Swan-Ganz Catheter Equations

O2 Tension-Based Indices

A-a Gradient – Normal <20 mmHg

$$\text{A-a Gradient} = (150 - 1.1*PaCO_2) - PaO_2$$

Intrapulmonary Shunt – Normal <5%

$$\frac{Qs}{Qt} = \frac{CcO_2 - CaO_2}{CcO_2 - CvO_2}$$

$$CcO_2 = (1.36*Hb*1) + (P_AO_2*0.003) \qquad P_AO_2 = (150 - 1.1*PaCO_2)$$
$$CaO_2 = (1.36*Hb*SaO_2) + (PaO_2*0.003)$$
$$CvO_2 = (1.36*Hb*SvO_2) + (PvO_2*0.003)$$

VQ Index – Normal <5%

$$VQI = \frac{1-SaO_2}{1-SvO_2}$$

Systemic Oxygen Delivery (DO_2) – Normal ≈ 1000 ml/min/m^2

$$DO_2 = CO*CaO_2*10$$

Systemic Oxygen Consumption (VO_2) – Normal 100-125 ml/min/m^2

$$VO_2 = (CO*CaO_2) - (CO*CvO_2)$$
$$= CO(CaO_2-CvO_2)$$
$$= CO*Hb*13.8*(SaO_2-SvO_2)$$

↑ ?

A-V O_2 Difference – Normal 5 vol %

$$\text{A-V } O_2 \text{ Difference} = CaO_2-CvO_2$$

Oxygen Extraction Ratio – Normal 22-30%

$$OER = \frac{CaO_2-CvO_2}{CaO_2} * 100$$

Oxygen Extraction Index – Normal 22-30%

$$OEI = \frac{SaO_2-SvO_2}{SaO_2} * 100$$