

## **Hematology (Complete Blood Count)**

**WBC** A white blood cell count is a measurement of the cells of the blood that the body uses to fight infection and react against foreign bodies or tissues. The percentages of the five different types of WBCs may temporarily shift depending on what is going on in the body. If there are too few WBCs present, the body may have trouble fighting infections. A high WBC count may indicate acute infection, inflammation, or tissue damage. If a white blood cells count is abnormal or questionable, a differential will be performed that differentiates the different kinds of white cells.

- Granulocytes are the most common type of WBC and their primary function is to kill and digest bacteria.
- Lymphocytes are primarily involved with fighting chronic bacterial and viral infections. They are also important in antibody production.
- Monocytes also phagocytize bacteria but can be produced more rapidly and live longer.
- Eosinophils and basophils are cells involved in allergic reactions and parasitic infections

**RBC** Red blood cells are concave shaped cells that are filled with hemoglobin, the protein that transports oxygen and carbon dioxide throughout the body. The hematocrit is a measurement of the proportion of the blood that is made of RBCs. The Hgb concentration is the measure of the total amount of hemoglobin in the blood.

**MCV, MCH, MCHC, and RDW** are red blood cell parameters. They tell about red blood cell size, hemoglobin concentration per cell, and size variation. These parameters are only important when interpreted along with hemoglobin, hematocrit, and red blood cell count.

**PLATELETS and MP** Platelets are the tiny cells that play an essential role in blood clotting. They are the first components to be activated when there has been an injury to a blood vessel and begin the formation of a blood clot. There is a risk of excessive bruising and bleeding when there are not enough platelets. The MPV is the average volume of the platelets.

## **Chemistry**

**SODIUM** is an electrolyte regulated by the kidneys and adrenal glands. This mineral plays an important role in the water balance in your body. Ingesting too much water, heart failure, or kidney failure can cause a low level in the blood. A low level can also be caused by the loss of sodium in diarrhea, urine, or vomit. Excess salt intake or insufficient water intake can cause a high level.

**BUN** Blood urea nitrogen is a waste product derived from protein breakdown in the liver and excreted by the kidneys. BUN levels will increase if the kidneys aren't functioning as they should. Dehydration, blood loss, high protein diets and/or strenuous exercise may also cause an increase. A low BUN level may be the result of liver disease, a low protein diet, pregnancy or excessive water consumption.

**GLUCOSE** is a simple sugar that serves as the main source of energy for the body. A high blood glucose (hyperglycemia) in

someone who has fasted for 12 hours suggests diabetes and further testing may be needed. A low glucose level (hypoglycemia) may mean too much insulin, but it may also mean that the blood sample was not handled properly after it was drawn. Even if you know you have diabetes it is important to report an elevated level to your health care provider.

**CREATININE** is a waste product of muscle metabolism. The blood concentration of creatinine depends upon two things – the amount of muscle you have and the ability of your kidneys to excrete the creatinine. High levels of creatinine in the blood usually indicate deterioration in kidney function and require medical evaluation by your health care provider (especially when associated with a high BUN). Low values are not generally considered significant.

**POTASSIUM** is an electrolyte found primarily inside cells whose role is to maintain water balance inside the cells and help in the transmission of nerve impulses. Low or high levels in the blood are of critical significance. Low levels may be caused by taking water pills or by not getting enough potassium in the diet and can cause muscle weakness and heart problems. A high potassium level can be found in kidney disease or in overuse of potassium supplements. Some “salt” substitutes contain potassium instead of sodium and excessive use of these substitutes can cause dangerously high levels of potassium in the blood. Any value outside the specified reference range, high or low, requires medical evaluation; this is especially important if you are taking a diuretic or heart medication.

**CO<sub>2</sub>** This is a measure of carbon dioxide in the blood. Though not very accurate on a venous sample because of exposure to air; this test is used as a rough guide to the acid/base balance in the body.

**CHLORIDE** is an electrolyte that helps regulate fluid in the body and maintain the acid-base balance. Chloride concentrations mirror those of sodium; increasing and decreasing for the same reasons. Borderline low or high levels of chloride have very little clinical significance.

**CALCIUM** is one of the most important minerals in the body. Ninety nine percent of the calcium in your body is contained in your bones – only one percent is outside. The one percent is very important for the proper functioning of nerves, enzymes, muscles, and blood clotting. The parathyroid gland is the main regulator of calcium in the body. Low levels of calcium in the blood are associated with malnutrition. High levels can be caused by bone disease, excessive use of antacids and milk, overdosing on vitamin D, and hyperparathyroidism. Your health care provider should evaluate any elevated calcium result.

**TOTAL PROTEIN** Proteins are important building blocks for all cells and tissues. Total protein is a measure of all the protein in the plasma of blood. A low or high total protein does not indicate a specific disease, but it does mean that some additional tests may be required to determine if there is a problem.

**ALBUMIN** Approximately two-thirds of the total protein circulating in your blood is albumin. It keeps fluid from leaking out

of vessels and transports hormones. Low albumin levels can cause swelling. A low level of albumin in the blood may be caused by malnutrition, excess water, liver disease, kidney disease, severe injury or major bone fractures, or slow bleeding over a long period of time.

**TOTAL BILIRUBIN** Bilirubin is an orange-yellow pigment in the blood that comes from the breakdown of old red blood cells. When the bilirubin level in the blood is high for a period of time, the whites of your eyes and your skin may become yellow – this is known as jaundice. A high bilirubin level in the blood can be caused by increased red blood cell destruction, liver disease, or by a blockage of bile ducts.

**ALKALINE PHOSPHATASE** is an enzyme that is found in all body tissue but most abundantly in the bone, liver, bile ducts, and gut. A high level of alkaline phosphatase in your blood may indicate bone, liver or bile duct disease. Certain drugs may also cause increased levels. Because of bone growth, growing children normally have a higher level than adults. Low values are not generally considered significant.

**AST (SGOT)** Aspartate aminotransferase is an enzyme found mainly in the heart and liver cells. It is released into the blood stream when any of these organs are damaged. Increased levels may be associated with liver or heart disease. Injury to either organ will cause the cells to lyse and the enzyme will be released into the circulation.

**ALT (SGPT)** Alanine aminotransferase is found predominately in the liver but also the kidneys, heart, and skeletal muscle. Generally, most ALT elevations are caused by liver disease; damage from alcohol, strenuous exercise and a number of diseases can cause high levels of both ALT and AST.

**ESTIMATED GFR** The glomerular filtration rate is a measure of the filtering capacity of the kidneys per minute. This estimation is calculated based upon the creatinine level. A low GFR suggests impaired kidney function and may help detect kidney disease in its early stages. The filtration rate of the kidneys generally decreases with age, but conditions such as diabetes and high blood pressure can cause further damage to the kidneys.

**TSH** Thyroid stimulating hormone is produced by the pituitary gland and stimulates the thyroid gland. The thyroid gland produces hormones that help the body control metabolism. If there is thyroid dysfunction, increased or decreased amounts of TSH may occur. The TSH test can also tell if your dose of thyroid hormone is correct, should you be taking medication. The easiest and most accurate way to assess abnormalities of thyroid gland function is by a measurement of TSH.

## **Lipid Profile**

**CHOLESTEROL** is a fat essential for life. Membranes in all tissues are composed of cholesterol, it is used to make hormones, and it forms bile acids essential to digestion. A small amount of the body's cholesterol circulates in the blood (plaque in the arteries is cholesterol the 'sticks' while in the circulation). Low levels may

be caused by liver disease or malnutrition. According to American Heart Association guidelines, a desirable cholesterol level is less than 200 mg/dL.

**TRIGLYCERIDES** are the body's storage form of fat. Although most triglycerides are found in adipose (fat) tissue, some triglycerides are stored in the blood to provide fuel for the muscles. Extra triglycerides are found in the blood after eating a meal, thus triglyceride levels should be checked when fasting so there are no extra triglycerides from a recent meal. The American Heart Association recommends levels less than 150 mg/dL. In most people, elevated triglyceride levels are linked to the occurrence of coronary artery disease. Elevated triglycerides may be a consequence of other disease, such as untreated diabetes mellitus.

**HDL** High density lipoproteins are one of the lipoproteins that carry cholesterol in the blood. HDL is considered beneficial because it removes excess cholesterol from the circulation and from artery walls and disposes of it; hence HDL is known as the 'good cholesterol.' The higher the level of HDL, the lower the risk of heart disease. Levels below 40 mg/dL are a risk factor for heart disease; levels above 50-60 mg/dL are considered protective against heart disease.

**LDL** Low density lipoproteins are also a lipoprotein that carries cholesterol in the blood, but instead of disposing of excess cholesterol, LDL deposits excess in blood vessel walls. It is also known as the 'bad cholesterol.' LDL levels less than 100 mg/dL are considered optimal. Higher levels increase the risk for heart disease. Calculation of LDL is not accurate when triglyceride levels are over 400 mg/dL.

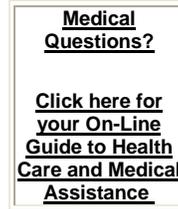
**VLDL** Very low density lipoproteins are the predominant carriers of triglycerides in the body. Increased VLDL level are also associated with an increased risk of arteriosclerosis and coronary artery disease.

**CORONARY RISK RATIO (CHOL/HDL)** is obtained by comparing the total cholesterol level to the HDL level. The higher this number, the greater the risk of coronary heart disease. A high HDL cholesterol level will result in a lower ratio, which means a lower risk. This could be true even if the total cholesterol level is high. It is this ratio that appears to best measure the lipid-associated risk of developing heart disease.

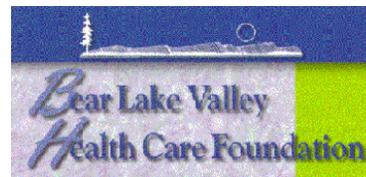
#### Optional Screening For Males

**PSA** Prostate specific antigen is a protein that is produced by cells in the male prostate gland. An increase in PSA levels is associated with prostate inflammation, prostate cancer, and benign prostatic hypertrophy. Although an increased PSA should be evaluated by a health care provider, it is not diagnostic of prostate cancer. A notable increase in PSA levels over time may be of more significance than a stable but elevated level.

If after reading this pamphlet, you still have questions concerning your blood chemistry results, please contact your health care provider. There are also some great resources on the hospital website [www.blmhospital.com](http://www.blmhospital.com). On the left hand side of the page click on this link:



The mission of Bear Lake Memorial Hospital is to perpetuate and foster access to optimum quality health care to the residents and visitors of the Bear Lake area. The Hospital will take a leadership role in planning for the overall health care needs of the community. The hospital will play a key role in the economic development of the area and provide a setting for the education and career development of its staff.



One of the purposes of the Bear Lake Valley Health Care Foundation is to provide community services that help to improve the health of the residents of the Bear Lake Valley. The Foundation sponsors the senior health fair each year and provides the funds for these health screens. If you would like to learn more about the Foundation or would like to help by contributing, please contact Craig Thomas at 847-4450.

## Caring for Our Community

Bear Lake Memorial Hospital  
and Skilled Nursing Facility



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### BLOOD PROFILE EXPLANATION

- You and your doctor can learn a great deal about your health from a few simple blood tests. Laboratory tests help in several ways, for instance, sometimes test results will be abnormal before you have any symptoms. For those times when symptoms have developed, laboratory test results help confirm that a problem does exist.
- Normal test results are just as significant as an abnormal result. When a result is normal, it not only helps to rule out disease, but it also establishes a baseline for you. Each person has his or her own normal baseline. An individual's own result is the best baseline for monitoring any changes that take place in the future. If any of your values are significantly different than before, but still normal, contact your health care provider.

#### Medications and Fasting

- Over the counter medications, prescription drugs, alcohol consumption and your fasting time may affect blood chemistry screening results. Your health care provider must have a complete and honest picture of your use of medications and lifestyle in order to effectively evaluate your health status. If all the needed information is provided, time and money will be saved. A 12 hour fast is recommended for the most accurate results. Glucose and cholesterol may be high if you have eaten within 4 hours. Triglycerides may be high if you have eaten within 12 hours.

#### Screening Values Outside the Reference Ranges:

- may indicate possible problems needing medical evaluation
- may mean there was a problem drawing your blood
- may show that you had eaten shortly before your blood was drawn

It is not possible to diagnose or treat any disease or health problem with these blood tests alone. They can help you learn more about your health, may help detect problems in early stages when treatment or changes in personal health habits can be most effective, and can guide you in maintaining a healthy lifestyle.