

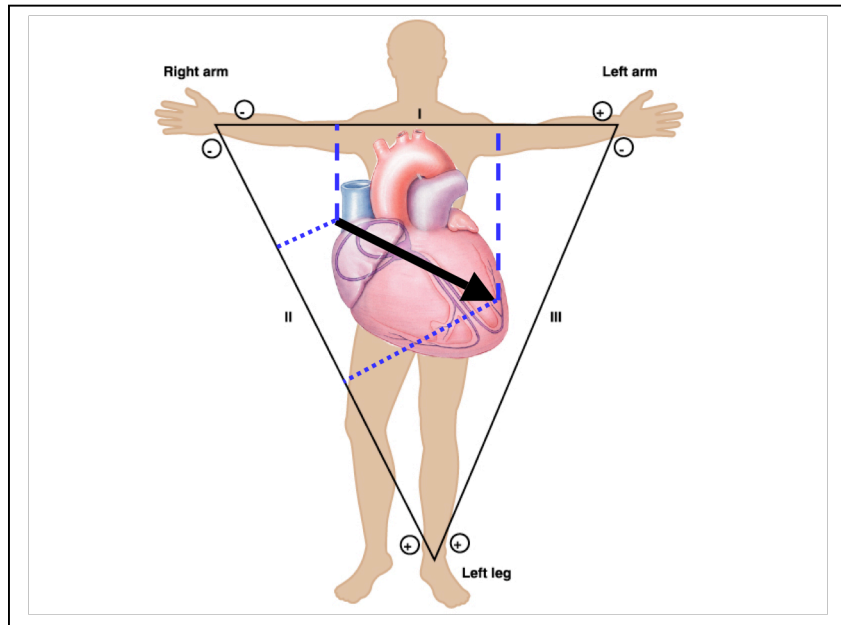
March 31, 2006

## ECG

1. Volume Conductor (e.g. the thorax)
  - a. Inhomogeneous – changes with position and somewhat time
    1. Changes with time depending upon how much water and air are inside of the body
  - b. Anisotropic: skeletal muscle fibers conduct depending upon direction that the muscle fibers lay
  - c. No current leaves the thorax: current moving toward boundary of body will change direction and move along the wall
  
2. Sources - Closed current loop
  - a. Extracellular current give rise to the ECG
    1. During action potentials
    2. There is a potential difference in space
  - b. No ECG
    1. All cells at plateau or at rest
    2. There is no potential difference in space
  
3. Equivalent (simplified) Sources
  - a. Dipole Surface
    1. Spreading wave front of action potentials, causing depolarization
    2. Dipole exists in area where there is a transition from depolarized cells to resting cells
    3. After wave front passes, cells go through plateau and refractory period and finally returning to rest.
  - b. Single “Heart” Dipole
    1. Not as realistic as dipole surface

#### 4. Lead Systems

Einthoven (limb) lead system: the figure shows the original image of the Einthoven lead system, which includes both arms and one leg. The triangle drawn on the subject's body shows the interpretation of each of the leads as the project of the heart vector on the line joining the two measurement sites.



Vocabulary  
Fourier  
Refractory

