(a-ET)PCO$_2$ gradients or differences- Alveolar dead space

There are three important applications of (a-ET)CO$_2$ differences.

**Monitoring PaCO$_2$**

Measurements of PETCO$_2$ constitute a useful non-invasive tool to monitor PaCO$_2$ and hence the ventilatory status of patients during anesthesia or in the intensive care unit. In normal individuals, the (a-ET)PCO$_2$ may vary from 2-5 mmHg. The PETCO$_2$ is even more useful if its relationship to PaCO$_2$ can be established initially by blood gas analysis. Thereafter, changes in PaCO$_2$ may be assumed to occur in parallel with those in PETCO$_2$ thus avoiding repeated arterial puncture provided there are no major hemodynamic changes or respiratory abnormalities that may alter alveolar dead space and hence, (a-ET)PCO$_2$. (For details - Physiology section)

**Monitoring alveolar dead space**

The (a-ET)PCO$_2$ is a measure of alveolar dead space, and changes in alveolar dead space correlate well with changes in (a-ET)PCO$_2$. An increase in (a-ET)PCO$_2$ suggests an increase in dead space ventilation. Hence (a-ET)PCO$_2$ is an indirect estimate of V/Q mismatching of the lung.

**Monitoring clinical progress of a critical patient**

In patients with severe lung disease or hemodynamic instability, the PETCO$_2$ may not be a good predictor of PaCO$_2$ because (a-ET)PCO$_2$ gradients vary with the changing V/Q relationship of the lungs, thus making PETCO$_2$ measurements less reliable. The emphasis here is on more ABG’s until the V/Q mismatch improves and a more constant (a-ET)PCO$_2$ relationship is established. Establishment of constant (a-ET)CO$_2$ implies a good improvement in the V/Q status of the patient.

References:


