

Lab. 10- Electrocardiogram (ECG)

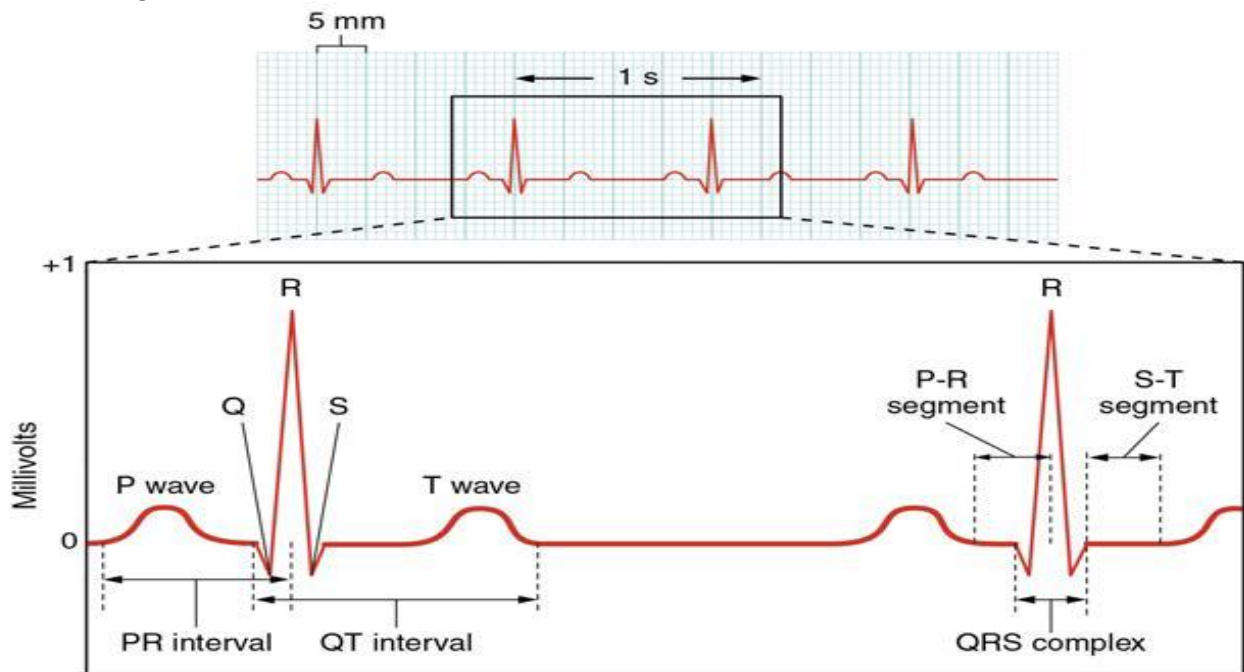
Learning outcomes of the lab exercises:

1. Identify the waveforms present on an ECG
2. Determine the activity of the heart during each waveform
3. Record and measure an ECG using physiological equipment
4. Identify common ECG abnormalities from a waveform

“By careful placement of surface electrodes on the body, it is possible to record the complex, compound electrical signal of the heart. This tracing of the electrical signal is the **electrocardiogram (ECG)**, also commonly abbreviated EKG (K coming kardiology, from the German term for cardiology). Careful analysis of the ECG reveals a detailed picture of both normal and abnormal heart function, and is an indispensable clinical diagnostic tool.”

Introduction to the ECG:

It is possible for us to measure the electrical activity of the heart. An ECG can be divided into three distinguishable waves.



OpenStax A&P, pg 855

- 1.) P wave:
 - Indicates movement of the depolarization wave through the atria
 - Indicates atrial contraction
- 2.) QRS complex:
 - Complicated pattern indicates ventricular depolarization
 - Indicates ventricular contraction
 - Odd shape due to directional change (later)
 - Largest wave because ventricles are the largest chambers (more cells)
- 3.) T wave:
 - Indicates ventricular repolarization
 - Ventricles relax
 - Atrial relaxation would be a small wave, masked by QRS complex

In addition, many smaller segments can be identified and measured on the ECG:

4.) P-R interval:

- Amount of time for atria to contract before ventricles start to contract
- Time allowed for complete ventricular filling

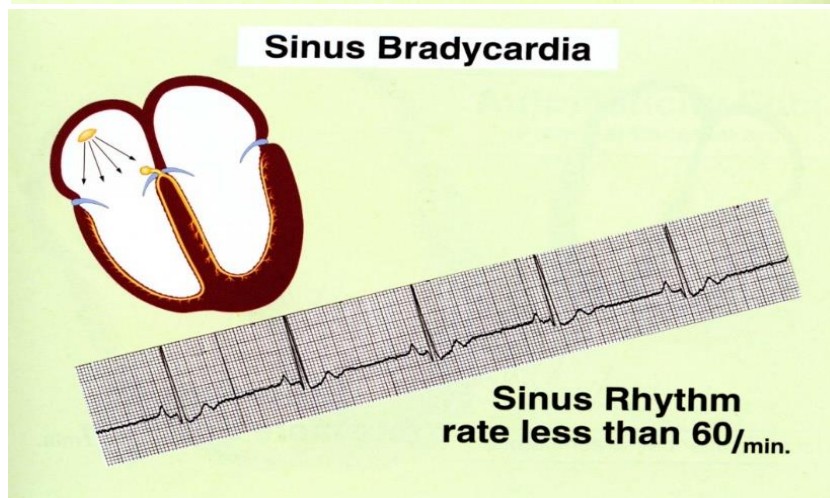
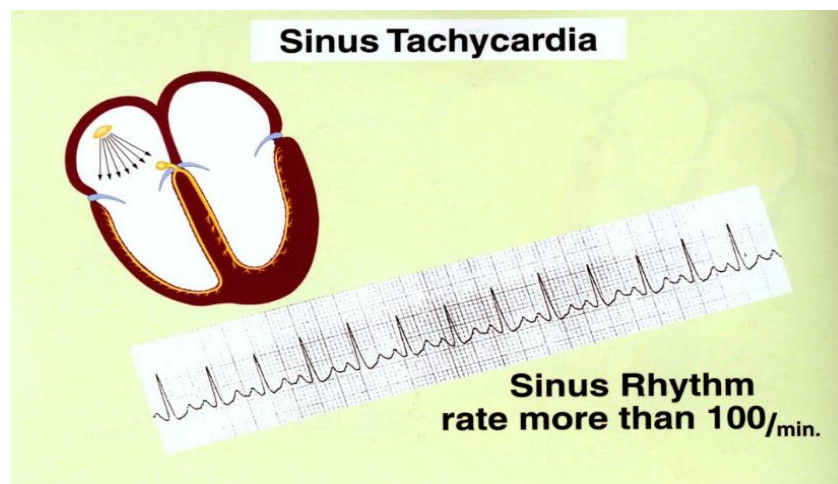
5.) Q-T interval:

- Amount of time for ventricles to contract and return to a relaxed state

6.) End of T to next R:

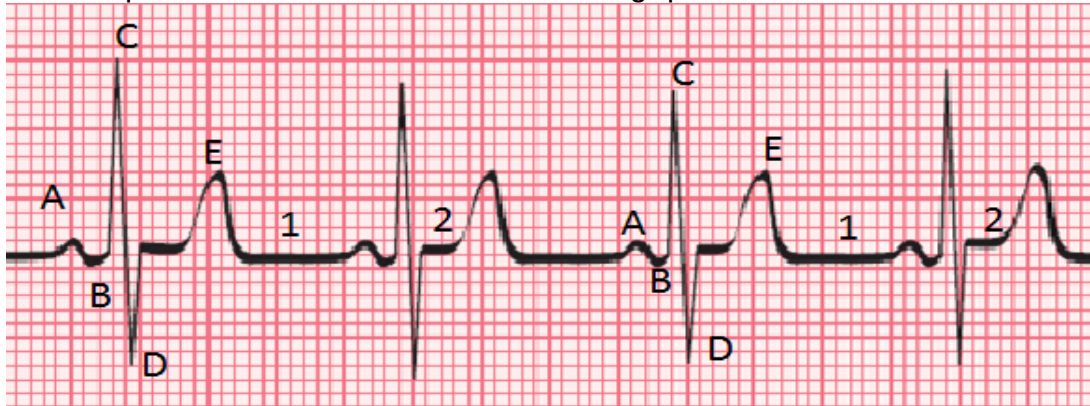
- Time when the ventricles are relaxed
- Ventricles are filling with blood
- Period of quiet time between major contractile events

“In a normal heart, the heart rate is the rate in which the sinoatrial node depolarizes as it is the source of depolarization of the heart. Heart rate, like other vital signs (blood pressure and respiratory rate) changes with age. In adults, a normal heart rate is between 60 and 90 beats per minute. A heart rate less than normal is called bradycardia (<60 in adults) and higher than normal is tachycardia (>100 in adults).” (*American Heart Association website*)



Activity: ECG Worksheet

Use the picture below to answer the following questions.



1. Which letter(s) describes the deflection for ventricular depolarization? _____
2. Which letter(s) describes the T-wave deflection? _____
3. Which letter(s) describes the deflection for atrial depolarization? _____
4. Explain the flat line on the ECG seen under #1. What is happening at this point in time?

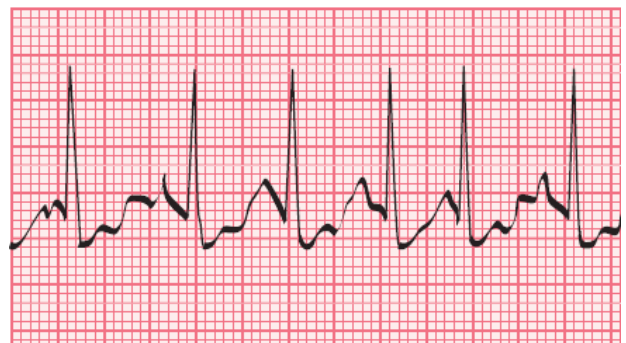
5. Explain why there is another flat line at #2. What is happening at this point in time?

6. In the Biopac activity, what did BPM stand for?

7. Thinking about the Biopac activity, what happens to BPM when ΔT decreased?

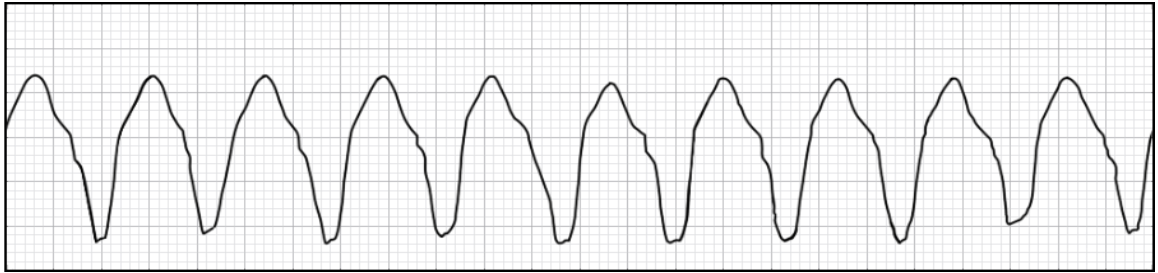
8. During the Biopac activity, what happened to ΔT when the person sat up?

9. Explain the problem with the ECG below.
Be specific for atria or ventricles as well as
depolarization or repolarization.



For each of the following ECG tracings, determine the following:

1)



[1a.] What waveform is abnormal? _____

[1b.] Is the problem with the ventricles or atria? _____

[1c.] Is it a depolarization or repolarization problem? _____

2)



[2a.] What waveform is abnormal? _____

[2b.] Is the problem with the ventricles or atria? _____

[2c.] Is it a depolarization or repolarization problem? _____

3)

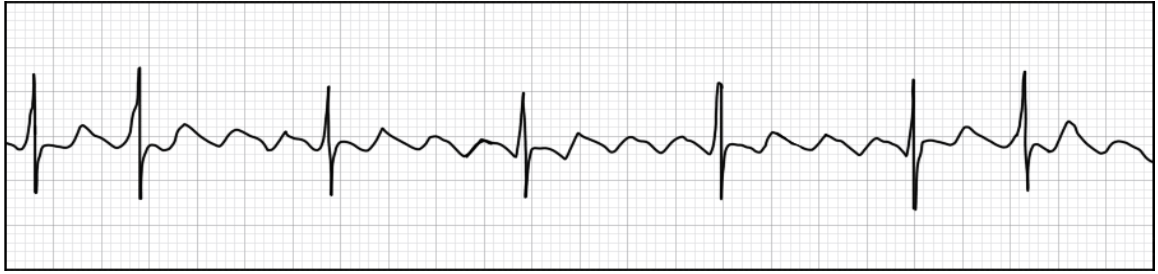


[3a.] What waveform is abnormal? _____

[3b.] Is the problem with the ventricles or atria? _____

[3c.] Is it a depolarization or repolarization problem? _____

4)



[4a.] What waveform is abnormal? _____

[4b.] Is the problem with the ventricles or atria? _____

[4c.] Is it a depolarization or repolarization problem? _____

5)



[5a.] What waveform is abnormal? _____

[5b.] Is the problem with the ventricles or atria? _____

[5c.] Is it a depolarization or repolarization problem? _____

6)



[6a.] What waveform is abnormal? _____

[6b.] Is the problem with the ventricles or atria? _____

[6c.] Is it a depolarization or repolarization problem? _____