LABORATORY REFERENCE RANGE VALUES

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Reference range values are for apparently healthy people and often overlap significantly with values for those who are sick. Actual values may vary significantly due to differences in assay methodologies and standardization. Institutions may also set up their own reference ranges based on the particular populations that they serve, thus regional differences may occur. Consequently, values reported by individual laboratories may differ from those listed in this appendix.

All values are given in conventional and SI units. However, cases where SI units have not been widely accepted, conventional units are used. In case of the heterogenous nature of the materials measured or uncertainty about the exact molecular weight of the compounds, SI measurements cannot be used so that mass per volume remains as the unit of concentration.

Abbreviations:

ACD, acid-citrate-dextrose; **AMP,** adenosine monophosphate; **CEA,** carcinoembryonic antigen; **CHF,** congestive heart failure; **Cit,** citrate; **Cl,** chlorine; **CNS,** central nervous system; **CSF,** cerebrospinal fluid; **cyclic AMP,** adenosine 3´,5´-cyclic phosphate; **EDTA,** ethylenediaminetetraacetic acid; **Hb,** hemoglobin; **HDL,** high-density lipoprotein; **Hep,** heparin; **LDL-C,** low-density lipoprotein-cholesterol; **MB,** myoglobin; **NaCit,** sodium citrate; **NAPA,** *N*-acetylprocainomide; **Ox,** oxalate; **RBC,** red blood cell(s); **RIA,** radioimmunoassay; **SD,** standard deviation; **WBC,** white blood cell(s)

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Tests	Conventional Units	SI Units
Acetaminophen, serum or plasma (Hep or EDTA)		
Therapeutic	10–30 mcg/mL	66–199 mcmol/L
Toxic	>200 mcg/mL	>1324 mcmol/L
Acetone		
Serum		
Qualitative	Negative	Negative
Quantitative	0.3–2.0 mg/dL	0.05–0.34 mmol/L
Urine		
Qualitative	Negative	Negative
Acid hemolysis test (Ham)	<5% lysis	<0.05 lysed fraction
Adrenocorticotropin (ACTH), plasma		
8 AM	<120 pg/mL	<26 pmol/L
Midnight (supine)	<10 pg/mL	<2.2 pmol/L
*Alanine aminotransferase (ALT, SGPT), serum		
Male	13–40 U/L (37°C)	0.22–0.68 mckat/L (37°C)
Female	10–28 U/L (37°C)	0.17–0.48 mckat/L (37°C)
Albumin		
Serum		
Adult	3.5–5.2 g/dL	35–52 g/L
>60 y	3.2–4.6 g/dL Avg. of 0.3 g/dL higher in patients in upright position	32–46 g/L Avg. of 3 g/L higher in patients in upright position
Urine		
Qualitative	Negative	Negative
Quantitative	50–80 mg/24 h	50–80 mg/24 h
CSF	10–30 mg/dL	100–300 mg/L
*Aldolase, serum	1.0–7.5 U/L (30°C)	0.02–0.13 mckat/L (30°C)
Aldosterone		
Serum		
Supine	3–16 ng/dL	0.08–0.44 nmol/L
Standing	7–30 ng/dL	0.19–0.83 nmol/L
Urine	3–19 mcg/24 h	8–51 nmol/24 h
Amikacin, serum or plasma (EDTA)		
Therapeutic		
Peak	25–35 mcg/mL	43–60 mcmol/L
Trough		
Less severe infection	1–4 mcg/mL	1.7–6.8 mcmol/L
Life-threatening infection	4–8 mcg/mL	6.8–13.7 mcmol/L
Toxic		
Peak	>35–40 mcg/mL	>60–68 mcmol/L
Trough	>10–15 mcg/mL	>17–26 mcmol/L
∂-Aminolevulinic acid, urine	1.3–7.0 mg/24 h	10–53 mcmol/24 h
Amitriptyline, serum or plasma (Hep or EDTA); trough (≥12 h after dose)		
Therapeutic	80–250 ng/mL	289–903 nmol/L
Toxic	>500 ng/mL	>1805 nmol/L
Ammonia		
Plasma (Hep)	9–33 mcmol/L	9–33 mcmol/L
*Amylase		
Serum	27–131 U/L	0.46–2.23 mckat/L
Urine	1–17 U/h	0.017-0.29 mckat/h
Amylase:creatinine clearance ratio	1–4%	0.01–0.04

*Test values dependent on laboratory methods used.

Tests	Conventional Units	SI Units
Androstenedione, serum		
Male	75–205 ng/dL	2.6–7.2 nmol/L
Female	85–275 ng/dL	3.0–9.6 nmol/L
Anion gap		
(Na – [Cl + HCO_3])	7–16 mEq/L	7–16 mmol/L
([Na + K] – [Cl + HCO_3])	10–20 mEq/L	10–20 mmol/L
α_1-Antitrypsin, serum	78–200 mg/dL	0.78–2.00 g/L
Apolipoprotein A-1		
Male	94–178 mg/dL	0.94–1.78 g/L
Female	101–199 mg/dL	1.01–1.99 g/L
Apolipoprotein B		
Male	63–133 mg/dL	0.63–1.33 g/L
Female	60–126 mg/dL	0.60–1.26 g/L
Arsenic		
Whole blood (Hep)	0.2–2.3 mcg/dL	0.03–0.31 mcmol/L
Chronic poisoning	10–50 mcg/dL	1.33–6.65 mcmol/L
Acute poisoning	60–930 mcg/dL	7.98–124 mcmol/L
Urine, 24 h	5–50 mcg/d	0.07–0.67 mcmol/d
Ascorbic acid, plasma (Ox, Hep, EDTA)	0.4–1.5 mg/dL	23–85 mcmol/L
*Aspartate aminotransferase (AST, SGOT), serum	10–59 U/L (37°C)	0.17–1.00 -2 to +3 kat/L (37°C)
Base excess, blood (Hep)	−2 to +3 mEq/L	−2 to +3 mmol/L
Bicarbonate, serum (venous)	22–29 mEq/L	22–29 mmol/L
†*Bilirubin		
Bilirubin, direct		
Birth–death	0.0–0.4 mg/dL	
Bilirubin, total		
Birth–1 day	1.0–6.0 mg/dL	
1–2 days	6.0–7.5 mg/dL	
2–5 days	4.0–13.5 mg/dL	
5 days–death	0.2–1.2 mg/dL	
Total bilirubin, neonatal		
Birth–1 day	1.0–6.0 mg/dL	
1–2 days	6.0–7.5 mg/dL	
2–5 days	4.0–13.5 mg/dL	
5 days–1 month	0.0–1.8 mg/dL	
1 month–death	0.0–1.8 mg/dL	
Bone marrow, differential cell count		
Adult		
Undifferentiated cells	0–1%	0–0.01
Myeloblast	0–2%	0–0.02
Promyelocyte	0-4%	0–0.04
Myelocytes		
Neutrophilic	5–20%	0.05–0.20
Eosinophilic	0–3%	0–0.03
Basophilic	0–1%	0–0.01
Metamyeolocytes and bands		
Neutrophilic	5–35%	0.05–0.35
Eosinophilic	0–5%	0–0.05
Basophilic	0–1%	0–0.01
Segmented neutrophils	5–15%	0.05–0.15
Pronormoblast	0–1.5%	0–0.015
Basophilic normoblast	0–5%	0–0.05
Polychromatophilic normoblast	5–30%	0.05–0.30
Orthochromatic normoblast	5–10%	0.05–0.10
Lymphocytes	10–20%	0.10–0.20
Plasma cells	0–2%	0–0.02
Monocytes	0–5%	0–0.05
CA-125, serum	<35 U/mL	<35 kU/L
CA 15-3, serum	<30 U/mL	<30 kU/L

*Test values dependent on laboratory methods used.
†Bilirubin data – Source: https://labs-sec.uhs-sa.com/clinical_ext/dols/soprefrange.asp

Tests	Conventional Units	SI Units
CA 19-9, serum	<37 U/mL	<37 kU/L
Cadmium, whole blood (Hep)	0.1–0.5 mcg/dL	8.9–44.5 nmol/L
Toxic	10–300 mcg/dL	0.89–26.70 mcmol/L
Cadmium, urine, 24 h	<15 mcg/d	<0.13 mcmol/d
Calcitonin, serum or plasma		
Male	≤100 pg/mL	≤100 ng/L
Female	≤30 pg/mL	≤30 ng/L
Calcium, serum	8.6–10.0 mg/dL (Slightly higher in children)	2.15–2.50 mmol/L (Slightly higher in children)
Calcium, ionized, serum	4.64–5.28 mg/dL	1.16–1.32 mmol/L
Calcium, urine		
Low calcium diet	50–150 mg/24 h	1.25–3.75 mmol/24 h
Usual diet; trough	100–300 mg/24 h	2.50–7.50 mmol/24 h
Carbamazepine, serum or plasma (Hep or EDTA), trough		
Therapeutic	4–12 mcg/mL	17–51 mcmol/L
Toxic	>15 mcg/mL	>63 mcmol/L
Carbon dioxide, total, serum/plasma (Hep)	22–28 mmol/L	22–28 mmol/L
Carbon dioxide (PCO_2), blood, arterial	Male 35–48 mmHg Female 32–45 mmHg	4.66–6.38 kPa 4.26–5.99 kPa
Carbon monoxide as carboxyhemoglobin (HbCO), whole blood (EDTA)		
Nonsmokers	0.5–1.5% total Hb	0.005–0.015 HbCO fraction
Smokers		
1–2 packs/d	4–5% total Hb	0.04–0.05 HbCO fraction
>2 packs/d	8–9% total Hb	0.08–0.09 HbCO fraction
Toxic	>20% total Hb	>0.20 HbCO fraction
Lethal	>50% total Hb	>0.5 HbCO fraction
Carotene, serum	10–85 mcg/dL	0.19–1.58 mcmol/L
Catecholamines, plasma (EDTA)		
Dopamine	< 30 pg/mL	<196 pmol/L
Epinephrine	<140 pg/mL	<764 pmol/L
Norepinephrine	<1700 pg/mL	<10,047 pmol/L
Catecholamines, urine		
Dopamine	65–400 mcg/24 h	425–2610 nmol/24 h
Epinephrine	0–20 mcg/24 h	0–109 nmol/24 h
Norepinephrine	15–80 mcg/24 h	89–473 nmol/24 h
CEA, serum		
Nonsmokers	<5.0 ng/mL	<5.0 mcg/L
*Cell counts, adult		
Erythrocytes		
Male	4.7–6.1 × 10^6/mcL	4.7–6.1 × 10^{12}/L
Female	4.2–5.4 × 10^6/mcL	4.2–5.4 × 10^{12}/L
Leukocytes		
Total	4.8–10.8 × 10^3/mcL	4.8–10.8 × 10^6/L
Differential	Percentage Absolute	Absolute (SI)
Myelocytes	0 0/mcL	0/L
Neutrophils		
Band	3–5 150–400/mcL	150–400 × 10^6/L
Segmented	54–62 3000–5800/mcL	3000–5800 × 10^6/L
Lymphocytes	20.5–51.1 1.2–3.4 x 10^3/mcL	1.2–3.4 × 10^9/L
Monocytes	1.7–9.3 0.11–0.59 x 10^3/mcL	0.11–0.59 × 10^9/L
Granulocytes	42.2–75.2 1.4–6.5 x 10^3/mcL	1.4–6.5 × 10^9/L
Eosinophils	0–0.7 x 10^3/mcL	0–0.7 × 10^9/L
Basophils	0–0.2 x 10^3/mcL	0–0.2 × 10^9/L
Platelets	130–400 x 10^3/mcL	130–400 × 10^9/L

(continued)

*Test values dependent on laboratory methods used.

Tests	Conventional Units	SI Units
**Cell counts, adult (continued from previous page)*		
Reticulocytes	0.5–1.5% RBCs 24,000–84,000/mcL	0.005–0.015 of RBCs 24–84 $\times$ 10^9/L
Cells, CSF	0–10 lymphocytes/mm^3 0 RBC/mm^3	0-10 lymphocytes/mm^3 0 RBC/mm^3
Ceruloplasmin, serum	20–60 mg/dL	0.2–0.6 g/L
Chloramphenicol, serum or plasma (Hep or EDTA); trough		
Therapeutic	10–25 mcg/mL	31–77 mcmol/L
Toxic	>25 mcg/mL	>77 mcmol/L
Chloride		
Serum or plasma (Hep)	98–107 mmol/L	98–107 mmol/L
Sweat		
Normal	5–35 mmol/L	5–35 mmol/L
Cystic fibrosis	60–200 mmol/L	60–200 mmol/L
Urine, 24 h (vary greatly with Cl intake)		
Infant	2–10 mmol/24 h	2–10 mmol/24h
Child	15–40 mmol/24 h	15–40 mmol/24h
Adult	110–250 mmol/24 h	110–250 mmol/24 h
CSF	118–132 mmol/L (20 mmol/L higher than serum)	118–132 mmol/L (20 mmol/L higher than serum)
Cholesterol, serum		
Adult desirable	<200 mg/dL	<5.2 mmol/L
borderline	200–239 mg/dL	5.2–6.2 mmol/L
high-risk	≥240 mg/dL	≥6.2 mmol/L
**Cholinesterase, serum*	4.9–11.9 U/mL	4.9–11.9 kU/L
Dibucaine inhibition	79–84%	0.79–0.84
Fluoride inhibition	58–64%	0.58–0.64
**Chorionic gonadotropin, intact*		
Serum or plasma (EDTA)		
Male and nonpregnant female	<5.0 mIU/mL	<5.0 IU/L
Pregnant female	Varies with gestational age	
Urine, qualitative		
Male and nonpregnant female	Negative	Negative
Pregnant female	Positive	Positive
Clonazepam, serum or plasma (Hep or EDTA); trough		
Therapeutic	15–60 ng/mL	48–190 nmol/L
Toxic	>80 ng/mL	>254 nmol/L
Coagulation tests		
Antithrombin III (synthetic substrate)	80–120% of normal	0.8–1.2 of normal
Bleeding time (Duke)	0–6 min	0–6 min
Bleeding time (Ivy)	1–6 min	1–6 min
Bleeding time (template)	2.3–9.5 min	2.3–9.5 min
Clot retraction, qualitative	50–100% in 2 h	0.5–1.0/2 h
Coagulation time (Lee-White)	5–15 min (glass tubes) 19–60 min (siliconized tubes)	5–15 min (glass tubes) 19–60 min (siliconized tubes)
Cold hemolysin test (Donath-Landsteiner)	No hemolysis	No hemolysis
Complement components		
Total hemolytic complement activity, plasma (EDTA)	75–160 U/mL	75–160 kU/L
(continued)		

*Test values dependent on laboratory methods used.

Tests	Conventional Units	SI Units
Complement components *(continued from previous page)*		
Total complement decay rate	10–20%	Fraction decay rate: 0.10–0.20
(functional), plasma (EDTA)	Deficiency: >50%	>0.50
C1q, serum	14.9–22.1 mg/dL	149–221 mg/L
C1r, serum	2.5–10.0 mg/dL	25–100 mg/L
C1s(C1 esterase), serum	5.0–10.0 mg/dL	50–100 mg/L
C2, serum	1.6–3.6 mg/dL	16–36 mg/L
C3, serum	90–180 mg/dL	0.9–1.8 g/L
C4, serum	10–40 mg/dL	0.1-0.4 g/L
C5, serum	5.5–11.3 mg/dL	55–113 mg/L
C6, serum	17.9–23.9 mg/dL	179–239 mg/L
C7, serum	2.7–7.4 mg/dL	27–74 mg/L
C8, serum	4.9–10.6 mg/dL	49–106 mg/L
C9, serum	3.3–9.5 mg/dL	33–95 mg/L
Coombs test		
Direct	Negative	Negative
Indirect	Negative	Negative
Copper		
Serum		
Male	70–140 mcg/dL	11–22 mcmol/L
Female	80–155 mcg/dL	13–24 mcmol/L
Urine	3–35 mcg/24 h	0.05–0.55 mcmol/24 h
Corpuscular values of erythrocytes (values are for adults; in children, values vary with age)		
Mean corpuscular hemoglobin (MCH)	27–31 pg	0.42–0.48 fmol
Mean corpuscular hemoglobin concentration (MCHC)	33–37 g/dL	330–370 g/L
Mean corpuscular volume (MCV)	Male 80–94 mcm^3	80–94 fL
	Female 81–99 mcm^3	81–99 fL
Cortisol, serum		
Plasma (Hep, EDTA, Ox)		
8 AM	5–23 mcg/dL	138–635 nmol/L
4 PM	3–16 mcg/dL	83–441 nmol/L
10 PM	<50% of 8 AM value	<0.5 of 8 AM value
Free, urine	<50 mcg/24 h	<138 mmol/24 h
*†Creatine kinase (CK), serum		
Male	15–105 U/L (30°C)	0.26–1.79 mckat/L (30°C)
Female	10–80 U/L (30°C)	0.17–1.36 mckat/L (30°C)
Note: Strenuous exercise or intramuscular injections may elevate transient CK levels.		
*Creatine kinase MB isoenzyme, serum	0–7 ng/mL	0–7 mcg/L
*Creatinine		
Serum or plasma, adult		
Male	0.7–1.3 mg/dL	62–115 mcmol/L
Female	0.6–1.1 mg/dL	53–97 mcmol/L
Urine		
Male	14–26 mg/kg body weight/24 h	124–230 mcmol/kg body weight/24 h
Female	11–20 mg/kg body weight/24 h	97–177 mcmol/kg body weight/24 h
*Creatinine clearance, serum or plasma and urine		
Male	94–140 mL/min/1.73 m^2	0.91–1.35 mL/s/m^2
Female	72–110 mL/min/1.73 m^2	0.69–1.06 mL/s/m^2
Cryoglobulins, serum	0	0

**Test values dependent on laboratory methods used.
†Test values dependent on patient's race.

Tests	Conventional Units	SI Units
Cyanide		
Serum		
Nonsmokers	0.004 mg/L	0.15 mcmol/L
Smokers	0.006 mg/L	0.23 mcmol/L
Nitroprusside therapy	0.01–0.06 mg/L	0.38–2.30 mcmol/L
Toxic	>0.1 mg/L	>3.84 mcmol/L
Whole blood (Ox)		
Nonsmokers	0.016 mg/L	0.61 mcmol/L
Smokers	0.041 mg/L	1.57 mcmol/L
Nitroprusside therapy	0.05–0.5 mg/L	1.92–19.20 mcmol/L
Toxic	>1 mg/L	>38.40 mcmol/L
Cyclic AMP		
Plasma (EDTA)		
Male	4.6–8.6 ng/mL	14–26 nmol/L
Female	4.3–7.6 ng/mL	13–23 nmol/L
Urine, 24 h	0.3–3.6 mg/d or 0.29–2.1 mg/g creatinine	1.0–10.9 mcmol/d or 100–723 mcmol/mol creatinine
Cystine or cysteine, urine, qualitative	Negative	Negative
*C-Peptide, serum	0.78–1.89 ng/mL	0.26–0.62 nmol/L
C-Reactive protein, serum	<0.5 mg/dL	<5 mg/L
*≠Cyclosporine, whole blood		
Therapeutic, trough	100–200 ng/mL	83–166 nmol/L
Dehydroepiandrostereone (DHEA), serum		
Male	180–1250 ng/dL	6.2–43.3 nmol/L
Female	130–980 ng/dL	4.5–34.0 nmol/L
Dehydroepiandrosterone sulfate (DHEAS) serum or plasma (Hep, EDTA)		
Male	59–452 mcg/mL	1.6–12.2 mcmol/L
Female		
Premenopausal	12–379 mcg/mL	0.8–10.2 mcmol/L
Postmenopausal	30–260 mcg/mL	0.8–7.1 mcmol/L
Desipramine, serum or plasma (Hep or EDTA); trough (12 h after dose)		
Therapeutic	75–300 ng/mL	281–1125 nmol/L
Toxic	>400 ng/mL	>1500 nmol/L
Diazepam, serum or plasma (Hep or EDTA); trough		
Therapeutic	100–1000 ng/mL	0.35–3.51 mcmol/L
Toxic	>5000 ng/mL	>17.55 mcmol/L
Digitoxin, serum or plasma (Hep or EDTA); 7.8 h after dose		
Therapeutic	20–35 ng/mL	26–46 nmol/L
Toxic	>45 ng/mL	>59 nmol/L
Digoxin, serum or plasma (Hep or EDTA); ≥12 h after dose		
Therapeutic		
CHF	0.8–1.5 ng/mL	1.0–1.9 nmol/L
Arrhythmias	1.5–2.0 ng/mL	1.9–2.6 nmol/L
Toxic		
Adult	>2.5 ng/mL	>3.2 nmol/L
Child	>3.0 ng/mL	>3.8 nmol/L

*Test values dependent on laboratory methods used.
≠Actual therapeutic range should be adjusted for individual patient.

Tests	Conventional Units	SI Units
Disopyramide, serum or plasma (Hep or EDTA); trough		
Therapeutic arrhythmias		
Atrial	2.8–3.2 mcg/mL	8.3–9.4 mcmol/L
Ventricular	3.3–7.5 mcg/mL	9.7–22 mcmol/L
Toxic	>7 mcg/mL	>20.7 mcmol/L
Doxepin, serum or plasma (Hep or EDTA); trough (≥12 h after dose)		
Therapeutic	150–250 ng/mL	537–895 nmol/L
Toxic	>500 ng/mL	>1790 nmol/L
*Estradiol, serum		
Adult		
Male	10–50 pg/mL	37-184 pmol/L
Female	Varies with menstrual cycle	
Ethanol (alcohol), whole blood (Ox) or serum		
Depression of CNS	>100 mg/dL	>21.7 mmol/L
Fatalities reported	>400 mg/dL	>86.8 mmol/L
Ethosuximide, serum or plasma (Hep or EDTA); trough		
Therapeutic	40–100 mcg/mL	283–708 mcmol/L
Toxic	>150 mcg/mL	>1062 mcmol/L
Euglobin lysis	No lysis in 2 h	No lysis in 2 h
α-Fetoprotein (AFP), serum	<15 ng/mL	<15 mcg/L
††Fat, fecal, F, 72 h		
Infant, breast-fed	<1 g/d	
Pediatrics (0–6 y)	<2 g/d	
Adult	<7 g/d	
Adult (fat-free diet)	<4 g/d	
§Fatty acids, total, serum	190–240 mg/dL	7–15 mmol/L
Nonesterified, serum	8–25 mg/dL	0.28–0.89 mmol/L
Ferritin, serum		
Male	20–150 ng/mL	20–250 mcg/L
Female	10–120 ng/mL	10–120 mcg/L
Ferritin values of <20 ng/mL (20 mcg/L) have been reported to be generally associated with depleted iron stores.		
Fibrin degradation products	<10 mcg/mL	<10 mg/L
*Fibrinogen, plasma (NaCit)	200–400 mg/dL	2–4 g/L
Fluoride		
Plasma (Hep)	0.01–0.2 mcg/mL	0.5–10.5 mcmol/L
Urine	0.2–3.2 mcg/mL	10.5–168 mcmol/L
Urine, occupational exposure	<8 mcg/mL	<421 mcmol/L
*Folate, Serum RBCs	3–20 ng/mL	7–45 nmol/L
Erythrocytes	140–628 ng/mL RBC	317–1422 nmol/L RBC
*Follicle-stimulating hormone (FSH), serum and plasma (Hep)		
Male	1.4–15.4 mIU/mL	1.4–15.4 IU/L
Female		
Follicular phase	1–10 mIU/mL	1–10 IU/L

(continued)

*Test values dependent on laboratory methods used.

††Reference values vary from laboratory to laboratory, but are generally found within the range of 5–7 g/d. It should be noted that children, especially infants, cannot ingest the 100 g/d of fat that is suggested for the test. Therefore, a fat retention coefficient is determined by measuring the difference between ingested fat and fecal fat, and expressing that difference as a percentage. The figure, called the fat retention coefficient, is 95% or greater in healthy children and adults. A low value indicates steatorrhea.
http://www.labcorp.com/datasets/labcorp/html/chapter/mono/sc008000.htm

§"Fatty acids" include a mixture of different aliphatic acids of varying molecular weight; a mean molecular weight of 284 daltons has been assumed.

Tests	Conventional Units	SI Units
Follicle-stimulating hormone *(continued from previous page)*		
Mid-cycle	6–17 mIU/mL	6–17 IU/L
Luteal phase	1–9 mIU/mL	1–9 IU/L
Postmenopausal	19–100 mIU/mL	19–100 IU/L
*Free thyroxine index (FTI), serum	4.2–13	4.2–13
Gastrin, serum	<100 pg/mL	<100 ng/L
Gentamicin, serum or plasma (EDTA)		
Therapeutic		
Peak		
Less severe infection	5–8 mcg/mL	10.4–16.7 mcmol
Severe infection	8–10 mcg/mL	16.7–20.9 mcmol/L
Trough		
Less severe infection	<1 mcg/mL	<2.1 mcmol/L
Moderate infection	<2 mcg/mL	<4.2 mcmol/L
Severe infection	<2–4 mcg/mL	<4.2–8.4 mcmol/L
Toxic		
Peak	>10–12 mcg/mL	>21–25 mcmol/L
Trough	>2–4 mcg/mL	>4.2–8.4 mcmol/L
Glucose (fasting)		
Blood	65–95 mg/dL	3.5–5.3 mmol/L
Plasma or serum	74–106 mg/dL	4.1–5.9 mmol/L
Glucose, 2 h postprandial, serum	<120 mg/dL	<6.7 mmol/L
Glucose, urine		
Quantitative	<500 mg/24 h	<2.8 mmol/24 h
Qualitative	Negative	Negative
Glucose, CSF	40–70 mg/dL	2.2–3.9 mmol/L
*Glucose-6-phosphate dehydrogenase in erythrocytes, whole blood (ACD, EDTA, or Hep)	12.1 ± 2.1 U/g Hb (SD) 351 ± 60.6 U/10^{12} RBC 4.11 ± 0.71 U/mL RBC	0.78 ± 0.13 mU/mol Hb 0.35 ± 0.06 nU/RBC 4.11 ± 0.71 kU/L RBC
γ-Glutamyltransfersae serum		
Males	2–30 U/L (37°C)	0.03–0.51 mckat/L (37°C)
Females	1–24 U/L (37°C)	0.02–0.41 mckat/L (37°C)
Glutethimide, serum		
Therapeutic	2–6 mcg/mL	9–28 mcmol/L
Toxic	>5 mcg/mL	>23 mcmol/L
Glycated hemoglobin (Hemoglobin A1c), whole blood (EDTA)	4.2% – 5.9%	0.042–0.059
Growth hormone, serum		
Male	<5 ng/mL	<5 mcg/L
Female	<10 ng/mL	<10 mcg/L
Haptoglobin, serum	30–200 mg/dL	0.3–2.0 g/L
†HDL-lipid panel		
Cholesterol, HDL	>40 mg/dL	
Cholesterol, LDL (calculated)		
optimal	<100 mg/dL	
near optimal	100–129 mg/dL	
borderline high	130–159 mg/dL	
high	>160 mg/dL	
Cholesterol, total		
0–1 year	50–120 mg/dL	
1–2 years	70–190 mg/dL	
2–16 years	120–220 mg/dL	
>16 years	0–199 mg/dL	
desirable	<200 mg/dL	

(continued)

*Test values dependent on laboratory methods used.

Tests	Conventional Units	SI Units
HDL-Lipid Panel *(continued)*		
borderline	200–239 mg/dL	
high	>240 mg/dL	
¶Tryglycerides		
desirable	<150 mg/dL	
borderline high	150–199 mg/dL	
high	>200 mg/dL	
Hematocrit		
Males	42–52%	0.42–0.52
Females	37–47%	0.37–0.47
Newborn	53–65%	0.53–0.65
Children (varies with age)	30–43%	0.30–0.43
Hemoglobin (Hb)		
Males	14.0–18.0 g/dL	2.17–2.79 mmol/L
Females	12.0–16.0 g/dL	1.86–2.48 mmol/L
Newborn	17.0–23.0 g/dL	2.64–3.57 mmol/L
Children (varies with age)	11.2–16.5 g/dL	1.74–2.56 mmol/L
Hemoglobin, fetal	≥1 y old: <2% of total Hb	≥1 y old: <0.02% of total Hb
Hemoglobin, plasma	<3 mg/dL	<0.47 mcmol/L
Hemoglobin and myoglobin, urine, qualitative	Negative	Negative
Hemoglobin electrophoresis, whole blood (EDTA, Cit, or Hep)		
HbA	>95%	>0.95 Hb fraction
HbA_2	1.5–3.7%	0.015–0.037 Hb fraction
HbF	<2%	<0.02 Hb fraction
Homogentisic acid, urine, qualitative	Negative	Negative
β-Hydroxybutyric acid, serum, plasma	0.21–2.81 mg/dL	20–270 mcmol/L
17-Hydroxycorticosteroids		
Urine		
Males	3–10 mg/24 h	8.3–27.6 mcmol/24 h (as cortisol)
Females	2–8 mg/24 h	5.5–22 mcmol/24 h (as cortisol)
5-Hydroxyindoleacetic acid, urine		
Qualitative	Negative	Negative
Quantitative	2–7 mg/24 h	10.4–36.6 mcmol/24 h
Imipramine, serum or plasma (Hep or EDTA); trough (≥12 h after dose)		
Therapeutic	150–250 ng/mL	536–893 nmol/L
Toxic	>500 ng/mL	>1785 nmol/L
Immunoglobulins, serum		
IgG	700–1600 mg/dL	7–16 g/L
IgA	70–400 mg/dL	0.7–4.0 g/L
IgM	40–230 mg/dL	0.4–2.3 g/L
IgD	0–8 mg/dL	0–80 mg/L
IgE	3–423 IU/mL	3–423 kIU/L
Immunoglobulin G (IgC), CSF	0.5–6.1 mg/dL	0.5–6.1 g/L
Insulin, plasma (fasting)	2–25 mcU/mL	13–174 pmol/L
*Iron, serum		
Males	65–175 mcg/dL	11.6–31.3 mcmol/L
Females	50–170 mcg/dL	9.0–30.4 mcmol/L
Iron binding capacity, serum, total (TIBC)	250–425 mcg/dL	44.8–71.6 mcmol/L

*Test values dependent on laboratory methods used.

¶ If the triglyceride value is >400 mg/dL, the LDL calculation is invalid.

http://webserver01.bjc.org/slch/pro/Professional.htm?http://webserver01.bjc.org/labtestguide/Lab%20Test%20Guidebook/slchlabsiteoneline.htm

Tests	Conventional Units	SI Units
Iron saturation, serum		
Male	20–50%	0.2–0.5
Female	15–50%	0.15–0.5
17-Ketosteroids, urine		
Males	10–25 mg/24 h	38–87 mcmol/24 h
Females	6–14 mg/24 h (decreases with age)	21–52 mcmol/24 h (decreases with age)
L-Lactate		
Plasma (NaF)		
Venous	4.5–19.8 mg/dL	0.5–2.2 mmol/L
Arterial	4.5–14.4 mg/dL	0.5–1.6 mmol/L
Whole blood (Hep), at bed rest		
Venous	8.1–15.3 mg/dL	0.9–1.7 mmol/L
Arterial	<11.3 mg/dL	<1.3 mmol/L
Urine, 24 h	496–1982 mg/d	5.5–22 mmol/d
CSF	10–22 mg/dL	1.1–2.4 mmol/L
*Lactate dehydrogenase		
Total (L→P), 37°C, serum		
Newborn	290–775 U/L	4.9–13.2 mckat/L
Neonate	545–2000 U/L	9.3–34 mckat/L
Infant	180–430 U/L	3.1–7.3 mckat/L
Child	110–295 U/L	1.9–5 mckat/L
Adult	100–190 U/L	1.7–3.2 mckat/L
>60 y	110–210 U/L	1.9–3.6 mckat/L
*Isoenzymes, serum by agarose gel electrophoresis		
Fraction 1	14–26% of total	0.14–0.26 fraction of total
Fraction 2	29–39% of total	0.29–0.39 fraction of total
Fraction 3	20–26% of total	0.20–0.26 fraction of total
Fraction 4	8–16% of total	0.08–0.16 fraction of total
Fraction 5	6–16% of total	0.06–0.16 fraction of total
*Lactate dehydrogenase, CSF	10% of serum value	0.10 fraction of serum value
LDL-cholesterol (LDL-C), serum or plasma (EDTA)		
Adult desirable	<130 mg/dL	<.2 mmol/L
borderline	130–159 mg/dL	3.37–4.12 mmol/L
high risk	≥160 mg/dL	≥4.13 mmol/L
Lead,		
Whole blood (Hep)	<25 mcg/dL	<0.48 mcmol/L
Urine, 24 h	<80 mcg/d	<0.39 mcmol/d
Lecithin-sphingomyelin (L:S) ratio, amniotic fluid	2.0–5.0 indicates probable fetal lung maturity; >3.5 in diabetic patients	2.0-5.0 indicates probable fetal lung maturity; >3.5 in diabetic patients
Lidocaine, serum or plasma (Hep or EDTA); 45 min after bolus dose		
Therapeutic	1.5–6.0 mcg/mL	6.4–26 mcmol/L
Toxic		
CNS, cardiovascular depression	6–8 mcg/mL	26–34.2 mcmol/L
Seizures, obtundation, decreased cardiac output	>8 mcg/mL	>34.2 mcmol/L
*Lipase, serum	23–300 U/L (37°C)	0.39–5.1 mckat/L (37°C)
Lithium, serum or plasma (Hep or EDTA); 12 h after last dose		
Therapeutic	0.6–1.2 mEq/L	0.6–1.2 mmol/L
Toxic	>2 mEq/L	>2 mmol/L
Lorazepam, serum or plasma (Hep or EDTA), therapeutic	50–240 ng/mL	156–746 nmol/L

*Test values dependent on laboratory methods used.

Tests	Conventional Units	SI Units
*Luteinizing hormone (LH), serum or plasma (Hep)		
Male	1.24–7.8 mIU/mL	1.24–7.8 IU/L
Female		
Follicular phase	1.68–15.0 mIU/mL	1.68–15.0 IU/L
Mid-cycle peak	21.9–56.6 mIU/mL	21.9–56.6 IU/L
Luteal phase	0.61–16.3 mIU/mL	0.61–16.3 IU/L
Postmenopausal	14.2–52.5 mIU/mL	14.2–52.3 IU/L
Magnesium		
Serum	1.3–2.1 mEq/L 1.6–2.6 mg/dL	0.65–1.07 mmol/L 16–26 mg/L
Urine	6.0–10.0 mEq/24 h	3.0–5.0 mmol/24 h
Mercury		
Whole blood (EDTA)	0.6–59 mcg/L	<0.29 mcmol/L
Urine, 24 h	<20 mcg/d	<0.1 mcmol/d
Toxic	>150 mcg/d	>0.75 mcmol/d
Metanephrines, total, urine	0.1–1.6 mg/24 h	0.5–8.1 mcmol/24 h
Methemoglobin (hemoglobin), whole blood (EDTA, Hep or ACD)	0.06–0.24 g/dL or 0.78 ± 0.37% of total Hb (SD)	9.3–37.2 mcmol/L or mass fraction of total Hb: 0.008 ± 0.0037 (SD)
Methotrexate, serum or plasma (Hep or EDTA)		
Therapeutic	Variable	Variable
Toxic		
1–2 wk after low dose therapy	≥0.02 mcmol/L	≥0.02 mcmol/L
post IV infusion 24 h	≥5 mcmol/L	≥5 mcmol/L
48 h	≥0.5 mcmol/L	≥0.5 mcmol/L
72 h	≥0.05 mcmol/L	≥0.05 mcmol/L
Myelin basic protein, CSF	<2.5 ng/mL	<2.5 mcg/L
Myoglobin, serum	<85 ng/mL	<85 mcg/L
Nortriptyline, serum or plasma (Hep or EDTA); trough (≥12 h after dose)		
Therapeutic	50–150 ng/mL	190–570 nmol/L
Toxic	>500 ng/mL	>1900 nmol/L
*5′-Nucleotidase, serum	2–17 U/L	0.034–0.29 mckat/L
N-Acetylprocainamide, serum or plasma (Hep or EDTA); trough		
Therapeutic	5–30 mcg/mL	18–108 mcmol/L
Toxic	>40 mcg/mL	>144 mcmol/L
Occult blood, feces, random	Negative (<2 mL blood/150 g stool/d)	Negative (<13.3 mL blood/kg stool/d)
Qualitative, urine, random	Negative	Negative
Osmolality		
Serum	275–295 mOsm/kg serum water	275–295 mmol/kg serum water
Urine	50–1200 mOsm/kg water	50–1200 mmol/kg water
Ratio, urine:serum	1.0–3.0 3.0–4.7 after 12 h fluid restriction	1.0–3.0 3.0–4.7 after 12 h fluid restriction
Osmotic fragility of erythrocytes	Begins in 0.45–0.39% NaCl Complete in 0.33–0.30% NaCl	Begins in 77–67 mmol/L NaCl Complete in 56–51 mmol/L NaCl
Oxazepam, serum or plasma (Hep or EDTA), therapeutic	0.2–1.4 mcg/mL	0.70–4.9 mcmol/L

*Test values dependent on laboratory methods used.

Tests	Conventional Units	SI Units
Oxygen, blood		
Capacity	16–24 vol% (varies with hemoglobin)	7.14–10.7 mmol/L (varies with hemoglobin)
Content		
Arterial	15–23 vol%	6.69–10.3 mmol/L
Venous	10–16 vol%	4.46–7.14 mmol/L
Saturation		
Arterial and capillary	95–98% of capacity	0.95–0.98 of capacity
Venous	60–85% of capacity	0.60–0.85 of capacity
Tension		
pO_2 arterial and capillary	83–108 mmHg	11.1–14.4 kPa
Venous	35–45 mmHg	4.6–6.0 kPa
P50, blood	25–29 mmHg (adjusted to pH 7.4)	3.33–3.86 kPa
Partial thromboplastin time activated (APTT)	<35 sec	<35 sec
Pentobarbital, serum or plasma (Hep or EDTA); trough		
Therapeutic		
Hypnotic	1–5 mcg/mL	4–22 mcmol/L
Therapeutic coma	20–50 mcg/mL	88–221 mcmol/L
Toxic	>10 mcg/mL	>44 mcmol/L
pH		
Blood, arterial	7.35–7.45	7.35–7.45
Urine	4.6–8.0 (depends on diet)	Same
Phenacetin, plasma (EDTA)		
Therapeutic	1–30 mcg/mL	6–167 mcmol/L
Toxic	50–250 mcg/mL	279–1395 mcmol/L
Phenobarbital, serum or plasma (Hep or EDTA); trough		
Therapeutic	15–40 mcg/mL	65–172 mcmol/L
Toxic		
Slowness, ataxia, nystagmus	35–80 mcg/mL	151–345 mcmol/L
Coma with reflexes	65–117 mcg/mL	280–504 mcmol/L
Coma without reflexes	>100 mcg/mL	>430 mcmol/L
Phenolsulfonphthalein (PSP) excretion, urine	28–51% in 15 min 13–24% in 30 min 9–17% in 60 min 3–10% in 2 h (After injection of 1 mL PSP intravenously)	0.28–0.51 in 15 min 0.13–0.24 in 30 min 0.09–0.17 in 60 min 0.03–0.10 in 2 h (After injection of 1 mL PSP intravenously)
Phenylalanine, serum	0.8–1.8 mg/dL	48–109 mcmol/L
Phenytoin, serum or plasma (Hep or EDTA); trough		
Therapeutic	10–20 mcg/mL	40–79 mcmol/L
Toxic	>20 mcg/mL	>79 mcmol/L
*Phosphatase, acid, prostatic, serum radioimmunoassay	<3.0 ng/mL	<3.0 mcg/L
*Phosphatase, alkaline, total, serum	38–126 U/L (37°C)	0.65–2.14 mckat/L
Phosphate, inorganic, serum		
Adults	2.7–4.5 mg/dL	0.87–1.45 mmol/L
Children	4.5–5.5 mg/dL	1.45–1.78 mmol/L
Phosphatidylglycerol, amniotic fluid		
Fetal lung immaturity	absent	absent
Fetal lung maturity	present	present
Phospholipids, serum	125–275 mg/dL	1.25–2.75 g/L
Phosphorus, urine	0.4–1.3 g/24 h	12.9–42 mmol/24 h
Porphobilinogen, urine		
Qualitative	Negative	Negative
Quantitative	<2.0 mg/24 h	<9 mcmol/24 h

*Test values dependent on laboratory methods used.

Tests	Conventional Units	SI Units
Porphyrins, urine		
Coproporphyrin	34–230 mcg/24 h	52–351 nmol/24 h
Uroporphyrin	27–52 mcg/24 h	32–63 nmol/24 h
Potassium, plasma (Hep)		
Males	3.5–4.5 mEq/L	3.5–4.5 mmol/L
Females	3.4–4.4 mEq/L	3.4–4.4 mmol/L
Potassium		
Serum		
Premature		
Cord	5.0–10.2 mEq/L	5.0–10.2 mmol/L
48 h	3.0–6.0 mEq/L	3.0–6.0 mmol/L
Newborn, cord	5.6–12.0 mEq/L	5.6–12.0 mmol/L
Newborn	3.7–5.9 mEq/L	3.7–5.9 mmol/L
Infant	4.1–5.3 mEq/L	4.1–5.3 mmol/L
Child	3.4–4.7 mEq/L	3.4–4.7 mmol/L
Adult	3.5–5.1 mEq/L	3.5–5.1 mmol/L
Urine, 24 h	25–125 mEq/d, varies with diet	25–125 mmol/d; varies with diet
CSF	70% of plasma level or 2.5–3.2 mEq/L; rises with plasma hyperosmolality	0.70 of plasma level or 2.5–3.2 mmol/L; rises with plasma hyperosmolality
Prealbumin (transthyretin), serum	10–40 mg/dL	100–400 mg/L
Primidone, serum or plasma (Hep or EDTA); trough		
Therapeutic	5–12 mcg/mL	23–55 mcmol/L
Toxic	>15 mcg/mL	>69 mcmol/L
Procainamide, serum or plasma (Hep or EDTA); trough		
Therapeutic	4–10 mcg/mL	17–42 mcmol/L
Toxic (also consider effect of metabolite, i.e., NAPA)	>10–12 mcg/mL	>42–51 mcmol/L
*Progesterone, serum		
Adult		
Male	13–97 ng/dL	0.4–3.1 nmol/L
Female		
Follicular phase	15–70 ng/dL	0.5–2.2 nmol/L
Luteal phase	200–2500 ng/dL	6.4–79.5 nmol/L
Pregnancy	Varies with gestational week	
*Prolactin, serum		
Males	2.5–15.0 ng/mL	2.5–15.0 mcg/L
Females	2.5–19.0 ng/mL	2.5–19.0 mcg/L
Propoxyphene, plasma (EDTA)		
Therapeutic	0.1–0.4 mcg/mL	0.3–1.2 mcmol/L
Toxic	>0.5 mcg/mL	>1.5 mcmol/L
Propranolol, serum or plasma (Hep or EDTA); trough		
Therapeutic	50–100 ng/mL	193–386 nmol/L
*Prostate-specific antigen (PSA), serum		
Male	<4.0 ng/mL	<4.0 mcg/L
*Protein, serum		
Total	6.4–8.3 g/dL	64–83 g/L
Albumin	3.9–5.1 g/dL	39–51 g/L
Globulin		
α_1	0.2–0.4 g/dL	2–4 g/L
α_2	0.4–0.8 g/dL	4–8 g/L
β	0.5–1.0 g/dL	5–10 g/L
γ	0.6–1.3 g/dL	6–13 g/L
Urine		
Qualitative	Negative	Negative
Quantitative	50–80 mg/24 h (at rest)	Same
CSF, total	8–32 mg/dL	80–320 mg/dL

*Test values dependent on laboratory methods used.

Tests	Conventional Units	SI Units
Prothrombin consumption	>20 sec	>20 sec
Prothrombin time-international normalized ratio (see NOTES below)		
INR: birth–6 mo	1.0–1.6	
INR: 6 mo–adult	0.9–1.2	
Protoporphyrin, total, WB	<60 mcg/dL	<600 mcg/L
Pyruvate, blood	0.3–0.9 mg/dL	34–103 mcmol/L
Quinidine, serum or plasma (Hep or EDTA); trough		
Therapeutic	2–5 mcg/mL	6–15 mcmol/L
Toxic	>6 mcg/mL	>18 mcmol/L
Salicylates, serum or plasma (Hep or EDTA); trough		
Therapeutic	150–300 mcg/mL	1.09–2.17 mmol/L
Toxic	>500 mcg/mL	>3.62 mmol/L
#Sedimentation rate, erythrocyte		
Westergren		
Male: 0–50 y	0–15 mm/h	
Male: >50 y	0–20 mm/h	
Female: 0–50 y	0–20 mm/h	
Female: >50 y	0–30 mm/h	
Wintrobe		
Males	<10 mm/h	
Females	<20 mm/h	
Critical value	>75 mm/h	
Sodium		
Serum or plasma (Hep)		
Premature		
Cord	116–140 mEq/L	116–140 mmol/L
48 h	128–148 mEq/L	128–148 mmol/L
Newborn, cord	126–166 mEq/L	126–166 mmol/L
Newborn	133–146 mEq/L	133–146 mmol/L
Infant	139–146 mEq/L	139–146 mmol/L
Child	138–145 mEq/L	138–145 mmol/L
Adult	136–145 mEq/L	136–145 mmol/L
Urine, 24 h	40–220 mEq/d (diet dependent)	40–220 mmol/d (diet dependent)
Sweat		
Normal	10–40 mEq/L	10–40 mmol/L
Cystic fibrosis	70–190 mEq/L	70–190 mmol/L
Specific gravity, urine	1.002–1.030	1.002–1.030
*Testosterone, serum		
Male	280–1100 ng/dL	0.52–38.17 nmol/L
Female	15–70 ng/dL	0.52–2.43 nmol/L
Pregnancy	3–4 × normal	3–4 x normal
Postmenopausal	8–35 ng/dL	0.28–1.22 nmol/L

NOTE: INR=[(Patient PT)/(Normal PT)] *ISI where ISI is the international sensitivity index, a value provided by the reagent manufacturer.
NOTE: …target therapeutic range (international normalized ratio) of 2.0–3.0. http://pediatrics.aappublications.org/cgi/content/full/112/5/e386
NOTE: The American College of Chest Physicians has recommended a therapeutic INR range for adults of 2.0–3.0, except in patients with mechanical cardiac valves who should have an INR of 2.5–3.5. 1…target INR range of 2.6–3.8 for children with heart disease and a slightly lower range of 2.1–3.3 for treating children with established venous thrombosis. Clinicians at Toronto's Hospital for Sick Children used an INR range of 2.0–3.0 initially but later found that a lower target of 1.3–1.8 was as effective and resulted in no bleeding complications. http://www.healthsystem.virginia.edu/internet/pediatrics/pharma-news/jan95.pdf
NOTE: The recommended therapeutic target for the treatment and prevention of venous thromboembolisms and pulmonary embolisms in an INR of 2.5 with a range between 2.0–3.0, and children with mechanical prosthetic heart valves have a recommended therapeutic INR range of 3.0 INR range between 2.5–3.5. Evaluate at that time. http://www.warfarinfo.com/pediatrics.htm

*Test values dependent on laboratory methods used.
http://www.labcorp.com/datasets/labcorp/html/chapter/mono/he005000.htm; http://www.utmb.edu/lsg/LabSurvivalGuide/hem/Sedimentation_Rate.htm

Tests	Conventional Units	SI Units
Theophylline, serum or plasma (Hep or EDTA)		
Therapeutic		
Bronchodilator	8–20 mcg/mL	44–111 mcmol/L
Prem. apnea	6–13 mcg/mL	33–72 mcmol/L
Toxic	>20 mcg/mL	>110 mcmol/L
Thiocyanate		
Serum or plasma (EDTA)		
Nonsmoker	1–4 mcg/mL	17–69 mcmol/L
Smoker	3–12 mcg/mL	52–206 mcmol/L
Therapeutic after nitroprusside infusion	6–29 mcg/mL	103–499 mcmol/L
Urine		
Nonsmoker	1–4 mg/d	17–69 mcmol/d
Smoker	7–17 mg/d	120–292 mcmol/d
Thiopental, serum or plasma (Hep or EDTA); trough		
Hypnotic	1.0–5.0 mcg/mL	4.1–20.7 mcmol/L
Coma	30–100 mcg/mL	124–413 mcmol/L
Anesthesia	7–130 mcg/mL	29–536 mcmol/L
Toxic concentration	>10 mcg/mL	>41 mcmol/L
*Thyroid-stimulating hormone (TSH), serum	0.4–4.2 mcU/mL	0.4–4.2 mU/L
Thyroxine serum	5–12 mcg/dL (varies with age, higher in children and pregnant women)	65–155 nmol/L (vaires with age, higher in children and pregnant women)
*Thyroxine, free, serum	0.8–2.7 ng/dL	10.3–35 pmol/L
Thyroxine binding globulin (TBG), serum	1.2–3.0 mg/dL	12–30 mg/L
Tobramycin, serum or plasma (Hep or EDTA)		
Therapeutic		
Peak		
Less severe infection	5–8 mcg/mL	11–17 mcmol/L
Severe infection	8–10 mcg/mL	17–21 mcmol/L
Trough		
Less severe infection	<1 mcg/mL	<2 mcmol/L
Moderate infection	<2 mcg/mL	<4 mcmol/L
Severe infection	<2–4 mcg/mL	<4–9 mcmol/L
Toxic		
Peak	>10–12 mcg/mL	>21–26 mcmol/L
Trough	>2–4 mcg/mL	>4–9 mcmol/L
Transferrin, serum		
Newborn	130–275 mg/dL	1.30–2.75 g/L
Adult	212–360 mg/dL	2.12–3.60 g/L
>60 yr	190–375 mg/dL	1.9–3.75 g/L
Triglycerides, serum, fasting		
Desirable	<250 mg/dL	<2.83 mmol/L
Borderline high	250–500 mg/dL	2.83–5.67 mmol/L
Hypertriglyceridemia	>500 mg/dL	>5.65 mmol/L
*Triiodothyronine, total (T_3) serum	100-200 ng/dL	1.54-3.8 nmol/L
*Troponin-I, cardiac, serum	undetectable	undetectable
Troponin-T, cardiac, serum	undetectable	undetectable
Urea nitrogen, serum	6–20 mg/dL	2.1–7.1 mmol urea/L
Urea nitrogen:creatinine ratio, serum	12:1 to 20:1	48–80 urea:creatinine mole ratio
*Uric acid		
Serum, enzymatic		
Male	4.5–8.0 mg/dL	0.27–0.47 mmol/L
Female	2.5–6.2 mg/dL	0.15–0.37 mmol/L

(continued)

*Test values dependent on laboratory methods used.

Tests	Conventional Units	SI Units
Uric Acid *(continued)*		
Child	2.0–5.5 mg/dL	0.12–0.32 mmol/L
Urine	250–750 mg/24 h (with normal diet)	1.48–4.43 mmol/24 h (with normal diet)
Urobilinogen, urine	0.1–0.8 Ehrlich unit/2 h 0.5–4.0 Eu/d	0.1-0.8 Eu/2h 0.5–4.0 Eu/d
Valproic acid, serum or plasma (Hep or EDTA); trough		
Therapeutic	50–100 mcg/mL	347–693 mcmol/L
Toxic	>100 mcg/mL	>693 mcmol/L
Vancomycin, serum or plasma (Hep or EDTA);		
Therapeutic		
Peak	20–40 mcg/mL	14–28 mcmol/L
Trough	5–10 mcg/mL	3–7 mcmol/L
Toxic	>80–100 mcg/mL	>55–69 mcmol/L
Vanillylmandelic acid (VMA), urine (4-hydroxy-3-methoxymandelic acid)	1.4–6.5 mg/24 h	7–33 mcmol/d
Viscosity, serum	1.00–1.24 cP	1.00–1.24 cP
Vitamin A, serum	30–80 mcg/dL	1.05–2.8 mcmol/L
Vitamin B12, serum	110–800 pg/mL	81–590 pmol/L
Vitamin E, serum		
Normal	5–18 mcg/mL	12–42 mcmol/L
Therapeutic	30–50 mcg/mL	69.6–116 mcmol/L
Zinc, serum	70–120 mcg/dL	10.7–18.4 mcmol/L

*Test values dependent on laboratory methods used.