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# Ekg / Ecgs (Quick Study: Academic)

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## EKGs / ECGs

**Basics**

- The abbreviation EKG comes from the German word elektrokardiogramm, both EKG and ECG can be used to mean "electrocardiogram". However, EKG will be used throughout this guide.
- An EKG is a graph of the electrical activity of the heart recorded by electrodes placed on the skin.
- There are two basic types of cardiac cells: myocardial cells and specialized cells.
- Myocardial cells are the working machinery of the heart and comprise the majority of heart tissue. They form the muscle layer of the atrial and ventricular walls.
- Specialized cells are the conductive system of the heart.
- Pacemaker cells activate and regulate myocardial cells, they do not contract themselves, so they cannot contract. They generate and conduct electrical impulses throughout the heart.
- Conducting cells conduct the electrical impulse generated by pacemaker cells throughout the heart.
- In a cardiac cell resting state, the inside of the cell is negatively charged when compared to the outside of the cell. The electrical activity inside the cell is maintained by ion pumps in the cell membrane.
- These pumps control the distribution of ions across the membrane, such as potassium, calcium, chloride, and sodium.
- The movement of the difference in electrical charge on either side of a cell membrane is called **action potential**.
- The exchange of electrons through the cardiac cell membrane produces this electrical activity which causes the positive charge on either side of the cell membrane. **Depolarization** is an electrical signal caused by positively charged ions entering the cell membrane.
- Depolarization is transmitted from cell to cell, producing a wave of electrical activity across the heart, which can be sensed by electrodes placed on a patient. This depolarization initiates the cycle of contraction.
- Depolarization is followed by a reversal of the flow of ions across the cell membrane called **repolarization**. In the restoration of negative polarity inside the cell.
- Repolarization initiates the relaxation phase of cardiac muscle, which is also detected by electrodes placed on the chest.

**Conduction Pathway**

- The path of conduction begins in the **sinus node**, which acts to pace the heart. Generally, the sinus node has the fastest rate of the heart.
- From the sinus node, the impulse travels through the **atrioventricular node** (AV node).
- The AV node is often referred to as the **pacemaker of the heart**, as it is the slowest of the heart's nodes.
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- The impulse then continues through the **bundle of His**, located in the upper part of the septum that separates the ventricles.
- The bundle of His branches into the **right and left bundle branches**.
- The right and left bundle branches divide into smaller branches and connect to the **Purkinje fibers**, which penetrate the ventricular muscle, where electrical impulses are sent through the Purkinje fibers, the cardiac muscle will contract.
- These fibers have pacemaker cells that have an intrinsic pace of 30-40 bpm.

**Lead Recording**

- An EKG is recorded by electrodes with adhesive pads that are placed on the patient's skin.
- Three electrodes are placed on the chest to trace the heart from different angles. A lead is a view of the heart from a particular angle.
- A single EKG can be used with three electrodes known as lead I, lead II, and lead III.
- An EKG records the electrical activity between the electrodes.
- One electrode is positive and is called the **positive electrode**, and the third is the **"ground"** which measures electrical interference from other sources.

When electrically charged ions move away from the positive electrode, the pattern on the graph will be negative. Conversely, when electrically charged ions move away from the negative electrode, the pattern will appear positive.



**Lead I Monitoring**

- The positive electrode is placed on the left upper side of the chest just below the clavicle. The negative electrode is placed below the right clavicle.
- This is the most common lead to capture monitoring because it resembles the normal pattern of electrical depolarization across the heart.
- Lead I assesses information on the lateral wall of the heart.

**Lead II Monitoring**

- The positive electrode is placed on the left side of the chest below the pectoral muscle.
- The negative electrode is placed on the right side.
- This is the most common lead to capture monitoring because it resembles the normal pattern of electrical depolarization across the heart.
- Lead II assesses information on the anterior wall of the heart.

**Lead III Monitoring**

- Lead III is a modified lead.
- The negative electrode is placed on the left side of the chest below the clavicle, the positive electrode is on the right side of the chest, in the 9th intercostal space.
- Lead III assesses information on the anterior wall of the heart.

**12-Lead EKG**

- Provides 12 views of the heart because 12 different EKG leads (I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, and V6).
- The 12 views are taken from 10 electrodes.
- One electrode is positive and is called the **positive electrode**.
- One electrode is negative and is called the **negative electrode**.
- Two preplaced electrodes (V4, V6) are placed on the chest laterally.



**precordial electrodes**

- V1 is placed in the 4th intercostal space on the right of the sternum.
- V2 is placed in the 4th intercostal space to the left of the sternum.
- V3 is placed between V2 and V4, which is located at the 5th intercostal space midclavicular line.
- V4 is placed in the 5th intercostal space.
- V5 is placed at the 6th intercostal space midclavicular line.
- V6 is placed at the 6th intercostal space midaxillary line.

**Augmented Leads**

- There are three augmented leads, which are created by making one electrode positive and the other one negative for storage.
- Lead aVR is created by making the left arm positive and the other leads negative.
- Lead aVL is created by making the right arm positive and the other leads negative.
- Lead aVF is created by making the leg positive and the other leads negative.

**the anterior part of the heart is viewed in leads V2, V3, and V4**

**the inferior part of the heart is viewed in leads V3, V4, V5, and V6**

**the left lateral side of the heart is viewed in leads V5, aVL, V5, and V6**

**the right anterior side of the heart is viewed in leads V1, V2, and V3**

**EKG Paper**

- In order to store waveform, it is necessary to understand EKG graph paper.
- The graph paper is made out of small and large squares.
- Each small square represents approx. 0.03 second.
- There are five small squares in a large square, each large square represents 0.20 second.
- Five large squares equal 1 second.
- The frequency of an EKG is 70 beat per second.
- The vertical lines of EKG paper measure the voltage, or amplitude, which is the strength of the electrical current.
- A strong current will have a greater deflection on a weaker current.
- When calibrated correctly, one small square is 1 millivolt, which equals 0.1 millivolts.
- One large square is 5 millivolts, which is equal to five small squares, or one millivolt and eight small squares.

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## Synopsis

The newest edition to BarChartsâ™ line of medical guides is an essential companion for anyone studying EKGs/ECGs or working in the medical field. This guide features an introduction to EKGs and how they work and also includes detailed sections covering the main types of arrhythmias, such as sinus rhythms, atrial rhythms, junctional rhythms, ventricular rhythms, and heart blocks. Helpful illustrations, along with the rate, rhythm, P wave, PR interval, and QRS complex, of each rhythm covered are also included to help with identification.

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## Customer Reviews

I'm in PA school and EKGs, for whatever reason, have been a struggle for me. This handy little pamphlet has been a huge help. Everything is laid out very simply in one place. It takes a lot of the fluff out that some other sources include. Best of all, you can store it in a folder or binder so it's easy to bring with you wherever you need. The product is laminated so it's very sturdy and can take a reasonable amount of wear. A must buy!

The EKG - Quick Study guide was more than I thought. It had a lot of information. It gave me all the information I was looking for and more. It is very handy to carry around. I use it at work. The price was great !

Useful tool for review, I been off in nursing for awhile, this here helps me a lot to refresh my knowledge, it comes with a laminated material which it is not easily tore up, easy to carry, and good to keep on file!

My husband works as a heart monitor tech and used these to study for his certifications. Additionally, he has them at his station and says they are so good people are always borrowing them and training staff is looking into purchasing for position candidates as study tool.

Awesome, use it in my job to help in case I need a refresher. Love to have something easy to look at and reference if need be.

I used this to practice over my EKG basics before I took my certification exam and passed with flying colors...

This has been extremely helpful in my studies. You seek and find exactly what you're looking for without a long drawn out book explanation. Great for reference.

very helpful quick study guide. convenient and 14 more words required. blah blah blah.... well, this is a good quick guide for short time review

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