Hi everyone! Happy test week! I hope you are all feeling prepared for your first exam—yours got this! This week we are going to be completing an overview of membrane potentials and starting to look at the EKG for the cardiovascular system. Please let me know if you have any questions!

Remember that the Tutoring Center offers free individual and group tutoring for this class. Our Group Tutoring sessions will be every Wednesday from 6:00-7:00 PM CST. You can reserve a spot at https://baylor.edu/tutoring.

KEY TERMS: Action potential, Graded potential, Resting Membrane potential, Concentration gradient, Electrical gradient

**Membrane potential:** also known as voltage, is a difference in electrical charge between two regions. Voltages along plasma membrane develop because the membrane is semipermeable.

**Resting Membrane Potential:** cell is in a polarized condition, the inside of the membrane is negatively charged, the outer portion is positively charged.

Factors that affect ion movement—>
1. **Concentration Gradient:** the difference in the concentration of a substance at two locations. Ions typically move passively from an area of high concentration to low concentration.
2. **Electrical Gradient:** the difference in the electrical potential, or voltage, at two locations. Cations are attracted to areas with lots of anions, and anions are attracted to areas with high concentrations of cations.

This is a great slide show that walks through the difference between electrical and concentration gradients. https://slideplayer.com/slide/8657375/

**Graded Potential:** a wave of electrical change that moves along the membrane. The intensity of the wave decreases as it moves farther along the membrane.

**Action Potential:** rapid reversal in polarity of a plasma membrane. The inside of the cell membrane becomes positively charged, the outside becomes positively charged.
EKG OVERVIEW: This is a general overview of the EKG for the second cardiovascular chapter which you will begin covering next week. This is meant to help get you started with the smaller concepts that you will need to put together in the following weeks. Next weeks resource will cover this in more detail.

An EKG, or ECG, represents the electrical activity that is occurring in the heart.

Listed below are some terms that you will want to be able to associate with an electrical event on the EKG. I have given a brief sentence for each as an example of what you would want to know for each term.

P wave: action potentials from the SA node sent to contractile cells. Represents atrial depolarization

T wave: Ventricle repolarization

QRS complex: ventricle depolarization & atrial repolarization

P-R interval: action potential travels from the SA node to the purkinje fibers

Q-T interval: the time needed for ventricles to depolarize and repolarize completely

P-Q segment: atria are completely depolarized

S-T segment: ventricles are completely depolarized

Everything that we have discussed about the EKG so far can be classified as an electrical event, now we will take a look at the cardiac cycle, which includes both the electrical and mechanical events involved with

Here is an image of the cardiac cycle, below I will cover the key terms that you will need to know for the cardiac cycle.
While the ECG depicts electrical events in the heart, systole and diastole depict mechanical events.

**Systole:** when cardiac muscle cells contract

**Diastole:** when cardiac muscle cells relax.

*A tip for remembering the difference between systole and diastole is that when you die, you will be relaxed, thus diastole and relax stay together*

There are four stages of the cardiac cycle, and they include the following —>

1. **Ventricular Filling:** Occurs during ventricular diastole and atrial systole. AV valve is open, blood is flowing from atrium into ventricle.

2. **Isovolumetric contraction:** Begins right after the QRS complex, both the AV and SL valves are closed. Ventricular myocardium is contracting (ventricular systole), and the pressure within the ventricles is building.

3. **Ventricular ejection:** When the pressure within the ventricle exceeds the pressure in the aorta, the SL valves will open and blood will be expelled into blood vessels.

4. **Isovolumetric relaxation:** Begins at the end of the T wave, ventricular pressure drops below aortic pressure and the SL valves close again. This period lasts until the pressure in the atria exceeds the pressure in the ventricles and the cardiac cycle will begin again.