

Clinical Values for Case Study Problem-Solving

COMPLETE BLOOD COUNT (CBC)	
Hematocrit (Hct), whole blood	Males: 39-49% Females: 35-45%
Hemoglobin, total (Hb), whole blood Males: 13.6-17.5 g/dL	Males: 13.6-17.5 g/dL Females: 12.0-15.5 g/dL Panic: <7.1 g/dL
Mean corpuscular hemoglobin (MCH), whole blood	26-34 pg
Mean corpuscular hemoglobin concentration (MCHC), whole blood	31-36 g/dL,
Mean corpuscular volume (MCV), whole blood	80-100 fL
Basophil count, whole blood	10-120/cu mm
Eosinophil count, whole blood	40-500/cu mm
Lymphocyte count, whole blood	800-3,500/cu mm
Monocyte count, whole blood	200-800/cu mm
Platelet (Plt) count, whole blood	150,000-450,000/cu mm Panic: <25,000/cu mm
Red blood cell (RBC) count, whole blood	4.7-6.1 million/cu mm
Reticulocyte count, whole blood 33,000-137,000/cu m	33,000-137,000/cu mm
White blood cell (WBC) count, whole blood	4,800-10,800/cu mm
White blood cell (WBC) count, whole blood	Neutrophils (segs), 57-67% Lymphocytes, 25-33% Monocytes/macrophages: 3-7% Eosinophils: 1-4% Basophils: 0-1 %
ELECTROLYTES	
Bicarbonate (HCO ₃ ⁻), carbon dioxide total, serum	22-32 meq/L Panic: < 15 or >40 meq/
Calcium (Ca ⁺²), serum	8.5-10.5 mg/dL Panic: <6.5 or > 13.5 mg/dL
Chloride (Cl ⁻), serum	101-112 meq/L Panic: <6.5 or > 13.5 mg/dL
Magnesium (Mg ⁺²), serum	1.8-3.0 mg/dL Panic: <0.5 or >4.5 mg/dL
Phosphate (PO ₄ ⁻³), serum	2.5-4.5 mg/dL

	Panic: <LO mg/dL
Potassium (K+), serum	3.5-5.0 meq/L Panic: <3.0 or >6.0 meq/L
Sodium (Na+), serum	135-145 meq/L Panic: <125 or >155 meq/L
RENAL FUNCTION TEST	
Blood urea nitrogen (BUN), serum	8-20 mg/dL
Creatinine (Cr), serum	0.6-1.2 mg/dL
LIVER FUNCTION TESTS	
Alanine aminotransferase (ALT), serum	7-56 IU/L
Alkaline phosphatase (Alk Phos), serum	41-133 IU/L
Aspartate aminotransferase (AST), serum	0-35 IU/L
Gamma-glutamyl transferase (GGT), serum	9-85 IU/L
Bilirubin, total, serum	0.1-1.2 mg/dL
Bilirubin, direct or conjugated, serum	0-0.5 mg/dL
Bilirubin, indirect or unconjugated, serum	0.1-0.7 mg/dL
THYROID FUNCTION TESTS	
Thyroid-stimulating hormone (TSH), serum	0.4-6 µU/mL
Thyroxine, free (FT4), serum	9-24 pmol/L
Thyroxine, total (T4), serum	5-11 µg/dL
Triiodothyronine, total (T3), serum	95-190 ng/dL
Radioactive iodine (I123) uptake	– 12-20% uptake by thyroid gland in 6 hrs – 5-25% uptake by thyroid gland in 24 hrs
TESTS FOR IRON IN THE BLOOD	
Ferritin, serum	Males: 16-300ng/mL Females: 4-161 ng/mL
Free erythrocyte protoporphyrin (FEP), whole blood	<35 µg/dL
Iron (Fe ²⁺), serum	50-175 µg/dL
Iron-binding capacity, total (TIBC), serum	250-460 µg/dL
Transferrin saturation	30-50%
ARTERIAL BLOOD GAS ASSESSMENT	
Effect of altitude on PaO ₂ , pH 7.40/38.0°C	PaO ₂
Sea level	99 mm Hg
2,000 feet	88 mm Hg
4,000 feet	77 mm Hg
6,000 feet	68 mm Hg
8,000 feet	58 mm Hg
10,000 feet	50 mm Hg
15,000 feet	30 mm Hg

Effect of PaO ₂ , on % saturation of hemoglobin, SaO ₂	% saturation of hemoglobin, SaO ₂
100 mm Hg	97.5%
90 mm Hg	96.5%
80 mm Hg	94.5%
70 mm Hg	92.7%
60 mm Hg critical	89.0%
50 mm Hg	83.5%
40 mm Hg	75.0%
30 mm Hg	57.0%
20 mm Hg	35.0%
10 mm Hg	13.5%

HORMONE ASSAYS

Adrenocorticotrophic hormone (ACTH), plasma	9-52 pg/mL
Calcitonin, plasma	Males: 0-11.5 pg/mL Females: 0-4.6 pg/mL
Cortisol, serum	8 AM: 5-20 µg/dL
Dehydroepiandrosterone sulfate (DHEAS), serum	1-12 µmol/L
Follicle-stimulating hormone (FSH), serum	Female Follicular phase: 4-13 mU/mL Luteal phase: 2-13 mU/mL Midcycle: 5-22 mU/rnL Postmenopause: 30-138 mU/mL Male: 1-10 mU/mL
Human chorionic gonadotropin, 13 subunit (13-HCG), serum	0-4 mU/mL
Insulin (Ins), serum	6-35 µU/mL
Luteinizing hormone (LH), serum	Female Follicular phase: 1-18 mU/mL Luteal phase: 0.4-20 mU/mL Midcycle: 24-105 mU/mL Postmenopause: 15-62 mU/mL Male: 1-10 mU/mL
Parathyroid hormone (PTH), serum	11-54 pg/mL
Prolactin (PRL), serum	<20 ng/mL
Testosterone, serum	Males: 175-781 ng/dL Females: 10-75 ng/dL

Lipids	
Cholesterol, serum	Desirable: <200 mg/dL Borderline: 200-239 mg/dL High risk: >240 mg/dL
High-density lipoprotein (HDL) cholesterol, serum	Desirable: >40 mg/dL in men and >50 mg/dL in women
Low-density lipoprotein (LDL) cholesterol, serum	<130 mg/dL Desirable Very high risk (has both cardiovascular disease and diabetes mellitus) <70 mg/dL High risk (has cardiovascular disease) <100 mg/dL Moderate risk (2 or more risk factors) <130 mg/dL Low risk (0-1 risk factors) <160 mg/dL
Triglycerides (Trig), serum	<165 mg/dL
CARDIAC MARKERS	
Creatine kinase (CK), serum	32-267 IU/L
Creatine kinase MB (CK-MB), serum	<16 IU/L
Troponin I, serum	<0.05 ng/mL
VITAMINS	
Folic acid, whole blood	165-760 ng/mL
Vitamin A, serum	3.-65 mg/dL
Vitamin B12, serum	140-820 pg/mL
Vitamin D, 25OH, serum	10-50 ng/mL
Vitamin D, 1,25OH, serum	20-76 pg/mL
Vitamin E, serum	0.5-0.7 mg/dL
BLOOD CLOTTING ASSESSMENT	
International normalized ratio (INR)	Approximately 1.0 in healthy patients not receiving anti-coagulant therapy; INR >2.0 suggests liver dysfunction Ideal target for warfarin prophylaxis and treatment of DVT = 2.5 (range 2.0-3.0) Ideal target for patients with prosthetic cardiac valves = 2.5-3.5 INR = (PT Patient/pTControl)ISI ISR = International Sensitivity Index (Each manufactured thromboplastin reagent has an ISI that should be used to calculate the INR.)
Partial thromboplastin time, activated	25-35 seconds

(PTT), plasma	Panic: ≥60 seconds
Prothrombin time (PT), whole blood	11-15 seconds Panic: ≥30 seconds

MISCELLANEOUS BLOOD TESTS

Albumin (Alb), serum	3.4-4.7 g/dL
Alpha-1-Antitrypsin (AAT), serum	110-270 mg/dL
a-Fetoprotein (AFP), serum	0-15 ng/mL
Ammonia (NH ₃), plasma	18-60 µg/dL
Amylase, serum	20-110 IU/L
Anion gap	6-12 meq/L
Carcinoembryonic antigen (CEA), serum	0-5 ng/mL
Ceruloplasmin, serum	20-60 mg/dL
C-reactive protein (CRP), plasma	0-0.5 mg/dL
Erythrocyte sedimentation rate (ESR), whole blood	Males: <10 mm/hr Females: < 15 mm/hr
Glucose (Glu), serum, fasting	60-110 mg/dL Panic: <40 or >500 mg/dL
Glucose, 2-hr post-prandial blood (PPBG)	<150 mg/dL >200 mg/dL suggests diabetes mellitus
Glycosylated hemoglobin (HbA _{1c}), serum	3.9-6.9%
Homocysteine (Homocys), serum	3.3-10.4 µmol/L
Lactate dehydrogenase (LDH), serum	88-230 IU/L
Methylmalonic acid (MMA), serum	0-0.05 mg/L
Osmolality, serum	273-293 mmol/kg H ₂ O Panic: <240 or >320 mmol/kg H ₂ O
Prostate-specific antigen (PSA), serum	Ages 40-49: 0-2.4 ng/mL Ages 50-59: 0-3.4 ng/mL Ages 60-69: 0-4.4 ng/mL Ages 70-79: 0-5.4 ng/mL
Protein, total, serum	6.0-8.0 g/dL
Uric acid, serum	Males: 2.4-7.4 mg/dL Females: 1.4-5.8 mg/dL

CEREBROSPINAL FLUID ANALYSIS

Glucose	50-70% of patient's serum glucose concentration
Lumbar puncture CSF appearance	Clear and colorless
Protein	15-45 mg/dL
Red blood cell (RBC) count	0/cu mm
White blood cell (WBC) count	0-6/cu mm

Lymphocyte count	0-5/cu mm
KNEE JOINT FLUID ANALYSIS	
Volume	<3.5 mL
Clarity	Transparent
Color	Colorless
White blood cell count	200-300/cu mm
Neutrophils and macrophages	<25%
Culture	Negative
Glucose	Approximately equal to serum glucose concentration
URINALYSIS	
pH	5.0-6.5
Specific gravity (SG)	1.016-1.022
Red blood cells (RBC)	0-5 RBC/high power field (HPF)
White blood cells (WBC)	0-5 WBC/HPF
Acetone (ketones)	Negative
Amylase	4-400 IU/L
Calcium excreted per 24 hrs	100-300 mg/24 hrs
Chloride	Depends on diet
Citrate excreted per 24 hrs	287-708 mg/24 hrs
Cortisol (free) excreted per 24 hrs	10-110 µg/24 hrs
Creatinine excreted per 24 hrs	15-25 mg/kg/24 hrs
Dopamine excreted per 24 hours	52-480 µg/24 hrs
Epinephrine excreted per 24 hrs	2-24 µg/24 hrs
Glucose	<0.05 g/dL
Microalbumin	<20 µg/mL
Norepinephrine excreted per 24 hrs	15-100 µg/24 hrs
Osmolality	100-900 mOsm/kg H ₂ O
Phosphorus excreted per 24 hrs	1 g/24 hrs
Potassium	Depends on diet
Protein, total, excreted per 24 hrs	<165 mg/24 hrs
Sodium	Depends on diet
Urea nitrogen excreted per 24 hrs	6-17 g/24 hrs
Urine volume per 24 hrs	1-2 L/24 hrs

VITAL SIGNS	
Heart rate	60-90 bpm
Heart rate, during sleep	50-60 bpm
Heart rate, conditioned athlete	40-60 bpm
Bradycardia	<60 bpm in non-athletes
Tachycardia	>100 bpm
Body mass index (BMI) = weight (kg) / [height (m)] ² 1 = 2.2 lb 1 m = 39.37 in	<18.5 = underweight 18.5-24.9 = healthy weight 25.0 – 29.9 = overweight 30.0-34.9= obesity, class I 35.0-39.9 = obesity, class II >40.0 = obesity, class III
Respiratory rate, at rest	12-14/min
Tachypnea	>16/min
Systolic blood pressure	90-130 mm
Diastolic blood pressure	<85 mm
Hypotension	Systolic BP <90 mm
Potentially hypertensive	140/90 mm
High-normal blood pressure	130-139/85-89 mm
Stage 1 hypertension	140-159/90-99 mm
Stage 2 hypertension	≥160/100 mm

Note. Laboratory values from “100 case Studies in Pathophysiology” by HJ Bruyere, Jr (2008)

Weight - http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html