KEYS TO UNDERSTANDING OXYGEN AND HEMODYNAMIC INDICES

TOTAL OXYGEN DELIVERY (ml O_2/min.)

$$D_{O_2} = \dot{Q}_T \times (Ca_{O_2} \times 10)$$

where $\dot{Q}_T$ is total cardiac output, CaO_2 is systemic arterial content, the factor 10 is used to convert CaO_2 to ml O_2/L blood

ARTERIAL-VENOUS OXYGEN CONTENT DIFFERENCE (vol%)

$$C(a-\bar{v})_{O_2} = Ca_{O_2} - C\bar{v}_{O_2}$$

where CaO_2 is systemic arterial O_2 content, and $C\bar{v}_{O_2}$ is mixed venous O_2 content

OXYGEN CONSUMPTION (ml O_2/min)

$$\dot{V}_{O_2} = \dot{Q}_T[C(a-\bar{v})_{O_2} \times 10]$$

where $\dot{Q}_T$ is the total cardiac, $C(a-\bar{v})_{O_2}$ is the arterial-venous oxygen content difference, the factor 10 is used to convert $C(a-\bar{v})_{O_2}$ to ml O_2/L

OXYGEN EXTRACTION RATIO

$$O_2ER = \frac{Ca_{O_2} - C\bar{v}_{O_2}}{Ca_{O_2}}$$

where CaO_2 is systemic arterial O_2 content, and $C\bar{v}_{O_2}$ is mixed venous O_2 content

CARDIAC OUTPUT (L/min)

Fick Equation $$\dot{Q}_T = \frac{\dot{V}_{O_2}}{(Ca_{O_2} - C\bar{v}_{O_2}) \times 10}$$

where $\dot{V}_{O_2}$ is oxygen consumption in ml/min, where CaO_2 is systemic arterial O_2 content, and $C\bar{v}_{O_2}$ is mixed venous O_2 content (ml/L)

SHUNT FRACTION (%)

$$\frac{\dot{Q}_S}{\dot{Q}_T} = \frac{Cc_{O_2} - Ca_{O_2}}{Cc_{O_2} - C\bar{v}_{O_2}}$$

where CcO_2 is pulmonary capillary O_2 content, CaO_2 is systemic arterial O_2 content, and $C\bar{v}_{O_2}$ is mixed venous O_2 content