

## MALE AND FEMALE PANEL CHARTS

### Complete Blood Count (CBC)

| Test                                 | What this test measures   | What test results may indicate  |   |
|--------------------------------------|---|---|---|
|                                      |   | <i>Low values</i>   | <i>High values</i>  |
| <b>Red blood cell count</b>          | Total number of red blood cells per volume of whole blood   | Blood loss<br>Hemorrhage<br>Bone marrow failure<br>Deficiencies of iron, folate, or vitamins B6 or B12<br>Hemolysis<br>Certain cancers          | High altitude<br>Congenital heart disease<br>Cor pulmonale<br>Polycythemia vera<br>Pulmonary fibrosis<br>Dehydration        |
| <b>Hemoglobin</b>                    | Hemoglobin is the component of red blood cells that carries oxygen and carbon dioxide<br><br>Screens for anemia and may detect red blood cell breakdown or hemolytic anemia | Anemia<br>Blood loss<br>Deficiencies of iron, folate, or vitamins B6 or B12   | Sickle cell anemia<br>Thalassemia<br>Transfusion reaction<br>Hemolysis<br>Dehydration<br>Polycythemia vera<br>High altitude |
| <b>Hematocrit</b>                    | Measures proportion of red blood cells to plasma  | Anemia<br>Blood loss<br>Bone marrow failure<br>Hemolysis<br>Certain cancers<br>Deficiencies of iron, folate, or vitamins B6 or B12<br>Cirrhosis | Dehydration<br>Polycythemia vera<br>High altitude   |
| <b>Mean corpuscular volume (MCV)</b> | Calculates the size of red blood cells<br><br>Differential diagnosis of anemias<br><br>Screen for occult alcoholism   | Microcytic anemia<br>Iron deficiency<br>Thalassemia ssemia  | Macrocytic anemia<br>Folic acid or B12 deficiency<br>Alcohol abuse<br>Hereditary spherocytosis                              |

| Test   | What this test measures  | What test results may indicate   |   |  |  |
|--|--|--|---|--|--|
|  |  | Low values   |   | High values                                      |  |
| <b>Mean corpuscular hemoglobin</b>               | Amount of hemoglobin per red blood cell  | Microcytic or normocytic anemia  | Macrocytic anemia   |  |  |
|  | Differential diagnosis of anemias  | Iron deficiency  | Folic acid or B12 deficiency  |  |  |
| <b>Mean corpuscular hemoglobin concentration</b> | Concentration of hemoglobin per red blood cell   | Hypochromic anemia   | Hereditary spherocytosis  |  |  |
|  | Used for laboratory quality control  | Iron deficiency<br>Thalassemia   |   |  |  |
| <b>RBC distribution width (RDW)</b>              | Measures size variability of red blood cell population<br><br>Distinguishes iron-deficiency anemia from anemia of chronic disease<br><br>Improves early detection of iron, B12, or folate deficiency<br><br>No subnormal values have been reported | <b>MEAN CORPUSCULAR VOLUME (MCV)</b>   |   |  |  |
|  |  | <b>RDW</b>   | <b>LOW</b>  | <b>NORMAL</b>                                    | <b>HIGH</b>                                |
|  |  | Normal   | Anemia of chronic disease   | Anemia of Chronic disease                        | Myeloplastic syndrome                      |
|  |  | High   | Iron deficiency   | Early deficiency of iron, vitamin B12, or folate | Deficiency of iron, vitamin B12, or folate |
| <b>White blood cell count</b>                    | Measures total white blood cell component of whole blood   | Bone marrow failure  | Infectious diseases (bacterial, viral, parasitic, or protozoal)   |  |  |
|  |  | Presence of toxic substance<br>Autoimmune diseases<br>Aplastic anemia<br>Liver or spleen disease<br>Radiation exposure | Inflammatory disease<br>Leukemia<br>Severe emotional or physical stress<br>Tissue damage                                      |  |  |
| <b>Neutrophils</b>                               | The first white blood cells to respond to infection  | Chronic infections   | Bacterial, viral and parasitic infections   |  |  |
|  |  | Bone marrow depression<br>Vitamin B12 or folic acid deficiency<br>Systemic lupus erythematosus                         | Emotional and physical stress<br>Hypersensitivity reactions<br>Diabetic acidosis<br>Polycythemia vera<br>Rheumatoid arthritis |  |  |

| Test               | What this test measures  | What test results may indicate   |  |
|--------------------|--|--|--|
|                    |  | <i>Low values</i>  | <i>High values</i>   |
| <b>Lymphocytes</b> | Assesses immune function   | Chemotherapy<br>Corticosteroids<br>Congestive heart failure<br>Aplastic anemia<br>Malignancy<br>AIDS<br>Renal failure                                      | Viral Infections:<br>(eg., mononucleosis,<br>hepatitis, mumps,<br>rubella, varicella)<br>Recovery from acute infection<br>Addison's disease<br>Inflammatory bowel disease<br>Drug hypersensitivity   |
| <b>Monocytes</b>   | Monocytes provide a defense<br>against infectious organisms<br>through the process of<br>ingestion, or phagocytosis<br><br>High levels often signify infection | Rheumatoid arthritis<br>Prednisone treatment   | Bacterial, viral, parasitic<br>or protozoal infections<br><br>Leukemia (AML, CML)<br><br>Hodgkin's and<br>non-Hodgkin's lymphoma<br>Myeloproliferative disease<br>Autoimmune disorders   |
| <b>Eosinophils</b> | Eosinophils are usually<br>found in the tissues<br><br>Presence in the blood usually<br>indicates allergy or infection   | Cushing's syndrome   | Systemic parasitic<br>infestation or fungal infection<br><br>Food allergies<br><br>Hay fever, asthma,<br>or allergies<br><br>Pulmonary syndromes<br><br>Vascular diseases<br><br>Immune deficiencies<br><br>Drug reactions<br><br>Inflammation                     |
| <b>Basophils</b>   | Often the first sign of blast crisis or an accelerated phase of chronic myelogenous leukemia   | Hyperthyroidism<br><br>Pregnancy<br><br>Post irradiation or chemotherapy<br><br>Following<br>glucocorticoid administration<br><br>Acute phase of infection | Chronic myelogenous leukemia<br><br>Basophilic leukemia<br><br>Polycythemia<br><br>Myeloid metaplasia<br>Hodgkin's disease<br>Post-splenectomy<br>Chronic hemolytic anemia<br><br>Chronic sinusitis<br><br>Varicella, variola infections<br><br>Ionizing radiation |

| Test                  | What this test measures   | What test results may indicate   |  |
|-----------------------|---|--|--|
|                       |   | <i>Low values</i>  | <i>High values</i>   |
| <b>Platelet count</b> | Platelets are necessary for normal blood clotting, and counts may be affected by several disease states | Chemotherapy<br>Hemolytic anemia<br>Hypersplenism<br>Idiopathic thrombocytopenia purpura<br>Vitamin B12 or folate deficiency<br>Leukemia<br>Prosthetic heart valves<br>Sequelae of massive blood transfusion<br>Disseminated intravascular coagulation | Post-splenectomy syndrome<br>Primary thrombocytosis<br>Certain malignancies<br>Early chronic myelogenous leukemia<br>Polycythemia vera<br>Rheumatoid arthritis |

### Chemistry Panel

| Test                    | What this test measures   | What test results may indicate   |  |
|-------------------------|---|--|--|
|                         |   | <i>Low values</i>  | <i>High values</i>   |
| <b>Glucose, fasting</b> | Direct measure of glucose<br><br>Common evaluation of diabetes and hypoglycemia | Pancreatic disorders<br><br>Endocrine disorders (e.g., early diabetes mellitus)<br>Malnutrition<br>Liver damage (alcoholism)<br>Insulin overdose<br>Hypoglycemia | Diabetes mellitus<br><br>Increased circulating epinephrine (e.g., due to emotion, burns, shock, anesthesia)<br>Acute or chronic pancreatitis<br>Vitamin B1 deficiency<br>Drug interactions |
| <b>Uric acid</b>        | Evaluation of gout, recurrent urinary stones, or kidney failure                 | Overhydration<br><br>Severe liver damage<br>Malnutrition<br>Low protein intake   | Gout<br><br>Impaired kidney function<br>Leukemia<br>Dehydration<br>Shock<br>Urinary tract obstruction<br>High protein intake   |

| Test                             | What this test measures  | What test results may indicate  |   |
|----------------------------------|--|---|---|
|                                  |  | <i>Low values</i>   | <i>High values</i>  |
| <b>BUN (blood urea nitrogen)</b> | Measures liver function, provides indirect assessment of kidney function and filtration rate   | Low protein intake<br>Overhydration<br>Liver disease<br>Malnutrition<br>Celiac disease<br>Anabolic steroid use  | Chronic renal disease<br>Urinary tract obstruction<br>Congestive heart failure<br>Shock<br>Ketoacidosis<br>Dehydration<br>Acute myocardial infarction<br>Bleeding from the GI tract<br>Muscle wasting   |
| <b>Creatinine</b>                | Creatinine is a byproduct of creatine phosphate breakdown from energy metabolism<br><br>Estimates kidney filtration rate and follows progression of renal disease<br><br>More specific of renal disease than BUN – tests used simultaneously for more complete picture | Decreased muscle mass<br>Liver disease<br>Inadequate dietary protein  | Impaired kidney function<br>High consumption of red meat<br>Muscle diseases (e.g., muscular dystrophy, acromegaly, gigantism)<br>Congestive heart failure<br>Dehydration  |
| <b>BUN/creatinine ratio</b>      | Assesses kidney function, monitors renal disease   | <u>With low BUN:</u><br>Low-protein diet<br>Starvation<br>Overhydration<br>Severe liver disease<br>Repeated dialysis<br>Pregnancy<br><u>With high creatinine:</u><br>Rhabdomyolysis (severe muscle injury)<br>Muscular patients who develop renal failure | <u>With normal creatinine:</u><br>Heart failure<br>Salt depletion<br>Dehydration<br>Blood loss<br>Catabolic states (increased tissue breakdown)<br>GI hemorrhage<br>High protein intake<br>Impaired kidney function<br>Drug interactions<br><u>With high creatinine:</u><br>Postrenal azotemia<br>Prerenal azotemia |

| Test                  | What this test measures  | What test results may indicate  |  |
|-----------------------|--|---|--|
|                       |  | <i>Low values</i>   | <i>High values</i>   |
| <b>Sodium</b>         | Evaluates and monitors fluid and electrolyte balance and therapy   | <p>Excessive fluid loss due to sweating, vomiting, diarrhea</p> <p>Pyloric obstruction</p> <p>Malabsorption</p> <p>Adrenal cortical insufficiency</p> <p>Diabetic acidosis</p> <p>Diuretics</p> <p>Hypothyroidism</p> <p>Chronic or acute renal failure</p> | <p>Dehydration</p> <p>Primary aldosteronism</p>  |
| <b>Potassium</b>      | <p>Evaluates and monitors electrolyte balance</p> <p>Especially important for cardiac patients</p>           | <p>Diarrhea or vomiting</p> <p>Excessive sweating</p> <p>Pyloric obstruction</p> <p>Starvation</p> <p>Malabsorption</p> <p>Primary aldosteronism</p> <p>Diuretics</p>   | <p>Acute renal failure</p> <p>Dehydration</p> <p>Adrenal cortical insufficiency</p>  |
| <b>Chloride</b>       | <p>Evaluates and monitors electrolyte balance</p> <p>May indicate acid-base balance and hydration status</p> | <p>Pulmonary emphysema</p> <p>Congestive heart failure</p> <p>Excessive sweating</p> <p>Diarrhea</p> <p>Adrenal cortical insufficiency</p> <p>Diabetic acidosis</p> <p>Diuretics</p>  | <p>Dehydration</p> <p>Hyperventilation</p> <p>Diabetes insipidus</p> <p>Kidney disorders</p> <p>Hyperparathyroidism</p>      |
| <b>Carbon dioxide</b> | Evaluates blood pH   | <p>Respiratory alkalosis (e.g., hyperventilation)</p> <p>Metabolic acidosis (e.g., diabetes)</p> <p>Severe diarrhea</p> <p>Kidney or heart failure</p>  | <p>Respiratory acidosis (e.g., chronic obstructive pulmonary disease)</p> <p>Metabolic alkalosis (e.g., severe vomiting)</p> |

| Test                          | What this test measures   | What test results may indicate   |   |
|-------------------------------|---|--|---|
|                               |   | Low values   | High values   |
| <b>Calcium</b>                | Evaluates parathyroid function and calcium metabolism   | Magnesium deficiency<br>Hyperphosphatemia<br>Hypoparathyroidism<br>Vitamin D deficiency<br>Malabsorption<br>Hypoalbuminemia  | Hyperparathyroidism<br>Hyperthyroidism<br>Paget's disease<br>Excess ingestion of vitamins A or D<br>Cancer<br>Bone fracture combined with bed rest  |
| <b>Phosphorus</b>             | Measures serum phosphorus levels  | Hyperparathyroidism<br>Ricketts or osteomalacia<br>Vitamin D deficiency<br>Hyperinsulinemia<br>Antacids<br>Diuretics<br>Long-term steroid use<br>Severe malnutrition                                 | Hypoparathyroidism<br>Bone cancer<br>Excessive vitamin D intake<br>Low blood calcium levels<br>Exercise<br>Dehydration<br>Healing bone fractures<br>Diabetes mellitus with ketosis<br>Liver disease, cirrhosis<br>Renal insufficiency |
| <b>Protein</b>                | Measures total protein in the blood, including albumin and globulin<br><br>Evaluates nutritional status, blood osmotic pressure, renal and other chronic diseases | Diarrhea<br>Malnutrition<br>Malabsorption<br>Liver disease<br>Crohn's disease or ulcerative colitis<br>Thyroid disease<br>Severe burns<br>Severe skin disease<br>Heart failure<br>Chronic alcoholism | Dehydration<br>Chronic liver disease<br>Neoplasms<br>Tropical diseases (e.g., leprosy)<br>Granulomatous diseases<br>Chronic infection<br>Inflammatory diseases  |
| <b>Albumin/globulin ratio</b> | Evaluates renal disease and other chronic diseases  | Liver dysfunction<br>Multiple myeloma<br>Autoimmune disease  | Hypothyroidism<br>Underproduction of immunoglobulins<br>Glucocorticoid excess (from drugs or tumors)  |

| Test                                   | What this test measures   | What test results may indicate         |  |
|--|---|--|--|
|  |   | <i>Low values</i>                      | <i>High values</i>   |
| <b>Bilirubin</b>                       | Evaluates liver and gallbladder function  | Drug interference (e.g., barbiturates) | <ul style="list-style-type: none"> <li>Liver disease</li> <li>Hepatitis</li> <li>Cirrhosis</li> <li>Biliary duct obstruction</li> <li>Gilbert's disease</li> <li>Pernicious anemia</li> <li>Hemolytic anemia</li> </ul>  |
| <b>Alkaline phosphatase</b>            | Detects and monitors liver and bone disease; also used as a tumor marker            |  | <ul style="list-style-type: none"> <li>Bone growth/healing fractures</li> <li>Acromegaly</li> <li>Liver or bone metastases</li> <li>Leukemia</li> <li>Hypervitaminosis D</li> <li>Hyperthyroidism</li> <li>Hyperparathyroidism</li> <li>Chronic alcohol ingestion</li> <li>Biliary obstruction</li> <li>Liver disease</li> <li>Diabetes mellitus</li> <li>Congestive heart failure</li> <li>Estrogens, birth control pills, oral hypoglycemic agents, etc</li> </ul> |
| <b>LDH (lactic acid dehydrogenase)</b> | Measures intracellular enzyme LDH, which when present may signify injury or disease | X-ray irradiation                      | <ul style="list-style-type: none"> <li>Muscle injury</li> <li>Burns or trauma</li> <li>Kidney disease</li> <li>Cardiac disease</li> <li>Liver disease (hepatitis, cirrhosis)</li> <li>Hemolytic anemia</li> <li>Pernicious anemia</li> <li>Malignant tumors</li> <li>Infectious mononucleosis</li> <li>Inflammation</li> </ul>   |

| Test   | What this test measures  | What test results may indicate   |  |
|--|--|--|--|
|  |  | <i>Low values</i>  | <i>High values</i>   |
| <p><b>Aspartate aminotransferase (AST)</b></p> <p>Also called serum glutamic-oxaloacetic transaminase (SGOT)</p> | <p>Evaluates disorders of the liver, gallbladder, and pancreas</p> <p>Indicator of cell injury or death</p>  | <p>Azotemia</p> <p>Chronic kidney dialysis</p> <p>Vitamin B6 deficiency</p>  | <p>Liver disease</p> <p>Trauma or surgery</p> <p>Myocardial infarction</p> <p>Acute pancreatitis</p> <p>Certain medications, including salicylates</p> <p>Chronic alcohol ingestion</p> <p>Heat exhaustion</p> <p>Mushroom poisoning</p> <p><u>Marked increase:</u></p> <p>Shock</p> <p>Liver disease</p> <p>Hepatitis</p> |
| <p><b>Alanine transaminase (ALT)</b></p> <p>Also called serum glutamic-pyruvic transaminase (SGPT)</p>           | <p>Identifies and monitors liver disease</p> <p>Distinguishes between the liver and RBC hemolysis as the source of jaundice</p> <p>Usually parallels but is lower than AST in alcohol-related diseases</p> | <p>Urinary tract infection</p> <p>Malnutrition</p>   | <p>All indications from AST <u>(see above) plus:</u></p> <p>Obesity</p> <p>Rapidly progressing acute lymphoblastic leukemia</p>  |
| <p><b>Iron</b></p>   | <p>Evaluates several conditions, including iron deficiency anemia and hemochromatosis</p>  | <p>Iron deficiency anemia</p> <p>Chronic blood loss</p> <p>Anemia due to infection or chronic diseases</p> <p>Nephrosis</p> <p>Hypothyroid</p> <p>Menstruation</p> | <p>Hemolytic anemia</p> <p>Hepatitis</p> <p>Acute iron toxicity</p> <p>Thalassemia</p> <p>Hemochromatosis</p>  |