

Normal Hemodynamic Parameters and Laboratory Values

Normal Hemodynamic Parameters – Adult

PARAMETER	EQUATION	NORMAL RANGE
Arterial Oxygen Saturation (SaO ₂)		95-100%
Mixed Venous Saturation (SvO ₂)		60-80%
Central Venous Oxygen Saturation (ScvO ₂)		70%
Arterial Blood Pressure (BP)	Systolic (SBP) Diastolic (DBP)	100-140 mmHg 60-90 mmHg
Mean Arterial Pressure (MAP)	$SBP + (2 \times DBP)/3$	70-105 mmHg
Right Atrial Pressure (RAP)		2-6 mmHg
Central Venous Pressure (CVP)		2-6 mmHg
Right Ventricular Pressure (RVP)	Systolic (RVSP) Diastolic (RVDP)	15-30 mmHg 0-8 mmHg
Pulmonary Artery Pressure (PAP)	Systolic (PASP) Diastolic (PADP)	15-30 mmHg 8-15 mmHg
Mean Pulmonary Artery Pressure (MPAP)	$PASP + (2 \times PADP)/3$	9-18 mmHg
Pulmonary Artery Occlusion Pressure (PAOP)		6-12 mmHg
Left Atrial Pressure (LAP)		4-12 mmHg
Cardiac Output (CO)	$HR \times SV/1000$	4.0-8.0 L/min
Cardiac Index (CI)	CO/BSA	2.5-4.0 L/min/m ²
Stroke Volume (SV)	$CO/HR \times 1000$	60-100 mL/beat
Stroke Volume Index (SVI)	$CI/HR \times 1000$	33-47 mL/m ² /beat
Stroke Volume Variation (SVV)	$(SV_{max} - SV_{min})/SV_{mean} \times 100$	10-15%
Systemic Vascular Resistance (SVR)	$80 \times (MAP - RAP)/CO$	800-1200 dynes-sec/cm ⁻⁵
Systemic Vascular Resistance Index (SVRI)	$80 \times (MAP - RAP)/CI$	1970-2390 dynes-sec/cm ⁻⁵ /m ²
Pulmonary Vascular Resistance (PVR)	$80 \times (MPAP - PAOP)/CO$	<250 dynes-sec/cm ⁻⁵
Pulmonary Vascular Resistance Index (PVRI)	$80 \times (MPAP - PAOP)/CI$	255-285 dynes-sec/cm ⁻⁵ /m ²
Left Ventricular Stroke Work Index (LVSWI)	$SVI \times (MAP - PAOP) \times 0.0136$	50-62 mmHg x ml/m ²
Right Ventricular Stroke Work Index (RVSWI)	$SVI \times (MPAP - CVP) \times 0.0136$	5-10 mmHg x ml/m ²



Edwards

Normal Hemodynamic Parameters – Adult

PARAMETER	EQUATION	NORMAL RANGE
Coronary Artery Perfusion Pressure (CPP)	Diastolic BP-PAOP	60-80 mmHg
Right Ventricular End-Diastolic Volume (RVEDV)	SV/EF	100-160 mL
Right Ventricular End-Diastolic Volume Index (RVEDVI)	RVEDV/BSA	60-100 mL/m ²
Right Ventricular End-Systolic Volume (RVESV)	EDV-SV	50-100 mL
Right Ventricular Ejection Fraction (RVEF)	SV/EDV x 100	40-60%
Arterial Oxygen Content (CaO ₂)	$(0.0138 \times \text{Hgb} \times \text{SaO}_2) + 0.0031 \times \text{PaO}_2$	16-22 mL/dL
Venous Oxygen Content (CvO ₂)	$(0.0138 \times \text{Hgb} \times \text{SvO}_2) + 0.0031 \times \text{PvO}_2$	15 mL/dL
A-V Oxygen Content Difference (C(a-v)O ₂)	CaO ₂ - CvO ₂	4-6 mL/dL
Oxygen Delivery (DO ₂)	CaO ₂ x CO x 10	950-1150 mL/min
Oxygen Delivery Index (DO ₂ I)	CaO ₂ x CI x 10	500-600 mL/min/m ²
Oxygen Consumption (VO ₂)	C(a - v) O ₂ x CO x 10	200-250 mL/min
Oxygen Consumption Index (VO ₂ I)	C(a - v) O ₂ x CI x 10	120-160 mL/min/m ²
Oxygen Extraction Ratio (O ₂ ER)	$(\text{CaO}_2 - \text{Cv O}_2) / \text{CaO}_2 \times 100$	22-30%
Oxygen Extraction Index (O ₂ EI)	$(\text{SaO}_2 - \text{SvO}_2) / \text{SaO}_2 \times 100$	20-25%

Normal Blood Laboratory Values

TEST	CONVENTIONAL UNITS (Reference Values*)	SI UNITS
Hematocrit (Hct)	Males: 42-52% Females: 36-48%	0.42-0.52 0.36-0.48
Hemoglobin (Hgb)	Males: 12.4-17.4 g/dL Females: 11.7-16 g/dL	124-174 g/L 117-160 g/L
Lactate	0.93-1.65 mEq/L	0.93-1.65 mmol/L

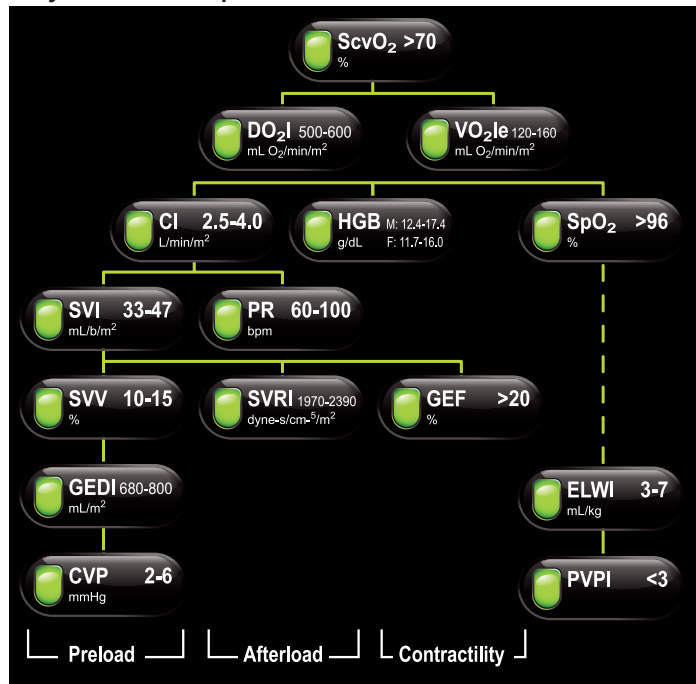
SI Units = International Units

*Reference Values vary by regional laboratory techniques and methods.

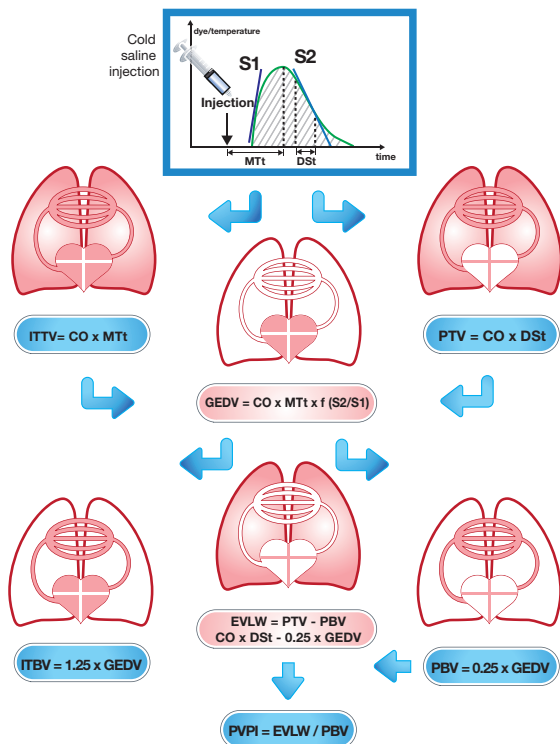
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PARAMETER	EQUATION	NORMAL RANGE
Extra Vascular Lung Water (EVLW)	CO x DST - 0.25 GEDV	
Extra Vascular Lung Water Index (ELWI)	EVLW/PBW Predicted Body Weight (PBW): Female: $45.5 + 0.91 \times (\text{Height}-152.4)$ Male: $50 + 0.91 \times (\text{Height}-152.4)$	3-7 mL/kg
Global End Diastolic Volume (GEDV)	CO x MTt x f(S1/S2)	
Global End Diastolic Volume Index (GEDI)	CI x MTt x f(S1/S2)	680-800 mL/m ²
Global Ejection Fraction (GEF)	SV x 4 / GEDV	>20%
Cardiac Function Index (CFI)	1000 x CO / GEDV	4.5-6.5 l/min
Intra Thoracic Blood Volume (ITBV)	ITBV = 1.25 x GEDV	
Intra Thoracic Blood Volume Index (ITBI)	ITBI = 1.25 x GEDI	850-1000 mL/m ²
Pulmonary Vascular Permeability Index (PVPI)	EVLW/0.25 x GEDV	<3
Cardiac Power (CPO)	CO x MAP x K	
Cardiac Power Index (CPI)	CI x MAP x K	0.5-0.7 W/m ²

Physio-Relationship



Transpulmonary Thermodilution TPTD



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