Electrocardiography I

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The EKG Electrodes

- The tracings on the EKG paper are a reflection of electrical activity of the heart.

**Action Potential of a Myocardial Cell**

Basic Physiological Properties of Heart Tissue

- Excitability
- Automaticity
- Conductivity
- Refractoriness

**Mechanisms for Changing Automaticity**

Normal Impulse Conduction

- Sinoatrial node
- AV node
- Bundle of His
- Bundle Branches
- Purkinje fibers
• A series of body surface electrodes are placed at specific points on the arms, legs and thorax that sense and record the heart’s electrical activity.

• The electrodes are assigned a specific polarity - i.e. - either negative or positive.

• The electrode we care about the most is the Sensing Electrode which is always given a positive polarity (+).

General Principle # 1
For Depolarization

The Isoelectric Line

CV Pathophys Course LESSON #1
This EKG tracing is BAD NEWS!
If the wave of depolarization is generally moving toward the positive sensing electrode, that electrode will record a positive deflection above the isoelectric line on the EKG paper.

General Principle # 2
For Depolarization

If the wave of depolarization is generally moving away from the positive sensing electrode, then the electrode will record a negative deflection below the isoelectric line on the EKG paper.

The EKG Leads
The Six Limb Leads

- Three Standard Leads:
  - Lead I
  - Lead II
  - Lead III

The Six Limb Leads

- Three Augmented Leads:
  - aVF
  - aVR
  - aVL

The Precordial Chest Leads

- There are six precordial chest leads:
  - V1, V2, V3, V4, V5, V6
The Standard Leads

• Lead I: created by making the left arm positive (+) and the right arm negative (−).
  • Its angle of orientation is $+0^\circ$

• Lead I looks across the heart from right to left along the $+0^\circ$ axis in the frontal plane.

• Lead II: created by making the left leg positive (+) and the right arm negative (−).
  • Its angle of orientation is $+60^\circ$
• Lead II looks across the heart from the right shoulder down to the left hip along the + $60^\circ$ axis in the frontal plane.

**Limb Leads**

**Precordial Leads**

**The “PQRST”**

• P wave - Atrial depolarization
• QRS - Ventricular depolarization
• T wave - Ventricular repolarization

**Nomenclature of QRS Complexes**

**Main Vectors of Depolarization**
Configuration of Precordial QRS Complexes

Normal ECG

- P wave
- QRS complex
- ST segment
- J point
- T wave
- U wave

Standardization:
- QT interval: 0.20 second
- PR segment: 0.04 second
- QRS complex: 0.10 second
- ST segment: 1.0 mV
- T wave: 0.54 mV
- U wave: 0.20 mV