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Human Physiology

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Lab #10-ELECTROCARDIOGRAPHY

Purpose

The purpose of this lab is to accurately set up and use an ECG and be able to identify its P, Q, R S,T waves and what action correlates to each waveform.

Procedures

10-A: Recording the ECG–Lead II

1. To get things started:

- Before you turn anything on, be sure the IWX/214 unit is plugged in, and that the IWX/214 unit is connected to the laptop by USB cable.

- Be sure that the C-AAMI-504 EEG cable is inserted into the isolated inputs of Channels 1 and 2 of the IWX/214. Be sure that the three color-coded lead wires are correctly inserted in the lead pedestal of the C-AAMI-504 EEG cable. Insert the connectors on the red, black, and green electrode lead wires into the color-coded matching sockets on the lead pedestal of the ECG cable. The white and brown lead wires can be removed and neatly placed in the Iworx case, you do not need them for Lab 10, but after the week is over they will need to be replaced.

- Once everything is connected, FIRST turn on the laptop and allow it to fully boot up before you turn on the IWX/214 unit. Once the Iworx unit is on, the red indicator light on the Iworx unit should light up and you may hear the USB chime from the laptop if the laptop does not default to mute (many are set to default to mute).

2. Open the Labscribe3 program by clicking on the Labscribe3 icon on the desktop. As soon as the program opens, you should see a window pop-up that says “Hardware found IWX214:2008-1-24,” click “OK.”

3. In the second row from the top row (the row that says “File Edit View Tools Settings Advanced External Devices Help”), click on the “Settings” tab. About one third of the way down the drop-down window should be a tab called “Human Heart.” Click on that tab and that should lead you to a tab called “ECG-Heart Sounds.” Click on that tab and the main window will look like this after you close the pdf file:

4. Since Lab 10 is about ECG only, we can hide the lower “Heart Sounds” row by clicking on the symbol to the left of the row label, then clicking on the “Hide” tab, and then “Yes”. The main window will then look something like this:

5. Remove the disposable ECG electrodes from its envelope and snap the lead wires onto the electrodes while the electrodes are still on the plastic shield. Instruct the subject to remove all jewelry from their wrists and ankles. Use an alcohol swab to clean a region of skin on the subject’s right wrist, and the inside of both ankles. Let the area dry.

6. Apply the black (-1) electrode to the scrubbed area on the right wrist. Repeat Steps 5 and 6 for the inside of the left ankle and the inside of the right ankle, so that the following Lead II is arranged:

- the black (-1) lead is attached to the right wrist,

- the red (+1) lead is connected to the left ankle,
- the green (C or ground) lead is connected to the right ankle.

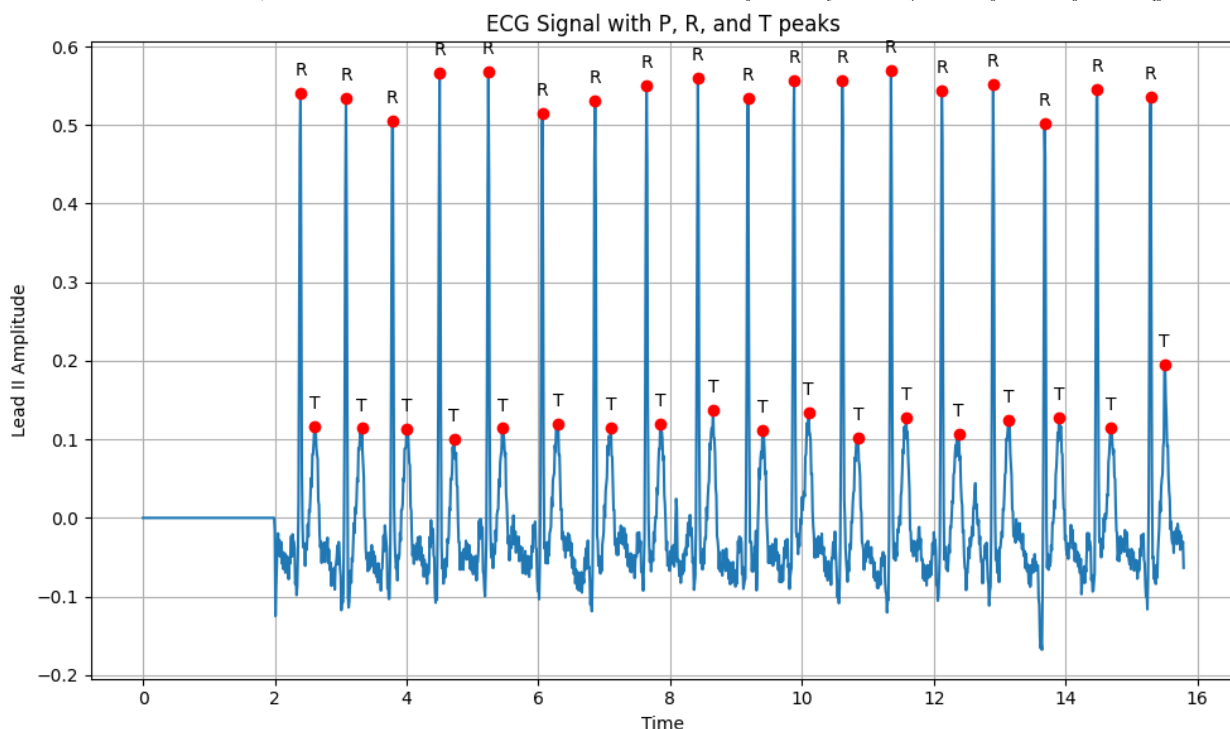
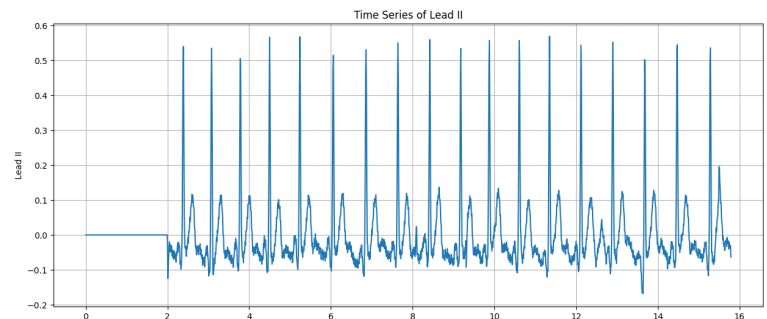
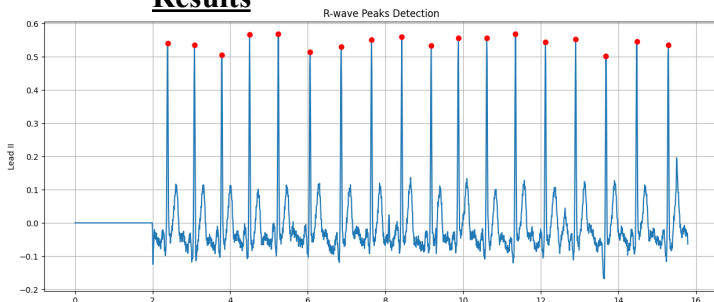
7. Instruct the subject to sit quietly with their hands in their lap. If the subject moves, the ECG trace will move off the top or bottom of the screen. If the subject moves any muscles in the arms or upper body, electromyograms (EMGs) from the muscles will appear on the ECG recording as noise.

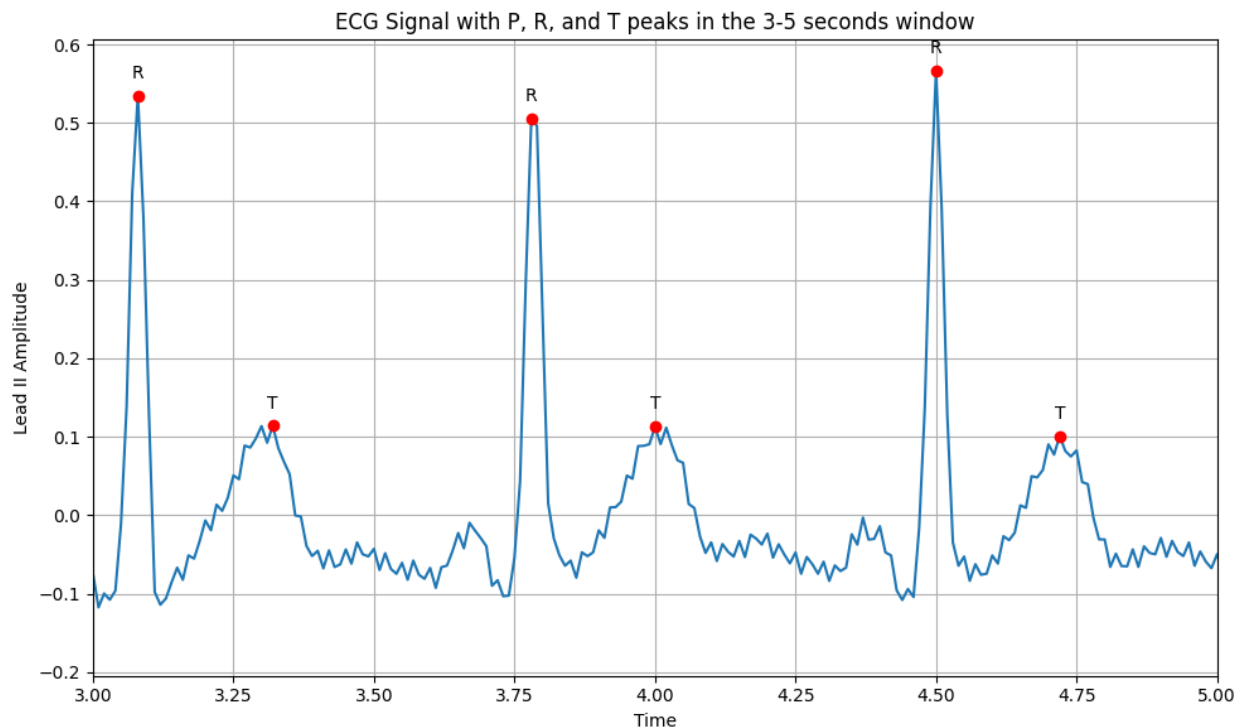
8. Click on the Record button, located on the upper right side of the LabScribe Main window. The signal should begin scrolling across the screen. If the ECG appears up side down in Lead II (upside down P, R and T waves), click on the upside down triangle on the far left of “ A1:ECG 0.3-35Hz,” then click on the first option “Invert.” This should correct the image of your Lead II ECG to be “right side up,”but do this ONLY ONCE.

9. When you have a suitable trace, type <Subject’s Name> Lead II in theMark box to the right of the Mark button. Press the Enter key on the key board after the recording has started to attach the comment to the data.

10. Click on the Auto Scale tab at the upper margin of the ECG channel (look for the row that says on the left “ A1:ECG 0.3-35Hz” the Auto Scale tab is the second icon after “Hz!” it looks like a magnifying glass with a " symbol on it). Your recording should look like the figure in step #4. If the ECG waves appear too compressed (too close together), consider clicking the tab above the “Mark” tab that looks like a now-capped pyramid. When the mouse is on top of this tab, it will say “Half Display Time.” Clicking this tab will spread out your ECG patterns for step 11. If you overdo that last step, reverse it by clicking on the tab that looks like double pyramids (“Double Display Time”) just to the right of the Half Display Time tab.

Results





Average RR interval: 0.76 seconds Heart rate: 79.07 BPM

Discussion

My results were pretty generic/normal. My average heart rate is 79.07 beats per minute while the average heart rate for a 21 y/o male is 80.02 beats per minute, meaning I'm within normal parameters for my age. Honestly a relief because whenever I do an EKG the doctors tend to ask if I'm ok because my heart rate is high wherever they take them because I always feared something was wrong with my heart(for absolutely no other reason than panic). My P,Q,R and T waves are fairly consistent as well and no arterial fibrillation or abnormal heart rate detected.

Conclusion

We learned how to properly conduct an ECG and how that reflects on our average heart beats, and observe whether the rhythm of our heartbeat is irregular, etc. An ECG can also help diagnose heart failure, coronary artery disease, arrhythmia. The waves of the ECG and their different indications are as follows, A P wave indicates atrial depolarization. QRS waves indicate ventricular depolarization, and T wave indicates ventricular repolarization. Depolarization causes the heart to contract, whereas repolarization leads to relaxation.