

Guyton Textbook of Medical Physiology

Lecture 1&2

What tends to decrease airway resistance?

- A) Asthma
- B) Stimulation by sympathetic fibers
- C) Treatment with acetylcholine
- D) Exhalation to residual volume

Answer :B

The pleural pressure of a normal 56-year-old woman is approximately -5 cm H₂O during resting conditions immediately before inspiration (i.e., at functional residual capacity [FRC]). What is the pleural pressure (in cm H₂O) during inspiration?

- A) +1
- B) +4
- C) 0
- D) -3
- E) -7

Answer :E

A healthy, 25-year-old medical student participates in a 10-kilometer charity run for the American Heart Association. Which muscles does the student use (contract) during expiration?

- A) Diaphragm and external intercostals
- B) Diaphragm and internal intercostals
- C) Diaphragm only
- D) Internal intercostals and abdominal recti
- E) Scaleni
- F) Sternocleidomastoid muscles

Answer:D

Several students are trying to see who can generate the highest expiratory flow. Which muscle is most effective at producing a maximal effort?

- A) Diaphragm
- B) Internal intercostals
- C) External intercostals
- D) Rectus abdominis
- E) Sternocleidomastoid

Answer:E



Assuming a respiratory rate of 12 breaths/min, calculate the minute ventilation.

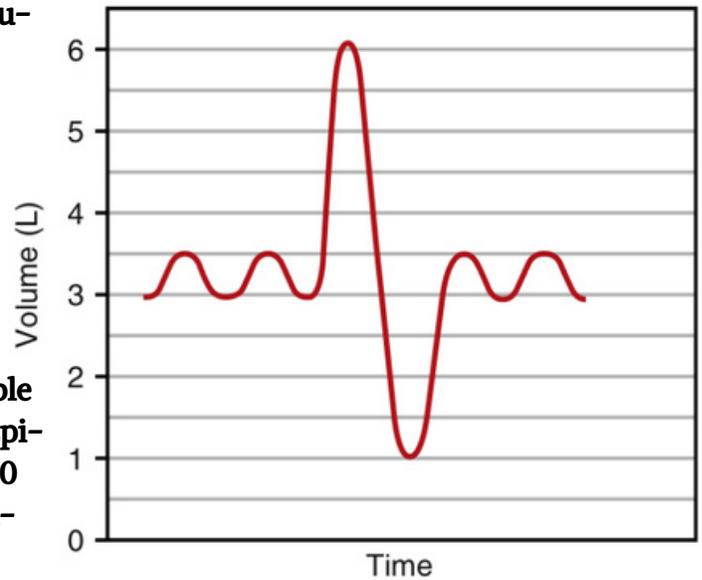
- A) 1 L/min
- B) 2 L/min
- C) 4 L/min
- D) 5 L/min
- E) 6 L/min

Answer:E

A 22-year-old woman inhales as much air as possible and exhales as much air as she can, producing the spirogram shown in the figure. A residual volume of 1.0 liter was determined using the helium dilution technique. What is her FRC (in liters)?

- A) 2.0
- B) 2.5
- C) 3.0
- D) 3.5
- E) 4.0
- F) 5.0

Answer :C



A patient has a dead space of 150 milliliters, FRC of 3 litres, tidal volume (VT) of 650 milliliters, expiratory reserve volume (ERV) of 1.5 liters, total lung capacity (TLC) of 8 liters, and respiratory rate of 15 breaths/ min. What is the residual volume (RV)?

- A) 500 milliliters
- B) 1000 milliliters
- C) 1500 milliliters
- D) 2500 milliliters
- E) 6500 milliliters

Answer :C

The various lung volumes and capacities include the total lung capacity (TLC), vital capacity (VC), inspiratory capacity (IC), tidal volume (VT), expiratory capacity (EC), expiratory reserve volume (ERV), inspiratory reserve volume (IRV), functional residual capacity (FRC), and residual volume (RV). Which of the following lung volumes and capacities can be measured using direct spirometry without additional methods?

	TLC	VC	IC	VT	EC	ERV	IRV	FRC	RV
A)	No	No	Yes	No	Yes	No	Yes	No	No
B)	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
C)	No	Yes	No						
D)	Yes	No	Yes						
E)	Yes								

Answer:B

A 34-year-old man sustains a bullet wound to the chest that causes a pneumothorax. What best describes the changes in lung volume and thoracic volume in this man compared with normal?

	Lung Volume	Thoracic Volume
A)	Decreased	Decreased
B)	Decreased	Increased
C)	Decreased	No change
D)	Increased	Decreased
E)	Increased	Increased
F)	No change	Decreased

Answer :B

A patient has a dead space of 150 milliliters, FRC of 3 litres, tidal volume (VT) of 650 milliliters, expiratory reserve volume (ERV) of 1.5 liters, total lung capacity (TLC) of 8 liters, and respiratory rate of 15 breaths/ min. What is the residual volume (RV)?

- A) 500 milliliters
- B) 1000 milliliters
- C) 1500 milliliters
- D) 2500 milliliters
- E) 6500 milliliters

Answer:C

A healthy 10-year-old boy breathes quietly under resting conditions. His tidal volume is 400 milliliters and his ventilation frequency is 12/min. Which of the following best describes the ventilation of the upper, middle, and lower lung zones in this boy?

Answer: D

	Upper Zone	Middle Zone	Lower Zone
A)	Highest	Lowest	Intermediate
B)	Highest	Intermediate	Lowest
C)	Intermediate	Lowest	Highest
D)	Lowest	Intermediate	Highest
E)	Same	Same	Same

A child who is eating round candies approximately 1 and 1.5 cm in diameter inhales one down his airway, blocking his left bronchiole. Which of the following describes the changes that occur?

Answer:E

	Left Lung Alveolar Pco ₂	Left Lung Alveolar Po ₂	Systemic Arterial Po ₂
A)	↑	↑	↔
B)	↑	↔	↑
C)	↓	↓	↓
D)	↑	↑	↑
E)	↑	↓	↓



A person with normal lungs at sea level (760 mm Hg) is breathing 50% O₂. What is the approximate alveolar P_{O₂}?

- A) 100
- B) 159
- C) 306
- D) 330
- E) 380

Answer:C

A person's normal VT is 400 milliliters with a dead space of 100 milliliters. The respiratory rate is 12 breaths/min. The person undergoes ventilation during surgery, and the VT is 700 with a rate of 12. What is the approximate alveolar P_{CO₂} for this person?

- A) 10
- B) 20
- C) 30
- D) 40
- E) 45

Answer:B

