FEB 2008
QUESTION 06

Compare the effect on arterial blood carbon dioxide and oxygen levels on ventilation perfusion inequalities

When ventilation (V) and perfusion (Q) are matched V/Q = 1, this never occurs globally

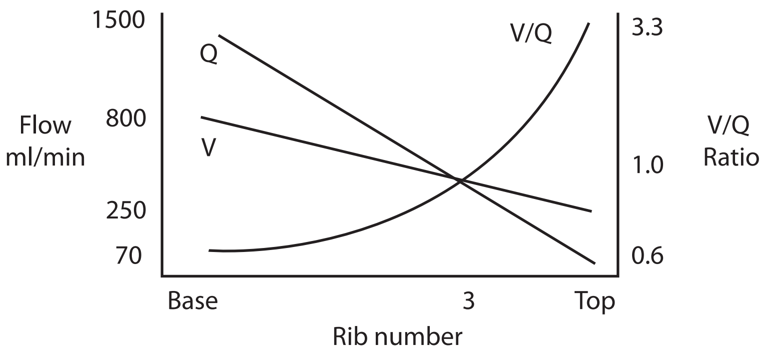
Dead space V/Q = infinity
Areas ventilated but not perfused/gas exchanged
Examples: apparatus, conducting airways, unperfused alevoli (Zone 1 West)
Calculated by Bohr's equation (conservation of mass)
$P_{EXPIRED}CO2(TV) = P_{ARTERIAL}PCO2(TV - PDS)$

Causes increased pCO2, compensated by increased RR

Shunt V/Q = 0
Areas perfused but not ventilated
Examples: thebsian and bronchial circ, non ventilated alveoli (Zone 3 West)
Calculated by the shunt equation (conservation of mass)
QT(Art O2 Content) = QS(MVO2 Content) + (QT-QS)(Postcap O2 Content)

Causes decreased PaO2 (incr PCO2 also but minor due to HbO2 curve vrs CO2 linear)
Compensated by increased FiO2 up to 30% shunt when this becomes ineffective

V/Q mismatch VQ >0 but not equal to 1
Mainly due the effect of gravity on perfusion and the weight of the lung



Most important during pathological lung processes (pneumonia, ARDS)
Difficult to calculate in isolation from shunt, MIGET techniques employed experiments
Alveolar - Arterial gradient used clinically
Alveolar gas equation = FiO2(Patm-47) - PCO2/0.8

Causes decreased paO2 and increased PCO2 (although the later is corrected quickly by increased ventialtion)
Compensated by increased FiO2