

Normal & Critical Lab Values

General Chemistry

Note: Reference ranges vary according to brand of laboratory assay materials used. Check normal reference ranges from your facility's laboratory when evaluating results.

| Lab | Conventional | SI Units |
|-----------------------------------|--|--|
| Albumin | 3.5–5.0 g/100 mL | 35–50 g/L |
| Aldolase | 1.3–8.2 U/L | 22–137 nmol sec ⁻¹ /L |
| Alkaline phosphatase | 13–39 U/L, infants and adolescents up to 104 U/L | 217–650 nmol · sec ⁻¹ /L, up to 1.26 μmol/L |
| Ammonia | 12–55 μmol/L | 12–55 μmol/L |
| Amylase | 4–25 units/mL | 4–25 arb. unit |
| Anion gap | 8–16 mEq/L | 8–16 mmol/L |
| AST, SGOT | Male: 8–46 U/L Female: 7–34 U/L | 0.14–0.78 μkat/L 0.12–0.58 μkat/L |
| Bilirubin, direct | up to 0.4 mg/100 mL | Up to 7 μmol/L |
| Bilirubin, total | up to 1.0 mg/100 mL | Up to 17 μmol/L |
| BUN | 8–25 mg/100 mL | 2.9–8.9 mmol/L |
| Ca ⁺ (calcium) | 8.5–10.5 mg/100 mL | 2.1–2.6 mmol/L |
| Calcitonin | Male: 0–14 pg/mL Female: 0–28 pg/mL | 0–4.1 pmol/L 0–8.2 pmol/L |
| Carbon dioxide (CO ₂) | 24–30 mEq/L | 24–30 mmol/L |
| Chloride (Cl ⁻) | 100–106 mEq/L | 100–106 mmol/L |
| Cholesterol | < 200 mg/dL | < 5.18 mmol/L |
| Cortisol | (AM) 5–25 μg/100 mL (PM) <10 μg/100 mL | 0.14–0.69 μmol/L 0–0.28 μmol/L |
| Creatine | Male: 0.2–0.5 mg/dL Female: 0.3–0.9 mg/dL | 15–40 μmol/L 25–70 μmol/L |

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General Chemistry (continued)

| Lab | Conventional | SI Units |
|------------------------------|---------------------------------------|--|
| Creatine kinase (CK) | Male: 17–148 U/L Female: 10–79 U/L | 283–2467 nmol sec ⁻¹ /L 167–1317 nmol sec ⁻¹ /L |
| Creatinine | 0.6–1.5 mg/100 mL | 53–133 μmol/L |
| Ferritin | 10–410 ng/dL | 10–410 μg/dL |
| Folate | 2.0–9.0 ng/mL | 4.5–0.4 nmol/L |
| Glucose | 70–110 mg/100 mL | 3.9–5.6 mmol/L |
| Ionized calcium | 4.25–5.25 mg/dL | 1.1–1.3 mmol/L |
| Iron (Fe) | 50–150 μg/100 mL | 9.0–26.9 μmol/L |
| Iron binding capacity (IBC) | 250–410 μg/100 mL | 44.8–73.4 μmol/L |
| K ⁺ (potassium) | 3.5–5.0 mEq/L | 3.5–5.0 mmol/L |
| Lactic acid | 0.6–1.8 mEq/L | 0.6–1.8 mmol/L |
| LDH (lactic dehydrogenase) | 45–90 U/L | 750–1500 nmol · sec ⁻¹ /L |
| Lipase | 2 units/mL or less | Up to 2 arb. unit |
| Magnesium | 1.5–2.0 mEq/L | 0.8–1.3 mmol/L |
| Mg ⁺⁺ (magnesium) | 1.5–2.0 mEq/L | 0.8–1.3 mmol/L |
| Na ⁺ (sodium) | 135–145 mEq/L | 135–145 mmol/L |
| Osmolality | 280–296 mOsm/kg water | 280–296 mmol/kg |
| Phosphorus | 3.0–4.5 mg/100 mL | 1.0–1.5 mmol/L |
| Potassium (K ⁺) | 3.5–5.0 mEq/L | 3.5–5.0 mmol/L |
| Prealbumin | 18–32 mg/dL | 180–320 mg/L |
| Protein, total | 6.0–8.4 g/100 mL | 60–84 g/L |
| PSA | < 4.0 ng/mL | < 4 μg/L |
| Pyruvate | 0–0.11 mEq/L | 0–0.11 mmol/L |

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General Chemistry (continued)

| Lab | Conventional | SI Units |
|---------------------------|---|------------------------------|
| Sodium (Na ⁺) | 135–145 mEq/L | 135–145 mmol/L |
| T3 | 75–195 ng/100 mL | 1.16–3.00 nmol/L |
| T4, free | Male: 0.8–1.8 ng/dL Female: 0.8–1.8 ng/dL | 10–23 pmol/L 10–23 pmol/L |
| T4, total | 4–12 µg/100 mL | 52–154 nmol/L |
| Thyroglobulin | 3–42 µ/mL | 3–42 µg/L |
| Triglycerides | 40–150 mg/100 mL | 0.4–1.5 g/L |
| TSH | 0.5–5.0 µU/mL | 0.5–5.0 arb. unit |
| Urea nitrogen | 8–25 mg/100 mL | 2.9–8.9 mmol/L |
| Uric acid | 3.0–7.0 mg/100 mL | 0.18–0.42 mmol/L |

Hematology (ABC, CBC, Blood Counts)

| Lab | Conventional | SI Units |
|-------------------------|--|--|
| Blood volume | 8.5%–9.0% of body weight in kg | 80–85 mL/kg |
| Red Blood Cell (RBC) | Male: 4.6–6.2 million/mm ³ Female: 4.2–5.9 million/mm ³ | 4.6–6.2 × 10 ¹² /L 4.2–5.9 × 10 ¹² /L |
| Hemoglobin (Hgb) | Male: 13–18 g/100 mL Female: 12–16g/100mL | Male: 8.1–11.2 mmol/L Female: 7.4–9.9 mmol/L |
| Hematocrit (Hct) | Male: 45%–52% Female: 37%–48% | Male: 0.45–0.52 Female: 0.37–0.48 |
| Leukocytes (WBC) | 4,300–10,800/mm ³ | 4.3–10.8 × 10 ⁹ /L |

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Hematology (ABC, CBC, Blood Counts) (cont'd)

| Lab | Conventional | SI Units |
|--------------------------------------|--|--|
| ■ Bands | 0–5% | $0.03–0.08 \times 10^9/L$ |
| ■ Basophils | 0–1% | $0–0.01 \times 10^9/L$ |
| ■ Eosinophils | 1%–4% | $0.01–0.04 \times 10^9/L$ |
| ■ Lymphocytes | 25%–40% | $0.25–0.40 \times 10^9/L$ |
| ■ B-Lymphocytes | 10%–20% | $0.10–0.20 \times 10^9/L$ |
| ■ T-Lymphocytes | 60%–80% | $0.60–0.80 \times 10^9/L$ |
| ■ Monocytes | 2%–8% | $0.02–0.08 \times 10^9/L$ |
| ■ Neutrophils | 54%–75% | $0.54–0.75 \times 10^9/L$ |
| Platelets | 150,000–350,000/mm ³ | $150–350 \times 10^9/L$ |
| Erythrocyte Sedimentation Rate (ESR) | Male: 1–13 mm/hr Female: 1–20 mm/hr | Male: 1–13 mm/hr Female: 1–20 mm/hr |

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Lipids (Cholesterol)

| | | |
|---------------|---------------------|------------------|
| Total | less than 200 mg/dL | < 5.20 mmol/L |
| HDL | 30–75 mg/dL | 0.80–2.05 mmol/L |
| LDL | less than 130 mg/dL | 1.55–4.65 mmol/L |
| Triglycerides | 40–150 mg/100 mL | 0.4–1.5 g/L |

Cardiac Enzyme Markers

| Enzyme | Conventional | SI Units |
|------------|--------------|-------------|
| Troponin-I | 0–0.1 ng/mL | 0–0.1 µg/L |
| Troponin-T | < 0.18 ng/mL | < 0.18 µg/L |
| CPK | <150 U/L | <150 U/L |
| CPK-MB | 0–5 ng/mL | 0–5 µg/L |
| SGOT | 1–36 U/L | 1–36 U/L |

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Cardiac Enzyme Markers (continued)

| Enzyme | Conventional | SI Units | |
|--------------|------------------------------|--|------------|
| LDH | 45–90 μL | 750–1500 $\text{nmol sec}^{-1}/\text{L}$ | |
| Myoglobin | Male: 10–95 ng/mL | 10–95 $\mu\text{g/L}$ | |
| | Female: 10–65 ng/mL | 10–65 $\mu\text{g/L}$ | |
| | | | |
| Progression→ | Onset | Peak | Duration |
| Troponin-I | 3–6 hrs | 12–24 hrs | 4–6 days |
| Troponin-T | 3–5 hrs | 24 hrs | 10–15 days |
| CPK | 4–6 hrs | 10–24 hrs | 3–4 days |
| CPK-MB | 4–6 hrs | 14–20 hrs | 2–3 days |
| SGOT | 12–18 hrs | 12–48 hrs | 3–4 days |
| LDH | 3–6 days | 3–6 days | 7–10 days |
| Myoglobin | 2–4 hrs | 6–10 hrs | 12–36 hrs |

Fb@DrugsBank

Coagulation

| Lab | Conventional | SI Units |
|------------------------------------|--------------------------------|-------------------------|
| ACT | 90–130 sec | 90–130 sec |
| PTT (activated) | 21–35 sec | 21–35 sec |
| Bleeding Time | 3–7 min | 3–7 min |
| Fibrinogen | 160–450 mg/dL | 1.6–4.5 g/L |
| INR | Target therapeutic: 2–3 | Target therapeutic: 2–3 |
| Plasminogen | 62%–130% | 0.62–1.30 |
| Platelets | 150,000–300,000/ mm^3 | $\times 10^9/\text{L}$ |
| PT (prothrombin time) | 10–12 sec | 10–12 sec |
| PTT (partial thrombo-plastin time) | 30–45 sec | 30–45 sec |
| Thrombin Time | 11–15 sec | 11–15 sec |

DIC Panel—Disseminated Intravascular

Coagulopathy

| Lab | Conventional | SI Units |
|---------------|---------------|-------------|
| PT | 10–12 sec | 10–12 sec |
| PTT | 30–45 sec | 30–45 sec |
| Fibrinogen | 160–450 mg/dL | 1.6–4.5 g/L |
| Thrombin Time | 11–15 sec | 11–15 sec |
| D-Dimer | < 20 | > 2000 µg/L |

Cerebrospinal Fluid (CSF)

| | | |
|----------------------|---------------------------------------|------------------|
| Color | Clear | Clear |
| Pressure | 75–200 mm H ₂ O | |
| Cell Count and Diff. | 0–5 cells (zero RBCs or granulocytes) | |
| Protein | 15–45 mg/dL | 0.15–0.45 g/L |
| A:G Ratio | 8:1 | |
| IgG | 3%–12% of total protein | |
| Glucose | 40–80 mg/dL | 2.22–4.44 mmol/L |
| Lactate | 10–20 mg/dL | 1.1–2.2 mmol/L |
| Urea | 10–15 mg/dL | 3.6–5.3 mmol/L |
| Glutamine | < 20 mg/dL | < 1370 µmol/L |

Thyroid Panel

| | | |
|---|-----------------|-------------------|
| T ₃ Total | 75–195 ng/100mL | 1.16–3.00 nmol/L |
| T ₃ Uptake (RT ₃ U) | 25%–35% | 0.25–0.35 |
| T ₃ Uptake Ratio | 0.1–1.35 | 0.1–0.35 |
| T ₄ Total | 4–12 µg/100 mL | 52–154 nmol/L |
| T ₄ Free | 0.9–2.3 ng/dL | 10–30 nm/L |
| TSH | 0.5–5.0 µU/mL | 0.5–5.0 arb. unit |

CRITICAL LAB VALUES

Lab Values

Critical Values

BMP-

| | | | |
|---------------|--------|------------------|-----------------------|
| Calcium | | 8.6 - 10 mg/dl | ≤ 8 mg/dl, ≥ 13 mg/dl |
| Cl- | | 99 - 109 | < 80, > 115 mEq/L |
| Gluc. | | 74 - 106 mg/dl | < 40, > 450 mg/dl |
| K+ | | 3.5 - 5.5 | < 2.8, ≥ 6.2 |
| Na++ | | 132 - 146 mEq/L | ≤ 120, ≥ 160 mEq/L |
| BUN | | 9 - 23 | ≥ 80 mg/dl |
| Creat. | Female | 0.5 - 1.1 mg/dl, | > 4 mg/dl |
| | Male | 0.7 - 1.3 mg/dl | |
| Total Protein | | 6.4 - 8.3 g/L | |
| Albumin | | 3.2 - 4.8 g/L | |

CBC

| | | | |
|----------------|--------|-------------------|---|
| Hgb | | 12.0 - 16.0 | ≤ 6.0 g/dl, ≥ 20 g/dl |
| Hct | Female | 37 - 47, | ≤ 18%, > 60% |
| | Male | 40 - 54 | |
| WBC | | 5.2 - 12.4 | ≤ 2.0, ≥ 30,000 |
| RBC | Female | 4.2 - 5.4, | |
| | Male | 4.6 - 6.19 | |
| Platelets | | 130,000 - 400,000 | ≤ 40,000, ≥ 999,000 |
| Ultra-Troponin | | 0.006 - 0.039 | 0.040 - 0.779 (high) > 0.78 (Critical) |

Serum Drug Levels

| | | |
|-----------------------------|---|--------------|
| Carbamazepine (Tegretol) | 4 - 10 mcg/ml | > 15 mcg/ml |
| Digoxin (Lanoxin) | 0.8 - 2.0 mg/dl | > 2.0 mg/dl |
| Gentamycin | peak - 5 - 10 mcg/ml valley - < 2.0 mcg/ml | > 10 mcg/ml |
| Phenobarbital | 15 - 40 mcg/ml | > 40 mcg/ml |
| Phenytoin (Dilantin) | 10 - 20 mcg/ml | > 20 mcg/ml |
| Theophylline (Aminophyllin) | 10 - 20 mcg/ml | > 20 mcg/ml |
| Tobramycin | peak - 5 - 10 mcg/ml valley - 0.5 - 2.0 mcg/ml | > 10 mcg/ml |
| Valproic Acid (Depakene) | 50 - 100 mcg/ml | > 125 mcg/ml |
| Vancomycin | peak - 25 - 40 mcg/ml valley - 5 - 15 mcg/ml | > 30 mcg/ml |

Anticoagulant Related and Clotting

| | | |
|--------------------------|------------------|--|
| PT | 9.0 - 11.7 sec. | > 80 sec. |
| INR (Coumadin) | 0.9 - 1.2 | > 6 |
| PTT (Heparin Monitoring) | 55.0 - 75.0 sec. | > 70 sec. |
| APTT (therapeutic) | 23.3 - 31.9 sec. | SJH ≤ 19 sec, ≥ 100 SJE No Low, ≥ 100 |
| Fibrinogen Level | 203 - 377 mg/dl | ≤ 100.0, ≥ 600.0 mg/dl |

ABG's -norms:

| | | | | | |
|-------------------|-------------|------------------|----------|--------------------|---------|
| pH | 7.35 - 7.45 | P O ₂ | 80 - 100 | BE | -2 / +2 |
| P CO ₂ | 35 - 45 | HCO ₃ | 22 - 26 | O _{2 sat} | > 95 |

Complete Blood Count (CBC)



| | |
|-------------|--|
| RBC | 4.5~5.0 million |
| WBC | 4,000~10,000 cells/ml |
| Neutrophils | 55-70% cells/ml |
| Lymphocytes | 20-40% cells/ml |
| Monocytes | 2-8% cells/ml |
| Eosinophils | 1-4 % cells/ml |
| Basophils | 0.5-1% cells/ml |
| Hemoglobin | 14-18 g/dl (men) 12-16 g/dl (women) |
| Hematocrit | 42-52% (men) 37-47% (women) |
| Platelets | 150,000-400,000 |

Comprehensive Metabolic Panel (CMP)

| | |
|------------|---------------|
| Sodium | 135-145 mEq/L |
| Potassium | 3.5-5.0 mEq/L |
| Chloride | 98-110 mEq/L |
| Calcium | 9-10.5 mg/dl |
| Magnesium | 1.3-2.1 mEq/L |
| Phosphorus | 3-4.5 mg/dl |
| Glucose | 70-110 mg/dl |
| BUN | 70-110 mg/dl |
| Creatinine | 0.5-1.4 mg/dl |
| Protein | 6.4-8.3 g/dl |
| Albumin | 3.5-5.0 g/dl |
| Bilirubin | 0.3-1 mg/dl |
| Alkaline | 30-120 U/L |
| ALT | 4-36 U/L |
| AST | 0-35 U/L |



Other



| | |
|--------------------------------|--|
| Triglycerides | 30-150 mg/dl |
| Total cholesterol | <200 mg/dl |
| HDL | >60 mg/dl |
| LDL | <130 mg/dl |
| Lactate | 0.5-2.2 mmol/L |
| HgB A1C | 30-150 mg/dl |
| Diabetic goal | 3<7% |
| TSH | 0.35-4.94µIU/ml |
| Free T4 | 0.7-1.8 ng/dl |
| Free T3 | 0.35-4.94µIU/ml |
| Uric Acid | 3.5-7.5 mg/dl |
| Erythrocyte sedimentation rate | <20mm/hour |
| Amylase | 25-120 U/L |
| Lipase | 0-160 U/L |
| Myoglobin | <90 mcg/L |
| Ammonia | 10-80mcg/dl |
| Iron | 80-180 mcg/dl (male) 60-160 mcg/dl (female) |

Arterial Blood Gas (ABG)



| | |
|------------------|-------------|
| pH | 7.35-7.45 |
| pCO ₂ | 35-45 mmHg |
| pO ₂ | 75-100 mmHg |
| HCO ₃ | 22-28 mEq/L |
| SaO ₂ | 93-100% |

Cardiac



| | |
|---------------------|-----------------|
| Trop | <0.3 ng/ml |
| BNP | <100 pg/ml |
| CK | 50-150 U/L |
| C-reactive protein | <1.0 mg/dl |
| Lactate | |
| dehydrogenase (LDH) | 11-12.5 seconds |

Coagulation



| | |
|---------|--|
| PT | 11-12.5 seconds |
| INR | 0.9-1.2 seconds 2.0-3.0 (A-fib) 2.5-3.5 (Mechanical valve) |
| aPTT | 30-40 seconds |
| D-Dimer | <0.5 mg/L |

NORMAL VALUES

Prothrombin Time (PT): 10-14 seconds

APTT: 35-45 seconds

Bleeding Time (BT): < 7 min

Thrombin Time (TT): 10-15 seconds