

ACCES for Pet Health

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What's in a CBC?

By Beth Guerra, DVM



CBC is the abbreviation for a complete blood count. There are three components to this test: white blood cell counts, red blood cell counts and platelet numbers. A CBC is part of a whole picture and must be interpreted in light of the patient's history, physical exam, and other diagnostic testing. Changes in one of these three areas may also reflect or cause abnormalities in the other cell lines. All three of these cells are primarily produced in the bone marrow.

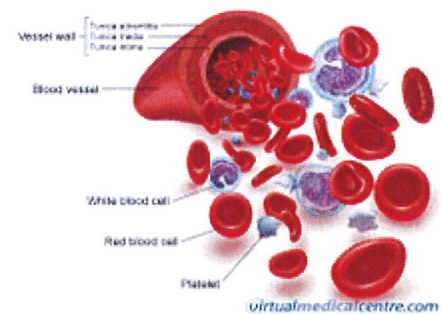
White blood cells are part of the immune system. Changes in these cells may indicate infection or inflammation. These white blood cells have a number of different functions and respond differently based on the underlying disease process. White blood cells are being used on a daily basis regardless of whether there is a problem present or not.

Lack of changes in cell numbers do not rule out abnormalities. For instance, many infections may not show up as an increase in white blood cell numbers. Severe, acute infections may actually reveal low white blood cell counts. Or in the early stages of an infection, the numbers may be normal as the immune system has not had enough time to ramp up production of the cells. Additionally, some elevations in the number can occur due to trauma, stress, cancer(leukemia) and have no infection present. Immune-mediated diseases (conditions in which the body is reacting inappropriately to its self) can also have very high elevations in the numbers without a source of infection. Again, information regarding white cell counts must be interpreted along with other clinical parameters.

Red blood cells carry oxygen to the body. Oxygen is needed in order to produce life sustaining energy. Elevations in red cell counts are termed polycythemia. This may occur due to simple dehydration(relative polycythemia) or due to bone marrow disease(absolute polycythemia). Relative polycythemia is much more common. Absolute polycythemia is rarely seen. It may occur due to some cancer or in some cases due to an unknown cause(idiopathic).

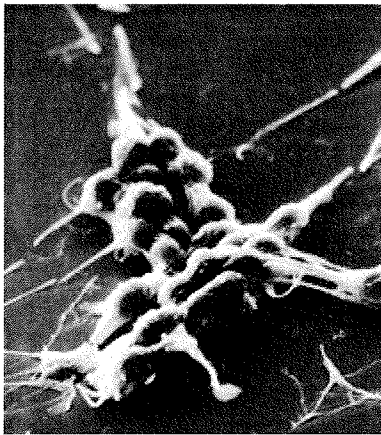
Anemia is the term used to describe low red cell numbers. Anemia is typically either acute(regenerative) or chronic(non-regenerative) in nature. The bone marrow's response to the anemia is what determines whether it is considered regenerative or non-regenerative. Acute anemia is further categorized into red cell loss(usually associated with hemorrhage) or hemolysis(red cell destruction by the immune system). Hemorrhage may occur due to trauma, bleeding/clotting disorders, intestinal bleeding, or a variety of other causes. Hemolysis, or destruction of the red cells, is typically due to the immune system attacking the red blood cells. Some infectious diseases target the red blood cells. The infectious agent cause changes to the red blood cells that the body's immune system sees as abnormal. The immune system thus attacks the red blood cells instead of the infectious agent that caused the problem. An example of this is an infection cats can acquire from fleas, *Mycoplasma hemofelis*. This organism is transmitted from the flea with a blood meal. The organism enters the red blood cells and causes changes that the immune system then reacts negatively to by destroying the red blood cell. Toxicities can also cause hemolysis of the red blood cells. Onions and zinc toxicities lead to changes in the structure of the red blood cells that again stimulate the white blood cells(immune system) to recognize the red cells as abnormal. Thus, the white blood cells then attack the red cells in order to destroy the abnormal cell. Adverse drug reactions, and some cancers may also lead to similar consequences. The most common cause to hemolysis in our hospital is due to auto-immune mediated destruction. No underlying cause is found to cause the immune system to attack and destroy the red cells.

Chronic, or non-regenerative, anemia has a number of potential causes. In people, iron deficiency, is a common cause. However, in animals, any ongoing disease process may result in anemia. Conditions such as inflammatory bowel disease, liver dysfunction, cancer, etc may result in a chronic, non-regenerative anemia. Additionally, causes to acute, regenerative anemia if present long enough may result in chronic non



CBC measures many things in your bloodstream.

regenerative anemia. Chronic kidney disease is a common cause to non regenerative anemia. The kidneys are involved with producing a hormone that stimulates the red cell production in the bone marrow. As the kidneys age and degenerate, the production of this hormone may decrease, leading to anemia.



platelets

Platelets are the third part to the CBC. Platelets themselves are no longer a cell when they enter the blood stream, but fragments of cells produced in the bone marrow. Platelets are what are involved in stimulating the coagulation, or clotting, system. Specifically, they are involved with is medically termed primary hemostasis. On a daily basis, the lining of our blood vessels, capillaries, etc. are going through a process of replacement. As those cells are being replaced, small holes may develop in the vessels that it becomes the job of the platelets to "plug". Once this occurs, changes occur with platelets that then stimulate both the immune system and the clotting system. This results in stabilizing the platelet "plug", and prevents bleeding. The main problem encountered with platelets occur when the number become very low. The patients often present with evidence of "pin point" bruising to the skin. Again, the most common cause to severe, low platelet counts is due to the immune system over reacting and then destroying the platelets. These patients often present with concurrent changes in the CBC, such as acute anemia due to bleeding and elevations in the white cell counts.

Elevations in the platelet numbers are usually not problematic, but may indicate there may be other underlying problems present in the body. For example, it is not uncommon to find an animal that has experienced blood loss from bleeding into the bowel to have an elevated platelet count.

A lot of information can be gathered from a CBC. However, as a stand alone test, it may not reveal the whole story of what is wrong with a patient. A common question asked by clients when their pet is diagnosed with cancer is why it didn't show up in the CBC. Unless a leukemia is present, or the cancer involves the bone marrow, it is not generally found on a CBC. One of the factors that allow cancer to grow is its ability to avoid detection by the immune system. Cancer cells are abnormal, and when abnormalities are detected by the immune system, the body usually will try to repair the problem. A CBC also cannot tell where bleeding may be occurring, why there is a non regenerative anemia, what organ system is infected, or why the platelets are being used up. Changes to the CBC often lead to further testing in order to develop an ideal treatment plan. for more information on anemia in pets" http://www.avmamedia.org/detail.asp?sid=294&NAME=Anemia_in_Pets

Posted by **Christina Ryan** at November 1, 2010 3:43 p.m.

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