

| Week 1 - Cardiovascular BLOCK B (Male) | | | | |
|---|---|---|--|--|
| Week (1) Starting: | | | | |
| 2/1/2010 (16/1/1431H) | | | | |
| CHAIR PERSON : Dr.Mona Abdulhafeeth | | | | |
| CO-CHAIR: Dr.Husam Faleh Al-Faleh | | | | |
| Saturday | Sunday | Monday | Tuesday | Wednesday |
| 8:00 ~ 9:00 am Introduction for Cardiovascular Block | 8:00 ~ 9:00 am Lecture: Conductive System of the heart Dr.Zohour | 8:00 ~ 9:00 am Lecture: Management of Acute and Chronic Heart Failure 1 Dr.Osama | 8:00 ~ 9:00 am Lecture: Independent learning | 8:00 ~ 10:00 am Independent learning |
| 9:00 ~ 10:00am Lecture: Histology of the circulatory system Dr. Ali Mohammed | 9:00 ~ 10:30am Small Group Discussion | 9:00 ~ 10:00am Lecture: Management of Acute and Chronic Heart Failure 2 Dr.Osama | 9:00 ~ 10:30am Small group discussion | |
| 10:00 ~ 11:00 am Lecture: Heart, Its Blood Supply & Pericardium Dr.Abdullah Al-Dahmash | | | | |
| 11:00 ~ 12:00 pm Lecture: Glucose utilization: Glycolysis Dr.Amr | 10:30 ~ 12:00pm Independent learning | 10:00 ~ 12:00pm (Practical) Anatomy of the Heart, its blood supply & Pericardium Room 118 1st Floor | 10:30 ~ 12:00pm Independent learning | 10:00 ~ 11:00am Lecture: Cardiac properties Dr.Zohour |
| | | | | 11:00 ~ 12:00 pm Independent learning |
| Lunch | Lunch | Lunch | Lunch | Lunch |
| 1:00 ~ 2:00 pm Lecture: Properties of the cardiac muscle & action potentials in cardiac muscle Dr.Zohour | 1:00 ~ 3:00 pm Salam | 1:00 ~ 3:00 pm Independent learning | 1:00 ~ 3:00 pm (Practical) Histology of the cardiovascular system Room 122 1st Floor | 1:00 ~ 3:00 pm Salam |
| 2:00 ~ 3:00 pm Independent learning | | | | |

LECTURE THEATER :

Room No. 236- Level 2- Seat Cap.153

King Saud University
College of Medicine

| Week 2 - Cardiovascular BLOCK B (Male) | | | | |
|---|---|--|---|--|
| Week (2) Starting: | | | | |
| 9/1/2010 (23/1/1431H) | | | | |
| CHAIR PERSON : Dr.Mona Abdulhafeeth | | | | |
| CO-CHAIR: Dr.Husam Faleh Al-Faleh | | | | |
| Saturday | Sunday | Monday | Tuesday | Wednesday |
| 8:00 - 9:00 am Lecture: Glucose utilization: Krebs cycle Dr.Amr | 8:00 - 9:00 am Independent learning | 8:00 - 9:00 am Lecture: Cardiac Cycle2 Dr.Zohour | 8:00 - 9:00 am Lecture: Interpretation of normal ECG Dr.Zohour | 8:00 - 9:00 am Lecture: Anti-arrhythmic agents 3 Prof.Khattab |
| 9:00 - 10:00 am Lecture: Cardiac Cycle1 Dr.Zohour | 9:00 - 10:30 am Small Group Discussion | 9:00 - 10:00 am Lecture: The Electrocardiogram Dr.Zohour | 9:00 - 10:30 am Small group discussion | 9:00 - 10:00 am Lecture: Cholesterol metabolism Dr.Waheed |
| 10:00 - 11:00 am Lecture: Heart sounds and murmur Dr.Zohour | 10:30 - 12:00 am Independent learning | 10:00 - 12:00 pm (Practical) The Electrocardiogram ECG (physiology) Room 2149 2nd Floor Room 3149 3rd Floor | 10:30 - 12:00 am Independent learning | 10:00 - 12:00pm (Practical) Heart Sounds (physiology) Room 2149 2nd Floor Room 3149 3rd Floor |
| 11:00 - 12:00 pm Lecture: Glucose production: gluconeogenesis Dr.Amr | | | | |
| Lunch | Lunch | Lunch | Lunch | Lunch |
| 1:00 - 2:00 pm Lecture: Lactic acidosis Dr.Amr | 1:00 - 3:00 pm Salam | 1:00 - 2:00 pm Lecture: Independent learning | 1:00 - 2:00 pm Lecture: Anti-arrhythmic agents 1 Prof.Khattab | 1:00 - 3:00 pm Salam |
| 2:00 - 3:00 pm Independent learning | | | 2:00 - 3:00 pm Lecture: Anti-arrhythmic agents 2 Prof.Khattab | |

LECTURE THEATER :

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| Week 3 ~ Cardiovascular BLOCK B (Male) | | | | |
|---|--|--|--|--|
| Week (3) Starting: | | | | |
| 16/1/2010 (1/2/1431H) | | | | |
| CHAIR PERSON : Dr.Mona Abdulhafeeth | | | | |
| CO-CHAIR: Dr.Husam Faleh Al-Faleh | | | | |
| Saturday | Sunday | Monday | Tuesday | Wednesday |
| 8:00 ~ 9:00 am Lecture: Cardiac Output Dr.M.Zughaibi | 8:00 ~ 9:00 am Lecture: Preload, afterload , contractility & cardiac function Dr.M.Zughaibi | 8:00 ~ 9:00 am Lecture: Venous return curves: Jugular venous pulse Dr.M.Zughaibi | 8:00 ~ 9:00 am Lecture: Factors that determine the normal B.P. e.g. heart rate, stroke Volume, blood volume Prof. Ashraf | 8:00 ~ 9:00 am Lecture: Peripheral resistance (diameters of arterioles and blood viscosity) and elasticity of aorta and large blood vessels Prof. Ashraf |
| 9:00 ~ 10:00 am Lecture: Major Arteries Dr. Khaleel Alyahya | 9:00 ~ 10:30 am Small Group Discussion | 9:00 ~ 10:00am Lecture: Physiological variations affecting blood pressure Prof. Ashraf | 9:00 ~ 10:30am Small group discussion | 9:00 ~ 10:00 am Independent learning |
| 10:00 ~ 11:00 am Lecture: Venous circulation and factors affecting venous return Dr.M.Zughaibi | 10:30 ~ 12:00am Independent learning | 10:00 ~ 12:00pm (Practical) Pharmacology Blood Pressure Room 3041 3rd Floor | 10:30 ~ 12:00pm Independent learning | 10:00 ~ 12:00pm (Practical) The recording of jugular venous and carotid arterial pressures (physiology) Room 2149 2nd Floor Room 3149 3rd Floor |
| 11:00 ~ 12:00 pm Lecture: Pathology: Diseases of arteries and veins 1 Dr.Hisham Al-Khaldi | | | | |
| Lunch | Lunch | Lunch | Lunch | Lunch |
| 1:00 ~ 2:00 pm Lecture: Lipoprotein and atherosclerosis Dr.Waheed | 1:00 ~ 3:00 pm Salam | 1:00 ~ 2:00 pm Lecture: Pathology: Diseases of arteries and veins 2 Dr.Hisham Al- Khaldi | 1:00 ~ 3:00 pm Independent learning | 1:00 ~ 3:00 pm Salam |
| 2:00 ~ 3:00 pm Independent learning | | 2:00 ~ 3:00 pm Independent learning | | |

LECTURE THEATER :

Room No. 236- Level 2- Seat Cap.153

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| Week 4 - Cardiovascular BLOCK B (Male) | | | | |
|--|---|--|---|--|
| Week (4) Starting: | | | | |
| 23/1/2010 (8/2/1431H) | | | | |
| CHAIR PERSON : Dr.Mona Abdulhafeeth | | | | |
| CO-CHAIR: Dr.Husam Faleh Al-Faleh | | | | |
| Saturday | Sunday | Monday | Tuesday | Wednesday |
| 8:00 ~ 9:00 am Lecture: Nervous regulation of the cardiovascular system Prof. Ashraf | 8:00 ~ 9:00 am Lecture: Pathology of hypertension Dr.Hisham Al-Khaldi | 8:00 ~ 9:00 am Lecture: Pathology: Atherosclerosis Dr.Hisham Al-Khaldi | 8:00 ~ 9:00 am Lecture: Independent learning | 8:00 ~ 9:00 am Lecture: Antihypertensive Drugs 2 Prof. Al-Haider |
| 9:00 ~ 11:00 am Lecture: (Practical) Arterial Blood Pressure Physiology Room 2149 2nd Floor Room 3149 3rd Floor | 9:00 ~ 10:30 am Small Group Discussion | 9:00 ~ 10:00 am Lecture: Ischaemic heart diseases (1) Dr.Hisham Al-Khaldi | 9:00 ~ 10:30 am Small Group Discussion | 9:00 ~ 10:00 am Lecture: Pathology: Ischaemic heart diseases (2) Dr.Hisham Al-Khaldi |
| 11:00 ~ 12:00 pm Lecture: Antihypertensive Drugs 1 Prof. Al-Haider | 10:30 ~ 12:00pm Independent learning | 10:00 ~ 12:00 pm Independent learning | 10:30 ~ 12:00 pm Independent learning | 10:00 ~ 12:00 pm Independent learning |
| Lunch | Lunch | Lunch | Lunch | Lunch |
| 1:00 ~ 2:00 pm Short term regulation by baroreceptors and chemoreceptors Prof. Ashraf | 1:00 ~ 3:00 pm Salam | 1:00 ~ 3:00 pm Independent learning | 1:00 ~ 3:00pm Practical: pathology Dr.Hisham Al-Khaldi Dr.Amer AL-Shafi Pathology Dept. Student Lab. Room 051142 | 1:00 ~ 3:00 pm Salam |
| 2:00 ~ 3:00 pm Intermediate regulatory mechanisms of arterial Pressure (Long term regulatory mechanism Prof. Ashraf | | | | |

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| Week 5 ~ Cardiovascular BLOCK B (Male) | | | | |
|--|--|--|---|--|
| Week (5) Starting: | | | | |
| 30/1/2010 (15/2/1431H) | | | | |
| CHAIR PERSON : Dr.Mona Abdulhafeeth | | | | |
| CO-CHAIR: Dr.Husam Faleh Al-Faleh | | | | |
| Saturday | Sunday | Monday | Tuesday | Wednesday |
| 8:00 ~ 9:00 am Lecture: Lipoprotein and atherosclerosis Dr.Waheed | 8:00 ~ 9:00 am Lecture: Oxidative stress and antioxidants Dr.Waheed | 8:00 ~ 9:00 am Lecture: Coronary Circulation (Anatomy) Dr.Khaleel alyahya | 8:00 ~ 9:00 am Lecture: Independent learning | 8:00 ~ 9:00 am Lecture: Microbiology Bacterial endocarditis Prof. KAMBAL |
| 9:00 ~ 10:00 am Lecture: Major Veins Dr. Khaleel Alyahya | 9:00 ~ 10:30am Small Group Discussion | 9:00 ~ 10:00am Lecture: Anti-anginal Drugs 1 Dr.Osama | 9:00 ~ 10:30 am Small Group Discussion | 9:00 ~ 10:00 am Lecture: Anti-anginal Drugs 3 Dr.Osama |
| 10:00 ~ 11:00 am Lecture: Drugs for hyperlipidemis 1 Dr.Osama | 10:30 ~ 12:00 am Independent learning | 10:00 ~ 11:00am Lecture: Pathology: ischemic heart disease Dr.Hisham Al-Khalidi | 10:30 ~ 12:00pm Independent learning | 10:00 ~ 11:00 am Lecture: Immunology of Rheumatic fever and Rheumatic heart disease. Prof.Shakoor |
| 11:00 ~ 12:00 pm Lecture: Drugs for hyperlipidemis 2 Dr.Osama | | 11:00 ~ 12:00pm Lecture: Anti-anginal Drugs 2 Dr.Osama | | 11:00 ~ 12:00pm Independent learning |
| Lunch | Lunch | Lunch | Lunch | Lunch |
| 1:00 ~ 3:00 pm (Practical) History taking & principles of CVS examination Group (1) Medical education department, skills lab., level 2 & 3 | 1:00 ~ 3:00 pm Salam | 1:00 ~ 3:00 pm (Practical) Major Arteries & Veins (Anatomy) Room 118 1st Floor | 1:00 ~ 3:00 pm Independent learning | 1:00 ~ 3:00 pm (Practical) History taking & principles of CVS examination Group (2) Medical education department, skills lab., level 2 & 3 |

LECTURE THEATER :

Room No. 236- Level 2- Seat Cap.153

King Saud University
College of Medicine

| Week 6 ~ Cardiovascular BLOCK B (Male) | | | | |
|---|--|--|--|---|
| Week (6) Starting: | | | | |
| 6/2/2010 (22/2/1431H) | | | | |
| CHAIR PERSON : Dr.Mona Abdulhafeeth | | | | |
| CO-CHAIR: Dr.Husam Faleh Al-Faleh | | | | |
| Saturday | Sunday | Monday | Tuesday | Wednesday |
| 8:00 ~ 9:00 am Lecture: Antioxidants Dr.Waheed | 8:00 ~ 9:00 am Lecture: Anticoagulants and fibrinolytics and management of myocardial infarction 2 Prof.Khattab | 8:00 ~ 9:00 am Lecture: Anticoagulants and fibrinolytics and management of myocardial infarction 3 Prof.Khattab | 8:00 ~ 12:00pm Independent learning | 8:00 ~ 10:00 am |

LECTURE THEATER :

Room No. 236- Level 2- Seat Cap.153

BIOCHEMISTRY

Lecture 1: Glucose utilization: Glycolysis

1. To understand the importance of glycolysis as a major oxidative pathway of glucose
2. To understand the main reactions of glycolytic pathway
3. To identify the rate-limiting enzymes of glycolytic pathway
4. To calculate ATP production in both aerobic and anaerobic conditions
5. To understand the biochemical basis of pyruvate kinase deficiency hemolytic anemia

Outlines:

1. Overview: Major oxidative pathway of glucose
Tissue and subcellular localization
Aerobic and anaerobic conditions
Substrate and end products
2. Important reactions
3. Anabolic part of glycolysis:
Synthesis of 2,3 BPG
Synthesis of triacylglycerol
4. Energy production: In presence and in absence of oxygen
5. Regulation:
Hormonal: insulin/glucagon ratio
Substrate availability and nutritional state
Rate-limiting enzymes: PFK-1 plus glucokinase and pyruvate kinase
Allosteric, covalent modification and induction/repression
Reciprocal regulation of glycolysis and gluconeogenesis for efficient glucose metabolism
6. Pyruvate kinase deficiency hemolytic anemia

Lecture 2: Glucose utilization: Krebs cycle

1. To understand the importance of Krebs cycle as a final common pathway for oxidation of all food stuff
2. To understand the main reactions of Krebs cycle
3. To calculate ATP production by Krebs cycle

Outlines:

1. Overview: Preparatory reaction: Oxidative decarboxylation of pyruvate
Krebs cycle as a major pathway for oxidation
Tissue and subcellular localization
2. Anabolic part of Krebs cycle:
Synthesis of glucose
Synthesis of non-essential amino acids
Synthesis of fatty acids
Synthesis of heme part of hemoglobin
3. Important reactions of Krebs cycle
4. Energy production:
Oxidative decarboxylation of pyruvate
Krebs cycle: Oxidative and substrate-level phosphorylation
Calculate net ATP production for complete oxidation of one glucose molecule to CO_2 and H_2O
5. Regulation:
Respiratory control of Krebs cycle

Lecture 3:**Glucose production: gluconeogenesis**

1. To understand the importance of gluconeogenesis as an important pathway for glucose production
2. To understand the main reactions of gluconeogenic pathway
3. To identify the rate-limiting enzymes of gluconeogenic pathway

Outlines:

1. Overview: Major pathway for glucose production
Tissue and subcellular localization
Gluconeogenic substrates: Glycerol, lactate and amino acids
2. Important reactions: 4 unique reactions plus reversible of glycolysis
3. Energy consumption
4. Regulation:
Hormonal: insulin/glucagon ratio
Substrate availability and nutritional state
Rate-limiting enzymes
Allosteric, covalent modification and induction/repression
Reciprocal regulation of glycolysis and gluconeogenesis for efficient glucose metabolism

Lecture 4:

Lactic acidosis

1. To understand conditions associated with excessive blood lactate production
2. To understand the importance and consequences of lactate production
3. To understand lactic acidosis Vs skeletal muscle cramp
4. To understand lactic acidosis as a medical emergency

Outlines:

1. Lactate production
2. Why lactate is an obligatory end-product of glycolysis under specified conditions?
3. Consumption of lactate: Cori cycle (mainly)
4. Lactic acidosis:
 - Increased blood lactate level (as compared to skeletal muscle lactate)
 - Acquired: Increased production, diseases associated with lactic acidosis
 - Congenital: Deficiency of pyruvate dehydrogenase enzyme complex
5. Monitoring of patient's recovery by measurement of blood lactate level

Lecture 5:

Cholesterol metabolism

1. To study the structure and functions of cholesterol
2. Relationship between hypercholesterolemia and atherosclerosis
3. To study cholesterol biosynthesis and its regulation
4. To study the factors that decrease blood cholesterol level
5. Bile salt functions and cholesterol excretion

Outlines:

1. Cholesterol structure (sterols and cholesteryl esters)
2. Cholesterol functions
3. Synthesis of cholesterol and its regulation
4. Degradation of cholesterol
5. Bile acids and bile salts

Lecture 6 and 7:**Lipoprotein metabolism**

1. To study the composition of plasma lipoproteins (chylomicrons, VLDL, LDL and HDL)
2. To study the metabolism and functions of plasma lipoproteins
3. To study the functions of apolipoproteins
4. To study the clinical aspects of lipoprotein metabolism-correlations between impaired lipoprotein metabolism and diseases

Outlines:

1. Composition of lipoproteins
2. Functions of plasma lipoproteins and apolipoproteins
3. Metabolism of chylomicron, VLDL, LDL and HDL
4. Type I, II and III hyperlipoproteinemia

Lecture 7:**Lipoproteins and atherosclerosis****Lecture 8 and 9:****Oxidative stress and chronic diseases & Antioxidants**

1. What are reactive oxygen species (ROS)?
2. Sources of ROS
3. Toxic effects of ROS
4. Protective mechanisms against ROS
5. Glucose 6-phosphate dehydrogenase (G6PD) deficiency

Outlines:

1. The family of reactive oxygen species
2. Sources of ROS
3. Chemical damage caused by ROS
4. Enzymes that catalyze antioxidant reactions
5. Antioxidant chemicals
6. The role of low density lipoprotein oxidation (LDL) in the pathogenesis of atherosclerosis
7. G6PD deficiency

Lecture 10:**Biochemical markers of myocardial infarction Lactic acidosis**

1. To understand the importance of a need for specific & sensitive markers for diagnosis of myocardial infarction of all stages.
2. To understand standards that should be considered for recruiting a biochemical marker for diagnosis & follow up of myocardial infarction
3. To be oriented by the currently used biomarkers for diagnosis & follow up of myocardial infarction and know the advantages & limitations of use of each.

Outlines of the lecture:

1. Short introduction to myocardial infarction (causes, clinical manifestations & diagnosis)
2. Mechanism of release of myocardial markers into plasma (in brief)
3. Most commonly used biochemical markers for diagnosis of myocardial infarction:

A. Cardiac Enzymes:

- Total CK
- CK-MB activity
- CK-MB mass

B. Cardiac Proteins:

- Troponins

4. Criteria for ideal biochemical markers for diagnosis & follow up of myocardial infarction

Immunology

Lecture 1: Immunology of Rheumatic fever and Rheumatic heart disease

- To explain how immune response, instead of protection, may contribute to bacterial pathogenesis.
- To describe of the cross - reactions that occur between microbial antigens and human tissue antigens e.g. epitopes shared between myocardial tissues and M proteins of the group A streptococci.
- To explain that rheumatic fever is an inflammatory disease with a predilection for connective tissues and is a sequel to a recent group A streptococcal pharyngeal infection.

ANATOMY

Lecture 1: Heart, Its Blood Supply & Pericardium

- **Heart:** Location, External features: apex, base, surfaces, borders, chambers & vessels entering and leaving, Internal features: chambers and valves.
- **Pericardium:** Layers: Fibrous (attachment, relations and nerve supply), Serous (Parietal, visceral), Pericardial sinuses (Transverse & oblique).
- **Coronary Arteries:** Origin, Course & Distribution, Branches.
- **Coronary Sinus:** Origin, Tributaries, Termination.

Veins other than Coronary Sinus: Venae cordis minime, anterior cardiac veins, oblique vein of left atrium.

Lecture 2: Histology of the circulatory system (Cardiovascular system)

- Wall of the heart.
- Large Elastic Arteries.
- Medium – Sized Arteries.
- Blood Capillaries.
- Medium – Sized vein.

Lecture 3: Major Arteries

- Aorta: Parts (Ascending, arch and descending).
- Arch of Aorta: Common carotid and subclavian.
- Common Carotid: External carotid to the head and neck (face, tongue, scalp, glands).
- Internal carotid to the brain.
- Subclavian to the upper limb (axillary, brachial, radial and ulnar).

Lecture 4: Major Veins:

- **Veins of Systemic Circulation:**
 - Superior Vena Cava: It drains the head, neck and upper limbs (radial, ulnar, brachial venae commitants, axillary, brachiocephalic, subclavian, internal jugular).
 - Inferior Vena Cava: It drains the lower part of the body (anterior

and posterior tibial, popliteal, femoral, external iliac, common iliac).

- Veins of Portal Circulation: Portal vein and its tributaries (splenic, superior and inferior mesenteric).
- Superficial Veins: External jugular, basilica, cephalic, great and small saphenous.
- The surface anatomy of the great saphenous vein because of its clinical importance.
- The superficial veins have valves and drain into the deep veins (accompany arteries) through communicating veins.
- Venous Anastomosis: Porto-Systemic.

(Practical) 1

Anatomy of the cardiovascular system

- External and internal features of the heart.
- Pericardium and pericardial sinuses.
- Coronary arteries.
- Coronary sinus and other veins.

(Practical) 2

Histology of the cardiovascular system

- Large elastic arteries.
- Medium- sized artery.
- Medium-sized vein.
- Wall of the heart.

(Practical) 3

Major Arteries Veins

- Aorta(ascending, thoracic & abdominal) regarding the origin, termination and main branches.
- The arteries that we can feel their pulsations.
- The major veins (SVC,IVC) and their main tributaries.
- Superficial veins and deep veins.
- Portal vein and its main tributes.

PHARMACOLOGY

Lecture 1: Anti-Arrhythmic Agents (3)

Drugs and Drug Classes to Consider:-

- a) – Class I
- b) – Class II
- c) – Class III
- d) – Class IV
- e) – Adenosine
- f) - Digoxin

Learning Outcomes:-

At the end of these lectures the student should be able to:-

- i- Describe the pathophysiologic mechanisms of cardiac arrhythmias (abnormal automaticity, triggered rhythms, re-entrant rhythms and abnormal impulse conduction).
- ii- Classify antiarrhythmic drugs according to the Vaughn-Williams classification into classes I, II, III and IV including other miscellaneous agents.
- iii- Describe the slow (calcium-dependent) and fast (sodium-dependent) responses, their relevance to sinoatrial, atrial, AV-nodal and ventricular tissues, and their alteration by antiarrhythmic drugs.
- iv- Describe the electrophysiologic actions of antiarrhythmic drugs in normal and abnormal myocardial and conduction tissue, and their effect on the phases of the cardiac action potential.
- v- Describe the relevant extracardiac actions of antiarrhythmic drugs
- vi- Describe the routes of administration, biotransformation and excretion of selected antiarrhythmic drugs.
- vii- Describe the pharmacokinetics and time-course of the cardiac actions of antiarrhythmic drugs (onset and duration of action).
- viii- Describe the use of antiarrhythmic drugs in supraventricular arrhythmias (atrial flutter, atrial fibrillation, paroxysmal atrial tachycardia, junctional arrhythmias).
- ix- Describe the use of antiarrhythmic drugs in ventricular arrhythmias (ventricular premature beats, ventricular tachycardia, ventricular fibrillation).
- x- Describe the cardiac and extracardiac manifestations of toxicity from antiarrhythmic drugs.

- xi- Describe the beneficial and adverse interactions among antiarrhythmic drugs and between antiarrhythmic drugs and cardiac glycosides.

- xii- Describe the significance of electrolyte and acid-base imbalance in arrhythmia generation and their influence on antiarrhythmic drug action.
- xiii- Describe the possible contraindications of antiarrhythmic drugs in the presence of heart block or congestive heart failure, and the precautions and contraindications in other conditions.

Lecture 2: Management of Acute and Chronic Heart Failure (2)
Drugs and Drug Classes to Consider

- a) Cardiac glycosides
- b) Vasodilators
- c) Angiotensin converting enzymes inhibitors
- d) Diuretics
- e) β - agonists and phosphodiesterase inhibitors

Learning Outcomes:-

At the end of these lectures the student should be able to:-

- i- Describe the effects of digoxin on myocardial contractility.
- ii- Explain the ionic basis for the mechanism of action of digoxin and the cardiac glycosides: discuss the roles of Na^+ , K^+ -ATPase inhibition and the $\text{Na}^+/\text{Ca}^{2+}$ exchanger.
- iii- Describe the electrophysiologic effects of digoxin on atrial and ventricular muscle and specialized conducting tissue.
- iv- Explain the significance of direct and indirect (autonomic) actions of digoxin.
- v- Describe the positive inotropic effects of the β -adrenoceptor-agonists and phosphodiesterase inhibitors.
- vi- Explain the effects of adrenoceptor antagonists and ACE-inhibitors on cardiac function and ventricular remodeling in the setting of heart failure.
- vii- Describe the hemodynamic actions of digoxin in the failing heart.
- viii- Describe the extracardiac actions of digoxin.
- ix- Explain the effects of vasodilators on preload and afterload.
- x- Describe the extracardiac actions of the adrenoceptor agonists, adrenoceptor antagonists, phosphodiesterase inhibitors and ACE-inhibitors.
- xi- Describe the routes of administration, the extent of oral absorption and bioavailability, the routes of elimination and extent of biotransformation of digoxin and other drugs used in heart failure.
- xii- Explain the concept of digitalization (loading dose) and maintenance therapy.
- xiii- Describe the use of digoxin in congestive heart failure and in atrial arrhythmias.
- xiv- Describe the role of adrenoceptor agonists, adrenoceptor antagonists, vasodilators, diuretics and ACE-inhibitors in the treatment of acute and chronic heart failure.
- xv- Describe the cardiac (delayed depolarizations and arrhythmias) and extracardiac manifestations of digoxin toxicity
- xvi- Describe the significance of changes in serum electrolyte levels (potassium, sodium, calcium, magnesium) with regard to digoxin toxicity.

- xvii-** Discuss the potential adverse effects with concomitant use of diuretics (both potassium-sparing and potassium depleting) in the elderly or in patients with congestive heart failure, hypothyroidism and renal disease.
- xviii-** Describe the interactions of digoxin and quinidine, verapamil, and other relevant drugs.
- xix-** Describe the cardiac and extracardiac side effects and limitations of the, vasodilators, phosphodiesterase inhibitors, and ACE-inhibitors.

Lecture 3: Antihypertensive Drugs (2)

Drugs and Drug Classes to Consider

- a) Sympatholytic agents
- b) Diuretics
- c) Angiotensin converting enzymes inhibitors and angiotensin receptor blockers
- d) Vasodilators

Learning Outcomes:-

At the end of these lectures the student should be able to:-

- i-** Discuss the mechanism of action of the several classes of agents used to manage hypertension according to the site of action within the pathogenesis of hypertension.
- ii-** Describe the mechanism by which each antihypertensive drug exerts its therapeutic function.
- iii-** Review the end organ effects of hypertension and the beneficial effects achieved by therapeutic management of the disease.
- iv-** Describe the actions of antihypertensive drugs on the heart, renal blood flow and renal function.
- v-** Describe the relevant actions of antihypertensive drugs in other organ systems
- vi-** Describe the use of antihypertensive drugs in mild, moderate and severe essential hypertension.
- vii-** Describe the time-course of their antihypertensive activity (onset and duration of action) for each class of agents.
- viii-** Discuss the role of non-pharmacological treatment modalities in the management of hypertension.
- ix-** Describe the use of antihypertensive drugs in mild, moderate and severe essential hypertension.
- x-** Describe the use of antihypertensive drugs in hypertensive emergencies and in pregnancy
- xi-** Describe the use of antihypertensive drugs in pheochromocytoma.
- xii-** Describe the cardiac and extracardiac side effects of antihypertensive drugs.
- xiii-** Describe the beneficial and adverse interactions between antihypertensive drugs and between antihypertensive drugs and other therapeutic agents

Lecture 4: AntiAnginal Drugs (3)

Drugs and Drug Classes to Consider

- a) Organic nitrates
- b) β -adrenoceptor blockers
- c) Calcium channel blockers
- d) Potassium channel openers
- e) Fatty acid oxidation inhibitors

Learning Outcomes:-

At the end of these lectures the student should be able to:-

- i- Describe the hemodynamic actions of antianginal drugs, including their coronary and peripheral vasodilator actions.
- ii- Describe the effects of each antianginal drug on the determinants of myocardial oxygen consumption (heart rate, myocardial wall tension, etc.) and/or oxygen supply (coronary blood flow).
- iii- Describe the effects of the antianginal drugs at the cellular level.
- iv- Describe the cardiac actions of antianginal drugs (electrophysiologic, coronary vasodilator, inotropic actions).
- v- Describe the actions of antianginal drugs on the peripheral circulation (arterial, venous) and their effects on ventricular preload and afterload.
- vi- Describe the routes of administration, biotransformation and excretion of antianginal drugs.
- vii- Describe the significance of a "first-pass effect" for orally administered antianginal drugs and the rationale underlying sublingual, buccal, intranasal and patch administration of nitrates.
- viii- Describe the time-course of antianginal activity (onset and duration of action).
- ix- Describe the problem of dose intervals and tolerance development with the nitrates.
- x- Describe the use of antianginal drugs in classic (effort-related) angina pectoris and vasospastic angina pectoris.
- xi- Describe the cardiac and extra-cardiac side effects of antianginal drugs.
- xii- Describe the beneficial and adverse interactions between antianginal drugs and between antianginal drugs and other cardiovascular drugs.

Lecture 5: Drugs for hyperlipidemias (2)

Drugs and Drug Classes to Consider

- a) Fibrates:- gemfibrozil , fenofibrate
- b) H M G CoA reductase inhibitors
- c) Nicotinic acid
- d) Bile acid binding resins
- e) Ezetimibe

Learning Outcomes:-

At the end of these lectures the student should be able to:-

- i- Describe the actions of each drug class on serum lipids, and compare and contrast the mechanism of each of these actions.
- ii- Characterize these agents according to their action to reduce lipid synthesis or enhance removal.
- iii- Discuss the role of the HMG CoA reductase inhibitors in preventing acute coronary events and stroke and as adjuncts in the management of dementia and other pathological disorders.
- iv- Describe the absorption, distribution, metabolism and excretion (ADME) of drugs used for hyperlipidemias.
- v- Compare and contrast the pharmacokinetics of nicotinic acid and fibric acids.
- vi- Describe the non-pharmacological management of hyperlipidemia (i.e. life style modifications).
- vii- Describe the use of these agents in familial and acquired hyperlipidemias, and their efficacy in atherosclerotic vascular disease.
- viii- Describe the cardiovascular and other systemic side effects of these drugs with special reference to the muscle and liver toxicities.
- ix- Describe the beneficial and adverse interactions between these drugs, and their interactions with digoxin, oral anticoagulants, and other relevant drugs.

Lecture 6:Anticoagulants and fibrinolytics and management of myocardial infarction (4)

Drugs and Drug Classes to Consider

- a) Heparin and low molecular weight heparin
- b) Oral anticoagulants
- c) Antiplatelet drugs

Learning Outcomes:-

At the end of these lectures the student should be able to:-

- i- Describe the use of thrombolytic agents as first-line in the therapy of acute post-myocardial infarction and stroke.
- ii- Consider the spectrum of agents available for cardioprotection and plaque stabilization in the setting of acute coronary syndrome.
- iii- Discuss the long-term use of antiplatelet agents (e.g. ASPIRIN and clopidogrel).
- iv- Describe the use of thrombolytic agents as first-line agents in the acute therapy of post-myocardial infarction and as adjuncts in the nonpharmacological management of coronary artery disease (e.g. surgical stent implantation).
- v- Discuss the appropriate use of parenteral versus oral anticoagulants.
- vi- Discuss the route and time of administration of thrombolytic agents.

- vii- Describe the use of thrombolytic and anticoagulant agents in the acute management of myocardial infarction.
- viii- Discuss the use of antiplatelet drugs, anticoagulant drugs, nitroglycerin, adrenergic blocking agents and angiotensin converting enzyme inhibitors as adjunctive agents in the management of myocardial infarctions.
- ix- Discuss the treatment of warfarin overdose.
- x- Discuss the management of heparin-induced thrombocytopenia.

Lecture 7:Antianemic drug

Drugs and Drug Classes to Consider

- a) Iron therapy , ferrous sulphate, gluconate, fumerate,
- b) Parenteral iron therapy, iron dextran ,iron sorbital
- c) Antidote :- desferrioxamine
- d) Cyalocobalamine, hydroxycobalamine,
- e) Folic acid
- f) Epoetin

Learning Outcomes:-

At the end of these lectures the student should be able to:-

- i- Identify various types of anemia and factors responsible for their development
- ii- Know agents used to overcome and treat specific types of anemia
- iii- Describe the absorption, distribution, metabolism and excretion (ADME) of drugs used for hyperlipidemias.
- iv- Understand the pharmacokinetic properties of agents used to treat anemia
- v- Discuss adverse effects , contraindications and drug interactions of agents used for treatment of anemia

Practicals:-

Practical 1

Title:- Rabbit heart**Learning Outcomes:-**

At the end of this Practical the student should know the effect of different drugs on force of contraction of the heart, heart rate coronary blood flow and how to specifically block these effects

Practical II**Title:- Cat Blood Pressure****Learning Outcomes:-**

At the end of this Practical the student should be able to understand the effect of different autonomic drugs on the cat blood pressure of the cat.

Recommended Textbooks:-

Basic and Clinical Pharmacology,

Katzung B. G.

Latest edition.

PHYSIOLOGY

Lecture 1:

Properties of the cardiac muscle:

- ❶ Excitability and the electrical properties of the heart
Definition/ mechanism and factors affecting excitability

Lecture 2:

- ❷ Conductivity
 - i. Conductive system of the heart e.g.: S.A. node, A.V. node ... etc.
 - ii. factors affecting conductivity

- ❸ Contractility; mechanism of contraction and factors affecting.

- ❹ Rhythmicity: Prepotential (ionic basis) and factors influencing

Lecture 3:

Cardiac properties (Applied Physiology) e.g. Heart block, Starling's law, extrasystoles etc.

Lecture 4:

Definition and different phases of the cardiac cycle

- i. pressure changes during the cycle (atrial, ventricular, aortic and pulmonary)
- ii. volume changes during the cycle

Lecture 5:

Heart sounds and murmur

Lecture 6:

Cardiac cycle (Applied Physiology): Jugular, cardiac and other arterial pulsations

The following two lectures are concerned with the genesis of the normal ECG, some of its abnormalities.

Lecture 7:

Genesis and understanding of the normal ECG pattern

Lecture 8:

Interpretation and information derived from normal ECG

Lecture 9:

Venous circulation and factors affecting venous return

Lecture 10:

Venous return curves: Jugular venous pulse (causes and clinical importance).

Lecture 11:

Cardiac output:

- i- Definition and methods of measurement
- ii- Factors controlling cardiac output: extrinsic control (nervous and chemical)

Lecture 12:

④

Preload, afterload and contractility: intrinsic control (hetero- and homometric mechanisms)

④

Cardiac function and systemic function curves and their importance

Lecture 13:

Physiological variations affecting blood pressure e.g. age, sex, emotion, race, respiratory movements, exercise, gravity, posture and sleep

Lecture 14:

Factors that determine the normal B.P. e.g. heart rate, stroke Volume, blood volume

Lecture 15:

Peripheral resistance (diameters of arterioles and blood viscosity) and elasticity of aorta and large blood vessels

Lecture 16:

Nervous regulation of the cardiovascular system

Lecture 17:

Short term regulation by baroreceptors and chemoreceptors

Lecture 18:

- Intermediate regulatory mechanisms of arterial Pressure
- Long term regulatory mechanism

Lecture 19:

Coronary Circulation

Lecture 20:

Shock

CARDIOVASCULAR PRACTICALS

PRACTICAL 1 HEART SOUNDS

PRACTICAL 2 THE ELECTROCARDIOGRAM (ECG)

PRACTICAL 3 THE RECORDING OF JUGULAR VENOUS AND CAROTID ARTERIAL PULSES

PRACTICALS 4 ARTERIAL BLOOD PRESSURE

PATHOLOGY

Lectures 1 and 2 : Atherosclerosis → definition, pathogenesis, types of hyperlipidemias, risk factors for atherosclerosis and composition of atheromatous plaques. Complications and consequences of atherosclerosis.

Hypertension → definition, classification, risk factors, pathogenesis and complications.

Lectures 3 and 4 : Ischaemic heart disease:

- Angina pectoris: definition and types.
- Myocardial infarction: definition, pathological changes (morphology), clinical presentation and changes of serum enzymes. Complications of myocardial infarction.
 - Rheumatic fever: → definition, Aetiology, pathological changes (Aschoff body), cardiac and non-cardiac manifestations of rheumatic fever with special emphasis on valvular manifestations (mitral and aortic valves involvement).

Lectures 5 :

Pathology of endocarditis and pericarditis: definitions, classification and causes with emphasis on subacute bacterial endocarditis, marantic endocarditis and chronic constrictive pericarditis

Lectures 6 and 7 : Diseases of arteries and veins(2).

- Pathology of varicose veins, thrombophlebitis and deep vein thrombosis.
- Definition of aneurysm, types and aetiology of aneurysms.
- Vasculitis – pathology of polyarteritis nodosa, giant cell arteritis and Buerger's disease. ANCA mediated vasculitis (Wegener's granulomatosis and hypersensitivity/leukocytoclastic vasculitis)