EMC 451 Advanced ECG Interpretation

Basic Concepts

Course Objectives

Upon completion of this course, the student will be able to:

- Describe the basic electrophysiological principles of the heart, including action potential, vectors, and axis.
- Describe the procedure for acquiring a 12-Lead ECG.
- Describe the properties of the normal 12-Lead ECG.
- Identify atrial and ventricular hyptertrophy on the 12-lead ECG.
- Using the 12-Lead ECG, differentiate between ventricular tachycardia and supraventricular tachycardia with aberrancy.

Course Objectives continued

- Identify ventricular conduction disturbances on the 12-Lead ECG, including:
  - LBBB
  - RBBB
  - LAFB
  - LPFB
  - 1º, 2º, and 3º atrioventricular block
- Using the 12-Lead ECG, identify the pre-excitation syndromes, including
  - Wolf-Parkinson-White Syndrome
  - Lown-Genong-Levine Syndrome

Course Objectives continued

- List and discuss the acute coronary syndromes and their management.
- Using the 12-Lead ECG, recognize and localize myocardial infarction.
- Discuss the effects of various medications on electrophysiology and their appearance on the 12-Lead ECG.

Course Objectives continued

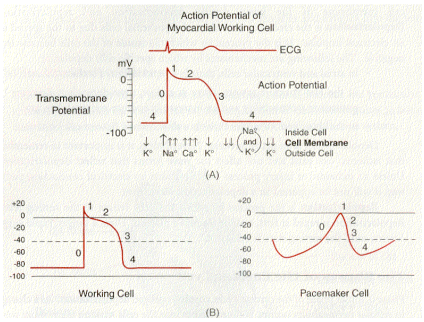
- Using the 12-Lead ECG, identify the patterns associated with various medical conditions, includ
  - Electrolyte disturbances
  - Pericarditis
  - Pericardial effusion
  - Pulmonary embolism
  - COPD
  - Q-T prolongation syndrome
  - Hypothermia
  - Pericardial tamponade
  - Increased ICP

Unit Objectives

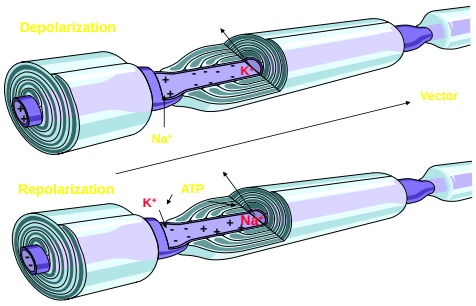
Upon completion of this unit, the student will be able to:

- Describe the electrical conduction system of the heart.
- Describe the genesis of the action potential.
- Describe the ECG Leads and electrode placement of the 12-Lead ECG.
- Describe how to acquire the 12-Lead ECG.
- Discuss the vectors of the heart.
- Name the waves and segments of the ECG.
- Describe the properties of time and voltage on the ECG.

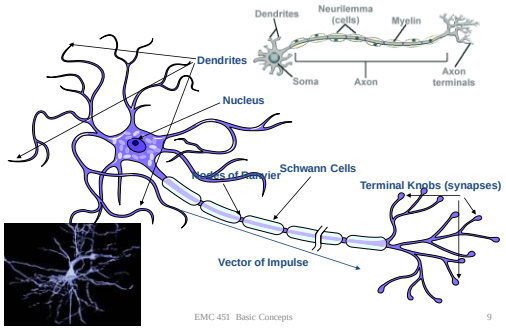
Action Potential



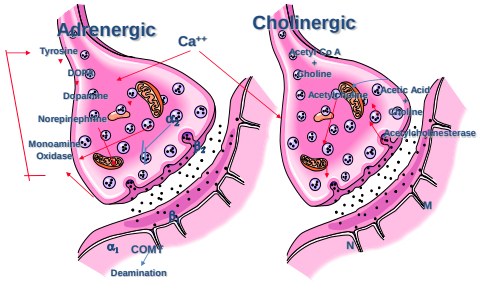
Depolarization, Repolarization



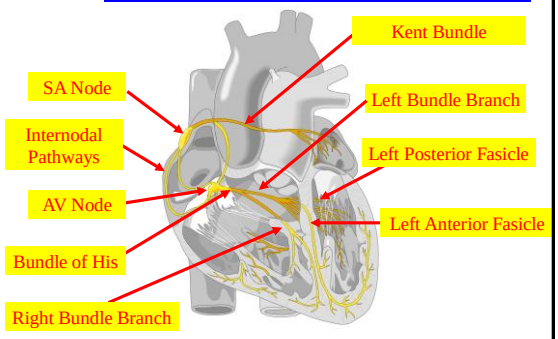
Neuronal Transmission



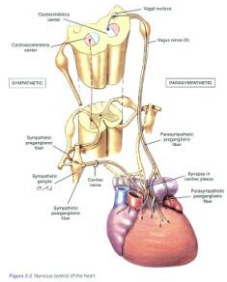
Autonomic Synapses



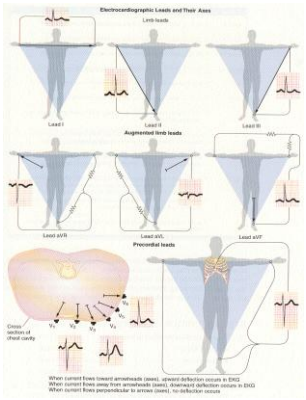
Electrical Conduction System



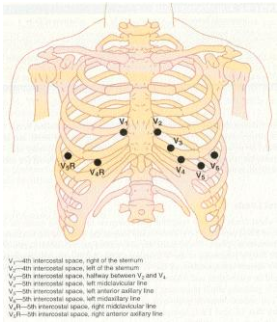
Control of Heart Rate



Lead Placement

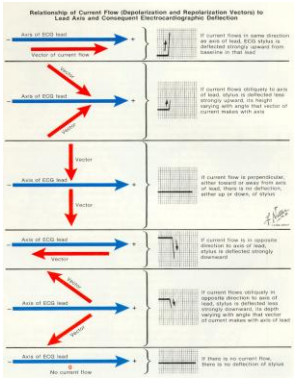


Lead Placement continued

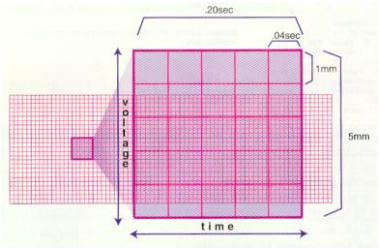


V_1—4th intercostal space, right of the sternum
V_2—4th intercostal space, left of the sternum
V_3—5th intercostal space, halfway between V_2 and V_4
V_4—5th intercostal space, left midclavicular line
V_5—5th intercostal space, left anterior axillary line
V_6—5th intercostal space, left midaxillary line
V_3R—5th intercostal space, right midclavicular line
V_4R—5th intercostal space, right anterior axillary line

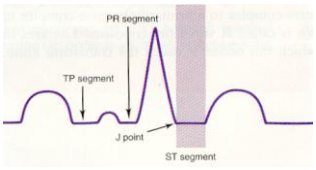
Electrical Vectors

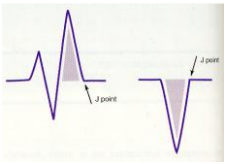


ECG Paper



Naming ECG Waves and Segments





Naming ECG Waves and Segments

- The first negative deflection is the Q wave.
- The first positive deflection the R wave.
- A negative deflection following the R wave is the S wave.
- Large waves are denoted with upper case letters and small waves are given lower case letters.
- If there are more than 2 positive deflections, they are called R and R .
- If there are more than 2 negative waves following the R wave, they are called S and S .

Naming ECG Waves continued