American Board of Internal Medicine®

# Hematology

Certification Examination Blueprint

## Purpose of the exam

The exam is designed to evaluate the knowledge, diagnostic reasoning, and clinical judgment skills expected of 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% |
| Hematopoietic Cell Transplantation (HCT) | 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).

**Exam format**

The exam is composed of multiple-choice questions with a single best answer, predominantly describing patient scenarios. Questions 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.

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 | |
| 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 | 5% |
| Sickle cell trait | |
| Sickle cell anemia (hemoglobin SS disease) | |

- Hemoglobin SC disease and C hemoglobinopathy
- Sickle cell-$\beta^0$ and sickle cell-$\beta^+$-thalassemias
- Non-sickle hemoglobinopathies
- Autoimmune hemolytic anemias (AIHA)
- Warm antibody-mediated autoimmune hemolytic anemia
- Cold antibody-mediated autoimmune hemolytic anemia
- Drug-induced hemolysis
- Metabolic enzyme deficiency hemolytic anemias
- 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 and Burkitt-like lymphomas | |
| Primary central nervous system lymphoma | |
| Lymphoplasmacytic lymphoma | |
| General lymphoma issues (not specific to lymphoma type) | |
| **Immunodeficiency-associated lymphoproliferative disorders** | <2% |
| Post-transplantation lymphoproliferative disorders | |
| 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-related 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%

## Hematopoietic Cell Transplantation (HCT) — 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
  - Donor selection
  - Stem cell source

| | |
|---|---|
| **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% |

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