

Blood and Circulation Module - Year 1 Semester 1

1
Credits – 6

Duration: 05 Weeks (25 days)

Module code	Concept	Objectives	Time	Department	T/L activity
2008-1/1/SBM-3/1	Overview	Students should be able to understand the clinical relevance to structure and function	1 hr	Medicine and Surgery	LD
2008-1/1/SBM-3/2	Composition of blood a. Blood components	<ol style="list-style-type: none"> List the components of blood (RBC, WBC, platelets, plasma) and state their functions Describe the structure and function of red cells Identify the white cells. State functions in immunity and changes in infections State the composition of plasma including plasma proteins Recall the normal values and describe the basis of test for PCV, Hb, WBC/DC,ESR Calculate red cell indices, state their normal values 	5hrs	Physiology	2hr lectures 3hr PD
	b. Haemopoiesis	<ol style="list-style-type: none"> Describe the steps and factors affecting haemopoiesis State the sites of erythropoiesis from fetus to adult Describe the regulation of haemopoiesis 	1 hr	Biochemistry	Lecture
	c. Hemoglobin	<ol style="list-style-type: none"> Describe the basic structure of hemoglobin State the different types of hemoglobin and their functional significance Outline the synthesis of haem and its regulation 	1hr	Biochemistry	Lecture
	d. Nutritional factors affecting erythropoiesis (Iron, Folate and B ₁₂ metabolism)	<ol style="list-style-type: none"> Describe the role of iron, folate and B₁₂ in erythropoiesis State the effect of iron,folate & B₁₂ deficiency on red cell morphology, Hb content 	2hr	Biochemistry	Lecture
	e. Red cell metabolism & red	<ol style="list-style-type: none"> Describe the importance of HMP shunt 	2hr	Biochemistry	Lecture

	cell structure	<p>in the maintenance of the red cell membranes.</p> <p>2. Describe the metabolism and metabolic adaptations of red cells.</p>			
	f. Anaemia and polycythaemia	<p>1. Define the terms anaemia and polycythaemia and list the different types of anaemias.</p> <p>2. Recall how to calculate the red cell indices and state their normal values and variations in anaemias.</p> <p>3. Describe the effects of anaemia and polycythaemia on blood flow dynamics.</p> <p>4. Describe how anaemia affects the shape of oxyhaemoglobin curve, P_aO_2, S_aO_2</p> <p>5. Identify the laboratory tests used to diagnose the various types of anaemias</p> <p>6. Describe the biochemical changes in haemolytic anaemias</p> <p>7. State the fate of haemoglobin in intravascular haemolysis</p> <p>8. State the basis of identification of haemoglobinuria and haemoglobinaemia</p>	2hr	Physiology	Lecture
			2hr	Physiology	SGD
			4hr	CCR group	CCR
			1hr	Biochemistry	Lecture
	g. Abnormal Hb	<p>1. Describe the molecular basis of abnormal Hb</p> <p>2. List the types of abnormal Hb</p> <p>3. State the functional defects associated with abnormal Hb</p> <p>4. State the basis of identification of abnormal variants of Hb</p>	2hr	Biochemistry	lectures
			3hr		Practical
	h. Plasma proteins	<p>1. List the plasma proteins and give sites of formation and functions</p> <p>2. Explain the basis of electrophoresis</p> <p>Clinical focus: Use in clinical practice</p>	6 hrs	Biochemistry	3hrs Lectures
					3hrs Practical

2008-1/1/SBM-3/3	Hemostasis	<ol style="list-style-type: none"> 1. Describe the processes of haemostasis and fibrinolysis 2. Describe basis of tests of haemostasis 3. Describe the basis of bleeding disorders <p>Clinical focus: Thrombus, embolus</p>	5hr	Physiology	2 hrs Lectures 3 hrs PD
2008-1/1/SBM-3/4	Blood groups & transfusions	<p>Explain the basis of blood grouping, cross-matching and incompatibility</p> <p>Clinical focus: Transfusion; Transfusion reactions</p>	2hr	Physiology	Lecture
2008-1/1/CLM-3/1	Collection of blood Capillary/ venous/arterial	<ol style="list-style-type: none"> 1. Know the principles underlying venepuncture and arterial puncture 2. Perform venepuncture on a model 		Physiology	PD
2008-1/1/SBM-3/5	Surface marking	<ol style="list-style-type: none"> 1. State and demonstrate the bony land marks of the thorax 2. Demonstrate the surface markings of the heart and pericardium 	2hr	Anatomy	PD

2008-1/1/SBM-3/6	<p>Mediastinum and the heart</p> <p>a. Mediastinum</p> <p>b. Pericardium and Heart</p> <p>c. Development</p>	<ol style="list-style-type: none"> 1. Recall and identify the boundaries of the mediastinum and its divisions 2. Describe the structures in the different divisions of the mediastinum and state their relations <hr/> <ol style="list-style-type: none"> 3. Describe the arrangement of the pericardium 4. State the nerve supply of the pericardium 5. State the functions of the pericardium 6. State the clinical correlations of the pericardium 7. Describe the position of the heart and the great vessels in the mediastinum 8. Describe the internal and external appearance and structure of the heart(chambers, valves, ect) 9. Identify the cardiac silhouette and the parts of the heart and great vessels that contribute to the outline of it 10. Describe the conducting system of the heart 11. Describe the arrangement of the great vessels 12. Describe the relations of the heart and the great vessels 13. Describe the blood supply of the heart. 	<p>15 hrs</p> <p>1hr</p> <p>2hr</p>		<p>Dissections</p> <p>lecture</p> <p>2h SGD (body side tutorial)</p>
		<ol style="list-style-type: none"> 14. Describe the microscopic structure of the heart. 	1hr		Lecture PD
		<ol style="list-style-type: none"> 15. Describe the clinical correlations of the heart and great vessels 			

<p>2008-1/1/SBM-3/7</p>	<p>Heart as a pump</p> <p>a. Functional organization of the heart and circulation (going into details of functional anatomy)</p> <p>b. Cardiac muscle action potential and its spread through the heart</p> <p>c. Events of the cardiac cycle with pressure and volume changes in each chamber</p> <p>d. Heart sounds and basis of production of a murmur</p> <p>e. Basic principles of electrocardiography</p>	<p>16. Describe the development of the heart and blood vessels</p> <p>17. Describe the foetal circulation</p> <p>18. Describe the circulatory changes that occur at birth</p> <p>19. Describe the congenital anomalies of the heart and blood vessels</p> <p>1. Describe the properties of cardiac muscle; special adaptations in comparison with skeletal and smooth muscle</p> <p>2. Discuss special structural, contractile and electrical aspects of cardiac muscle in contrast to smooth and skeletal muscle</p> <p>3. Describe the conducting system of the heart</p> <p>4. Describe the origin and spread of the cardiac impulse.</p> <p>5. Describe the events and explain the pressure and volume changes in the cardiac cycle</p> <p>6. Explain how normal heart sounds are produced and their timing in relation to the cardiac cycle</p> <p>7. Explain the principles of electrocardiography</p>	<p>5 hrs</p> <p>9 hrs</p>	<p>Anatomy</p> <p>Physiology</p>	<p>Lectures</p> <p>7 hr Lectures</p> <p>2 hrs SGD on heart as a pump</p>
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	f. Changes in cardiac rate & rhythm, ECG	<ol style="list-style-type: none"> 1. Explain the physiological basis of arrhythmias 2. Describe Re entry phenomenon 3. Identify sinus tachycardia and bradycardia on an ECG strip. 4. Calculate heart rate on an ECG strip with regular and irregular rhythms 	1hr	Physiology	1hr Lecture
	g. Valvular defects and murmurs	<ol style="list-style-type: none"> 1. Explain how abnormal heart sounds are produced and their timing in relation to the cardiac cycle 2. Explain the changes in haemodynamics in valvular disease 	1hr	Physiology	Lecture
2008-1/1/CLM-3/2	Echocardiography	<ol style="list-style-type: none"> 1. Draw a typical ECG 2. Describe variations in health 3. Calculate heart rate in normal and abnormal ECG's 4. Identify arrhythmias 	3hr	Physiology	3hrs PD on ECG (1/3 of batch)
2008-1/1/SBM-3/8	Cardiac output and venous return	<ol style="list-style-type: none"> 1. Explain the terms: Cardiac output, Stroke volume EDV, ESV etc 2. State Starling's law of the heart and its relationship to stroke volume 3. Explain the term venous return, its relationship to stroke volume and discuss factors affecting it. 4. Explain the role of nervous system, hormones and body temperature in the control of cardiac function 5. Explain how cardiac output is regulated. 	9 hrs	Physiology Physiology CCR group	3hrs Lecture 2hrs SGD 4hrs CCR on cardio-vascular regulation

2008-1/1/SBM-3/9	Vascular tree a. General arrangement of the Arterial, venous and lymphatic circulations b. Aorta, pulmonary artery, superior and inferior vena cava	1. Describe the arrangement of the vascular tree. 2. Describe the structural features of the components of the vascular tree. 3. Correlate how the structural features of the vascular tree is adapted to perform its functions 4. Describe the extent, course, branches and immediate relations of the aorta, pulmonary artery, superior and inferior vena cava	1hr 3 hrs	Anatomy	1hr Lecture 3hrs Practical
		5. Describe the clinical correlations of the vascular tree	1hr		lecture
	Cross sectional anatomy	1. Identify structures in cross sections of the thorax in gross specimens 2. identify above structures in a cross sectional radiograph 3. understand the importance of cross sectional anatomy			

2008-1/1/SBM-3/10	<p>Flow dynamics Blood flow through the vascular tree</p> <p>a. Peripheral resistance and factors regulating blood flow b. Arterial blood pressure and variation of pressure throughout the vascular tree c. Systemic venous filling pressure and the jugular venous pressure changes d. Pre-load and after-load e. Microcirculation</p>	<ol style="list-style-type: none"> 1. State the factors affecting blood flow. 2. Explain the term peripheral resistance 3. Explain the nervous, mechanical, hormonal and local factors (endothelial) affecting peripheral resistance. 4. Explain the causation of arterial and venous pulsations with venous pressure waves 5. Explain the concept of systemic filling pressure and explain the factors affecting it 6. Define pre-load and after-load 7. Describe microcirculation with special reference to the structure of a typical capillary bed, pre and post- capillary sphincters, metarterioles, endarteries. 	3 hr	Physiology	3hrs Lectures
2008-1/1/CLM-3/3	<p>Examination of arterial and venous pulses</p>	<ol style="list-style-type: none"> i. Explain the basis of examination of the arterial and venous pulses ii. Examine arterial pulses at different sites. iii. Examine venous pulses 	3hrs	Physiology	3 hr practical
2008-1/1/SBM-3/11	<p>Role of the vascular endothelium in regulation of blood flow</p>	<ol style="list-style-type: none"> 1. State the functions of vascular endothelium 2. List vasodilators produced by Endothelial cells 3. List Endothelium-derived constrictors 4. State how NO is synthesised 5. State how the synthesis of NO is regulated 6. State the role of NO 7. Describe how of renin-angiotensin-aldosterone system functions in maintaining blood flow 8. State role of ACE inhibitors in the treatment of certain types of hypertension 	2hrs	Biochemistry	2hr LD

2008-1/1/SBM-3/12	<p>Blood pressure and its regulation</p> <p>a. Systolic and diastolic pressures, pulse pressure, mean arterial pressure</p> <p>b. Relationship between peripheral resistance, cardiac output and blood pressure</p> <p>c. Mechanisms of short term and long term regulation of blood pressure</p> <p>d. Effects of posture and gravity on blood pressure</p>	<ol style="list-style-type: none"> 1. Explain the terms systolic, diastolic, mean arterial and pulse pressure and their relationship to each other 2. Describe the relationship between peripheral resistance, cardiac output and blood pressure 3. Recall the normal range of arterial blood pressure and state variations with age, sex, posture emotions and exercise 4. Explain the mechanisms of short-term and long-term regulation of blood pressure 	4 hrs	Physiology	<p>2hrs Lectures</p> <p>2hrs SGD</p>
2008-1/1/CLM-3/4	<p>Measurement of blood pressure</p>	<ol style="list-style-type: none"> i. Explain the basis of blood pressure measurement. ii. Should be able to measure systolic and diastolic blood pressure 	3hrs		3hrs Practical on measurement of BP
2008-1/1/SBM-3/13	<p>Tissue fluids</p> <p>a. Formation of tissue fluid, fluid exchange</p> <p>b. Starling's forces</p> <p>c. Oedema – the basis of it's formation</p>	<ol style="list-style-type: none"> 1. Explain the process of tissue fluid formation in terms of Starling forces. 2. Discuss the factors causing oedema giving examples, and their clinical importance. 	2 hr	Physiology	Lecture

2008-1/1/CLM-3/5	Cardiovascular system examination a. Auscultation of the precordium and identification of normal heart sounds b. Demonstration of clinical examination of cardiovascular system	Examination of the cardiovascular system i. Explain the basis of examination of the cardiovascular system ii. Examine precordium Auscultate for normal heart Sounds and murmurs iii. be able to perform a complete cardiovascular examination	3hrs	Physiology	
2008-1/1/SBM-3/14	Circulation through special regions	Explain the special features of the following regional circulations with respect to their functions; a. Skin b. Splanchnic c. Renal d. Cerebral e. Muscle f. Hepatic g. Coronary	4 hrs	Physiology	Lectures
2008-1/1/CLM-3/6	Tests of Autonomic functions in relation to CVS	1. Explain the basis of the tests of autonomic function 2. Describe the Valsalva manoeuvre, the changes in physiological parameters and the basis for the changes 3. Should be able to perform the following tests of autonomic function I. Valsalva manoeuvre II. Deep breath test III. Test for orthostatic hypotension	2 hrs	Physiology	PD

2008 -1/1/CLM-3/4	Imaging	Correlate gross anatomy with imaging	1hr	Radiology	Lecture
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Blood & Circulation Module – (Year 1 Semester 1)

Module Summary

	Lectures (hrs)	PD (hrs)	Dissection (hrs)	CCR (hrs)	SGD (hrs)	Total (hrs)
Anatomy	9	5	15		2	31
Physiology	31	26		8	8	73
Biochemistry	14	6				20
Radiology	1					1
Medicine	1					1
Total	56	37	15	8	10	126

Names and the departments of the teachers involved in the teaching programme:

Dept. of Anatomy

Prof. M. Chandrasekera
 Dr Sanjaya Adikari
 Dr. Ajith Sominanda
 Dr. Himani Amarathunge
 Dr. Deepthi Nanayakkara
 Dr PCA Ratnatunge

Dept. of Biochemistry

Prof. R. Sivakanesan
 Dr. P.H.P. Fernando
 Dr. HKI Perera
 Dr. S.B.P. Athauda
 Dr. Shirani Ranasinghe

Dept. of Anaesthesiology

Dr. Vasanthi Pinto

Dept. of Physiology

Dr. Jayantha Rajaratne
 Dr. Vajira Weerasinghe
 Dr. Anula Kariyawasam
 Dr. Shamila Rajaratne
 Dr. Anoja Ariyasinghe
 Dr. P Dahanayake

Examination Format

Module	Credits	Total duration of examination	MCQ	SAQ	OSPE
Blood and Circulation	6	4	1	1 ½	1 ½