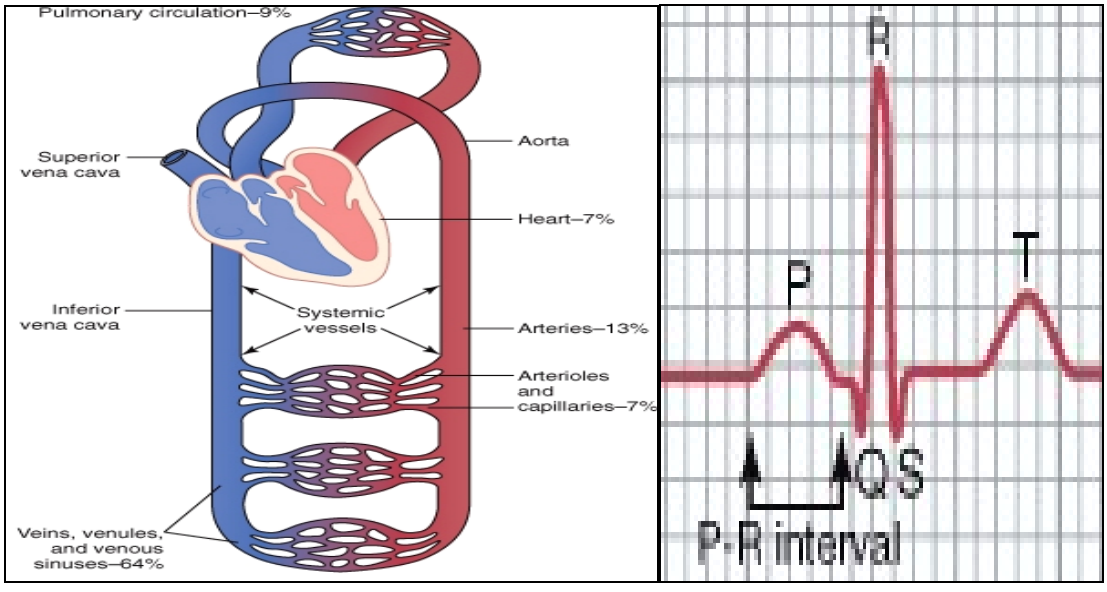
AJK Medical College

Muzaffarabad, AJK, Pakistan

STUDY GUIDE
CARDIOVASCULAR SYSTEM
1st Year MBBS



Department of Medical Education

CONTENTS

CVS Module Team

1. Prof. Jamshed Ali (Principal/Patron)
2. Prof. Dr. Muhammad Ayub (Planner)
3. Dr. Asad Bilal (Coordinator)
4. Prof. Dr. Javed Akhtar Rathore (Member)
5. Dr. Zahid Azeem (Member)
6. Dr. Ijaz Anwar (Member)

INTRODUCTION

Cardiovascular System (CVS) module is an ideal blend of basic and clinical sciences. CVS is an important system of the body and cardiovascular diseases are among the most common cause of death in developing and developed countries. Hence, a good understanding of this important system will help you a lot in your future clinical training years. Be alert and try to learn as much as possible during this period of 5-weeks.

This module has been integrated around cardiovascular system with relevant concepts, principles and skills from anatomy, physiology, biochemistry, embryology, pathophysiology and general medicine. The course has been structured as an integrated study of the human cardiovascular system. It provides instruction into the mechanisms of operation of the human cardiovascular system and the skills needed to evaluate them. Emphasis is placed on the integration of relevant principles with respect to the behaviour of normal circulation and its responses to stress and disease.

Cardiovascular module core content includes five themes and clinical cases have been developed to create clinical relevance to whatever is being learned in the sessions.

Your time table will guide you through the module and will also tell you about the learning strategy being used during that very session.

2.2 Goals:

- To provide a road-map for integrated learning of normal structure and function of the organs, constituting the cardiovascular system.
- To provide scientific basis for the understanding of symptomatology of selected cardiovascular disorders as a foundation for future clinical training.

2.3 Learning outcomes

By the end of the module the learner will be able to:

Knowledge:

- Describe the normal structure and function of the different parts of the heart, the aorta and large elastic arteries, arterioles and capillaries; venules, veins, and lymphatics, and understands haemodynamics.
- Recognise and identifies the changes in structure and/or functioning of the cardiovascular system in the selected common diseases: Rheumatic heart disease, Palpitation, ischemic heart disease, congenital heart disease, peripheral vascular diseases, hypertension, heart failure, and shock

Skills:

- Identify normal and abnormal findings in the heart and blood vessels on gross, microscopic and radiologic examination
- Perform general physical examination of the CVS and recognize abnormalities in common disorders
- Examine the peripheral pulses
- Examine JVP
- Record blood pressure
- Record and recognise normal ECGs
- Recognise normal heart sounds on physical examination

Attitude:

- Advocates lifestyle modification for prevention and control of heart diseases, and psycho-social impact on individual and community level due to ever increasing morbidity and mortality associated with cardiovascular disorders.

2.4 Teaching Strategy

The content of this module will be delivered by a combination of different teaching strategies. These include small group discussions (SGD), large group interactive sessions (LGIS), demonstrations in dissection hall, lab practical and clinical skill sessions at skill lab. Moreover, you will be given a group project which will be assessed at the end of the block.

2.5 Organization of Module

Organization

The module consists of five themes, each based on a real life situation. The module will employ different modes of instruction, briefly described below. Major emphasis will be on discussion, analysis and deductions; all by the students and guided by the faculty.

2.6 Content Delivery

Entire curriculum will be delivered by clinical case scenarios each covering a theme. Read the cases and the objectives of the theme which you are supposed to encounter next day, understand and explain the case 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 small group sessions. Each theme has an associated case. The case will be the centre around which learning will take place. Depending on the case you might be required to deduce objectives and learning issues OR only learning issues. Every group will have a facilitator assigned to it. The facilitator will be there to keep you on track, giving you maximum liberty to discuss and achieve the objectives as a group. Small groups in some cases may be followed by a wrap up session. Rest of the information will be there in the schedule.

Large group

Large group instruction will be employed at times sparingly. Attend large group sessions with the following focus

a. Identify important points
b. Ask questions of points not well understood in the text
c. Measure your learning comprehension

Videos

Dissection videos, video demonstrations on history taking and clinical examination on diseases like angina will be shown to give you an idea into the disease process, testing and practical aspect of communicating with the patients.

Hands-on Activities/Practical

PBL related practical activities, linked with cases, will take place.

Lab: Attend your scheduled lab and take advantage of open times to continue to study. Use your labs to correlate text structures to actual specimens in lab practice.

Self Directed Learning and Directed Self Learning

A few SDLs/DSLs 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. It will also help in breaking the monotonous/strenuous schedule and make you life- long learner.

2.7 Assessment

In this 5-weeks duration module, you will have surprise quizzes and intermittent short tests. A full-fledged formative assessment will be taken at the middle of module. This will give you an idea about the format of the examination that you will go through at the end of the module. Of course, this will be followed by feedback on your performance in the exam.

Comprehensive end of module exam will comprise of:

Marks obtained in the module examination will contribute 30% (internal assessment) towards end of year Professional University Examination.

2.8 Recommended Icons

 Introduction to case

 For Objectives

 This Icon will refer to critical questions

 This Icon will refer to Lab sessions

 This Icon will refer to resource material

 This Icon will refer to key words

THEMES

1. **Chest pain on exertion**
2. **Child with abnormal heart sounds**
3. **Fever with Joint Pains**
4. **Breathlessness with Pedal Swelling/Cold Clammy Extremities**
5. **Hypertension**

LEARNING OBJECTIVES:

1.1. Theme Central Chest Pain

Knowledge

- Describe topographic anatomy of the heart, pericardium, and coronary arteries and of great vessels of mediastinum.
- Relate coronary circulation (regulation) in physiological (normal, exercise) and patho-physiological conditions (ischemic heart disease).
- Enumerate the salient features of chest pain related to IHD.
- Relate conducting system of the heart with CAD.
- Interpret the ECG changes in relation to ischemic changes in the heart.
- Define, classify and correlate lipid metabolism with ischemia.
- Correlate biochemical markers of myocardial injury with time duration.
- Describe epidemiology and the natural history of cardiac diseases
- Enumerate risk factors for the CVS diseases. Compare and contrast risk amongst various population groups and developed and developing countries
- Describe the lifestyle and dietary modifications for prevention of CVS diseases and importance of primary and secondary prevention in this regard

Skills & Attitude:

- Demonstrate surface anatomy of the heart, pericardium and great vessels of mediastinum.
- Identify the coronary arteries and the areas supplied by them (cadaver/specimen/diagram).
- Estimate sugar, and cholesterol level from given blood sample.
- Take history and physical examination of CVS.
- Record and interpret normal ECG (waves, intervals, segments).
- Identify the various anatomical structures of CVS visualized by different imaging modalities (X- Ray Chest, Echocardiography, angiography)
- Perform BLS
- Demonstrate professional attitude when dealing with patients, ethics of Breaking Bad News

Theme-2: Child with abnormal heart sounds

Knowledge:

- Compare between the normal and abnormal cardiac development.
- Differentiate between the foetal circulation and circulation after birth.

Skills:

- Take history of a patient with congenital heart disease from the parents to differentiate between cyanotic and acyanotic defects.
- Identify various congenital cardiac anomalies on pictures/images.

Attitude:

- To develop awareness about risk factors causing CHD: genetic/iatrogenic/ infections

Theme-3: Fever with Joint Pains

Knowledge:

- Compare the action potential of cardiac muscles and conducting tissues.
- Draw and label the conductive system of heart (Revisit)
- Relate heart rate and rhythm in physiological (normal, exercise) and pathophysiological conditions (tachy-, brady- arrhythmias) (Revisit)

Skills & Attitude:

- Palpate radial pulse and note its rate, rhythm, volume, character.
- Calculate rate and identify rhythm on ECG

Theme-4: Breathlessness with Pedal Swelling

Knowledge

- Relate mechanical events of heart during a cardiac cycle with electrical events.
- Relate the cardiac output with different physiological and patho-physiological states (heart failure)
- Associate Starling's Forces with oedema formation
- Compare different types of heart failure (systolic and diastolic)
- Explain the pathophysiology of heart failure
- Compare cardiogenic shock with other types of shock
- Relate beta fatty acid oxidation with energy supply of heart
- Describe the synthesis of Citidine Tri-Phosphate (CTP) with respect to endorgonic and exorgonic reaction

Skills & Attitude:

- Identify histological section of various tissues of heart, arteries, veins and lymphatics
- Identify the signs of heart failure and cardiac silhouette on X- Ray chest and measure cardiothoracic ratio
- Measure the JVP and identify different wave forms
- Identify the cardiac chambers and valves on 2D Echocardiogram

Theme-5 (Hypertension)

Knowledge

- Relate the development of vascular system with their anomalies and effects
- Compare and contrast the structure and function of arteries, veins and capillaries
- Define blood pressure and explain physiological and pathophysiological aspects of blood pressure regulation
- Describe the Renin Angiotensin Activating System (RAAS)
- Describe determinants and factors contributing towards hypertension and cardiac diseases with emphasis on the primordial prevention

Skills & Attitudes

- Recording blood pressure, physiological and pathological variations of blood pressure
- Measure paediatric blood pressure
- Identify histological sections of arteries, veins and capillaries

- Mark surface anatomy of major peripheral vessels
- Counsel a simulated patient for primary and secondary hypertension and its complications
- Recommend nutritional and lifestyle changes Dietary Approaches to Stop Hypertension (DASH) diet

Please note that the PBL in this book and that actually given to you may be quite different looking as new PBLs and Case Scenarios are introduced as a continuous process of module development.

Central Chest Pain

Mr. Sheereen Gul, a middle aged businessman from Peshawar was visiting Muzaffarabad. After a heavy meal at a well-known restaurant, he walked briskly to join his fellows to board their transport. He fell short of breath and developed chest pain radiating to inner aspect of his left arm. The pain reduced on stopping.

He was taken to Casualty Department of SKBZH. On arrival, his pulse rate was 95/minute, blood pressure was 80/50 mmHg and he had pallor on face and cold sweat. The heart sounds were normal on auscultation. His chest X-ray (PA view) showed cardiomegaly. He informed the doctor that he was taking medication for hypertension.

Mr. Gul was admitted to CCU and given supportive therapy. His Electrocardiogram showed ST-elevation in all leads. Troponin-I (cardiac marker) was raised in blood. His coronary angiography next morning showed narrowing of 3 coronary arteries.

Critical questions:

1. What are the possible causes of pain in this case?
2. Why do you think this is cardiac pain?
3. Chest pain with radiation to the neck or arm is a 'characteristic' symptom of Acute Myocardial Infarction (AMI) in many patients; explain why the pain can be felt in these distant regions.
4. What lab tests will you request for this patient immediately? What additional studies might be appropriate? Justify your answer.
5. What is the rationale for measuring cardiac biochemical markers? What is the time course for changes in each cardiac enzyme following acute myocardial infarction (AMI)?
6. Enlist risk factors for this patient. How would you relate dyslipidemia as major risk factor for IHD?
7. Which mechanisms cause an acute myocardial infarction (AMI) considering changes in coronary artery?
8. What physiological mechanisms lead to tachycardia, tachypnea, and hypotension in this case?
9. How does lipid metabolism affect the vascular system?
10. How will you identify ischemic changes on ECG comparing with normal tracing?
11. How are the changes in the 12-lead ECG associated with infarctions in the following regions: inferior, antero-septal, anterior, and posterior?
12. What is the electrophysiological basis for ST-depression and ST-elevation?
13. How do AMI differ between men and women?
14. How might people with diabetes present differently?

Child with Abnormal Heart Sounds

A young couple brought their 1st baby 'Guddoo' aged 3 months to Paediatrics Department of AIMS with a complaint of his cheeks occasionally becoming blue on crying and difficulty in feeding on mother's breast. The mother told that she often feels his heart beat thrilling his chest wall when she puts him on her chest.

On examination it was apparently a healthy baby with no visible congenital defects. His abdomen was soft and no viscera were palpable, chest was clear on clinical examination and he had normal growth landmarks. His pulse was 128 per minute, respiratory rate 45 per minute and blood pressure was 80/35 mmHg. His apex beat was palpable in the 5th intercostals space in mid-clavicular line. There was systolic thrill at left upper sternal edge. There was systolic murmur audible on auscultation in addition to 1st and 2nd heart sound.

His echocardiography revealed a ventricular septal defect and slight right ventricular hepertrophy.

There was no family history of such condition. The baby was born as a normal vaginal delivery at full term.

Critical Questions:

1. What are the possible causes of tachypnea in a child of this age?
2. What made you think it is a congenital heart disease?
3. Why the child was having cyanosis?
4. What has gone wrong in cardiac development in this case?
5. What are the changes occurring in circulation after birth?

Fever with Joint Pains

Asghar, a 16-year-old boy was brought to medical OPD with high grade fever and painful swelling of right knee joint for the last 3 days. He gives history of having a very bad sore throat 5 years ago when he had high grade fever, body aches and pains and cough.

Family history was unremarkable. He belonged to low-middle socioeconomic class.

On examination he was having temperature 39 °C, pulse 100/min, BP 100/70 mmHg. His right knee was hot, tender on touch, and slightly swollen.

Systemic examination revealed mildly enlarged tonsils, normal GIT, and clinically clear chest. He had mid-diestolic murmur over the mitral area with early diastolic murmur down the left sternal edge.

On X-ray chest he had slightly enlarged heart. Echocardiography showed enlarged left atrium, and mitral stenosis with moderate regurgitation, and mild aortic regurgitation.

X-Ray of the right knee joint showed increase in the joint space compared to left knee.

His TLC was 7,400/mm^3, with 60% Neutrophils, 38% Lymphocytes, 2% Eosinophils, and ESR 95 mm at the end of 1st hour.

Urine analysis was within normal limits. Blood ASO Titre was raised.

Critical Questions:

1. How are the normal Heart sounds produced?
2. What is the pathophysiological basis of murmurs and added sounds?
3. What hemodynamic changes can occur in patient suffering from valvular heart disease?
4. How will you differentiate systole from diastole on auscultation?

Breathlessness with Pedal Swelling

Nizam Din Wani, a 55-year-old man has been experiencing progressive shortness of breath with exertion for about past 1 year. At first he tried to ignore his symptoms but they have not subsided creating uncomfort for the last 4 weeks. His dyspnoea is worse on walking upstairs. For the past few days he has also noticed palpitation, and orthopnoea. Now he has shortness of breath at rest also and swelling around the ankles and on feet. He is on medication for hypertension.

He is a farmer by profession, and is a heavy smoker for the last 35 years, and not allergic to anything in his knowledge.

On examination his temperature was normal, pulse was 110/min, BP 160/90 mmHg. His JVP was raised, so was the end-capillary wedge pressure, and there were bilateral pedal pitting oedema. His apex beat is in the 7th intercostals space in the anterior axillary line. His heart sounds are normal and there are no added sounds. There are bilateral basal crackles on auscultation. He has enlarged liver palpable 3 fingers below the right costal margin. His X-Ray chest shows cardiomegaly and bat-wing appearance in lung fields.

Critical questions

1. What are the probable causes of dyspnea in this patient?
2. What is the primary mechanism for the fluid overload in heart failure?
3. Why are systolic and diastolic arterial pressures abnormal? Why is resting heart rate so high?
4. What is ejection fraction and what is a normal range of values? Does stroke volume always have to be reduced when ejection fraction is low?
5. What causes ventricular dilation in response to systolic dysfunction?
6. What is pulmonary capillary wedge pressure, what does it measure, and what is the significance of an elevated value?
7. What can cause pulmonary artery pressure to become elevated? What are the long-term consequences of pulmonary hypertension on right ventricular function?
8. How can an elevated left atrial pressure lead to pulmonary edema? Also, describe the gross and microscopic changes in pulmonary edema.
9. Accurately draw a normal ventricular pressure-volume loop. Explain why the pressure-volume loop is altered in this patient.
10. What is the difference between afterload (systolic) and preload (diastolic) failure in terms of underlying mechanisms and their effects on ventricular function? Illustrate the functional differences using pressure-volume loops.

High Blood Pressure

Khawaja Raees Ahmed, a 43-year-old businessman presented to a clinic to have his blood pressure checked. He had his blood pressure checked a week ago at a local clinic and it was 190/110 mmHg. Subsequent blood pressure readings were 170/105, 180/100, and 160/90 mmHg over the last 3 days. He has been in good health and describes no symptoms at this time. His blood pressure has been elevated on a few occasions in the past, but later his blood pressure was normal. He has not had his blood pressure checked in 2–3 years.

Khawaja Sahib has a sedentary life style and has an increased salt intake. His late father died because of a sudden heart attack. His elder brother is a known case of hypertension and diabetes and is taking medication for it.

On examination, he was afebrile, his pulse was 72/min, BP was 190/110 mmHg, Respiratory rate was 16/min. His weight was 110 Kg, height was 1.83 m. He had a normal light reflex. Fundoscopy revealed sharp disc margins and spontaneous venous pulsation, AV nipping and silver wiring.

He had slightly enlarged heart size on chest x-ray. Rest of the systems were normal.

Critical questions

1. What are the causes of elevated blood pressure? What will be the effect of hypertension on vascular endothelium?
2. What is the relationship between cardiac output, systemic vascular resistance, and arterial blood pressure?
3. How do you relate the role of the kidney in regulating arterial pressure?
4. For Khawaja Sahib, list and discuss non-modifiable risk factors and modifiable risk factors related to his primary diagnosis.
5. Calculate Mr. Khawaja's body mass index (BMI).

Leg Pain on Walking

Chaudhry Muhammad Akbar, 60 year old, shopkeeper at Ambor reported to AIMS with pain in left calf after a brief walk. The pain subsided on stopping and resting. He was a known case of hypertension and diabetes, and suffered a minor heart attack 1 year ego. He was on medication after the heart attack.

On examination he was an obese man with pulse 65/min, BP 160/100 mmHg, carotid bruit present on left side. He had no palpable left popliteal artery and weakly palpable right one. Dorsal pedis and posterior tibial arteries were not palpable on both sides.

Based on medical history and physical examination, the doctor referred him for a Magnetic Resonance Angiogram of the lower limb arteries.

Critical questions

1. What is the probable cause of calf pain in this patient?
2. Why does the pain stop on resting?
3. What could be the risk factor for the past heart attack in this particular patient?
4. What is carotid bruit?
5. Why are some peripheral blood vessels masked on palpation?
6. What results of Angiogram do you expect?

Earthquake Disaster

On 8th October 2005 the teaching session in AJK University was going on. At 8:52 AM there was an earth which jolted the whole area. The ceiling of the lecture hall fell on the class and the students and the teacher were buried under it. The rescue team of volunteer doctors and civil defence reached the scene after 30 minutes and started rescue operation. Besides many casualties, there were a number of injured people recovered.

Nabeel, a 20-year-old boy was recovered from under a fallen pillar. He had his left foot crushed under the garbage, almost detached from the leg. He was frankly bleeding, semi-unconscious, and having cold sweat on the forehead.

On examination only carotid pulses were palpable. On auscultation his heart rate was 130/min, respiration was 24/min, and BP was not recordable. He was bleeding from his crushed left foot. Fortunately there was no other injury to the rest of his body except a bruise on the left shoulder.

The doctor with the help of volunteers tied a string as tourniquet on the left lower limb above the crushed area, shifted him to a wooden plaque used as a stretcher, and raised the foot-end of the plaque. The doctor kept the tourniquet visible and the patient was rushed to a nearby rescue camp set in the ground of collapsed CMH.

Immediately he was transfused whole blood, his left foot was amputated, the injured area was repaired, and he was managed in the tented hospital.

Critical questions

1. What was the cause of Nabeel being semi-unconscious and having tachycardia with BP and pulses not recordable?
2. Where is the location of carotid pulse?
3. Why did the doctor apply a string tourniquet?
4. Why should the tourniquet be visible?
5. Why did the doctor raise the foot-end of the stretcher?
6. Why was Nabeel transfused?

LIST OF PBLs

PBL-1

Child with Abnormal Heart Sounds

A young couple brought their 1st baby named Khalid alias 'Guddoo' aged 3 months to Paediatrics Department of AIMS with a complaint of his cheeks occasionally becoming blue on crying and difficulty in feeding on mother's breast. The mother told that she often feels his heart beat thrilling his chest wall when she puts him on her chest.

On examination it was apparently a healthy baby with no visible congenital defects. His abdomen was soft and no viscera were palpable, chest was clear on clinical examination and he had normal growth landmarks. His pulse was 128 per minute, respiratory rate 45 per minute and blood pressure was 80/35 mmHg. His apex beat was palpable in the 5th intercostals space in mid-clavicular line. There was systolic thrill at left upper sternal edge. There was systolic murmur audible on auscultation in addition to 1st and 2nd heart sound.

His chest x-ray showed a boot-shaped heart. Echocardiography revealed a ventricular septal defect and right ventricular hepertrophy.

There is no family history of such condition. The baby was born as a normal vaginal delivery at full term.

PBL-2

Central Chest Pain

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PBL-3

High Blood Pressure

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PBL-4

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CVS Module–1st Year MBBS

Week 1					
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
8:00 – 9:00	**RES Module Written Assessment** (Time: 8:00-11:00)	**IPA Block-2**	**LGIS** Anatomy of Heart & great visuals **Dr. Asad Bilal**	**LGIS** Action potential in cardiac muscle **Prof. M. Ayub**	**LGIS** Coronary circulation **Prof. Ghuncha**
9:00 – 10:00			**LGIS** Properties of Cardiac Muscles **Dr. Ijaz Anwar**	**LGIS** Development of Heart tube & Congenital Anomalies **Prof. Ghuncha**	**LGIS** Lipoproteins chemistry **Dr Zahid Azeem/Dr.Nayab**
10:00- 10:15			**Break 10:00 to 10: 15**		
10:15-11:15	Introduction to CVS Module **Prof. Ayub & Module Team**		**Dissection** Mediastinum, Heart & great visuals **Dr. Asad Bilal & Team-1**	**PBL-1B** **Prof. Ayub & Team-2**	**Practical** A: Histology of Myocardium B: Cholesterol estimation C: Examination of the Hear
11:15-12:15	**PBL-1A** **Prof. Ayub & Team-2**		**Practical** B: Histology of Myocardium C: Cholesterol estimation A: Examination of the Heart	**Practical** C: Histology of Myocardium A: Cholesterol estimation B: Examination of the Heart	
12:15-1:00					**JUMA PRAYERS**
1:00 – 1:45					
1:00-1:30	**Prayers**				
1:30-4:00	**DSL**	**DSL**	**DSL**	**DSL**	**DSL** Ischemic Heart Disease

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CVS Module–1st Year MBBS

Week 2					
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
8:00 – 9:00	**LGIS** Fetal circulation & physiological changes at birth **Prof. Ayub/Dr. Ijaz Anwar**	**SGD** Congenital anomalies/ Congenital Heart Disease **Team-1**		**LGIS** Conductive system of the heart **Dr. Ayub**	**Pak- Studies**
9:00-10:00	**LGIS** Current of Injury **Dr. Babar Bilal**	**LGIS** Lipotrim Metabolism **Dr. Zahid Azeem**	**LGIS** Shock **Prof. Ayub**		**Islamic Studies**
Break 10:00 to 10: 15					
10:15 - 11:15	**SGD** Physiological basis of ECG **Team-2** **Wrap-up: Dr. Ijaz Anwar**	**LGIS** Cardiac cycle **Prof. Ayub**			
11:15 - 12:15		**Practical** **A:** coronary arteries & cardiac muscles **B:** ketone bodies estimation **C:** ECG recording and Interpretation	**Practical** **B:** coronary arteries & cardiac muscles **C:** ketone bodies estimation **A:** ECG recording and interpretation	**Practical** **C:** coronary arteries & cardiac muscles **A:** ketone bodies estimation **B:** ECG recording and Interpretation	
12:15 - 1:00	**PBL-2A** **Prof. Ayub and Team-2**				
1:00 - 1:45					**JUMA PRAYERS**
1:45 -2:00	**Prayers**				
2:00-4:00	**DSL**	**DSL** PDA, ASD, VSD, Valvular Diseases	**DSL**	**DSL**	**DSL**

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CVS Module – 1st Year MBBS

Week 3					
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
8:00– 9:00	**LGIS** Cardiac output **Prof. Ayub**	**LGIS** Heart Sounds and Murmurs; Cardiac arrhythmias **Prof. Dr. M. Ayub**	**LGIS** Short term Regulation of Blood Pressure **Dr. Poshmal/Ayub**	**LGIS** Principles of treatment of Hypertension **Prof. M. Arif**	**Skill Lab** Measurement of BP & its variation (posture & exercise induced) Pulse, JVP **Drs. Khalid, Babar Bilal, Munazzah**
9:00-10:00	**LGIS** Cholesterol Biosynthesis & role in health & diseases **Prof. Alam Khan**	**LGIS** Coronary Angiogram, CT & MRI **Dr. Shaukat Dar**	**LGIS** Long term Regulation of Blood Pressure **Dr. Amna/Ayub**	**LGIS** Ischemic Heart Disease **Dr. Waqar Haider**	
10:00 – 10:30	**Tea Break**				
10:30–11:30	**LGIS** β-Oxidation of fatly acids & Keton-bodies as alternate source of energy for heart **Dr. Zahid Azeem**	**Skill Lab** History, Exam & counseling of family of CHD patient **Dr. Zakir Naqvi, Dr. Naeem, Dr. Mateen**	**LGIS** Cardiac Catheterization **Dr. Rizwan Abid**	**LGIS** Pathophysiology of Circulatory Shock **Prof. Anwar ul Haq**	**LGIS** Echocardiography **Dr. Shaukat Dar**
11:30-12:30	**PBL-2B** **Dr. Fauzia & Team-2**	**LGIS** Hypertension **Dr. Ali Arshad**	**SGD** Aldosterone RAS in hypertension **Prof. Alam Khan & Team-2** **Wrap-up** **Prof. Alam Khan**	**LGIS** Glycolysis **Prof. Alam Khan**	**PBL-3B** **Dr. Ijaz Anwar & Team-2**
12:30-1:30		**LGIS** Vectorial analysis of ECG **Dr. Babar Bilal**		**LGIS** TCA cycle **Dr Zahid Azeem**	
1:30–2:00	**Lunch and prayers**				
2:00–3:00	**Practical** A: Measurement of BP B: Histology of Blood Vessels C: Estimation of Cardiac Enzymes	**PBL- 3A** **Dr. Fouzia & Team-2**	**Practical** B: Measurement of BP C: Histology of Blood Vessels A: Estimation of Cardiac Enzymes	**Practical** C: Measurement of BP A: Histology of Blood Vessels B: Estimation of Cardiac Enzymes	SDL
3:00-4:00					

AJK Medical College, Muzaffarabad

CVS Module – 1st Year MBBS

Week 4					
Time	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
8:00–9:00	**LGIS** Cardiac enzymes & biomarkers of IHD **Dr. Zahid Azeem**	**LGIS** Development of Major Blood Vessels & congenital anomalies **Prof. Ghuncha**	**SGD** Peripheral Arterial Disease Regional circulation and Lymph **Drs. Saleem Abbasi, Ali Arshad, Rizwan Abid**	**CFR/BCLS/CPR Training Workshop**	**PBL- 4B** **Dr. Ali Arshad & Team-2**
9:00-10:00	**LGIS** Conductive system of the heart **Dr. Ayub**	**LGIS** **DVT** **Dr Ziyad Kiani**			
10:00–10:30	**Tea Break**				
10:30–11:30	**PBL- 4A** **Dr. Ali Arshad & Team-2**	**Skill Lab** Counseling for primary & secondary prevention of Hypertension **Drs. Babar Bilal, Kh. Imtiazm Uzma Hafeez**	**LGIS** Overview of CVS Module **Prof. Ghuncha**	**CFR/BCLS/CPR Training Workshop**	**LGIS** Atherosclerosis **Dr. Waqar Haider**
11:30-12:30					**Revision**
12:30–1:30	**DSL** Mediastinum	**LGIS** Acute arterial ischemia **Dr Sarmad**	**LGIS** Interstitial Fluid Dynamics **Dr. Ijaz Anwar**		
1:30-2:00	**Lunch and prayers**				
2:00–3:00	**Practical** A: Vectorial analysis & ECG in Disease B: Histology of Blood Vessels C: Estimation of Cardiac Enzymes	**Practical** B: Vectorial analysis & ECG in Disease C: Histology of Blood Vessels A: Estimation of Cardiac Enzymes	**Practical** C: Vectorial analysis & ECG in Disease A: Histology of Blood Vessels B: Estimation of Cardiac Enzymes	**CFR/BCLS/CPR Training Workshop**	**DSL** Prevention of Coronary Heart Disease
3:00-4:00					

LEARNING RESOURCES

Reference Books:

1) Guyton 13th Edition
2) Sherwood 7th Edition
3) Ganong 23rd Edition
4) Snell's Clinical Anatomy
5) Last's Anatomy by RJ Last
6) Clinically Oriented Anatomy by Keith. L. Moore
7) The Developing Human by Moore & Persaud
8) Basic Histology by Luiz Carlos Junqueira
9) DiFiore's Atlas of Histology 11th Edition
10) Lippincot's Biochemistry review 5th edition
11) Harper's Biochemistry 28th Edition
12) Macleod's Clinical Examination

Glossary: Following online medical dictionaries can be referred

www.nlm.nih.gov/medlineplus/mplusdictioary.html
www.online-medical-dictionary.org
www.medterms.com

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