CARDIOVASCULAR SYSTEM (CVS) Test Questions

Part 1: Mid-CVS Questions

Anatomy & Histology

1. A cardiothoracic surgeon is performing a thymectomy and carefully dissects the contents of the anterior mediastinum. Which of the following structures is normally found within this specific space?

A) Deep cardiac plexus
B) Sternopericardial ligaments
C) Bifurcation of the trachea
D) Hemi-azygos vein

Correct Answer: B

2. During a central venous catheterization via the right internal jugular vein, understanding venous anatomy is crucial. Which vessel drains directly into the right brachiocephalic vein?

A) Right internal thoracic vein
B) Azygos vein
C) Left superior intercostal vein
D) Hemi-azygos vein

Correct Answer: A

3. Identifying anatomical landmarks is essential for interpreting chest imaging. Which of the following structural pairings or descriptions is incorrect?

A) Left common carotid artery — originates directly from the arch of the aorta
B) Arch of the aorta — begins and ends at the level of the sternal angle (T4/T5)
C) Brachiocephalic artery — bifurcates at the level of the left sternoclavicular joint
D) Left subclavian artery — lies posterior to the left common carotid artery at its origin

Correct Answer: C

4. A 52-year-old woman presents with progressive shortness of breath and facial swelling. During physical examination, the physician notes marked facial flushing, jugular venous distension, and upper extremity edema when she raises both arms above her head (Pemberton's sign). Occlusion of which vessel explains these clinical findings?

A) Subclavian vein
B) Brachiocephalic vein
C) Inferior vena cava
D) Superior vena cava

Correct Answer: D

5. During cardiac surgery, a surgeon places a finger through the transverse pericardial sinus to clamp the great vessels. Which of the following structures forms the immediate anterior boundary of this sinus?

A) Superior vena cava
B) Ascending aorta and pulmonary trunk
C) Left atrium
D) Inferior vena cava

Correct Answer: B

6. Which of the following statements regarding the external morphology and surfaces of the heart is incorrect?

A) The diaphragmatic (inferior) surface is composed equally of both atria and both ventricles.
B) The sternocostal (anterior) surface is formed mainly by the right ventricle.
C) The base of the heart is formed predominantly by the left atrium.
D) The apex of the heart is formed entirely by the left ventricle.

Correct Answer: A

7. The fibrous skeleton provides structural support and electrical insulation for the heart. The right fibrous trigone specifically connects which two structures?

A) The pulmonary valve ring and the mitral valve ring
B) The tricuspid valve ring and the mitral valve ring
C) The aortic valve ring and the tricuspid valve ring
D) The aortic valve ring and the pulmonary valve ring

Correct Answer: C

8. During cannulation for cardiopulmonary bypass surgery, surgeons routinely utilize a specific, distensible heart chamber appendage as an easily accessible point of entry to insert a venous cannula. Which structure is most commonly used for this purpose?

A) Left auricle
B) Apex of the left ventricle
C) Conus arteriosus
D) Right auricle

Correct Answer: D

9. Understanding the spatial orientation of cardiac valves is essential for echocardiography. Which of the following pairings or descriptions is incorrect?

A) Tricuspid valve — possesses anterior, posterior, and septal cusps.
B) Mitral valve — the anterior cusp is positioned anteriorly and to the left.
C) Aortic valve — possesses right, left, and posterior (non-coronary) cusps.
D) Pulmonary valve — possesses anterior, right, and left semilunar cusps.

Correct Answer: B

10. Purkinje fibers must distribute electrical impulses rapidly across the right ventricular wall to ensure coordinated contraction. Cardiac conduction waves reach the anterior papillary muscle of the right ventricle primarily via which pathway?

A) Terminal crest (crista terminalis)
B) Septomarginal trabecula (moderator band)
C) Tendon of Todaro
D) Pectinate muscles

Correct Answer: B

11. Examination of a tissue biopsy under an electron microscope reveals microvessels consisting of a single layer of endothelial cells, a continuous basal lamina, and numerous well-developed occluding tight junctions (zonulae occludentes). What type of vessel is this?

A) Continuous capillaries
B) Fenestrated capillaries
C) Sinusoidal capillaries
D) Post-capillary venules

Correct Answer: A

12. A cross-section of a major blood vessel is examined under a light microscope. The tissue displays a thick subendothelial layer, a completely absent internal elastic lamina, a thin tunica media, and a remarkably thick tunica adventitia containing abundant bundles of longitudinally arranged smooth muscle cells. Identify this vessel:

A) Aorta
B) Pulmonary trunk
C) Femoral artery
D) Inferior Vena Cava (IVC)

Correct Answer: D

13. A 64-year-old patient undergoes an angiogram following a myocardial infarction. Imaging shows a significant atherosclerotic occlusion leading to compromised blood supply to the left atrium and the lateral wall of the left ventricle. Which artery is most likely occluded?

A) Left anterior descending artery
B) Circumflex artery
C) Marginal artery
D) Posterior interventricular artery

Correct Answer: B

14. During a clinical case discussion, a cardiologist mentions that a patient has a 'Right Dominant' coronary circulation. What does this classification mean anatomically?

A) The anterior interventricular artery originates from the right coronary artery.
B) The right coronary artery supplies the entire left ventricular apex.
C) The posterior interventricular artery is derived from the right coronary artery.
D) The sinoatrial (SA) nodal artery arises from the right coronary artery.

Correct Answer: C

15. To isolate and clearly evaluate the sound produced by the closure of the pulmonary valve without interference from other cardiac valves, where should a clinician place the stethoscope?

A) Right 2nd intercostal space, adjacent to the sternocostal joint
B) Left 2nd intercostal space, adjacent to the sternocostal joint
C) Left 5th intercostal space, along the midclavicular line
D) Lower left sternal border, near the 5th intercostal space

Correct Answer: B

16. During an ablation procedure for a cardiac arrhythmia, an electrophysiologist needs to precisely locate the atrioventricular (AV) node. Which anatomical landmark serves to delineate this region?

A) Oval fossa (Fossa ovalis)
B) Terminal crest (Crista terminalis)
C) Sinus venarum
D) Triangle of Koch

Correct Answer: D

Microbiology

17. Which of the following statements regarding Viral Hemorrhagic Fevers (VHFs) is false?

A) Filoviruses (e.g., Ebola and Marburg) can be transmitted directly from person to person.
B) Arboviruses are a distinct family of viruses that cause VHF, and include Hantavirus, Arenaviridae, and Filoviridae.
C) Lassa fever is caused by an Arenavirus and is typically spread via contact with rodent excreta.
D) Hemorrhagic manifestations in VHFs are largely driven by endothelial dysfunction and thrombocytopenia.

Correct Answer: B

18. In the clinical diagnosis of Infective Endocarditis (IE) using the Modified Duke Criteria, several minor criteria represent systemic immunologic or vascular signs. Which of the following is not part of these clinical combination signs?

A) Osler nodes
B) Roth spots
C) Janeway lesions
D) Hypothermia

Correct Answer: D

19. A 45-year-old male with a history of a prosthetic mitral valve presents with a low-grade fever, malaise, fatigue, and weight loss that have gradually worsened over the past 5 weeks. Physical examination reveals a new-onset holosystolic cardiac murmur. Blood cultures are drawn. Given the clinical course, this case represents subacute infective endocarditis. What is the most common causative organism?

A) Staphylococcus aureus
B) Enterococcus faecalis
C) Viridans Group Streptococci (VGS)
D) Pseudomonas aeruginosa

Correct Answer: C

20. Outbreaks of Viral Hemorrhagic Fevers (VHFs) pose significant public health challenges. Which of the following VHF-causing agents lacks the capacity for direct person-to-person transmission?

A) Ebola virus
B) Dengue fever virus
C) Lassa fever virus
D) Marburg virus

Correct Answer: B

Physiology & Pharmacology

21. During the cardiac cycle, blood flows across chambers driven by pressure differentials. The smallest difference in pressure during ventricular systole occurs between which two structures?

A) Left atrium and Left ventricle
B) Right atrium and Left ventricle
C) Left ventricle and Aorta
D) Right ventricle and Pulmonary artery

Correct Answer: C

22. A patient is evaluated in the clinic and found to have a cardiac output of 8 L/min, an R-R interval on EKG of 0.75 seconds, and an end-systolic volume (ESV) of 50 mL. What is this patient's calculated ejection fraction (EF)?

A) 56%
B) 67%
C) 75%
D) Cannot be determined with the provided data

Correct Answer: B

23. Which specific phase of the cardiac cycle begins immediately at the moment of semilunar valve closure?

A) Isovolumetric contraction
B) Rapid ejection
C) Isovolumetric relaxation
D) Reduced ejection

Correct Answer: C

24. Regarding the functional anatomy and mechanical protection of cardiac valves, which of the following statements is incorrect?

A) The anterior cusp of the mitral valve is anatomically attached anteriorly and to the left.
B) Eddies and vortices formed by blood filling the sinuses of Valsalva prevent the aortic valve leaflets from striking and occluding the coronary ostia during ejection.
C) Papillary muscles contract during systole to prevent the eversion of AV valve leaflets into the atria.
D) The semilunar valves lack chordae tendineae because their smaller orifice areas and structural geometry experience less mechanical stress than AV valves.

Correct Answer: A

25. According to the Frank-Starling mechanism of the heart, what is the primary intrinsic determinant of myocardial contractile force?

A) Afterload (mean arterial pressure)
B) End-diastolic volume (or initial muscle fiber length)
C) Peak systolic ventricular pressure
D) Intracellular cyclic AMP levels

Correct Answer: B

26. A clinical instructor asks a student to pair a classic valvular heart defect with its characteristic abnormal heart murmur. Which of the following represents a correct pairing?

A) Mitral regurgitation — Diastolic murmur
B) Aortic stenosis — Diastolic murmur
C) Mitral stenosis — Systolic murmur
D) Aortic regurgitation — Diastolic murmur

Correct Answer: D

27. A patient presents with signs of digitalis toxicity. Which of the following cardiac manifestations or clinical findings is not a recognized adverse effect of digoxin therapy?

A) Ventricular tachycardia (including Bidirectional Ventricular Tachycardia)

B) Abnormal color vision distortion (xanthopsia/yellow-green halos)

C) Atrial tachycardia with a rate of 100 bpm accompanied by severe ventricular escape rhythms

D) High-degree atrioventricular (AV) nodal block

Correct Answer: C

28. What is the primary physiological purpose of the specialized electrical conduction delay observed within the atrioventricular (AV) node?

A) To protect the ventricles from rapid retrograde conduction waves

B) To allow adequate time for ventricular filling during atrial contraction

C) To allow the SA node time to repolarize completely

D) To ensure that all cardiac valves open simultaneously

Correct Answer: B

29. During which distinct phase of a normal, healthy cardiac cycle are all four heart valves (both atrioventricular and both semilunar valves) open simultaneously?

A) Early diastole

B) Mid-systole

C) Late diastole

D) There is no phase where all four valves are open at the same time

Correct Answer: D

30. In electrocardiography (EKG), if a patient's mean electrical axis reveals a highly positive QRS complex in Lead III (+120°) and a completely positive deflection in Lead aVR (-150°), the total net vector of ventricular depolarization is pointing toward which value?

A) +120°

B) -90°

C) -30°

D) +180° (Extreme right axis deviation)

Correct Answer: D

31. A 56-year-old male with a history of severe coronary artery disease is prescribed dipyridamole. He subsequently experiences worsening retrosternal chest pain. This phenomenon, known as the 'coronary steal phenomenon,' is primarily caused by which mechanism?

A) Direct vasoconstriction of collateral vessels supplying ischemic myocardium
B) Selective vasodilation of non-ischemic arterioles, diverting blood flow away from ischemic zones
C) Severe drug-induced systemic hypotension that reduces global coronary perfusion pressure
D) Microvascular thrombosis induced by platelet activation

Correct Answer: B

32. A pregnant woman requires management for chronic hypertension. The physician selects alpha-methyldopa. What is the primary mechanism of action of this pharmacological agent?

A) Direct antagonism of peripheral alpha-1 adrenergic receptors on vascular smooth muscle
B) Direct inhibition of voltage-gated L-type calcium channels in arteriole beds
C) Conversion to a false neurotransmitter (alpha-methylnorepinephrine) that acts as a central alpha-2 adrenergic agonist
D) Irreversible inhibition of tyrosine hydroxylase, preventing catecholamine synthesis

Correct Answer: C

Part 2: CVS Final Questions

Physiology & Hemodynamics

33. Anemia is a clinical condition characterized by reduced hemoglobin concentration, which profoundly alters cardiovascular dynamics. Why is anemia characteristically associated with highly turbulent blood flow?

A) Increased plasma density
B) Increased peripheral vascular resistance
C) Decreased blood viscosity
D) Decreased cardiac output

Correct Answer: C

34. During a complex neck dissection surgery, a patient's vagus nerve is inadvertently injured. Postoperatively, the nurse reports a markedly elevated pulse pressure. What physiological mechanism explains this finding?

A) Compensatory sympathetic activation triggered by peripheral chemoreceptors
B) Direct vagal-mediated vasoconstriction of large muscular arteries
C) Severe bradycardia resulting in increased ventricular filling times
D) Loss of the normal baroreceptor reflex brake, leading to uninhibited sympathetic output

Correct Answer: D

35. A patient presents with acute respiratory distress, severe hypoxemia (paO2 < 60 mmHg), significantly elevated arterial blood pressure, and marked hyperventilation. Which of the following choices explains the development of hypertension in this specific context?

A) Central chemoreceptors sensing low oxygen levels, directly causing hyperventilation

B) Peripheral chemoreceptors sensing low oxygen levels, driving reflex sympathetic activation

C) Central chemoreceptors sensing low oxygen levels, directly driving sympathetic activation

D) Baroreceptors sensing low oxygen levels, decreasing their firing rate to increase pressure

Correct Answer: B

36. A patient undergoes an above-the-knee amputation of the right lower extremity. How does this surgical removal of a limb affect the patient's Total Peripheral Resistance (TPR)?

A) TPR decreases because of local compensatory vasodilation in the opposite limb

B) TPR increases because a major vascular bed arranged in parallel circulation has been removed

C) TPR decreases because the total physical length of the systemic vasculature has been shortened

D) TPR remains unchanged because systemic autoregulation instantly matches cardiac output

Correct Answer: B

37. A 42-year-old patient with nephrotic syndrome is losing massive quantities of plasma proteins (primarily albumin) in their urine. Which of the following forces explains the development of the generalized pitting edema seen in this patient?

A) Decreased capillary oncotic pressure

B) Increased capillary hydrostatic pressure

C) Increased interstitial fluid oncotic pressure

D) Decreased lymphatic drainage capacity

Correct Answer: A

38. A 22-year-old male is diagnosed with a left-sided varicocele ('bag of worms' appearance in the scrotum). Which structural pathology underlies the development of a varicocele?

A) Fibrotic occlusion of the internal pudendal artery

B) Ineffective or absent venous valves coupled with gravitational stretching of the venous leaflets

C) Hypertrophy of the tunica adventitia within the pampiniform plexus

D) Increased hydrostatic pressure within the inferior vena cava draining the right gonad

Correct Answer: B

39. A 75-year-old patient presents for a routine check-up. Her blood pressure is noted to be 140/50 mmHg. What structural vascular change associated with normal aging best explains this wide pulse pressure?

A) Loss of aortic compliance (elastic expansion) and decreased elastic recoil

B) Generalized hypertrophy of precapillary arteriolar sphincters

C) Widespread formation of arteriovenous shunts in skeletal muscle

D) Compensatory downregulation of endothelial nitric oxide synthase (eNOS)

Correct Answer: A

40. If you want to selectively increase local blood flow to a specific organ tissue bed without altering the patient's global systemic mean arterial blood pressure, which of the following interventions could achieve this?

A) Increasing global cardiac output while simultaneously increasing total peripheral resistance

B) Inducing widespread systemic venoconstriction to increase venous return

C) Increasing the diameter of local arterioles supplying that specific tissue bed

D) Decreasing local capillary density within the target organ tissue

Correct Answer: C

41. A student has an inflatable blood pressure cuff wrapped tightly around their arm for an extended period during a laboratory demonstration. Immediately after the cuff is deflated, the skin distal to the cuff becomes visibly red and warm to the touch. What physiological phenomenon explains this clinical finding?

A) Reactive hyperemia triggered by the local accumulation of vasodilator metabolites

B) Active hyperemia driven by a sudden burst of sympathetic beta-2 adrenergic output

C) Ischemic necrosis causing microvascular endothelial breakdown

D) Reflex-mediated systemic baroreceptor activation lowering total resistance

Correct Answer: A

42. Which of the following choices accurately describes systemic vessel hemodynamics during the initial phases of strenuous exercise?

A) Immediate, generalized vasoconstriction of active skeletal muscle vessels to preserve core pressure

B) Profound vasodilation of renal and splanchnic vascular beds to accommodate increased cardiac output

C) Global venodilation to increase the storage capacity of the venous reservoir

D) Early vasoconstriction of cutaneous blood vessels followed by eventual vasodilation as core temperature rises

Correct Answer: D

Pharmacology & Pathology

43. A 34-year-old female being treated for a cardiac arrhythmia develops a malar rash, arthralgias, and generalized fatigue. Laboratory testing reveals positive anti-histone antibodies, confirming Drug-Induced Systemic Lupus Erythematosus (DI-SLE). Which antiarrhythmic drug is most likely responsible for this presentation?

A) Amiodarone
B) Procainamide
C) Lidocaine
D) Verapamil

Correct Answer: B

44. Antiarrhythmic agents must be precisely matched to their specific clinical indications. Which of the following drug-to-therapeutic-use pairings is incorrect?

A) Dofetilide — Treatment of symptomatic sinus bradycardia
B) Amiodarone — Management of both supraventricular and ventricular arrhythmias
C) Verapamil — Control of ventricular rate in supraventricular arrhythmias (e.g., Atrial Fibrillation)
D) Lidocaine — Acute suppression of ventricular arrhythmias (e.g., post-myocardial infarction)
E) Esmolol — Rapid, perioperative management of acute tachyarrhythmias

Correct Answer: A

45. A clinician wishes to utilize a Class IB antiarrhythmic agent that selectively binds to voltage-gated sodium channels in their inactivated state, showing high affinity for rapidly firing or ischemic myocardial tissue. Which drug fits this classification?

A) Amiodarone
B) Dofetilide
C) Lidocaine
D) Verapamil

Correct Answer: C

46. Re-entry is a major mechanism underlying the generation of clinical tachyarrhythmias. All of the following conditions are required to establish a functional re-entry circuit except one. Which description is not mandatory?

A) A region of unidirectional conduction block within one pathway of the circuit
B) The presence of a fixed, distinct anatomical bifurcation or physical tissue loop
C) The conduction time around the tissue loop must exceed the refractory period of the unblocked tissue
D) A localized area of slowed conduction velocity within the circuit loop

Correct Answer: B

47. Drug-induced or congenital prolongation of the QT interval on an EKG is a critical clinical concern because it predisposes patients to lethal polymorphic ventricular tachycardia (Torsades de Pointes). Which of the following statements regarding QT prolongation is false?

A) The prolongation can be congenital, caused by mutations in cardiac ion channel genes.
B) QT prolongation is precipitated and worsened by tachycardic, fast heart rates.
C) It can be severely precipitated by electrolyte derangements, particularly hypokalemia.
D) Delayed repolarization permits the development of Early Afterdepolarizations (EADs) that trigger arrhythmias.
E) Numerous non-cardiac drugs, including certain macrolide antibiotics and antipsychotics, can induce this state.

Correct Answer: B

Part 3: Embryology & Clinical Congenital Anomalies

48. During the complex remodeling of the primitive embryonic venous system, the segment of the inferior vena cava (IVC) located within the liver (the hepatic segment) is derived from which embryonic precursor structure?

A) Left umbilical vein
B) Anterior cardinal vein
C) Right vitelline vein
D) Subcardinal vein

Correct Answer: C

49. Development of the systemic venous system relies on the symmetric regression and persistence of specific vascular segments. The left jugular vein is derived from which embryonic precursor?

A) Left anterior cardinal vein
B) Right anterior cardinal vein
C) Left vitelline vein
D) Posterior cardinal vein

Correct Answer: A

50. The specific endothelial valve that guards the orifice of the coronary sinus within the right atrium—known anatomically as the Valve of the Coronary Sinus (Thebesian Valve)—develops embryologically from which structure?

A) Left venous valve of the sinus venosus
B) Right venous valve of the sinus venosus
C) Septum spurium
D) Endocardial cushions

Correct Answer: B

51. Congenital cardiovascular defects can lead to profound structural abnormalities. A newborn is diagnosed with complete closure of the tricuspid orifice, preventing direct communication between the right atrium and right ventricle. This defect, known as Tricuspid Atresia, is characteristically associated with which of the following secondary anatomical findings?

A) Hypoplasia (atrophy) of the right ventricle and hypertrophy of the left ventricle
B) Pronounced atrophy and thinning of the right atrial wall
C) Isolated hypoplasia of the left ventricle
D) Severe dextrocardia with normal ventricular volumes

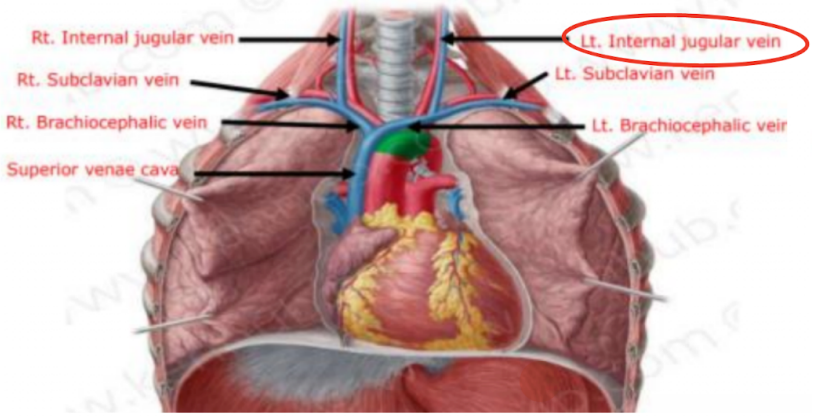
Correct Answer: A

52. A 4-month-old infant presents with worsening cyanosis, feeding difficulties, and a harsh systolic ejection murmur heard best at the upper left sternal border. A chest X-ray reveals a classic 'boot-shaped' heart, but minimal lung congestion. What is the primary clinical factor that determines the severity of cyanosis and the overall prognosis in a patient with Tetralogy of Fallot (TOF)?

A) The exact physical size of the ventricular septal defect (VSD)
B) The presence of a concomitant patent ductus arteriosus (PDA)
C) The degree of overriding of the aorta
D) The degree of right ventricular outflow tract obstruction (pulmonary stenosis)

Correct Answer: D

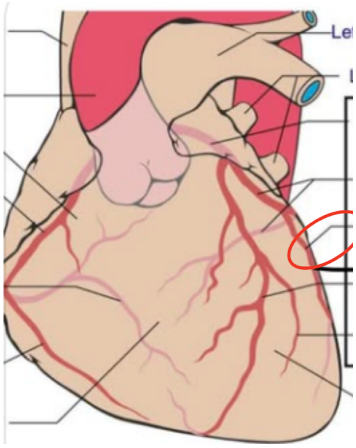
53. Which embryonic vein is the primary origin of this structure?



A. Right anterior cardinal vein
B. Left anterior cardinal vein
C. Left posterior cardinal vein
D. Right vitelline vein

Correct Answer: B

54. The circled artery most commonly arises from which artery?



A. Right coronary artery
B. Anterior interventricular (LAD) artery
C. Circumflex artery
D. Posterior interventricular artery
E. Conus artery

Correct Answer: c

55. Identify the circled vessel:

Image 4. CT Anatomy of the chest, axial reconstruction. 1, Trachea. 2, Rib. 3, Brachiocephalic artery. 4, Brachiocephalic vein (left side). 5, Pectoralis major muscle. 6, Pectoralis minor muscle. 7, Common carotid artery (left side). 8, Subclavian artery (left side). 9, Oesophagus. 10, Scapula.

A. Left common carotid artery
B. Brachiocephalic trunk
C. Left subclavian artery
D. Left vertebral artery
E. Descending thoracic aorta

Correct Answer: c