Diffusion Capacity

Diffusion capacity = transfer factor

1. Ability of gases to cross the alveolar-capillary membrane
    a. The properties of this membrane are solely responsible for gas crossing
    b. Carbon monoxide (CO gas) is usually used to quantify the diffusion capacity
    c. This is because CO has rapid transport across membrane
2. The diffusion limit of CO = **DLCO**; usually reported in PFTs
    a. Measured by inspiration of CO and helium
    b. Use CO in very low doses in mixture with hydrogen
    c. Hold breath 10-12seconds, then analyze exhaled air – see how much is present in expired gas and work out transfer factor
    d. Reduced DLCO:
        i. Reduced DLCO → takes longer for gas to diffuse across
        ii. Anaemia
        iii. Standing up (test is done seated)
        iv. Emphysema (pure chronic bronchitis maintains relatively normal DLCO): emphysema = destruction of alveolar septa
            1. Causes: smoking most common/ α1-antitrypsin deficiency (more commonly in young);
            2. Emphysema → nodes in lungs
        v. Atelectasis: collapse of lung lobe
        vi. Loss of lung parenchyma: pneumonia, pneumonectomy, fibrosis etc.
        vii. Pulmonary vascular disease – pulmonary hypertension, vasculitis

Arterial Blood Gases

Sampled anaerobically on an automated analyzer
Analysed for gas tensions and pH
Oxygen saturation of Hgb
Hgb content
Key determinants of ABGs:

- pO2: inspired oxygen fraction, ventilation perfusion matching (including shunt), cardiac output, systemic oxygen consumption, alveolar ventilation
    - Hypoxemia (low O2) → SOB; low cardiac output → hypoxemia
    - pO2 determined by O2 intake (e.g. high altitude)
    - Fever and septic: patient requires increased O2
- pCO2: alveolar ventilation, ventilation perfusion matching, metabolic CO2 production
- pH: alveolar ventilation, metabolic acid-base balance

Clinical usefulness of ABGs:

- ABGs = endpoint of gas-exchange function of the lung
- Reflex gas exchange, not lung mechanics
- If problem is one of the lung mechanics, e.g. asthma, follow the lung mechanics (spirometry) as well as gas exchange

Pre-operative evaluation

History and physical exam, especially of the respiratory system
ABG if O2 sat <96% or suspect CO2 retention
CXR in all patients >65 or known lung disease
Spirometry especially prior to thoraco-abdominal operations