Hematology: Blood & lymph system Study Guide

Sohag Faculty of Medicine

Sohag University

Prepared by

Histology & Cell biology
Human Anatomy & Embryology
Medical physiology
Medical biochemistry
Medical Parasitology
Microbiology & Immunology
Pathology
Pharmacology

Under supervision of

Faculty of Medicine
Sohag University
2024-2025

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Contents

Basic Information about the Block

Program on which the course is given
Bachelor of Medicine and Surgery (M.B. B.Ch.).

Elements (major or minor) of the program:
Undergraduate

Departments offering the course:
- ✓ Department ofHistology &cell biology
- ✓ Department ofHuman Anatomy & Embryology
- ✓ Department ofMedical physiology
- ✓ Department ofMedical biochemistry
- ✓ Department ofMedical Parasitology
- ✓ Department ofMicrobiology & Immunology
- ✓ Department ofPathology
- ✓ Department ofPharmacology

Academic. year/level:
2nd year, 3rdsemester

Date of specification approval:
2023-2024

- **Title:** Hematology, Blood & lymph system

Code: HEM-212

Credit points: 6

Lectures:31 hours

Practical:21 hours

Student learning activities:32hrs.

Total:94hours

Block Map

Block	Departments Involved	Code	Points	days/ week	learning activities		
Hematology, Blood & lymph System	All departments of basic sciences	HEM -212	6	4 wks	contact hours/ points	formative assessment /Feedback	assignments and other home and self-learning (Portfolio based evidence)
					63 hours	2	32

الفرقة الثانية / الترم الثالث : 4 أسابيع/ 6 نقاط : المرحلة قبل الاكلينيكية (الوحدات التعليمية **الخاصة بنظام الأجهزة ، مقدمة لرعاية المريض)**

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الوحدة التعليمية Block	الأقسام المشاركة	الكود	النقاط	الاسابيع	إجمالي الدرجات	عدد ساعات الامتحان التحريري
Hematology, Blood & lymph system الجهاز الليمفاوي والدمو ي	All departments of basic sciences** أقسام العلوم الأساسيه	HEM-212	6	4 اسابيع	90	١,٥

NARS competencies covered by the block

1.6. Select the appropriate investigations and interpret their results taking into consideration cost/effectiveness factors.

1.8. Apply knowledge of the clinical and biomedical sciences relevant to theclinical problem at hand.

1.9. Retrieve, analyze, and evaluate relevant and current data from literature, using information technologies and library resources, to help solve a clinical problem based on evidence (EBM).

1.11. Perform diagnostic and intervention procedures2 in a skillful and safemanner, adapting to unanticipated findings or changing clinical circumstances.

2.1. Identify the basic determinants ofhealth and principles of health improvement.

2.4 Identify the major health risks in his/her community, includingdemographic, occupational and environmental risks.

endemic diseases, and prevalent chronic diseases.

2.5 Describe the principles of disease prevention, and empower communities, specific groups or individuals by raising their awareness and building their capacity.

2.6 Recognize the epidemiology of common diseases within his/hercommunity, and apply the systematic approaches useful in reducing the incidence and prevalence of those diseases.

4.1 Describe the normal structure of the body and its major organ systems and explain their functions.

4.5 Identify various causes (genetic,developmental, metabolic, toxic, microbiologic, autoimmune, neoplastic, degenerative, and traumatic) ofillness/disease and explain the ways in which they operate on the body (pathogenesis).

4.6 Describe altered structure and function of the body and its major organ systems that are seen invarious diseases and conditions.

4.8 Demonstrate basic sciences specific practical skills and procedures relevant to future practice, recognizing their scientific basis, and interpret common diagnostic modalities, including: imaging, electrocardiograms, laboratory assays, pathologic studies, and functional assessment tests.

Professional Information

Block Aims

Overall Aims
This block aims to provide students with foundations of structures (macroscopic and microscopic), functions, diseases (pathology of diseases, biochemical, bacterial, immunological & parasitic aspects diseases) and pharmacological aspects of diseases of the blood and lymph system.
Intended Learning Outcomes of the Block:
A- Knowledge and understanding
Upon completion of the course, students should be able to: A1- Define the importance of the lymphatic system and describe its anatomical components and lymphoid organs (thymus, spleen, tonsils, and lymph nodes). A2- Explain what lymph, its formation, and the direction of lymph flow is. A3-Understand the anatomy of the major lymphatic ducts (thoracic duct and right lymphatic duct).
A4-Describe the structure of lymphatic organs, Primary as thymus gland Secondary as lymph node and spleen. A5- Define & classify lymphatic tissue; diffuse and nodular
A6- Mention different types of WBCs, normal count and demonstrate functions of each type.
A-7.1. List etiologies of lymphadenitis (viral, bacterial and fungal). A-7.2. Memorize the general features and pathogenesis of viral lymphadenitis. A-8.1. Memorize the general features and major virulence factors of some important bacteria causing lymphadenitis. A-8.2 List etiologies of bacteremia and septicemia. A-8.3. State the blood borne pathogens A-8.4. Memorize infection causes of fever of unknown origin
A-9. Visceral leishmanisis types, life cycle, epidemiology and specimen collection. A-10. Types of lymphatic filariasis causative parasites, life cycle, epidemiology and specimen collection.

A-11. Recognize the different types of lymphadenitis.
A-12. Classify the lymphoid neoplasms.
A-13. Mention the subtypes of Hodgkin lymphoma.
A-14. Describe the different types of Hodgkin lymphoma with emphasis on clinical presentation, histopathologic features, immunophenotyping of Hodgkin giant cells and prognosis of Hodgkin lymphoma.
A-15. Describe a subset of non-Hodgkin lymphomas that are clinically important.
A-16. Describe the clinical staging of lymphomas.

A-17 Describe the cytological characteristics of each element (RBCs, WBCs, Platelets).
A-18 Mention the origin of the different blood elements
A-19 Differentiate between 2 types of bone marrow, red and yellow.
A-20 Describe the constituents of bone marrow
A-21 Define the stages of red blood corpuscles (erythrocytes) development
A-22 Define the stages of development of granular leucocytes
A-23Define the stages of development of non -granular leucocytes; monocytes and lymphocytes
A-24 Define the stages of development of platelets

A-25.1 Describe the biochemical structure of hemoglobin, List the different types and derivatives of hemoglobin.
A-25.2 List the steps of heme synthesis, determine the sites where they occur, describe the regulation of heme synthesis and disorders of heme synthesis.
A-25.3 Define HMP shunt, describe its regulation, List the products
A-25.4 Define hemolytic anemia due to glucose-6-phosphate dehydrogenase deficiency (Favism).
A-25.5 List the different sources of iron, describe iron absorption and describe how iron is transported and stored in the body. Iron deficiency and iron overload

A-26. Mention functions of blood in general
A-27. Clarify contents of plasma and functions of plasma proteins
A-28. Demonstrate functions of red blood cells and its haemoglobin content
A-29. List factors affecting erythropoiesis
A-30 Demonstrate platelets and its normal platelet count and its functions
A-31. To understand hemostasis
A-32. To clarify Extrinsic coagulation pathway
A-33. To clarify intrinsic coagulation pathway
A-34. Demonstrate different clotting factors

A-35. Identify the types of malarial parasites
A-36. Identify types of trypanosomes
A-37. To provide the basic knowledge about the commonly used groups of anticoagulant drugs as heparin, oral Anticoagulants, thrombolytic drugs and antiplatelet drugs as regard the mechanism of action and therapeutic uses.

B-Intellectual skills:

By the end of the block, students should be able to:

B-1. Correlate anatomical facts with its major clinical applications (lymph node infection, and lymph node affection in cancer)
B-2 Recognize the different lymphatic organs
B-3. Explain the functions of lymphatic system. Clarify reticulo-endothelial system and their general functions. Know the functions of the spleen.
B-4. Understand what the immunity is and know types and functions of innate immunity.
B-5.1. Analyze and interpret the available data to achieve the diagnosis of some important viruses causing lymphadenitis.
B-6.1. Analyze and interpret the available data to achieve the diagnosis ofsome important bacteria causing lymphadenitis.
B-6.2. Analyze and interpret the available data to achieve the diagnosis of bacteremia and septicemia
B-7.1. Find and memorize the amastigotes of Leishmaniadonovani in a RES tissue smear (bone marrow or spleen).
B-7.2. Know the morphology of Toxoplasma stages and how they are present in tissues
B-7.3. Diagnose the different species of microfiariae that could be seen in blood film in a case of lymphatic filariasis.
B-8. Compare Hodgkin and Non-Hodgkin lymphomas.
B-9. Compare between the different types of non-Hodgkin lymphomas.
B-10. Compare between different types of blood elements by Light microscopy
B-11. Illustrate the different steps of hematopoiesis
B-12. know the composition and functions of the blood. Understand the plasma proteins and their functions.
B-13. Know the red blood cells and their functions. Clarify the erythropoiesis and factors affecting it. Understand types of anemia and polycythemia.

B-14. Understand complication of incompatible blood transfusion. B-15. Clarify the hemostasis. Understand the mechanisms of hemostasis. Clarify the blood coagulation and coagulation factors. Know the mechanism of blood coagulation. Compare between intrinsic and extrinsic Pathway. B-16. Know the platelets and their functions. B-17. Clarify the disorders of bleeding. B-18. Discuss the biochemical mechanism of different blood disorders.

B-19 Interpret the clinical picture and laboratory test results to choose the most appropriate therapeutic regimen.

C- Practical skills:

By the end of the course, students should be able to:

C1. Examine the histological slides under the microscope efficiently

C2- Use the microscope to differentiate between different lymphatic organs in histological slide.

C3. Identify the method of specimen collection.

C4. Identify the microscopic features of causative bacterial pathogens.

C5. Manipulate the media and the tests used for bacterial identification.

C6. Identify the diagnostic techniques of causative viral pathogens

C7. Student should know the microscopical picture of amastigotes in macrophages, promatigotes in culture.

C8. He should know the microscopical picture of microfilariae in thick blood film, adding to this, other microfilariae which could be seen in blood.

C9- Identify the gross picture of lymphoma.

C10- Identify the microscopic criteria of reactive hyperplasia of the lymph node.

C11- Identify the microscopic picture of Hodgkin lymphoma.

C12- Identify the microscopic criteria of non-Hodgkin lymphomas.

C13- Identify the microscopic criteria of metastatic carcinoma of lymph node.

C14- Use the microscope to differentiate between different blood cells in blood film and bone marrow smear

C15- Perform a differential leucocytic count using the blood film.

C16- List different biochemical investigations evaluating iron state in blood and iron deficiency anemia.

C-17 Demonstrate the estimation of iron and total iron binding capacity in serum

C- 18 Mention the principle of estimation of iron and total iron binding capacity in serum

C-19 Mention the diagnostic importance of serum iron estimation.

C-20 List the different sources of iron, describe iron absorption and describe how iron is transported and stored in the body.

C21- Measure haemoglobin level & interpretation of its results. know different blood indices. Understand the difference between adult haemoglobin and fetal haemoglobin.

C22- Measure erythrocyte sedimentation rate (ESR)

C23- Practises blood group. Know the universal donor and recipient.

Understand Rh factor and its importance in blood transfusion.
C24- Measure coagulation time, bleeding time and their value in bleeding disorders.
C25- Display safe laboratory practice.
C26- Participate in laboratory tutorials, exercises, and physiological case scenarios.
C27- Handle techniques and procedures commonly utilized in the field of medical physiology and understand its principles.
C28- Handle diagnostic tools in Parasites of lymphatic and reiculoendothelial system; visceral leishmaniasis and lymphatic filariasis.
C29- Demonstrate the anatomy of spleen and great lymphatic vessels.
C30- Estimate the hematocrite value.

D- General and transferable skills:

By the end of the course, students should be able to:

D1- Practice the skill of self-learning.
D2- Demonstrate personal responsibility.
D3- Practice the skill of respect colleagues.
D4- Adhere to the value of teamwork by acting in small group.
D5- Qualify adequate cooperation with his/her colleagues.
D6- Justify the efforts required to accomplish the tasks in specified time.
D7- Set the use of sources of biomedical information to remain current with advances in knowledge and practice.
D8- Display freely, keeping an ethical behavior
D9- Share in the work efficiently with the instruments and equipments of the department in a responsible manner keeping them intact and clean.
D10- Modify his capability to describe, discuss and solve problems.
D11- Reflect on and assess his/her performance using various performance indicators and information sources.

Structure of the block

	Lectures	Practical	Small group discussions	Formative assessment	Revisions and Exams	Total
Contact Hours	31 hours	21 hours	11 hours	2 hours	-	65 hours
Credit	**1**	**0.7**	**0.36**	Formative assessment (point)+portfolio-based activities (points)= 4 points		

Learning Methods

1- Lectures for knowledge and intellectual skill outcomes.

2- Practical sessions to gain practical skills aided with the practical book.

3- Group discussion (GD) for the topics studied in lectures or related topics, including libraries, E learning (practical photographs and questions of different topics available online for student's assessments) and consulting professors for gathering information.

Methods of Student Assessment

1. Formative:

This is used to monitor student's learning to provide ongoing feedback that can be used by instructors to improve their teaching and by students to improve their learning. It's given once weekly, and the answers are presented and discussed immediately with you after the assessment.

2. Summative:

It is used to evaluate student's achievements at the end of an instructional unit. The grades tell whether the student achieved the learning goal or not.

The student's performance will be assessed according to the following:

Assessment task	Type of assessment	Proportion of total assessment	
		%	Marks
Mid-block exam	50% MCQ (best answer), 50% short answer questions, unlabeled diagrams, matching questions + structured short assay	20	18
Portfolio		10	9
Final written exam	50% MCQ (best answer), 50% short answer questions, unlabeled diagrams, matching questions + structured short assay	40	36
Practical		30	27
Total		100	90

Block evaluation

- Students' results
- Students' feedback
- Tutors' feedback

Lecture Topics and Intended Learning Outcomes

No.	ILOs	Lecture Titles	Week No.	ContBact Hours
1.	A1, A2, A3	1. Anatomy of the lymphatic system (anatomy) Haematology at a Glance Second Edition, 2005. P. 16 Handbook of Medical Sciences Second Edition, 2011. P 836 ELSEVIER'S INTEGRATED ANATOMY & EMBRYOLOGY 2007 p. 3, 4	1ST	2 hr.
2.	A4	2.lymphatic system (histology) Human Histology:AlanStevens,JamesS.Lowe. 3rd edition . Chapter8:Immune system Copyright © 2004	3rd	1hr
3.	A5	3. lymphatic system(histology). Human Histology:AlanStevens,James S.Lowe. 3rd edition. Chapter8:Immune system Copyright © 2004	3rd	2hr
4.	A6	4. Lymphatic system, spleen and innate immunity (physiology) The Human body in Health and disease Kevin T. Patton 6th edition. P. 417, 422, 423	2nd	2 hr
5.	A.7.1, A.7.2	5. Viral lymphadenitis(Microbiology) Lippincott's illustrated reviews , p. 197,198	3rd	1 hr
6.	A.8.1, A.8.2, A.8.3, A.8.4	6. Bacterial lymphadenitis, Blood related infections (Microbiology) Lippincott's illustrated reviews, p. 234 Elsevier's Integrated Review, p. 105-108 113, 115, 117, 119	1ST	2 hr
7.	A.9, A.10	7. Parasites of lymphatic and reiculoendothelial system; visceral leishmaniasis and lymphatic filariasis. (Parasitology)	1ST	2 hr
8.	A.11, A.12	8. Types of lymphadenitis and classification of lymphoid neoplasms (pathology). Elsevier's Integrated Pathology (2007), p. 274/ Hematologyat a Glance (second edition), p. 64	1ST	1 hr
9.	A.13	9. Types of Hodgkin lymphoma. (pathology). First AID for the Basic sciences organ systems (Third edition), p. 312, 313 &314	1ST	1 hr

10.	A.14	10. Types of Non- Hodgkin lymphoma. (pathology). First AID for the Basic sciences organ systems (Third edition), p. 315	3rd	2 hr

11.	A.15, A.16	11. Types of Non- Hodgkin lymphoma (continued). (pathology). First AID for the Basic sciences organ systems (Third edition), p. 316/ Hematologyat a Glance (second edition), p. 60&61.	3rd	1 hr
12.	A.17, A.18, A.19, A.20	12. Blood elements (histology). Human Histology:AlanStevens,JamesS.Lowe. 3rd edition . Chapter 7:Blood cells.	1st	1 hr
13.	A.21, A.22, A.23, A.24	13.Hematopoiesis (histology). Illustrated Interactive Q & A:Lippincott's Illustrated Q & A Review of Histology.Guiyun Zhang, Bruce A. Fenderson . Chapter 5 .Blood and Hematopoiesis	3rd	2 hr
14.	A.25	14. Hemoglobin (biochemistry). Oxford p. 138, 390, 580. / First Aid for the basic sciences P. 281, 304, 785	3rd	2hr
15.	A.26, A.27	15. Plasma and Red Blood cells (physiology). The Human body in Health and disease Kevin T. Patton 6th edition. P. 340, 343, 344	2nd	1 hr
16.	A.28, A.29	16. White blood cells (physiology). The Human body in Health and disease Kevin T. Patton 6th edition. P. 351-352	2nd	1 hr
17.	A.30, A.31	17. Platelets &Hemostasis (physiology). The Human body in Health and disease Kevin T. Patton 6th edition. P. 355	2nd	2hr
18.	A.32, A.33, A.34	18. Blood types (physiology). The Human body in Health and disease Kevin T. Patton 6th edition. P. 345-348	2nd	1 hr
19.	A.35, A.36	19.The human Malarial Parasites, Trypanosomes.	2nd	2 hr
20.	A.37	20. Anticoagulants (pharmacology).	3rd	2 hr
Revisions			3rdwk	
Exams			4rdwk	
Total				31 hrs

Practical Topics and Their Intended Learning Outcomes

No.	ILOs	Practical Topic	wks	hrs
1	C1, C2	Use the L.M and stained sections for the identification of different types of lymph tissues and organs as Thymus Lymph node and Spleen	1st	1 hr
2	C3, C4, C5, C6	Laboratory diagnosis of important etiologic agents of lymphadenitis	1st	2hrs
3	C7, C8	Tissue and Lymphatic System Parasites	1st	1hr
4	C9	Gross picture of lymphoma	1st	2hr
5	C10, C11, C12	Microscopic picture of reactive hyperplasia of the lymph node, HL, NHL and metastatic carcinoma in lymph node.	1st	2hr
6	C13, C14	Describe the cytological characteristics of different blood elements by examination of Blood film by H&E and Bone marrow smear by H&E	2nd	2hrs
7	C15, C16, C17, C18, C19	Different biochemical investigations evaluating iron state	2nd	2hrs
8	C20	Haemoglobin estimation and blood indices	2nd	2 hrs
9	C21	ESR	2nd	1hr
10	C22	Blood groups	2nd	1hr
11	C23	Bleeding time and coagulation time	2nd	1hr
12	C27, C28	Blood Parasites	2nd	1hr
14	C29	Anatomy of spleen and Great lymphatic vessel	1st	2hr
14	C30	Hematocrit value		1hr
Total				**21 hrs**

Group Discussion Topics

No.	ILOs	Topics	wks	hrs
1	B.5	Cases about viral and bacterial lymphadenitis	1st	2hrs
2	B.8, B.9	B-cell NHL, HL, Burkitt lymphoma	1st	2hr
3	B.10, B.11	Cases about histology of lymphatic system and blood elements	2nd	1hr
4	B.18	Porphyria, favism, iron deficiency anaemia, hemochromatosis	2nd	2hr
5	B.12, 13, 14, 15	Cases about disorders of blood elements	2nd	1hr
6	B. 7	Cases about parasites of lymphatic and blood parasites	2nd	1 hr
7	B. 19	Cases about anticoagulant drugs	2nd	2hrs
Total				**11 hrs**

Formative assessment

No.	Topics	wks	hrs
1	Quiz to evaluate topics of the 1st week	**1st**	**2hrs**

Blueprint of the block

No	List of topics	ILOS	Contact hours	Weight	Total marks	End of the block	Final written exam	Portfolio
1.	Anatomy of the lymphatic system	A1, A2, A3	**2 hr**	**6.4%**	**3.5**	**1**	**2.5**	
2.	Histology of lymphatic system	A4, A5	**2 hrs**	**6.4%**	**3.5**	**1**	**2.5**	
3.	Physiology of lymphatic system, spleen and innate immunity	A6	**1 hr**	**3.2%**	**1.5**	**0.5**	**1**	
4.	Viral lymphadenitis	A.7.1, A.7.2	**1 hr**	**3.2%**	**1.5**	**0.5**	**1**	
5.	Bacterial lymphadenitis, Blood related infections	A.8.1, A.8.2, A.8.3, A.8.4	**2 hr**	**6.4%**	**3.5**	**1**	**2.5**	
6.	Parasites of lymphatic and reiculoendothelial system; visceral leishmaniasis and lymphatic filariasis	A.9, A.10	**2 hr**	**6.4%**	**3.5**	**1**	**2.5**	
7.	Types of lymphadenitis and classification of lymphoid neoplasms	A.11, A.12	**2 hr**	**6.4%**	**3.5**	**1.5**	**2**	
8.	Types of Hodgkin lymphoma	A.13	**2 hr**	**6.4%**	**3.5**	**1**	**2.5**	

9.	Types of Non-Hodgkin	A.14, 15,16	**2 hrs**	**6.4%**	**3.5**	**1**	**2.5**	
	lymphoma							
10.	Blood elements	A.17, A.18, A.19, A.20	**2 hr**	**6.4%**	**3.5**	**1**	**2.5**	
11.	Hematopoiesis	A.21, A.22, A.23, A.24	**1 hr**	**3.3%**	**2**	**1**	**1**	
12.	Hemoglobin	A.25	**2 hr**	**6.4%**	**3.5**	**1.5**	**2**	
13.	Plasma and Red Blood cells	A.26, A.27	**2 hr**	**6.4%**	**3.5**	**2**	**1.5**	
14.	White blood cells	A.28, A.29	**1 hr**	**3.3%**	**2**	**-**	**2**	
15.	Platelets &Hemostasis	A.30, A.31	**1 hr**	**3.2%**	**1.5**	**-**	**1.5**	
16.	Blood types	A.32, A.33, A.34	**2 hr**	**6.4%**	**3.5**	**2**	**1.5**	
17.	The human Malarial Parasites, Trypanosomes	A.35, A.36	**2 hr**	**6.4%**	**3.5**	**2**	**1.5**	
18.	Anticoagulants	A.37	**2 hr**	**6.4%**	**3.5**	**-**	**3.5**	
			31hrs.	**100%**	**54 marks**	**20% 18 marks**	**40% 36 marks**	**10% 9 marks**

Study Resources

1. Lecture notes
2. Books:

- Haematology at a Glance Second Edition, 2005.
- Handbook of Medical Sciences Second Edition, 2011.
- Elsevier's integrated anatomy & embryology 2007
- Human Histology:Alan Stevens,JamesS.Lowe. 3rd edition . 2004
- The Human body in Health and disease. Kevin T. Patton 6th edition.
- Lippincott illustrated reviews: Integrated systems. Leeper-Woodford SK, Adkison LR. Wolters Kluwer. 2016.
- Elsevier's integrated review. Immunology & Microbiology. Actor JK. Elsevier Saunders.2nd edition. 2012.
- Elsevier's Integrated Pathology (2007)
- Illustrated Interactive Q & A:Lippincott's Illustrated Q & A Review of Histology.Guiyun Zhang, Bruce A. Fenderson .
- Oxford / First Aid for the basic sciences

Lecture Outlines

Lecture (1,2): Anatomy of the lymphatic system (Anatomy)

Objectives & contents:

By the end of the lecture the student will be able to:

1-Define the importance of the lymphatic system and describe its anatomical components and lymphoid organs (thymus, spleen, tonsils, and lymph nodes).

2-Explain what is lymph, its formation, and the direction of lymph flow.

3-Understand the anatomy of the major lymphatic ducts (thoracic duct and right lymphatic duct).

Lecture (3,12): Blood elements (Histology)

Objectives & contents:

By the end of the lecture the student will be able to:

Describe the cytological characteristics of each element (RBCs, WBCs, Platelets).

Lecture (4,5): Bacterial lymphadenitis, Blood related infections (Microbiology)

Objectives & contents:

By the end of the lecture the student will be able to:

1. Memorize the general features and major virulence factors of some important bacteria causing lymphadenitis.
2. Demonstrate laboratory diagnosis of some important bacteria causing lymphadenitis
3. List etiologies of bacteremia and septicemia
4. State the blood borne pathogens
5. Memorize infection causes of fever of unknown origin

Lecture (6,7): Parasites of lymphatic and reticulo-endothelial system(Parasitology)

Objectives& contents:

By the end of the lecture the student will be able to:

1. Visceral leishmanisis types, life cycle, epidemiology and specimen collection.
2. Pathophysiology and clinical presentation, diagnosis, treatment and prevention.
3. Types of lymphatic filariasis causative parasites, life cycle, epidemiology and specimen collection.
4. Pathophysiology and clinical presentation, diagnosis, treatment and prevention.

Lecture (8,9): Types of lymphadenitis and classification of lymphoidneoplasms (Pathology)

Objectives & contents:

By the end of the lecture the student will be able to:

1. Recognize the different types of lymphadenitis.
2. Classify the lymphoid neoplasms.

Lecture (10,11): Types of Hodgkin lymphoma

Objectives & contents:

By the end of the lecture the student will be able to:

1. Mention the subtypes of Hodgkin lymphoma.
2. Describe the different types of Hodgkin lymphoma with emphasis on clinical presentation, histopathologic features, immunophenotyping of Hodgkin giant cells and prognosis of Hodgkin lymphoma.

Lecture (13): Hematopoiesis (Histology)

Objectives & contents:

By the end of the lecture the student will be able to:

1- Mention the origin of the different blood elements

2-Differentiate between 2 types of bone marrow, red and yellow.

3- Describe the constituents of bone marrow.

4-Define the stages of red blood corpuscles (erythrocytes) development.

5- Define the stages of development of granular leucocytes.

6-Define the stages of development of non -granular leucocytes; monocytes and lymphocytes.

7- Define the stages of development of platelets.

Lecture (14,15):Plasma and Red Blood cells

Objectives & contents:

By the end of the lecture the student will be able to:

1-Mention functions of blood in general.

2- Clarify contents of plasma and functions of plasma proteins.

3- Demonstrate functions of Red blood cells and its haemoglobin content.

4- Factors affecting erythropoiesis.

Lecture (16): White blood cells (physiology)

Objectives & contents:

By the end of the lecture the student will be able to:

Mention different types of WBCs, normal count and demonstrate functions of each type.

Lecture (17): Lymphatic system, spleen and innate immunity(Physiology)

Objectives& contents:

By the end of the lecture the student will be able to:

1- To demonstrate functions of lymph nodes.

2- To understand different functions of spleen.

3- To demonstrate definition of immunity and the role of innate immunity.

Lecture (18): Platelets &Hemostasis (physiology)

Objectives & contents:

By the end of the lecture the student will be able to:

1- Demonstrate platelets and its normal platelet count and its functions

2- To understand hemostasis

3-To clarify extrinsic and intrinsic pathways

4- Demonstrate different clotting factors

Lecture (19): Blood types (Physiology)

Objectives& contents:

By the end of the lecture the student will be able to:

1- To understand different blood groups

2- To understand Rh factor and its role in blood typing.

3- Blood transfusion and effect of incompatible blood transfusion

Lecture (20,21): The human Malarial Parasites, Trypanosomes(Parasitology)

Objectives & contents:

By the end of the lecture the student will be able to:

1- Identify the types of malarial parasites.

2- Identify Life cycle epidemiology and specimen collection.

3- Identify pathophysiology and clinical presentation, diagnosis, treatment and prevention.

4- Identify types of trypanosomes.

5- Identify life cycle epidemiology and specimen collection

6- Identify pathophysiology and clinical presentation, diagnosis, treatment and prevention.

discontinue or avoid drug administration.

6. Know how to reverse the effects of anticoagulant drugs.
7. Understand the importance of anticoagulation in reducing morbidity and mortality in people with atrial fibrillation and venous thromboembolism.
8. Clarify the role of aspirin as antithrombotic drug in the prophylaxis of myocardial infarction, stroke and peripheral vascular thromboses.
9. Appreciate the importance of giving patients adequate information about their proposed therapy.

Lectures (22 & 23): Types of Non- Hodgkin lymphoma (Pathology)

Objectives & contents:

By the end of the lecture the student will be able to:

1- Describe a subset of Non-Hodgkin lymphomas that are clinically important as (Small Lymphocytic Lymphoma/ Chronic Lymphocytic Leukemia, follicular lymphoma, mantle cell lymphoma, Extra-nodal marginal zone lymphoma (MALT lymphoma), Diffuse large B cell lymphoma, Burkitt lymphoma, Acute lymphoblastic lymphoma/leukemia).

3- Describe the clinical staging of lymphomas.

Lecture (24,25): Hemoglobin (Biochemistry)

Objectives & contents:

By the end of the lecture the student will be able to:

1. Describe the biochemical structure of hemoglobin, List the different types and derivatives of hemoglobin.
2. List the steps of heme synthesis, determine the sites where they occur, describe the regulation of heme synthesis and disorders of heme synthesis.
3. Define HMP shunt, describe its regulation& list the products.
4. Define hemolytic anemia due to glucose-6-phosphate dehydrogenase deficiency (Favism).
5. List the different sources of iron, describe iron absorption and describe how iron is transported and stored in the body. Iron deficiency and iron overload.

Lectures (26 & 27): Pharmacology of anticoagulants

Objectives& contents:

By the end of the lecture the student will be able to:

1-Describe different types of anticoagulants.

2- Adverse effects and side effects of anticoagulants.

Lectures (28 & 29): Histology of lymphatic system

Objectives& contents:

By the end of the lecture the student will be able to:

1-Describe the structure of lymphatic organs; Primary as thymus gland Secondary as lymph node and spleen.

2- Define & classify lymphatic tissue; diffuse and nodular

Lecture (30): Viral lymphadenitis (Microbiology)

Objectives& contents:

By the end of the lecture the student will be able to:

1. List etiologies of lymphadenitis (viral, bacterial and fungal).
2. Memorize the general features and pathogenesis of viral lymphadenitis
3. Demonstrate laboratory diagnosis of some important viruses causing lymphadenitis.

Lectures	Anatomy	Physiology	Biochemistry	Histology	Pathology	Pharmacology	Parasitology	Microbiology	Total
Lecture (Hours)	2	7	2	5	6	2	4	3	31
Total Marks	3.5	12	3.5	9	10,5	3.5	7	5	54
Mid-Block	1	5	_	3	4	-	3	2	18
Final Block	2.5	7	3.5	6	6.5	3.5	4	3	36
Final mcq	2.5	2	3.5	-	-	3.5	4	3	18.5
Final written	-	5	-	6	6.5	-	-	-	17.5
الدور التانى									
Final mcq	3.5	5	3.5	-	-	3.5	7	5	27.5
Final written	-	7	-	9	10.5	-	-	-	26.5