

12-Lead Acquisition and Interpretation for the EMT-Paramedic

At the completion of this unit of study the student should be able to perform the following objectives with 100% accuracy.

- 1. Describe the incidence, morbidity, and mortality of cardiovascular disease.**
- 2. Discuss prevention strategies that may reduce the morbidity and mortality of cardiovascular disease.**
- 3. Identify the risk factors most predisposing to coronary artery disease.**
- 4. Describe the anatomy of the heart:**
 - a) Including the position in the thoracic cavity,**
 - b) Layers of the heart,**
 - c) Chambers of the heart,**
 - d) Location and function of cardiac valves.**
- 5. Identify the major structures of the vascular system.**
- 6. Define each of the following and relate each to the pathophysiology of heart disease:**
 - a) Preload,**
 - b) Afterload,**
 - c) Left ventricular end-diastolic pressure**
- 7. Identify the arterial blood supply to any given area of the myocardium.**
- 8. Compare and contrast the coronary arterial distribution to the major portions of the cardiac conduction system.**
- 9. Identify the structure and course of all divisions and subdivisions of the cardiac conduction system.**
- 10. Identify and describe how the heart's pacemaking control, rate, and rhythm are determined.**
- 11. Explain the physiological basis of conduction delay in the AV node.**
- 12. Define the functional properties of cardiac muscle.**

- 13. Define the events comprising electrical potential.**
- 14. List the most important ions involved in myocardial action potential and their primary function in this process.**
 - a) Potassium,
 - b) Sodium,
 - c) Chloride,
 - d) Calcium,
 - e) Magnesium.
- 15. Describe the events involved in the steps from excitation to contraction of cardiac muscle fibers.**
- 16. State and describe the clinical significance of Starling's Law.**
- 17. Identify the structures of the autonomic nervous system and their effect on heart:**
 - a) Rate,
 - b) Rhythm,
 - c) Contractility.
- 18. Define and give examples of positive and negative:**
 - a) Inotropism,
 - b) Chronotropism,
 - c) Dromotropism.
- 19. Discuss the pathophysiology of cardiac disease and injury.**
- 20. Explain the purpose of 12-Lead EKG monitoring and its limitations.**
- 21. Correlate the electrophysiological and hemodynamic events occurring throughout the entire cardiac cycle with the 12-Lead EKG wave forms, segments, and intervals:**
 - a) P-Wave Morphology,
 - b) QRS-Complex Morphology,
 - c) T-wave Morphology,
 - d) U-Wave Morphology,
 - e) R-R Interval,
 - f) PR-Interval,
 - g) ST-Segment,
 - h) QT-Interval,
 - i) QTc-Interval,
 - j) TP-Segment.

- 22. Identify how heart rates, durations, and amplitudes may be determined from 12-Lead EKG recordings.**
- 23. Explain the concept of positive and negative current flow on the 12-lead EKG.**
- 24. Explain the location and lead placement on the chest wall for the following leads:**
 - a) Bipolar-Limb Leads**
 - b) Unipolar-Augmented Leads**
 - c) Precordial-Anterior Chest Wall**
- 25. Define Einthoven's Triangle.**
- 26. Define the Triaxial System.**
- 27. Define the Hexaxial System.**
- 28. Define a mathematical vector.**
 - a) Direction,**
 - b) Speed,**
 - c) Limitation.**
- 29. Explain the Vector Axis of the 12-lead EKG.**
- 30. Explain Mean QRS axis determination.**
- 31. Explain the Axis Deviation of the 12-Lead EKG.**
- 32. Explain the view of the heart provided by bipolar, unipolar, and precordial 12-Lead EKG leads.**
- 33. Relate the cardiac surfaces or areas represented by the 12-Lead EKG leads.**
- 34. Explain the standard 12-Lead view with respect to current flow.**
- 35. Explain the reciprocal 12-Lead view with respect to current flow.**
- 36. Define the following clinical terms:**
 - a) Ischemia**
 - b) Injury**
 - c) Infarct**
- 37. Identify patient situations where 12-Lead EKG interpretation is indicated.**
- 38. Describe the epidemiology, morbidity, mortality, and pathophysiology of angina pectoris.**

39. Describe the assessment and management of a patient with angina pectoris.
40. Identify the 12-Lead EKG findings in patients with angina pectoris.
41. Recognize the 12-Lead EKG changes that may reflect evidence of myocardial ischemia.
42. Describe the epidemiology, morbidity, mortality, and pathophysiology of myocardial infarction.
43. Identify the primary hemodynamic changes produced in myocardial infarction.
44. List and describe the assessment parameters to be evaluated in a patient with a suspected myocardial infarction.
45. Identify the anticipated clinical presentation of a patient with a suspected acute myocardial infarction.
46. Differentiate the characteristics of the pain/discomfort occurring in angina pectoris and acute myocardial infarction.
47. Recognize the 12-Lead EKG changes that may reflect evidence of myocardial injury.
48. Correlate abnormal 12-Lead EKG findings with clinical interpretation.
49. Identify the 12-Lead EKG changes characteristically seen during evolution of an acute myocardial infarction.
 - a) Dynamic T-Wave Changes
 - i) Peaking
 - ii) Inversion
 - b) ST-Segment Changes
 - i) Depression
 - ii) Elevation
 - c) Q-Wave Formation
50. Identify the most common complications of an acute myocardial infarction.
51. Identify each of the following STEMI patterns on the 12-Lead EKG:
 - a) Anterior
 - b) Lateral
 - c) Inferior
 - d) Posterior

- 52. Given each of the following STEMI patterns on the 12-Lead EKG, identify each coronary artery affected:**
- a) Anterior**
 - b) Lateral**
 - c) Inferior**
 - d) Posterior**
- 53. Identify Left Bundle Branch Block on the 12-Lead EKG.**
- 54. Identify Right Bundle Branch Block on the 12-Lead EKG.**
- 55. Identify non-MI patterns on the 12-Lead EKG of clinical importance.**
- a) Pericarditis**
 - b) BBB**
 - c) Electrolyte Imbalances**
 - d) Drug Toxicity**
 - e) Trauma**
- 56. Explain a systematic approach to 12-Lead EKG diagnosis.**
- 57. Specify the treatment measures that may be taken to prevent or minimize complications in the patient suspected of myocardial infarction.**
- 58. Describe the time window as it pertains to reperfusion of a myocardial injury or infarction.**
- 59. List other clinical conditions that may mimic signs and symptoms of coronary artery disease and angina pectoris.**
- 60. List the necessary components when documenting 12-lead EKG acquisition.**
- 61. Identify those situations that adversely affect the proper acquisition of a 12-lead EKG**
- 62. List the methods to deliver the 12-lead EKG to the receiving facility.**
- 63. Skills check –off.**

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