

Q15 Describe the physiological consequences of decreasing Functional Residual Capacity (FRC) by one litre in an adult (Sept 2010)

FRC

- Functional residual capacity – residual volume plus expiratory reserve volume
- An equilibrium point at which the elastic recoil of the lungs equals the outward spring of the chest wall
- Approx 30ml/kg (2200ml in 70kg male)
- Can be affected by gender (less in females for same height), body size (linearly related to height), obesity, diaphragmatic muscle tone, PEEP, posture (supine less than erect) and disease (decrease in elastic recoil of lungs/chest wall)

CONSEQUENCES OF 1L DECREASE

- Reduction in O₂ store → reduces the effect of pre-oxygenation in intubation → risk of hypoxaemia during induction
- Increases airways resistance → as airways are held open by radial traction of surrounding lung parenchyma
- Reduces compliance → moves lungs to the flatter part of the compliance curve
- Increases work of breathing → by increasing airway resistance and reducing compliance and increasing atelectasis in the supine position. If FRC falls below closing capacity, get air trapping and dynamic airway closure → more WOB
- Increases pulmonary vascular resistance → decreased radial traction on extra alveolar vessels causes reduction in radius of those vessels and thus increase in PVR.
- Increase in RV afterload → due to increase in PVR
- Increases V/Q mismatch → due to dynamic airway closure, atelectasis, gas trapping, thus more shunt and reduction in PaO₂