

Saintmama

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Minute and alveolar ventilation

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Minute and alveolar ventilation

Both minute and alveolar ventilation are concerns human respiration and involve inhalation and exhalation of oxygen and carbon dioxide, respectively. Despite this kind of relationship, there is an underpinning difference between the two concepts. The minute ventilation encompasses the air inhaled and exhaled in a minute from human's lungs. In respiratory medicine, minute ventilation is a significant parameter as it shows some relationship with the levels of carbon dioxide. The minute ventilation is measured by use of Wright respirometer. In most cases, other respiratory parameters are used in calculating minute ventilation.

It is viewed as a minute flow, and it is also understood as a unit of volume. Biologically it is treated as flow rate because it represents the change of the amount of air over time. The minute ventilation units are in metric expressed as six litres per minute. MV is a symbol used mostly to represent the minute ventilation. A device called wright respirometer is used as well as mechanical ventilators to determine or measure gas flow.

To calculate the minute ventilation tidal volume and rate of respiration are used with due consideration of alveolar ventilation dead space. It is given by equation $V = V_t \times f$

The minute ventilation has some psychological significance. Basically, in this ventilation, the CO₂ level, inversely varies in regard to minute volume. Someone high minute ventilation portrays a reduced level of CO₂ in the blood. This is common for individuals exposed to hyperventilation, but for a normal person, the body itself changes the minute ventilation in the process of physiological maintenance of homeostasis. This means that during the assessment of

patients with severe distress, minute ventilation. This is useful because it can help in maintaining the rate of breath between 10-14 in every one minute(Richard, 2020).

On the other hand, the alveolar ventilation involves of exchanging of gas that takes place between the external environment and the alveolar(Pathway medicine,2020). This process occurs such that, there incoming oxygen into the human lungs. This oxygen come from the atmosphere. In alveolar ventilation, carbon dioxide is received in the lungs where venous blood get released out of the body. Mostly it is viewed as fresh air volume entering into human alveoli in every one minute, but still, it is said to be the air leaving the human body in every one minute through alveoli(Pathway medicine,2020).

Biologically, the rate of alveolar ventilation can be measured in millilitres per minute. Alveolar ventilation rate is determined by considering the rate at which the air flows and which is encountered at the time of normal breathing at the lung's area of gas exchange(Pathway medicine,2020).

The rate of alveolar ventilation is calculated by use of Alveolar ventilation equation as shown here.

K- unit correction factor

Paco₂- Partial pressure of carbon dioxide within arteries

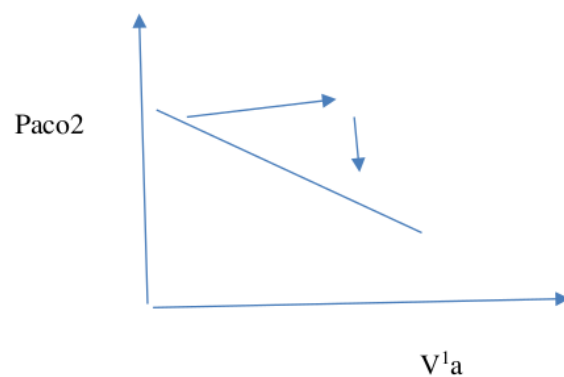
V_{co2} –Rate of exhalation of carbon dioxide

V¹A- Alveolar ventilation

$$V^1A = \frac{v1co2}{pa\ co2} \times k$$

The AV equation offers an instructive is useful in understanding how the alveolar ventilation influence partial pressure of carbon dioxide within the arteries. It works by having a doubled alveolar ventilation and making the partial pressure carbon dioxide half. The alveolar ventilation equation offers a very paramount relationship between partial pressure besides alveolar ventilation. Sensibly, the CO₂ partial pressure fluctuates with a given rate of carbon dioxide exhalation for a whole body. This is shown in the graph below.

This ventilation is an essential physiological variable that is useful in determining oxygen and carbon dioxide concentration as far as the functioning of alveoli is concerned. The alveolar ventilation portrays an intuitively intelligible relationship with oxygen and carbon dioxide concentration in the alveoli air. Whenever there is a high rate of exchange of air in alveoli, it means that the alveolar ventilation is also high. Now, this brings fresh air rich in oxygen and carbon dioxide is taken out. This makes the oxygen concentration to rise with a reduced level of carbon dioxide within alveoli. Alternatively, in the functioning alveoli, in case there is a low rate of exchange of the air, then it means that alveolar ventilation goes down, and this brings (Pathway medicine,2020).



As shown above, once the rate of alveolar ventilation is doubled, the pressure of arterial carbon dioxide is halved. As the percentage of alveolar ventilation reduces, the more partial pressure of carbon dioxide is created.

To sum up, though different, minute and alveolar ventilation are very important in assessing patients with health issues and in need of medical attention. Alveolar ventilation involves of exchanging of gas that takes place alveoli while minute ventilation concerns the amount of air that inhaled and exhaled in a minute from human's lungs.

References

Pathway medicine, (2020). The "Alveolar ventilation" <http://www.pathwaymedicine.org/alveolar-ventilation>

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