Hematology Blueprint

Certification Examination (CERT)

Purpose of the exam

The exam is designed to evaluate the knowledge, diagnostic reasoning, and clinical judgment skills expected by the certified hematologist in the broad domain of the discipline. The ability to make appropriate diagnostic and management decisions that have important consequences for patients will be assessed. The exam may require recognition of common as well as rare clinical problems for which patients may consult a certified hematologist.

Exam content

Exam content is determined by a pre-established blueprint, or table of specifications. The blueprint is developed by ABIM and is reviewed annually and updated as needed for currency. Trainees, training program directors, and certified practitioners in the discipline are surveyed periodically to provide feedback and inform the blueprinting process.

The primary medical content categories of the blueprint are shown below, with the percentage assigned to each for a typical exam:

Medical Content Category	% of Exam
Hematopoietic System	25%
Coagulation	27%
Hematologic Neoplastic Disorders	35%
Transfusion Medicine	5%
Cellular Therapy	8%
	100%

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

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.

Exam format

The exam is composed of up to 240 single-best-answer multiple-choice questions, of which approximately 40 are new questions that do not count in the examinee's score. Most questions describe patient scenarios and ask about the work done (that is, tasks performed) by physicians in the course of practice:

- Making a diagnosis
- Ordering and interpreting results of tests
- Recommending treatment or other patient care
- Assessing risk, determining prognosis, and applying principles from epidemiologic studies
- Understanding the underlying pathophysiology of disease and basic science knowledge applicable to patient care

Clinical information presented may include patient photographs, radiographs, photomicrographs, and other media to illustrate relevant patient findings. Learn more information on how exams are developed.

A tutorial including examples of ABIM exam question format can be found at http://www.abim.org/certification/exam-information/hematology/exam-tutorial.aspx.

The blueprint can be expanded for additional detail as shown below. Each of the medical content categories is listed there, and below each major category are the content subsections and specific topics that *may* appear in the exam. Please note: actual exam content may vary.

Hematopoietic System	**25%** of Exam
Normal hematopoiesis	<2%
Disorders of red blood cells or iron	21%
Red blood cell production disorders	4%
Nutritional deficiencies	
Iron deficiency	
Nutritional anemia, non–iron deficiency	

- Anemia of chronic inflammation
- Red cell aplasia and hypoplasia
- Sideroblastic anemia

Red blood cell destruction disorders 15%

- Thalassemias
  - Alpha thalassemia
  - Beta thalassemia
  - Hemoglobin E disorders
- Sickle cell disorders 4.5%
  - Sickle cell trait
  - Sickle cell anemia (hemoglobin SS disease)
  - Hemoglobin SC disease
  - Sickle cell-β^0 and sickle cell-β^+-thalassemias
- Non-sickle hemoglobinopathies
- Autoimmune hemolytic anemias (AIHA)
  - Warm antibody-mediated autoimmune hemolytic anemia
  - Cold antibody-mediated autoimmune hemolytic anemia
  - Drug-induced hemolysis
- Metabolic abnormalities and enzyme deficiency hemolytic anemias
  - Oxidant hemolysis, including glucose-6-phosphate dehydrogenase (G6PD) deficiency
  - Pyruvate kinase deficiency and other metabolic deficiencies
- Paroxysmal nocturnal hemoglobinuria
- Red blood cell membrane disorders
- Microangiopathic hemolytic anemias (other than TTP, HUS, or DIC)
- Non-autoimmune, acquired hemolytic anemias

Erythrocytosis

Porphyrias

Hemochromatosis

White blood cell disorders <2%

- Granulocyte disorders
  - Quantitative granulocyte disorders
  - Qualitative granulocyte disorders

Lymphocytopenia and lymphocyte dysfunction syndromes

Leukocytosis

Eosinophilia

Hemophagocytic syndromes

Bone marrow failure syndromes 2%

- Aplastic anemia
  - Inherited aplastic anemia
  - Acquired aplastic anemia
- Pancytopenia

Coagulation — **27%** of Exam

Platelet and megakaryocyte disorders 7%

- Inherited disorders of platelet function
- Acquired disorders of platelet function
  - Drug-induced disorders
  - Non-drug-induced disorders
- Thrombocytopenia 4.5%
  - Inherited thrombocytopenia
  - Acquired thrombocytopenia
    - Immune thrombocytopenic purpura (ITP)
    - Drug-induced thrombocytopenia
    - Thrombotic thrombocytopenic purpura (TTP)
    - Hemolytic uremic syndrome (HUS)
    - Thrombocytopenia secondary to liver Disease and splenic disorders
- Thrombocytosis

Hemostasis 10%

- Molecular basis of coagulation and hemostatic agents
  - Normal hemostasis
  - Laboratory evaluation
  - Hemostatic drugs
- Inherited bleeding disorders (non-platelet) 6%
  - Von Willebrand disease
    - Types 1, 2A, 2M, 2N, and 3
    - Type 2B
    - Modifiers of von Willebrand factor levels
  - Hemophilias A and B
    - Hemophilia A
    - Hemophilia B
  - Factor XI deficiency
  - Factor deficiencies other than factor XI

- Inherited vascular abnormalities
- Acquired bleeding disorders (non-platelet)
  - Factor inhibitors
  - Disseminated intravascular coagulation (DIC)
  - Acquired vascular abnormalities
  - Secondary acquired factor deficiencies

Thrombosis 10%

- Molecular basis of natural anticoagulants, fibrinolytic pathway, and anticoagulant therapy 5.5%
  - Normal anticoagulant and fibrinolytic mechanisms
  - Laboratory evaluation
  - Anticoagulant drugs
- Thrombotic disorders 4.5%
  - Inherited thrombotic disorders
    - Factor V Leiden and prothrombin G20210A
    - Deficiencies of natural anticoagulants (antithrombin, proteins C and S)
    - Hyperhomocysteinemia
  - 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

Myeloproliferative neoplasms 4.5%

- Chronic myeloid leukemia
- Polycythemia vera and secondary erythrocytosis
- Primary myelofibrosis
- Essential thrombocythemia
- Mastocytosis
- Chronic neutrophilic leukemia

Acute leukemias and myelodysplasia 8%

- Acute promyelocytic leukemia
- Acute myeloid leukemia (non-promyelocytic)

- Therapy-related myeloid neoplasms
- Myeloid sarcoma/extramedullary leukemia
- Myelodysplastic syndromes
- Chronic myelomonocytic leukemia and myelodysplastic/myeloproliferative neoplasm overlap syndromes
- B-cell acute lymphoblastic leukemia/lymphoma (B-ALL)
- T-cell acute lymphoblastic leukemia/lymphoma (T-ALL)

B-cell neoplasms 13%

- Chronic lymphoid leukemias
  - Chronic lymphocytic leukemia/small lymphocytic lymphoma
  - Monoclonal B-cell lymphocytosis
  - Hairy cell leukemia
- Plasma cell neoplasms
  - Multiple myeloma
  - Plasmacytomas
  - Amyloidosis
  - Castleman disease and POEMS syndrome (polyneuropathy, organ enlargement, endocrinopathy, Monoclonal plasma-proliferative disorder, skin changes)
  - Monoclonal gammopathy of undetermined significance (MGUS)
- Non-Hodgkin lymphomas, B-cell 7%
  - Diffuse large B-cell lymphoma
  - Follicular lymphoma
  - Mantle cell lymphoma
  - Marginal zone B-cell and mucosa-associated lymphoid tissue (MALT) lymphomas
  - Burkitt lymphoma
  - Primary central nervous system lymphoma
  - Lymphoplasmacytic lymphoma (including Waldenström macroglobulinemia)
  - General lymphoma issues (not specific to lymphoma type)

Immunodeficiency-associated lymphoproliferative disorders <2%

- Post-transplantation lymphoproliferative disorders (solid organ transplant)
- Lymphomas associated with human immunodeficiency virus (HIV) infection or primary immune disorders

Lymphoproliferative disorders associated with iatrogenic immunodeficiency	
T-cell and NK-cell neoplasms	<2%
Cutaneous T-cell lymphoma (mycosis fungoides and Sézary syndrome)	
T-cell lymphomas	
Adult T-cell leukemia/lymphoma	
Large granular lymphocyte leukemia	
Prolymphocytic leukemia	
Hodgkin lymphoma	2%
Classical Hodgkin lymphoma	
Nodular lymphocyte-predominant Hodgkin lymphoma	
Histiocytic and dendritic cell neoplasms	<2%
Myeloid and lymphoid neoplasms with eosinophilia and Abnormalities of *PDGFRA*, *PDGFRB*, or *FGFR1*	<2%
Complications of hematologic malignancies	<2%
Tumor lysis syndrome	
Spinal cord compression	
Paraneoplastic disorders	
Pharmacology	2.5%
Toxicities and complications, including cytopenic complications	
Drug dosing and dose modifications	
Clinical trial design and interpretation	<2%

Transfusion Medicine — 5% of Exam

Clinical indications for the use of blood products	<2%
Red blood cell preparations	
Platelet preparations	
Fresh frozen plasma	
Cryoprecipitate	
Risks associated with blood products	4%
Risks associated with administration	
Allergic reactions	
Nonanaphylactic allergic reactions	
IgA deficiency	
Anaphylactic reactions	

- Graft-versus-host disease
- Electrolyte disturbances
- Infectious organisms
- Alloimmunizations
- Transfusion reactions
  - Hemolytic reactions
  - Febrile reactions
  - Transfusion-related acute lung injury (TRALI)
  - Transfusion-associated circulatory overload (TACO)
- Post-transfusion purpura and other risks associated with administration
- Risks associated with therapeutic apheresis procedures

Management of patients who refuse transfusion <2%

Cellular Therapy — **8%** of Exam

Hematopoietic cell biology and engraftment <2%
- Biology of hematopoietic cell transplantation
- Biologic and immunologic relationship between donor and host

Hematopoietic cell transplantation in the management of hematologic diseases 2%
- Autologous HCT
- Allogeneic HCT

Conditioning regimens <2%
- Regimen intensity
- Toxicities

Supportive care <2%
- Preventing infectious disease
- Transfusion support, including graft compatibility and blood product issues

Graft-versus-host disease (GVHD) <2%
- Acute GVHD
- Chronic GVHD

Other complications after hematopoietic cell transplantation <2%
- Engraftment failure or rejection
- Infections
- Organ toxicity

Transplant-associated thrombotic microangiopathy	
Post-transplant lymphoproliferative disorder	
Late effects	
Disease relapse	<2%
Chimeric antigen receptor (CAR) T-cell therapy and other genetically modified cell therapy	<2%

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