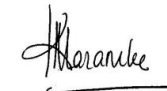


## Blood and Circulation Module

Module coordinator – Prof. NS Kalupahana

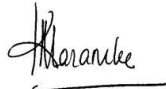
SBM + CLM -114 hrs

Module code	CONCEPT	Objectives	Time	Responsible Dept	T/L activity
2014-1/1/SBM-3/1	Overview	Students should be able to understand the clinical relevance to structure and function	1 hr	Medicine or Surgery	LD
2014-1/1/SBM-3/2	<b>Composition of blood</b> a. Blood components	<ol style="list-style-type: none"> <li>List the components of blood (RBC, WBC, platelets, plasma) and state their functions</li> <li>Describe the structure and function of red cells</li> <li>Identify the white cells. State functions in immunity and changes in infections</li> <li>State the composition of plasma including plasma proteins</li> <li>Recall the normal values and describe the basis of test for PCV, Hb, WBC/DC,ESR Calculate red cell indices, state their normal values</li> </ol>	5hr	Physiology	2hr lecture  3hr PD
	b. Haemopoiesis	<ol style="list-style-type: none"> <li>Describe the steps and factors affecting haemopoiesis</li> <li>State the sites of erythropoiesis from fetus to adult</li> <li>Describe the regulation of haemopoiesis</li> </ol>	1hr	Biochemistry	Lecture
	c. Hemoglobin	<ol style="list-style-type: none"> <li>Describe the basic structure of hemoglobin</li> <li>State the different types of hemoglobin and their functional significance</li> <li>Outline the synthesis of haem and its regulation</li> </ol>	1hr	Biochemistry	Lecture
	d. Nutritional factors affecting erythropoiesis (Iron, Folate and B <sub>12</sub> metabolism)	<ol style="list-style-type: none"> <li>Describe the role of iron, folate and B<sub>12</sub> in erythropoiesis</li> <li>State the effect of iron,folate &amp; B12 deficiency on red cell morphology, Hb content</li> </ol>	2hr	Biochemistry	Lecture



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	e. Red cell metabolism & red cell structure	<ol style="list-style-type: none"> <li>1. Describe the importance of HMP shunt in the maintenance of the red cell membranes.</li> <li>2. Describe the metabolism and metabolic adaptations of red cells.</li> </ol>	2hr	Biochemistry	Lecture
	f. Anaemia and polycythaemia	<ol style="list-style-type: none"> <li>1. Define the terms anaemia and polycythaemia and list the different types of anaemias.</li> <li>2. Recall how to calculate the red cell indices and state their normal values and variations in anaemias.</li> <li>3. Describe the effects of anaemia and polycythaemia on blood flow dynamics.</li> <li>4. Describe how anaemia affects the shape of oxyhaemoglobin curve, <math>P_aO_2</math>, <math>S_aO_2</math></li> <li>5. Identify the laboratory tests used to diagnose the various types of anaemias</li> <li>6. Describe the biochemical changes in haemolytic anaemias</li> <li>7. State the fate of haemoglobin in intravascular haemolysis</li> <li>8. State the basis of identification of haemoglobinuria and haemoglobinaemia</li> </ol>	1hr 2hr 4hr 1hr	Physiology CCR group Biochemistry	Lecture SGD CCR Lecture
	g. Abnormal Hb	<ol style="list-style-type: none"> <li>1. Describe the molecular basis of abnormal Hb</li> <li>2. List the types of abnormal Hb</li> <li>3. State the functional defects associated with abnormal Hb</li> <li>4. State the basis of identification of abnormal variants of Hb</li> </ol>	2hr 3hr	Biochemistry	lectures Practical
	h. Plasma proteins	<ol style="list-style-type: none"> <li>1. List the plasma proteins and give sites of formation and functions</li> <li>2. Explain the basis of electrophoresis</li> </ol> <p>Clinical focus: Use in clinical practice</p>	6 hrs	Biochemistry	3hrs Lectures 3hrs Practical




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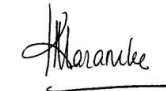
2014-1/1/SBM-3/3	Hemostasis	<ol style="list-style-type: none"> <li>1. Describe the processes of haemostasis and fibrinolysis</li> <li>2. Describe basis of tests of haemostasis</li> <li>3. Describe the basis of bleeding disorders</li> </ol> <p>Clinical focus: Thrombus, embolus</p>	5hr	Physiology	2 hrs Lectures  3 hrs PD
2014-1/1/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
2014-1/1/CLM-3/1	<b>Collection of blood</b> Capillary/ venous/arterial	<ol style="list-style-type: none"> <li>1. Know the principles underlying venepuncture and arterial puncture</li> <li>2. Perform venepuncture on a model or volunteer</li> </ol>		Physiology	PD
2014-1/1/SBM-3/5	<b>Surface marking</b>	Demonstrate the surface markings of the heart and pericardium	2hr	Anatomy	PD



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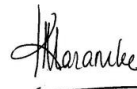
<p><b>2014-1/1/SBM-3/6</b></p>	<p>Mediastinum and the heart</p> <p>a. Mediastinum b. Pericardium and Heart c. Development</p>	<p>1. Recall and identify the boundaries of the mediastinum and its divisions 2. Describe the structures in the different divisions of the mediastinum and state their relations</p>	<p>1hr</p>	<p>Anatomy</p>	<p>lecture</p>
<p> Chairperson Curriculum Coordinating Committee Faculty of Medicine, University of Peradeniya</p>		<p>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>	<p>12 hrs  2hr</p>	<p>Anatomy</p>	<p>Dissections  2h SGD (body side tutorial)</p>
		<p>14. Describe the microscopic structure of the cardiac muscle and blood vessels and lymphatics 15. Describe the arrangement of the vascular tree. 16. Describe the arrangement of the lymphatic system 17. Correlate how the structural features of the vascular tree is adapted to perform its functions</p>	<p>1hr  2hr</p>	<p>Anatomy</p>	<p>Lecture  PD</p>
		<p>Describe the clinical correlations of the heart and great vessels</p>	<p>1hr</p>	<p>Anatomy</p>	<p>Lecture</p>

2014-1/1/SBM-3/7	Heart as a pump	<p>18 . Describe the development of the heart and blood vessels</p> <p>19. Describe the foetal circulation</p> <p>20. Describe the circulatory changes that occur at birth</p> <p>21. Describe the congenital anomalies of the heart and blood vessels</p>	5 hrs	Anatomy	Lecture
	<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>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>	9 hrs	Physiology	7 hr Lectures 2 hrs SGD



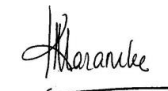
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	f. Changes in cardiac rate & rhythm,	<ol style="list-style-type: none"> <li>1. Explain the physiological basis of arrhythmias</li> <li>2. Describe Re entry phenomenon</li> <li>3. Identify sinus tachycardia and bradycardia on an ECG strip.</li> <li>4. Calculate heart rate on an ECG strip with regular and irregular rhythms</li> </ol>	2hr	Physiology	2 Lecture
	g. Valvular defects and murmurs	<ol style="list-style-type: none"> <li>1. Explain how abnormal heart sounds are produced and their timing in relation to the cardiac cycle</li> </ol>	1hr	Physiology	Lecture
2014-1/1/CLM-3/2	<b>Electrocardiography</b>	<ol style="list-style-type: none"> <li>1. Draw a typical ECG</li> <li>2. Describe variations in health &amp; in disease conditions</li> <li>3. Calculate heart rate in normal and abnormal ECG's</li> <li>4. Identify basic arrhythmias</li> </ol>	3hr	Physiology	3hrs PD
2014-1/1/SBM-3/8	<b>Cardiac output and venous return</b>  <ol style="list-style-type: none"> <li>a. Definitions and determinants</li> <li>b. Frank-Starling's law of the heart and relationship to stroke volume</li> <li>c. Autonomic nervous control of the heart</li> <li>d. Factors affecting cardiac output and venous return</li> <li>e. End diastolic and end systolic volumes their changes in different situations</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the terms: Cardiac output, Stroke volume EDV, ESV etc</li> <li>2. State Starling's law of the heart and its relationship to stroke volume</li> <li>3. Explain the term venous return, its relationship to stroke volume and discuss factors affecting it.</li> <li>4. Explain the role of nervous system, hormones and body temperature in the control of cardiac function</li> <li>5. Explain how cardiac output is regulated.</li> </ol>	8 hrs	Physiology	2hrs Lecture  2hrs SGD  4hrs CCR



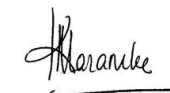
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2014-1/1/SBM-3/9	Cross sectional anatomy	<ol style="list-style-type: none"> <li>1. Identify structures in cross sections of the thorax in gross specimens</li> <li>2. identify above structures in a cross sectional radiograph</li> <li>3. understand the importance of cross sectional anatomy</li> </ol>		Anatomy	
2014-1/1/SBM-3/10	<p><b>Flow dynamics</b> <b>Blood flow through the vascular tree</b></p> <ol style="list-style-type: none"> <li>a. Peripheral resistance and factors regulating blood flow</li> <li>b. Arterial blood pressure and variation of pressure throughout the vascular tree</li> <li>c. Jugular venous pressure changes</li> <li>d. Pre-load and after-load</li> <li>e. Microcirculation</li> </ol>	<ol style="list-style-type: none"> <li>1. State the factors affecting blood flow.</li> <li>2. Explain the term peripheral resistance</li> <li>3. Explain the nervous, mechanical, hormonal and local factors (endothelial) affecting peripheral resistance.</li> <li>4. Explain the causation of arterial and venous pulsations with venous pressure waves</li> <li>5. Define pre-load and after-load</li> <li>6. Describe microcirculation with special reference to the structure of a typical capillary bed, pre and post- capillary sphincters, metarterioles, endarteries.</li> </ol>	2 hr	Physiology	Lectures
2014-1/1/CLM-3/3	<b>Examination of arterial and venous pulses</b>	<ol style="list-style-type: none"> <li>i. Explain the basis of examination of the arterial and venous pulses</li> <li>ii. Examine arterial pulses at different sites.</li> <li>iii. Examine venous pulses</li> </ol>	2hr	Physiology	2 hr practical



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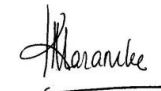
2014-1/1/SBM-3/11	<b>Role of the vascular endothelium in regulation of blood flow</b>	<ol style="list-style-type: none"> <li>1. State the functions of vascular endothelium</li> <li>2. List vasodilators produced by Endothelial cells</li> <li>3. List Endothelium-derived constrictors</li> <li>4. State how NO is synthesised</li> <li>5. State how the synthesis of NO is regulated</li> <li>6. State the role of NO</li> <li>7. Describe how of renin-angiotensin-aldosterone system functions in maintaining blood flow</li> <li>8. State role of ACE inhibitors in the treatment of certain types of hypertension</li> </ol>	2hr	Biochemistry	2hr LD
2014-1/1/SBM-3/12	<b>Blood pressure and its regulation</b>  a. Systolic and diastolic pressures, pulse pressure, mean arterial pressure b. Relationship between peripheral resistance, cardiac output and blood pressure c. Mechanisms of short term and long term regulation of blood pressure d. Effects of posture and gravity on blood pressure	<ol style="list-style-type: none"> <li>1. Explain the terms systolic, diastolic, mean arterial and pulse pressure and their relationship to each other</li> <li>2. Describe the relationship between peripheral resistance, cardiac output and blood pressure</li> <li>3. Recall the normal range of arterial blood pressure and state variations with age, sex, posture emotions and exercise</li> <li>4. Explain the mechanisms of short-term and long-term regulation of blood pressure</li> </ol>	4hr	Physiology	2hrs Lectures  2hrs SGD
2014-1/1/CLM-3/4	<b>Measurement of blood pressure</b>	<ol style="list-style-type: none"> <li>i. Explain the basis of blood pressure measurement.</li> <li>ii. Should be able to measure systolic and diastolic blood pressure</li> </ol>	2hr	Physiology	PD



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2014-1/1/SBM-3/13	<b>Tissue fluids</b> a. Formation of tissue fluid, fluid exchange b. Starling's forces c. Oedema – the basis of it's formation	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.	2hr	Physiology	Lecture
2014-1/1/CLM-3/5	<b>Cardiovascular system examination</b> a. Demonstration of clinical examination of the cardiovascular system b. Auscultation of the precordium and identification of normal heart sounds	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	3hr	Physiology	PD
2014-1/1/SBM-3/14	<b>Circulation through special regions</b>	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	3hr	Physiology	Lecture



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2014-1/1/CLM-3/6	<b>Tests of Autonomic functions in relation to CVS</b>	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	1hr  2hr	Physiology	lecture  PD
2014 -1/1/CLM-3/4	<b>Imaging</b>	Correlate gross anatomy with imaging	1hr	Radiology (Dr BH)	Lecture

Revised in June 2014



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