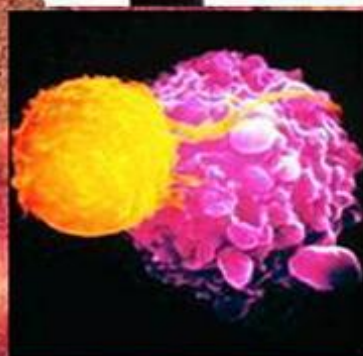


# BLOOD, LYMPH & IMMUNOLOGY

## MODULE

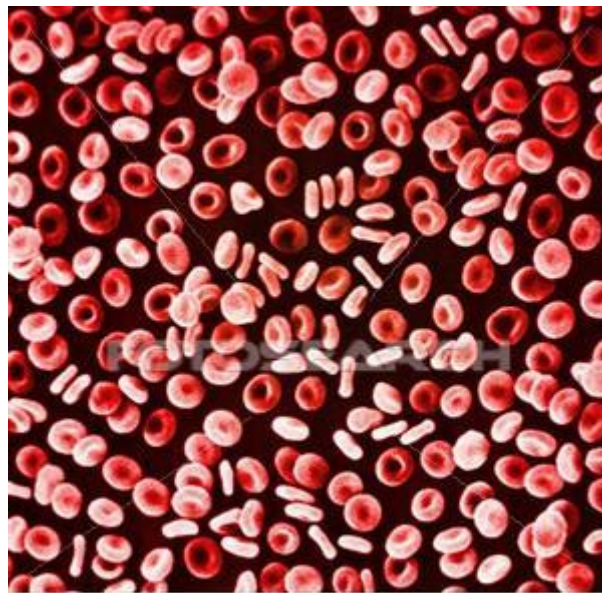
## PHASE II



FACULTY OF MEDICAL SCIENCES  
UNIVERSITY OF SRI JAYEWARDENEPURA

# **Blood, lymph and Immunology module**

## **Phase 11**



**Faculty of Medical Sciences**  
**University of Sri Jayewardenepura**  
**2009**

## **Blood, Lymph & Immune Module – Phase II**

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## **General introduction:**

Haematology is the study of blood and its diseases. “Haem” means blood, “ology” means the study of. Blood is composed of cells and fluid (plasma) which travels to each cell in the body through the circulatory system, carrying oxygen and bringing back waste products for removal through the lungs and the kidneys. Unlike any other organ, blood cells and plasma reflect disease processes in other organs as well. By testing these two components many diseases can be diagnosed. Therefore studying blood is like opening a book to all aspects of medicine.

Fluid which leaks out of the capillaries forming interstitial fluid gets back to the circulatory system through the lymph channels. Lymph consists of fluid and cells (lymphocytes). The lymph channels with the lymph glands consist of part of the immune system of the body. Blood, immune system and lymph is a closely related network. Studying it together gives you a better understanding of its functions.

Phase I module gave you knowledge about the normal structure, function, physiology and biochemistry of blood, immune and lymph systems.

Phase II will help you to understand how and when the normal physiology can change, how to detect these changes and what measures can be taken to correct it. This will enable you to link the laboratory aspects to the clinical aspects of haematology.

Haematology consists of learning about red cells and its diseases, white cells and its diseases, clotting of blood and its disorders. You may have heard the term “Blood is Life”. It is true. Letting out a lot of blood can cause death to a person. Giving blood can save a life. The study of giving blood is blood transfusion medicine. You will be learning quite a lot about transfusion medicine as it is essential in the fields of medicine, surgery, obstetrics and gynaecology, whichever you hope to pursue in the future.

## **Immunology:-**

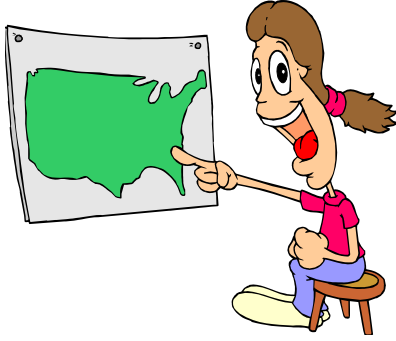
The immune system is a fascinating structure, which is a product of millions of years of evolution. The immune system may be viewed as the body's 'army', as it patrols to identify if the enemy has invaded (organisms), then alerts and trains the 'army' to go to the site where the enemy has invaded and to swiftly eliminate or control the enemy, using the most powerful and sophisticated weapons. At the same time it also ensures that all these functions are carried out quickly and efficiently, with the minimum of damage to the host.

One component of the immune system, the innate immune system, 'knows' how to combat a range of potential pathogens without being specifically notified or trained in advance (initial defense against the enemy, which is non specific). The adaptive immune system is more like the intelligence wing of the army, which analyzes the available evidence against the intruder, keeps records (memory) and deploys the best defense which is specific and are most efficient in getting rid of the enemy.

Although our immune system is remarkable in every sense, malfunctioning does occur. Sometimes it acts inappropriately against harmless invaders (hypersensitivity), and sometimes even against its own (autoimmunity). Unfortunately, Sometimes the whole system fails and is unable to protect against the enemy (immune deficiency).

In the immunology section of this module, we will be looking at the wonders of the immune system and what happens when things go wrong. We will also learn how we can manipulate our immune system in order to increase our survival and for the immune system to work better. (vaccination, drugs, transplantation).

**We hope you will enjoy this educational process that has been planned for you.**



## ***A Peep into what you will be learning.....***

### **Haematological malignancies**

A 10yr old boy was seen by a general practitioner with fever of 5 days duration, which was treated with antibiotics. As the fever continued, a government medical officer admitted him to the hospital with change of antibiotics. He developed severe joint pains and bone pain while in the ward.

His latest Full Blood Count showed,

White cell count - $70 \times 10^9/l$ , Lymphocytes-98%, Hb-6.2g/dl

Platelet count -  $70 \times 10^9/l$

Blood picture showed numerous blast cells with a comment of acute leukaemia

When the parents were told that it is a “blood cancer” he was immediately taken home against medical advice for other modes of treatment. One month later the child died of severe sepsis and bleeding without any specific therapy.

### **You will be learning:**

- The importance of a Full Blood Count and blood picture in a recurrent ongoing illness
- The differential diagnosis of a high white cell count.
- The pathogenesis, diagnosis and treatment of acute leukaemia
- The importance of explaining to the parents of the curable nature of the disease and the proper guidance towards therapy.
- The importance of family support, social support and how to find financial support in situations of this nature.

## **Transfusion Medicine**

A man was brought to the accident service following a road traffic accident. He had continuous mild bleeding from the wound and his haemoglobin was 9g/dl. Two units of packed red cells were transfused. 20mins following blood transfusion, patient developed fever, uneasiness, abdominal pain and passage of red coloured urine.

### **You will be learning:**

- When is a transfusion necessary?
- Why do transfusion reactions occur?
- The importance of pre transfusion compatibility testing
- How to minimize errors of pre transfusion compatibility testing
- How to deal with a transfusion reaction
- The Importance of screening donors for transfusion

## **Blood clotting and anticoagulation therapy**

60yr old man with atrial fibrillation, on a 'blood thinning' drug. He wants to know why he has to be on this drug for life.

### **You will be learning :**

- About the inherited and acquired causes of thrombophilia
- The prevention and treatment of thrombophilic conditions
- The laboratory basis of monitoring with PT/INR ,when on a 'blood thinning' drug.

## **Anaemias**

6yr old Nimal was on monthly blood transfusions for thalassemia major. The Paediatrician requested the Haematologist to screen the rest of the family. Full blood count was done with a blood picture and other relevant tests for the whole family. Nimal's 3yr old sister and his mother Shanthie were found to be "thalassemia carriers". Shanthie wishes to have another child since she has no hope for Nimal's survival to adulthood.

### **You will be learning about:**

- The importance of screening and detecting thalassemia carriers in preventing the birth of a thalassemia major child.
- Early diagnosis and management of Thalassemia major to prevent complications and have a normal life.
- Available laboratory methods to detect a thalassemia carrier patient.

## **Haemostasis and bleeding disorders**

50 yr old man was admitted to the casualty ward with prolonged bleeding from an accidental cut. Surgeons have excluded any local problem and a report from the hematology laboratory came as 'ABNORMAL'

### **You will be learning :**

- The normal haemostatic functions in arresting bleeding
- About the components necessary in normal haemostasis
- About the acquired and inherited bleeding disorders
- Steps and Principles of laboratory testing of a bleeder

### **Immune deficiency:**

Asela, 3 year old boy was admitted to the paediatric ward with clinical features suggestive of pneumonia of the right lower lobe. *Streptococcus pneumoniae* was isolated from his blood culture. He has had 3 previous episodes of otitis media and an episode of pneumonia. His right ear drum was now perforated and he has chronic otitis media. He was quite small for his age, with his height and weight below the 3<sup>rd</sup> centile. He had 2 older sisters who were well. Asela's uncle (mother's brother) had died at the age of 9 years due to a severe pneumonia.

As a primary immune deficiency was suspected, quantitative assessment of serum immunoglobulin levels were performed, which showed very low serum IgG levels. CD4, CD8 T cell numbers and function were normal. As all evidence pointed towards a B cell disorder, flowcytometry was performed to determine B cell numbers in the blood, which confirmed that he was suffering from a disorder known as X- linked agammaglobulinemia.

After confirming the diagnosis, the parents were counselled and educated for the need for vigorous antimicrobial treatment of all infections and to seek medical advice when the baby initially develops any signs of infection. He was scheduled to undergo lung function tests and high resolution CT scan to evaluate if the lung architecture was damaged. The recommended treatment for this condition is life long monthly passive immunization with pooled gamma globulins. However, due to the high cost of pooled gamma globulins, this treatment is given less frequently in Sri Lanka.



**You will be learning:**

- Aetiology and classification of immune deficiency disorders
- Different clinical presentations and when to suspect an immune deficiency disorder
- Defects in the immune system which give rise to common immune deficiency disorders
- Diagnosis
- Principles of management and long term prognosis

**Autoimmunity:**

Chathurika, a 18 year old school girl who was hoping to sit for her A' levels in a few months, presented to the medical clinic complaining of pain and swelling in the small joints of her hand for the past 8 weeks. She also said that she has been unusually tired lately and had swelling of her feet. She also complained of amenorrhoea for the past 4 months, but her main concern was the rash which had developed on her cheeks recently.

On examination, her conjunctiva was pale and her cervical and inguinal lymph nodes were enlarged. Based on the clinical features, systemic lupus erythematosus (SLE) was suspected. Her initial reports were as follows:

Hb: 9.5g/dl

WBC: 4,500 cells/mm<sup>3</sup> (Neutrophils 45%, lymphocytes 48%)

Platelets: 97,000

Liver function tests: normal

ESR: 45mm

Urine proteins: +

Based on the above reports, tests for detection of antinuclear antibody and anti-dsDNA were performed and both became positive. Her serum complement levels (C3 and C4) were low. She was commenced on NSAIDs, oral steroids and also referred to a nephrologist for specific treatment for her involvement of kidneys.

### **You will be learning**

- Aetiology and immunological mechanisms responsible for autoimmune disorders
- Principals of diagnosis and management of autoimmune disorders
- Clinical presentation, investigation and management of some common autoimmune disorders

### **Hypersensitivity:**

#### **Patient 1:**

Sewmini, a well looking 6 month old baby, presented to the well baby clinic for 6 month immunizations. Although she had weighed 3.2kg at birth her growth had faltered and her weight was now less than the 3<sup>rd</sup> centile. Formula feeds had been introduced at 4 months because the mother had to return to work. Since then the baby was irritable most of the time and was crying especially after feeds. Her stool habits had also changed and she was passing greenish coloured stools several times a day. She also vomited after many of the formula feeds. The stool full report was normal except for some pus cells and the stool culture had failed to grow any pathogenic organisms. Sewmini had also developed atopic dermatitis at the age of 3 months, but it had gradually worsened despite treatment. The parents had visited many doctors for treatment for her 'diarrhoea' and rash. They had tried introducing several types of food as they were worried about the lack of weight gain.

As the baby was otherwise healthy, cow's milk allergy was suspected. Skin prick tests for cow's milk allergens were carried out and were positive. The parents were educated about cow's milk allergy and were informed that the baby should avoid all dairy products. They were also reassured that allergy to cows milk was temporary and that most babies out grow it. When the baby was assessed after 2 weeks, her stools had become normal again and her atopic dermatitis had improved.

### **You will be learning:**

- Different clinical presentations of allergy in children
- The immunological mechanisms that are responsible for the development of allergy
- When to suspect allergy and diagnostic tests
- Principals of immediate and long term management

- Prognosis
- How things could have been better

**Patient 2:**

Dilshan, a demonstrator working at the Department of Pharmacology was brought to the Colombo South Teaching Hospital emergency treatment unit by his friends. He has attended a wedding of one of his batch mates and had suddenly fallen ill after eating a desert which contained tropical fruits and nuts. He was having difficulty in breathing and generalized urticaria. He could not speak and he indicated he was feeling dizzy. His blood pressure was 80/50 mmHg and he had widespread rhonchi throughout his lung fields. As food induced anaphylaxis was suspected, he was given intramuscular adrenaline, antihistamines and oxygen and recovered uneventfully.

However, as he had a severe life threatening reaction to a particular food allergen, he is likely to have a similar episode the next time he consumes the same allergen. As the allergen in the food was not identified, he underwent skin prick testing (in vivo allergy testing) to determine what he was allergic to. As the ingredients of the desert had contained cashew nut, mango, kiwi fruit and banana, he underwent skin prick testing for each of these. When he was tested with kiwi fruit a 15mm wheal developed on the site, whereas the other food elicited no reaction. Therefore, it was confirmed that he was allergic to kiwi fruit and was asked to avoid it.

**You will be learning**

- Different types of hypersensitivity reactions
- The immunological mechanisms that are responsible for the development of allergy and other hypersensitivity reactions
- Different clinical presentations of allergy
- Aetiology of allergic disorders
- When to suspect allergy and diagnostic tests
- Principals of immediate and long term management
- Prognosis

# General Objectives

## **Blood**

*At the end of the module the student should be able to-*

- Identify, initiate baseline investigations and arrive at a diagnosis of the **common and life threatening haematological disorders.**
- Have a basic knowledge of the less common haematological diseases.
- Be competent in transfusion medicine in order to request & administer blood / blood products, & manage a transfusion reaction.
- Have skills for venepuncture, collection of blood & interpretation of basic haematological tests.
- Be able to counsel
  - patients & family members of hereditary & life threatening haematological disorders.
  - potential blood donors.
- Be able to apply the knowledge gained in the prevention of nutritional anaemias in the community.

## **Lymphoreticular system**

*At the end of the module the student should be able to-*

- discuss the causes, pathogenesis, clinical presentation, diagnosis and management of diseases of the lymphoreticular system

## **Immunology**

*At the end of the module the student should be able to*

- Recall the functioning of the normal immune system.
- Understand in detail the components and effector functions of the innate immune system and adaptive immune system.
- Discuss the clinical manifestations, pathogenesis, laboratory diagnosis and principles of management of immunopathological diseases.
- Discuss the application of immunological principles in prevention of infective diseases.
- Apply the immunological principles to the prevention and management of complications of blood transfusions and organ transplantation.
- Outline recent developments in immunology as applicable to clinical medicine.

## **Broad content areas – Blood**

- Introduction to haematology
- Anaemias
  - Deficiency anaemias
  - Haemolytic anaemias
- Bone marrow failure
- Thrombocytopenia
- Coagulation & thrombotic disorders
- Myeloproliferative disorder
- Haematological malignancies
  - Leukaemias
  - Multiple Myeloma
- Transfusion medicine

## **Broad content areas – Lymphoreticular**

1. Recapitulation of function of lymphoreticular system.
2. Lymphatic filariasis.
3. Other causes of lymphoedema and lymphadenitis.
4. Lymphomas

## **Broad content areas – Immunology**

1. An overview of immune system
2. Innate immunity
3. Antigen and antigen presentation
4. Cell mediated immunity
5. Humoral immunity
6. Immune responses to microbes
7. Hypersensitivity
8. Autoimmunity
9. Immunodeficiency
10. Immunity to tumours
11. Drugs and the immune system
12. Immune regulation
13. Vaccination
14. Blood transfusion and transplant immunology

# Blood

**A – must know**

**B – good to know**

**C – nice to know**

	Intermediate Objectives	Content	Learning activity	Department	Time
<b>1</b>	<b>Introduction to Haematology</b> i. Recall the mechanisms of Haemopoiesis	a. Sites (A) b. Production (A) c. Regulatory factors d. Reticulocyte count and its clinical significance (A)	FiLM	Pathology	45 mts
	ii. Normal peripheral blood cells ▪ Recall phase-I contents. ▪ Discuss the formation and regulation of WBC, RBC & Platelets	a. Types (A) b. Functions (A) c. Concentrations (A) d. Life span (A) e. Identification on blood films / colour photographs (B)	CAL (Self directed learning)	Pathology	45 mts
	iii. Interpret basic tests in haematology	a. ESR (A) b. PCV (A) c. FBC report d. Red cell (A) indices report (A) e. Blood picture reports (A)	Practical with SGD	Pathology	45 mts
<b>2</b>	<b>Anaemia</b> i. <b>General approach</b> ▪ Define ▪ Classify ▪ Diagnose ▪ Principles of investigation treatment & prevention of anaemia	a. Definition (A) b. Classification (morphological & etiological) (A) c. General clinical features- (A) d. Complications common to all anaemias (A) e. Laboratory findings (A) f. Treatment (A)	Lecture	Pathology	45 mts

	<p><b>ii. Deficiency anaemias</b></p> <ul style="list-style-type: none"> <li>▪ Iron deficiency</li> <li>▪ B<sub>12</sub>/ folate deficiency</li> </ul> <p>Recall - metabolism Discuss causes, clinical features, lab diagnosis, management &amp; prevention</p>	<p>a) Causes (A) b) Clinical features (A) c) Lab features (A) d) Therapeutic trial (A) e) Management</p> <ul style="list-style-type: none"> <li>▪ Treatment of deficiency state (A)</li> <li>▪ Treatment of cause (A)</li> </ul>	<p><b>Lecture</b> <b>IDA</b> <b>CAL</b> (B<sub>12</sub>/folate deficiency)</p>	<p>Pathology  Pathology</p>	<p>45 mts  45mts</p>
	<p><b>iii. Haemolytic anaemia</b></p> <p><b>General aspects</b></p> <ul style="list-style-type: none"> <li>▪ Recognize the clinical presentation of Haemolytic anaemia.</li> <li>▪ Discuss the general principles of diagnosis &amp; investigation.</li> </ul>	<p>a. Definition (A) b. Classification (A) c. Clinical Presentation (A)</p> <ul style="list-style-type: none"> <li>▪ <b>Intra vascular haemolysis</b> (A)</li> <li>▪ <b>Extra vascular haemolysis</b> (A)</li> </ul> <p>d. Investigations for evidence of Haemolysis (A) e. Diagnosis</p>	<p>PBL – Jaundice &amp; Anaemia</p> <p>Anaemia with red urine</p>	<p>Path / Med</p>	<p>45 mts</p>
	<p><b>Common Haemolytic anaemias</b></p> <ul style="list-style-type: none"> <li>▪ Discuss briefly the principles of specific diagnosis of common Haemolytic disorders seen in clinical practice.</li> </ul>	<p>a. Hereditary spherocytosis (A) b. G6PD deficiency (A) c. Acquired HA (A) d. Thalassaemia &amp; abnormal Hb (A)</p> <ul style="list-style-type: none"> <li>▪ Pathogenesis</li> <li>▪ Diagnosis</li> <li>▪ Clinical</li> <li>▪ Laboratory</li> </ul>	<p>Lecture</p> <p>Lecture / video</p>	<p>Path</p> <p>Paed</p>	<p>45 mts</p> <p>45 mts</p>

3	<p><b>Pancytopenia</b></p> <ul style="list-style-type: none"> <li>▪ Define</li> <li>▪ List the causes of pancytopenia</li> <li>▪ Relate pancytopenia to organomegaly &amp; lymphadenopathy</li> <li>▪ Identify pancytopenia on FBC</li> </ul>	<p><b>.Pancytopenia (A)</b></p> <ul style="list-style-type: none"> <li>•Causes</li> <li>•Definition</li> </ul> <p><b>DD of pancytopenia with hepato – splenomegaly / lymphadenopathy (A)</b></p>	SGD	Path	45 mts
4	<p><b>Bone Marrow Failure (BMF)</b></p> <p><b>Aplastic anaemia</b></p> <ul style="list-style-type: none"> <li>▪ Define, classify, diagnose &amp; outline the management of apalastic anaemia.</li> </ul>	<p><b>BMF</b></p> <p>.Define &amp; List causes(A)</p> <ul style="list-style-type: none"> <li>•Aplastic anaemia (A)</li> <li>•Marrow infiltration (A)</li> <li>•MDS (C)</li> </ul> <p>a.Definition (A)</p> <p>b.Classification (A)</p> <p>c.Clinical features (A)</p> <p>d.Laboratory Investigations(A)</p> <p>e.Management (A) with emphasis on supportive care &amp; outline of specific treatment</p>	Lecture	Pathology	45 mts
5	<p><b>White cell abnormalities</b></p> <p>Identify abnormal WBC counts in blood reports &amp; outline the pathogenesis &amp; the clinical significance of these.</p>	<p>a.Leucoerythroblastic blood picture (A)</p> <p>b.Leucocytosis &amp; leucopenia (Neutropenia) (A)</p> <p>c.Myeloid &amp; lymphoid leukaemoid reactions (A)</p>	Tute- (Problem based discussion)	Path	45 mts
6	<p><b>Haematological malignancies - (1).Acute &amp; chronic leukaemias</b></p> <ul style="list-style-type: none"> <li>•Discuss briefly acute &amp; chronic leukaemias and outline the principles of management.</li> </ul>	<p>a.Definition (A)</p> <p>b.Classification (B) (list only)</p> <p>c.Pathogenesis (A)</p> <p>d.Diagnosis (A) (clinical &amp; lab)</p> <p>e.Management (B)</p>	Lecture Tute Problem Based discussion	Path / Oncology Path	45 mts x2  45 mts



	<p><b>ii. Multiple Myeloma</b></p> <ul style="list-style-type: none"> <li>• Define</li> <li>• List the causes of paraproteinaemias</li> <li>• Discuss pathology, diagnosis &amp; principles of treatment</li> </ul>	<p>a. Definition (A)</p> <p>b. List the causes of paraproteinaemias (A)</p> <p>c. Diagnostic criteria of Multiple Myeloma (A)</p> <p>d. Clinical features - (A) Symptoms, signs &amp; complications</p> <p>e. Management –</p> <ul style="list-style-type: none"> <li>• General (A)</li> <li>• Specific (B)</li> </ul>	Self directed learning Audio / Visual activity	pathology	45x2
7	<p><b>Polycythaemia</b></p> <ul style="list-style-type: none"> <li>• Discuss the diagnostic approach to a patient with polycythaemia</li> <li>• Discuss briefly Primary &amp; secondary polycythaemias</li> </ul> <p><b>Myeloproliferative disorders</b></p>	<p>a. Define (A)</p> <p>b. Classify (A)</p> <p>c. Differentiate (primary &amp; secondary) (A)</p> <p>d. Symptoms &amp; Signs (A)</p> <p>e. Diagnosis &amp; Management (A) (PRV), (ET), (MF) (B)</p>	CAL	Pathology	45 mts
8	<p><b>Haemostasis &amp; Thrombosis</b></p> <p><b>i. General aspects</b></p> <ul style="list-style-type: none"> <li>• Describe the haemostatic response to vessel wall injury</li> <li>• List the types of bleeding &amp; relate them to the cause.</li> </ul>	<p>a. Platelet &amp; vessel wall response (A)</p> <p>b. Coagulation cascade (A)</p> <p>c. Fibrinolysis (A)</p> <p>d. Naturally occurring anticoagulants (A)</p> <p>e. Mucosal and skin bleeds (A)</p> <p>f. Prolonged bleeding from cut wounds (A)</p> <p>g. Haemarthrosis (A)</p>	Lecture-	Path / Medicine	45 mts

	<p><b>ii. Tests of haemostatic function</b></p> <ul style="list-style-type: none"> <li>•Outline the principles of the above laboratory tests.</li> <li>•Select the test in relation to the type of bleeding</li> </ul>	<ul style="list-style-type: none"> <li>a. Bleeding time (A)</li> <li>b. Clotting time (A)</li> <li>c. Hess's test (A)</li> <li>d. PT (extrinsic pathway) (A)</li> <li>e. APTT (Intrinsic pathway) (A)</li> <li>f. TT (Final pathway) (A)</li> </ul>	Practical with SGD	Path	45 mts
	<p><b>iii. Thrombocytopenia</b></p> <ul style="list-style-type: none"> <li>•Define thrombocytopenia &amp; outline its causes</li> <li>•Discuss clinical manifestations and management</li> <li>•<b>Acquired immune thrombocytopenia</b> - Discuss the diagnosis &amp; management <b>ITP</b></li> </ul>	<ul style="list-style-type: none"> <li>•Isolated thrombocytopenia(A)</li> <li>•Thrombocytopenia associated with other cytopenias(A)</li> <li>b. ITP (A)</li> <li>•Definition ,Diagnosis ,Management</li> </ul>	<b>PBL-</b>	Path, Paed, Medicine	45 mts x2
	<p><b>iv. Coagulation disorders</b></p> <ul style="list-style-type: none"> <li>•Outline the classification.</li> <li>•<b>Hereditary coagulation disorders</b> - Describe the Pathogenesis Clinical presentation Complications Laboratory diagnosis, Management &amp; prevention of common hereditary coagulation disorders</li> </ul>	<p>Hereditary and acquired</p> <p>Hereditary</p> <ul style="list-style-type: none"> <li>a. Hemophilia A (A)</li> <li>b. Hemophilia B (A)</li> <li>c. Von Willebrands disease (A)</li> </ul>	Lecture -	Paed	45 mts
	<p><b>Acquired coagulation disorders</b></p> <ul style="list-style-type: none"> <li>• List causes</li> </ul>	<ul style="list-style-type: none"> <li>a. Vitamin K deficiency (A)</li> <li>b. Liver disease (A)</li> </ul>	Lecture	Path	45 mts

	· Discuss pathogenesis, clinical presentations, diagnosis (Laboratory & clinical) & management of acquired coagulation disorders	c.DIC (A)			
	<b>v.Thrombophilia</b> •Recognize clinical presentations •Outline the causes •Outline principles of anticoagulant therapy & laboratory control	a.Acquired thrombophilia (B) •Antiphospholipid syndrome. b.Hereditary (C) c.Anticoagulant therapy Warfarin Heparin	CAL	Pathology	45 mts
<b>9</b>	<b>Blood Transfusion</b> •Blood transfusion and transplant immunology. <b>i.Blood groups &amp; cross match</b> •Describe ABO, Rh blood group antigens and antibodies •Outline the minor blood group systems •Discuss the principles of selection of appropriate donor blood for transfusion	a.Principles of blood transfusion, organ transplant and transplant rejection (A) b.ABO, Rh (A) Minor blood group systems (B) c.Cross match technique (A) d.Antiglobulin test (A)	Lecture  Lecture  Practical x2 /Tute	Path  Path  Path	45 mts  45 mts  45x2 mts
	<b>ii.Complications of transfusion</b> Transfusion reactions List the transfusion reactions •Discuss the mechanisms, clinical features , laboratory diagnosis & baseline management of a transfusion reaction with emphasis on haemolytic transfusion reactions.  •Massive transfusion (B) . Transfusion transmitted diseases (B)	a.Mild, moderate & severe transfusion reactions (A)	Lecture-	Path/ Medi	45 mts

	<b>iii. Discuss donor selection, collection and storage of blood</b>	a. Donor selection criteria (A) b. Collection of blood (A) c. Storage & testing of donor blood (B)	To observe at National Blood Transfusion Service (NBTS)		45x3
	<b>iv. Blood components</b> Outline the basis of blood storage, process of issue & transport of blood & its products. <b>Preparation (C)</b>  <b>v. Rational use of blood products</b> Discuss the rationale of requesting for blood and blood products in routine and emergency situations.	• Whole blood • Packed red cells • FFP • Cryoprecipitate • Platelets  Clinical case discussions	To observe at National Blood Transfusion Service (NBTS)  SGD Problem based discussions	Path/ Medicine/ Surgery/Gyn & Obs	45 mts
	<b>Haemolytic disease of newborn (HDN)</b> <ul style="list-style-type: none"> <li>▪ Outline the pathogenesis, antenatal &amp; postnatal assessment &amp; the principles underlying the prevention &amp; treatment of HDN</li> <li>▪ List the criteria for exchange transfusion</li> </ul>		Seminar	Path/paed/G&O	45 x2 mts

	<b>LYMPHORETICULAR SYSTEM</b> Recall the basic structure and functions of a lymph node, thymus & spleen	•Recapitulation of anatomy & function of lymph nodes, thymus, spleen (B)	FLM - Phase 01 Blood, Lymph Module		
	Discuss the pathogenesis, clinical features, diagnosis, management, prevention & control of <b>lymphatic filariasis</b> in Sri Lanka	<i>Wuchereria bancrofti</i> (A) <i>Brugia malayi</i> (B) •Vector, life cycle, pathogenesis, clinical features •Diagnosis and identification of microfilariae of <i>Wuchereria bancrofti</i> and <i>Brugia malayi</i> in a thick blood film •Tropical pulmonary eosinophilia – pathogenesis, clinical features, diagnosis •Management (drugs) •Epidemiology and the filariasis control programme in Sri Lanka	04 Lectures 02 Tutes 01 Practical	Parasitology	
	•Discuss other causes of Lymphoedema & lymphadenitis	Acute (A) lymphangitis, lymphadenitis, developmental abnormalities (cystic hydroma, lymphangioma circumscripta) primary & secondary lymphoedema	01 Lecture –	Surgery	
	<b>Lymphomas</b> •Define •Classify (be aware only) •Briefly describe the histological features. •Discuss the clinical features. •Outline investigations, management & prognosis.	a.Definition (A) b.Classification (B) •Hodgkin's Lymphoma - Rye classification •Non Hodgkin's Lymphoma - WHO c.Relate different histological types to prognosis (B) d.Clinical features, investigations and management (A)	01 Lecture-	Path	

	<b>IMMUNOLOGY</b> Basics of immunology	Recapitulation of phase I immunology course contents and innate immunity (A)	FLM-	Micro	
	Antigen and antigen presentation	(a) The types of antigens recognized by T cells and B cells (A) (b) The necessity of antigen presentation to T cells (A) (c) The mechanisms by which antigen presentation occurs (B)	01 Lecture Micro		
	Cell mediated immunity	(a) Types of CD4+ T cells (A) (b) The effector functions of TH1 cells and TH2 cells (A) (c) The effector mechanisms and mechanisms of action of CD8+ T cells (A) (d) The role of regulatory T cells in immunity (B) and their mechanisms of action (c)	01 Lecture Micro		
	Humoral immunity	(a) Types of antibodies and their functions (A) (b) Effector functions of B cells (A) (c) T cell dependant and T cell independent B cell responses (B)	01 SGD (micro)		
	•Hypersensitivity •Types I, II, III, IV	a. Classification (A) b. Clinical presentation (A) c. Pathogenesis (A) d. Laboratory based investigation (A) e. Interpretation of results of laboratory based investigations (B) e. Principles of management of type I hypersensitivity (A)	01 Lecture 01 FLM (Micro)		
	Immunity to microbes	Innate and adaptive immune responses to a. Extracellular bacteria b. Intracellular bacteria c. Viruses	2 SGD Micro		

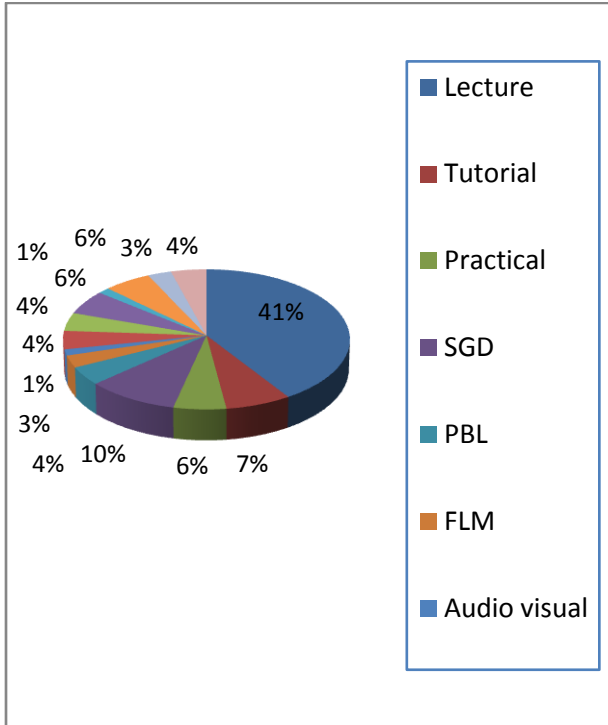
		d.Fungi e.parasites			
	Tumour immunology	a. The immune responses involved in eliminating tumors (A) b. The immune mechanisms involved elimination (B) c. Immunization as a method of treating tumors (C)	Lecture (Micro)		
	Immunizaiton	a.Immunological basis of immunization and types of vaccines. (A) b. Vaccination in EPI and non EPI (false contraindications, true contraindications, efficacy, route of administration, side effects.) c. visit to well baby clinic	Lecture - Micro Visit to well baby clinic - Paed Lecture - Com Med, Paed Log Book		
	Autoimmunity	A The immune mechanisms involved in the pathogenesis of autoimmune diseases (A) b: Laboratory based diagnosis Interpretation of laboratory based investigations (A) c. Principals of management (B)  Special emphasis on: SLE, Rheumatoid arthritis, Guillian barre, Myesthenia gravis with principles of management	01 lecture and 01 problem based discussion	Microbiology	
	Immune regulation	a. The mechanisms by which the immune system prevents autoimmunity (A) b.The cells involved in regulating the immune response (B)	01Lecture (Micro)		

	Drugs and the immune system	<ul style="list-style-type: none"> <li>a. drugs that affect the immune system (A)</li> <li>b. Their actions on the immune system (B)</li> <li>c. Monoclonal antibodies used in modern treatment (B)</li> </ul>	01 Lecture Pharmacology		
	Immunodeficiency	<ul style="list-style-type: none"> <li>a. Classification – primary (congenital), secondary (acquired)</li> <li>b. Aetiology</li> <li>c. Clinical features</li> <li>d. Immunopathological mechanisms of clinical features</li> <li>e. Laboratory based investigation</li> <li>f. Principals of management</li> </ul>	01 Lecture- Micro		
	Transplant immunology	Principles of organ transplant and transplant rejection	01 Lecture/ Micro		



# Pie Chart

## 4 week module



Activity	Number
Lecture s	29
Tutorial	5
Practical	4
SmallGroupDiscussion	7
ProblemBasedLearning	3
FixedLearningModule	2
Audio visual	1
ComputerAssitedLearning	3
Well baby clinic visit	3
NationalBloodTransfusionService visits	4
Seminars	1
Viva assessment	4
Self study	2
MCQ discussion	3

## Assessments

- **Formative assessments will be at the end of module in the form of vivas and MCQs**  
**The lectures and self assessments will be made available in the form of CDs for groups of students to borrow and view within the department premises**
- **Summative-** assessment at the end of the term as planned in curriculum

## Reading Material

- *Blood*
  - 1) Text book
    - Essential Haematology by A.V Hoffbrand + Petit  
4<sup>th</sup> edition/ Most recent edition
  - 2) Practicals
    - Practical Haematology by Daicic + Lewis  
10<sup>th</sup> edition
  - 3) For reference only
    - Postgraduates Haematology by A.V Hoffbrand

□ ***Lymphoreticular (Parasitology)***

1) Basic clinical parasitology by Harold .W. Brown, Franklin .A. Neva  
6<sup>th</sup> edition

2) Manson's Tropical Diseases by P.E.C. Manson – Bahr, D.R. Bell  
19<sup>th</sup> edition

3) Markell and Voge's Medical Parasitology by Edward K. Markell, David T. John, Wojeciech  
8<sup>th</sup> edition

□ ***Immunology (Microbiology)***

1) Basic clinical immunology by Daniel P. Stites' , ABBAS I. Tever, Tristnam G. Parslow

2) **Immunology** – Essentials of Clinical Immunology, 5<sup>th</sup> Edition  
> Helen Chapel, Mansel Haeney, Siraj Misbah, Neil Snowden

## Blood and Immunology Module: Total 4 weeks

### Week 1

Time	Monday	Tuesday	Wednesday	Thursday	Friday
1-1.45 p.m.	L: Haemopoiesis (Pathology)	L: Antigen and Antigen presentation (Microbiology)	L: Anaemia (Pathology)	L: Iron Deficiency anaemia (Path)	PBL: Haemolytic anaemia (Path)
1.45-2.30 p.m.	<b>Tute/Prac/SGD</b> B: Haemopoiesis tutorial I: Basics of Immunology (FLM) L: Function of the LN/Spleen (FLM)	<b>Tute/Prac/SGD</b> B: Peripheral blood (CAL) I: Humoral immunity and antibodies (SGD)  One group free	L: Lymph filariasis (Parasitology)	L: Cell mediated immunity (Microbiology)	PBL: Haemolytic anaemia (Path)
2.45-3.30 p.m.	<b>Tute/Prac/SGD</b> B: Haemopoiesis tutorial I: Basic of Immunology (FLM) L: Function of the LN/Spleen (FLM)	<b>Tute/Prac/SGD</b> B: Peripheral blood (CAL) I: Humoral immunity and antibodies (SGD)  One group free	L: Lymph filariasis (Parasitology)	B12 deficiency SGD (Path)	L: Hypersensitivity (Microbiology)
3.30-4.15 p.m.	<b>Tute/Prac/SGD</b> B: Haemopoiesis tutorial I: Basic of Immunology (FLM) L: Function of the LN/Spleen (FLM)	<b>Tute/Prac/SGD</b> B: Peripheral blood (CAL) I: Humoral immunity and antibodies (SGD)  One group free	L: Lymph filariasis (Parasitology)	B12 deficiency SGD (Path)	L: Haemolytic anaemia (Path)

## Week 2

Time	Monday	Tuesday	Wednesday	Thursday	Friday
1-1.45 p.m.	L: Autoimmunity (Microbiology)	L: Thalasseamia (Path)	L: Thalassaemia (Paed)	L: Immune deficiency (Microbiology)	L: Acute leukaemia (Path)
1.45-2.39 p.m.	<b>Tute/Prac/SGD</b> B: IDA (tutorial) I: Immunity to viruses (SGD) L: Filariasis (tutorial)	<b>Tute/Prac/SGD</b> B: Lab test (Practical) I: Hypersensitivity (CAL) L: Filariasis (tutorial)	Thalassemia (SGD) (Path)	L: Aplastic anaemia (Path)	PBD: White cell disorders (Path)
2.45-3.30 p.m.	<b>Tute/Prac/SGD</b> B: IDA (tutorial) I: Immunity to viruses (SGD) L: Filariasis (tutorial)	<b>Tute/Prac/SGD</b> B: Lab test (Practical) I: Hypersensitivity (CAL) L: Filariasis (tutorial)	Pancytopenia (SGD) (Path)	L: Tumour Immunology (Microbiology)	L: Transplantation (Microbiology)
3.30-4.15 p.m.	<b>Tute/Prac/SGD</b> B: IDA (tutorial) I: Immunity to viruses (SGD) L: Filariasis (tutorial)	<b>Tute/Prac/SGD</b> B: Lab test (Practical) I: Hypersensitivity (CAL) L: Filariasis (tutorial)	L: Immunization (Microbiology)	L: Drugs and the immune system (Pharmacology)	Self study

### Week 3

Time	Monday	Tuesday	Wednesday	Thursday	Friday
1-1.45 p.m.	L: Chronic leukaemia (Path)	L: Blood transfusion (Path)	Well baby clinic	Myeloma video/Lecture	NBTS
1.45-2.30 p.m.	<b>Tute/Prac/SGD</b> B: Leukaemia (PBD) I: Immunity to Bacteria and fungi (SGD) L: Filariasis practical	<b>Tute/Prac/SGD</b> B: Blood transfusion practical B: Complication of blood transfusion (SGD)	Well baby clinic	L: Transfusion medicine (Path)	NBTS
2.45-3.30 p.m.	<b>Tute/Prac/SGD</b> B: Leukaemia (PBD) I: Immunity to Bacteria and fungi (SGD) L: Filariasis practical	<b>Tute/Prac/SGD</b> B: Blood transfusion practical B: Complication of blood transfusion (SGD)	Well baby clinic	HDN Seminar	NBTS
3.30-4.15 p.m.	<b>Tute/Prac/SGD</b> B: Leukaemia (PBD) I: Immunity to Bacteria and fungi (SGD) L: Filariasis practical	<b>Tute/Prac/SGD</b> B: Blood transfusion practical B: Complication of blood transfusion (SGD)	Well baby clinic	HDN Seminar	NBTS

Week 4

Time	Monday	Tuesday	Wednesday	Thursday	Friday
1-1.45 p.m.	L: Haemostasis (Path)	L: Coagulation disorders (Paed)	L: Acquired coagulation disorders (Path)	Haematology MCQs	Viva assessments and feedback
1.45-2.30 p.m.	<b>Tute/Prac/SGD</b> B: tests for haemostatic function Practical/SGD B: Thrombocytopenia (PBL) I: Common autoimmune disorders (SGD)	<b>Tute/Prac/SGD</b> B: Polycythaemia (CAL) B: Thrombophilia (tute)	L: Lymphoma (Path)	Immunology MCQs	Viva assessments and feedback
2.45-3.30 p.m.	<b>Tute/Prac/SGD</b> B: tests for haemostatic function Practical/SGD B: Thrombocytopenia (PBL) I: Common autoimmune disorders (SGD)	<b>Tute/Prac/SGD</b> B: Polycythaemia (CAL) B: Thrombophilia (tute)	L: Lymphadenitis and lymphoma (surgery)	Lymph MCQs	Viva assessments and feedback
3.30-4.15 p.m.	<b>Tute/Prac/SGD</b> B: tests for haemostatic function Practical/SGD B: Thrombocytopenia I: Common autoimmune disorders (SGD)	<b>Tute/Prac/SGD</b> B: Polycythaemia (CAL) B: Thrombophilia (tute)	L: Immune regulation (Microbiology)	Self study	Viva assessments and feedback

- Please fill in the feed back forms given to you at different periods of your module and return it to the module chairperson/convenor
- A genuine feed is appreciated to improve the module

*Thank you*

