

**MIDDLE SCHOOL**

**Biotechnology**

**Analyzing Sparky’s Blood Test**

**Goal:** Students will analyze Sparky’s complete blood count (CBC) results to determine what disease Sparky has. They will also realize that this one test is not enough to make a positive conclusion on some diseases.

**Learning Objectives:** Students will…

* Read and analyze the blood test results
* Determine what the blood tests mean
* Conclude that Sparky has anemia
* Realize that they need to do more tests

**Materials:**

* Copy of Sparky’s Hematology test sheets

**Time Required:** 20 – 30 minute class period

**Standards Met:**

* Science In Personal and Social Perspectives: Natural hazards
* Science As Inquiry: Abilities necessary to do science as inquiry

**Procedure:**

* Ask the students if they have ever had a blood test. Discuss these situations. Why do doctors order blood tests?
* Review the parts of the blood. What do the parts of the blood do?
* Remind the students that on Sparky’s initial medical history form from the Furry Friends Medical Center that it has said that results were pending on a CBC.
* Have the students predict what the blood tests will say.
* The blood test cost $200.00. This needs to be recorded on the Medical Expense Log.
* Pass out a copy of Sparky’s hematology results.
* Students read through the results, the summaries and the table.
* Tell the students that they now need to go back through their Disease/Disorder Definition packets
* They need to fill in the test results and determine if they can make a positive decision on any of Sparky’s illnesses.
* If any hypotheses are wrong, they need to write these on the forms as well.
* Determine possible treatments and note them on the form.

**Follow Up:**

* Students could research why onions can cause anemia in cats.

**Assessment:**

* Positive conclusion of anemia.

**Analyzing Sparky’s Blood Test: Hematology**

Feline Name- Sparky

Complete Blood Count Results

Blood Type- AB\* (could lead to problems during pregnancy)

**Sparky’s Results Sparky’s Counts Normal Feline Counts**  
**WBC**..... 10.6 x 103/mcl Normal (4-12 x 103/mcl)  
**RBC**....... 3.8x 106/mcl Low (5.7-10.5 x 106/mcl)   
**HGB**........ 8 g/dl Slightly Lower (9-16 g/dl)   
**PLT**........ 210/mcl Normal (160-420/mcl)

**What Does It All Mean?**

 **WBC** is an abbreviation for [white blood cell](http://www.petplace.com/cats/understanding-blood-work-the-complete-blood-count-cbc-for-cats-2/page2.aspx) count. These cells help fight infection and respond when an area of the body becomes inflamed. Elevated white blood cell counts indicate infection, inflammation and some forms of [cancer](http://www.petplace.com/cats/understanding-blood-work-the-complete-blood-count-cbc-for-cats-2/page2.aspx) or leukemia. Low white blood cells counts can indicate viral infections, bone marrow abnormalities or overwhelming infections and blood poisoning.

 **RBC** is an abbreviation for red blood cell count. These cells are responsible for transporting oxygen throughout the body. Oxygen is used as fuel for the body and is very important. High red blood cell numbers usually indicate dehydration but can also indicate uncommon diseases that cause an excess production of red blood cells from the bone marrow. Low red blood cell counts are referred to as anemia and can be a result of blood loss, active bleeding, bone marrow disease or excessive red blood cell breakdown that is seen in some immune diseases and toxin ingestion.

 **HGB** is an abbreviation for [hemoglobin](http://www.petplace.com/cats/understanding-blood-work-the-complete-blood-count-cbc-for-cats-2/page2.aspx). This molecule is responsible for binding and releasing oxygen onto the red blood cells. Without hemoglobin, oxygen cannot be transported. High levels of hemoglobin usually indicate high red blood cell counts and dehydration. Low levels indicate anemia, bleeding or iron deficiency.

**• PLT** is an abbreviation for platelets. The platelets are responsible for sealing any leaks in the blood vessels. When platelet counts are low, spontaneous bleeding can occur. High platelet counts usually indicate a disorder of the bone marrow or an overwhelming response to an immune blood disease. Low platelet counts indicate bleeding or excessive destruction of platelets caused by [parasites](http://www.petplace.com/cats/understanding-blood-work-the-complete-blood-count-cbc-for-cats-2/page2.aspx) or immune diseases.

**Common Cat Diseases/Disorders Blood Count Analysis**

Not all diseases/disorders affect blood counts

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Hyper-  thyroid-  ism | FIV | Hyper-  adreno-  corticism | Diabetes  Mellitus | FLUTD | Rhino-  tracheitis | PKD | Feline  Distemper | Abscess | Anemia | Folliculitis | Feline  Acne |
| WBC |  | Low |  |  | High | High | Low | Low | High |  | High |  |
| RBC | High |  |  |  |  |  |  |  |  | Low |  |  |
| HGB |  |  |  |  |  |  |  |  |  | Low |  |  |
| PLT |  |  |  |  |  |  |  |  |  |  |  |  |

# Analyzing Sparky’s Blood Test

# ANEMIA CAUSED BY ONIONS

### Written by Margaret A. Wissman

(This article was in the Simian, the SSA's monthly newsletter, some time ago.)

**This article focuses on monkeys, but the information pertains to dogs and cats as well.**

As a veterinarian, I have known for many years that onions, whether fresh, cooked or dehydrated, can cause anemia in pets. I remember reading a case report years ago concerning a small dog that ate a good portion of a bag of fresh, whole onions one day while his owner was at work, and the dog was near death when discovered by his frantic owner. However, I continually read stories about owners feeding onions to their monkeys, and I realize that most people have no idea of the dangers of feeding onions. So, I thought it would be a good idea to educate owners about onions.   
  
Onions can cause Heinz-body hemolytic anemia. What is anemia? Anemia is any condition in which the number of red blood cells is decreased. Red blood cells carry oxygen to the tissues on a molecule called hemoglobin, and the number can be measured by counting the number of red blood cells (RBCs) or quantity of blood, or by the concentration of hemoglobin or by the measurement of the concentration of the blood. The term Heinz-body describes changes that occur to RBCs when they are exposed to oxidants, including ingested onions. Heinz-body form when hemoglobin molecules are adversely changed and the hemoglobin coalesces in the RBCs. Heinz-body changes to RBCs is irreversible. These changes to the red cells make them more rigid, which is not good. Red Blood cells must bend and flex as the twist and turn on their course through the blood vessels of the body, and if they cannot, they may rupture or be filtered out of the bloodstream.   
  
Let's now cut through all this medical jargon. What exactly does happen when onions are consumed? Simply put, onions cause red blood cells to become unable to function properly, then causing them to rupture. This causes anemia.  
  
What clinical signs will occur with onion toxicosis? The signs that you see will depend on the amount of onions consumed, the length of time they have been fed, and the size of the animal. Gums (mucous membranes) may appear pale if there is moderate or severe anemia/ If lots of RBCs have ruptured, there may be hemoglobin in the urine, causing it to appear reddish or brown, or the tissues may become jaundiced. Weakness, depression, rapid heart rate and rapid respiratory rate may be observed as a result of there not being enough oxygen reaching the tissues (hypoxia). Vomiting, decreased appetite and diarrhea may also occur. Blood tests taken by your veterinarian will show certain characteristics. Heinz-bodies can be seen on blood smears and the packed cell volume will be decreased, indicating anemia. As the body tries to replace the damaged blood cells, certain characteristics may also be seen in the blood. Hemoglobin may be seen in the urine.  
  
Many case reports have been published concerning Heinz-body hemolytic in dogs and cats. Most clinical cases have occurred in small dogs. One report describes Heinz-body hemolytic anemia in two cats fed onion soup! I know that many research facilities that house non-human primates will not feed them onions because of problems with anemia. One lab had anemia problems in baboons that were frequently fed onions. Since we know that onions can cause fatal hemolytic anemia, it is best to never feed them to our pet monkeys. However, there can be hidden onion in some products that we feed as well. For example, many veterinarians feed sick cats and kittens all-meat baby foods, and some cases of Heinz-body hemolytic anemia have occurred after these have been fed, Why? Check the label. You may be surprised to find that many baby food manufacturers add onions or onion powder to increase palatability. There can be enough onion products in these little jars to cause serious problems in these small creatures. A jar of chicken baby food that I have right here has this list of ingredients: chicken, water, modified corn starch, onion powder and extractive of celery. Another product that I like to feed, which is a good first solid for my baby monkeys are chicken sticks. However, let's go down the list of ingredients: chicken, water calcium reduced dried skim milk, salt sugar, onion powder, and garlic powder. I only offer this very infrequently to my toddler now! Onions are often added to products to enhance the flavor of many food, especially for human babies, so be sure to read the label carefully before feeding any prepared food to your monkeys.   
  
What about onion toxicity in humans? Since damage from feeding onions seems worse in little dogs and cats, it may be that the amount of onion in baby foods is not enough to cause problems in humans, in relation to their size. But certainly, the amount of onion in baby foods can be potentially harmful to monkeys. And fresh or cooked onions will certainly cause a degree of Heinz-body formation in the blood of primates. Based on the information that we now have, I would recommend not feeding onions to monkeys at all. I would like to see labs that have experienced Heinz-body hemolytic anemia in monkeys fed onions write up the cases to present to other vets, so that others may learn the hazards of onions. So, please spread the word to other owners that onions should not be fed to non-human primates or other species of animals, as well.