

## Physiologic Dead Space (VD)

The physiologic dead space represents the amount of air that is inspired but does not take part in gas exchange. Two areas of the lung contribute to the physiologic dead space: one is the space in the conductive airway, also called anatomic dead space, and the other is the alveoli that are not well perfused, such as the apex of the lung, also called functional dead space. Physiologic dead space can quickly provide insight into how patients' gas exchange in the lungs is functioning. Causes of an increase in physiologic dead space include shunt or diseases that damage the alveoli. Physiologic dead space can be calculated by multiplying the tidal volume (TV) with the difference between the arterial partial pressure of CO<sub>2</sub> (PaCO<sub>2</sub>) and the partial pressure of CO<sub>2</sub> in the expired air (PECO<sub>2</sub>) and divided by the arterial partial pressure of CO<sub>2</sub> (PaCO<sub>2</sub>). In other words, it is the volume of air that is proportional to the percentage of CO<sub>2</sub> that entered the lungs but did not get exchanged.



PLAY PICMONIC

### Tidal Volume (Vt)

#### Volume-Cup Tidal-wave

Tidal volume (Vt or TV) is the volume of air displaced between normal inspiration and expiration when extra effort is not applied. It is normally around 500 ml in a young, healthy adult.

### Partial Pressure of Arterial CO<sub>2</sub> (PaCO<sub>2</sub>)

#### Partial Pressure-Gauge Artery-Archer with CO<sub>2</sub>

This is the partial pressure of CO<sub>2</sub> in the arteries. It can be obtained and measured with an arterial blood gas (ABG).

### Partial Pressure of CO<sub>2</sub> in Expired Air (PECO<sub>2</sub>)

#### Partial Pressure-gauge Exhaust with CO<sub>2</sub>

The partial pressure of CO<sub>2</sub> in the expired air is an important piece of information for calculating the physiologic dead space. This can be obtained from capnometry clinically.

### $VD = VT \times (PaCO_2 - PECO_2) / PaCO_2$

#### Volume-cup and Dead-space-man EQUALS Artery-Archer with CO<sub>2</sub> SUB-Tract Exhaust CO<sub>2</sub> OVER Artery-Archer with CO<sub>2</sub>

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