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Ekg / Ecgs (Quick Study: Academic)

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EKGs / ECGs

Basics

- The information in EKG comes from the cardiac muscle depolarization. Both EKG and ECG can be used to measure "cardiac conduction". However, ECG will be used throughout this guide.
- An EKG is a graph of the electrical activity occurring in the heart measured by cardiac cells.
- There are two basic types of cardiac cells: myocytes and myofibroblasts.
- Myofibroblasts cells are the working machinery of the heart and comprise the majority of heart tissue. They form the muscular layer of the atrial and ventricular walls.
- Myocytes are the specialized cells that cause the heart to contract.
- Specialized cells are the conduction system of the heart.
- Pacemaker cells activate and regulate myofibroblasts cells; they do not contain filaments, so they cannot contract; they generate and conduct electrical impulses throughout the heart.
- Electrical conducting cells generate an electrical impulse generated by pacemaker cells throughout the heart.
- In cardiac cells resting state, the inside of the cell is negatively charged when compared to the outside of the cell; the electropositive inside the cell is maintained by ion pump in the cell membrane.
- These pumps control the distribution of ions across the membrane, as potassium, sodium, chloride, and calcium.
- 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.
- When an action potential occurs, the cell membrane depolarization is an electrical event 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's skin; depolarization initiates the cycle of contraction.
- Depolarization is followed by reversal of the flow of ions across the cell membrane called **repolarization**, or 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 Pathways

- The path of conduction begins in the **atrioventricular (AV) node**, at the base of the heart; where冲动s travel to pass the heart; generally, the AV node is the only site where the impulse can be slowed down.
- These cells have the ability to conduct the impulse around the AV node.
- The AV node is followed by the **His-Purkinje system**, which is made up of:
 - The **His bundle** (a very thickened bundle of myofibroblasts cells that transmits the impulse to the ventricles).
 - The **left and right bundle branches** (which branch off the His bundle to conduct the impulse to the ventricles).
 - The **left and right Purkinje fibers** (which branch off the bundle branches to conduct the impulse to the ventricles).
- The impulse is then sent to the **ventricular muscle (VM)**, located in the lower area of the right ventricle.
- The main function of the VM muscle is to delay the electrical impulse, thus allowing the atria to contract and ventricles to relax.
- The impulse is then transmitted through the **bundle of His**, located in the upper part of the septum that separates the ventricles.
- The bundle of His has pacemaker cells that transmits at a rate of 40-60 bpm.
- This area contains the AV node with the right and left bundle branches—an area called the **AV junction**.
- The right bundle branch sends messages to the right ventricle; the left bundle branch divides and supply transmission to the left ventricle.
- The right and left bundle branches divide into smaller branches and connect to the Purkinje fibers, which penetrate the ventricular muscle; when electrical impulses are sent through these Purkinje fibers, the cardiac ventricles contract.
- These fibers have pacemaker cells that have an intrinsic pace of 20-40 bpm.

Electrocardiogram

- An EKG is recorded by electrode leads adhesive pads that are placed on the patient's skin.
- These electrodes are placed on the chest to view the heart from different angles; a lead is a view of the heart from a particular angle.
- A single EKG can be seen with three electrode leads as lead I, lead II, and lead III.
- An EKG records the electrical activity between the electrodes.
- There are three types of leads:
 - One electrode is positive, the second is negative, and the third is the "ground", which measures electrical interference from other sources.
- When electricity flows toward the positive electrode, the pattern on the graph will be upright.
- Conversely, when electricity flows away from the positive electrode, the pattern will appear inverted.

Lead I Monitoring

- The positive electrode is placed on the left side of the chest just below the clavicle; the negative electrode is placed before the right clavicle.
- The flow of electricity is from the negative to the positive electrode.
- Lead I is used for QRS complexes, as it upright.
- Lead I accesses 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 previous muscle; the negative electrode is placed before the right clavicle.
- That is the most common lead for cardiac monitoring because it records the normal pattern of electrical depolarization across the heart.
- Lead II accesses information on the inferior wall of the heart.

Lead III Monitoring

- Lead III is modified chest lead.
- The negative electrode is on the left side of the chest below the clavicle; the positive electrode is on the right side of the sternum, in the midclavicular space.
- Lead III accesses information on the anterior wall of the heart.

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12-lead EKG

- Provides more angles of the heart because it collects 12 leads.
- 1, 2, 3, aVF, aVL, aVR, V1, V2, V3, V4, V5, and V6.
- The 12 views are taken from 10 electrodes.
- Each lead is a view of the heart from a particular angle.
- For potential electrodes (V1-V6) are placed on the chest horizontally.

Precordial Electrodes

- V1 is placed in the 4th intercostal space in 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 at the 5th intercostal space, which is located at the 5th intercostal space sternal line.
- V5 is placed at the 5th intercostal space midclavicular line.

Augmented Leads

- There are three augmented leads, which are created by making one electrode positive and the other one negative, for example:
 - Lead aVR is created by making the right arm positive and the other leads negative.
 - Lead aVR is created by making the right arm 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, and V5.
- The left lateral side of the heart is viewed in leads I, aVL, V5, and V6.
- The right posterior part of the heart is viewed in leads II, aVF, V5, and V6.

ECG 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 is one millimeter square, 0.08 second.
- There are two small squares in a large square; each large square represents 0.16 second.
- Each large square equals 1 mm.
- The paper has a speed of 25mm/s, 25 mm per second.
- The vertical lines on EKG paper measure the voltage in millivolt, 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 mm, 0.08, which equals 0.1 millivolt.
- One large square, which is equal to five small squares, is 5 mm high and equals 0.5 millivolt.



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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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