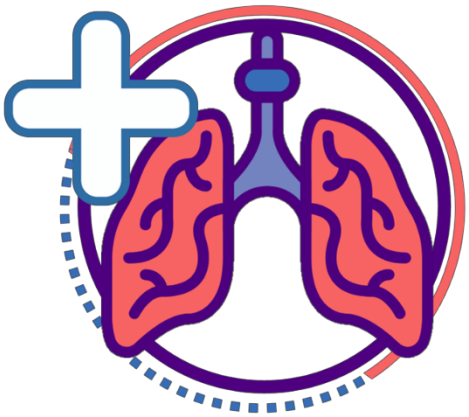


RESPIRATORY SYSTEM

Physiology

Sheet Slide

Number:	8
Done by:	Omar Sami
Corrected by:	Mustafa Khader
Doctor:	Yanal Shafaqouj

Let us retrieve our discussion about the ventilation-perfusion ratio **(V/Q)**.

- When **(V/Q) is Zero → this means that no ventilation is taking place, V is Zero; bronchial obstruction is an example.**

Side note: let us assume that alveolar ventilation has been totally diminished due to any reason, what do you think blood perfusion would act like?

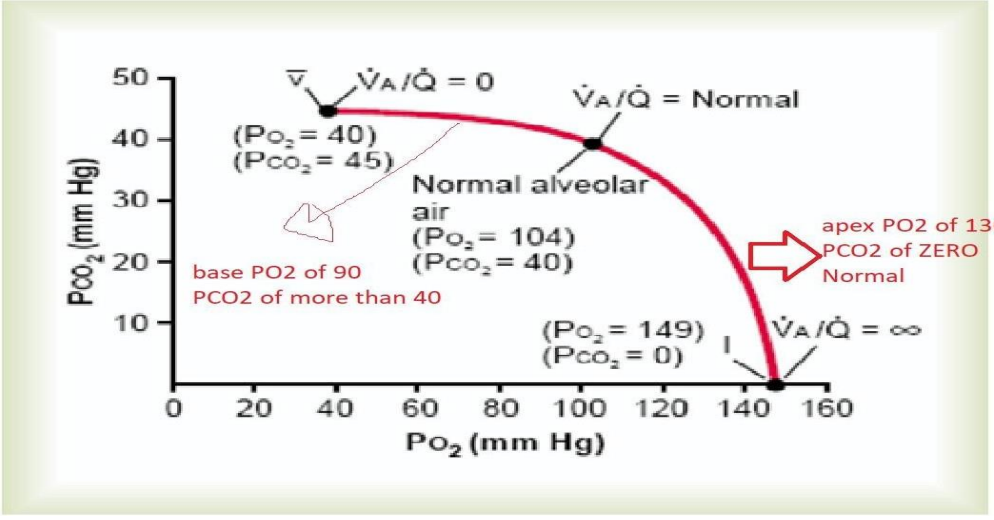
Not to mention the temporarily already existing blood flow, the capillary will soon get constricted and the blood flow to the unventilated area of the lung will drop dramatically; our bodies are machines of high efficiency, especially when it comes to blood, none should be wasted.

So, what should you keep in mind is that in hypoventilation state ***(V/Q)*** is zero, ***V*** being zero at first, then ***Q*** will follow, being zero too.

- When **(V/Q) is** $\infty \rightarrow$ this means **that obstruction in the capillaries is taking place; thus, no perfusion to the desired area, pulmonary embolism is an example.**

Remember that any value over zero = ∞.

How is this ratio represented using curves, and what data does it imply?
This is very important



x-axis → PO2
y-axis → PCO2

***X-axis intercept represents* (V/Q) = ∞** → note that at that point alveolar PO2 is 150 mmHg while alveolar PCO2 is zero, same as the outer atmosphere, almost. No blood is there to consume O2 neither to give CO2. Pulmonary Embolism mightbe the cause.

→ *And this is a classic example of Physiological Dead space, where ventilation is present, but perfusion is absent.*

→ it is also called *"Alveolar wasted volume": part of the lung is being ventilated but not perfused.*

***At the other extreme, where PO2 is 40 while PCO2 is 45 is what represents a* (V/Q) of Zero. Why?**

An airway total obstruction will cause diminished ventilation to the downstream area, yet O2 concentration won't drop to zero, the reason behind is that O2 is also present in the capillaries with a partial pressure of 40 mmHg, CO2 won't get exchanged too, remains 45 mmHg in its partial pressure within the capillaries. In this case, ***PO2 & PCO2*** *within the alveolus will be same as the capillary,* ***40 mmHg and 45 mmHg****, Respectively.*

Q: *Is obstruction only the cause of such a case, or can there be other causes to a (V/Q) of zero?*

A: *remember that the value of V is what causes a* **(V/Q) of zero,** right to left pulmonary shunts is an example of which; skipping ventilation in the lungs, as the blood by-passes the whole pulmonary circulation to the systemic, hence, no ventilation.

Wikipedia: A pulmonary shunt occurs as a result of blood flowing right-to-left through cardiac openings or in pulmonary arteriovenous malformations. The shunt which means V/Q = 0 for that particular part of the lung field under consideration results in de-oxygenated blood going to the heart from the lungs via the pulmonary veins.

To make a long story short, whenever there is no ventilation whatever the cause was {either bronchial or cardiac defects}, **(V/Q) Is zero.**