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Lab 10- (EKG)
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Purpose: Electrocardiography is the study of electrical activity of the heart. In this activity we are going to be doing our own proper Ekgs with all three leads on each other recording from the laptop computer running the Iworx program.

Procedure:

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 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 iWorkx unit is on, the red indicator light on the Iworkx unit should light up and you may hear the USB chime from the laptop if the laptop does not default to mute.

2. Open the Labscribe3 program by clicking on the Labscribe 3 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 from the top row, 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 wiresontothe 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 11 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.

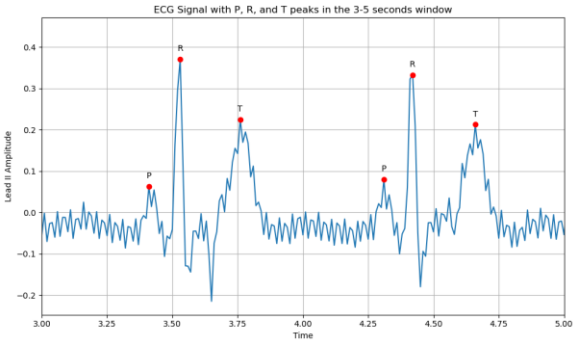
8: Click on the Record button, located on the upper right side of the LabScribe Main window. The signal should begin scrolling across the screen. If the ECG appears upside-down in Lead (upside down P, R and T waves), click on the upside-down triangle on the far left of "A1: ECG 0.3-5Hz," then click on 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 the Mark box to the right of the Mark button. Press the Enter key on the keyboard after the recording has started to attach the comment to the data.

10: Click on the Auto Scale tab at the upper margin of 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 snow-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.

11: Record for approximately one minute and then click stop to halt recording. Label one set of the five ECG waves (P, Q,R, S & T). Notice that every cycle is similar but not identical, and the distances between the QRS complexes may alter slightly.

Result:



Discussion: Found it very interesting how we measured and did our own EKG.The EKG records three electrical cardiac events : (1) atrial depolarization, (2) ventricular depolarization, and (3) ventricular repolarization. The electrocardiographic correlates of these events are called the P wave, the QRS complex, and the T wave, respectively. Cardiac muscle cells are the sources of this electrical activity. EKG are more graphical recorss that measure the change in the electrical activity of the heart.

Conclusion: The P wave is a record of the electrical activity through the upper heart chambers (atria). The QRS complex is a record of the movement of electrical impulses through the lower heart chambers (ventricles). The ST segment shows when the ventricle is contracting but no electricity is flowing through it. An electrocardiogram (ECG or EKG) records the electrical signal from the heart to check for different heart conditions. Electrodes are placed on the chest to record the heart's electrical signals, which cause the heart to beat. The signals are shown as waves on an attached computer monitor or printer. The three limb electrodes, I, II, and III form a triangle at the right arm (RA), left arm (LA), and left leg (LL). In mathematical terms, Einthoven's Law Explains that Lead II's complex is equal to the sum of the corresponding complexes in Leads I and III. Many kinds of abnormalities can often be seen on an ECG. They include a previous heart attack (myocardial infarction), an abnormal heart rhythm (arrhythmia), an inadequate supply of blood and oxygen to the heart (ischemia), and excessive thickening (hypertrophy) of the heart's muscular walls.