



Course Title: 36CEU Diagnostics & Pathophysiology of the Cardiovascular System

Chapter 1: Control of Cardiovascular System

1. Which of the following is a function of the circulatory system?
(A): maintaining the proper gaseous exchange
(B): delivering important substances in body
(C): removing decay products
(D): all of the above
2. The foundation of hemodynamics is the _____ of the heart performance.
(A): phase mode
(B): electricity
(C): endurance
(D): elasticity
3. The anatomy of the heart is designed in such a way so that the displacement blood can penetrate without hindrance through the closed arterial valve into the _____.
(A): pulmonary trunk
(B): inferior vena cava
(C): aorta
(D): femoral artery
4. The tension created in S – L phase represents the _____ of the blood flow during the blood ejection phase in systolic pressure.
(A): viscosity
(B): velocity
(C): volume
(D): amount
5. Which of the following phase represents contraction of ventricular walls on a ECG curve?
(A): S – L
(B): R – S
(C): L – j
(D): P - P

Chapter 2: Molecular Control of Smooth Muscle Cell Differentiation Marker Genes by Serum Response Factor and Its Interacting Proteins

6. Vascular smooth muscle cells (SMCs) exhibit a wide range of different phenotypes at different stages of development.
(A): True
(B): False
7. Which of the following are differentiation marker genes in vascular smooth muscle cells?
(A): smooth muscle (SM) α -actin
(B): SM-myosin heavy chain
(C): SM22 α and h1-calponin

(D): all of the above

8. _____ was cloned as a co-factor of SRF by a bioinformatics-based screen and found to be exclusively expressed in SMCs and cardiomyocytes.

- (A): Myogenin
- (B): PAX3
- (C): Myocardin
- (D): MYH7

9. _____ are a family of transcription factors with a highly conserved DNA-binding domain that regulate cell proliferation, differentiation, and migration in many cell types during embryogenesis.

- (A): Homeodomain proteins
- (B): Mitochondria
- (C): Myosin and actin
- (D): Erythrocytes

Chapter 3: Trans Fatty Acids and Human Health

10. According to various studies, animal and vegetable fats satisfy _____ of the daily energy demands of human beings.

- (A): 1 % to 5%
- (B): 6% to 9%
- (C): 10% to 15%
- (D): 22% to 42%

11. Fat is a **major** source of energy for the body.

- (A): True
- (B): False

12. _____ increases the risk of heart diseases.

- (A): Fiber intake
- (B): Low-density lipoprotein (LDL)
- (C): Omega 3 fatty acids
- (D): High-density lipoprotein (HDL)

13. Which of the following hydrogenated oil is the **major** source of trans fatty acids (TFAs) worldwide?

- (A): canola oil
- (B): coconut oil
- (C): soybean oil
- (D): cashew oil

14. Trans fatty acids (TFAs) should contribute **not** more than ___% of the daily energy.

- (A): 1
- (B): 15
- (C): 20
- (D): 30

15. Margarine was invented in _____.

- (A): 1700
- (B): 1869

- (C): 1900
- (D): 1950

16. Obesity is a severe health issue that is characterized by fat accumulation and defined by means of the _____.

- (A): cholesterol ratio (CR)
- (B): blood sugar level
- (C): body mass index (BMI)
- (D): vitamin D level

17. Which of the following is a strong marker of cardiovascular risk?

- (A): Diabetes
- (B): Asthma
- (C): Smoking
- (D): LDL/HDL cholesterol ratio

18. In 2003, _____ became the first country to introduce laws to control the sale of foods containing TFAs.

- (A): Canada
- (B): England
- (C): Italy
- (D): Denmark

19. _____ contains lowest amount of trans fatty acids (TFAs).

- (A): Mediterranean diet
- (B): French fries
- (C): Chocolate cake
- (D): High bacon diet

Chapter 4: Control and Coordination of Vasomotor Tone in the Microcirculation

20. _____ control and coordinate the blood flow distribution in such a way that each capillary is correctly supplied at the proper pressure.

- (A): Arterioles
- (B): Aorta
- (C): Pulmonary veins
- (D): Superior vena cava

21. Which of the following is the outer layer of the vascular wall of the arteries?

- (A): tunica adventitia
- (B): tunica media
- (C): tunica intima
- (D): pericardium

22. The _____ controls the vasomotor tone by controlling blood vessel's lumen diameter.

- (A): purkinje fiber
- (B): vascular smooth muscle
- (C): hypothalamus
- (D): mitral valve

23. Which of the following play a central role controlling the vasomotor tone by producing signal

for smooth muscle cells?

- (A): immunoglobulins
- (B): hyper-polarizing factors
- (C): Ca^{2+} channels
- (D): GABA signals

24. _____ is a vasodilator that relaxes the vascular smooth muscles.

- (A): Epinephrine
- (B): Sodium chloride
- (C): Nitric oxide
- (D): Dopamine

25. Which of the following inter-cellular channels allows small metabolites and second messengers?

- (A): Gap junctions
- (B): Synapses
- (C): Axon terminals
- (D): Ventral roots

26. _____ is an intracellular vasomotor signal of the astrocyte-mediated neurovascular coupling.

- (A): Potassium
- (B): Iron
- (C): Vitamin D
- (D): Calcium

Chapter 5: Hemodynamics

27. _____ is the study of the relationship among physical factors affecting blood flow through the vessels.

- (A): Microbiology
- (B): Chemistry
- (C): Cardiology
- (D): Hemodynamics

28. _____ is defined as the volume of blood passing each point of the vessel in one unit time.

- (A): Vasoconstriction
- (B): Flow (F)
- (C): Vasodilation
- (D): Elasticity

29. _____ is how difficult it is for blood to flow from point A to point B.

- (A): Amicable
- (B): Affable
- (C): Resistance
- (D): Unresistant

30. The red blood cells, erythrocytes (RBCs), constitute 46% of the suspending particle volume of blood.

- (A): True
- (B): False

31. _____ increases pressure in the blood vessels causing more blood flow to the various body organs.

- (A): Physical exercise
- (B): Diabetes
- (C): Smoking
- (D): Sleeping

32. In _____, part of an artery dilates abnormally.

- (A): aneurysm
- (B): stroke
- (C): hydrocephalus
- (D): meningitis

33. Normally what is a mean arterial pressure in the foot arteries while standing?

- (A): 10 mmHg
- (B): 50 mmHg
- (C): 100 mmHg
- (D): 180 mmHg

34. In arteriosclerosis, blood vessels can cause hypertension, high pulse pressure and high work load for the heart.

- (A): True
- (B): False

Chapter 6: Adenosinergic System in the Mesenteric Vessels

35. Which of the following exerts vasodilation in blood vessels?

- (A): Pepsin
- (B): Renin
- (C): Adenosine
- (D): Cortisol

36. When administered systemically, adenosine produces which of the following?

- (A): hypotension
- (B): bradycardia
- (C): tachycardia
- (D): both A and B

37. _____ has been associated with increased L-arginine transport and Nitric Oxide synthesis as well as a reduced adenosine transport in human umbilical vein endothelial cells.

- (A): Preeclampsia
- (B): Gestational diabetes
- (C): High blood pressure
- (D): Gallstones

38. The _____ artery supplies blood to the descending colon and rectum.

- (A): superior mesenteric
- (B): inferior mesenteric
- (C): femoral
- (D): pulmonary

39. Under normal resting conditions in humans, total hepatic blood flow is 1200 to 1400 mL/min which represents about ____% of cardiac output.

- (A): 1
- (B): 5
- (C): 10
- (D): 25

40. The ____ regulate the tone of the mesenteric arteries and resistance of the blood vessels.

- (A): adrenal glands
- (B): thymus hormones
- (C): sympathetic adrenergic nerves
- (D): sciatic nerves

Chapter 7: Endothelial Nitric Oxide Synthase, Nitric Oxide and Metabolic Disturbances in the Vascular System

41. Obesity and diabetes increase the risk for the development of atherosclerosis and subsequent cardiovascular disease.

- (A): True
- (B): False

42. ____ negatively affect whole body insulin sensitivity and disturb carbohydrate and lipid metabolism.

- (A): Free fatty acids (FFA)
- (B): Low sodium levels
- (C): Aerobic exercise
- (D): Mediterranean diet

43. Dietary habits are **NOT** associated with acute or chronic effects on the vascular system.

- (A): True
- (B): False

44. Which of the following oils exert more positive and beneficial effect on vascular function?

- (A): Palm and Peanut
- (B): Vegetable
- (C): EPA and DHA-rich fish
- (D): none of the above

45. Which of the following are advantages of physical activity/exercise?

- (A): decrease in body fat storage
- (B): improvement in lipid and lipoprotein metabolism
- (C): improvement in insulin sensitivity
- (D): all of the above

Chapter 8: The Diagnostic Performance of Cardiovascular System and Evaluation of Hemodynamic Parameters Based on Heart Cycle Phase Analysis

46. ____ identifies the phase pattern of a heart cycle.

- (A): Chest x-ray
- (B): Electrocardiogram (ECG)
- (C): Echocardiography

(D): Angiography

47. The research in ECG detected that the area delivering the **most** informative signals is located within the zone of the _____.

- (A): apex
- (B): ascending aorta
- (C): pulmonary artery
- (D): superior vena cava

48. ____ shows very small amplitudes on ECG in patients with diminished contraction function of the interventricular septum and the myocardium.

- (A): QRS complex
- (B): No-P-wave effect
- (C): T and P wave bifurcation
- (D): T-wave inversion effect

Chapter 9: Biophysical Phenomena in Blood Flow System in the Process of Indirect Arterial Pressure Measurement

49. A sphygmomanometer measures which of the following?

- (A): systolic arterial pressure
- (B): diastolic arterial pressure
- (C): pulse
- (D): both A and B

Chapter 10: Interrelation Between the Changes of Phase Functions of Cardiac Muscle Contraction and Biochemical Processes as an Algorithm for Identifying Local Pathologies in Cardiovascular System

50. Which of the following consume **most** of oxygen in the body.

- (A): Lysosomes
- (B): Ribosomes
- (C): Mitochondria
- (D): Vesicles

51. Which of the following is needed for cardiac muscles to contract?

- (A): Adenosine triphosphate (ATP)
- (B): Ca^{2+}
- (C): Iron molecules
- (D): both A and B

52. Metabolism of cardiomyocytes is predominantly aerobic.

- (A): True
- (B): False

53. Synthesis of molecular ATP occurs in the process of oxidative phosphorylation in _____.

- (A): nucleus
- (B): mitochondria
- (C): vesicles
- (D): aorta

54. The **main** transporter of ATP in cardiomyocytes is _____.
- (A): hemoglobin
 - (B): creatine phosphate
 - (C): cholesterol
 - (D): potassium
55. Lack of oxygen affects which of the following stage of the cell energy supply?
- (A): synthesis
 - (B): transportation
 - (C): consumption of ATP
 - (D): all of the above
56. Normal rhythmic contractions of cardiac cells occur as a result of spontaneous activity of the pacemaker cells located in the _____.
- (A): superior vena cava
 - (B): mitral valve
 - (C): sinoatrial node
 - (D): apex of the heart
57. Autonomous frequency of normal heart contractions is about _____ beats per minute without external impacts.
- (A): 27
 - (B): 50
 - (C): 100
 - (D): 200
58. The central nervous system (CNS) activates which of the following during stress?
- (A): hypothalamus
 - (B): pituitary gland
 - (C): suprarenal gland
 - (D): all of the above

Chapter 11: Application of Computational Intelligence Techniques for Cardiovascular Diagnostics

59. Cardiovascular disease, including heart disease and stroke, remains the leading cause of death around the world.
- (A): True
 - (B): False
60. _____ is **most** commonly associated with abnormal or unstable blood pressure (BP).
- (A): Diabetes
 - (B): Hemodynamic instability
 - (C): Hydrocephalus
 - (D): Anemia
61. The typical electrocardiogram (ECG) consists of which of the following basic wave?
- (A): P
 - (B): QRS
 - (C): T
 - (D): all of the above

62. _____ represents the ventricular repolarization on ECG.

- (A): QRS complex
- (B): T wave
- (C): P wave
- (D): PR complex

63. The **most** difficult problem faced by today's automatic ECG analysis is the _____ of ECG waveforms.

- (A): size and shapes
- (B): lengths
- (C): large variation in the morphologies
- (D): timings

64. The effectiveness of ECG alarms in ICU depends on which of the following?

- (A): sensitivity of the alarms
- (B): specificity of the alarms
- (C): responses of the ICU staff to the alarms
- (D): all of the above

65. Due to limited physiological monitoring and a patient's individual pathophysiology, intensive care medicine has to cope with a high amount of uncertainty.

- (A): True
- (B): False

Chapter 12: Analysis of Time Course Changes in the Cardiovascular Response to Head-Up Tilt in Fighter Pilots

66. Which of the following cardiovascular change occurs in fighter pilots during head-up tilt (HUT)?

- (A): mean arterial pressure (MAP)
- (B): heart rate (HR) & stroke volume (SV)
- (C): total peripheral resistance (TPR)
- (D): all of the above

67. According to the study, during HUT the _____ are stimulated to different extents, based on their respective distances from the heart.

- (A): pulmonary veins
- (B): aortic and carotid baroreceptors
- (C): 3rd and 4th ventricles
- (D): femoral arteries

Chapter 13: Physical Activity and Cardiovascular Health

68. Physical activity comprises any body movement produced by the skeletal muscles that results in a substantial increase over the resting energy expenditure.

- (A): True
- (B): False

69. _____ is also an important expression of physical activity contributing to energy expenditure and to the energy balance.

- (A): Occupational work

- (B): Watching TV
- (C): Playing video games
- (D): Driving

70. According to the study in 1960 almost half the jobs (48%) in private industry in the U.S. required at least moderate intensity physical activity whereas in 2008 less than _____% demand this level of energy expenditure.

- (A): 20
- (B): 47
- (C): 60
- (D): 80

71. Center for Disease Control (CDC) and the American College of Sports Medicine (ACSM) recommend at least _____ of moderate-intensity physical activity on most days of the week.

- (A): 5 minutes
- (B): 30 minutes
- (C): 2 hours
- (D): 3.5 hours

72. According to the study highly active men had a 22% lower risk of all-cause mortality and women had _____% comparing to mildly active men and women, respectively.

- (A): 10
- (B): 15
- (C): 31
- (D): 45

73. _____ is a study of distribution and determinants of health-related events in specific populations, and the application of this study to the prevention and control of health problems.

- (A): Cardiology
- (B): Anthropology
- (C): Epidemiology
- (D): Sociology

74. _____ is a key pathophysiological event in vascular diseases and the consequent cardiovascular and cerebral injury.

- (A): Viral infection
- (B): Smoking
- (C): Alcohol intake
- (D): Inflammation

75. Which of the following are the **most** prevalent risk factors for cardiovascular diseases?

- (A): hypertension
- (B): diabetes and dyslipidemia
- (C): overweight or obesity
- (D): all of the above

Chapter 14: Cardiovascular Disease Risk Factors

76. _____ is a condition in which the walls of the arteries supplying blood to the heart muscle thicken.

- (A): Coronary heart disease (CHD)

- (B): Aneurysm
- (C): Meningitis
- (D): High blood pressure

77. The loss of blood supply to part of the brain may lead to irreversible damage to brain tissue and can cause _____.

- (A): stroke
- (B): diabetes
- (C): hydrocephalus
- (D): brain tumors

78. ____ involves atherosclerotic plaques narrowing the arteries supplying other regions apart from the myocardium and brain.

- (A): Brain aneurysm
- (B): Peripheral vascular disease (PVD)
- (C): High cholesterol ratio
- (D): Obesity

79. _____ is the **most** common cause of cardiovascular disease (CVD) and related mortality.

- (A): Diabetes
- (B): Alcohol intake
- (C): Atherosclerosis
- (D): Liver disease

80. Which of the following is a lipid-related cardiovascular risk factor?

- (A): high plasma total and low-density lipoprotein (LDL) cholesterol
- (B): low plasma high density lipoprotein (HDL) cholesterol
- (C): elevated plasma triglycerides
- (D): all of the above

81. Which of the following is a **major** determinant for triglyceride level?

- (A): genetic trait
- (B): number of erythrocytes
- (C): dietary factors
- (D): blood pressure ratio

82. Which of the following factors increase HDL cholesterol level?

- (A): exogenous estrogen and triglyceride lowering drugs
- (B): intensive exercise and moderate consumption of alcohol
- (C): loss of excess body fat
- (D): all of the above

83. _____ is a **major** clotting factor in the blood and a pro-inflammatory molecule that plays an important role in atherosclerosis.

- (A): Fibrinogen
- (B): Calcium
- (C): Pepsin
- (D): Thymine

84. Which of the following can significantly increase cardiovascular risk?

- (A): physical exercise

- (B): exposure to secondhand smoke
- (C): fatty fish oil
- (D): none of the above

85. Which of the following is a predominant source of saturated fatty acids (SFAs)?

- (A): meat
- (B): dairy
- (C): fruits and vegetables
- (D): both A and B

86. Oleic acid as a part of the _____ has been shown to have anti-inflammatory effects.

- (A): Keto diet
- (B): South Beach Diet
- (C): Mediterranean diet
- (D): Paleo Diet

87. Fish oils, fish oil supplements, and ocean fish are rich source of _____.

- (A): trans fatty acids
- (B): hydrogenated oils
- (C): omega-3 fatty acids
- (D): vitamin C

88. Trans fatty acids raise _____ level.

- (A): LDL cholesterol
- (B): HDL cholesterol
- (C): blood sugar
- (D): vitamin D

89. _____'s major function is to prevent oxidation of Polyunsaturated Fatty Acids in the cell membrane.

- (A): Vitamin E
- (B): Vitamin A
- (C): Vitamin D
- (D): Folic acid

90. Excessive alcohol intake is associated with increased risk for which of the following?

- (A): hypertension
- (B): stroke
- (C): coronary artery disease
- (D): all of the above

91. _____ is a risk factor for coronary heart disease, stroke, and heart failure.

- (A): Migraine
- (B): Hypertension
- (C): Meningitis
- (D): Hyperthyroidism

92. People with diabetes have more than two-fold greater risk of CVD compared to non-diabetics.

- (A): True
- (B): False

93. Which of the following Psychosocial stressor is associated with an increased likelihood of developing CVD?

- (A): money status
- (B): depression
- (C): job status
- (D): annual income

94. Loss of _____ following natural or surgical menopause is associated with increased CVD risk in women.

- (A): testosterone
- (B): progesterone
- (C): estrogen
- (D): epinephrine

Chapter 15: Cardiovascular and Cerebrovascular Problems in the Development of Cognitive Impairment: For Medical Professionals Involved in the Treatment of Atherosclerosis

95. _____ disease is the **most** common form of dementia or cognitive impairment.

- (A): Parkinson's
- (B): Foot & mouth
- (C): Alzheimer's
- (D): Hodgkin's

96. According to the study _____ due to heart failure is related to the deterioration of cognitive function in elderly.

- (A): low cardiac output
- (B): high cholesterol level
- (C): high blood sugar level
- (D): low bilirubin ratio

97. _____ is a risk factor for stroke.

- (A): Atrial fibrillation (AF)
- (B): Low vitamin D level
- (C): Low blood pressure
- (D): Hyperthyroidism

98. Which of the following contribute to the deterioration of cognitive function?

- (A): hyperlipidemia
- (B): hypertension
- (C): smoking and diabetes
- (D): all of the above

Chapter 16: French Paradox, Polyphenols and Cardiovascular Protection: The Oestrogenic Receptor- α Implication

99. The French paradox is based on the relationship between _____ and cardiovascular health.

- (A): red meat
- (B): red wine
- (C): seafood
- (D): tobacco consumption

100. _____ is found in colorful fruits and beneficial to the cardiovascular health.
(A): LDL
(B): Polyphenols
(C): Mercury
(D): Hydrogenated oils

101. Wine is a hydro-alcoholic acid solution and its **major** component is _____.
(A): water
(B): grapes
(C): vinegar
(D): ethanol

Chapter 17: Importance of Dermatology in Infective Endocarditis

102. Infective endocarditis (IE) is an endovascular microbial infection of intracardiac structures.
(A): True
(B): False

103. Which of the following is the **main** risk factor for infective endocarditis (IE)?
(A): gender
(B): socioeconomic status
(C): age
(D): environment

104. Which of the following is a first choice of imaging modality to diagnose infective endocarditis (IE)?
(A): MRI
(B): Digital Radiography
(C): Nuclear Medicine
(D): Transthoracic Echocardiography

Chapter 18: Cardiovascular Risk Factors: Implications in Diabetes, Other Disease States and Herbal Drugs

105. _____ is the **most** prevalent indicator for susceptibility to atherosclerotic heart disease.
(A): Obesity
(B): Hyperlipidemia
(C): Dementia
(D): Bronchitis

106. _____ is an amphipathic waxy steroid of fat that is manufactured in the liver or intestines and plays a critical role in cardiovascular diseases.
(A): Insulin
(B): Cholesterol
(C): Bilirubin
(D): Sucrose

107. _____ carries excess cholesterol away from most tissues to the liver.
(A): High Density Lipoprotein-cholesterol (HDL)
(B): Low Density Lipoprotein-cholesterol (LDL)

- (C): Pepsin
- (D): Corticosteroid

108. Atherosclerosis is caused by build up of which of the following in a blood vessel's wall?

- (A): lipids
- (B): cholesterol
- (C): calcium and cellular debris
- (D): all of the above

Chapter 19: Morphology and Functional Changes of Intestine, Trophology Status and Systemic Inflammation in Patients with Chronic Heart Failure

109. Which of the following is an effect of mal-absorption due to chronic heart failure (CHF)?

- (A): High blood pressure
- (B): Hypothyroidism
- (C): Loss of body mass
- (D): Kidney stones

110. _____ is defined as an unintentional severe weight loss caused by chronic heart failure.

- (A): Cardiac cachexia
- (B): Hyperlipidemia
- (C): Gastritis
- (D): Irritable Bowel Syndrome (IBS)

Chapter 20: Evaluation and Treatment of Hypotension in Premature Infants

111. Which of the following contributes to the blood pressure?

- (A): Cardiac output (CO)
- (B): Systemic vascular resistance (SVR)
- (C): Insulin regulation
- (D): Both A and B

112. _____ is the **most** frequent cause of hypotension in preterm infants.

- (A): Diabetes
- (B): Hypovolemia
- (C): Leukemia
- (D): Jaundice

113. Which of the following can cause hypovolemia in preterm infants?

- (A): acute blood loss
- (B): excessive trans-epidermal water loss during gestation
- (C): malnutrition
- (D): both A and B

114. _____ are performed routinely on neonates admitted to the NICU to measure arterial oxygenation as an indicator of the arterial circulation.

- (A): SpO2 measurements
- (B): ECGs
- (C): Angiograms
- (D): Chest X-rays

115. Which of the following provides useful information regarding CO, contractility, pulmonary hemodynamics, and PDA shunting in hypotensive preterm infants?

- (A): Computed Tomography
- (B): Echocardiography
- (C): MRI
- (D): Nuclear Medicine

116. _____ is the **most** commonly used vasopressor/inotrope for the treatment of systemic hypotension in preterm infants.

- (A): Insulin
- (B): Progesterone
- (C): Dopamine
- (D): Antibiotic

Chapter 21: Role of Echocardiography in Research into Neglected Cardiovascular Diseases in Sub-Saharan Africa

117. _____ is a fibrous thickening of the ventricular endocardium, leading to restrictive physiology associated with atrioventricular valve dysfunction.

- (A): Congestive heart failure
- (B): Hyperlipidemia
- (C): Endomyocardial fibrosis
- (D): High blood pressure

118. Which of the following is a characteristic of established endomyocardial fibrosis (EMF)?

- (A): thickened endocardium
- (B): ventricular obliteration
- (C): dilated atria
- (D): all of the above

Chapter 22: Psychophysiological Cardiovascular Functioning in Hostile Defensive Women

119. _____ are the leading causes of death and disability in the world, in both developed and developing countries, and also in both sexes.

- (A): Cardiovascular diseases
- (B): Occupational hazards
- (C): Alcohol and tobacco
- (D): Cancers

120. According to the study _____ can cause faster heart rate and higher blood pressure.

- (A): asthma
- (B): emotions
- (C): headache
- (D): menopause