

LAB 2

Heart Anatomy and ECG

Assignments:

Due before lab:

Quiz over heart anatomy (pgs 14-15) and ECG waves (pg. 21)

Label the diagrams of the heart on page 14 and 15 using the terms listed on those pages.

Using the labeled ECG on page 21, explain what each of the designated waves represents.

Do the case study on page 23.

Next lab:

Quiz over pre-lab for “Heart as a Pump” (pg. 25-27) and IP exercise on Cardiac Output (pg. 34).

Objectives:

Identify the anatomy of the human heart model using the terms provided.

Identify the anatomy of the pig heart using the terms provided.

Conduct an experiment using the BIOPAC system and record ECG tracings.

Label and identify the waves on an ECG and be able to explain what the waves represent.

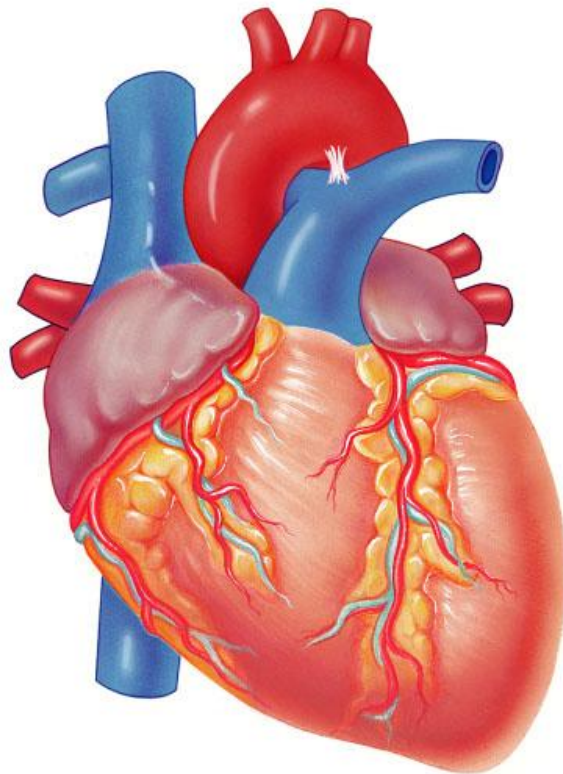
Identify abnormal ECG tracings pg. 23.

Know the Einthoven Triangle for Bipolar Leads

External view –Label the following:

Right atrium
Left atrium
Right Ventricle
Left ventricle
Right Coronary artery

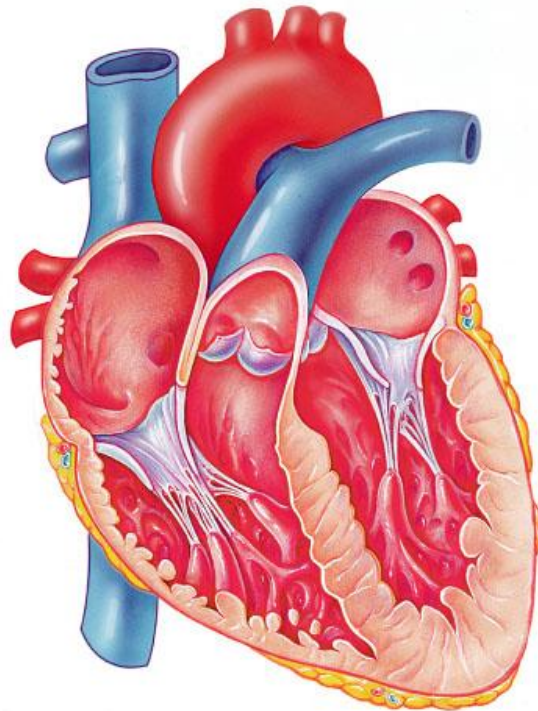
Superior Vena Cava
Aorta
Pulmonary trunk
Pulmonary arteries
Pulmonary veins



Internal view - Label the following:

Right atrium
Left atrium
Right ventricle
Left ventricle
Aorta
Aortic semilunar valve
Tricuspid valve
Bicuspid Valve

Pulmonary trunk
Pulmonary semilunar valve
Chordae tendinae
Papillary muscle
Pulmonary veins



A. Heart Model**HEART MODEL KEY**

3. Superior vena cava
4. Ascending aorta
5. Arch of aorta
6. Brachiocephalic artery
7. Left common carotid artery
8. Left subclavian
9. Descending aorta

10. Pulmonary trunk
11. Right pulmonary artery
12. Left pulmonary artery

18. Right pulmonary veins
19. Left pulmonary veins
20. Inferior vena cava

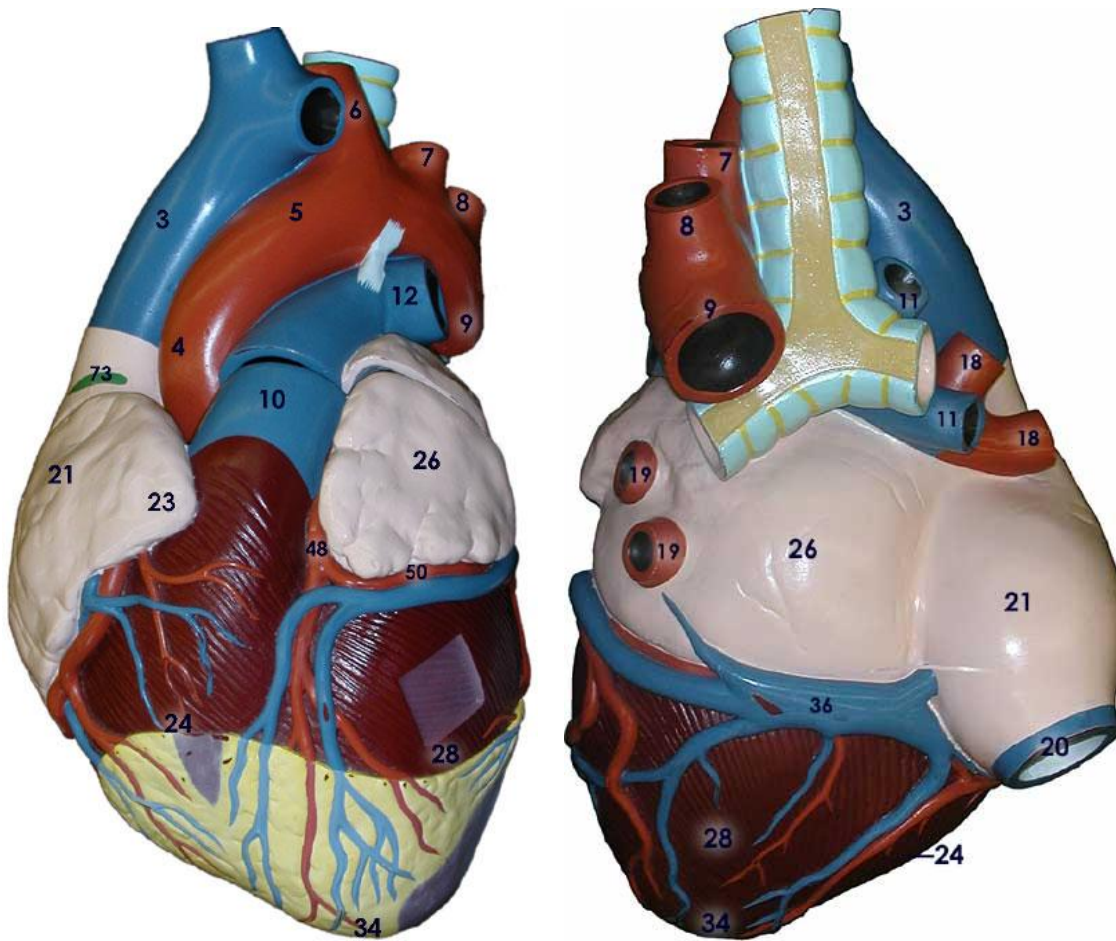
21. Right atrium
23. Right auricle
24. Right ventricle
26. Left atrium
28. Left ventricle

34. Apex of heart
36. Coronary sinus

48. Left coronary artery
50. Circumflex branch of left coronary artery

56. Tricuspid valve
58. Papillary muscles
59. Chordae tendineae
63. Pulmonary semilunar valve
67. Bicuspid (mitral) valve
70. Aortic semilunar valve

73. Sinoatrial node (SA node)
74. Atrioventricular node (AV node)
75. Atrioventricular bundle or Bundle of His
 - Bundle branches
 - Purkinji fibers



Identify all **exterior** parts of heart on these pictures of your model using the terms on previous page.



Identify all **interior** parts of the heart on this picture of your model using the terms on pg. 16.

IV. Pig Heart

Identify:

left and right atrium

left and right ventricle

pulmonary trunk

pulmonary semilunar valve

aorta

aortic semilunar valve

pulmonary veins

superior and inferior vena cava

tricuspid valve

bicuspid (mitral) valve

chordae tendineae

papillary muscles

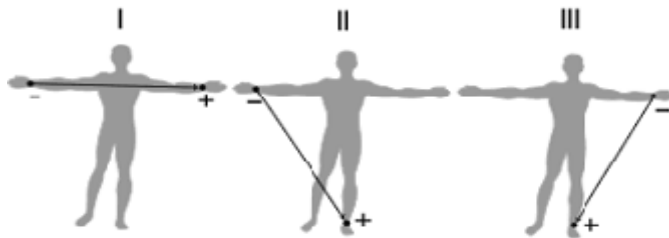
Electrocardiogram (ECG or EKG)

On the following pages you will find the Biopac Systems laboratory exercise for recording ECGs. Each group (of 4-6 students) will record an ECG for one of the group members.

You are responsible for:

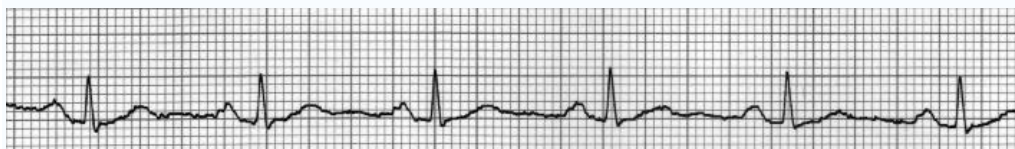
1. Reading about ECGs in your textbook.
2. Knowing all the parts of an ECG tracing and physiologically what they represent.
3. Knowing where electrodes are placed
4. Being able to identify the normal and abnormal ECGs
5. Know the Einthoven Triangle for Bipolar Leads

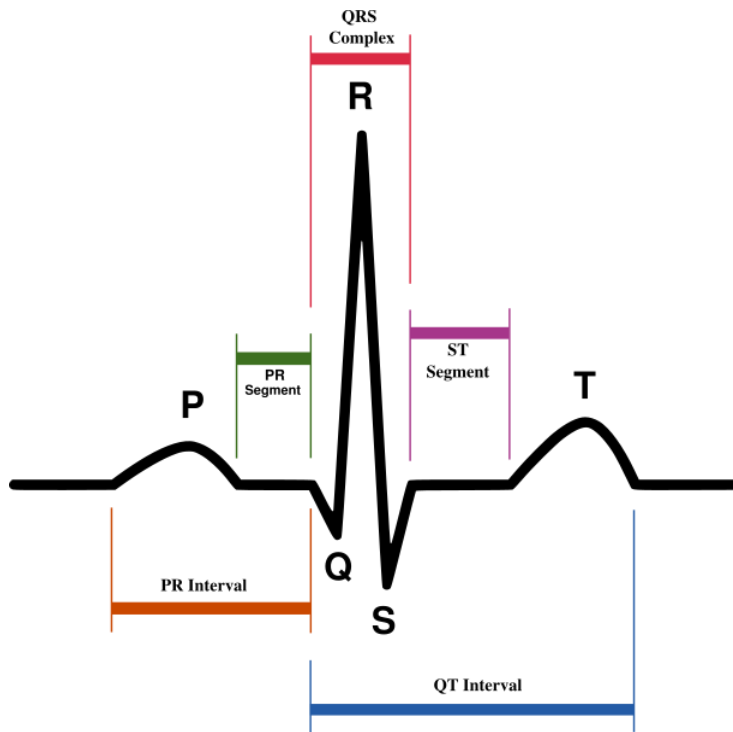
Bipolar Leads:



An **electrocardiogram (ECG or EKG)**, abbreviated from the German *Elektrokardiogramm*) is a graphic produced by an **electrocardiograph**, which records the electrical activity of the heart over time. It is the gold standard of cardiac rhythm analysis and plays a key role in the screening and diagnosis of cardiovascular disease.

The electrocardiogram does not assess the contractility of the heart.





Define:

P wave

QRS complex

T wave

PR interval

QT interval

The Biopac System for ECG and pulse rate (BPM)

TO RUN BIOPAC

1. **Setup:**
 turn on MP30
 turn on computer
 hit return for logon
 double click on "Biopac Student Lab" (in middle)
 click on "Lesson 5 (L05) – "ok"
 type in subject's name
 2. **Hook up subject:**
 white lead – right arm
 black lead – right leg (ground)
 red lead – left leg
 3. **Control measurement:**
 hook up subject and have them stand quietly
 do calibration
 record for 10-20 sec – hit **SUSPEND**
 4. **Exercise: Have the patient exercise for 3 minutes.**

 Do NOT disconnect the electrodes. Run in place for 3 minutes.
 After exercise hit **RESUME** and record 10-20 sec. Hit **SUSPEND**
 click **DONE**
 click **ANALYZE CURRENT DATA**
 5. **Analyze Data**
 click on small box in the upper left corner of the screen. Scroll and click "**bpm**"
 click on the magnifying box and magnify 3 complete heart cycles
 click on **I beam** (in the lower right corner of your screen). Place I beam at the peak of one QRS wave. Click and drag to next QRS wave (peak to peak) and record bpm in the table below.
 Repeat for "after exercise"
 6. **Print** a copy of your recording. You may want to magnify 3 or 4 waves to get a larger image and then print a copy. (Click on the magnifying glass in the lower right corner of the computer and drag over the waves you want to enlarge)
- On the printed copy, label the P, QRS, and T waves.** What do each of these waves represents?

Control bpm

Exercise bpm

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THE CASE OF ABNORMAL ECG (EKG)

After a fairly severe heart attack, The EKG reveals normal sinus rhythm, but only for the P wave. The QRS and T waves are no longer in synchrony with the P wave.

What is the problem?

What part of the heart is damaged?

What is pacing the ventricles?

Normal and Abnormal ECGs:



Normal

