TABLE 1.1 Approximate Compositions of Extracellular and Intracellular Fluids

Substance and Units	Extracellular Fluid	Intracellular Fluid[a]
Na^+ (mEq/L)	140	14
K^+ (mEq/L)	4	120
Ca^{2+}, ionized (mEq/L)	2.5[b]	1×10^{-4}
Cl^- (mEq/L)	105	10
HCO_3^- (mEq/L)	24	10
pH[c]	7.4	7.1
Osmolarity (mOsm/L)	290	290

[a]The major anions of intracellular fluid are proteins and organic phosphates.

[b]The corresponding total $[Ca^{2+}]$ in extracellular fluid is 5 mEq/L or 10 mg/dL.

[c]pH is $-\log_{10}$ of the $[H^+]$; pH 7.4 corresponds to $[H^+]$ of 40×10^{-9} Eq/L.

Plasma, Serum, or Blood Concentrations

Substance	Average Normal Value	Range	Comments
Bicarbonate (HCO_3^-)	24 mEq/L	22–26 mEq/L	Venous blood; measured as total CO_2
Calcium (Ca^{2+}), ionized	5 mg/dL		
Calcium (Ca^{2+}), total	10 mg/dL		
Chloride (Cl^-)	100 mEq/L	98–106 mEq/L	
Creatinine	1.2 mg/dL	0.5–1.5 mg/dL	
Glucose	80 mg/dL	70–100 mg/dL	Fasting
Hematocrit	0.45	0.4–0.5	Men, 0.47; women, 0.41
Hemoglobin	15 g/dL		
Hydrogen ion (H^+)	40 nEq/L		Arterial blood
Magnesium (Mg^{2+})	0.9 mmol/L		
Osmolarity	287 mOsm/L	280–298 mOsm/L	Osmolality is mOsm/kg H_2O
O_2 saturation	98%	96%–100%	Arterial blood
P_{CO_2}, arterial	40 mm Hg		
P_{CO_2}, venous	46 mm Hg		
P_{O_2}, arterial	100 mm Hg		
P_{O_2}, venous	40 mm Hg		
pH, arterial	7.4	7.37–7.42	
pH, venous	7.37		
Phosphate	1.2 mmol/L		
Potassium (K^+)	4.5 mEq/L		
Protein, albumin	4.5 g/dL		
Protein, total	7 g/dL	6–8 g/dL	
Sodium (Na^+)	140 mEq/L		
Urea nitrogen (BUN)	12 mg/dL	9–18 mg/dL	Varies with dietary protein
Uric acid	5 mg/dL		

Other Parameters and Values

System	Parameter	Average Normal Value	Comments
Cardiovascular	Cardiac output, rest	5 L/min	
	Cardiac output, exercise	15 L/min	Maximum value
	Stroke volume	80 mL	
	Heart rate, rest	60/min	
	Heart rate, exercise	180/min	Maximum value
	Ejection fraction	0.55	Stroke volume/end-diastolic volume
	Systemic arterial pressure (Pa)	100 mm Hg	Systolic, 120 mm Hg Diastolic, 80 mm Hg
	Pulmonary arterial pressure	15 mm Hg	Systolic, 25 mm Hg Diastolic, 8 mm Hg
	Right atrial pressure	2 mm Hg	
	Left atrial pressure	5 mm Hg	Pulmonary wedge pressure
Respiratory	Barometric pressure (P_B)	760 mm Hg	Sea level
	Water vapor pressure (P_{H_2O})	47 mm Hg	At 37°C
	Total lung capacity	6.0 L	
	Functional residual capacity	2.4 L	
	Vital capacity	4.7 L	
	Tidal volume	0.5 L	
	STPD	273 K, 760 mm Hg	Standard conditions, dry
	BTPS	310 K, 760 mm Hg, 47 mm Hg	Body conditions, saturated
	Solubility of O_2 in blood	0.003 mL O_2/100 mL blood per mm Hg	
	Solubility of CO_2 in blood	0.07 mL CO_2/100 mL blood per mm Hg	
	CO_2 production	200 mL/min	
	O_2 consumption	250 mL/min	
	Respiratory exchange quotient	0.8	CO_2 production/O_2 consumption
	Hematocrit	0.45	
	Hemoglobin concentration	15 g/dL	
	O_2-binding capacity of hemoglobin	1.34 mL O_2/g Hb	At 100% saturation
Renal	Body water, total	60% of body weight	
	Body water, ICF	40% of body weight	
	Body water, ECF	20% of body weight	Interstitial fluid and plasma
	Glomerular filtration rate (GFR)	120 mL/min	Males, 120 mL/min Females, 95 mL/min
	Renal plasma flow (RPF)	650 mL/min	Clearance of PAH
	Renal blood flow	1200 mL/min	
	Filtration fraction	0.2	GFR/RPF
	Serum anion gap	10–16 mEq/L	$[Na^+] - ([Cl^-] + [HCO_3^-])$

Weak Acids and Bases	pK	Other Values	
Acetoacetic acid	3.8	Body surface area (for 70-kg man)	1.73 m^2
Ammonia (NH_3/NH_4^+)	9.2	Body weight	70 kg
β-hydroxybutyric acid	4.8	Faraday constant	96,500 coulombs/equivalent
Carbonic acid (HCO_3^-/CO_2)	6.1	Gas constant (R)	0.082 L-atm/mol-K
Creatinine	5.0	2.3 RT/F	60 mV at 37°C
Hemoglobin, deoxygenated	7.9		
Hemoglobin, oxygenated	6.7		
Lactic acid	3.9		
Phosphoric acid ($HPO_4^{-2}/H_2PO_4^-$)	6.8		