



Capnometry Answers

1) B

The Enghoff equation describes the dead space to tidal volume ration

$$\frac{V_d}{V_t} = \frac{P_a\text{CO}_2 - P_e\text{CO}_2}{P_a\text{CO}_2}$$

40 – 35 / 40

VD is the volume of the exhale that arises from the physiological dead space of the lung and VT is the tidal volume, PaCO₂ is the partial pressure of carbon dioxide in the arterial blood, and PeCO₂ is the partial pressure of carbon dioxide in the average expired (exhaled) air.

2) A

Phase I - Anatomical dead space

Phase II - Transition phase: gas from proximal lung areas and fast emptying lung areas

Phase III - Plateau phase: gas from alveoli and slow emptying areas

3) B

Area X - CO₂ elimination

Area Y - Alveolar dead space

Area Z - Anatomical dead space

4) D

VCO₂ (the amount of CO₂ produced in a minute) is a very helpful parameter. It can increase by increased metabolism like fevers, agitation, seizures, sepsis and is reduced in hypothermia, decreased cardiac output. PEEP levels can also influence VCO₂.

5) B

6) B

The sudden drop in PECO₂ could be secondary to multiple reasons but in this question, Pulmonary embolism is the most likely etiology.

7) C

The volumetric capnography in COPD patients shows a prolonged Phase II, an increase in PECO₂, and a continuously ascending slope without plateau in Phase III.

8) D

The continuous drop in the PECO₂ could be secondary to airway leak, worsening cardiac output, shock state, pulmonary embolism, arrhythmias but not in airway obstruction

9) B

The cleft seen phase III is secondary to a patient inspiratory effort during exhalation indicating patient-ventilator dyssynchrony

10) B

In ARDS, Phase I is larger due to increased anatomical dead space caused by PEEP.

The slope of Phase II is decreased due to lung perfusion abnormalities.

The slope of Phase III is increased due to lung heterogeneity.

Reference

Volumetric capnometry. <https://www.hamilton-medical.com/dam/jcr:69bc9049-0388-42e0-becd-6e6c2f5f5af0/Volumetric-Capnography-ebook-en-ELO20151002N.00.pdf>

