Topic: Arteriosclerosis
Objectives, the student should be able to:

1). Define and differentiate arteriosclerosis, atherosclerosis and arteriolosclerosis.

2). Define and be able to discuss the epidemiology, risk factors, pathogenesis, and clinical significance of atherosclerosis.

3). Describe and be able to discuss the gross and microscopic morphology of a fatty streak and atherosclerotic plaque. Be able to differentiate a simple atherosclerotic lesion from a complicated atherosclerotic lesion (plaque).

4). Define and be able to discuss the gross morphology, microscopic morphology and clinical significance of Monckeberg’s medial calcific sclerosis.

5). Define and be able to discuss the pathogenesis, morphology and clinical significance of arteriolosclerosis and be able to differentiate these features between the hyaline type and hyperplastic type.

Vocabulary Words/Related Terms:

Arteriosclerosis
Atherosclerosis
Monckeberg’s medial calcific sclerosis
Arteriolosclerosis (Hyaline and Hyperplastic types)
Hyperlipidemia and hypercholesterolemia
Fatty streaks
Atheromatous plaque/atheroma
Fibrous plaque
Atherosclerotic aneurysm
Thrombosis
Cholesterol embolus

Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 7th Edition by, Kumar, Abbas, Fausto, 2005

Objective 1 pp. 516
Objective 2 pp. 516-524
Objective 3 pp. 517-519
Objective 4 pp. 515-516
Objective 5 pp. 529-530

Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 8th Edition by, Kumar, Abbas, Fausto, 2010
Topic: Valvular Heart Disease

Objectives, the student should be able to:

1). List the major etiologies of acquired Valvular Heart Disease, the valves, which are typically involved and the clinical presentation. Define and differentiate stenosis and regurgitation.

2). Organize and be able to discuss the clinical features, pathogenesis, gross morphology of valve and heart, and complications of calcific aortic stenosis.

3). Organize and be able to discuss the clinical features, pathogenesis, and gross-microscopic morphology of mitral valve prolapse.

4). Outline and be able to discuss the clinical features, morphology and complications of mitral annular calcification.

5). Organize and be able to discuss the etiology, pathogenesis, gross and microscopic morphology and clinical features and complications of Rheumatic Heart Disease.

6). List the different types of prosthetic cardiac valves. List and be able to discuss the different complications, which may arise in patients with artificial cardiac valves.

Vocabulary Words/Related Terms:

- Stenosis
- Regurgitation (insufficiency)
- Rheumatic fever
- Aschoff bodies
- Anitschkow cells
- Rheumatoid nodules
- Erythema marginatum
- Migratory polyarthritis
- Acute and Chronic Rheumatic Carditis
- Degenerative calcification stenosis
- Mitral valve prolapse
- Bioprosthetic cardiac valves
- Mechanical cardiac valves
- Hemolysis

Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 7th Edition by, Kumar, Abbas, Fausto, 2005
Topic: Pathophysiology – Valvular Heart Disease
Objectives, the student should be able to:

1). Identification of common valvular pathology.

2). Association of valvular pathology with underlying risk factors.

3). Description of murmurs associated with valvular pathologies.

4). Description of the clinical course and signs/symptoms of valvular heart disease.
MoD PATHOLOGY AND PATHOPHYSIOLOGY COURSE
September 15, 2014
(Student Independent Study)

Topic: Lipids and Carbohydrates
Objectives, the student should be able to do the following:

1). List, define, organize and be able to discuss the major classes of lipids and lipoproteins including desirable levels of each.

2). Organize and be able to discuss proper specimen collection and storage for lipid studies and basic methodology for lipid quantitation. Be able to discuss factors that vary lipoprotein levels including, sex, age, genetics, behavioral factors and disease states.

3). Organize and be able to discuss the six (6) types of hyperlipoproteinemias as classified by Fredickson.

4). Organize and be able to discuss the significance of decreased HDL, increased LDL, elevated chylomicrons, markedly decreased cholesterol, LCAT deficiencies, lipoprotein lipase deficiencies and apolipoprotein deficiencies.

5). List and be able to discuss common causes of hyperglycemia, and hypoglycemia. Discuss tests used to diagnose reactive hypoglycemia.

6). Organize and be able to discuss screening tests, diagnostic tests, and monitoring tests of diabetes mellitus.

7). Be able to discuss the relationship of diabetes mellitus with hypercholesterolemia and hypertriglyceridemia, and pregnancy (gestational diabetes).

Vocabulary Words/Related Terms:

Chylomicrons     Lipoprotein electrophoresis
Very low density lipoproteins (VLDL)     Hypertriglyceridemia
Low density lipoproteins (LDL)          Hypercholesterolemia
High density lipoproteins (HDL)         Bassen-Kornzweig syndrome
Lipoprotein lipase                        Tangier disease
Cholesterol                                Chylomicron retention disease
Triglycerides                              Glucose intolerance
LpX lipoprotein                            Postprandial glucose tests
Apolipoprotein A                           Glycohemoglobin (glycosylated hemoglobin, hemoglobin A1C)
Apolipoprotein B                           Glucose tolerance test
Apolipoprotein C                           Reactive hypoglycemia
Lecithin: cholesterol acyltransferase (LCAT) Homocystine
Topic: Cardiovascular Imaging #1 & #2
Objectives, the student should be able to:

1). Relate the methodology and usefulness of common imaging modalities.
2). List the advantages and disadvantages of each.
3). Correlate the imaging results with the history and exam.
4). Relate the cost-effectiveness and risk in various clinical scenarios.
MoD PATHOLOGY AND PATHOPHYSIOLOGY COURSE
September 15, 2014, 9:45 – 10:45 am
Dr. Andrew Sholl

Topic: Cardiac Failure (Heart Failure, Shock, Cardiac Tumors)

Objectives, the student should be able to:

1). Be able to define and discuss etiologies of congestive heart failure, high output failure, forward failure, backward failure, left sided heart failure and right sided heart failure.

2). Be able to discuss the compensatory mechanism of heart failure.

3). Learn and be able to discuss etiologies, pathogenesis, morphology, and clinical manifestations of left sided heart failure and right sided heart failure.

4). Learn and be able to discuss the etiologies, pathogenesis and morphology of cor pulmonale (chronic and acute).

5). Define cardiogenic shock and be able to discuss the etiologies, pathogenesis, morphology, stages and clinical manifestations of cardiogenic shock.

6). List and be able to discuss the types of cardiac tumors (i.e., metastatic, myxoma, rhabdomyomas and lipomas) and cardiac effects of noncardiac neoplasms.

Vocabulary Words/Related Terms:

- Congestive heart failure
- Orthopnea
- High output failure
- Cor pulmonale (acute and chronic)
- Forward and backward failure
- Shock
- Left sided and right sided failure
- Cardiogenic shock
- Compensated heart failure
- Cardiac tamponade
- Decompensated heart failure
- Ischemic encephalopathy
- Pulmonary edema
- Acute tubular necrosis
- Heart failure cells
- Shock lung
- Nut-meg liver (chronic passive congestion)
- Myxoma
- Dyspnea
- Rhabdomyoma
- Paroxysmal nocturnal dyspnea
- Lipoma

Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 7th Edition by, Kumar, Abbas, Fausto, 2005

Objective 1 pp. 559-560
Objective 2 pp. 560-562
Objective 3 pp. 562-563
Objective 4 pp. 588
Objective 5 pp. 139, 142
Objective 6 pp. 613-614
Title: Aneurysms, Embolism, Vasculitides, Myocardial Infarction, and Thrombophlebitis

Attached is a “Quiz” which you should be prepared to discuss at the tutorial. Be prepared to participate in a group discussion related to the above topics at the tutorial. Also attached are 2 case studies with questions you should review and answer for discussion at the tutorial.

Objectives, the student should be able to:

1). Be able to discuss the etiology, pathogenesis, gross and microscopic morphology and clinical significance of different types of aneurysms including atherosclerotic aneurysm, syphilitic aneurysm, dissecting aneurysm and berry aneurysm.

2). Be able to discuss the predisposing factors, pathogenesis, physiologic changes, gross and microscopic features and clinical effects of pulmonary embolism. Be able to define and discuss the pathogenesis of bone marrow embolism, fat embolism, air embolism and amniotic fluid embolism.

3). Define and be able to discuss the predisposing factors, pathogenesis, morphology and clinical significance of varicose veins, and thrombophlebitis. Be able to discuss the role of lymphatics in malignancy and infections and different etiologies of lymphedema.

4). Be able to discuss the pathogenesis, distribution and size of vessels involved and morphology of major vasculitides (polyarteritis nodosa, Wegener’s granulomatosis, hypersensitivity vasculitis, temporal or giant cell arteritis, Kawasaki’s arteritis, Buerger’s Disease and Takayasu’s arteritis.

Vocabulary Words/Related Terms

- Atherosclerotic aneurysm
- Saccular aneurysm
- Syphilitic (luetic) aneurysm
- Obliterative endarteritis
- “Tree Bark”
- Pseudoaneurysm
- Dissecting aneurysm
- Double barreled aorta
- Marfan’s Syndrome
- Cystic medial necrosis
- Berry (saccular) aneurysm
- Pulmonary embolism
- Saddle embolus

- Hemorrhoids
- Esophageal varices
- Thrombophlebitis
- Migratory thrombophlebitis
- Superior/inferior vena cava syndrome
- Lymphangitis
- Lymphedema
- Peau d’orange
- Heredofamilial congenital lymphedema
- Lymphedema praecox
- Antineutrophil Cytoplasmic Antibody (ANCA)
- Polyarteritis nodosa
- Wegener’s granulomatosis
Bone marrow embolism  Leukocytoclastic angiitis
Fat embolism    Temporal (Giant cell) arteritis
Air embolism    Takayasu’s arteritis
Amniotic fluid embolism  Kawasaki’s arteritis
Varicose veins    Buerger’s Disease

Cardiovascular Pathology Tutorial
Page 2

**Recommended Reading:** Robbins and Cotran *Pathologic Basis of Disease* 7th Edition by, Kumar, Abbas, Fausto, 2005

- Objective 1 - pp. 530-534, 1366-1368
- Objective 2 - pp. 135-137
- Objective 3 - pp. 543-544
- Objective 4 - pp. 534-542

**Recommended Reading:** Robbins and Cotran *Pathologic Basis of Disease* 8th Edition by, Kumar, Abbas, Fausto, 2010

- Objective 1 - pp. 374-377, 506-510, 1297
- Objective 2 - pp. 125-127
- Objective 3 - pp. 518-520
- Objective 4 - pp. 510-518
MoD PATHOLOGY AND PATHOPHYSIOLOGY COURSE  
Pathology of Cardiovascular Infections  
September 16, 2014  
(Student Independent Study)

Topic: Pathology of CV Infection (Endocarditis, Myocarditis, Pericardial Disease)

Enclosed is a “quiz” and 2 case studies which you should review. Below are objectives, vocabulary words (related terms) and recommended reading regarding these topics.

Objectives, the student should be able to:

1). Organize and be able to discuss the epidemiology, pathogenesis, gross and microscopic morphology, clinical presentation and course of infectious and non-infectious endocarditis. Compare and contrast bacterial and marantic endocarditis.

2). Organize and be able to discuss different etiologies, pathogenesis, gross and microscopic morphology, clinical presentation and course of myocarditis.

3). Organize and be able to discuss the different types etiologies, morphology and clinical consequences of pericarditis and pericardial effusion. Define and be able to discuss etiologies and clinical significance of hemopericardium.

4). Organize and be able to discuss carcinoid syndrome related heart disease in terms of pathogenesis and morphology.

Vocabulary Related Terms

- Acute and subacute endocarditis
- Vegetations
- Ring abscess
- Septic infarcts
- Mycotic aneurysms
- Nonbacterial endocarditis (marantic endocarditis)
- Lambl’s excrescences
- Verrucous endocarditis
- Libman - Sacks endocarditis
- Myocarditis
- Giant cell myocarditis
- Diphtherial myocarditis
- Rheumatic myocarditis
- Aschoff bodies
- Chagas’ Disease - myocarditis
- Myocardial toxoplasmosis
- Pericarditis, acute and chronic
- Constrictive pericarditis
- Fibrinous pericarditis
- Uremic pericarditis
- “Bread and butter” pericarditis
- Pericardial effusion
- Chylous, serous and serosanguinous effusions
- Hemopericardium
- Cardiac tamponade
- Carcinoid syndrome
Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 7th Edition by, Kumar, Abbas, Fausto, 2005
Objective 1 - pp. 595-598
Objective 2 - pp. 607-609
Objective 3 - pp. 611-612
Objective 4 - pp. 599-600

Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 8th Edition by, Kumar, Abbas, Fausto, 2010
Objective 1 - pp. 566-569
Objective 2 - pp. 578-579
Objective 3 - pp. 581-583
Objective 4 - pp. 569-570
Topic: Ischemic Heart Disease, Sudden Cardiac Death

Objectives, the student should be able to:

1). Organize and be able to discuss the epidemiology, risk factors, pathogenesis, and different etiologies of coronary heart disease (ischemic heart disease).

2). Define and be able to differentiate the different types of angina (angina pectoris, Prinzmetal's angina and unstable angina).

3). Organize and be able to discuss the pathogenesis, risk factors, morphology and clinical features of a myocardial infarct. Be able to describe the sequences of gross and microscopic morphologic changes which occur in a myocardial infarction from the acute phase to healed scarring. Learn the distribution of myocardial infarction related to site of coronary artery obstruction.

4). List, describe and be able to discuss the different complications of myocardial infarction.

5). Organize and be able to describe the clinical features, laboratory diagnosis (cardiac profiles, CPK-MB, Troponin), and treatment of myocardial infarction.

6). Define ischemic cardiomyopathy. Organize and be able to discuss the clinical features and morphology of chronic Ischemic Heart Disease.

7). Define sudden cardiac death. List and be able to discuss the different causes, relationship to arrhythmias, and morphology of hearts in sudden cardiac death.

Vocabulary Words/ Related Terms:

- Coronary Heart Disease
- Infarct extension
- Atherosclerotic plaque
- Papillary muscle dysfunction
- Coronary artery thrombosis
- Mural thrombi
- Angina pectoris
- Acute pericarditis
- Prinzmetal's angina
- Ventricular aneurysm
- Unstable (crescendo) angina
- Creatine kinase - MM, MB, BB
- Myocardial infarction
- Troponin
- Contraction bands
- Ischemic cardiomyopathy
- Myocytolysis
- Sudden Cardiac Death
Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 7th Edition by, Kumar, Abbas, Fausto, 2005

- Objective 1 pp. 571-574; 520-524
- Objective 2 pp. 575
- Objective 3 pp. 575-583
- Objective 4 pp. 584-586
- Objective 5 pp. 583-584
- Objective 6 pp. 586
- Objective 7 pp. 586-587

Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 8th Edition by, Kumar, Abbas, Fausto, 2010

- Objective 1 pp. 545
- Objective 2 pp. 546-547
- Objective 3 pp. 547-556
- Objective 4 pp. 556-558
- Objective 5 pp. 547-556
- Objective 6 pp. 558
- Objective 7 pp. 558-559
MoD PATHOLOGY AND PATHOPHYSIOLOGY COURSE  
September 18, 2014, 11:00 am – 12:00 noon  
Dr. Elma LeDoux

Topic: Pathophysiology – Ischemic Heart Disease  
Objectives, the student should be able to:

1). Recognize the spectrum of ischemic heart disease and acute coronary syndrome.

2). State risk factors for coronary heart disease.

3). Identify the signs and symptoms of chronic stable angina and acute coronary syndrome.

4). State the potential mechanical and electrical complications of ischemic heart disease.

5). State the basic, emergent care of ACS.

6). Identify methods of evaluating patients for coronary heart disease (stress testing, coronary angiography, etc.).

Vocabulary Words/Related Terms:

<table>
<thead>
<tr>
<th>Ischemia</th>
<th>Mechanical Complications of ACS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatty Streak</td>
<td>Electrical Complications of ACS</td>
</tr>
<tr>
<td>Atheroma</td>
<td>Left Ventricular Aneurysm</td>
</tr>
<tr>
<td>Acute Coronary Syndrome (ACS)</td>
<td>Akinesia, hypokinesia, dyskinesia</td>
</tr>
<tr>
<td>Risk Factors for Coronary Heart Disease</td>
<td>Pulmonary Edema</td>
</tr>
<tr>
<td>Framingham Study</td>
<td>Defibrillation (AED, AICD)</td>
</tr>
<tr>
<td>Bogalusa Heart Study</td>
<td>AV Block</td>
</tr>
<tr>
<td>ACS-signs and symptoms</td>
<td>Bundle Branch Block</td>
</tr>
<tr>
<td>STEMI vs. NSTEMI</td>
<td>Temporary pacing</td>
</tr>
<tr>
<td>Cardiac Markers</td>
<td>Stress testing (more on this in Imaging)</td>
</tr>
<tr>
<td>“MONA” in ACS treatment</td>
<td>Angiography</td>
</tr>
<tr>
<td>Angioplasty; stent</td>
<td>Heart failure post-MI/remodeling</td>
</tr>
</tbody>
</table>
Topic: EKG #1, #2, and #3

Objectives - At the conclusion of the two lectures, the students should be able to recognize and describe the clinical significance of the following electrocardiographic findings:

1. Normal sinus rhythm (but is it appropriate for the clinical scenario, such as fever?)
2. Sinus bradycardia (athletes, beta-blockers, old age/sick sinus syndrome)
3. Sinus tachycardia (exercise, fever, anemia, ischemia, acute volume loss, cocaine, hyperthyroidism, sympathomimetic drugs, pulmonary embolus, etc.)
4. Atrial fibrillation (common in older patients with HTN or coronary heart disease (CHD); stroke risk, anticoagulation, rate control, EKG characterized by irregularly irregular rhythm and no p waves)
5. Ventricular tachycardia (wide QRS rhythm, if sustained is a medical emergency)
6. Ventricular fibrillation (no organized rhythm, no pulse, requires electrical shock)
7. Clinical significance of electrocardiographic complex’s intervals: PR, QRS, QT
8. Atrioventricular (AV) block- of varying degrees; first degree assoc with prolonged PR interval: caused by ischemia, drugs such as digoxin, old age/fibrosis of AV nodal tissue, inflammatory (Lyme disease). Complete AV block-usually needs pacemaker
9. Prolonged QRS duration- as in bundle branch block or severe hyperkalemia
10. Left ventricular hypertrophy- increased magnitude of the QRS complex on EKG associated with longstanding systemic hypertension
11. Low voltage complexes on the EKG- pericardial fluid, emphysema, myxedema heart disease
12. Peaked T waves-hyperkalemia (seen with renal failure, hemolysis, too much K+ supplement)
13. Flattened T waves with U waves- think hypokalemia (diuretic therapy)
14. Prolonged QT interval (acquired/iatrogenic most common)- antiarrhythmic meds, phenothiazines, hypothermia, myxedema, hypocalcemia

15. T wave inversion- myocardial ischemia (may be acute or chronic)

16. ST segment changes (elevation or depression) – indicate myocardial injury

17. Q waves- EKG marker of myocardial cell necrosis (infarction)- correlate with hx & Troponin

18. Atrial abnormalities (peaked or notched p waves) associated with atrial enlargement

19. Baseline artifact (tremor, shivering, myopotentials)

20. Electronic pacemaker spike (spike followed by a wide QRS when the ventricle is paced)
Topic: Congenital Heart Disease (CHD)
Objectives: The student should be able to:

1). List and be able to discuss the 3 major categories of Congenital Heart Disease (CHD), and the genetic and environmental factors which play a role. Define, describe and be able to discuss the types of Congenital Heart Disease that produce left-to-right shunts, right-to-left shunts and obstruction. Be familiar with the more common types.

2). Outline and be able to discuss the embryologic abnormalities, pathogenesis, gross morphology and clinical features of the 3 types of Atrial Septal Defect (ASD): ostium secundum, ostium primum, and sinus venosus. Which is most common?

3). Outline and be able to discuss the embryologic abnormalities - pathogenesis, gross morphology, complications and clinical features of Ventricular Septal Defects (VSD).

4). Outline and be able to discuss reasons the ductus arteriosus closes normally and reasons it does not close. Outline and be able to discuss the gross morphology, associated defects and clinical features of a Patent (‘Persistent’) Ductus Arteriosus (PDA).

5). Organize and be able to discuss the components of, pathogenesis of, gross morphology, complications and clinical features of Tetralogy of Fallot (TOF).

6). List and be able to discuss the pathogenesis, gross morphology, associated defects and clinical features of Transposition of the Great Arteries (TGA).

7). Organize and be able to discuss the associated malformations, associated vascular defects, associated syndromes, gross morphology and clinical features of Coarctation of the aorta (COA). Be able to differentiate between pre-ductal coarctation and post-ductal coarctation.

Vocabulary Words/Related Terms:

Cyanosis
Left-to-right shunt and right-to-left shunt
Atrial septal defects, (ostium secundum, ostium primum types)
Sinus venous atrial septal defect
Ventricular septal defects
Intraventricular muscular ridge
Ligamentum arteriosum
Patent ductus arteriosus
Tetralogy of Fallot
Transposition of the great vessels
Preductal coarctation
Post ductal coarctation
Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 7th Edition by, Kumar, Abbas, Fausto, 2005

Objective 1 pp. 564-566
Objective 2 pp. 567
Objective 3 pp. 568
Objective 4 pp. 568
Objective 5 pp. 568-569
Objective 6 pp. 569-570
Objective 7 pp. 570-571

Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 8th Edition by, Kumar, Abbas, Fausto, 2010

Objective 1 pp. 537-545
Objective 2 pp. 540-541
Objective 3 pp. 541
Objective 4 pp. 541-542
Objective 5 pp. 542-543
Objective 6 pp. 543
Objective 7 pp. 544
MoD PATHOLOGY AND PATHOPHYSIOLOGY COURSE
September 23, 2014
Student Independent Study

Topic: Cardiac Biopsy, Transplantation, Cardiomyopathies (CMP)

Objectives, the student should be able to:

1). List indications for heart transplantation and be able to define allograft and xenograft. Be able to describe the technique used to perform a heart biopsy.

2). Compare and contrast T-cell mediated and B-cell mediated (humoral) transplant rejection in terms of pathogenesis and morphology.

3). Organize and be able to discuss mechanisms and morphology of hyperacute rejection, acute rejection and chronic rejection.

4). Be able to discuss the role of immunosuppressive therapy following transplantation, and the complications of inadequate therapy (rejection) and excessive therapy (infection and neoplasia).

5). Be able to discuss long term pathologic changes which occur posttransplantation such as accelerated atherosclerotic graft vascular disease.

6). Organize and be able to discuss the classification of cardiomyopathies. Compare and contrast the etiologies, pathogenesis, morphology and clinical features and course of ischemic, dilated, hypertrophic, and restrictive cardiomyopathies.

Vocabulary Words/Related Terms:

- Allograft
- Xenograft
- Hyperacute rejection
- Acute rejection
- Acute rejection vasculitis
- Epstein-Barr virus lymphoproliferative disease
- Graft-versus-host disease
- Cardiomyopathy
- Ischemic cardiomyopathy

- Dilated cardiomyopathy
- Hypertrophic cardiomyopathy
- Restrictive cardiomyopathy
- Idiopathic hypertrophic subaortic stenosis
- Endomyocardial fibrosis
- Eosinophilic endomyocardial fibrosis (Loeffler’s Syndrome)
- Cardiac amyloidosis
- Cardiac hemochromatosis
Cardiac Biopsy, Transplantation, Cardiomyopathies (CMP)

Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 7th Edition by, Kumar, Abbas, Fausto, 2005

Objective 1 pp. 615 and lecture  
Objective 2 pp. 217-220  
Objective 3 pp. 220-221  
Objective 4 pp. 221-222  
Objective 5 pp. 221, 615  
Objective 6 pp. 601-607, 586

Recommended Reading: Robbins and Cotran Pathologic Basis of Disease 8th Edition by, Kumar, Abbas, Fausto, 2010

Objective 1 pp. 585 and lecture  
Objective 2 pp. 226-228  
Objective 3 pp. 228-229  
Objective 4 pp. 229-230  
Objective 5 pp. 585  
Objective 6 pp. 571-577
At the conclusion of this activity, the students should be able to:

1. Define the clinical syndrome of heart failure and its known risk factors.
2. Describe the various mechanisms responsible for the development of heart failure.
3. Relate the underlying pathophysiology to the clinical presentation.
4. Compare and contrast left heart failure, right heart failure, biventricular failure, systolic heart failure, and diastolic heart failure.
5. Describe and discuss the utility of both the American College of Cardiology/American Heart Association (ACC/AHA) and the New York Heart Association (NYHA) staging systems.
6. State the common drugs used in the treatment of heart failure and describe their mechanisms of action and potential complications of use.
7. Briefly discuss non-pharmacologic and evolving therapies (such as cardiac resynchronization therapy [CRT]) in the treatment of refractory heart failure.

Key Words:

- Heart failure syndrome
- Staging systems (ACC/AHA; NYHA)
- Systemic Hypertension
- Left Ventricular Hypertrophy (LVH)
- Necrosis
- Fibrosis
- Apoptosis
- Remodeling
- Mitral Regurgitation
- Systolic Heart Failure
- Hypokinesis
- Akinesis
- Dyskinesis
- Diastolic Heart Failure
- Left heart failure
- Right heart failure
- Biventricular failure
- Ejection Fraction (EF)
- Vasodilators (eg hydralazine)
- ACE inhibitors (eg ramipril)

- Sleep apnea
- Atrial fibrillation
- Bundle branch block
- Sudden Cardiac Death
- Cardiac Resynchronization therapy
- Left Ventricular Assist Device (LVAD)
- Abnormal excitation-contraction coupling
- Beta-adrenergic desensitization
- Hibernating myocardium
- Natriuretic peptides (eg nesiritide)
- Digoxin
- Inotropes (eg milrinone)
- Bradykinin
- Azotemia
- Beta blockers (e.g. carvedilol)
- Diuretics (eg furosemide)
- Aldosterone antagonists (eg spironolactone)
- Renin-Angiotensin-Aldosterone system
- Angiotensin receptor blockers (eg losartan)