
Autoimmune hemolytic anemias (AIHA)					
Warm antibody-mediated autoimmune hemolytic anemia	✓	✓	✓	✓	⊘
Cold antibody-mediated autoimmune hemolytic anemia **LF**	✓	⊘	✓	⊘	⊘
Drug-induced hemolysis **LF**	⊘	⊘	⊘	⊘	⊘
Metabolic abnormalities and enzyme deficiency hemolytic anemias					
Oxidant hemolysis, including glucose-6-phosphate dehydrogenase (G6PD) deficiency **LF**	⊘*	⊘*	⊘*	⊘*	⊘*
Pyruvate kinase deficiency and other metabolic deficiencies **LF**	⊘*	⊘*	✗*	✗*	✗*
Paroxysmal nocturnal hemoglobinuria **LF**	✓	⊘	⊘	⊘	⊘
Red blood cell membrane disorders **LF**	⊘	⊘	⊘	⊘	✗
Microangiopathic hemolytic anemias (other than TTP, HUS, or DIC)	✓	✓	✓	✓	⊘
Non-autoimmune, acquired hemolytic anemias **LF**	⊘	⊘	⊘	⊘	⊘
Erythrocytosis	✓	✓	✓	✓	⊘
Porphyrias **LF**	⊘	✗	✗	✗	✗
Hemochromatosis	✓	✓	✓	⊘	⊘

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HEMATOPOIETIC SYSTEM *continued…* *(25% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
WHITE BLOOD CELL DISORDERS *(<2% of exam)*					
Granulocyte disorders					
Quantitative granulocyte disorders	✓	✓	✓	/	/
Qualitative granulocyte disorders **LF**	/*	/*	/*	/*	✗*
Lymphocytopenia and lymphocyte dysfunction syndromes **LF**	/	/	/	✗	✗
Leukocytosis	✓	✓	✓	✓	/
Eosinophilia **LF**	/	/	/	/	/
Hemophagocytic syndromes **LF**	/	/	/	/	✗
BONE MARROW FAILURE SYNDROMES *(2% of exam)*					
Aplastic anemia					
Inherited aplastic anemia **LF**	/	/	/	✗	✗
Acquired aplastic anemia **LF**	/	/	✓	/	/
Pancytopenia	✓	✓	✓	✓	/

COAGULATION *(27% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
PLATELET AND MEGAKARYOCYTE DISORDERS *(7% of exam)*					
Inherited disorders of platelet function **LF**	/	/	/	/	/
Acquired disorders of platelet function					
Drug-induced disorders	✓	✓	✓	/	/
Non-drug-induced disorders	/	/	✓	/	/

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COAGULATION *continued…* *(27% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
PLATELET AND MEGAKARYOCYTE DISORDERS *continued… (7% of exam)*					
Thrombocytopenia *(4.5% of exam)*					
Inherited thrombocytopenia **LF**	⊘	⊘	⊘	✗	✗
Acquired thrombocytopenia					
Immune thrombocytopenic purpura (ITP)	✓	✓	✓	✓	⊘
Drug-induced thrombocytopenia	✓	✓	✓	✓	⊘
Thrombotic thrombocytopenia purpura (TTP)	✓	✓	✓	✓	✓
Hemolytic uremic syndrome (HUS) **LF**	✓	✓	✓	⊘	⊘
Thrombocytopenia secondary to liver disease and splenic disorders	✓	⊘	⊘	⊘	⊘
Thrombocytosis	✓	✓	✓	✓	⊘
HEMOSTASIS *(10% of exam)*					
Molecular basis of coagulation and hemostatic agents					
Normal hemostasis	✓	✓	✓	⊘	⊘
Laboratory evaluation	✓	✓	✓	⊘	⊘
Hemostatic drugs	✓	✓	✓	⊘	⊘
Inherited bleeding disorders (non-platelet) *(6% of exam)*					
Von Willebrand disease					
Types 1, 2A, 2M, 2N, and 3	✓	✓	✓	⊘	⊘
Type 2B **LF**	⊘	⊘	⊘	⊘	⊘
Modifiers of von Willebrand factor levels	⊘	⊘	⊘	⊘	✗
Hemophilias A and B					
Hemophilia A **LF**	✓	✓	✓	⊘	⊘
Hemophilia B **LF**	⊘	⊘	✓	⊘	⊘
Factor XI deficiency **LF**	⊘	⊘	⊘	✗	✗

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COAGULATION *continued…* *(27% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
HEMOSTASIS *continued… (10% of exam)*					
Inherited bleeding disorders (non-platelet) *continued… (6% of exam)*					
Factor deficiencies other than factor XI **LF**	⁄	⁄	⁄	✗	✗
Inherited vascular abnormalities **LF**	⁄	⁄	✗	✗	✗
Acquired bleeding disorders (non-platelet)					
Factor inhibitors **LF**	✓	✓	✓	⁄	⁄
Disseminated intravascular coagulation (DIC)	✓	✓	✓	⁄	⁄
Acquired vascular abnormalities **LF**	⁄	⁄	⁄	✗	✗
Secondary acquired factor deficiencies **LF**	⁄	⁄	⁄	⁄	⁄
THROMBOSIS *(10% of exam)*					
Molecular basis of natural anticoagulants, fibrinolytic pathway, and anticoagulant therapy *(5.5% of exam)*					
Normal anticoagulant and fibrinolytic mechanisms	✓	✓	⁄	⁄	⁄
Laboratory evaluation	✓	✓	✓	⁄	⁄
Anticoagulant drugs	✓	✓	✓	✓	✓
Thrombotic disorders *(4.5% of exam)*					
Inherited thrombotic disorders					
Factor V Leiden and prothrombin G20210A	✓	✓	✓	✓	⁄
Deficiencies of natural anticoagulants (antithrombin, proteins C and S)	✓	✓	✓	⁄	⁄
Hyperhomocysteinemia **LF**	⁄*	⁄*	⁄*	✗*	✗*

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COAGULATION *continued…* *(27% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
THROMBOSIS *continued… (10% of exam)*					
Thrombotic disorders *continued… (4.5% of exam)*					
Acquired thrombotic disorders					
Heparin-induced thrombocytopenia (HIT)	✓	✓	✓	✓	✓
Anti-phospholipid antibody syndrome (APS)	✓	✓	✓	✓	⊘
Cancer-related thrombotic disorders	✓	✓	✓	✓	⊘
Thromboembolism at unusual sites	✓	✓	✓	⊘	⊘
Thrombosis management (non-disease-specific)	✓	✓	✓	✓	✓
Complications of thrombotic disorders	✓	✓	✓	✓	⊘

HEMATOLOGIC NEOPLASTIC DISORDERS *(35% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
MYELOPROLIFERATIVE NEOPLASMS *(4.5% of exam)*					
Chronic myeloid leukemia	✓	✓	✓	✓	⊘
Polycythemia vera and secondary erythrocytosis	✓	✓	✓	✓	⊘
Primary myelofibrosis **LF**	✓	✓	✓	⊘	⊘
Essential thrombocythemia	✓	✓	✓	⊘	⊘
Mastocytosis **LF**	⊘	⊘	⊘	✗	✗
Chronic neutrophilic leukemia **LF**	✗	✗	✗	✗	✗

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HEMATOLOGIC NEOPLASTIC DISORDERS *continued…* *(35% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
ACUTE LEUKEMIAS AND MYELODYSPLASIA *(8% of exam)*					
Acute promyelocytic leukemia LF	✓	✓	✓	✓	⊘
Acute myeloid leukemia (non-promyelocytic)	✓	✓	✓	✓	⊘
Therapy-related myeloid neoplasms	✓	✓	✓	⊘	⊘
Myeloid sarcoma/extramedullary leukemia LF	⊘	⊘	⊘	✗	✗
Myelodysplastic syndromes	✓	✓	✓	✓	⊘
Chronic myelomonocytic leukemia and myelodysplastic/ myeloproliferative neoplasm overlap syndromes LF	✓	⊘	⊘	⊘	✗
B-cell acute lymphoblastic leukemia/lymphoma (B-ALL) LF	✓	✓	✓	⊘	⊘
T-cell acute lymphoblastic leukemia/lymphoma (T-ALL) LF	✓	✓	⊘	⊘	✗
B-CELL NEOPLASMS *(13% if exam)*					
Chronic lymphoid leukemias					
Chronic lymphocytic leukemia/ small lymphocytic lymphoma	✓	✓	✓	✓	⊘
Monoclonal B-cell lymphocytosis	⊘	⊘	⊘	⊘	✗
Hairy cell leukemia LF	✓	✓	✓	⊘	✗
Plasma cell neoplasms					
Multiple myeloma	✓	✓	✓	✓	✓
Plasmacytomas LF	✓	✓	✓	⊘	⊘
Amyloidosis LF	✓	✓	✓	⊘	✗
Castleman disease and POEMS syndrome (polyneuropathy, organ enlargement, endocrinopathy, monoclonal plasma-proliferative disorder, skin changes) LF	⊘	⊘	⊘*	✗	✗
Monoclonal gammopathy of undetermined significance (MGUS)	✓	✓	✓	✓	⊘

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B-CELL NEOPLASMS *continued… (13% if exam)*					
Non-Hodgkin lymphomas, B-cell *(7% of exam)*					
Diffuse large B-cell lymphoma	✓	✓	✓	✓	/
Follicular lymphoma	✓	✓	✓	✓	/
Mantle cell lymphoma	✓	✓	✓	✓	/
Marginal zone B-cell and mucosa-associated lymphoid tissue (MALT) lymphomas	✓	✓	✓	/	/
Burkitt lymphoma **LF**	✓	✓	✓	✓	/
Primary central nervous system lymphoma **LF**	✓	/	✓	/	✗
Lymphoplasmacytic lymphoma (including Waldenström macroglobulinemia) **LF**	✓	✓	✓	/	/
General lymphoma issues (not specific to lymphoma type)	✓	✓	✓	/	/
IMMUNODEFICIENCY-ASSOCIATED LYMPHOPROLIFERATIVE DISORDERS *(<2% of exam)*					
Post-transplantation lymphoproliferative disorders (solid organ transplant) **LF**	/	/	/	/	✗
Lymphomas associated with human immunodeficiency virus (HIV) infection or primary immune disorders **LF**	/	✓	✓	/	✗
IMMUNODEFICIENCY-ASSOCIATED LYMPHOPROLIFERATIVE DISORDERS *continued… (<2% of exam)*					
Lymphoproliferative disorders associated with iatrogenic immunodeficiency **LF**	/	/	/	✗	✗

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T-CELL AND NK-CELL NEOPLASMS *(<2% of exam)*					
Cutaneous T-cell lymphoma (mycosis fungoides and Sézary syndrome) LF	✓	✓	✓	✓	✗
T-cell lymphomas LF	✓	✓	✓	✓	✗
Adult T-cell leukemia/lymphoma LF	✓	✓	✓	✗	✗
Large granular lymphocytic leukemia LF	✓	✓	✓	✓	✗
Prolymphocytic leukemia LF	✓	✓	✓	✗	✗
HODGKIN LYMPHOMA *(2% of exam)*					
Classical Hodgkin lymphoma	✓	✓	✓	✓	✓
Nodular lymphocyte-predominant Hodgkin lymphoma LF	✓	✓	✓	✓	✓
HISTIOCYTIC AND DENDRITIC CELL NEOPLASMS *(<2% of exam)*					
Histiocytic and dendritic cell neoplasms LF	✓	✗	✗	✗	✗
MYELOID AND LYMPHOID NEOPLASMS WITH EOSINOPHILIA AND ABNORMALITIES OF PDGFRA, PDGFRB, OR FGFR1 *(<2% of exam)*					
Myeloid and lymphoid neoplasms with eosinophilia and abnormalities of PDGFRA, PDGFRB, or FGFR1 LF	✓	✓	✓	✗	✗
COMPLICATIONS OF HEMATOLOGIC MALIGNANCIES *(<2% of exam)*					
Tumor lysis syndrome	✓	✓	✓	✓	✓
Spinal cord compression LF	✓	✓	✓	✓	✓
Paraneoplastic disorders LF	✓	✓	✓	✓	✗
PHARMACOLOGY *(2.5% of exam)*					
Toxicities and complications, including cytopenic complications	✓	✓	✓	✓	✓
Drug dosing and dose modifications	✓	✓	✓	✓	✓
CLINICAL TRIAL DESIGN AND INTERPRETATION *(<2% of exam)*					
Clinical trial design and interpretation	*Not Applicable*		✓	✓	✗

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TRANSFUSION MEDICINE *(5% of exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
CLINICAL INDICATIONS FOR THE USE OF BLOOD PRODUCTS *(<2% of exam)*					
Red blood cell preparations	✓	✓	✓	⊘	⊘
Platelet preparations	⊘	⊘	✓	⊘	⊘
Fresh frozen plasma	⊘	⊘	✓	⊘	⊘
Cryoprecipitate	⊘	⊘	⊘	⊘	⊘
RISKS ASSOCIATED WITH BLOOD PRODUCTS *(4% of exam)*					
Risks associated with administration					
Allergic reactions					
Nonanaphylactic allergic reactions	✓	⊘	✓	⊘	⊘
IgA deficiency **LF**	⊘	⊘	⊘	⊘	✗
Anaphylactic reactions **LF**	✓	⊘	✓	⊘	⊘
Graft-versus-host disease **LF**	⊘	⊘	⊘	⊘	⊘
Electrolyte disturbances **LF**	⊘	⊘	⊘	✗	✗
Infectious organisms **LF**	⊘	⊘	⊘	⊘	✗
Alloimmunizations	⊘	⊘	⊘	⊘	⊘
Transfusion reactions					
Hemolytic reactions **LF**	✓	✓	✓	⊘	⊘
Febrile reactions	⊘	⊘	⊘	⊘	✗
Transfusion-related acute lung injury (TRALI) **LF**	✓	⊘	✓	⊘	⊘
Transfusion-associated circulatory overload (TACO) **LF**	⊘	⊘	⊘	⊘	⊘
Post-transfusion purpura and other risks associated with administration **LF**	⊘	⊘	⊘	⊘	✗
Risks associated with therapeutic apheresis procedures **LF**	⊘	⊘	⊘	⊘	✗
MANAGEMENT OF PATIENTS WHO REFUSE TRANSFUSION *(<2% of exam)*					
Management of patients who refuse transfusion	⊘*	⊘*	⊘*	✗*	✗*

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CELLULAR THERAPY *(8% or exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
HEMATOPOIETIC CELL BIOLOGY AND ENGRAFTMENT *(<2% of exam)*					
Biology of hematopoietic cell transplantation **LF**	⊘	⊘	⊘	⊘	⊘
Biologic and immunologic relationship between donor and host **LF**	⊘	⊘	⊘	⊘	⊘
HEMATOPOIETIC CELL TRANSPLANTATION (HCT) IN THE MANAGEMENT OF HEMATOLOGIC DISEASES *(2% of exam)*					
Autologous HCT	⊘	⊘	⊘	⊘	⊘
Allogeneic HCT	⊘*	✗*	⊘*	⊘*	✗*
CONDITIONING REGIMENS *(<2% of exam)*					
Regimen intensity **LF**	⊘*	⊘*	⊘*	⊘*	✗*
Toxicities	⊘	⊘	⊘	⊘	✗
SUPPORTIVE CARE *(<2% of exam)*					
Preventing infectious disease	⊘	⊘	⊘	⊘*	✗
Transfusion support, including graft compatibility and blood product issues **LF**	⊘	⊘	⊘	✗	✗
GRAFT-VERSUS-HOST DISEASE (GVHD) *(<2% of exam)*					
Acute GVHD **LF**	⊘	⊘	⊘	✗	✗
Chronic GVHD	⊘	⊘	⊘	✗	✗

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CELLULAR THERAPY *continued…* *(8% or exam)*	**Diagnosis**	**Testing**	**Treatment/ Care Decisions**	**Risk Assessment/ Prognosis/ Epidemiology**	**Pathophysiology/ Basic Science**
OTHER COMPLICATIONS AFTER HEMATOPOIETIC CELL TRANSPLANTATION *(<2% of exam)*					
Engraftment failure or rejection **LF**	⊘*	⊘*	⊘*	⊘*	✗*
Infections	⊘	⊘	⊘	⊘	✗
Organ toxicity	⊘*	⊘*	⊘*	⊘*	✗*
Transplant-associated thrombotic microangiopathy	⊘*	⊘*	⊘*	⊘*	✗*
Post-transplant lymphoproliferative disorder	⊘*	⊘*	⊘*	⊘*	✗*
Late effects	⊘	⊘	⊘	⊘	✗
DISEASE RELAPSE *(<2% of exam)*					
Disease relapse **LF**	⊘	⊘	⊘	✗	✗
CHIMERIC ANTIGEN RECEPTOR (CAR) T-CELL THERAPY AND OTHER GENETICALLY MODIFIED CELL THERAPY *(<2% of exam)*					
Chimeric antigen receptor (CAR) T-cell therapy and other genetically modified cell therapy **LF**	⊘	✗	⊘	⊘	✗

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