SAUDI FELLOWSHIP TRAINING PROGRAM

HEMATOLOGY

Final Examination

Exam Format:

The Saudi subspecialty fellowship and diplomas final written examination shall consist of one paper with 80-120 multiple-choice questions (single best answer out of four options). 10 unscored items can be added for pretesting purposes.

Passing Score:

The passing score is 70%. However, if the percentage of candidates passing the examination before final approval is less than 70%, the passing score must be lowered by one mark at a time aiming at achieving 70% passing rate or 65% passing score whichever comes first. Under no circumstances can the passing score be reduced below 65%.

Suggested References:

TEXT BOOKS:

* Hematology, 7th Edition, Basic Principles and Practice by Ronald Hoffman
* Wintrobe's Clinical Hematology Thirteenth Edition by John P. Greer
* Williams Hematology, 9th Edition by Kenneth Kaushansky
* ASH –SAP American Society of Hematology Self-Assessment Program, 6th edition
* Dacie and Lewis Practical Haematology, 12th Edition, by Barbara Bain, Imelda Bates, Mike Laffan
* Bone Marrow Pathology by Kathryn Foucar
*WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues, WHO Classification of Tumours, Revised 4th Edition. Edited by Swerdlow SH, Campo E, Harris NL, Jaffe ES, Pileri SA, Stein H, Thiele J, 2017.

JOURNALS:

* Blood
* Blood Review
* British Journal of Hematology
* Hemophilia
* Journal of Thrombosis and Hemostasis
* Hematology: ASH Education Program Book
* New England Journal of Medicine
* Bone Marrow Transplantation
* Biology of Blood and Marrow Transplantation
* Journal of Clinical Oncology
* Leukemia & Lymphoma
* Leukemia
* The Lancet
* Lancet Oncology

On-Line RESOURCES:

Uptodate.com
ASH Image Bank

Note:

This list is intended for use as a study aid only. SCFHS does not intend the list to imply endorsement of these specific references, nor are the exam questions necessarily taken solely from these sources.

Main topics to be assessed under each major discipline are as follows:

❖ **Hematopoietic System 18%**

1. **Normal Hematopoiesis**
2. **RBC**

Red blood cell production disorders
- Nutritional deficiencies
- Anemia of chronic disease
- Red cell aplasia and hypoplasia
- Sideroblastic anemia

Red blood cell destruction disorders
- Thalassemias
  - Alpha thalassemia
  - Beta thalassemia
  - Hemoglobin E disorders
- Sickle cell disorders
  - Sickle cell trait
  - Sickle cell anemia (hemoglobin SS disease)
  - Hemoglobin SC disease and C hemoglobinopathy
  - Sickle cell-β0 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 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

3. **WBC**

Granulocyte dysfunction disorders

Granulocytopenia

Lymphocytopenia and lymphocyte dysfunction syndromes

Leukocytosis
- Eosinophilia

4.BM failure

Aplastic anemia
- Inherited aplastic anemia
- Acquired aplastic anemia

Pancytopenia

❖ **Bleeding disorders 11%**

1- Platelet and megakaryocyte disorders

Inherited disorders of platelet function

Acquired disorders of platelet function
- Drug-induced disorders
- Non-drug-induced disorders

Thrombocytopenia
- 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

2- Hemostasis

Molecular basis of coagulation and hemostatic agents
- Normal hemostasis
- Laboratory evaluation
- Hemostatic drugs

3-Inherited bleeding disorders (non-platelet)
- 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

4- Acquired bleeding disorders (non-platelet)

Factor inhibitors

Disseminated intravascular coagulation (DIC)

Acquired vascular abnormalities

Secondary acquired factor deficiencies

❖ **Thrombosis 10%**

1- Molecular basis of natural anticoagulants, fibrinolytic

Pathway and anticoagulant therapy

Normal anticoagulant and fibrinolytic mechanisms

Laboratory evaluation

Anticoagulant drugs

2- Thrombotic disorders

Inherited thrombotic disorders

Factor V Leiden and prothrombin G20210A

Deficiencies of natural anticoagulants

(Antithrombin, proteins C and S)

Disorders involving cysteine and homocysteine metabolism

3- Acquired thrombotic disorders

Heparin-induced thrombocytopenia (HIT)

Anti-phospholipid antibody syndrome (APS)

Cancer-related thrombotic disorders

4- Thromboembolism at unusual sites

5- Thrombosis management (non-disease-specific)

6- Complications of thrombotic disorders

❖ **Transfusion medicine 7%**

1- Clinical indications for the use of blood products

Red blood cell preparations

Platelet preparations

Granulocyte preparations

Fresh frozen plasma

Cryoprecipitate

2- Risks associated with blood products

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 dministration

Risks associated with therapeutic apheresis procedures

❖ **Myeloproliferative disorders and Leukemia 15%**

1- Myeloproliferative neoplasms

Chronic myeloid leukemia

Polycythemia vera and secondary erythrocytosis

Primary myelofibrosis

Essential thrombocythemia

Mastocytosis

Chronic neutrophilic leukemia

2- Acute myeloid leukemias (AML)

Acute promyelocytic leukemia

AML with recurrent genetic abnormalities

Therapy-related myeloid neoplasms

Myeloid sarcoma

AML with myelodysplasia-related changes

AML not otherwise specified

3- Myelodysplastic syndromes (MDS) and chronic myelomonocytic leukemia

Myelodysplastic syndromes

Chronic myelomonocytic leukemia

4- Myeloid and lymphoid neoplasms with eosinophilia and abnormalities of *PDGFRA*, *PDGFRB*, or *FGFR1*

❖ **Lymphoproliferative disorders 14%**

1- B-cell neoplasms

B-cell acute lymphoblastic leukemia/lymphoma (B-ALL)
Lymphoplasmacytic lymphoma
Chronic lymphoid leukemias
Chronic lymphocytic leukemia/small lymphocytic lymphoma
Monoclonal B-cell lymphocytosis
Hairy cell leukemia
B-cell prolymphocytic leukemia
Non-Hodgkin lymphomas, B-cell
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
General lymphoma issues (not specific to lymphoma type)

2- Immunodeficiency-associated lymphoproliferative disorders

Post-transplantation lymphoproliferative disorders
Lymphomas associated with HIV infection or primary immune disorders
Lymphoproliferative disorders associated with iatrogenic immunodeficiency

3- T-cell and NK-cell neoplasms

T-cell acute lymphoblastic leukemia/lymphoma (T-ALL)
Cutaneous T-cell lymphoma (mycosis fungoides and Sezary syndrome)
T-cell lymphomas
Adult T-cell leukemia/lymphoma
Large granular lymphocyte leukemia

4- Hodgkin lymphoma

Classical Hodgkin lymphoma
Nodular lymphocyte-predominant Hodgkin lymphoma

5- Histiocytic and dendritic cell neoplasms

❖ **Plasma cell neoplasms 10%**

1- Multiple myeloma
2- Plasmacytomas
3- Amyloidosis
4- Castleman disease
5- Monoclonal gammopathy of undetermined significance (MGUS)

❖ **Pharmacology & complications of hematopoietic neoplasms 5%**

1- Complications of hematologic malignancies

Hemophagocytic syndrome
Tumor lysis syndrome
Spinal cord compression
Paraneoplastic disorders

2- Pharmacology

Toxicities and complications, including cytopenic complications
Drug dosing and dose modifications

❖ **Hematopoietic Cell Transplantation (HCT) and CAR-T Cell Therapy 10%**

1- Stem cell biology and engraftment

Biology of hematopoiesis and hematopoietic cell transplantation
Tumor immunology
Biologic and immunologic relationship between donor and host

2- Hematopoietic cell transplantation in the management of hematologic diseases

Autologous transplantation
Syngeneic transplantation
Allogeneic transplantation
Reduced-intensity allogeneic transplantation
Haplo-identical transplantation
Cord blood transplantation

3- Conditioning regimens

Components
Toxicities

4- Collecting and handling cells for transplantation

Bone marrow
Peripheral blood
Mobilization
Donor complications of cell collection

5- Prophylaxis and supportive care

Preventing infectious disease
Pharmacologic prevention
Environmental prevention
Immunosuppressive therapy for graft-versus-host disease (GVHD)
Graft-versus-host disease

T-cell depletion
Complications of immunosuppressive therapy
Transfusion and blood product issues related to transplantation

6- Complications after hematopoietic cell transplantation

Marrow engraftment failure
Graft-versus-host disease, clinical
Acute
Chronic
Opportunistic infections
Hepatic sinusoidal obstruction syndrome
Management of relapse
Late effects

7- Biology of CAR-T cell therapy, indications and complications

Blueprint Outlines:

No.	Sections	Percentage
1	Hematopoietic System	18%
2	Bleeding disorders	11%
3	Thrombosis	10%
3	Transfusion Medicine	7%
5	Myeloproliferative disorders and Leukemia	15%
6	Lymphoproliferative disorders	14%
7	Plasma Cell Neoplasm	10%
8	Pharmacology & complications of hematopoietic neoplasms	5%
9	Hematopoietic Cell Transplantation (HCT) & CAR-T cell therapy	10%
Total		100%

Notes:

- Blueprint distributions of the examination may differ up to +/-5% in each section.
- Percentages and content are subject to change at any time. See the SCFHS website for the most up-to-date information.
- Research, Ethics, Professionalism, and Patient Safety are incorporated within various domains.