# Appendix C: Common Laboratory Tests and Normal Values

| | |
|---|---|
| **Acetaminophen (serum or plasma)** | |
| Therapeutic concentration | 10–30 μg/ml |
| Toxic concentration | >200 μg/ml |
| **Albumin (plasma)** | |
| Newborn | 2.5–3.4 g/dl |
| <5 yr | 3.4–5.0 g/dl |
| 5–19 yr | 4.0–5.6 g/dl |
| **Alkaline phosphatase (ALP) (serum)** | |
| 1–9 yr | 145–420 U/L |
| 2–10 yr | 100–320 U/L |
| 11–18 yr male | 100–390 U/L |
| 11–18 yr female | 100–320 U/L |
| **Ammonia nitrogen (serum or plasma)** | |
| Newborn | 90–150 mg/dl |
| Child | 40–80 mg/dl |
| **Amylase (serum)** | |
| 1–19 yr | 35–127 U/L |



| | |
|---|---|
| **Antistreptolysin O titer (ASO titer) (serum)** | |
| 2–4 yr | <166 Todd units |
| School-aged | 170–330 Todd units |
| **Bicarbonate ($HCO_3$) (serum)** | |
| Infant (venous) | 20–24 mEq/L |
| >2 years (venous) | 22–29 mEq/L |
| >2 years (arterial) | 21–28 mEq/L |
| **Bilirubin (total) (serum)** | |
| Premature Infant | |
| Cord blood | <2 mg/dl |
| 0–1 day | <8 mg/dl |
| 1–2 days | <12 mg/dl |
| 2–5 days | <16 mg/dl |
| >5 days | <20 mg/dl |
| Full-term Infant | |
| Cord | <2.8 mg/dl |
| 0–1day | <2–6 mg/dl |
| 1–2 days | <6–8 mg/dl |
| 2–5 days | <4–6 mg/dl |
| >5 days | <10 mg/dl |
| **Bilirubin (conjugated) (serum)** | 0.0–0.2 mEq/L |
| **Blood volume (whole blood)** | |
| Female | 50–75 ml/Kg |
| Male | 52–83 ml/Kg |
| **C-reactive protein (CRP) (serum)** | |
| 2–12 yr | 67–1800 ng/ml |
| **Calcium (Ca)—Total (serum)** | |
| Newborn | 9.0–10.6 mg/dl |
| Child | 8.8–10.8 mg/dl |

*Continued*

| | |
|---|---|
| **Carbon dioxide** | |
| **Partial pressure ($PCO_2$)** (whole blood, arterial) | |
| Newborn | 27–40 mm Hg |
| Infant | 27–41 mm Hg |
| Thereafter: Male | 35–48 mm Hg |
| Female | 32–45 mm Hg |
| **Total ($tCO_2$)** (serum or plasma) | |
| Newborn | 13–22 mmol/L |
| Infant | 20–28 mmol/L |
| Child | 20–28 mmol/L |
| Thereafter | 23–30 mmol/L |
| **Chloride (Cl) (serum)** | |
| Newborn | 97–110 mmol/L |
| Thereafter | 98–106 mmol/L |
| **Chloride (sweat)** | |
| Normal | <40 mmol/L |
| Borderline | 45–60 mmol/L |
| Cystic Fibrosis | >60 mmol/L |
| **Cholesterol (total)** | |
| Newborn | 53–135 mg/dl |
| Infant | 70–175 mg/dl |
| Child | 120–200 mg/dl |
| Adolescent | <200 mg/dl |
| **Creatine kinase (CK, CPK) (serum)** | |
| Newborn | 87–725 U/L |
| **Creatine (serum)** | |
| Newborn | 0.3–1.0 mg/dl |
| Infant | 0.2–0.4 mg/dl |
| Child | 0.3–0.7 mg/dl |
| Adolescent | 0.5–1.0 mg/dl |



| | |
|---|---|
| **Digoxin (serum or plasma)** | |
| Therapeutic concentration | |
| Congestive heart failure (CHF) | 0.8–1.5 ng/ml |
| Arrhythmias | 1.5–2.0 ng/ml |
| Toxic concentration | >2.5 ng/mt |
| **Erythrocyte (RBC) count (whole blood)** | |
| Newborn | 4.8–7.1 million/$mm^3$ |
| 3–6 mo | 3.1–4.5 million/$mm^3$ |
| 0.5–2 yr | 3.7–5.3 million/$mm^3$ |
| 2–6 yr | 3.9–5.3 million/$mm^3$ |
| 6–12 yr | 4.0–5.2 million/$mm^3$ |
| 12–18 yr: Male | 4.5–5.3 million/$mm^3$ |
| Female | 4.1–5.1 million/$mm^3$ |
| **Erythrocyte sedimentation rate (ESR) (whole blood)** | |
| Westergren (modified) | |
| Child | 0–10 mm/hr |
| Wintrobe | |
| Child | 0–13 mm/hr |
| **Fibroginogen (plasma)** | |
| Newborn | 125–300 mg/dl |
| Thereafter | 200–400 mg/dl |
| **Glucose (serum)** | |
| Newborn | 50–90 mg/dl |
| Child | 60–100 mg/dl |
| Thereafter | 70–105 mg/dl |
| **Growth hormone (hGH, somatotropin) (plasma, fasting)** | |
| Newborn | 5–40 ng/ml |
| Child | 0–10 ng/ml |
| **Hematocrit (HCT, Hct) (whole blood)** | |
| Newborn | 44–72% |
| 2 mo | 28–42% |

*Continued*

| | |
|---|---|
| 6–12 yr | 35–45% |
| 12–18 yr: Male | 37–49% |
| Female | 36–46% |

**Hemoglobin (Hb) (whole blood)**

| | |
|---|---|
| Newborn | 14–27 g/dl |
| 2 mo | 9–14 g/dl |
| 6–12 yr | 11.5–15.5 g/dl |
| 12–18 yr: Male | 13–16 g/dl |
| Female | 12–16 g/dl |

**Iron (serum)**

| | |
|---|---|
| Newborn | 100–250 µg/dl |
| Infant | 40–100 µg/dl |
| Child | 50–120 µg/dl |
| Thereafter: Male | 50–160 µg/dl |
| Female | 40–150 µg/dl |

**Lead (whole blood)**

| | |
|---|---|
| Child | <10 µg/dl |

**Leukocyte (WBC) Count (whole blood)**

| | |
|---|---|
| Newborn | 9–30 ×1000 cells/mm$^3$ |
| 1–3 yr | 6.0–17.5 × 1000 cells/mm$^3$ |
| 4–7 yr | 5.5–15.5 × 1000 cells/mm$^3$ |
| 8–13 yr | 4.5–13.5 × 1000 cells/mm$^3$ |
| Adult | 4.5–11.0 × 1000 cells/mm$^3$ |

**Leukocyte differential count (whole blood)**

| | |
|---|---|
| Myelocytes | 0% |
| Neutrophils—"bands" | 3–5% |
| Neutrophils—"segs" | 54–62% |
| Lymphocytes | 25–33% |
| Monocytes | 3–7% |
| Eosinophils | 1–3% |
| Basophils | 0–0.75% |



**Osmolality (serum)**

| | |
|---|---|
| Child, adult | 275–295 mOsmol/kg $H_2O$ |

**Oxygen, partial pressure ($PO_2$) (whole blood, arterial)**

| | |
|---|---|
| Birth | 8–24 mm Hg |
| 1 d | 54–95 mm Hg |
| Thereafter (decreased with age) | 83–108 mm Hg |

**Oxygen saturation ($SaO_2$) (whole blood, arterial)**

| | |
|---|---|
| Newborn | 85–90% |
| Thereafter | 95–99% |

**Partial thromboplastin time (PTT) (whole blood) (Na citrate)**

| | |
|---|---|
| Nonactivated | 60–85 seconds (Platelin) |
| Activated | 25–35 seconds (differs with methods) |

**Phenylalanine (serum)**

| | |
|---|---|
| Premature | 2.0–7.5 mg/dl |
| Newborn | 1.2–3.4 mg/dl |
| Thereafter | 0.8–1.8 mg/dl |

**Plasma volume (plasma)**

| | |
|---|---|
| Male | 25–43 ml/kg |
| Female | 28–45 ml/kg |

**Platelet count (thrombocyte count) (whole blood)**

| | |
|---|---|
| Newborn (After 1 wk, same as adult) | 84–478 × $10^3$ mm$^3$ (µl) |
| Adult | 150–400 × $10^3$ mm$^3$ (µl) |

**Potassium (serum)**

| | |
|---|---|
| <2 yr | 3.0–6.0 mmol/L |
| 2–12 yr | 3.5–7.0 mmol/L |
| >12 yr | 3.5–5.0 mmol/L |

**Protein (serum, total)**

| | |
|---|---|
| Premature | 4.3–7.5 g/dl |
| Newborn | 4.6–7.4 g/dl |
| 1–7 yr | 6.1–7.9 g/dl |

| | |
|---|---|
| 8–12 yr | 6.4–8.1 g/dl |
| 13–19 yr | 6.6–8.2 g/dl |
| **Prothrombin time (PT)** | |
| One-stage (Quick) (whole blood) | |
| In general | 11–15 seconds (varies with type of thromboplastin) |
| Newborn | Prolonged by 2–3 sec |
| **Sodium (serum or plasma)** | |
| Newborn | 136–146 mmol/L |
| Infant | 139–146 mmol/L |
| Child | 138–145 mmol/L |
| Thereafter | 136–146 mmol/L |
| **Specific gravity (urine)** | |
| Newborn | 1.016–1.030 |
| Infants | 1.002–1.006 |
| Thereafter | 1.016–1.030 |
| **Thyroxine ($T_4$, $T_4$ total, $T_4$ RIA) (serum)** | |
| Newborn | 9–18 µg/dl |
| Infant | 7–15 µg/dl |
| 1–5 yr | 7.3–15 µg/dl |
| 5–10 yr | 6.4–13.3 µg/dl |
| Thereafter | 5–12 µg/dl |
| **Thyrotropin (thyroid stimulating hormone [TSH])** | |
| Newborn | 3–18 µIU/L by day 3 of life |
| Thereafter | 2–10 mU/L |

| **Triglycerides (TG) (serum) (after ≥12 hr fast)** | M | F |
|---|---|---|
| 0–5 yr | 30–86 mg/dl | 32–99 mg/dl |
| 6–11 yr | 31–108 mg/dl | 35–114 mg/dl |
| 12–15 yr | 36–138 mg/dl | 41–138 mg/dl |
| 16–19 yr | 40–163 mg/dl | 40–128 mg/dl |



| | |
|---|---|
| **Triiodothyronine ($T_3$, $T_3$ total, $T_3$ RIA) (serum)** | |
| Newborn | 72–260 ng/dl |
| 1–5 yr | 100–260 ng/dl |
| 5–10 yr | 90–240 ng/dl |
| 10–15 yr | 80–210 ng/dl |
| Thereafter | 115–190 ng/dl |
| **Urea nitrogen (serum or plasma)** | |
| Newborn | 3–12 mg/dl |
| Infant/child | 5–18 mg/dl |
| Thereafter | 7–18 mg/dl |
| **Urine volume (urine, 24 hr)** | |
| Newborn | 50–300 ml/d |
| Infant | 350–550 ml/d |
| Child | 500–1000 ml/d |
| Adolescent | 700–1400 ml/d |
| Thereafter: Male | 800–1800 ml/d |
| Female | 600–1600 ml/d (varies with intake and other factors) |

*Note*: Normal lab values differ depending on lab used. Verify your facility's normal values.

SOURCE: Modified from *Delmar's Guide to Laboratory and Diagnostic Tests* by R. Daniels. (2001). Albany, NY: Delmar; *Nelson Textbook of Pediatrics* (16th ed.), by R. Behrman, R. Kliegman, and H. Jenson. (2000). Philadelphia, PA: W. B. Saunders; *A Manual of Laboratory and Diagnostic Tests* (6th ed.) by F. Fischbach. (1999). Philadelphia PA: Lippincott.

# COMMON LABORATORY TESTS*

| Test/Specimen | Age/Sex/Reference | Conventional Units | International Units (SI) |
|---|---|---|---|
| | | Normal Ranges | |
| Acetaminophen | | | |
| Serum or plasma | Therap. conc. | 10-30 µg/ml | 66-200 µmol/L |
| | Toxic conc. | >200 µg/ml | >1300 µmol/L |
| Ammonia nitrogen | | | |
| Plasma or serum | Newborn | 90-150 µg/dl | 64-107 µmol/L |
| | 0-2 wk | 79-129 µg/dl | 56-92 µmol/L |
| | >1 mo | 29-70 µg/dl | 21-50 µmol/L |
| | Thereafter | 15-45 µg/dl | 11-32 µmol/L |
| Urine, 24 hr | | 500-1200 mg/d | 36-86 mmol/d |
| Antistreptolysin O titer (ASO) | | | |
| Serum | 2-4 yr | <160 Todd units | |
| | School-age children | 170-330 Todd units | |
| Base excess | | | |
| Whole blood | Newborn | (−10)-(−2) mmol/L | (−10)-(−2) mmol/L |
| | Infant | (−7)-(−1) mmol/L | (−7)-(−1) mmol/L |
| | Child | (−4)-(+2) mmol/L | (−4)-(+2) mmol/L |
| | Thereafter | (−3)-(+3) mmol/L | (−3)-(+3) mmol/L |
| Bicarbonate ($HCO_3$) | | | |
| Serum | Arterial | 21-28 mmol/L | 21-28 mmol/L |
| | Venous | 22-29 mmol/L | 22-29 mmol/L |

| Bilirubin, total | | Premature (mg/dl) | Full term (mg/dl) | Premature (µmol/L) | Full term (µmol/L) |
|---|---|---|---|---|---|
| Serum | Cord | <2.0 | <2.0 | <34 | <34 |
| | 0.1 d | 8.0 | <6.0 | <137 | <103 |
| | 1-2 d | 12.0 | <8.0 | <205 | <137 |
| | 2-5 d | 16.0 | <12.0 | <274 | <205 |
| | Thereafter | 2.0 | 0.2-1.0 | <34 | 3.4-17.1 |
| Bilirubin, direct (conjugated) | | | | | |
| Serum | | 0-0.2 mg/dl | | 0-3.4 µmol/L | |
| Bleeding time | | | | | |
| Blood from skin puncture | | | | | |
| Ivy | Normal | 2-7 min | | 2-7 min | |
| | Borderline | 7-11 min | | 7-11 min | |
| Simplate (G-D) | | 2.75-8 min | | 2.75-8 min | |
| Blood volume | | | | | |
| Whole blood | Male | 52-83 ml/kg | | 0.052-0.083 L/kg | |
| | Female | 50-75 ml/kg | | 0.050-0.075 L/kg | |
| C-reactive protein (CRP) | | | | | |
| Serum | Cord | 52-1330 ng/ml | | 52-1330 µg/L | |
| | 2-12 yr | 67-1800 ng/ml | | 67-1800 µg/L | |
| Calcium, ionized | | | | | |
| Serum, plasma, or whole blood | Cord | 5.0-6.0 mg/dl | | 1.25-1.50 mmol/L | |
| | Newborn, 3-24 hr | 4.3-5.1 mg/dl | | 1.07-1.27 mmol/L | |
| | 24-48 hr | 4.0-4.7 mg/dl | | 1.00-1.17 mmol/L | |
| | Thereafter | 4.8-4.92 mg/dl | | 1.12-1.23 mmol/L | |

Modified from Behrman RE and others, editors: *Nelson textbook of pediatrics,* ed 15, Philadelphia, 1996, WB Saunders.
*For a description of abbreviations see p. 652.

*Continued*

| Test/Specimen | Age/Sex/Reference | Conventional Units | International Units (SI) |
|---|---|---|---|
| | | Normal Ranges | |
| Calcium, total | | | |
| Serum | Cord | 9.0-11.5 mg/dl | 2.25-2.88 mmol/L |
| | Newborn, 3-24 hr | 9.0-10.6 mg/dl | 2.3-2.65 mmol/L |
| | 24-48 hr | 7.0-12.0 mg/dl | 1.75-3.0 mmol/L |
| | 4-7 d | 9.0-10.9 mg/dl | 2.25-2.73 mmol/L |
| | Child | 8.8-10.8 mg/dl | 2.2-2.70 mmol/L |
| | Thereafter | 8.4-10.2 mg/dl | 2.1-2.55 mmol/L |
| Carbon dioxide, partial pressure ($Pco_2$) | | | |
| Whole blood, arterial | Newborn | 27-40 mm Hg | 3.6-5.3 kPa |
| | Infant | 27-41 mm Hg | 3.6-5.5 kPa |
| | Thereafter: Male | 35-48 mm Hg | 4.7-6.4 kPa |
| | Female | 32-45 mm Hg | 4.3-6.0 kPa |
| Carbon dioxide, total ($tCO_2$) | | | |
| Serum or plasma | Cord | 14-22 mEq/L | 14-22 mmol/L |
| | Premature (1 wk) | 14-27 mEq/L | 14-27 mmol/L |
| | Newborn | 13-22 mEq/L | 13-22 mmol/L |
| | Infant, child | 20-28 mEq/L | 20-28 mmol/L |
| | Thereafter | 23-30 mEq/L | 23-30 mmol/L |
| Cerebrospinal fluid (CSF) | | | |
| Pressure | | 70-180 mm water | 70-180 mm water |
| Volume | Child | 60-100 ml | 0.06-0.10 L |
| | Adult | 100-160 ml | 0.10-0.16 L |
| Chloride | | | |
| Serum or plasma | Cord | 96-104 mmol/L | 96-104 mmol/L |
| | Newborn | 97-110 mmol/L | 97-110 mmol/L |
| | Thereafter | 98-106 mmol/L | 98-106 mmol/L |
| Sweat | Normal (homozygote) | <40 mmol/L | <40 mmol/L |
| | Marginal (e.g., asthma, Addison disease, malnutrition) | 45-60 mmol/L | 45-60 mmol/L |
| | Cystic fibrosis | >60 mmol/L | >60 mmol/L |
| Cholesterol, total | 1-3 yr | 45-182 mg/dl | 1.15-4.70 mmol/L |
| | 4-6 yr | 109-189 mg/dl | 2.80-4.80 mmol/L |

| | *Percentiles* | | | *Percentiles* | | |
|---|---|---|---|---|---|---|
| Male: | 5 | 75 | 95 | 5 | 75 | 95 |
| 6-9 yr | 126 | 172 | 191 mg/dL | 3.26 | 4.45 | 4.94 mmol/L |
| 10-14 yr | 130 | 179 | 204 mg/dL | 3.36 | 4.63 | 5.28 mmol/L |
| 15-19 yr | 114 | 167 | 198 mg/dL | 2.95 | 4.32 | 5.12 mmol/L |

| | *Percentiles* | | | *Percentiles* | | |
|---|---|---|---|---|---|---|
| Female: | 5 | 75 | 95 | 5 | 75 | 95 |
| 6-9 yr | 122 | 173 | 209 mg/dL | 3.16 | 4.47 | 5.41 mmol/L |
| 10-14 yr | 124 | 174 | 217 mg/dL | 3.21 | 4.50 | 5.61 mmol/L |
| 15-19 yr | 125 | 175 | 212 mg/dL | 3.23 | 4.53 | 5.48 mmol/L |

| | | | |
|---|---|---|---|
| Clotting time (Lee-White) | | | |
| Whole blood | | 5-8 min (glass tubes) | 5-8 min |
| | | 5-15 min (room temp) | 5-15 min |
| | | 30 min (silicone tube) | 30 min |

| Test/Specimen | Age/Sex/Reference | Conventional Units | International Units (SI) |
|---|---|---|---|
| | | Normal Ranges | |
| Creatine kinase (CK, CPK) | | | |
| Serum | Cord blood | 70-380 U/L | 70-380 U/L |
| | 5-8 hr | 214-1175 U/L | 214-1175 U/L |
| | 24-33 hr | 130-1200 U/L | 130-1200 U/L |
| | 72-100 hr | 87-725 U/L | 87-725 U/L |
| | Adult | 5-130 U/L | 5-130 U/L |
| Creatinine | | | |
| Serum | Cord | 0.6-1.2 mg/dl | 53-106 μmol/L |
| | Newborn | 0.3-1.0 mg/dl | 27-88 μmol/L |
| | Infant | 0.2-0.4 mg/dl | 18-35 μmol/L |
| | Child | 0.3-0.7 mg/dl | 27-62 μmol/L |
| | Adolescent | 0.5-1.0 mg/dl | 44-88 μmol/L |
| | Adult: Male | 0.6-1.2 mg/dl | 53-106 μmol/L |
| | Female | 0.5-1.1 mg/dl | 44-97 μmol/L |
| Urine, 24 hr | Premature | 8.1-15.0 mg/kg/24 hr | 72-133 μmol/kg/24 hr |
| | Full term | 10.4-19.7 mg/kg/24 hr | 92-174 μmol/kg/24 hr |
| | 1.5-7 yr | 10-15 mg/kg/24 hr | 88-133 μmol/kg/24 hr |
| | 7-15 yr | 5.2-41 mg/kg/24 hr | 46-362 μmol/kg/24 hr |
| Creatinine clearance (endogenous) | | | |
| Serum or plasma and urine | Newborn | 40-65 ml/min/1.73 $m^2$ | |
| | <40 yr: Male | 97-137 ml/min/1.73 $m^2$ | |
| | Female | 88-128 ml/min/1.73 $m^2$ | |
| Digoxin | | | |
| Serum, plasma; collect at least 12 hr after dose | Therap. conc. | | |
| | 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 conc. | | |
| | Child | >2.5 ng/ml | >3.2 nmol/L |
| | Adult | >3.0 ng/ml | >3.8 nmol/L |
| Eosinophil count | | | |
| Whole blood, capillary blood | | 50-350 cells/$mm^3$ (μl) | 50-350 × $10^6$ cells/L |
| Erythrocyte (RBC) count | | | |
| Whole blood | Cord | 3.9-5.5 million/$mm^3$ | 3.9-5.5 × $10^{12}$ cells/L |
| | 1-3 d | 4.0-6.6 million/$mm^3$ | 4.0-6.6 × $10^{12}$ cells/L |
| | 1 wk | 3.9-6.3 million/$mm^3$ | 3.9-6.3 × $10^{12}$ cells/L |
| | 2 wk | 3.6-6.2 million/$mm^3$ | 3.6-6.2 × $10^{12}$ cells/L |
| | 1 mo | 3.0-5.4 million/$mm^3$ | 3.0-5.4 × $10^{12}$ cells/L |
| | 2 mo | 2.7-4.9 million/$mm^3$ | 2.7-4.9 × $10^{12}$ cells/L |
| | 3-6 mo | 3.1-4.5 million/$mm^3$ | 3.1-4.5 × $10^{12}$ cells/L |
| | 0.5-2 yr | 3.7-5.3 million/$mm^3$ | 3.7-5.3 × $10^{12}$ cells/L |
| | 2-6 yr | 3.9-5.3 million/$mm^3$ | 3.9-5.3 × $10^{12}$ cells/L |
| | 6-12 yr | 4.0-5.2 million/$mm^3$ | 4.0-5.2 × $10^{12}$ cells/L |
| | 12-18 yr: Male | 4.5-5.3 million/$mm^3$ | 4.5-5.3 × $10^{12}$ cells/L |
| | Female | 4.1-5.1 million/$mm^3$ | 4.1-5.1 × $10^{12}$ cells/L |
| Erythrocyte sedimentation rate (ESR) | | | |
| Whole blood | | | |
| Westergren (modified) | Child | 0-10 mm/hr | 0-10 mm/hr |
| | <50 yr: Male | 0-15 mm/hr | 0-15 mm/hr |
| | Female | 0-20 mm/hr | 0-20 mm/hr |
| Wintrobe | Child | 0-13 mm/hr | 0-13 mm/hr |
| | Adult: Male | 0-9 mm/hr | 0-9 mm/hr |
| | Female | 0-20 mm/hr | 0-20 mm/hr |

*Continued*

| Test/Specimen | Age/Sex/Reference | Conventional Units | International Units (SI) |
|---|---|---|---|
| | | Normal Ranges | |
| Fibrinogen | | | |
| Plasma | Newborn | 125-300 mg/dl | 1.25-3.00 g/L |
| | Thereafter | 200-400 mg/dl | 2.00-4.00 g/L |
| Galactose | | | |
| Serum | Newborn | 0-20 mg/dl | 0-1.11 mmol/L |
| Urine | Newborn | ≤60 mg/dl | ≤3.33 mmol/L |
| | Thereafter | <14 mg/24 hr | <0.08 mmol/24 hr |
| Glucose | | | |
| Serum | Cord | 45-96 mg/dl | 2.5-5.3 mmol/L |
| | Newborn, 1 d | 40-60 mg/dl | 2.2-3.3 mmol/L |
| | Newborn, >1 d | 50-90 mg/dl | 2.8-5.0 mmol/L |
| | Child | 60-100 mg/dl | 3.3-5.5 mmol/L |
| | Thereafter | 70-105 mg/dl | 3.9-5.8 mmol/L |
| Whole blood | Adult | 65-95 mg/dl | 3.6-5.3 mmol/L |
| CSF | Adult | 40-70 mg/dl | 2.2-3.9 mmol/L |
| Urine (quantitative) | | <0.5 g/d | <2.8 mmol/d |
| (Qualitative) | | Negative | Negative |
| Glucose tolerance test (GTT), oral | | | |
| Serum | | | |

| Dosages | | Normal | Diabetic | Normal | Diabetic |
|---|---|---|---|---|---|
| Adult: 75 g | Fasting | 70-105 mg/dl | >115 mg/dl | 3.9-5.8 mmol/L | >6.4 mmol/L |
| Child: 1.75 g/kg of ideal | 60 min | 120-170 mg/dl | ≥200 mg/dl | 6.7-9.4 mmol/L | ≥11 mmol/L |
| weight up to maximum | 90 min | 100-140 mg/dl | ≥200 mg/dl | 5.6-7.8 mmol/L | ≥11 mmol/L |
| of 75 g | 120 min | 70-120 mg/dl | ≥140 mg/dl | 3.9-6.7 mmol/L | ≥7.8 mmol/L |

| | | | |
|---|---|---|---|
| Growth hormone (hGH, somatotropin) | | | |
| Plasma | Cord | 10-50 ng/ml | 10-50 µg/L |
| Fasting, at rest | Newborn | 10-40 ng/ml | 10-40 µg/L |
| | Child | <5 ng/ml | <5 µg/L |
| | Adult: Male | <5 ng/ml | <5 µg/L |
| | Female | <8 ng/ml | <8 µg/L |
| Hematocrit (HCT, Hct) | | | |
| Whole blood | 1 d (cap) | 48%-69% | 0.48-0.69 vol. fraction |
| | 2 d | 48%-75% | 0.48-0.75 vol. fraction |
| | 3 d | 44%-72% | 0.44-0.72 vol. fraction |
| | 2 mo | 28%-42% | 0.28-0.42 vol. fraction |
| | 6-12 yr | 35%-45% | 0.35-0.45 vol. fraction |
| | 12-18 yr: Male | 37%-49% | 0.37-0.49 vol. fraction |
| | Female | 36%-46% | 0.36-0.46 vol. fraction |
| Hemoglobin (Hb) | | | |
| Whole blood | 1-3 d (cap) | 14.5-22.5 g/dl | 2.25-3.49 mmol/L |
| | 2 mo | 9.0-14.0 g/dl | 1.40-2.17 mmol/L |
| | 6-12 yr | 11.5-15.5 g/dl | 1.78-2.40 mmol/L |
| | 12-18 yr: Male | 13.0-16.0 g/dl | 2.02-2.48 mmol/L |
| | Female | 12.0-16.0 g/dl | 1.86-2.48 mmol/L |
| Hemoglobin A (HbA) | | | |
| Whole blood | | >95% of total | 0.95 fraction of Hb |

| Test/Specimen | Age/Sex/Reference | Conventional Units | International Units (SI) |
|---|---|---|---|
| | | Normal Ranges | |
| Hemoglobin F (HbF) | | | |
| Whole blood | 1 d | 63%-92% HbF | 0.63-0.92 mass fraction HbF |
| | 5 d | 65%-88% HbF | 0.65-0.88 mass fraction HbF |
| | 3 wk | 55%-85% HbF | 0.55-0.85 mass fraction HbF |
| | 6-9 wk | 31%-75% HbF | 0.31-0.75 mass fraction HbF |
| | 3-4 mo | <2%-59% HbF | <0.02-0.59 mass fraction HbF |
| | 6 mo | <2%-9% HbF | <0.02-0.09 mass fraction HbF |
| | Adult | <2.0% HbF | <0.02 mass fraction HbF |
| Immunoglobulin A (IgA) | | | |
| Serum | Cord blood | 1.4-3.6 mg/dl | 14-36 mg/L |
| | 1-3 mo | 1.3-53 mg/dl | 13-530 mg/L |
| | 4-6 mo | 4.4-84 mg/dl | 44-840 mg/L |
| | 7 mo-1 yr | 11-106 mg/dl | 110-1060 mg/L |
| | 2-5 yr | 14-159 mg/dl | 140-1590 mg/L |
| | 6-10 yr | 33-236 mg/dl | 330-2360 mg/L |
| | Adult | 70-312 mg/dl | 700-3120 mg/L |
| Immunoglobulin D (IgD) | | | |
| Serum | Newborn | None detected | None detected |
| | Thereafter | 0-8 mg/dl | 0-80 mg/L |
| Immunoglobulin E (IgE) | | | |
| Serum | Male | 0-230 IU/ml | 0-230 kIU/L |
| | Female | 0-170 IU/ml | 0-170 kIU/L |
| Immunoglobulin G (IgG) | | | |
| Serum | Cord blood | 636-1606 mg/dl | 6.36-16.06 g/L |
| | 1 mo | 251-906 mg/dl | 2.51-9.06 g/L |
| | 2-4 mo | 176-601 mg/dl | 1.76-6.01 g/L |
| | 5-12 mo | 172-1069 mg/dl | 1.72-10.69 g/L |
| | 1-5 yr | 345-1236 mg/dl | 3.45-12.36 g/L |
| | 6-10 yr | 608-1572 mg/dl | 6.08-15.72 g/L |
| | Adult | 639-1349 mg/dl | 6.39-13.49 g/L |
| Immunoglobulin M (IgM) | | | |
| Serum | Cord blood | 6.3-25 mg/dl | 63-250 mg/L |
| | 1 mo-4 mo | 17-105 mg/dl | 170-1050 mg/L |
| | 5 mo-9 mo | 33-126 mg/dl | 330-1260 mg/L |
| | 10 mo-1 yr | 41-173 mg/dl | 410-1730 mg/L |
| | 2-8 yr | 43-207 mg/dl | 430-2070 mg/L |
| | 9-10 yr | 52-242 mg/dl | 520-2420 mg/L |
| | Adult | 56-352 mg/dl | 560-3520 mg/L |
| Iron | | | |
| Serum | Newborn | 100-250 µg/dl | 17.90-44.75 µmol/L |
| | Infant | 40-100 µg/dl | 7.16-17.90 µmol/L |
| | Child | 50-120 µg/dl | 8.95-21.48 µmol/L |
| | Thereafter: Male | 50-160 µg/dl | 8.95-28.64 µmol/L |
| | Female | 40-150 µg/dl | 7.16-26.85 µmol/L |
| | Intoxicated child | 280-2550 µg/dl | 50.12-456.5 µmol/L |
| | Fatally poisoned child | >1800 µg/dl | >322.2 µmol/L |
| Iron-binding capacity, total (TIBC) | | | |
| Serum | Infant | 100-400 µg/dl | 17.90-71.60 µmol/L |
| | Thereafter | 250-400 µg/dl | 44.75-71.60 µmol/L |
| Lead | | | |
| Whole blood | Child | <10 µg/dl | <0.48 µmol/L |
| Urine, 24 hr | | <80 µg/L | <0.39 µmol/L |

*Continued*

| Test/Specimen | Age/Sex/Reference | Conventional Units | International Units (SI) |
|---|---|---|---|
| | | Normal Ranges | |
| Leukocyte count (WBC count) | | **×1000 cells/mm³ (μl)** | **×10⁹ cells/L** |
| (Whole blood) | Birth | 9.0-30.0 | 9.0-30.0 |
| | 24 hr | 9.4-34.0 | 9.4-34.0 |
| | 1 mo | 5.0-19.5 | 5.0-19.5 |
| | 1-3 yr | 6.0-17.5 | 6.0-17.5 |
| | 4-7 yr | 5.5-15.5 | 5.5-15.5 |
| | 8-13 yr | 4.5-13.5 | 4.5-13.5 |
| | Adult | 4.5-11.0 | 4.5-11.0 |
| | | **×1000 cells/mm³ (μl)** | **×10⁹ cells/L** |
| CSF | Premature | 0-25 mononuclear | 0-25 |
| | | 0-100 polymorphonuclear | 1-100 |
| | | 0-1000 RBC | 0-1000 |
| | Newborn | 0-20 mononuclear | 0-20 |
| | | 0-70 polymorphonuclear | 0-70 |
| | | 0-800 RBC | 0-800 |
| | Neonate | 0-5 mononuclear | 0-5 |
| | | 0-25 polymorphonuclear | 0-25 |
| | | 0-50 RBC | 0-50 |
| | Thereafter | 0-5 mononuclear | 0-5 |

| Test/Specimen | Age/Sex/Reference | Conventional Units | International Units (SI) |
|---|---|---|---|
| Leukocyte differential count | | | |
| Whole blood | Myelocytes | 0% | 0 cells/mm³ (μl) | Number fraction 0 |
| | Neutrophils—"bands" | 3%-5% | 150-400 cells/mm³ (μl) | Number fraction 0.03-0.05 |
| | Neutrophils—"segs" | 54%-62% | 3000-5800 cells/mm³ (μl) | Number fraction 0.54-0.62 |
| | Lymphocytes | 25%-33% | 1500-3000 cells/mm³ (μl) | Number fraction 0.25-0.33 |
| | Monocytes | 3%-7% | 285-500 cells/mm³ (μl) | Number fraction 0.03-0.07 |
| | Eosinophils | 1%-3% | 50-250 cells/mm³ (μl) | Number fraction 0.01-0.03 |
| | Basophils | 0%-0.75% | 15-50 cells/mm³ (μl) | Number fraction 0-0.0075 |
| Mean corpuscular hemoglobin (MCH) | | | |
| Whole blood | Birth | 31-37 pg/cell | 0.48-0.57 fmol/L |
| | 1-3 d (cap) | 31-37 pg/cell | 0.48-0.57 fmol/L |
| | 1 wk-1 mo | 28-40 pg/cell | 0.43-0.62 fmol/L |
| | 2 mo | 26-34 pg/cell | 0.40-0.53 fmol/L |
| | 3-6 mo | 25-35 pg/cell | 0.39-0.54 fmol/L |
| | 0.5-2 yr | 23-31 pg/cell | 0.36-0.48 fmol/L |
| | 2-6 yr | 24-30 pg/cell | 0.37-0.47 fmol/L |
| | 6-12 yr | 25-33 pg/cell | 0.39-0.51 fmol/L |
| | 12-18 yr | 25-35 pg/cell | 0.39-0.54 fmol/L |
| | 18-49 yr | 26-34 pg/cell | 0.40-0.53 fmol/L |

| Test/Specimen | Age/Sex/Reference | Conventional Units<br>Normal Ranges | International Units (SI)<br>Normal Ranges |
|---|---|---|---|
| Mean corpuscular hemoglobin concentration (MCHC) | | | |
| Whole blood | Birth | 30%-36% Hb/cell or g Hb/dl RBC | 4.65-5.58 mmol or Hb/L RBC |
| | 1-3 d (cap) | 29%-37% Hb/cell or g Hb/dl RBC | 4.50-5.74 mmol or Hb/L RBC |
| | 1-2 wk | 28%-38% Hb/cell or g Hb/dl RBC | 4.34-5.89 mmol or Hb/L RBC |
| | 1-2 mo | 29%-37% Hb/cell or g Hb/dl RBC | 4.50-5.74 mmol or Hb/L RBC |
| | 3 mo-2 yr | 30%-36% Hb/cell or g Hb/dl RBC | 4.65-5.58 mmol or Hb/L RBC |
| | 2-18 yr | 31%-37% Hb/cell or g Hb/dl RBC | 4.81-5.74 mmol or Hb/L RBC |
| | >18 yr | 31%-37% Hb/cell or g Hb/dl RBC | 4.81-5.74 mmol or Hb/L RBC |
| Mean corpuscular volume (MCV) | | | |
| Whole blood | 1-3 d (cap) | 95-121 $\mu m^3$ | 95-121 fl |
| | 0.5-2 yr | 70-86 $\mu m^3$ | 70-86 fl |
| | 6-12 yr | 77-95 $\mu m^3$ | 77-95 fl |
| | 12-18 yr: Male | 78-98 $\mu m^3$ | 78-98 fl |
| | Female | 78-102 $\mu m^3$ | 78-102 fl |
| Osmolality | | | |
| Serum | Child, adult: | 275-295 mOsmol/kg $H_2O$ | |
| Urine, random | | 50-1400 mOsmol/kg $H_2O$, depending on fluid intake; after 12 hr fluid restriction: >850 mOsmol/kg $H_2O$ | |
| Urine, 24 hr | | ≈300-900 mOsmol/kg $H_2O$ | |
| Oxygen, partial pressure ($Po_2$) | | | |
| Whole blood, arterial | Birth | 8-24 mm Hg | 1.1-3.2 kPa |
| | 5-10 min | 33-75 mm Hg | 4.4-10.0 kPa |
| | 30 min | 31-85 mm Hg | 4.1-11.3 kPa |
| | >1 hr | 55-80 mm Hg | 7.3-10.6 kPa |
| | 1 d | 54-95 mm Hg | 7.2-12.6 kPa |
| | Thereafter (decreases with age) | 83-108 mm Hg | 11-14.4 kPa |
| Oxygen saturation ($Sao_2$) | | | |
| Whole blood, arterial | Newborn | 85%-90% | Fraction saturated 0.85-0.90 |
| | Thereafter | 95%-99% | Fraction saturated 0.95-0.99 |
| Partial thromboplastin time (PTT) | | | |
| Whole blood (Na citrate) | | | |
| Nonactivated | | 60-85 s (Platelin) | 60-85 s |
| Activated | | 25-35 s (differs with method) | 25-35 s |
| pH | | | **H+ concentration** |
| Whole blood, arterial | Premature (48 hr) | 7.35-7.50 | 31-44 nmol/L |
| | Birth, full term | 7.11-7.36 | 43-77 nmol/L |
| | 5-10 min | 7.09-7.30 | 50-81 nmol/L |
| | 30 min | 7.21-7.38 | 41-61 nmol/L |
| | >1 hr | 7.26-7.49 | 32-54 nmol/L |
| | 1 d | 7.29-7.45 | 35-51 nmol/L |
| | Thereafter | 7.35-7.45 | 35-44 nmol/L |
| | Must be corrected for body temperature | | |

*Continued*