Biology 125- Human Physiology

Laboratory 14- Respiratory Physiology

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I. Purpose

The purpose of this lab is to measure the Vital Compacity (VC) and Forced Expiratory Volume (FEV). The compare the date between females and males.

II. Procedure

14-A: The measurement of human lung volumes–Morgan ComPAS Pneumotrac (SVC)

1. The Morgan ComPAS computer program has already calculated and factored in the BTPS (Body Temperature Pressure Saturation) correction factor for the spirometer temperature.

   Ex.: spirometer temperature = 25°C
   BTPS correction factor = 1.075

   454 ml x 1.075 = 488.05 ml (rounded off to 488 ml)

2. Fully insert the Pneumotrac filter/mouthpiece you purchased at the bookstore. If you have difficulty keeping air from leaking through your nose, you may need to wear a nose clip, as air leakage will result in inaccurate results.
3. Be sure the correct student information is loaded up before you start the SVC (slow vital capacity) test.
4. After starting the SVC test, follow the verbal instructions of your instructor: begin with your mouth off the mouthpiece so the pneumotach can equilibrate; then get a good seal with your lips and begin normal quiet (tidal) breathing.
5. Watch the screen to be sure you are showing stable tidal breathing; the moving line should be around a half liter and NOT drifting up or down. (NOTE: speed or rate of expiration is not important for slow vital capacity 14-A.)
6. After stable tidal breathing, you will be instructed to take the deepest breath in as you can, then blow it all out, and finally return to normal tidal breathing. Your instructor will print out your SVC Volume Time Curve. This will be a part of your 14-A results. Be sure to follow the Lab 14 Data Management Instructions for GLR-14.
7. Your SVC Volume Time Curve should look similar to Figure 14-1.

8. Label your spirometer tracing and calculate the amount for each lung volume and capacity. Descriptions for lung volumes and capacities are on the next page. Average values based on a 5'10", 70-kg. (~170 lbs.) male are provided, as well as some percent values needed to calculate volumes and capacities for other individuals.
9. To calculate the six lung volumes and capacities we are measuring in 14-A: convert the millimeter measurement into milliliters by measuring the height of the volume in mm in the SVC graph (see Fig. 14-1 on p.92) and multiplying that length in mm by 64.17ml/mm (our SVC conversion factor). Then round off ml to whole numbers. Use the gridlines to double check that your figures are in the ballpark (e.g., if you calculated the vital capacity in Fig. 14-1to be3800ml, you must be off because you can tell from just looking at the gridlines that it is much closer to 5000 ml than 3800 ml).
10. Compare your values to the average values given above. Explain possible causes for any differences between the two values. After completing14-C, you will have a predicted VC from a nomogram; compare your actual VC from the SVC test (14-A) with that predicted VC from the 14-C nomogram.

<u>14-B: The Forced Vital Capacity (FVC) or Forced Expiratory Volume (FEV)–Morgan ComPAS Pneumotrac</u>

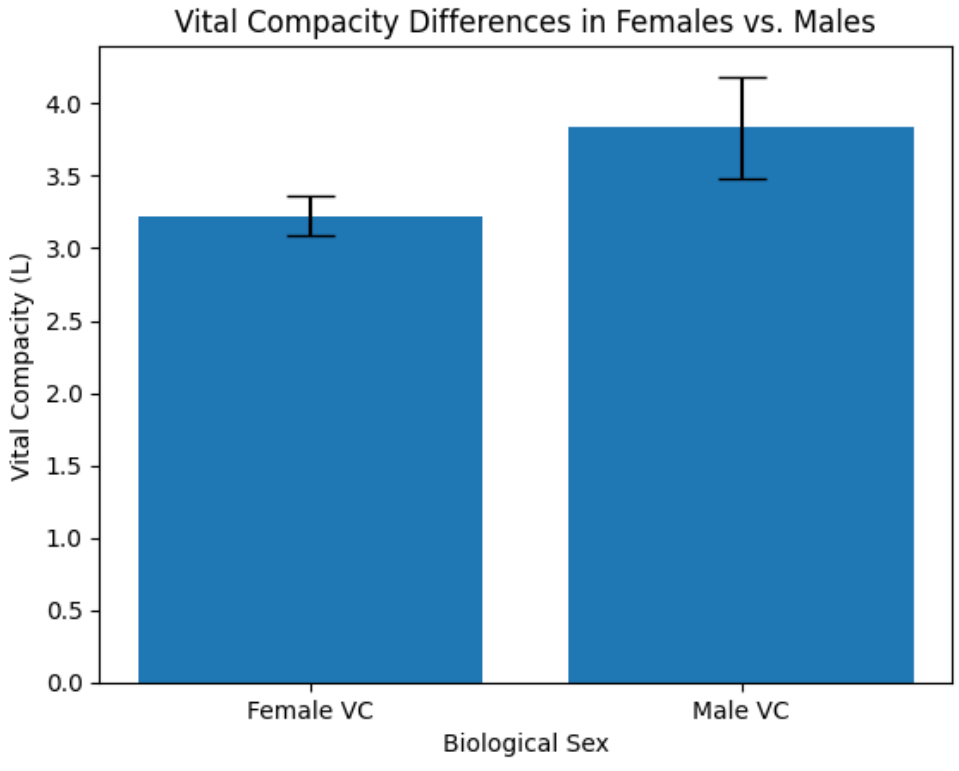
1. The Morgan ComPAS computer program has already calculated and factored in the BTPS (Body Temperature Pressure Saturation) correction factor.
2. Fully insert the Pneumotrac filter/mouthpiece you purchased at the bookstore. If you have difficulty keeping air from leaking through your nose, you may need to wear a nose clip, as air leakage will result in inaccurate results.
3. Be sure the correct student information is loaded up before you start the FVC test.
4. After starting the FVC test, follow the verbal instructions of your instructor: begin with your mouth off the mouthpiece so the pneumotach can equilibrate; after getting a good seal with your mouth, start with tidal breathing; when you are ready, take in the deepest breath possible, then forcefully blow it out as fast as you can and keep squeezing until instructed to stop. The instructor will print out your "FVC Volume Time Curve" (part of your 14-B results), and it should look similar to Figure 14-2.
5. To calculate the vital capacity for the FVC test (also called the forced expiratory volume),measure the height of the highest peak of the curve in mm and multiply that length in mm by 66.67ml/mm (our FVC conversion factor). Then round off ml to whole numbers. (NOTE: this is similar to the 14-A SVC calculations, but with a different conversion factor.) Just like in

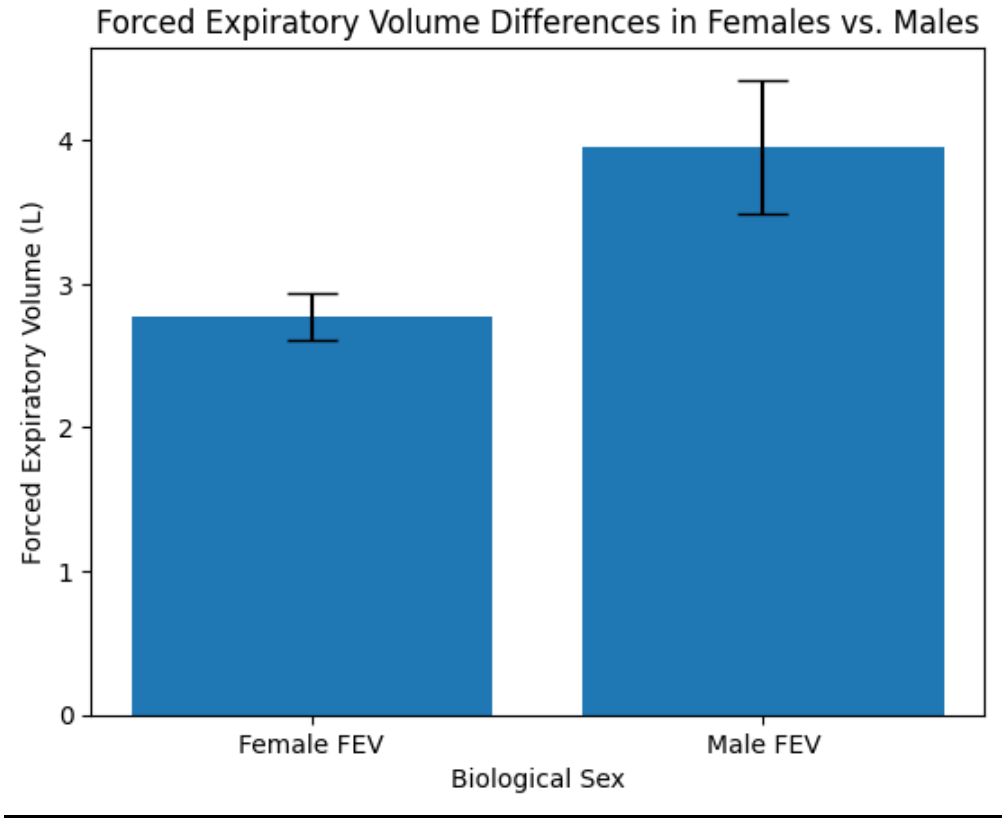
14-A, use the gridlines to double check that your figures are in the ballpark (e.g., if you calculated the vital capacity in Fig. 14-2 on p.94 to be 3635 ml, you must be off because you can tell from just looking at the gridlines that it is much closer to 4500 ml than 3635 ml). Can you see this in Fig. 14-2?

6. Go to the "1 second" vertical line in your FVC graph and measure the height where the curved line crosses the 1 second vertical line in the same way as you did for the FVC instep5. This is your FEV1volume.
7. Divide the volume you calculated for FEV1by the volume you calculated for the vital capacity in step 6, and then multiply by 100 to determine the percentage of the vital capacity exhaled at one second.
8. Go to the "3 second" vertical line in your FVC graph and measure the height where the curved line crosses the 3 second vertical line in the same way as you did in steps 5 and 6. This is your FEV 3 volume.
9. Divide the volume you calculated for FEV 3 by the volume you calculated for the vital capacity in step 6, and then multiply by 100 to determine the percentage of the vital capacity exhaled at three seconds.
10. Compare these values to the predicted values and explain possible causes for any differences.

III. Result

Vital Compacity (VC)- Females Vs. Males and Forced Expiratory Volume Differences in Females Vs. Males.





IV. Discussion

VC and FEC tests were conducted and documented by biological sex (female vs. male). The test results were documented. First, the data was put directly into colab. Secondly, we calculated the standard error of mean and the average/mean of the results. These results were then converted into a graph to show the average between females and male.

V. Conclusion

I learned today that according to the test results that were given males seem to have a higher VC and FEV than females. I makes me wonder why that is?