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PULMONARY FUNCTION I

- *Volumes and Capacities*

DATA REPORT

Student's Name: A.T.P.Amarasekara

Lab Section: Pulmonary Function I

Date: 12/12/2022

Subject Profile

Name: A.T.P.Amarasekara Height: 150cm Gender: ~~Male~~ / Female

Age: 21 years Weight: 46.5kg

I. Data and Calculations

A. Vital Capacity

i) Predicted: Use the equation below to calculate your **Predicted Vital Capacity**: 3.082 liters

Equations for Predicted Vital Capacity (Kory, Hamilton, Callahan: 1960)		*Where*	
Male	V.C. = 0.052H - 0.022A – 3.60	V.C.	Vital Capacity in liters
Female	V.C. = 0.041H - 0.018A – 2.69	H	Height in centimeters
		A	Age in years

ii) Observed: Use the P-P result to note **Observed Vital Capacity**: 1.012 liters
= 2 P-P

iii) Observed *vs.* Predicted

What is Subject's observed Vital Capacity to predicted Vital Capacity as a percentage?

Observed/Predicted VC = (1.012/3.082) x 100= 32.84%

Note: Vital capacities are dependent on other factors besides age and height. Therefore, 80% of predicted values are still considered "normal."

B. Volume & Capacity Measurements

Complete Table 12.2 with the requested measurement results and calculate results per the formulas provided.

Table 12.2 Measurements

Title		Measurement Result		Calculation	
Tidal Volume	TV	a = 2 P-P Cycle 3 inhale: b = 2 P-P Cycle 3 exhale: c = 2 P-P Cycle 4 inhale: d = 2 P-P Cycle 4 exhale:	0.33748 0.32388 0.32970 0.37007	(a + b + c + d) / 4 =	0.34029
Inspiratory Reserve Volume	IRV	2 Delta 0.70747			
Expiratory Reserve Volume	ERV	2 Delta 0.03873			
Residual Volume	RV	2 Min 1.07129		Default = 1 (*Preference setting*)	
Inspiratory Capacity	IC	2 Delta 1.06955		TV + IRV =	1.04775
Expiratory Capacity	EC	2 Delta 0.32975		TV + ERV =	0.37902
Functional Residual Capacity	FRC			ERV + RV =	1.11002
Total Lung Capacity	TLC	2 Max 2.08620		IRV + TV + ERV + RV =	2.15778

C. Observed vs. Predicted Volumes

Using data obtained for Table 12.2, compare Subject's lung volumes with the average volumes presented in the Introduction.

Table 12.3 Average Volumes *vs.* Measured Volumes

Volume Title		Average Volume	Measured Volume
Tidal Volume	TV	Resting subject, normal breathing: TV is approximately 500 ml. During exercise: TV can be more than 3 liters	~~greater than~~ ~~equal to~~ less than
Inspiratory Reserve Volume	IRV	Resting IRV for young adults is males = approximately 3,300 ml females = approximately 1,900 ml	~~greater than~~ ~~equal to~~ less than
Expiratory Reserve Volume	ERV	Resting ERV for young adults is males = approximately 1,000 ml females = approximately 700 ml	~~greater than~~ ~~equal to~~ less than

II. Questions

D. Why does predicted vital capacity vary with height?

With the height, the size of the lung differs. Hence, the vital capacity varies with height. For example, it is more likely to have a higher vital capacity for a taller person compared to a shorter person. However this may change with other factors.

E. Explain how factors other than height might affect lung capacity.

Age: Lung capacity tends to decrease over time due to changes in the elasticity of lung tissues and decrease in respiratory muscle strength.

Gender: Generally females have a lower lung capacity compared to males due to reduced airway diameter and lung volumes.

Fitness: Regular exercise can increase lung capacity by strengthening the respiratory muscles and improving the lung function.

Personal habits: Habits like smoking damages the lung tissues reducing the lung compliance causing a reduction in lung capacity especially in long term smokers.

Environmental factors: Exposure to air pollution, high altitudes can also affect lung capacity.

F. How would the volume measurements change if data were collected after vigorous exercise?

The Tidal Volume (TV) will increase while reducing the Inspiratory Reserve Volume (IRV) and Expiratory Reserve Volume (ERV). However, the Residual Volume will remain unchanged.

G. What is the difference between volume measurements and capacities?

Lung volumes are single value measurements while lung capacities are the sum of at least two of lung volumes.

H. Define **Tidal Volume**.

Tidal volume is the amount of air that moves into the lungs in a single inspiration or moves out from the lungs in a single expiration during normal breathing.

I. Define **Inspiratory Reserve Volume**.

Inspiratory Reserve Volume is the extra amount of air moving into the lungs after the tidal volume has been breathed in in a heavy breathing.

J. Define **Expiratory Reserve Volume**.

Expiratory Reserve Volume is the extra amount of air moving out form the lungs after the tidal volume has been breathed out in a heavy breathing.

K. Define **Residual Volume**.

Residual volume is the amount of air that remains inside the lungs even after a maximal forced expiration. This volume of air cannot be removed from the lungs and it causes the alveoli to remain opened all the time.

L. Define **Pulmonary Capacity**.

Pulmonary capacity is the sum of two or more lung volumes.

M. Name the **Pulmonary Capacities**.

Inspiratory capacity (IC) – IRV + TV

Viral Capacity (VC) – IRV + TV + ERV

Functional Residual Capacity (FRV) – ERV + RV

Total Lung Capacity (TLC) – VC + RV

End of Lesson 12 Data Report