

V. DATA ANALYSIS

FAST TRACK Data Analysis

- Enter the **Review Saved Data** mode.
 - Note Channel Number (CH) designations:

Channel	Displays
CH 1	Airflow
CH 2	ECG
CH3	Skin Temp.
CH41	Heart Rate
 - Note the measurement box settings:

Channel	Measurement
CH 1	P-P
CH 1	BPM
CH 3	Mean (Temperature)
CH 41	Mean (Heart Rate)

Data Analysis continues...

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.

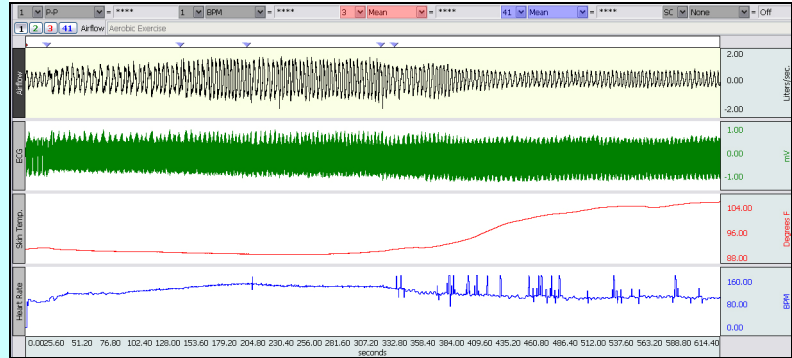


Fig. 15.15

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 them.

Brief definition of measurements:

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

BPM: For this lesson, stands for "Breaths Per Minute." First calculates the difference in time between the end and beginning of the area selected by the I-Beam tool (same as ΔT), and divides this value into 60 seconds/minute.

Mean: Displays the average value 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 selected area is the area selected by the I-Beam tool (including the endpoints).

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: $\text{⌘} + \text{click}$ (Windows) or $\text{⌘} + \text{click}$ (Mac) the channel number box to toggle channel display.

- Zoom in on the data from time 0 to just after the first event marker (Begin Exercising), then choose Display > AutoScale Waveforms.)

This is the period when the **Subject** was at rest.

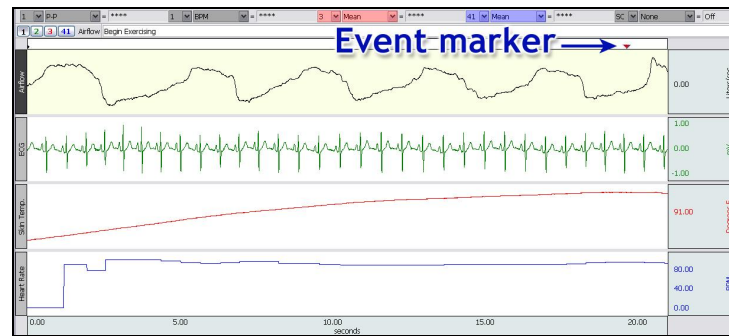


Fig. 15.16 Example of data prior to exercise

- Using the I-Beam cursor, select an area of one complete breath cycle. Choose a breath cycle past the two second mark (Heart Rate is invalid). Record the Airflow amplitude (CH 1 ó P-P,) Breathing Rate (CH 1 ó BPM,) Skin Temp. (CH 3 ó Mean) and Heart Rate (CH 41 ó Mean).



A

The airflow transducer records inhalation as positive values, no airflow as 0, and exhalation as negative values. Therefore, the start of inhalation is recorded as the ascending positive waveform starting at 0. The end of exhalation is where the recording ends at 0 from a negative value. One complete breath cycle is from the start of one inhale to the start of the next inhale.

Notes:

- Choose a breath cycle that does not correspond to any sporadic Heart Rate values. (Your selected area should resemble Fig. 15.19.)
- Turn ON Grids to help identify the zero point.
- Airflow data can be difficult to interpret, because the **Subject** may not breathe in and out smoothly. Any brief pauses or slowing in breathing will cause the airflow to read at or near zero. Data interpretation is more difficult when the Subject is in a resting state (shallow, slow, breathing).

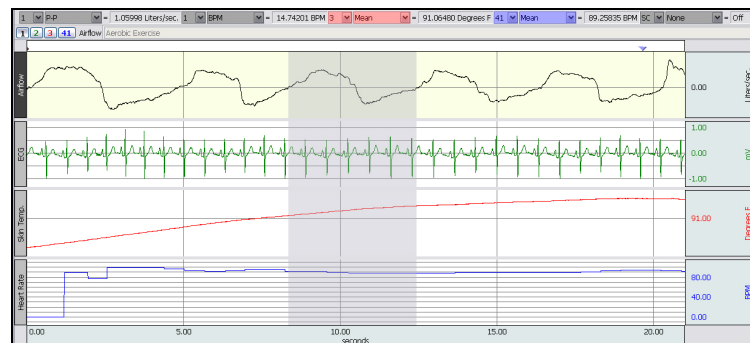


Fig. 15.17 Example of one breath cycle selected (Grids ON)

Data Analysis continues...

- Scroll to the data just after the "Begin Exercising" event marker and select the first complete breath cycle. Record the Airflow amplitude, Breathing Rate, Skin Temp. and Heart Rate.

 B

- Repeat Step 4 at approximately* 30-second intervals during the exercise portion.

 B

- Scroll to the post-exercise recording and take measurements to complete Table 15.3.

 C

- Answer the questions at the end of the Data Report.
- Save** or **Print** the data file.
- Quit** the program.

END OF DATA ANALYSIS

Select Display > Autoscale Waveforms if data goes out of view.

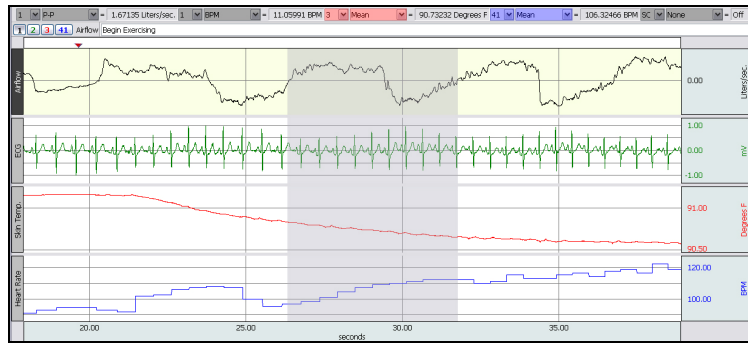


Fig. 15.18 Example of first breath cycle during exercise

Note*: Choose the nearest breath cycle that does not contain sporadic Heart Rate values.

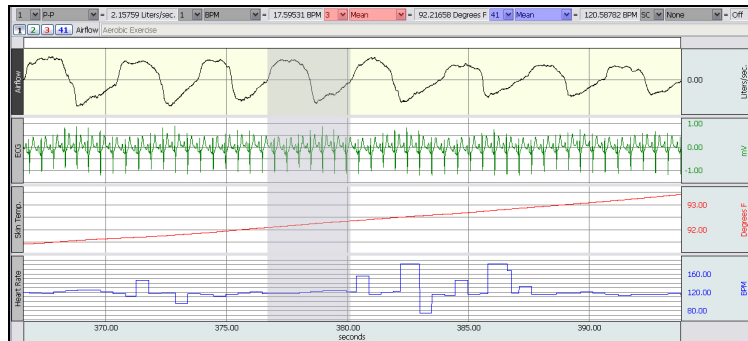


Fig. 15.19 Breath cycle selected does not include sporadic BPM values

An electronically editable **Data Report** is located 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 LESSON 15

Complete the Lesson 15 Data Report that follows.

AEROBIC EXERCISE PHYSIOLOGY

- Cardiovascular and Respiratory Adjustments
- ECG During and Post-Exercise
- Ventilation During and Post-Exercise
- Heat Exchange

DATA REPORT

Student's Name: _____
 Lab Section: _____
 Date: _____

I. Data and Calculations

Subject Profile

Name: _____ Height: _____
 Age: _____ Gender: Male / Female Weight: _____
 Calculated maximum heart rate: _____

A. Pre-exercise

Complete Table 15.1 with the requested measurements for data in the 5-second interval before exercise.

Table 15.1

Airflow Amplitude	Breathing Rate	Skin Temp.	Heart Rate
1 ▼ P-P ▼	1 ▼ BPM ▼	3 ▼ Mean ▼	41 ▼ Mean ▼

B. During Exercise

Complete Table 15.2 with the requested measurements for data during exercise.

**Note* Time references are the starting points of the exercise recording and do not correspond to the data window's horizontal time scale. You may not have collected 5 minutes of data.

Table 15.2

Time* (min)	Time* (secs)	Airflow Amplitude	Breathing Rate	Skin Temp.	Heart Rate
		1 ▼ P-P ▼	1 ▼ BPM ▼	3 ▼ Mean ▼	41 ▼ Mean ▼
0	0				
	30				
1	60				
	90				
2	120				
	150				
3	180				
	210				
4	240				
	270				
5	300				

C. Post-Exercise

Complete Table 15.3 with the requested measurements for data after exercise.

**Note* Time references are the starting points of the post-exercise recording and do not correspond to the data window's horizontal time scale. You may not have collected 5 minutes of data.

Table 15.3

Time* (min)	Time* (secs)	Airflow Amplitude	Breathing Rate	Skin Temp.	Heart Rate
		1 P-P	1 BPM	3 Mean	41 Mean
0	0				
	30				
1	60				
	90				
2	120				
	150				
3	180				
	210				
4	240				
	270				
5	300				

II. Questions:

D. Using your data, compare changes in pulmonary airflow that occurred during exercise and during the recovery period.

E. Is pulmonary airflow synonymous with pulmonary ventilation? Justify your answer.

F. Use the data in Tables 15.2 and 15.3 to describe changes in respiratory rate and heart rate that occur during and after moderate exercise. Explain the physiological basis of the observed changes.

G. How long did it take for heart rate, respiratory rate, and pulmonary airflow to return to resting (pre-exercise) levels?

H. Compare the electrocardiogram recorded during the pre-exercise, exercise, and post-exercise periods, and describe any observed changes.

I. Compare changes in skin temperature recorded before, during, and after exercise. Explain the physiological basis of the observed changes.

J. When exercising, does wiping off sweat help cool the body? Why or why not?

K. By what cellular chemical process is most of the ATP requirement for exercising skeletal muscles met?

L. What is meant by the term oxygen debt?

M. A high oxygen debt is associated with a low blood pH. Why and how?

N. Explain why and how dynamic exercise increases cardiac output.

O. List four other cardiovascular responses to dynamic exercise.

III. OPTIONAL Active Learning Portion

A. *Hypothesis*

B. *Materials*

C. *Method*

D. *Set Up*

E. *Experimental Results*
