

The Most Important Formulas for Respiratory Therapists:

Parameter	Formula	Normal Range
SVR - Systemic Vascular Resistance	$[(MAP-CVP) \times 80] / CO$	800-1200 dynes-sec/cm ⁵
SVRI - Systemic Vascular Resistance Index	$[(MAP-CVP) \times 80] / CI$	1950-2450 dynes-sec/cm ⁵ /m ²
PVR - Pulmonary Vascular Resistance	$[(MPAP-PAOP) \times 80] / CO$	20-150 dynes-sec/cm ⁵
PVRI - Pulmonary Vascular Resistance Index	$[(MPAP-PAOP) \times 80] / CI$	50-280 dynes-sec/cm ⁵ /m ²
SV - Stroke Volume	CO / HR	60-100 ml/beat
MAP - Mean Arterial Pressure	$Diastolic + [Systolic - Diastolic]/3$	70-105 mmHg
Pulse Pressure	$Systolic - Diastolic$	30-50 mmHg
CaO2 - Arterial Oxygen Content	$[(Hb \times 1.34)SaO_2] + [PaO_2 \times 0.0031]$	16-22 ml O ₂ / dL blood
CvO2 - Mixed Venous Oxygen Content	$[(Hb \times 1.34)SvO_2] + [PvO_2 \times 0.0031]$	12-17 ml O ₂ / dL blood
C(a-v)O2 - AV Content Difference	$CaO_2 - CvO_2$	4-6 ml O ₂ / dL blood
CO - Cardiac Output	$SV \times HR$	4-8 L/min
CI - Cardiac Index	CO / BSA	2.8-4.0 L/min/m ²
DO2 - Oxygen Delivery	$CaO_2 \times CO \times 10$	950-1150 ml/min
VO2 - Oxygen Consumption	$C(a-v)O_2 \times CO \times 10$	200-250 ml/min
VC02 - CO ₂ Production		150-230 ml/min
O2ER - Oxygen Extraction Ratio	VO_2/DO_2	0.23-0.32
RQ (Respiratory Quotient)	VCO_2/VO_2	0.75-0.90
CcO2 - Pulmonary End Capillary O ₂ Content	$(Hb \times 1.37) + 0.0031[0.5(P_{atm}-47)-P_{aCO_2}]$	
Qs / Qt - Shunt Fraction	$[CcO_2 - CaO_2] / [CcO_2 - CvO_2]$	0.05 or 5%
Anion Gap	$Na^+ - (Cl + HCO_3)$	8-12 mmol/L or mEq/L
TLC - Total Lung Capacity	$TLC = VC + RV$	80 ml/kg ~5-6 Liters
VC - Vital Capacity	$VC = IRV + ERV + V_t$	> 75-80% predicted
VE - Minute Ventilation	$V_t \times RR$	4-7 L/min ~100ml/kg/min
PAO2 - Alveolar Air Equation	$(PB-PH_2O) FiO_2 - (PaCO_2 \times 1.25)$	
A-a Gradient	$PAO_2 - PaO_2$	21%FiO ₂ = 2-22mmHg, 100%FiO ₂ = 10-60
OI - Oxygen Index	PaO_2 / FiO_2	500
VA - Alveolar Ventilation	$[VCO_2 / PaCO_2]K$	4-6 L/min
VD/Vt = Deadspace	$[PaCO_2-PECO_2]/PaCO_2$	0.2-0.4

Raw – Airway Resistance	[Palv-Pmouth]/Flow	1.5-2.0 cmH2O/L/sec
Compliance	ΔVolume / ΔPressure	
Static Compliance	Vt / [Plateau Pressure – PEEP]	50-85 ml/cmH2O
Dynamic Compliance	Vt / [Peak Inspiratory Pressure – PEEP]	75-125 ml/cmH2O
Chest Wall Compliance	Vt / [Airway Pressure – Intrapleural Pressure]	
Pulmonary Blood Flow Distribution	Zone 1: PA > Pa > Pv Zone 2: Pa > PA > Pv Zone 3: Pa > Pv > PA	
CPP – Cerebral Perfusion Pressure	MAP – ICP	70-100mmHg
CPP – Coronary Perfusion Pressure	Diastolic – PAWP	60-80mmHg
PF Ratio	PaO2/FiO2	>200
Henderson Hasselbach Equation	pH = pK + log[(HCO3)/(H2CO3)] or pH = 6.1 + log[HCO3/0.03(PaCO2)]	

If there are missing or incorrect formula, please let us know to update: info@respiratoryexam.com

