EducationRN
Lab Analysis Cheat Sheet

Blood Count

WBC 5,000-10,000 mm³	↑: infections, autoimmune disorders, inflammation, and leukemia
	↓: prolonged infection, bone marrow suppression, immunosuppression
Neutrophils ~ 50%-70% Normal ANC: 3000-7000 cells/µl	↑: inflammation, bacterial infections, malignancy, glucocorticoid use, and stress (rare, and it should rapidly return to a normal level if no infection is present)
	↓: bone marrow suppression - adverse effect of treatments (nonsteroidal anti-inflammatory drugs, acetaminophen, chemotherapy agents, radiation).
Band <6%	↑: is called left shift = serious bacterial infections
Lymphocytes 20%-35% 1500-3000 cells/µl	↑: viral hepatitis, mumps, mononucleosis, and autoimmune and connective tissue diseases, including lupus, rheumatoid arthritis, sarcoidosis, and ulcerative colitis
	↓: HIV/AIDS, glucocorticoid use, advanced tuberculosis, and rare congenital disorders, severe burns, cancer, radiation, age-related decreased production.
Monocytes 3%-8% 100-700 cells/µl	↑: leukemia, ulcerative colitis, viral diseases (like mononucleosis and herpes zoster), and chronic inflammation
	↓: bone marrow failure or suppression, and corticosteroid excess.
Eosinophils 1%-3% 100-400 cells/µl	↑: parasites, allergies, collagen diseases, problems with the spleen and central nervous system.
	↓: aplastic anemia, corticosteroid excess (due to either stress or adrenocortical hyperfunction or medication)
Basophils 0.4%-1% 20-50 cells/µl	↑: allergies, chronic inflammatory disorders, infection, and hypersensitivity reactions.
	↓: alcoholism, anemia, malnutrition, viral infections, and increased adrenal steroids.
RBC **W: 4.2 – 5.4 M/uL** **M: 4.7 – 6.1 M/uL**	↑: high altitudes, post-strenuous physical exercise, chronic anoxia (COPD), dehydration, and polycythemia or erythrocytosis.
	↓: renal disease, anemia (hemorrhage, destruction of erythrocytes, a dietary deficiency - especially iron, folic acid, and vitamin B_{12}), genetic aberrations like sickle cell anemia, drug/treatment induced bone marrow suppression, bone marrow failure, leukemia, overhydration.
Hgb W: 12-16 g/dL M: 14-18 g/dL	(↑ or ↓ same as RBCs)
Hct W: 37%-47% M: 42%-52%	(↑ or ↓ same as RBCs)
MCV W: 78-102 M: 78-100	↑: pernicious anemia and folic acid deficiencies
	↓: iron deficiency anemia and lead poisoning
MCH 25-35	(↑ or ↓ same as MCV)
MCHV 31%-37%	↑: spherocytosis or anemia
	↓: iron deficiency anemia and hemoglobinopathy
Reticulocytes 0.5%-2.5%	↑: hemolysis, blood loss, therapeutic response inducing production of RBC
	↓: decreased RBC production (i.e., pernicious anemia, age, bone marrow suppression)
ESR (Sed rate) <20 mm/hr	↑: inflammation; Autoimmune disorder; Infection
	↓: Sickle Cell; Polycythemia, condition resulting in increased Hgb and RBC count
PLT	↑: polycythemia vera, malignancy, infections, splenectomy (sometimes high

150,000-400,000 mm3	altitudes, strenuous exercise, and certain drugs can increase the count)
	↓: suppressed bone marrow function, autoimmune disease, hemorrhage, iron deficiency anemia, hypersplenism, splenomegaly, and drug side effects.

Chemistry

Potassium 3.5 – 5 mEq/L	↑: renal failure, burns, increased intake, metabolic acidosis, dehydration, muscle necrosis,
	↓: diuretics, vomiting/diarrhea, poor intake, metabolic alkalosis, CHF (fluid retention- hemodilution)
Sodium 136-145 mEq/L	↑: dehydration, excessive fluid loss, high sodium intake, fever
	↓: diuretics, vomiting/diarrhea, low intake, hemodilution,
Calcium 9-10.5 mg/dL	↑: bone disease, parathyroid disorder, thiazide diuretics, cancer, dehydration, Vit D toxicity
	↓: liver disease, renal disease, malnutrition, acute pancreatitis, massive blood transfusions, vit. D deficiency
Phosphate 3-4.5 mg/dL	↑: renal disease, hypoparathyroidism, hypocalcemia
	↓: hyperparathyroidism, diabetic coma, malnutrition, hypercalcemia
Magnesium 1.3-2.1 mEq/dL	↑: renal failure, diabetic acidosis, hypothyroidism
	↓: hemodialysis, blood transfusions, CRF, burns, alcoholism
Phosphorus 3-4.5 mg/dL	↑: bone metastases, DKA, ↑vit K, hyperthermia, hypocalcemia, hypoparathyroidism, lactic acidosis, PE, renal failure, resp acidosis
	↓: gout, ETOH withdrawal, septicemia, growth hormone deficiency, dietary, hyperinsulinism, hyperparathyroidism, hypokalemia, impaired renal absorption, renal defects, resp. Alkalosis, resp. Infections, PTH producing tumors, burns, Vit D deficiency
Glucose Fasting 70-105 mg/dL	↑: diabetes mellitus, stress (physical and emotional), corticosteroids, severe renal disease
	↓: hypoglycemia, poor PO intake, excessive insulin intake, malabsorption syndromes
HgbA1C 4-6%	↑: >6% poor controlled diabetes mellitus
	↓: <4% CRF, chronic blood loss
BUN 10-20 mg/dL	↑: hypovolemia, renal failure, CHF (decreased renal flow), diabetes
	↓: inadequate protein intake, malabsorption syndromes, liver disease
Creatinine W:0.5-1.1 mg/dL M:0.6-1.2 mg/dL	↑: dehydration, renal disease, CHF
	↓: inadequate protein intake, decreased muscle mass, liver disease
ALT 10-60 U/L	↑: hepatitis, cirrhosis, liver cancer, MI, pancreatitis, biliary duct obstruction,
	↓: malnutrition, UTI
AST 8-20 U/L	↑: hepatitis, ETOH abuse, cancer, liver damage, pancreatitis, biliary duct obstruction, CHF, cardiac damage
	↓: azotemia, renal disease
Ammonia 10-80 mcg/dL	↑: liver disease, renal disease
Bilirubin Total 0.1-1.0 mg/dL	↑: hepatic destruction, hemolytic anemias, pancreatic cancer, drugs
Albumin 3.5-5 g/dL	↑: IV albumin infusion, dehydration
	↓: malnutrition, burns, renal disease, Crohn's disease, liver disease
Protein 6-8 g/dL	↑: dehydration, inflammatory disease
	↓: severe liver disease, malnutrition, ETOH abuse, Crohn's disease

Blood Lipid Levels

Cholesterol <200 mg/dL	↑: alcoholism, high dietary intake, glomerulonephritis, hypothyroidism, CRF, obesity (effects: CV disease, atherosclerosis)
	↓: malabsorption, liver disease, starvation, hyperthyroidism
HDL **M: <45 mg/dL** **W: <55 mg/dL**	↑: chronic hepatitis, exercise (effects: lower risk for heart disease)
	↓: sedentary lifestyle, obesity, smoking, CRF (effects: increased risk for heart disease)
LDL <130 mg/dL	↑: familial, DM, CRF, high intake (effects: increased risk for heart disease)
	↓: acute stress, chronic anemia, chronic pulmonary disease, malnutrition, malabsorption, hyperthyroidism

Coagulation

PTT 30-40 seconds **aPTT 30-40 seconds**	↑: heparin, LMWH, clot busting drugs, hemophilia, severe liver disease, vitamin K deficiency, warfarin (lab not used to monitor warfarin, but it affects PTT as well)
	↓: end-stage cancer, pregnancy
PT 11-12.5 seconds **INR 0.8-1.1** **Therapeutical range 2-3**	↑: liver disease, biliary obstruction, vit. K deficiency, poor fat absorption, DIC, warfarin (INR is used to monitor therapeutic levels of med)
	↓: dehydration, high vit K levels

Arterial Blood Gases

pH 7.35 -7.45	↑: alkalosis
	↓: acidosis
PaCO$_2$ 35-45 mmHg	↑: hypercarbia
	↓: hyperventilation
HCO$_3$ 21-28 mEq/L	↑: metabolic alkalosis or compensated respiratory acidosis
	↓: metabolic acidosis or compensated respiratory alkalosis
PaO$_2$ 80-100%	↑: supplemental O$_2$
	↓: hypoxia, hypoxemia, COPD, pna
O$_2$ Saturation (SaO$_2$) 95-100%	↑: supplemental O$_2$
	↓: hypoxia, hypoxemia, COPD, pna

Urinalysis

Specific gravity 1.005 – 1.030	↑: diabetes mellitus, dehydration, radiopaque dye, CHF, vomiting/diarrhea
	↓: diabetes insipidus, diuretics, excessive water intake
Urine pH 4.6- 8.0	↑: Alkaline – prolonged standing urine, UTI, high intake of citrus fruit or vegetarian diet, respiratory or metabolic alkalosis
	↓: Acidic – diarrhea, starvation, UTI, cranberry juice, respiratory or metabolic acidosis
Urine WBC **W: 0-5 HPF** **M: 1-3 HPF**	Present: UTI, glomerulonephritis, pyelonephritis

Protein 0-8 mg/dL	Present: chronic kidney disease, fever, acute infections, trauma, stress, excessive exercise, diabetic neuropathy
Urine glucose 0.5 g/day	Positive: diabetes mellitus, brain tumors or injury