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)	100 - 140 mmHg
	Diastolic (DBP)	60 - 90 mmHg
Mean Arterial Pressure (MAP)	SBP + (2 x DPB)/3	70 - 105 mmHg
Right Atrial Pressure (RAP)/ Central Venous Pressure (CVP)		2 - 6 mmHg
Right Ventricular Pressure (RVP)	Systolic (RVSP)	15 - 30 mmHg
	Diastolic (RVDP)	2 - 8 mmHg
Pulmonary Artery Pressure (PAP)	Systolic (PASP)	15 - 30 mmHg
	Diastolic (PADP)	8 - 15 mmHg
Mean Pulmonary Artery Pressure (MPAP)	PASP + (2 x PADP)/3	9 - 18 mmHg
Pulmonary Artery Occlusion Pressure (PAOP)		6 - 12 mmHg
Left Atrial Pressure (LAP)		4 - 12 mmHg
Cardiac Output (CO)	HR x 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 x 1000	60 - 100 mL/beat
Stroke Volume Index (SVI)	CI/HR x 1000	33 - 47 mL/m^2/beat
Stroke Volume Variation (SVV)	SVmax - SVmin/SVmean x 100	10 - 15%
Systemic Vascular Resistance (SVR)	80 x (MAP - RAP)/CO	800 - 1200 dynes - sec/cm^{-5}
Systemic Vascular Resistance Index (SVRI)	80 x (MAP - RAP)/CI	1970 - 2390 dynes - sec/cm^{-5}/m^2
Pulmonary Vascular Resistance (PVR)	80 x (MPAP - PAOP)/CO	<250 dynes - sec/cm^{-5}
Pulmonary Vascular Resistance Index (PVRI)	80 x (MPAP - PAOP)/CI	255 - 285 dynes - sec/cm^{-5}/m^2
Left Ventricular Stroke Work (LVSW)	SI x MAP x 0.0144	8 - 10 g/m/m^2
Left Ventricular Stroke Work Index (LVSWI)	SVI x (MAP - PAOP) x 0.0136	50 - 62 g/m^2/beat
Right Ventricular Stroke Work (RVSW)	SI x MAP x 0.0144	51 - 61 g/m/m^2
Right Ventricular Stroke Work Index (RVSWI)	SVI x (MPAP - CVP) x 0.0136	5 - 10 g/m^2/beat

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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 x Hgb x SaO_2) + 0.0031 x PaO_2	16 - 22 mL/dL
Venous Oxygen Content (CvO_2)	(0.0138 x Hgb x SvO_2) + 0.0031 x 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_2I)	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_2I)	C(a - v)O_2 x CI x 10	120 - 160 mL/min/m^2
Oxygen Extraction Ratio (O_2ER)	(CaO_2 - CvO_2)/CaO_2 x 100	22 - 30%
Oxygen Extraction Index (O_2EI)	(SaO_2 - SvO_2)/SaO_2 x 100	20 - 25%

Normal Blood Laboratory Values

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