

पुस्तिका में पृष्ठों की संख्या-32  
No. of Pages in Booklet -32  
पुस्तिका में प्रश्नों की संख्या-180  
No. of Questions in Booklet -180

**SSAP-22**

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प्रश्न पुस्तिका संख्या /  
Question Booklet No.

Paper Code : 13  
SUBJECT : Cardiology  
(Super Speciality)

समय : 3.00 घण्टे  
Time: 3.00 Hours

अधिकतम अंक : 180  
Maximum Marks: 180

प्रश्न-पत्र पुस्तिका के पेपर सील/ पॉलिथिन बैग को खोलने पर परीक्षार्थी यह सुनिश्चित कर लें कि प्रश्न पुस्तिका संख्या तथा ओ.एम.आर उत्तर-पत्रक पर अंकित बारकोड समान हैं। इसमें कोई भिन्नता हो तो परीक्षार्थी वीक्षक से दूसरा प्रश्न-पत्र प्राप्त कर लें। ऐसा सुनिश्चित करने की जिम्मेदारी अभ्यर्थी की होगी।

**On opening the paper seal /polythene bag of the Question Booklet the candidate should ensure that Question Booklet Number and Barcode of OMR Answer Sheet must be same. If there is any difference, candidate must obtain another Question Booklet from Invigilator. Candidate himself shall be responsible for ensuring this.**

### परीक्षार्थियों के लिए निर्देश

1. सभी प्रश्नों के उत्तर दीजिए।
2. सभी प्रश्नों के अंक समान हैं।
3. प्रत्येक प्रश्न का केवल एक ही उत्तर दीजिए।
4. एक से अधिक उत्तर देने की दशा में प्रश्न के उत्तर को गलत माना जाएगा।
5. प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं, जिन्हें क्रमशः 1, 2, 3, 4 अंकित किया गया है। अभ्यर्थी को सही उत्तर निर्दिष्ट करते हुए उनमें से केवल एक गोले अथवा बबल को उत्तर-पत्रक पर नीले बॉल प्वाइंट पेन से गहरा करना है।
6. **OMR** उत्तर-पत्रक इस परीक्षा पुस्तिका के अन्दर रखा है। जब आपको परीक्षा पुस्तिका खोलने को कहा जाए, तो उत्तर-पत्रक निकाल कर ध्यान से केवल नीले बॉल प्वाइंट पेन से विवरण भरें।
7. प्रत्येक गलत उत्तर के लिए प्रश्न अंक का 1/3 भाग काटा जायेगा। गलत उत्तर से तात्पर्य अशुद्ध उत्तर अथवा किसी भी प्रश्न के एक से अधिक उत्तर से है। किसी भी प्रश्न से संबंधित गोले या बबल को खाली छोड़ना गलत उत्तर नहीं माना जायेगा।
8. मोबाइल फोन अथवा इलेक्ट्रॉनिक यंत्र का परीक्षा हॉल में प्रयोग पूर्णतया वर्जित है। यदि किसी अभ्यर्थी के पास ऐसी कोई वर्जित सामग्री मिलती है, तो उसके विरुद्ध आयोग द्वारा नियमानुसार कार्यवाही की जायेगी।
9. कृपया अपना रोल नम्बर ओ.एम.आर. पत्रक पर सावधानीपूर्वक सही भरें। गलत अथवा अपूर्ण रोल नम्बर भरने पर 5 अंक कुल प्राप्तांकों में से काटे जा सकते हैं।
10. यदि किसी प्रश्न में किसी प्रकार की कोई मुद्रण या तथ्यात्मक प्रकार की त्रुटि हो, तो प्रश्न के हिन्दी तथा अंग्रेजी रूपान्तरों में से अंग्रेजी रूपान्तर मान्य होगा।

**चेतावनी :** अगर कोई अभ्यर्थी नकल करते पकड़ा जाता है या उसके पास से कोई अनधिकृत सामग्री पाई जाती है, तो उस अभ्यर्थी के विरुद्ध पुलिस में प्राथमिकी दर्ज कराते हुए विविध नियमों-प्रावधानों के तहत कार्यवाही की जाएगी। साथ ही विभाग ऐसे अभ्यर्थी को भविष्य में होने वाली विभाग की समस्त परीक्षाओं से विवर्जित कर सकता है।

### INSTRUCTIONS FOR CANDIDATES

1. Answer all questions.
2. All questions carry equal marks.
3. Only one answer is to be given for each question.
4. If more than one answers are marked, it would be treated as wrong answer.
5. Each question has four alternative responses marked serially as 1, 2, 3, 4. You have to darken only one circle or bubble indicating the correct answer on the Answer Sheet using **BLUE BALL POINT PEN**.
6. The **OMR** Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully with **blue ball point pen** only.
7. **1/3 part of the mark(s) of each question will be deducted for each wrong answer.** A wrong answer means an incorrect answer or more than one answers for any question. Leaving all the relevant circles or bubbles of any question blank will not be considered as wrong answer.
8. Mobile Phone or any other electronic gadget in the examination hall is strictly prohibited. A candidate found with any of such objectionable material with him/her will be strictly dealt as per rules.
9. Please correctly fill your Roll Number in O.M.R. Sheet. **5 Marks** can be deducted for filling wrong or incomplete Roll Number.
10. If there is any sort of ambiguity/mistake either of printing or factual nature, then out of Hindi and English Version of the question, the English Version will be treated as standard.

**Warning :** If a candidate is found copying or if any unauthorized material is found in his/her possession, F.I.R. would be lodged against him/her in the Police Station and he/she would liable to be prosecuted. Department may also debar him/her permanently from all future examinations.

**इस परीक्षा पुस्तिका को तब तक न खोलें जब तक कहा न जाए।  
Do not open this Test Booklet until you are asked to do so.**

## CARDIOLOGY

1. A 40-year-old man is investigated for shortness of breath on exertion. The following catheter data were obtained: Pressure (mmHg) -
- |                                   |       |
|-----------------------------------|-------|
| Right atrial end - diastolic      | 6     |
| Right ventricular end - diastolic | 5     |
| Pulmonary artery                  | 54/34 |
| Pulmonary capillary wedge         | 18    |
| Left ventricular end - diastolic  | 10    |

What underlying condition caused the patient to be breathless?

- |                     |                        |
|---------------------|------------------------|
| (1) Mitral Stenosis | (2) Tricuspid Stenosis |
| (3) Aortic Stenosis | (4) Pulmonary Stenosis |
2. A 64-year-old male with metastatic carcinoma lung presented to emergency with a systolic BP of 73/25 mmHg. He presented complaining of fatigue and worsening dyspnea over the last 3-5 days. His physical examination shows elevated neck veins. Chest radiograph shows a massive, water bottle-shaped heart shadow and no new pulmonary infiltrates. Which of the following additional findings is most likely present on physical examination?
- (1) Fall in systolic blood pressure greater than 10 mmHg with inspiration
  - (2) Lack of fall of the jugular venous pressure with inspiration
  - (3) Late diastolic murmur with opening snap
  - (4) Pulsus parvus et tardus
3. A 72-year-old man seeks evaluation for leg pain with ambulation. He describes the pain as an aching to crampy pain in the muscles of his thighs. The pain subsides within minutes of resting. On rare occasions, he has noted numbness of his right foot at rest, and pain in his right leg has woken him at night. He has a history of hypertension and cerebrovascular disease. Four years previously had a transient ischemic attack and underwent right carotid endarterectomy. He currently takes aspirin, irbesartan, hydrochlorothiazide, and atenolol on a daily basis. On examination, he is noted to have diminished dorsalis pedis and posterior tibial pulses bilaterally. The right dorsalis pedis pulse is faint. There is loss of hair in the distal extremities. Capillary refill is approximately 5 seconds in the right foot and 3 seconds in the left foot. Which of the following findings would be suggestive of critical ischemia of the right foot?
- (1) Ankle - brachial index less than 0.3
  - (2) Ankle - brachial index less than 0.9
  - (3) Ankle - brachial index greater than 1.2
  - (4) Lack of palpable dorsalis pedis pulse

4. In SYNTAX trial, which strategy (CABG or PCI) was associated with a significantly lower rate of MACE (i.e. death, MI, stroke, or repeat revascularization) at 5 year follow-up for all patients with left main stenosis?
- (1) CABG
  - (2) PCI
  - (3) PCI associated with higher rate of repeat revascularization but lower rate of stroke, resulting in no significant difference between two strategies
  - (4) Hybrid revascularization with a LIMA to the LAD and a DES to the LCX and RCA lesions
5. A 40-year-old man presents to A & E with a 12-hour history of sudden-onset palpitations. He has no previous medical history of note and the clinical examination is unremarkable. His troponin is negative. His ECG shows atrial fibrillation with a ventricular rate of 130 bpm, his BP is 130/70 mmHg and his oxygen saturation is 98%. He has no symptoms associated with his palpitations. What is the best management?
- (1) Amiodarone 300 mg IV loading followed by 900 mg over 24 hours
  - (2) Flecainide 2 mg/kg over 10 minutes followed by oral dose
  - (3) Digoxin 500 micrograms IV followed by 500 micrograms after 6 hours
  - (4) Anti-coagulate, rate control, and perform DC cardio version in 6 weeks
6. A 72-year-old man with symptomatic persistent atrial fibrillation is admitted for pulmonary vein isolation. Which one of the following statement is most likely to be true?
- (1) The risk of stroke is around 5%.
  - (2) The chance of successful ablation of the arrhythmia is around 90% at 1 year.
  - (3) The chance of successful ablation is higher for persistent AF than for paroxysmal AF.
  - (4) The risk of cardiac tamponade is around 5%.
7. Which of the following statement about pulsus paradoxus is correct?
- (1) Inspiration in normal individuals results in a decline of systolic arterial pressure of upto 18 mmHg.
  - (2) Accurate determination of pulsus paradoxus requires intra-arterial pressure measurement.
  - (3) Pulsus paradoxus in tamponade is typically accompanied by the Kussmaul sign.
  - (4) Pulsus paradoxus is unlikely to be present in patients with significant aortic regurgitation, even in the presence of tamponade.
8. A 56-year-old asymptomatic man with a history of hypertension and cigarette smoking is referred for an exercise treadmill test. After 7 minutes on the standard Bruce protocol, he is noted to have 1 mm of flat ST – segment depression in leads II, III and aVF. He stops exercising at 9 minutes because of leg fatigue and breathlessness. The peak heart rate is 85% of the maximum predicted for his age. The ST segments return to baseline by 1 minute into recovery. Which of the following statement is correct?
- (1) This test is conclusive for severe stenosis of the proximal right coronary artery.
  - (2) His risk of death due to an acute myocardial infarction during the next year is > 50%.
  - (3) He should proceed directly to coronary angiography.
  - (4) The test predicts a 25% risk of cardiac events over the next 5 years, most likely the development of angina.

9. A 46-year-old woman with progressive exertional dyspnea was recently found to have bilateral hilar adenopathy on chest x – ray and first – degree Atrioventricular (AV) block on her ECG. A transbronchial biopsy demonstrated non-caseating granulomas consistent with sarcoidosis and she is referred to you for assessment of cardiac involvement. Which of the following statement is TRUE regarding the diagnostic evaluation of cardiac sarcoidosis?
- (1) Left ventricular regional wall motion abnormalities in sarcoidosis are typically present in coronary distributions.
  - (2) An elevated serum angiotensin converting enzyme level has low sensitivity, but high specificity for the diagnosis of sarcoidosis.
  - (3) Sarcoid-associated Late Gadolinium Enhancement (LGE) on Cardiac Magnetic Resonance (CMR) imaging is usually localized to the endocardial border.
  - (4) <sup>18</sup>F – fluorodeoxyglucose (FDG) uptake on cardiac Positron Emission Tomography (PET) differentiates active cardiac sarcoidosis from inactive scar tissue.
10. The timing of an “innocent” murmur is usually -
- (1) Early systolic
  - (2) Presystolic
  - (3) Midsystolic
  - (4) Holosystolic
11. Which of the following statement regarding the measurement of cardiac output is correct?
- (1) In the thermodilution method, cardiac output is directly related to the area under the thermodilution curve.
  - (2) The thermodilution method tends to underestimate cardiac output in low output states.
  - (3) In the presence of tricuspid regurgitation, the thermodilution method is preferred over the Fick technique for measuring cardiac output.
  - (4) A limitation of the Fick method is the necessity of measuring oxygen consumption in a steady state.
12. Which of the following statements is TRUE regarding the response of healthy older adults to aerobic exercise?
- (1) Ventricular stroke volume decreases with age such that there is an age-related fall in cardiac output during exercise.
  - (2) Systolic and diastolic blood pressures each rise significantly during aerobic exercise.
  - (3) A decline in beta-adrenergic responsiveness contributes to a fall in the maximum heart rate in older individuals.
  - (4) A normal adult’s cardiac output doubles during maximum aerobic exercise.
13. Physiologic states and dynamic maneuvers alter the characteristics of heart murmurs. Which of the following statement is correct?
- (1) In acute mitral regurgitation, the left atrial pressure rises dramatically so that the murmur is heard only during late systole.
  - (2) Rising from a squatting to a standing position causes the murmur of mitral valve prolapse to begin later in systole.
  - (3) The diastolic rumble of mitral stenosis becomes more prominent during the strain phase of a Valsalva maneuver.
  - (4) The murmur of aortic stenosis, but not mitral regurgitation, becomes louder during the beat after a premature ventricular contraction.

14. Which of the following statement concerning the echocardiographic evaluation of aortic stenosis is TRUE?
- (1) The peak-to-peak gradient measured at cardiac catheterization routinely exceeds the peak instantaneous aortic valve pressure gradient assessed by Doppler echocardiography.
  - (2) Patients with impaired left ventricular function may have severe aortic stenosis, as determined by the continuity equation, despite a peak outflow velocity of only 2 to 3 m/s.
  - (3) Among Doppler techniques, the most accurate transaortic valve flow velocity in aortic stenosis is measured by pulsed – wave Doppler imaging.
  - (4) The greatest degree of error in the calculation of aortic valve area using the continuity equation resides in inaccurate measurement of the transaortic valve flow velocity.
15. Which of the following conditions is NOT often associated with a prominent R wave in electrocardiographic lead V1?
- (1) Right ventricular hypertrophy
  - (2) Wolff-Parkinson – White syndrome
  - (3) Duchenne muscular dystrophy
  - (4) Left anterior fascicular block
16. Which of the following statement about digitalis-induced arrhythmias is FALSE?
- (1) Ventricular bigeminy with varying morphology and regular coupling is a sign of digitalis toxicity.
  - (2) Non-paroxysmal junctional tachycardia is a common digitalis – induced arrhythmia.
  - (3) Atrial tachycardia with block is diagnostic of digitalis toxicity.
  - (4) The development of atrioventricular dissociation in a patient taking digitalis is a likely indication of digitalis toxicity.
17. The only FDA approved therapy for systemic thrombolysis in patients with acute pulmonary embolism is -
- (1) Reteplase
  - (2) Tenecteplase
  - (3) Alteplase
  - (4) Streptokinase
18. A 63-year-old woman suffered bronchospasm during diagnostic coronary angiography with a high osmolar contrast agent 2 years ago. She presents for repeat coronary angiography secondary to angina and a positive stress test. What is the likelihood of another reaction, when exposed to a non-ionic low osmolar contrast agent?
- (1) <1%
  - (2) <10%
  - (3) <25%
  - (4) <50%
19. Among patients presenting with acute STEMI, the presence of a CTO in a non-infarct-related artery (non - IRA) is -
- (1) A stronger predictor of 5 year mortality than the presence of Multivessel Disease (MVD)
  - (2) Less predictive of 5 year mortality after STEMI than the presence of MVD and diabetes mellitus
  - (3) Not independently associated with increased 5 year mortality after adjustment for other angiographic and clinical variables
  - (4) A predictor of late-term (> 1 year) mortality, but not at earlier time points

20. Which of the following is NOT likely to be a complication of cyclosporine therapy in the cardiac transplant recipient?
- (1) Gingival hyperplasia
  - (2) Myelosuppression
  - (3) Hypertension
  - (4) Tremor
21. Which of the following statement about the use of adenosine in the management of cardiac arrhythmias is NOT correct?
- (1) Adenosine administration aids in the diagnosis of wide QRS complex tachycardia.
  - (2) Slow, peripheral intravenous administration of 6 to 12 mg of adenosine terminates supraventricular tachycardia involving the atrioventricular node.
  - (3) Patients with heart transplants demonstrate an exaggerated response to adenosine.
  - (4) Adenosine may be ineffective in patients who have recently consumed caffeine.
22. Which of the following statement about congenital Long QT Syndromes (LQTS) is TRUE?
- (1) Most forms of LQTS result from mutations in genes that code for proteins in cardiac calcium channels.
  - (2) LQT1 patients experience a high frequency of cardiac events during swimming.
  - (3) Sudden loud acoustic events are a common trigger of syncope in LQT3 patients.
  - (4) Cardiac events during sleep are common in patients with LQT2.
23. Which of the following statement about the antiarrhythmic drug dofetilide is NOT correct?
- (1) It has significant renal excretion.
  - (2) It prolongs the QT interval in a dose-dependent fashion.
  - (3) It is unsafe in patients with prior myocardial infarction.
  - (4) Patients must be admitted to hospital for drug initiation.
24. Which of the following statement regarding genetic lipoprotein disorders is correct?
- (1) Familial Hypercholesterolemia (FH) results from mutations in the gene that encodes the enzyme HMG-CoA reductase.
  - (2) Mutations in the apoB gene results in a form of hypercholesterolemia that is indistinguishable from FH.
  - (3) Patients with familial hypertriglyceridemia typically develop xanthomas or xanthelasmas.
  - (4) Gain of function mutations in the PCSK9 gene result in decreased low-density lipoprotein (LDL) cholesterol level and a reduction in coronary events.
25. Clinical trials of which of the following dietary interventions have NOT shown significant improvements in coronary artery disease endpoints?
- (1) Mediterranean – style diet supplemented with alpha-linolenic acid
  - (2) Mediterranean style diet supplemented with extra-virgin olive oil or nuts
  - (3) Low-carbohydrate, high protein, high fat diet (e.g. Atkins-style diet)
  - (4) Regular fatty fish or fish oil consumption

26. Which of the following statement regarding high sensitivity C-reactive protein (hs-CRP) is NOT correct?
- (1) Statins reduce hs-CRP in a manner directly related to their low density lipoprotein-lowering effect.
  - (2) An hs-CRP level  $>3\text{mg/L}$  in a patient with unstable angina is associated with an increased risk of recurrent coronary events.
  - (3) An elevated level of hs-CRP is predictive of the onset of type 2 diabetes mellitus.
  - (4) Statin therapy has been shown to reduce cardiovascular events in apparently healthy individuals with elevated hs-CRP even if the baseline LDL-C is  $<130\text{ mg/dL}$ .
27. Which statement regarding ventricular free wall rupture complicating Myocardial Infarction (MI) is NOT correct?
- (1) It is more likely to occur in patients with a history of prior MI.
  - (2) It occurs most commonly within the first 48 hours after infarction.
  - (3) It occurs in 1% to 2% of patients after MI.
  - (4) It is more common in elderly patients and in women.
28. Which statement regarding acute coronary syndromes is FALSE?
- (1) Occlusive coronary thrombosis is typically responsible for ST – segment elevations.
  - (2) Q waves develop in approximately 75% of patients with ST-segment elevation myocardial infarction who do not undergo acute reperfusion interventions.
  - (3) The presence of pathologic Q waves reliably indicates the transmural involvement of myocardial infarction.
  - (4) Non-occlusive coronary thrombosis typically results in ST – segment depressions and/or T wave inversions.
29. Which of the following statement concerning the utility of cardiac biomarkers in patients with acute coronary syndromes is FALSE?
- (1) Levels of C-Reactive protein (CRP) are greatly elevated in patients with An Acute Coronary Syndrome (ACS) compared with patients with stable coronary disease.
  - (2) CRP and cardiac – specified troponin levels offer complementary information in the prognosis of patients with ACS.
  - (3) In patients with unstable angina, an elevated myeloperoxidase level is associated with increased risk of death.
  - (4) Patients with non-ST-elevation MI and elevated White Blood Cell (WBC) counts have similar mortality rates as those with normal WBC counts.
30. Which of the following statement regarding Peripheral Arterial Disease (PAD) is correct?
- (1) The prevalence of PAD is 5% in patients older than 75 years.
  - (2) Hypercholesterolemia is a more powerful risk factor than cigarette smoking.
  - (3) Claudication symptoms are present in only 10% to 30% of patients with PAD.
  - (4) The earliest aortic site of fatty streak and atheroma development is in the ascending thoracic aorta.

31. Which of the following statement regarding endovascular repair of abdominal aortic aneurysm is FALSE?
- (1) Anatomic constraints limit the use of endografts.
  - (2) Primary success rates for aneurysm exclusion are > 75%.
  - (3) Endoleaks are a serious complication after implantation.
  - (4) Long term outcomes are better with endografts than with open surgical repair.
32. Which of the following statement regarding oral antiplatelet agents is correct?
- (1) Clopidogrel and prasugrel are irreversible inhibitors of the platelet P2Y<sub>12</sub> adenosine diphosphate receptor.
  - (2) Prasugrel displays a slower onset of action than clopidogrel.
  - (3) Non-steroidal anti-inflammatory drugs such as ibuprofen enhance the antiplatelet effect of aspirin.
  - (4) Cilostazol mechanism of action is via activation of nitric oxide synthesis.
33. True statement about the ECG in congenital heart disease include all of the following, except -
- (1) First degree Atrioventricular (AV) block is often present in patients with AV septal defects, congenitally corrected transposition of the great arteries or Ebstein anomaly.
  - (2) Atrial fibrillation is more common than atrial flutter in young patients with congenital heart disease.
  - (3) The presence of right ventricular hypertrophy suggests pulmonary hypertension or right ventricular outflow tract obstruction.
  - (4) In infants, the electrocardiographic pattern of myocardial infarction is associated with anomalous origin of a coronary artery.
34. Which of the following statement about the clinical findings in patients with Atrial Septal Defect (ASD) is NOT correct?
- (1) A midsystolic ejection murmur and a diastolic rumbling murmur at the lower left sternal border are common features on cardiac examination.
  - (2) Patients with ostium primum defect usually show right ventricular hypertrophy, a small rSR' pattern in the right precordial levels, and rightward axis on the ECG.
  - (3) Tall R or R' waves in V<sub>1</sub> may signal the development of pulmonary hypertension.
  - (4) Echocardiographic features of ASD include right ventricular and pulmonary arterial dilatation and paradoxical intraventricular septal motion.
35. In patients with pulmonary arterial hypertension, which of the following is the most reliable predictor of mortality?
- (1) Elevated right atrial pressure
  - (2) Elevated mean pulmonary artery pressure
  - (3) Diastolic septal flattening on transthoracic echocardiography
  - (4) Transpulmonary gradient <10 mm Hg



36. Which of the following statement about Tuberculous pericarditis is NOT correct?
- (1) Tuberculous pericarditis usually arises via retrograde spread from adjacent lymph nodes or by early hematogenous spread from the primary infection.
  - (2) Tuberculous pericardial effusions usually accumulate slowly.
  - (3) Measurement of adenosine deaminase in pericardial fluid is a highly sensitive and specific test for the diagnosis of Tuberculous pericarditis.
  - (4) The addition of corticosteroids to a three-drug antibacterial regimen reduces mortality in patients with Tuberculous pericarditis.
37. A 27-year-old woman presents with 2 days of shortness of breath. The plasma D dimer level is elevated. A high-resolution chest computed tomographic scan reveals a segmental pulmonary embolism, and deep vein thrombosis is found in the right femoral vein. She denies any recent travel, immobility or surgery. Which of the following primary hypercoagulable states is most frequent among patients who present with deep vein thrombosis?
- (1) Protein C deficiency
  - (2) Activated protein C resistance
  - (3) Antithrombin deficiency
  - (4) Prothrombin gene 20210 mutation
38. Which of the following warrants an implantable cardioverter-defibrillator for primary prevention of sudden cardiac death in a patient with hypertrophic cardiomyopathy?
- (1) Sustained atrial fibrillation
  - (2) Late gadolinium enhancement on contrast-enhanced cardiac MRI that comprises > 15% of left ventricular mass.
  - (3) Interventricular septal wall thickness of 25 mm
  - (4) Loss of function mutation in the fibrillin -1 (FBN1) gene
39. Which of the following statement about hemodynamic findings in constrictive pericarditis and restrictive cardiomyopathy is correct?
- (1) A diastolic “dip-and-plateau” pattern is present in the Right Ventricular (RV) waveform in constrictive pericarditis, but not restrictive cardiomyopathy.
  - (2) Concordance of left ventricular and RV systolic pressures during respiration is typical of constrictive pericarditis.
  - (3) In constrictive pericarditis, the ratio of RV systolic pressure to RV end diastolic pressure is usually > 3.
  - (4) An RV systolic pressure > 50 mmHg is more consistent with restrictive cardiomyopathy than with constrictive pericarditis.

40. A 20-year-old man with Duchenne muscular dystrophy presents for evaluation. Regarding cardiac involvement in this condition, which of the following statements is TRUE?
- (1) Fewer than 25% of patients with Duchenne muscular dystrophy > 18 years develop a dilated cardiomyopathy.
  - (2) The ECG typically shows tall R waves with increased R/S amplitude in V1 and deep narrow Q waves in the left precordial leads.
  - (3) There is a direct association between the presence of dilated cardiomyopathy and electrocardiographic abnormalities.
  - (4) The most common rhythm disturbance is ventricular tachycardia.
41. A 63-year-old man with metastatic colon cancer is prescribed therapy targeting Vascular Endothelial Growth Factor (VEGF). Which of the following statements is correct about the use of the monoclonal antibody/VEGF antagonist bevacizumab?
- (1) The left ventricular ejection fraction tends to increase with use of this drug.
  - (2) Hypotension is a common side effect.
  - (3) The risk of arterial, but not venous, thromboembolic events is increased.
  - (4) Haemorrhagic pericardial effusion is associated with continuous use of this agent.
42. A 34-year-old man is receiving doxorubicin chemotherapy for lymphoma. Which of the following statements regarding the risk of doxorubicin-induced cardiotoxicity is NOT correct?
- (1) Previous or concurrent mediastinal irradiation increases the risk of cardiotoxicity.
  - (2) The age groups most at risk are the very young and the very old.
  - (3) Cardiomyopathy does not develop unless the total cumulative dose exceeds 700 mg/m<sup>2</sup>.
  - (4) Concurrent use of cyclophosphamide increases the risk of cardiotoxicity.
43. Which of the following statements is correct regarding familial forms of Dilated Cardiomyopathy (DCM)?
- (1) Familial forms account for less than 3% of cases of DCM.
  - (2) Most inherited forms of dilated cardiomyopathy fit an autosomal recessive pattern.
  - (3) Familial DCM most commonly results from mutations in genes that encode sarcolemmal surface receptors.
  - (4) In symptomatic patients, histologic examination of the heart typically demonstrates extensive areas of interstitial and perivascular fibrosis.
44. A 35-year-old man presents with complaints of exertional dyspnea. His medical history is significant for chest radiation therapy as a teenager for treatment for a hematologic malignancy. Regarding cardiovascular effects of radiation therapy, which of the following statements is correct?
- (1) Most complications develop within 5 years of radiation exposure.
  - (2) Constrictive pericarditis is typically an acute reaction to radiation therapy.
  - (3) The conduction system is typically spared from adverse effects of radiation.
  - (4) Cancer survivors who received head and neck radiation are at a heightened risk of stroke.



48. A 67-year-old male was admitted with progressive angina. His history was significant for a Drug-Eluting Stent (DES) placement in a long, calcified mid – LAD stenosis with mild to moderate non-obstructive disease, elsewhere 3 weeks prior to admission in the setting of unstable angina.
- Repeat catheterization revealed a significant new lesion 5 mm from the distal edge of the recently placed stent. Because the operators had difficulty with predilation using balloon angioplasty, they considered using Cutting Balloon Angioplasty (CBA) for better lesion preparation. Which of the following is TRUE considering use of CBA?
- (1) CBA is appropriate in lesions with angiographic calcification.
  - (2) CBA may be used for high-pressure balloon-resistant lesions.
  - (3) CBA is contraindicated in use distal to a recently implanted stent.
  - (4) CBA is contraindicated for use in the presence of visible thrombus.
49. After diagnostic angiography with a 5 Fr system, you are asked to treat a focal stenosis in the mid – LAD. Upon placement of a 7 Fr JL 4 guide catheter, you notice significant dampening of the pressure waveform. Which of the following is the best course of action?
- (1) Manipulate the catheter in the left main in an attempt to improve the waveform
  - (2) Change to a catheter with side holes
  - (3) Perform Intravascular Ultrasound (IVUS) to better understand the geometry and presence of any disease in the left main
  - (4) Downsize to a 6 Fr guide catheter
50. Optimal technique for laser angioplasty includes all of the following techniques, except -
- (1) Coaxial guide wire positioning
  - (2) Use of frequent contrast injections to monitor progress of lasing
  - (3) Use of lasing cycles of 5 seconds on and 10 seconds off for upto 45 seconds
  - (4) Adjunctive stenting in appropriate- sized vessels
51. Which of the following is a Percutaneous Coronary Intervention (PCI) guideline class III recommendation for rotational atherectomy?
- (1) Routine treatment of de novo or in-stent restenosis
  - (2) Inability to cross a lesion with a balloon catheter
  - (3) Long lesions
  - (4) Treatment of heavily calcified lesions

52. The first stent implanted in a human coronary artery was implanted in March 1986 by Jacques Puel in Toulouse (France) and was called the -
- (1) Dotter stent
  - (2) Wall stent
  - (3) Palmaz Schatz stent
  - (4) Cypher stent
53. A 80-year-old woman with atrial fibrillation and chronic oral anticoagulation presents in the catheterization lab with stable inferior ischemia. You see a sub-occlusive stenosis of the mid – RCA and decide to treat with stent implantation. Which of the following is CORRECT?
- (1) DES cannot be implanted in such patients
  - (2) The BioFreedom or Endeavor stents are considered a better option compared to BMS
  - (3) There is no increased risk of bleeding by prescribing DAPT together with oral anticoagulation
  - (4) Due to increased risk of bleeding, oral anticoagulation can be replaced with DAPT.
54. A 15-year-old male presented to the OPD with complaints of dyspnea on exertion. Chest radiograph was suggestive of unilateral pulmonary plethora. Most possible diagnosis is -
- (1) Transposition of great arteries
  - (2) Double outlet right ventricle
  - (3) Aberrant origin of pulmonary artery from aorta
  - (4) Total anomalous pulmonary venous connection
55. A 63-year-old male presented to the outpatient department with complaints of shortness of breath. He was subsequently evaluated and underwent placement of an IVC filter. All are possible indications for this procedure, except -
- (1) Contraindication to anticoagulation
  - (2) Intolerance to anticoagulation
  - (3) Failure of anticoagulation
  - (4) Prior to orthopaedic surgery
56. A 32-year-old presented with complaints of chest pain and fever for the past 20-25 days. On clinical evaluation, there was presence of irregular, non-tender, hemorrhagic macules located on the palms, soles, thenar and hypothenar eminences of the hands. These are a result of -
- (1) Immunological phenomenon
  - (2) Embolic phenomenon
  - (3) Autoimmune
  - (4) Drug hypersensitivity
57. All the following are causes of Osborn waves, except -
- (1) Hypothermia
  - (2) Subarachnoid hemorrhage
  - (3) Vasospastic angina
  - (4) Hypocalcemia

58. A 45-year-old obese, female patient with diabetes who was hypercholesterolemic, hypertensive, and a heavy (two-packs-a-day) smoker with NSTEMI is referred for elective PCI of the LAD. She is planned for radial access PCI. Which anticoagulation regimen would minimize her risk of bleeding complications?
- (1) Unfractionated Heparin (UFH)
  - (2) Bivalirudin
  - (3) Low Molecular Weight Heparin (LMWH)
  - (4) None of the above
59. Which of the following describe the correct landmarks for TIMI Frame Count (TFC) assessment in the Left Anterior Descending (LAD) and Left Circumflex (LCx) arteries, respectively?
- (1) LAD – last septal perforator
  - (2) LAD – last diagonal branch
  - (3) LCx – the most distal bifurcation of the segment with the longest total distance that includes the culprit lesion for the LCx
  - (4) LCx – end of most distal obtuse marginal branch
60. The most common conduction abnormality following Percutaneous Transluminal Septal Myocardial Ablation (PTSMA) is -
- (1) Complete heart block
  - (2) Left Bundle Branch Block (LBBB)
  - (3) Right Bundle Branch Block (RBBB)
  - (4) Alternating RBBB and LBBB
61. You are referred a 61-year-old patient with HCM and an LVOT gradient of 65 mmHg. He has NYHA Class III symptoms despite optimal beta-blocker therapy. You determine that he has anatomy suitable for both alcohol septal ablation and surgical septal myectomy. After discussing the patient's options, he chooses to go forward with alcohol septal ablation. Compared to septal myectomy, this patient undergoing alcohol septal ablation is more likely to have which of the following?
- (1) Improved short – term mortality
  - (2) Improved long – term mortality
  - (3) Increased risk for ventricular tachyarrhythmia
  - (4) Increased risk for pacemaker implantation
62. Which of the following coronary artery anomalies is the most prevalent?
- (1) Single coronary artery
  - (2) Origin of the Left Circumflex (LCx) coronary artery from the Right Coronary Artery (RCA)
  - (3) Origin of the Left Anterior Descending (LAD) coronary artery from the right coronary sinus
  - (4) Origin of the left main coronary artery from the right coronary sinus

63. A 17-year-old male presents with history of recurrent seizures and abdominal pain. He denies any history of smoking, alcohol or similar complaints in the family members. Findings on clinical examination include Adenoma sebaceum and Ash leaf macules. Systemic examination revealed a lump in the abdomen. Cardiac involvement in these patients would include -
- (1) Ventricular Rhabdomyomas
  - (2) Complete heart block
  - (3) Mitral annular disjunction
  - (4) Mitral valve prolapse
64. A patient with long-standing severe pulmonary stenosis underwent successful balloon valvuloplasty. Right ventricular pressure suddenly rises to near systemic levels following the procedure. The most likely cause is -
- (1) Valve leaflet avulsion
  - (2) Severe pulmonary insufficiency
  - (3) Restenosis
  - (4) Infundibular spasm
65. A 25-year-old previously healthy male presents with complaints of acute onset chest and back pain. On examination, he is hemodynamically stable with pulse rate of 106/min and BP of 160/90 mmHg. He is a known hypertensive for the past one year. His CT was done in the emergency as a part of the "triple rule out CT protocol" which suggests type B Aortic dissection. The next best step in management would be -
- (1) Urgent surgery
  - (2) Medical management with control of blood pressure
  - (3) Urgent endovascular graft intervention
  - (4) None of the above
66. An elderly patient with stable angina is found to have an intermediate stenosis in the LAD and a FFR of 0.70 PCI is successfully performed. Her risk of death, MI, or urgent revascularization following PCI is best described as which of the following?
- (1) Similar to the risk of patients with an FFR > 0.80
  - (2) Similar to the risk of patients with an FFR < 0.80 treated with optimal medical therapy alone
  - (3) Her risk is minimal as her CAD has been resolved
  - (4) Higher than the risk with optimal medical therapy due to the risk of stent thrombosis
67. Which statement about the historical background of surgical revascularization in humans is TRUE?
- (1) Coronary Artery Bypass Grafting (CABG) using Saphenous Vein Grafts (SVGs) was first performed in the 1960s.
  - (2) SVGs were used as bypass conduits earlier than the Internal Mammary Artery (IMA)
  - (3) The first conduit used was the IMA
  - (4) (1) and (3) are true
68. Following dietary changes are advised to reduce prevalence of coronary heart disease, except -
- (1) Increased complex carbohydrate intake
  - (2) Saturated fat intake less than 10% of total energy intake
  - (3) Salt intake less than 7g/day
  - (4) Reduce fat intake to 20-30% of total energy intake

69. Which one of the following statements on influence of smoking on risk of Coronary Heart Disease (CHD) is not true?
- (1) Risk of death from CHD decreases from cessation of smoking
  - (2) Filters provide a protective effect for CHD
  - (3) Women and men are of equal risk
  - (4) Influence of smoking is synergistic to other risk factors for CHD
70. The MONICA study involved measurement of all, except -
- (1) Incidence rates
  - (2) Case fatality
  - (3) Risk Factor levels
  - (4) Prevalence Rate
71. Which of the following primordial prevention strategies is not correct for Coronary Heart Disease?
- (1) Take healthy diet containing adequate amounts of macro and micronutrients
  - (2) Regular physical activity
  - (3) Management of Hypertension and Diabetes
  - (4) Prevention of tobacco use
72. A family history of premature coronary heart disease elevates the risk for CHD in offspring -
- (1) Approximately threefold
  - (2) Approximately twofold
  - (3) Approximately fourfold
  - (4) Approximately 1.5 fold
73. Xanthomas within the palmar creases are specific for -
- (1) Type I hyperlipoproteinemia
  - (2) Type II hyperlipoproteinemia
  - (3) Type III hyperlipoproteinemia
  - (4) Type IV hyperlipoproteinemia
74. The normal venous pressure fall with inspiration is -
- (1) At least 3 mm of Hg
  - (2) At least 3 mm of blood
  - (3) At least 5 mm of Hg
  - (4) At least 5 mm of blood
75. Which of the following has been proven to be most beneficial for initial treatment in pulmonary arterial hypertension (World Health Organization functional class II)?
- (1) Epoprostenol IV 5  $\mu\text{g}$  /( $\text{kg min}$ )
  - (2) Ambrisentan 10 mg daily
  - (3) Tadalafil 40 mg daily
  - (4) Ambrisentan 10 mg daily and Tadalafil 40 mg daily



76. Which of the following anticoagulants does not require Antithrombin III for its anticoagulant effect to work?
- (1) Heparin (2) Enoxaparin  
(3) Rivaroxaban (4) Fondaparinux
77. Which of the following antiarrhythmics would require the most dose adjustment when added to a patient already taking a high dose of metoprolol?
- (1) Propafenone (2) Dofetilide  
(3) Flecainide (4) Disopyramide
78. Features of restrictive cardiomyopathy may include all of the following, except which option?
- (1) Raised JVP (2) Loud S3  
(3) Kussmaul's sign (4) A diastolic knock in pulmonary area
79. A patient has an LV Outflow Tract (LVOT) velocity of 1 m/s, Time Velocity Integral (TVI) of 25 cm, LVOT diameter of 2 cm, aortic transvalvular velocity of 1.5 m/s, and heart rate 70 bpm. What is the cardiac output of this patient?
- (1) 5.5 L/min  
(2) 4.5 L/min  
(3) 6.3 L/min  
(4) Cannot be determined based on the data given
80. During cardiac CT Coronary Angiography, which organ gets the highest radiation dose?
- (1) Heart (2) Lungs  
(3) Esophagus (4) Breast
81. Which of the following have the most abundant gap junctions?
- (1) Ventricular myocyte (2) Atrial myocyte  
(3) Purkinje cells (4) All of the above
82. What is the increase in myocardial contractile force with acute increase in afterload called?
- (1) Frank-Starling phenomenon (2) Anrep phenomenon  
(3) Bowditch phenomenon (4) None of the above
83. An increase in LV end – systolic size would increase which of the following?
- (1) LV preload (2) LV afterload  
(3) None of the above (4) Both of the above

84. What is your recommendation for a donor heart that is normal except for 3 + functional Tricuspid Regurgitation (TR)?
- (1) Reject the heart
  - (2) Assign the heart to alternate list
  - (3) Do DeVega annuloplasty on bench and use the heart
  - (4) Do tricuspid valve replacement and use the heart
85. In an adult patient with heart transplant beyond 6 months, which of the following surveillance regimens for rejection is appropriate?
- (1) Biannual endomyocardial biopsy for the first 5 years
  - (2) Biannual endomyocardial biopsy for the first 2 years
  - (3) Echocardiography in place of biopsy
  - (4) Cardiac magnetic resonance imaging with delayed enhancement in place of biopsy
86. Which of the following statement is true in a heart transplant patient who gets pregnant?
- (1) Discontinue all anti-rejections medications in the first trimester because of teratogenicity.
  - (2) Discontinue all anti-rejection medications throughout pregnancy because of fetal growth retardation.
  - (3) Continue corticosteroids and calcineurin inhibitors (cyclosporine or tacrolimus).
  - (4) Continue corticosteroids, tacrolimus and mycophenolate mofetil.
87. Which of the following prosthetic valves may need to be explanted before LAVD implant?
- (1) Mechanical aortic valve
  - (2) Bioprosthetic aortic valve
  - (3) Normally functioning mechanical mitral valve
  - (4) Mechanical mitral valve with 3+ Mitral Regurgitation (MR)
88. Which statin has least interaction with immune suppressants?
- |                  |                  |
|------------------|------------------|
| (1) Simvastatin  | (2) Pravastatin  |
| (3) Atorvastatin | (4) Rosuvastatin |
89. Which of the following mutations is responsible for the majority of patients with familial PH?
- |                      |                       |
|----------------------|-----------------------|
| (1) BMPR 2 mutations | (2) BMPR1B mutations  |
| (3) SMAD 9 mutations | (4) None of the above |

90. In a patient with type 1 Brugada syndrome presenting with syncope, the 2 year risk of sudden death is which of the following?
- (1) 2% (2) 10%  
(3) 30% (4) 80%
91. A 70-year-old patient with paroxysmal atrial fibrillation was started on flecainide 100 mg BID. She has been doing well. An ECG done 1 week later reveals sinus rhythm with LBBB. Which of the following is the appropriate next step?
- (1) No change (2) Reduce dose of flecainide to 50 mg BID  
(3) Discontinue flecainide (4) Recommend pacemaker implantation
92. A 67-year-old female patient with history of atrial fibrillation, hypertension and St Jude aortic valve replacement is scheduled to undergo hip replacement. What is the best option for management of anticoagulation?
- (1) Discontinue warfarin 5 days prior to procedure, bridge With Low Molecular Weight Heparin (LMWH) when INR is 2.0, resume warfarin on day of surgery  
(2) Discontinue warfarin 5 days prior to procedure, no bridging with LMWH is needed, resume warfarin on day of surgery  
(3) Continue warfarin  
(4) Discontinue warfarin 2 days prior to procedure, bridge with LMWH after surgery, resume warfarin on day of surgery
93. In a patient with history of syncope and evidence of right bundle branch block with left anterior fascicular block on one ECG and a right bundle branch block with left posterior fascicular block on an ECG done on the following day, what is the next appropriate step?
- (1) Event monitor (2) EP studies  
(3) Loop recorder (4) Permanent pacemaker implantation
94. The patient has not achieved 50% lowering of her LDL-C and has an LDL-C that remains >70 mg/dL despite on atorvastatin 40 mg daily dose. Patients requires an additional 25% lowering of LDL-C to meet her targets of therapy.  
Which of the following is the most appropriate next step in therapy for this patient?
- (1) Start colestipol, titrated to 8 g per day  
(2) Start ezetimibe, 10 mg daily  
(3) Start evolocumab, 140 mg subcutaneous every 2 weeks  
(4) Recommend intensive lifestyle changes

95. Patient of Chronic heart failure requires temporary mechanical support devices. Which of the following techniques requires trans – septal puncture for implantation?
- (1) IABP (2) Tandem heart  
(3) Impella device (4) ECMO
96. GUSTO – 1 was a landmark trial that compared front – loaded alteplase with streptokinase in acute STEMI within 6 h. What were the findings?
- (1) Reduced death with alteplase  
(2) Reduced myocardial reinfarction with alteplase  
(3) Trend to increased intracranial bleed with streptokinase  
(4) All of the above
97. An ICD implant for primary prevention is indicated in which of the following patients?
- (1) 50-year-old patient with history of myocardial infarction 6 weeks ago, NYHA class I symptoms, LVEF 30%  
(2) 40-year-old asymptomatic male with ECG suggestive of Brugada syndrome, whose brother died suddenly  
(3) 45-year-old asymptomatic patient with history of hypertrophic cardiomyopathy, LV thickness 2.0 cm  
(4) 18-year-old female with lightheaded spells and QT prolongation on ECG.
98. A 46-year-old patient with inferior STEMI, post primary PCI, became suddenly short of breath, rapidly evolving into pulmonary edema. On examination, his heart rate was 130 bpm, BP 80/50 mmHg, bilateral rales. Cardiac sounds were soft and there were no murmurs. The ECG showed sinus tachycardia with normal ST segments. What is the most likely diagnosis?
- (1) Coronary stent thrombosis (2) Acute pulmonary embolism  
(3) Papillary muscle rupture (4) Large RV infarct
99. In what percentage of patients does the resting ECG become abnormal in patients with stable CAD during an episode of angina?
- (1) 100% (2) 50%  
(3) 75% (4) 25%
100. Prophylaxis against IE is indicated in a patient with a prosthetic Mitral Valve (MV) undergoing which of the following procedures in the absence of local infection in the instrumented area?
- (1) Esophagogastroduodenoscopy (2) Colonoscopy  
(3) Cystoscopy (4) None of the above

101. In a patient undergoing MV surgery for severe MR, which type of anatomy is most suitable for successful repair?
- (1) Flail P2 (2) Flail A2  
(3) Bileaflet MV prolapse (4) Barlow's disease
102. A 62-year-old man with previous anterior myocardial infarction has an EF of 30%, LV dilation, and bileaflet tethering causing MR. The MR jet area is 4 cm<sup>2</sup>, vena contracta 5 mm and the ERO area is 0.25 cm<sup>2</sup>. Which of the following describes the state of MR?
- (1) Mild (2) Moderate  
(3) Severe (4) Need more data
103. Indicators of severe tricuspid stenosis include all, except which of the following?
- (1) Mean diastolic gradient >5 mmHg  
(2) PHT>190 ms  
(3) Valve area by continuity equation <1.0 cm<sup>2</sup>  
(4) Mean diastolic gradient >10 to 15 mmHg
104. For a 52-year-old man with bileaflet aortic mechanical valve with one of the risk factors such as atrial fibrillation, LV dysfunction, prior thromboemboli or hypercoagulable state, what is the preferred anticoagulation regimen?
- (1) Warfarin to an INR goal of 3.0 and aspirin 81 mg daily  
(2) Warfarin to an INR goal of 3.0 only  
(3) Warfarin to an INR goal of 3.5  
(4) Warfarin to an INR goal of 2.5 and aspirin 81 mg daily
105. A 75-year-old man with no symptoms has severe aortic valve calcification, aortic valve velocity of 4.5 m/s and EF of 65%. What stage is he in?
- (1) Stage B (2) Stage C1  
(3) Stage C2 (4) Stage D
106. A 24-year-old man presents with 5 day history of low-grade fever, malaise, and cough and recent chest pain. He has a triphasic pericardial rub and concave-up ST elevation in Electrocardiogram (ECG) leads. Erythrocyte Sedimentation Rate (ESR) is 96 mm at the end of first hour and complete blood count is normal. Serum troponin I level is 15 times the normal. What is the most likely cause of his pericarditis?
- (1) Idiopathic (2) Viral  
(3) Bacterial (4) Tubercular

107. A 19-year-old patient has DCM with an Ejection Fraction (EF) of 10%, complete heart block, junctional escape rhythm with Left Bundle Branch Block (LBBB), and muscle weakness. What is the likely mutation in-
- (1) Lamin A/C gene (2) Troponin T gene  
(3) Desmin gene (4) Titin Gene
108. Which of the following mutations may not cause Hypertrophic Cardiomyopathy (HCM)?
- (1) Myosin heavy chain (2) Myosin light chain  
(3) Troponin T (4) Desmin
109. A 45-year-old man has HCM and found to have MHC gene mutation. The same mutation is found in one of his sons who is 20 years old. The son had a normal physical examination, ECG, and an echocardiogram. How frequently would you repeat an echocardiogram on this son?
- (1) No need to repeat  
(2) Every 12-18 months  
(3) Every 5 years  
(4) Only if symptoms occur or ECG becomes abnormal
110. A 42-year-old man presents with shortness of breath, tingling of fingers, vague abdominal pains, and blurred vision. He is hypertensive, creatinine is 2.4 mg/dL and has corneal opacities. He has reduced touch sensations in hands and feet. An echocardiogram shows moderate LVH with normal wall motion. What is the likely diagnosis?
- (1) HCM (2) Hypertensive heart disease  
(3) Fabry disease (4) Hemochromatosis
111. A 52-year-old man presented with chest pain. The ECG showed increased voltage and deep T wave inversions V2 to V6. The cardiac enzymes were negative and the coronary angiogram was completely normal. What is the LV gram likely to show?
- (1) Apical akinesis (2) Severe LVH  
(3) Dyskinesis distal 2/3 of left ventricle (4) A spade-shaped left ventricle
112. What are the most common anomalies seen in DiGeorge syndrome (22q11)?
- (1) VSD and arch anomalies (2) Pulmonary valve stenosis  
(3) ASD (4) Supravalvular AS
113. Bicuspid aortic valves are seen in what percentage of the population?
- (1) 4-6% (2) 20%  
(3) 1-2% (4) 10%

114. Which of the following is an anomaly that should be sought out in a patient with Tetralogy of Fallot being referred for surgical repair?
- (1) Anomalous origin of Left Anterior Descending (LAD) artery From Right Coronary Artery (RCA)
  - (2) Anomalous RCA from LAD
  - (3) Anomalous left circumflex artery from RCA
  - (4) None of the above
115. A patient with a history of repaired TOF is referred to you for complaints of fatigue and lack of exercise tolerance. Her echocardiogram shows moderate RV enlargement with mild hypokinesis. What is the probable cause of her right - sided enlargement?
- (1) Severe Tricuspid Regurgitation (TR)
  - (2) Severe pulmonary valve regurgitation
  - (3) Severe mitral regurgitation
  - (4) Severe aortic regurgitation
116. What is a Rastelli repair?
- (1) Closure of VSD and placement of right ventricle – P conduit
  - (2) Balloon atrial septostomy
  - (3) Repair of VSD
  - (4) Repair of ASD
117. An 18-year-old patient with prior Mustard procedure for TGA has developed facial swelling with suffusion. The jugular venous pressure is markedly raised. There is no edema, liver is normal sized and there are no murmurs. What is the likely explanation?
- (1) Constrictive pericarditis
  - (2) Failure of subpulmonic ventricle
  - (3) Baffle obstruction
  - (4) Systolic Anterior Motion (SAM) with dynamic subpulmonic obstruction
118. Following are the causes of Hilar shadows in Congenital Heart Diseases, except-
- (1) c - TGA
  - (2) Univentricular heart with inverted great arteries
  - (3) Truncus arteriosus
  - (4) Tricuspid atresia
119. Following are Congenital Heart Diseases associated with “Straightening of the left border” of the heart, except?
- (1) c – TGA
  - (2) Ebstein’s anomaly
  - (3) Absent left pericardium
  - (4) Hypoplastic left heart
120. In which Congenital Heart Diseases the oxygen saturations in all chambers (RA, RV, LA, LV and AA) is equal?
- (1) c-TGA
  - (2) d-TGA
  - (3) TAPVR
  - (4) Single Ventricle with d - TGA

121. Tetralogy of Fallot may be associated with which of the following genetic defects?
- (1) Point mutation in major histocompatibility complex gene
  - (2) 22q11 deletion
  - (3) 9-22 translocation
  - (4) None of the above
122. What is the desired depth of chest compression in adult CPR?
- (1)  $\geq 2$  in
  - (2) 1.5-2 in
  - (3) Enough to produce a pulse
  - (4) Any of the above
123. What is the condition that is associated with the highest maternal mortality with pregnancy?
- (1) Marfan syndrome with aortic root measurement of 4.5 cm
  - (2) Family history of cardiomyopathy
  - (3) Severe mitral regurgitation
  - (4) Ventricular Septal Defect (VSD) with a right-to-left shunt
124. Which of the following statements is not true regarding diagnosis of pheochromocytoma?
- (1) Plasma catecholamines or 24 hr urine metanephrines are good screening tests.
  - (2) Clonidine suppression test is positive with pheochromocytoma with  $>50\%$  suppression of serum norepinephrine.
  - (3) Magnetic Resonance Imaging (MRI) is the more specific imaging modality compared with computed tomography scan
  - (4) Metaiodobenzylguanidine scan is helpful to show that the discovered mass is indeed producing hormones.
125. A 46-year-old patient with hepatitis C cirrhosis have a dyspnoea at rest and has an oxygen saturation of 85%. He has normal LV and valvular function and normal PA pressure. What is the most likely cause of dyspnoea?
- (1) Emphysema due to  $\alpha$ -1 – antitrypsin deficiency
  - (2) Pulmonary arteriovenous fistula
  - (3) Patent foramen ovale
  - (4) Diastolic heart failure
126. Which of the following can 5-fluorouracil potentially cause?
- (1) Coronary vasospasm, especially in those with CAD
  - (2) Myocarditis
  - (3) Pericarditis
  - (4) None of the above
127. Cigarette smoking increases the odds ratio of peripheral vascular disease by which of the following?
- (1) Sevenfold
  - (2) Threefold
  - (3) Ninefold
  - (4) Twofold



128. A 58-year-old male is known to have Marfan syndrome. His echocardiogram shows ascending aortic aneurysm 4.1 cm in size. What is the next step?
- (1) Computed Tomography (CT) every 6 months
  - (2) Echocardiogram every 6 months
  - (3) Annual Computed Tomography (CT) or Magnetic Resonance Imaging (MRI)
  - (4) Echocardiogram every 3 months
129. All statements are true regarding epidemiologic transition, except -
- (1) Cardiovascular Disease (CVD) burden has shifted to Low And Middle Income Countries (LMICs).
  - (2) CVD death rates are high in Eastern Europe.
  - (3) CVD death rates low in sub Saharan Africa.
  - (4) Over all world wise CVD death rate is >40%.
130. The correct Population Attributable Fraction (PAF) for modifiable risk factor for Coronary Heart Disease (CHD) in decreasing sequence is as follows-
- (1) High Cholesterol >High BP > low fruit and vegetable intake
  - (2) High BP >High Cholesterol > Over weight and obesity
  - (3) Over weight and obesity >High BP > High Cholesterol > Smoking
  - (4) Smoking > Over weight and obesity > High BP > High Cholesterol
131. Gaseous air pollutants deleterious to cardiovascular health include all, except -
- (1) Carbon monoxide (CO)
  - (2) Sulfur Oxide (SO<sub>x</sub>)
  - (3) Carbon dioxide (CO<sub>2</sub>)
  - (4) Ozone (O<sub>3</sub>)
132. Which number is best in Number Needed To Treat (NNT) for better result for a given trial?
- (1) 20
  - (2) 30
  - (3) 5
  - (4) 15
133. Proposed mechanism for the increased incidence of Hypertension in Blacks include all, except -
- (1) Genetic susceptibility
  - (2) Socio economic status
  - (3) Alteration in RAAS system
  - (4) High birth weight
134. Pathogenic properties of angiotensin II includes all, except -
- (1) Myocardial fibrosis
  - (2) Increased intraglomerular pressure
  - (3) Increased sodium reabsorption
  - (4) Promotion of LDL cholesterol uptake
135. Major positive outcome trials with RAAS inhibitors for chronic heart failure includes all, except -
- (1) SOLVD trial
  - (2) CHARM trial
  - (3) GISSI trial
  - (4) VAL-HeFT trial

136. Following statement regarding relative efficacy on receptors of inotropic drugs is true, except -
- (1) Dobutamine – Beta 1 > Beta 2 > Alpha
  - (2) Norepinephrine – Beta 1 > Alpha > Beta 2
  - (3) Phenylephrine – Beta 2 > Alpha
  - (4) Epinephrine – Beta 1 = Beta 2 > Alpha
137. ICD implantation showed positive outcome in all trials, except -
- (1) MANDIT TRIAL
  - (2) MUSTT TRIAL
  - (3) AVID TRIAL
  - (4) CAST TRIAL
138. In patient mortality is best assessed in acute heart failure by following risk scores, except -
- (1) STS score
  - (2) ADHERE risk tree score
  - (3) EFFECT risk index score
  - (4) PROTECT risk score
139. Following statement is true regarding Treppe Phenomenon, except -
- (1) It is an autoregulation method by which myocardial tension increases with an increase in heart rate.
  - (2) An increase in heart rate increases force of contraction generated by myocardial cell with each heart beat despite accounting for all other influences.
  - (3) Its frequency dependent activation.
  - (4) Its afterload dependent increase in force in succession.
140. Contraindication of cardiac transplant is -
- (1) Systolic heart failure with severe functional limitations with EF < 35%
  - (2) Severe symptomatic hypertrophic cardiomyopathy
  - (3) Cardiogenic shock following acute myocarditis not expected to recover
  - (4) Congenital heart disease with severe fixed PAH
141. Following statement is false -
- (1) Inotropic effect of digoxin persists after transplantation.
  - (2) Ventricular rate does not control by digoxin in atrial fibrillation of transplanted heart.
  - (3) Nifedipine will cause reflex tachycardia.
  - (4) Exaggerated fatigue response to beta-blockers in transplanted heart with exercise.
142. All statements are true, except -
- (1) Diagnostic specificity to diagnose CAD by PET is > 90%.
  - (2) Diagnostic sensitivity to diagnose CAD by SPECT is > 85%.
  - (3) Diagnostic specificity to diagnose CAD by SPECT is > 95%.
  - (4) PET has higher diagnostic accuracy than SPECT to diagnose CAD.

143. Radiopharmaceuticals used for SPECT MPI includes all, except -
- (1) Tc-99m mibi
  - (2) Rb 80
  - (3) Flurpiridaz – F 18
  - (4) N-13-NH3
144. Following statement is true, except -
- (1) Nodal tissue has calcium dependent slow upstroke action potential.
  - (2) Nodal tissue does not have voltage sensitive sodium channels.
  - (3) Diastolic membrane potential of nodal tissue drops to  $-50$  to  $-60$  mV to initiate spontaneous depolarization.
  - (4) Nodal tissue has resting membrane potential of  $-90$  mV.
145. Following statement regarding sinus node function is correct, except -
- (1) Normal Corrected SNRT is 500-600 msec.
  - (2) Sino atrial Conduction Time = Post pacing PP return interval – post return PP interval/2.
  - (3) SACT greater than 120 msec is suggestive of Sinus node dysfunction.
  - (4) Intrinsic heart rate is calculated after giving 0.04 mg/kg i.v. atropine.
146. Normal intra cardiac conduction interval includes all, except -
- (1) P-A interval = 25 – 45 msec
  - (2) A-H interval = 60 – 130 msec
  - (3) H-V interval = 100 msec
  - (4) Intra-His duration = < 30 msec
147. Short RP narrow QRS supra ventricular tachycardia includes all, except -
- (1) Typical slow fast AVNRT
  - (2) Orthodromic AVRT
  - (3) Permanent Junctional Reciprocation Tachycardia (PJRT)
  - (4) Atypical slow-slow AVNRT
148. Most common cause of sudden cardiac death in athletes is -
- (1) Hypertrophic Cardiomyopathy (HCM)
  - (2) Congenital coronary artery anomalies
  - (3) Arrhythmogenic Right Ventricular Dysplasia (ARVD)
  - (4) Atherosclerotic CAD
149. Following statement is true regarding aspirin in primary prevention, except -
- (1) European guidelines recommend aspirin for primary prevention.
  - (2) Aspirin has shown risk reduction of CAD in males.
  - (3) Aspirin has shown risk reduction of stroke in females.
  - (4) FDA has not approved aspirin for primary prevention.

150. Which statement is wrong?
- (1) Normal level of Homocysteine corresponds to < 15 micro mole per litre.
  - (2) Normal level of Lipoprotein (a) is less than 300 mg/Litre.
  - (3) Normal level of hsCRP is less than 1 gm/Litre.
  - (4) Normal level of fibrinogen is 2-4 gm/Litre.
151. Parameters included for Diagnostic criteria of metabolic syndrome include all, except -
- (1) Obesity
  - (2) Hypertension
  - (3) Low HDL levels
  - (4) Triglycerides > 20 mg/dL
152. Renal parenchymal diseases causing Hypertension includes all, except -
- (1) Intra renal vasculitis
  - (2) Chronic Glomerulonephritis
  - (3) Chronic Pyelonephritis
  - (4) Polycystic disease
153. All are Monogenic hypertension syndromes, except -
- (1) Familial Hyperaldosteronism Type I
  - (2) Cushing syndrome
  - (3) Gordon syndrome
  - (4) Liddle syndrome
154. Regarding BP measurement following statement is false -
- (1) Traditionally left arm should be chosen for measuring BP in screening situation.
  - (2) Maximum Inflation Level (MIL) is 30 mm of Hg higher than the palpated SBP value.
  - (3) Immediately deflate at a rate of 2 mm of Hg per second.
  - (4) 188/166,180/164,182/162 readings suggest failure to recognize auscultatory gap.
155. Following statements regarding Home BP Monitoring (HBPM) are true, except -
- (1) White coat hypertension is defined by normal HBP but elevated Office BP.
  - (2) Masked hypertension is defined by normal office BP but elevated HBP.
  - (3) Masked hypertension is not seen in treated hypertensive patients.
  - (4) Night time BP superiorly correlates with cardiovascular risk.
156. Following statement regarding circadian rhythm of BP is true, except -
- (1) Circadian rhythm of BP is a reflection of circadian variation in RAAS and sympathetic nervous system.
  - (2) 25-35% hypertensive patient are non-dippers.
  - (3) Non-dippers are typified by less than 10% drop in night BP of day time value.
  - (4) Older persons are frequently dippers.

157. Vulnerable plaque is characterized by -
- (1) Large fibro atheroma with necrotic core
  - (2) Fibro atheroma cap less 65 micron thickness
  - (3) Neovascularization of plaque
  - (4) Intra plaque haemorrhage
158. Platelet adhesion to vessel wall involves all, except -
- (1) GP IIb /IIIa
  - (2) GP Ib / IX
  - (3) Collagen
  - (4) GP IV
159. Following statements are correct, except -
- (1) In aerobic condition 60-90% cardiac energy comes from fatty acid metabolism.
  - (2) In ischaemic condition 40-50% cardiac energy comes from oxidation of pyruvate and lactate metabolism.
  - (3) In aerobic condition almost 98% ATP comes from oxidative phosphorylation in the mitochondria.
  - (4) In hypoxia 90% cardiac energy comes from oxidation of pyruvate and lactate metabolism.
160. Potential mediators of reperfusion injury includes all, except -
- (1) Oxygen paradox
  - (2) Increase in arrhythmogenic threshold
  - (3) Calcium paradox
  - (4) pH paradox
161. Following statement is true regarding Ac Rheumatic fever (ARF), except -
- (1) ARF is equally common in males and females but RHD is more common in males in almost all population.
  - (2) Peak incidence of ARF occurs between age 5-15 years.
  - (3) Incidence of ARF is rare after 35 years age.
  - (4) 5% of first episodes of ARF occurs in less than 5 years age.
162. Following is true regarding pathogenesis of ARF, except -
- (1) Group A Streptococcus initiates ARF in susceptible host
  - (2) Most patients have elevated levels of ASO antibody titres
  - (3) Outbreaks of ARF usually follow epidemics of Streptococcal pharyngitis
  - (4) Inadequate treatment of Streptococcal pharyngitis increases the incidence of subsequent ARF
163. Severe chronic Aortic regurgitation is characterised by all, except -
- (1) AR jet deceleration time < 200 msec
  - (2) Vena contracta size > 6 mm
  - (3) Jet width / LVOT width ratio (%) = > 65%
  - (4) Regurgitant fraction = < 50%

164. Following statements are true regarding ischemic MR, except -
- (1) Antero lateral papillary muscle has dual blood supply.
  - (2) Posteromedial papillary muscle has singular blood supply.
  - (3) Ischaemic MR is common in anterior MI.
  - (4) Ischaemic MR is common in inferoposterior MI.
165. Following statement regarding prosthetic valve is true, except -
- (1) Monoleaflet valves are less thrombogenic and lower profile than ball and cage valves.
  - (2) Calcification in bioprosthetic valve occurs after 5-7 yrs.
  - (3) Long term anticoagulation is not required in bioprosthetic valves.
  - (4) Ball and cage valves are bulky and more thrombogenic.
166. Regarding Trans Catheter Aortic Valve Implantation (TAVI), following is true, except -
- (1) TAVI is superior to Surgical Aortic Valve Replacement (SAVR) in high risk case.
  - (2) Post implantation need of permanent pacemaker is approximately 1%.
  - (3) 30-day all-cause mortality in intermediate risk group is approx 1%.
  - (4) The low risk Nordic aortic valve intervention trial reported comparable results at 2 yrs of TAVI and SAVR.
167. Gold paint pericarditis is seen in -
- |                       |                          |
|-----------------------|--------------------------|
| (1) Dressler syndrome | (2) Scleroderma          |
| (3) Hyperlipidaemia   | (4) Polyarteritis nodosa |
168. Prognosis of myocarditis is best in -
- |                                       |                              |
|---------------------------------------|------------------------------|
| (1) Giant cell myocarditis            | (2) Eosinophilic myocarditis |
| (3) Fulminant lymphocytic myocarditis | (4) Radiation myocarditis    |
169. A disease related to Arrhythmogenic right ventricular dysplasia is -
- |                                       |                                |
|---------------------------------------|--------------------------------|
| (1) Ebstein's anomaly                 | (2) RV endomyocardial fibrosis |
| (3) Idiopathic dilated cardiomyopathy | (4) Uhl's anomaly              |
170. Following statements are true, except -
- (1) Kartagener syndrome is situs inversus, sinusitis and bronchiectasis.
  - (2) Situs inversus with levocardia is consistently associated with complex congenital heart diseases.
  - (3) Goldenhar syndrome has been reported with Situs solitus with dextrocardia.
  - (4) Situs inversus with dextrocardia usually occurs without coexisting congenital heart diseases.
171. Right isomerism is characterized by all, except -
- |   |                                       |
|---|---------------------------------------|
| (1) Polysplenia                         | (2) Bilateral sinoatrial nodes        |
| (3) Bilateral morphological right atria | (4) Stomach right sided or left sided |
172. William syndrome is characterized by all, except -
- |                                   |                        |
|-----------------------------------|------------------------|
| (1) Elfin facies                  | (2) Mental retardation |
| (3) Supravalvular aortic stenosis | (4) normotensive       |

173. Congenital Pulmonary stenosis due to dysplastic valve is characterized by all, except -
- (1) It is associated with Noonan syndrome
  - (2) Dysplastic valve without commissural fusion
  - (3) Dilated pulmonary trunk
  - (4) Absence of pulmonary ejection click
174. Ventricular septal defect is present in all, except -
- (1) Edwards syndrome
  - (2) Turner syndrome
  - (3) Patau syndrome
  - (4) Down syndrome
175. Characteristics of Taussig – Bing anomaly includes all, except -
- (1) PR prolongation is not as frequent as in DORV with sub aortic VSD
  - (2) Its DORV with non-restrictive VSD with PS
  - (3) Bi atrial P wave abnormality
  - (4) QRS axis is vertical/ rightward with clockwise depolarization
176. Regarding Anomalous origin of Left Coronary Artery from Pulmonary Artery (ALCAPA), all are correct, except -
- (1) Ischaemic pain cause infant to be irritable, dyspnoeic and diaphoretic
  - (2) Auscultation reveal MR murmur and continuous murmur of inter coronary anastomosis that tend to be softer in systole
  - (3) ECG shows LAD, LVH and deep narrow q in leads I, aVL
  - (4) Skiagram chest shown normal CT ratio
177. Hampton Hump in skiagram chest is suggestive of -
- (1) Pulmonary arterial hypertension
  - (2) Pulmonary oedema
  - (3) Pulmonary Infarction
  - (4) Pulmonary plethora
178. Approach to prevent contrast induced nephropathy includes all, except -
- (1) Isotonic 0.9% normal saline
  - (2) Soda bicarbonate infusion
  - (3) Use of low iso-osmolar contrast agent
  - (4) Statin
179. During angiography which artery goes in the same direction of image intensifier on the fluoroscopic screen?
- (1) Left anterior descending artery
  - (2) Diagonal arteries
  - (3) Left circumflex artery
  - (4) Obtuse marginal artery
180. Advantage of OCT over IVUS includes all, except -
- (1) Calcium is visualized without shadowing
  - (2) Low resolution and high penetration images
  - (3) Intra luminal homogeneous white thrombus of platelet without backscattering
  - (4) Intra luminal red thrombus of RBCs with high backscattering with high signal attenuation

Space for Rough Work / रफ कार्य के लिए जगह