

**AJK Medical College,
Muzaffarabad**

Study Guide

**Blood and Immunity (0103) Module
(1st Year)**



Duration: 2-Weeks

Starting on:

Pre-requisition: FM & CMB Module

DEPARTMENT OF MEDICAL EDUCATION

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Blood and Immunity Module Team

1	Prof. Dr. Sarosh Majid Salaria	Principal/Patron-in-Chief
2	Prof. Dr. Muhammad Ayub	Planner
3	Dr. Zahid Azeem	Coordinator
4.	Dr. Sarmad Latif Awan	DME
5	Prof. Dr. Muhammad Munir Sheikh	Member
6	Dr. Fauzia Hameed	Member
7	Dr. Mumtaz Khan	Member

Rationale of Module

Theme 1: Blood Components

Blood may be regarded as a unique organ in which the major constituents are within the circulation and permeate virtually every organ and tissue of the body. It acts as a portal for transport of respiratory gases, nutrients, hormones, etc. It helps in maintaining fluid and electrolyte, acid base balance and temperature regulation. Students should be familiar with the development of this system in the foetus as well so that the understanding of congenital disorders is unconstrained.

The diseases of blood encompass a wide spectrum ranging from anaemia, which is treatable as well as preventable to thalassemia and coagulation disorders, which are congenital and till recently untreatable. Anaemia is one of the commonest diseases in Pakistan as it affects a large proportion of children and women in all ages and stages of life. This preventable and treatable disease can be life threatening during pregnancy and delivery and hence the students of medicine should be well versed with the technology of prevention and management. The congenital coagulation disorders and thalassemia are not as common in Pakistan and till recently were considered untreatable however recent advances in their knowledge at cellular and molecular level are beginning to impact on diagnosis and treatment.

Diseases affecting any system of the body impart secondary influences on haematological parameters like haemoglobin (HB), erythrocyte sedimentation rate (ESR), white blood count (WBC) etc and blood is incriminated as a vehicle of infection in some major diseases like HIV/AIDS and has a prominent role to play in immunity. In addition sudden loss of blood through manic haemorrhage (e.g., during abortion, delivery or following trauma in road traffic accidents) constitutes a life-threatening condition in need of urgent attention including blood transfusion. This further enhances the importance of learning the science and art of blood. The assessment of blood and parameters is facilitated by ease of access to laboratories with facilities of blood and bone marrow examination.

It is important for students to know about the components of blood especially physiology and how physiology affects cellular biology and oxygen carriage. An understanding of blood components and its physiology will give the student an insight into disorders of blood production such as anaemia, sickle cell anaemia, thalassemia and polycythemia.

Iron deficiency anaemia is very common in women and children; 50% of women and 50–60% of children under 5 years of age are suffering from iron deficiency anaemia in Pakistan.

Theme 2: Reticulo-Endothelial (RE) System

The different organs of the body called reticuloendothelial (RE) system play an important role in the defence system of the body. The study of the structure and function RE organs (lymph nodes, thymus and spleen) and the various cells involved in the body defence mechanisms constitute an essential component of medical studies.

Theme 3: Coagulation System

Haematological disorders cover a wide spectrum ranging from anaemias and thalassemia to congenital coagulation disorders and acquired coagulation defects. The focus of this unit will be on the coagulation mechanism and its disorders.

Theme 4: Blood Groups and Transfusion

Blood may be regarded as a unique organ in which the major constituents are within the circulation and permeate virtually every organ in the body. There are many diseases that are

transmitted by blood transfusion or prick of needle contaminated with infected blood. Notable examples are HIV/AIDS (the epidemic of the century) and hepatitis B virus. The students should know how to guard against transmission of infection through blood so that they can not only prevent the spread but also educate the community.

At the same time the knowledge of blood groups and the effects of matched and mismatched blood transfusion is also essential for medical student. The need for studying blood transfusion had been mentioned in the earlier units. While learning the techniques, uses and complications of blood transfusion is also essential to understand the cultural and behavioural factors influencing donation and receiving of blood.

Theme 5: Immunity and Allergy

Our body has various mechanisms whereby it can protect itself from invading agents; one major mechanism of these is the immune response. Immune related disorders are an important aspect of medicine. The study of immunity and allergy is necessary to understand these disorders.

It is common knowledge that national and international efforts are being made to raise the immunity of the populations especially children through immunization programs. These programs have succeeded in either eradicating major killer diseases like small pox from the globe or curbing their spread and limiting their deleterious effects.

MODULE ORGANIZATION

LEARNING STRATEGIES

Module consists of themes, each based on learning objectives, the module will apply different modes of instruction briefly describe below. Major emphasis will be on Discussion, Analysis and deduction; All by the student and guided by faculty.

Entire Curriculum will be delivered by the clinical case scenarios, each related to a theme. Read the cases and learning objectives of the theme which you are supposed to encounter next day. Understand and explain the cases to yourself and read the relevant information. Following learning/teaching strategies will be employed to discuss the cases.

Small Group Discussion

Main bulk of the course content will be delivered in the small group sessions. Each theme has an associated case. The case will be the centre around which learning will take place. Depending upon the case you might be required to deduce objectives or learning issues. Every group will have a facilitator assigned to it. Small group discussions will be followed by a wrap up session.

Large Group Interactive Session

Large group instruction will be employed at time sparingly. Attend large group session to resolve queries, conceptual learning and to standardize learning of all groups.

Hands on Activities/Practical

Practical activities, linked with case, will take place.

Laboratory

Attend your schedule Lab and take advantage of the open times to continue study. Use your Labs to correlate text structures to actual specimens in Lab practice.

Self Directed Learning (SDL)

A few SDLs have been added in between to create an environment for you to search literature as well as to deduce and synthesize information from different sources to meet the learning objectives.

Directed Self-Learning (DSL)

A few DSLs have been added in the schedules to develop your targeted literature search and collection of the desired information from learning resources.

Journal Club Meeting

Few Journal Club meetings are also schedule in the module.

ASSESSMENT

In this, 2-week module, you will have surprise quizzes and formative assessments. Comprehensive written assessment (SAQ, MCQ) will be held at the end of the module: whereas, performance assessment (IPE) will be held at the end of the block. The marks obtained will contribute 30% towards the end of year professional Examination/summative assessment.

Table of Specifications (ToS)

Blood and Immunity

#	Themes	%
1	Components of Blood	25
2	Coagulation Systems	20
3	Blood Groups and Transfusion	15
4	Reticulo-Endothelial System	15
5	Immunity and Allergy	25
	Grand Total	100%

LEARNING OBJECTIVES

Theme 1: Blood Components

General Instructional Objectives

At the end of the unit the learners should be able to:

- understand the development of the haemopoietic system;
- recognise blood components;
- perform in the laboratory estimation of HB, WBC, RBC, and ESR in the blood and urobilinogen and other pigments in the urine;
- define anaemia and the different types of anaemia;
- describe the components of bone marrow and their role in haemopoiesis;
- comprehend the major congenital problems related to blood like, thalassemia, G6PD deficiency, etc;
- appreciate the role of educational, socio-economic and cultural factors as risk factors for anaemia.

Specific Instructional Objectives

The learners, by the end of this unit, will be able to:

- define blood and list its components;
- describe the microscopic structure and function of peripheral blood;
- mention development of haemopoietic system and changes occurring after birth;
- outline the mechanisms of production and destruction of RBCs;
- give a brief account of the different types of anaemias explain their pathophysiology and effects on circulatory and other systems;
- describe the mode of inheritance and main features of the inherited errors of RBC metabolism like thalassemia and sickle cell anaemia;
- perform the common laboratory tests for estimation of haemoglobin and other cellular components of blood;
- diagnose anaemia in a give patient with fairly typical symptoms and signs;
- explain the pathogenesis of leukaemia and state relevant laboratory tests for it and interpret their results.

Theme 2: Coagulation System

General Instructional Objective

By the end of this unit the students will understand coagulation system and its disorders.

Specific Instructional Objectives

By the end of the unit the students should be able to:

- explain normal clotting mechanism;
- describe the mechanism and physiological basis of common bleeding disorders;
- explain principles of anticoagulation;
- perform bleeding and clotting time laboratory tests;
- explain the phenomenon of intravascular anticoagulation (for the 1st year it should be based on blood clotting);
- list bleeding disorders such as hemophilia and other clotting factor deficiencies and describe how they are caused;
- describe the physiological basis of thrombo-embolic disorders;

- h) explain the physiological basis of anticoagulant therapy quoting few examples.

Theme 3: Blood Groups and Transfusion

General Instructional Objective

By the end of this unit the students should be able to appreciate different blood groups, serology, transfusion and the cultural factors associated with blood transfusion.

Specific Instructional Objectives

By the end of this unit the students should be able to:

- a) perform the laboratory test under supervision to identify different blood groups;
- b) give a brief account of ABO blood groups and Rh. Factor in medicine citing specific examples;
- c) list the hazards of blood transfusion;
- d) explain the mechanism of blood transfusion and prevention of known hazards;
- e) give his/her opinion on the roots and impact of the cultural attitude towards blood donation in Pakistan.

Theme 4: Reticulo-Endothelial (RE) System

General Instructional Objectives

By the end of this unit the students should understand the response of body to infection and know the components, functions and development of each organ of reticulo-endothelial system.

Specific Instructional Objectives

By the end of this unit the students should be able to:

- a) illustrate and describe the architecture of lymph-nodes;
 - b) depict and explain the structure and function of spleen, thymus and other glands;
 - c) depict and describe the structure and function of associated lymph-nodes;
 - d) explain the role of WBCs, in resistance against infection;
 - e) describe the role of monocytes, macrophages and defence system ;
 - f) illustrate structure and explain the function of reticulo-endothelial cells;
 - g) define inflammation, and describe the role of macrophages and neutrophils in inflammation;
 - h) draw and interpret the structure and function of eosinophils, and eosinophilia;
- explain the mechanism of leucopenia and leukaemia.

Theme 5: Immunity and Allergy

General Instructional Objectives

By the end of this unit the student should be able to understand the basics of immune system (innate and acquired), allergy and the role of lymphocytes. They should also be able to appreciate the role of immunization in the prevention and control of major diseases.

Specific Instructional Objectives

By the end of the unit the student should be able to:

- a) explain the mechanism of immunity and allergy;
- b) explain the role of lymphocytes in immunity;
- c) differentiate between cell-mediated and humoral immunity;
- d) describe the structure of antibodies and the their types;

- e) list different types of cells and describe their function in relation to organ transplant;
- f) describe the mode of action of the two types of vaccination, active and passive;
- g) give a brief account of immunizing agents, mode of administration and scheduling in the national immunization program viz. the expanded program of immunization (EPI);
- h) explain the pathogenesis of immuno-deficiency states giving examples especially of infections like HIV/AIDS and drugs

PBL-1

Scenario:

A 10-year-old boy was brought to the clinic with complaints of pallor, weight loss and easy fatigability. On examination he had normal temperature, pale conjunctiva, and nails, his heart rate was 125/min. There were no other abnormal findings.

His laboratory findings for the blood test were:

Hb: 7.5 gm% TLC: 7,000 DLC: High % of eosinophils

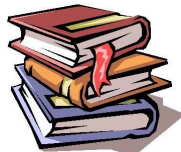
His stool examination revealed: Ova of Hookworms

PBL-2

Scenario:

Six years old Seema complains of fatigue for the past 2 weeks. In school she had a severe nosebleed for which she was brought to the hospital. She said that 3 weeks back she had some illness, which the doctor said, was viral infection. The doctor found her to be severely anaemic with petechiae over her trunk and extremities. The child's lab: studies show Hb 4 gm% with a total leukocyte count (TLC) 100,000/Cm³, and 80% of cells are atypical

Recommended Books



Last's Anatomy

KLM Text book of Clinically Oriented Anatomy

Textbook of Human Physiology

(Guyton and Hall)

Annual Review of Medical Physiology

(William F Ganong)

Biochemistry – Lippincott's Illustrated Reviews (6th edition)

(Champe, Harvey and Ferrier)

Harper's Illustrated Biochemistry

(Murray, Bender, Botham, Kennelly, Rodwell and Weil)

Wheater's Functional Histology

(Young, Lowe, Stevens and Heath)

DiFore atlas of histology

Caution!
Eighty percent (80%) attendance is mandatory to appear in Module/Professional/University Examination as per Pakistan Medical and Dental Council (PMDC) regulations.

AJK Medical College, Muzaffarabad

Blood & Immunity Module – Class (1st Year MBBS) Week-1

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8 – 10AM	CMB Module Written Assessment	<u>LGIS</u> Hemopoiesis-Red cell series Dr. Shakeel	<u>LGIS</u> Hemopoiesis-White cell series Dr. Shakeel	LGIS Blood groups Prof. Ayub	<u>LGIS</u> Anemias Prof. Ayub
10– 1030		<u>LGIS</u> Hemoglobin Synthesis and Metabolism Dr. Zahid	<u>LGIS</u> Functions of blood cells Dr. Ijaz Anwar	<u>LGIS</u> Coagulation pathways Dr. Fauzia	
10.30– 12:30			Tea Break		
12.30– 1:30	<u>LGIS</u> Introduction to module Dr. Ayub & Team	<u>SGD</u> Structure, function and Types of hemoglobins Team-2 <u>Wrap Up by Dr. Alam</u>	SGD Coagulation factors Team-2 <u>Wrap Up</u> Dr. Fouzia	<u>SGD</u> Plasma Proteins Team-2 <u>Wrap-up</u> Dr. Zahid Azeem	<u>LGIS</u> Hemoglobin Degradation Dr. Zahid Azeem
	<u>LGIS</u> Composition of blood Dr. Ayub	<u>PBL-1A</u> Dr. Fauzia & Team-2	<u>SDL</u>	LGIS Immunity Dr. Fauzia	PBL-1B Dr. Fauzia
1:30– 2:00P M	Lunch and Prayer Break				
2:00- 4:00P M	<u>Practical (Anatomy)</u> A: Physiology: (G.1; 1-33) B: Histology: (G.2; 34-66) C: Biochem: (G.3;67100)	<u>Practical (Anatomy)</u> A: Physiology: (G.1;1-33) B: Histology: (G.2; 34-66) C: Biochem. (G.3;67-100)	<u>Practical (Physiology)</u> A: Biochem: (G.1;1-33) B: Physio: (G.2; 34-66) C: Histology: (G.3;67-100)	<u>Practical (Physiology)</u> A: Histology: (G.1;1-33) B: Biochem: (G.2;34-66) C: Physio: (G.3;67-100)	DSL EPI in Pakistan

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Blood & Immunity Module – (1st Year)

Week-2

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8 – 10AM	<u>PBL-2A</u> Dr. Fauzia & Team-2	<u>LGIS</u> Transfusion reactions Dr. Malik Mehmood	<u>SGD</u> Types of Immunity Team-II	<u>LGIS</u> Histocompatibility Complexes-2 Dr Zahid	Islamic Studies
		<u>LGIS</u> Histocompatibility Complexes-1 Dr. Zahid	Warp-up Dr. Fauzia	<u>LGIS</u> Complement System Dr. Zahid	DSL Complement system
	Tea Break (10:00–10:30 AM)				
10.30–12:30	<u>LGIS</u> Immunoglobulin Structure and types Dr Zahid	<u>LGIS</u> Biochemical basis of Hemoglobinopathies Dr. Zahid	<u>SGD</u> Polycythemia Team 2 Wrap-up Prof. Ayub	SGD Organ transplant & rejection Team-II Warp-up Dr. Fauzia	PBL-2B Dr. Fauzia & Team-1 & 2
12.30–1:30	<u>LGIS</u> Thalasemia Dr. Manzoor	Skill Lab History and examination of anemic patients Drs. Javaid, Imtiaz, Munazzah			
	<u>LGIS</u> Hemoglobinopathies Dr. Malik Mehmood				
	Lunch and Prayer Break (1:30–2:00 PM)				
2:00-4:00P M	<u>Practical</u> A: Histology: (G.1; 1-33) B: Biochem: (G.2; 34-66) C: Physiology: (G.3; 67-100)	<u>Practical</u> A: Physio: (G.1; 1-33) B: Histo: (G.2;34-66) C: Biochem: (G.3;67-100)	<u>Practical</u> A: Biochem: (G.1; 1-33) B: Physio: (G.2; 34-66) C: Histo: (G.3; 67-100)	<u>Practical</u> A: Histology: (G.1; 1-33) B: Biochem: (G.2; 34-66) C: Physiology: (G.3; 67-100)	<u>Revision</u>



For Inquiries & Trouble Shooting
Please contact

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