

## MAKING SENSE OF BLOOD TEST RESULTS

When your dog is believed to be ill, your vet may order various lab tests to try to determine what is wrong. The tests most commonly performed on dogs are Hematology and Blood Chemistry. The Hematology values indicate the numbers of the different kinds of cells and the amount of hemoglobin in the blood, while the Blood Chemistry tells you the amounts of the different chemical substances dissolved in the liquid component of blood, the plasma. Since there are differences in normal values between breeds of dogs, and even between individuals, and because different laboratories will show on the lab report slightly different normal ranges (depending on which specific tests that lab uses), it is important that you find out what is normal for your dog, when it is in good health so that if certain values change, they are recognized as different from your dog's normal situation. In this way your vet will detect any problems early on, so that they can be treated early when treatment is more likely to be effective.

There are additional lab tests, such as urinalysis, and specialized blood tests aimed at examining such components as hormones, antibodies, and clotting factors. These may be ordered if there is a suspicion of problems that the vet thinks might be glandular or immune in nature or related to improper blood clotting. When a problem with an internal organ is suspected, your vet may order a specific "profile" to check the particular values associated with the organ thought to be having trouble ("hepatic profile" to check liver function, "renal profile" to check kidney function, "pancreatic profile" to check the pancreas).

Below are some of the commonly performed lab tests, and the range of normal values (in USA units; Source: Merck Veterinary Manual). If your dog's result on a test falls outside the normal range, the lab will flag that on the report as either High or Low.

The normal body temperature of a dog is 101 to 102.5.

### HEMATOLOGY

#### CBC (Complete Blood Count)

RBC (red blood cell count) 5.5 - 8.5 cells X 10<sup>6</sup>/ml Vitamin B-12). High RBC suggests dehydration.

WBC (white blood cell count) 6 - 17 cells X 10<sup>3</sup>/ml Low WBC count suggests major virus infection, certain drug or chemical toxicity. High WBC caused by bacterial infections, stress, malignancies of blood.

Hb or Hgb (Hemoglobin) 12 - 18 g/dL Low Hgb caused by anemia, which can result from bleeding, nutritional deficiencies, parasitic infections, chronic diseases of liver, cancer. High levels seen with dehydration.

Ht or Hct (Hematocrit; Packed Cell Volume) 37 - 55 % of whole blood by volume Low in anemia resulting from hemorrhage, nutritional deficiencies, parasites, chronic diseases. Elevated in dehydration.

PL (or plts) (Platelets) 2 - 9 x 10<sup>5</sup>/ml Important one of several components of blood clotting process. Decreased platelets put dog at risk of bleeding, and results from hemorrhage, some autoimmune disorders (lupus, hemolytic anemia), depression of bone marrow, clotting within blood vessels. Elevated platelets suggests cancer or can result from injury to blood vessels or bone fracture.

DIFF (Differential white blood cell count ... relative amounts of different types of WBC). May be expressed as total numbers, or as % of total WBC

Neutrophils 60 - 70% Elevated in acute bacterial infections or extreme stress.

Lymphocytes 12 - 30% Reduced in initial stages of infections, or after steroid use.

Monocytes 3 - 10% Generally constant except in leukemia, when increased.

Eosinophils 2 - 10% Increased in parasitic infections and in allergies. Decreased in prolonged stress.

## BLOOD (SERUM) CHEMISTRY VALUES

### ENZYMES

ALT Alanine aminotransferase; sometimes called SGPT) 8.2 - 57.3 u/L Elevated when liver is diseased

AMYL (Amylase) 269.5 - 1,462.4 u/L  
Elevated in pancreatic or kidney disease

ALKP (Alkaline Phosphatase) 10.6 - 100.7 u/L  
Elevated in diseases of liver or bones

AST (Aspartate transaminase; sometimes called SGOT) 8.9 - 48.5 u/L Elevated in liver disease

CK (Creatine kinase) 13.7 - 119.7 u/L  
Elevation suggests heart disease

GGT (Gamma-glutamyl transferase) 1.0 - 9.7 u/L  
Elevated in pancreatic disease, sometimes liver disease

LDH (Lactic dehydrogenase) 24.1 - 219.2 u/L  
Elevated in liver disease, heart disease

SDH (Sorbitol dehydrogenase) 3.1 - 7.6 u/L  
Elevated in liver disease

Bicarbonate 18.1 - 224.5 mEq/L  
Buffers the blood to maintain a normal acid/base balance; can be affected by many things

Bilirubin 0.1 - 0.6 mg/dL  
Elevated in liver disease, and in diseases where there is abnormally fast breakdown of red blood cells

Calcium 8.7 - 11.8 mg/dL  
Essential for bone formation, muscle activity, blood clotting. Low levels seen in pancreatic injury, underactive thyroid, eclampsia of pregnancy; elevated levels seen in some tumors, kidney disease, parathyroid gland disease.

Chloride 102.1 - 117.4 mEq/L  
An electrolyte that must be in balance with sodium, potassium, bicarbonate. Low chloride and electrolyte imbalance in general can result from vomiting, diarrhea; and can cause cardiac problems.

Cholesterol 115.6 - 253.7 mg/dL  
High cholesterol not thought to be associated with heart disease in dogs. Low levels seen with overactive thyroid gland or faulty intestinal absorption of food. Elevated levels seen in hypothyroidism, in liver, kidney, and cardiovascular disease, and in diabetes and stress.

Creatinine 0.5 - 1.6 mg/dL  
Elevated creatinine suggests kidney disease. If Creatinine is normal but BUN elevated, suggests early or mild kidney disease. Increased creatinine and increased BUN indicate longstanding renal disease, especially if phosphorus also elevated.

Glucose 61.9 - 108.3 mg/dL  
Elevated blood glucose suggests diabetes. Low blood glucose seen in liver, pancreatic, and adrenal gland disease.

Magnesium 1.7 - 2.7 mg/dL  
Decreased in kidney, digestive tract, thyroid, and adrenal disease, and with some drugs; low magnesium has widespread consequences on heart, muscles, metabolism.

Phosphorus 2.9 - 6.2 mg/dL  
Low phosphorus seen in overactive parathyroid gland, some malignancies, poor absorption of nutrients, malnutrition. Elevated phosphorus seen with kidney disease, underactive parathyroid gland, or kidney failure (see BUN).

Potassium 3.8 - 5.6 mEq/L  
One of the electrolytes (see Chloride)

Protein (Total) 5.5 - 7.5 g/dL  
Increased in dehydration, cancers of blood and bone marrow; decreased in malnutrition, liver and kidney disease, bleeding. SPECIFIC proteins (Albumin, Globulin) associated with more specific disorders.

Albumin 2.6 - 4.0 g/dL  
Few albumin seen with chronic liver or kidney disease, intestinal parasites; elevated albumin seen with dehydration.

Globulin 2.1 - 3.7 g/dL

Low globulins indicate immune system malfunction, infections. Elevated globulin seen with stress, dehydration, allergies, blood diseases, liver disease, heart disease, arthritis or diabetes.

Sodium 140.3 - 153.9 mEq/L

One of the electrolytes (see Chloride)

BUN (Urea Nitrogen) 8.8 - 25.9 mg/dL

If BUN is elevated but Creatinine is normal, suggests early or mild kidney disease. If both BUN and Creatinine are elevated, indicates longstanding renal disease, especially if phosphorus is also elevated.