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Biopac Student Lab® Lesson 7
ECG & PULSE
Analysis Procedure
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V.   DATA ANALYSIS

FAST TRACK DATA ANALYSIS

1. Enter the **Review Saved Data** mode and choose the correct file.

   - Note Channel Number (CH) designations:

Channel	Displays
CH 1	**ECG**
CH 40	**Pulse**

   - Note measurement box settings:

Channel	Measurement
CH 1	**Delta T** (time interval)
CH 1	**BPM** (rate)
CH 1	**P-P**
CH 40	**P-P**

DETAILED EXPLANATION OF DATA ANALYSIS STEPS

If entering **Review Saved Data** mode from the Startup dialog or lessons menu, make sure to choose the correct file.

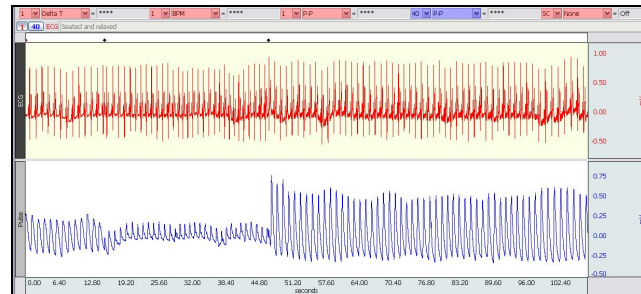The data window should resemble Fig. 7.13.

Fig. 7.13 Example data

The measurement boxes are above the marker region in the data window. Each measurement has three sections: channel number, measurement type, and result. The first two sections are pull-down menus that are activated when you click on them.

Brief definition of measurements:

Delta T: Displays the amount of time in the selected area (the difference in time between the endpoints of the selected area.)

BPM: The **B**eats **P**er **M**inute measurement first calculates the difference in time between the beginning and end of the selected area (seconds/beat,) and divides this value into 60 seconds/minute.

P-P (Peak-to-Peak)**:** Subtracts the minimum value from the maximum value found in the selected area.

Rate Mean: If CH 40 Heart Rate data was recorded, use the Rate Mean measurement, which is designed specifically for rate data and calculates accurate statistical means using one value only for every cardiac cycle. This avoids any unintentional weighting due to time variation in heart rate, unlike the amplitude "Mean" measurement.

The õselected areaö is the area selected by the I-Beam (including endpoints.)

Note: The append event markers ✚ mark the beginning of each recording. Click on (activate) the event marker to display its label.

Useful tools for changing view:

Display menu: Autoscale Horizontal, Autoscale Waveforms, Zoom Back, Zoom Forward

Scroll Bars: Time (Horizontal); Amplitude (Vertical)

Cursor Tools: Zoom Tool

Buttons: Overlap, Split, Show Grid, Hide Grid, -, +

Hide/Show Channel: õAlt + clickö (Windows) or õOption + clickö (Mac) the channel number box to toggle channel display.

2. **Zoom** in on a small section of the õ**Seated and relaxed**ö data.

   Data Analysis continues…

Be sure to zoom in far enough so that you can easily measure the intervals between peaks, approximately 4 cardiac cycles.

3. Using the **I-Beam** cursor, select the area between two successive R waves (one cardiac cycle).

    📑 A

4. Repeat the above measurements for each of the data recordings.

    📑 A

5. Using the **I-Beam** cursor, select the area between two successive pulse peaks (one cardiac cycle).

    📑 A

6. Repeat the above measurements for each of the data recordings.

    📑 A

7. Select individual pulse peaks for each recording and determine their amplitudes.

    📑 B

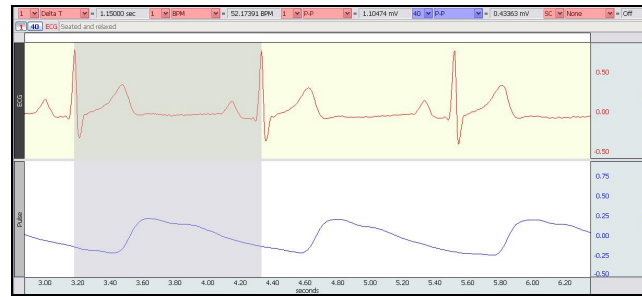Try to go from R wave peak to R wave peak as precisely as possible (Fig. 7.14).
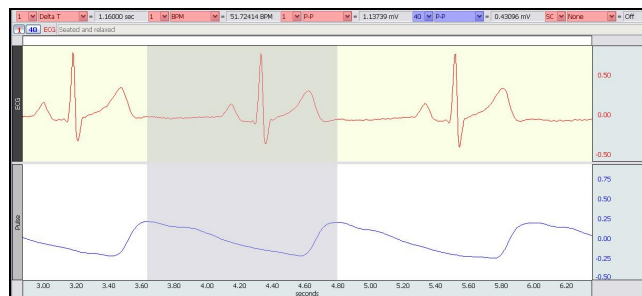

Fig. 7.14 R-R interval selected

Fig. 7.15 Area between two successive pulse peaks

Use the **P-P** (CH 40) measurements.

Note: It is best to take measurements on data immediately following the start of the recording (after marker) because the body's homeostatic regulation of blood pressure and volume occurs quickly. The increase or decrease in your results will be dependent on the timing of your data relative to the speed of physiological adjustments.
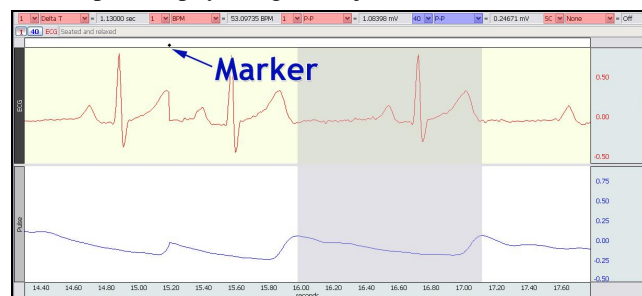

Fig. 7.16 Selection for amplitude measurements

Data Analysis continues…

8. Using the I-Beam cursor, select the interval between the R-wave and pulse peak.

   📄 C

Record two time intervals (**Delta T;)** one from õSeated and Relaxedö data and õSeated, right hand above headö data.

Fig. 7.17 R-wave to next pulse peak

9. Answer the questions at the end of the Data Report.
10. **Save** or **Print** the data file.
11. **Quit** the program.
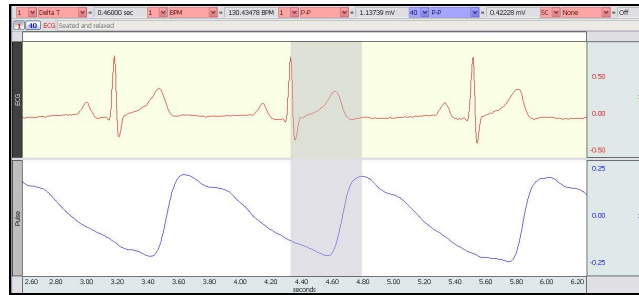
An electronically editable **Data Report** can be found in the journal (following the lesson summary,) or immediately following this Data Analysis section. Your instructor will recommend the preferred format for your lab.

END OF DATA ANALYSIS

END OF LESSON 7
Complete the Lesson 7 Data Report that follows.

ECG & PULSE

- *Mechanical Action of the Heart, Peripheral Pressure Pulse, and Plethysmography*

DATA REPORT

Student's Name: _____

Lab Section: _____

Date: _____

I.   Data and Calculations

Subject Profile

Name:_____   Height:_____

Age:_____   Gender: Male / Female   Weight:_____

A.   Comparison of ECG with Pulse Plethysmogram

Complete Table 7.1 with data from three cycles from each acquired recording and calculate the Means.

Table 7.1

Condition	Selected Area	Measurement		Cycle I	Cycle 2	Cycle 3	Mean
Arm Relaxed	R-R Interval	**DeltaT**	CH 1				
	Heart Rate	**BPM**	CH 1				
	Pulse Interval	**DeltaT**	CH 1				
	Pulse Rate	**BPM**	CH 1				
Temp. Change	R-R Interval	**DeltaT**	CH 1				
	Heart Rate	**BPM**	CH 1				
	Pulse Interval	**DeltaT**	CH 1				
	Pulse Rate	**BPM**	CH 1				
Arm Up	R-R Interval	**DeltaT**	CH 1				
	Heart Rate	**BPM**	CH 1				
	Pulse Interval	**DeltaT**	CH 1				
	Pulse Rate	**BPM**	CH 1				

B.   Relative Volume Changes

Complete Table 7.2 with data from each acquired recording.

Table 7.2

Measurement	Arm Resting	Temperature	Arm Up
QRS Amplitude CH1 P-P			
Relative Pulse Amplitude (mV) CH 40 P-P			

C. **Calculation of Pulse Speed**

Distance between Subject's sternum and shoulder? _____cm

Distance between Subject's shoulder and fingertip? _____cm

Total distance? _____cm

Data from 'Arm relaxed' recording of the recording (measure with I-Beam)
Time between R-wave and Pulse peak? _____secs

Speed?_____cm/sec

Data from 'Arm up' recording of the recording (measure with I-Beam)
Time between R-wave and Pulse peak? _____secs

Speed?_____cm/sec

II. Questions

D. Referring to data in table 7.1, are the values of heart rate and pulse rate similar for each condition? Yes   /   No

Explain why the values might differ or be similar.

_____

_____

_____

E. Referring to Table 7.2 data, how much did the amplitude of the QRS complex change between conditions?

Extreme temp – Arm Resting?   _____   mV

Arm up – Arm Resting? _____ mV

F. Referring to Table 7.2 data, how much did the pulse amplitude change between arm positions?

Extreme temp – Arm Resting?   _____   mV

Arm up – Arm Resting? _____ mV

G. Referring to Table 7.2 data, does the amplitude of the QRS complex change with the pulse amplitudes? Why or why not?

_____

_____

_____

H. Describe one mechanism that causes changes in blood volume to your fingertip.

_____

_____

_____

I. Referring to data from section C of this report, how would you explain the difference in speed, if any?

_____

_____

_____

J. Which components of the cardiac cycle (atrial systole and diastole, ventricular systole and diastole) are discernible in the pulse tracing?

_____

_____

_____

K. Would you expect the calculated pulse wave velocities of other students to be very close if not the same as yours? Why or why not?

_____

_____

_____

L. Explain any amplitude or frequency changes that occurred with arm position.

_____

_____

_____

III. OPTIONAL Active Learning Portion

A. *Hypothesis*

_____

_____

_____

_____

B. *Materials*

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C. *Method*

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D. *Set Up*

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E. *Experimental Results*

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_____

End of Lesson 7 Data Report