REFERENCE VALUES FOR COMMONLY ORDERED TESTS (part 1 of 3)

Analyte	Specimen	Reference value	
		Conventional units	SI units
Adrenocorticotropin (ACTH)	P	6.0–76.0 pg/mL	1.3–16.7 pmol/liter
Aminotransferases	S		
Aspartate (AST, SGOT)		0–35 U/liter	0–0.58 μkat/liter
Alanine (ALT, SGPT)		0–35 U/liter	0–0.58 μkat/liter
Ammonia (as NH_3)	P	10–80 μg/dL	6–47 μmol/liter
Amylase	S	60–180 U/liter	0.8–3.2 μkat/liter
Anion gap	S	7–16 mmol/liter	7–16 mmol/liter
Antinuclear antibody	S	Negative at 1:40 dilution	N/A
Antithrombin III	P		
Antigenic		22–39 mg/dL	220–390 mg/liter
Functional		80–130%	0.8–1.30 U/liter
Arterial blood gases (sea level)	WB, arterial		
Bicarbonate (HCO_3^-)		21–30 mEq/liter	21–28 mmol/liter
Partial pressure of carbon dioxide (PCO_2)		35–45 mm Hg	4.7–5.9 kPa
pH		7.38–7.44	7.38–7.44
Partial pressure of oxygen (PO_2)		80–100 mm Hg	11–13 kPa
Bilirubin	S		
Total		0.3–1.0 mg/dL	5.1–17.0 μmol/liter
Direct		0.1–0.3 mg/dL	1.7–5.1 μmol/liter
Indirect		0.2–0.7 mg/dL	3.4–12.0 μmol/liter
Bleeding time		2.0–9.5 min	2.0–9.5 min
Calcitonin	S		
Male		3–26 pg/mL	3–26 ng/liter
Female		2–17 pg/mL	2–17 ng/liter
Calcium	S	9.0–10.5 mg/dL	2.2–2.6 mmol/liter
Calcium, ionized	WB	4.5–5.6 mg/dL	1.1–1.4 mmol/liter
Carbon dioxide			
Content (sea level)	P	21–30 mEq/liter	21–30 mmol/liter
Partial pressure (PCO_2) (sea level)	WB, arterial	35–45 mm Hg	4.7–5.9 kPa
Carcinoembryonic antigen (CEA)	S	0–3.4 ng/mL	0–3.4 μg/liter
Chloride	S	98–106 mEq/liter	98–106 mmol/liter
Cholesterol (totals)[1]	P		
Desirable		<200 mg/dL	<5.17 mmol/liter
Borderline high		200–239 mg/dL	5.17–6.18 mmol/liter
High		≥240 mg/dL	≥6.18 mmol/liter
Low-density lipoprotein (LDL) cholesterol	P		
Desirable		<100 mg/dL	<2.59 mmol/liter
Near or above normal		100–129 mg/dL	2.59–3.34 mmol/liter
Borderline high		130–159 mg/dL	3.36–4.11 mmol/liter
High		160–189 mg/dL	4.13–4.88 mmol/liter
Very high		≥190 mg/dL	≥4.91 mmol/liter
High-density lipoprotein (HDL) cholesterol	P		
Low		<40 mg/dL	<1.03 mmol/liter
High		≥60 mg/dL	≥1.55 mmol/liter
Copper	S	70–140 μg/dL	11–22 μmol/liter
Cortisol	S		
Fasting, 8 am-noon		5–25 μg/dL	138–690 nmol/liter
Noon-8 pm		5–15 μg/dL	138–414 nmol/liter
8 pm-8 am		0–10 μg/dL	0–276 nmol/liter
Creatine kinase (totals)	S		
Male		60–400 U/liter	1.00–6.67 μkat/liter
Female		40–150 U/liter	0.67–2.50 μkat/liter
MB isoenzyme		0–7 ng/mL	0–7 μg/liter
Creatinine	S	<1.5 mg/dL	<133 μmol/liter
Erythrocyte count	WB		
Male		4.50–5.90 × 10^6/mm^3	4.50–5.90 × 10^{12}/liter
Female		4.00–5.20 × 10^6/mm^3	4.00–5.20 × 10^{12}/liter
Erythrocyte sedimentation rate	WB		
Male		0–17 mm/hr	0–17 mm/hr
Female		1–25 mm/hr	1–25 mm/hr
Ferritin	S		
Male		30–300 ng/mL	30–300 μg/liter
Female		10–200 ng/mL	10–200 μg/liter
Fibrinogen	P	150–400 mg/dL	1.50–4.00 g/liter

(continued)

Analyte	Specimen	Reference value	
		Conventional units	**SI units**
Folate (folic acid)	S, P		
Normal		3.1–17.5 ng/mL	7.0–39.7 nmol/liter
Borderline deficient		2.2–3.0 ng/mL	5.0–6.8 nmol/liter
Deficient		<2.2 ng/mL	<5.0 nmol/liter
Excess		>17.5 ng/mL	>39.7 nmol/liter
Folic acid	RC	150–450 ng/mL/cells	340–1020 nmol/liter/cells
Follicle-stimulating hormone (FSH)	S, P		
Female, menstruating			
Follicular phase		3.0–20.0 mIU/mL	3.0–20.0 IU/liter
Ovulatory phase		9.0–26.0 mIU/mL	9.0–26.0 IU/liter
Luteal phase		1.0–12.0 mIU/mL	1.0–12.0 IU/liter
Female, postmenopausal		18.0–153.0 mIU/mL	18.0–153.0 IU/liter
Male		1.0–12.0 mIU/mL	1.0–12.0 IU/liter
Glucose	P		
Fasting, normal		75–115 mg/dL	4.2–6.4 mmol/liter
Fasting, diabetes mellitus		>125 mg/dL	>7.0 mmol/liter
2-hour postprandial		120 mg/dL	<6.7 mmol/liter
Glucose-6-phosphate dehydrogenase, erythrocyte	WB	No gross deficiency	N/A
γ-Glutamyltransferase	S	1–94 U/liter	1–94 U/liter
Haptoglobin	S	16–199 mg/dL	0.16–1.99 g/liter
Hematocrit	WB		
Male		41.0–53.0%	0.41–0.53
Female		36.0–46.0%	0.36–0.46
Hemoglobin			
Plasma	P	1–5 mg/dL	0.01–0.05 g/liter
Whole blood, male	WB	13.5–17.5 g/dL	8.4–10.9 mmol/liter
Whole blood, female	WB	12.0–16.0 g/dL	7.4–9.9 mmol/liter
Hemoglobin electrophoresis	WB		
Hemoglobin A		95–98%	0.95–0.98
Hemoglobin A_{1c}		3.8–6.4%	0.038–0.064 Hg fraction
Hemoglobin A_2		1.5–3.5%	0.015–0.035
Hemoglobin F		0–2.0%	0–0.02
Hemoglobins other than A, A_2, or F		Absent	Absent
Iron (hematology and coagulation values)	S	30–160 μg/dL	5.4–28.7 μmol/liter
Iron-binding capacity (hematology and coagulation values)	S	228–428 μg/dL	40.8–76.7 μmol/liter
Iron (clinical chemistry values)	S	50–150 μg/dL	9–27 μmol/liter
Iron-binding capacity (clinical chemistry values)	S	250–370 μg/dL	45–66 μmol/liter
Lactate	P, venous	5–15 mg/dL	0.6–1.7 mmol/liter
Lactate dehydrogenase isoenzymes	S		
Fraction 1 (of total)		14–26%	0.14–0.25
Fraction 2		29–39%	0.29–0.39
Fraction 3		20–26%	0.20–0.25
Fraction 4		8–16%	0.08–0.16
Fraction 5		6–16%	0.06–0.16
Lactate dehydrogenase	S	100–190 U/liter	1.7–3.2 μkat/liter
Lead (adult)	S	<10–20 μg/dL	<0.5–1 μmol/liter
Leukocyte count (WBC)	WB	4.5–11.0 × 10^3/mm^3	4.5–11 × 10^9/liter
Lipase	S	0–160 U/liter	0–2.66 μkat/liter
Magnesium	S	1.8–3.0 mg/dL	0.8–1.2 mmol/liter
Mean corpuscular hemoglobin (MCH)	WB	26.0–34.0 pg/cell	26.0–34.0 pg/cell
Mean corpuscular hemoglobin concentration (MCHC)	WB	31.0–37.0 g/dL	310–370 g/liter
Mean corpuscular volume (MCV)	WB	80–100 μm^3	80–100 fl
Osmolality	P	285–295 mOsm/kg serum water	285–295 mmol/kg serum water
Oxygen			
Content (sea level)	WB (arterial)	17–21 vol%	
	WB (venous, arm)	10–16 vol%	
Saturation (sea level)	WB (arterial)	97%	0.97 mol/mol
	WB (venous, arm)	60–85%	0.60–0.85 mol/mol
Partial pressure (PO_2)	WB	80–100 mm Hg	11–13 kPa
Partial-thromboplastin time (activated)	P	22.1–35.1 sec	22.1–35.1 sec
Phosphatase			
Acid	S	0–5.5 U/liter	0.90 nkat/liter
Alkaline	S	30–120 U/liter	0.5–2.0 nkat/liter

(continued)

REFERENCE VALUES FOR COMMONLY ORDERED TESTS (part 3 of 3)

Analyte	Specimen	Reference value	
		Conventional units	SI units
Phosphorus, inorganic	S	3–4.5 mg/dL	1.0–1.4 mmol/liter
Platelet count	WB	150–350 × 10^3/mm^3	150–350 × 10^9/liter
Potassium	S	3.5–5.0 mEq/liter	3.5–5.0 mmol/liter
Progesterone	S, P		
Female, menstruating			
Follicular		<0.2 ng/mL	<0.6 nmol/liter
Midluteal		3–20 ng/mL	9.54–63.6 nmol/liter
Male		<0.2–1.4 ng/mL	<0.60–4.45 nmol/liter
Prolactin	S		
Male		0–15 ng/mL	0–15 µg/liter
Female		0–20 ng/mL	0–20 µg/liter
Prostate-specific antigen (PSA)	S		
Female		<0.5 ng/mL	<0.5 µg/liter
Male			
≤40 years		0–2.0 ng/mL	0–2.0 µg/liter
>40 years		0–4.0 ng/mL	0–4.0 µg/liter
Protein	S		
Total		5.5–8.0 g/dL	55–80 g/liter
Fractions			
Albumin		3.5–5.5 g/dL (50–60%)	35–55 g/liter
$Alpha_1$		0.2–0.4 g/dL (4.2–7.2%)	2–4 g/liter
$Alpha_2$		0.5–0.9 g/dL (6.8–12%)	5–9 g/liter
Beta		0.6–1.1 g/dL (9.3–15%)	6–11 g/liter
Gamma		0.7–1.7 g/dL (13–23%)	7–17 g/liter
Globulin		2.0–3.5 g/dL (40–50%)	20–35 g/liter
Protein C	P		
Total antigen		70–140%	0.70–1.40
Functional		70–140%	0.70–1.40
Protein S	P		
Total antigen		70–140%	0.70–1.40
Functional		70–140%	0.70–1.40
Free antigen		70–140%	0.70–1.40
Prothrombin time	P	11.1–13.1 sec	11.1–13.1 sec
Reticulocyte count	WB	0.5–2.5% red cells	0.005–0.025 red cells
Rheumatoid factor	S, JF	<30.0 IU/mL	<30 kIU/liter
Sodium	S	136–145 mEq/liter	136–145 mmol/liter
Testosterone	S		
Total (morning)			
Female		6–86 ng/dL	0.21–2.98 nmol/liter
Male		270–1070 ng/dL	9.36–37.10 nmol/liter
Thyroid hormone function tests	S		
Thyroid-stimulating hormone (TSH)		0.5–4.7 µU/mL	0.5–4.7 mU/liter
Thyroxine			
Total (T_4)		4.5–10.9 µg/dL	58–140 nmol/liter
Free (fT_4)		0.8–2.7 ng/dL	10.3–35.0 pmol/liter
Triiodothyronine			
Total (T_3)		60–181 ng/dL	0.92–2.78 nmol/liter
Free (fT_3)		1.4–4.4 pg/mL	0.22–6.78 pmol/liter
Transferrin	S	230–390 mg/dL	2.3–3.9 g/liter
Triglycerides	S	<160 mg/dL	<1.8 mmol/liter
Urea nitrogen	S	10–20 mg/dL	3.6–7.1 mmol/liter
Uric acid	S		
Male		2.5–8.0 mg/dL	150–480 µmol/liter
Female		1.5–6.0 mg/dL	90–360 µmol/liter
Vitamin A	S	20–100 µg/dL	0.7–3.5 µmol/liter
Vitamin B_{12}	S, P		
Normal		>250 pg/mL	>185 pmol/liter
Borderline		125–250 pg/mL	92–185 pmol/liter
Deficient		<125 pg/mL	<92 pmol/liter

NOTES

1. National Institutes of Health. Third report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). September 2002. Available at: www.nhlbi.nih.gov/guidelines/cholesterol/index.htm.

Accessed October 16, 2008.
JF = joint fluid; P = plasma; RC = red cells; S = serum; WB = whole blood.
Adapted from N Engl J Med. 351:15; October 7, 2004.