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JAYPEE

2nd Edition

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MCQs in Physiology



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CHAPTER 3

Cardiovascular System

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What is important in CVS?
ECG, Cardiac output, Cardiac cycle, Venous return and their regulation, Coronary circulation, Haemodynamics of blood floow (especially to heart, lungs, kidney, etc.), Dynamics of shock.

1. The basis of Korotkow's sound is stated to be:
a. AV valve closure
b. Aortic valve closure
c. Arterial expansion
d. Arterial turbulence

2. Opening of aortic valves is initiated when:
a. Ventricular pressure exceeds aortic pressure
b. Ventricles contract
c. Ventricles relax
d. Aortic contracts

3. Essential hypertension is generally associated with an early increase in:
a. Oxygen use
b. Coronary flow
c. Cardiac work
d. Cardiac output

4. A hypertrophied ventricle will depolarize:
a. More rapidly than other ventricle
b. Shift the electrical to involved side
c. Before the other ventricle
d. None of the above

5. Changes in mean electrical axis of the ventricles may be caused by:
a. Muscular necrosis
b. Bundle branch block
c. Change in body position
d. Hypertrophy of one ventricle
e. All of the above

6. Pulse pressure in a particular vessel is determined chiefly by:
a. Distance from heart
b. Frictional characteristics of lumen
c. Distensibility
d. Cross-sectional area

7. Sympathetic stimulation of heart causes:
a. Increased coronary flow
b. Increased excitability of heart
c. Increased force of myocardial contraction
d. All of the above

8. Parasympathetic stimulation of heart causes:
a. Decreased rate of SA node
b. Increased excitability of A-V junctional fibers
c. Prevents ventricular contraction
d. None of the above

9. Increased pressure within carotid sinus produces:
a. Reflex increase in venous pressure
b. Reflex hyperpnoea
c. Reflex bradycardia
d. Increase in heart rate

Answers

1. d	2. a	3. c	4. b
5. e	6. c	7. d	8. a
9. c			

10. What is not true of "a" wave of venous pulsations in neck?
a. Exaggerated in tricuspid stenosis
b. Abolished in atrial fibrillation
c. Occurs just after in carotid artery
d. Exaggerated in complete heart block when P wave falls between QRS and T waves

11. In man cardiac cycle duration (sec) is:
a. 0.4
b. 0.8
c. 1
d. 1.6

12. Blood flow through left coronary artery:
a. Regulated by sympathetic vasodilator nerves
b. Increases when myocardial hypoxia
c. Greatest during early systole
d. Decrease in reflex response to fall in blood pressure

13. All is true for veins, except:
a. Innervated by sympathetic vasodilator nerves
b. Contain major part of blood volume
c. Respond to an increase in intraluminal pressure by constriction
d. Receive nutrition through vasa vasorum which arises from veins

14. Ventricular filling:
a. Produces third heart sound in some healthy persons
b. Depends mainly on contraction of atria
c. Begins during isometric ventricular relaxation
d. Will not occur unless atrial pressure is higher than atmospheric pressure

15. Sympathetic vasoconstrictor tone is diminished in response to increased activity of:
a. Carotid body chemoreceptors
b. Carotid sinus pressoreceptors
c. Pain receptors
d. Medullary chemoreceptors

16. When pacemaker is another area of heart, it denotes?
a. Wrong with conducting tissue
b. Wrong with SA node
c. Wrong with neural controlling system
d. None of the above

17. Dicrotic notch in aortic pressure curve is:
a. Magnified by aortic regurgitation
b. Absent in arteriosclerosis
c. Of no diagnostic value
d. Coincident with 2nd heart sound

18. Absolute refractory period of heart:
a. Heart is in diastole
b. Unresponsive to neural stimuli
c. No action potential from another part of heart will reexcite the heart muscle
d. None of the above

19. The law relating distending pressure and tension in a blood vessels wall is called:
a. Frank Starling law
b. Einthoven's law
c. Law of Laplace
d. Mary's Law

20. Vascular distensibility is least for the following vascular segment:
a. Pulmonary artery
b. Systemic artery
c. Systemic vein
d. Pulmonary vein

21. Turbulant blood flow is produced by:
a. Decreased velocity of circulation
b. Decreased cardiac output
c. Decreased haematocrit
d. All of the above

22. Pulse pressure is lowest in:
a. Capillaries
b. Arterioles
c. Radial artery
d. Femoral artery

Answers

10. c	**11. b**	**12. b**	**13. d**
14. a	**15. b**	**16. b**	**17. d**
18. c	**19. c**	**20. b**	**21. c**
22. a			

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23. Oncotic pressure is measured by:
a. Osmal
b. Arterioles
c. Radial artery
d. Femoral artery

24. Following are increased during exercise, except:
a. Cardiac Output
b. Venous return
c. Coronary blood flow
d. Peripheral vascular resistance

25. To estimate cardiac output by dye-dilution technique, dye concentration is measured in:
a. Sample from peripheral artery
b. Sample from right atrium
c. Sample from aorta
d. Sample from pulmonary artery continuously

26. What best characterizes the sinusoids?
a. Have smaller diameter than lymph capillaries
b. Are not found in skeletal muscles
c. Have a continuous endothelial lining
d. Have a continuous basement membrane

27. Bhopal gas tragedy is caused by Methyl isocyanate that causes J reflex. Which Indian Scientist did single nerve studies to discover this reflex?
a. AS Paintal
b. JC Bose
c. GK Chinnha
d. BK Anand

28. Causes of hypoxic hypoxia include all, except:
a. Kyphoscoliosis
b. Emphysema
c. Pulmonary fibrosis
d. Carbon monoxide poisoning

29. The most common form of hypoxia is:
a. Hypoxia
b. Stagnant
c. Anemic
d. Histitoxic

30. Hemoglobin has ..... times affinity for carbon monoxide than oxygen:
a. 50
b. 100
c. 210
d. 320

31. Carbon monoxide reacts with hemoglobin in form of:
a. Carboxyhemoglobin
b. Reduced hemoglobin
c. Cyanohemoglobin
c. Any of the above

32. Administration of oxygen rich gas mixtures is of value in all, except:
a. Histitoxic hypoxia
b. Stagnant hypoxia
c. Anemic hypoxia
d. Hypoxic hypoxia

33. Which of the following is most fatal complications of increased barometric pressure?
a. Oxygen toxicity
b. Nitrogen narcosis
c. Air embolism
d. Decompensation sickness

34. The normal plasma oncotic pressure is:
a. 10 mmHg
b. 15 mmHg
c. 20 mmHg
d. 30 mmHg

35. The prime regulator of blood flow through exercising muscles is:
a. Venous tone
b. Sympathetic control
c. Vasodilator metabolites
d. Parasympathetic control

36. Blood pressure is not reliable in:
a. Coarctation of aorta
b. Pulmonary stenosis
c. Atrial fibrillation
d. Polyarteritis nodosa

Answers

23. a	**24. d**	**25. a**	**26. b**
27. a	**28. d**	**29. a**	**30. c**
31. a	**32. a**	**33. c**	**34. d**
35. c	**36. c**		

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37. Blood flow in ml/100 g/min is maximum in:
a. Kidneys
b. Liver
c. Heart
d. Skin

38. After liver and kidneys, the blood flow is maximum in:
a. Brain
b. Skeletal muscle
c. Skin
d. Heart muscle

39. Major part of total peripheral resistance:
a. Medium and small arteries
b. Venules
c. Capillaries
d. Arterioles

40. Blood flow reaching the liver via portal versus hepatic artery is:
a. 2:1
b. 3:1
c. 4:1
d. 6:1

41. Hepatic blood flow is:
a. 500 ml/min
b. 800 ml/min
c. 1200 ml/min
d. 1500 ml/min

42. Heart receives about:
a. 1% cardiac output
b. 2% of cardiac output
c. 5% cardiac output
d. 10% cardiac output

43. Which of the following is true about composition of venous blood?

	PO_2 (mmHg) (saturated %)	PCO_2 (mmHg)	Hb
a.	95	40	75
b.	40	40	75
c.	40	46	75
d.	46	40	75

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Answers

37. a **38. b** **39. d** **40. a**
41. a **42. c** **43. c**

Explanatory Answers

1. Korotkoff's sound is due to arterial turbulence. It is described as tapping, banging, muffling and disappearance. ***(AK Jain 363)***
2. Opening of valves is a slowly developing process and does not produce any noise. When the pressure in the LV exceed the pressure in the aorta (80 mmHg) and the pressure in the pulmonary artery (10 to 12 mmHg), opening of semilunar occur. ***(AK Jain 298)***
3. Essential or primary hypertension is defined as arterial BP >150/90 mm Hg. Cardiac output (SV, HR) and viscosity of the blood is normal, increased PR due to sympathetic overactivity or influence of Angiotensin, catecholamines cause increase in cardiac work. ***(AK Jain 416)***
4. In left ventricular hypertrophy abnormal left axis deviation (LAD) of mean QRS vector left of –30 occurs. In right ventricular hypertrophy RAD right of + 110° is present. ***(AK Jain 310)***
5. Abnormal axis deviation is caused by bundle branch bloc, ventricular hypertrophy and myocardial infarction. ***(AK Jain 310)***
6. In advancing age due to loss in elasticity of blood vessels, stretching decreases which results in increased pressure during systole with normal diastolic blood pressure (Systolic hypertension). The blood vessels behave like a rigid tube. It is characterized by high pulse pressure. Pulse pressure is determined by elasticity of vessel wall that varies inversely with total peripheral resistance. ***(AK Jain 363)***
7. Sympathetic stimulation (T1-T5) increases heart rate (chronotropic action), increases speed and force of myocardium contraction (ionotropic), increases conductivity in conducting tissue (positive chronotropic) and increases excitability of heart (positive bathmotropic). ***(AK Jain 338)***
8. Parasympathetic supply decrease rate of impulse generation by SAN causing heart rate to decrease (negative chronotropic). ***(AK Jain 340)***
9. Due to pressure on carotid sinus produced by tight collar, marked bradycadia and hypotension is produced. ***(AK Jain 413)***
10. There is no valve at junction of superior vena cava (SVC) and right atrium (RA) therefore right atrial pressure changes are transmitted to the jugular vein in the neck.

    "a" wave is due to atrial systole. Some blood regurgitates into the great veins when atria contracts, even though the orifices of IVC and SVC are constricted. In addition veins inflow stops, causing rise in venous pressure, contributing to the "a" wave. ***(AK Jain 301)***
11. Cardiac cycle normal duration is 0.8 sec at heart rate of 75/min. Ventricular systole 0.3 sec, ventricular diastole 0.5 sec, atrial systole 0.1 sec and atrial diastole 0.7 sec. ***(AK Jain 297)***
12. Myocardial hypoxia causes formation of adenosine, a vasodilator metabolite that increases coronary blood flow (phenomenon called reactive hyperemia). ***(AK Jain 383)***
13. Veins are capacitance vessels, which simply change their luminal shape to accommodate large volume of blood without much increase in transmural pressure. ***(AK Jain 326)***
14. The third heart sounds (HS_3) is due to vibrations of cardiac walls produced by rapid filling phase of the ventricles during ventricular diastole proper. It has low intensity and is of 0.1 sec duration. ***(AK Jain 301)***
15. Reduction of sympathetic constrictor tone occurs in condition of flushed skin of stress, via hypothalamus, vasodilation of skeletal muscle, viscera, skin and blood vessels through baroreceptors. ***(AK Jain 340)***

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16. SAN is called the cardiac pacemaker and its rate of discharge normally determines the rate at which the heart beats. ***(AK Jain 294)***
17. During protodiastole the arterial pressure exceeds that in the ventricles and results in sharp closure of semilunar valves causing sharp (HS_2) or dicrotic notch. ***(AK Jain 300)***
18. Cardiac muscle is refractory, i.e. nonresponsive to restimulation during most part of action potential. Normal refractory period (ARP) is 180-200 msec and relative refractory period (RRP) is upto 50 msec ***(AK Jain 180)***
19. Law of Laplace states that the distending pressure (P) in a distensible hollow object is equal to the tension in the wall (T) divided by the radius of curvature (R). P=2T/R ***(AK Jain 332)***
20. Skin and skeletal muscles blood vessels represents by far the most important site of peripheral resistance and offer maximum respiration to blood flow. ***(AK Jain 325)***
21. Turbulent blood flow is given by Reynold's number (Re)= Vρd/n where V is velocity of flow in cm/sec, ρ density of blood equal to 1, d is the diameter of blood vessel, n is viscosity of blood in poise. Turbulence develops when Re exceeds 2000. Viscosity is directly proportional to haematocrit, i.e. packed cell volume, concentration of plasma protein, diameter of vessel wall because of plasma skimming. Viscosity decreases when vessel wall diameter falls below 300 μm due to secretion of mucpolysaccharide. Re > 3000 turbulence is present, <2000 no turbulence is present. ***(AK Jain 331)***
22. Pulse pressure is the difference between systolic and diastolic pressure (50 mm Hg). Pressure falls very slightly in large and medium sized arteries but rapidly in small arteries and arterioles. The pulse pressure decline rapidly to 5 mm at the end of arterioles. ***(Ganong 22nd edition 587)***
23. Colloidal osmotic pressure due to plasma colloids is called oncotic pressure. ***(AK Jain 15)***
24. Sympathetic vasodilator nerve dilate the arterioles only. Therefore during exercise vascular peripheral resistance of muscle blood vessels decrease allowing more blood supply. ***(AK Jain 400)***
25. Dye is injected into vein, it passes though the heart, then pulmonary circulation and finally will be evenly distributed in blood stream. Hence sample is taken from peripheral artery. ***(AK Jain 301)***
26. Sinusoids are discontinuous capillaries, possess a thin endothelial layer with large gaps between individual cells. Therefore, allow easy exchange of large protein molecules. Bone marrow, liver and spleen are the sites. ***(AK Jain 326)***
27. J receptors are sensitive to the content of interstitial fluid between the capillary endothelium and alveolar epithelium. They respond to pulmonary congestion, pulmonary embolisation, pulmonary oedema and inhaling of strong irritants/chemicals. Tachypnoea is rapid shallow respiration. J receptors have a physiological role in severe exercise, cause an increase in interstitial fluid in the lungs. J receptors get stimulated, inhibiting spinal stretch reflex and thus limit the power of contraction of skeletal muscle. ***(AK Jain 471)***
28. CO poisoning is a form of anemic hypoxia, as carboxyhemoglobin is formed preventing hemoglobin to combine with oxygen. ***(AK Jain 487)***
29. The most common form of hypoxia is hypoxic hypoxia. At tissue level, the oxygen utilization is 5ml % in normal as well as hpoxic hypoxia (high altitude). ***(AK Jain 486)***
30. Hemoglobin has 250 times affinities for CO. ***(AK Jain 57)***
31. Carbon monoxide reacts with hemoglobin in the form of carboxyhemoglobin. ***(AK Jain 57)***
32. Administration of oxygen gas mixtures is of no value in histotoxic hypoxia. Histotoxic hypoxia: hypoxia in which the amount of oxygen delivered to the tissue cells is adequate but because of the action of a toxic agent the tissue cells cannot make use of the oxygen supplied to them. ***(AK Jain 489)***
33. Entry of air into the blood circulation may cause death. ***(AK Jain 501)***

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34. Colloidal osmotic pressure due to plasma colloids means same as that of oncotic pressure. The normal oncotic pressure is 25 mm Hg or 30 mm Hg. ***(AK Jain 53)***
35. The prime regulator of blood flow through exercising muscle is vasodilator metabolites. ***(AK Jain 325)***
36. Blood pressure is not reliable in atrial fibrillation. Excitation waves causes irregular contractions. So BP is also not regular. ***(AK Jain 315)***
37. Normally renal blood flow is 1.2 to 1.3 L/min, i.e. 300-400 ml/100 gm/min. Coronary blood flow is 60 to 80 ml/100 gm/min, Brain 55 ml/100 gm/min, skeletal muscle 3-4 ml/100 gm/min. ***(AK Jain 525)***
38. After liver (1300 ml) and kidneys (1200 ml) the blood flow is maximum in skeletal muscle (1000 ml). ***(AK Jain 325)***
39. Resistance vessels are arterioles. ***(AK Jain 324)***
40. Blood flow (ml/min) reaching the liver via portal versus hepatic artery is 1200: 300 = 4:1. ***(AK Jain 245)***
41. Hepatic artery is 1500 ml/min, 300 ml/min from hepatic artery, 1200 ml/min from portal venous supply. ***(AK Jain 245)***
42. Heart receives about 5% of cardiac output. Blood flow to the heart = 250 ml/min. Cardiac output = 5000 ml/min (approx). Therefore % of cardiac output going to heart (250/5000) × 100 = 5%. ***(AK Jain 355)***
43. PO_2 (mm of Hg) is 40 and PCO_2 is 46. ***(AK Jain 463)***

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