

LEARNING OBJECTIVES FOR CARDIOVASCULAR PATHOPHYSIOLOGY

Overall Objective: The overall objective of the Cardiovascular Pathophysiology Course is to provide the student with a systematic approach to the evaluation of patients with heart disease. It will serve as a basis for the major clinical year when the natural history of disease and its modifications by therapies are studied.

The physiologic principles which govern the function of the heart and the alterations induced by functional and structural abnormalities will be discussed in the lectures.

In evaluating the patient, emphasis is placed on findings obtained from the history, physical examination, and hemodynamic tests. If the mechanisms underlying these findings can be identified, the correct etiologic, anatomic, and physiologic diagnoses can usually be deduced.

The cases have been selected to illustrate some of the major physiologic abnormalities identified in the lectures. The student who truly understands the physiologic events underlying the symptoms, signs, and laboratory tests presented in the cases and who can integrate basic knowledge with specific disease states will have achieved the goals of this course.

Specific Objectives:

MEDICAL KNOWLEDGE:

I BASIC PRINCIPLES UNDERLYING ALL CARDIAC DISEASE STATES

The Cardiac Cycle:

Students should be able to describe

1. The mechanics and hemodynamics of the normal cardiac cycle
2. The origin of heart sounds and murmurs

Students should be able to explain

1. Abnormalities of heart sounds and the origins of heart murmurs in different disease states

2. The hemodynamic abnormalities associated with disease states including valvular heart disease, myocardial disease, ischemic heart disease, and congenital heart disease.

Pulmonary Circulation:

Students should be able to describe

1. The normal pulmonary circulation including functional anatomy, determinants of pulmonary arterial pressure, pulmonary blood flow, determinants of pulmonary blood volume and the pulmonary endothelium
2. Abnormal pulmonary circulation including the mechanism of production of pulmonary hypertension and consequences of passive pulmonary hypertension.

Students should be able to explain

1. The mechanisms leading to pulmonary congestion in different disease states including valvular heart disease, myocardial disease, ischemic heart disease, and congenital heart disease.

Compliance and Ventricular Performance:

Students should be able to identify

1. The determinants of ventricular compliance

Students should be able to draw

1. Ventricular function curves (stroke work versus end-diastolic pressure and end-diastolic volume, end-diastolic pressure versus end-diastolic volume)

Students should be able to

1. Describe the relationship between ventricular volume and ventricular pressure in normal and diseased hearts
2. Construct ventricular function curves (work versus end-diastolic pressure) for different clinical states

Determinants of Myocardial Oxygen Supply and Demand

Students should be able to name

1. the determinants of myocardial oxygen supply and demand

Students should be able to explain

1. The relationship between myocardial supply and demand in different disease states including valvular heart disease, myocardial disease, ischemic heart disease, and congenital heart disease.

Compensatory Mechanisms in Disease States:

Students should be able to describe

1. Adaptive mechanisms in ventricular pressure and volume overloads
2. The Frank-Starling principle in heart failure
3. Neurohormonal activation in heart failure

Students should be able to

1. Describe the ventricular changes in pressure and volume overload states
2. Recognize common pressure and volume overload states
4. Explain the consequences of sustained neurohormonal activation in heart failure

II VALVULAR HEART DISEASE

Students should be able to discuss

1. etiologies of valvular abnormalities (acquired, congenital)
2. dysfunction caused by valvular abnormalities
3. endocarditis
4. complications of prosthetic heart valves
5. pathology of valvular lesions

Students should be able to

1. describe the complications of valvular dysfunction
2. describe the mechanism of heart failure for different types of valvular lesions

III MYOCARDIAL DISEASES

Students should be able to identify

1. the three types of myocardial disease (dilated, hypertrophic {primary and secondary}, and restrictive
2. the etiologies of different types of myocardial disease
3. the pathology of myocardial disease

Students should be able to

1. describe the different patterns of myocardial disease
2. explain the mechanisms of heart failure in the different forms of myocardial disease
3. discuss the distinctions between myocardial failure, congestive failure, and circulatory failure

IV CORONARY ARTERY DISEASE

Students should be able to describe

1. normal coronary anatomy
2. risk factors for the development of coronary artery disease
3. acute coronary syndromes (sudden death, myocardial infarction, unstable angina)
4. pathology of ischemic heart disease
5. lipid disorders

Students should be able to

1. explain the pathophysiology of the acute coronary syndromes
2. describe the therapy for acute coronary syndromes (aspirin, thrombolytic therapy, etc.) in terms of the underlying pathophysiology
3. describe the complications of acute myocardial infarction
4. explain the mechanisms of heart failure in coronary artery disease
5. describe lipid lowering medications, their mechanisms of action, and their complications

V CONGENITAL HEART DISEASE

Students should be able to discuss

1. the normal fetal, neonatal, and mature circulations

2. left-to-right shunts
3. common congenital abnormalities causing cyanosis
4. the genetics of congenital heart disease

Students should be able to

1. describe the common left-to-right shunts
2. discuss Eisenmenger's syndrome (pathophysiology, clinical manifestations, complications)
3. explain the mechanisms of heart failure in various forms of congenital heart disease

VI PERICARDIAL DISEASE AND CARDIAC TUMORS

Students should be able to identify

1. types and etiologies of pericardial disease
2. primary and secondary cardiac tumors

Students should be able to

1. explain the pathophysiology of cardiac tamponade
2. explain the mechanism of heart failure in pericardial constriction
3. discuss common tumors affecting the heart

PATIENT CARE:

In the case discussions, the student will begin to learn to interpret appropriate laboratory and diagnostic studies. They will learn to analyze and synthesize data from history, physical exam and diagnostic studies to develop hypotheses, diagnostic strategies and management plans.

INTERPERSONAL AND COMMUNICATION SKILLS:

In the case discussions, the student will be expected to communicate effectively with their peers to foster effective information exchange.

PROFESSIONALISM:

By participation in the case discussions, the student will exhibit their dependability and sense of responsibility. The student will have the opportunity to acknowledge and accept his/her limitations in knowledge and clinical skills and demonstrate his/her ability to deal with uncertainty.