

**MIDDLE SCHOOL**

**Biotechnology**

**Diagnosing Sparky**

**Background:**

Doctors diagnose patients based on symptoms, medical history and physical observations. Once they have an initial medical history, they decide on a possible diagnosis. Tests are administered to be sure of a positive diagnosis. Medical tests and treatments were developed by using biotechnology.

Students will be introduced to Sparky. They will discover that Sparky has some medical problems and, by considering her symptoms, will have to predict what illnesses Sparky has.

**Teacher Note- Sparky has -Anemia (from eating onions and an unbalanced diet)**

**-Diabetes Mellitus**

**-Feline Acne**

**Goal**: Using observations and inferences as clues, students will decipher common cat diseases/disorders and hypothesize possible illnesses that Sparky may have.

**Learning Objectives:** Students will…

* Discover “Sparky” based on an Animal Shelter’s report
* Read and infer medical symptoms
* Triage diseases based on common symptoms
* Read summaries about common cat diseases/disorders
* Hypothesize on what diseases/disorders Sparky may have
* Complete medical forms

**Materials**: (students should be placed in small groups (2-3 students per group)

* Copy of Classified Ad
* Medical folder for each group
* Furry Friend Medical History sheet (1 per group)
* Triage Chart for Common Cat Disorders sheet (1 per group)
* Definition, Description and Treatment Packet (1 per group) (make a class set to reuse for each class)
* Disease/Disorder Information Sheet (need several per group)
* Veterinary Assistants’ Medical Billing Log
* Final Treatment Sheet
* Veterinary Assistants’ Effort Sheet

**Time Required**: 2 45 – 60 minute class period

**Standards Met**:

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

**Procedure:**

* Pass out the Furry Friends Medical History on Sparky.
* Have the class read the information sheet and ask them what they think of Sparky.
* Do they think she’d make a good pet?
* Does she need medical attention?
* How do doctors diagnose patients?
* Once the class decides that she needs medical attention, tell them that they are going to assist the Furry Friends Animal Shelter by acting as Veterinary Assistants as they diagnose Sparky.
* Give each group a “medical folder”. Each group of veterinary assistants should organize their folders. Tell the students that all of their medical forms will go into this folder and it will be assessed at the end of the unit. In each folder, students should have:
* Medical Billing Log (top sheet on left)
* Veterinary Assistant Effort Sheet (2nd sheet on left)
* Final Treatment Sheet (bottom sheet on left)
* 3 Disease/Disorder Information Sheet (on right)
* Pass out the Triage Chart to each group, the students will circle symptoms that match up with Sparky’s.
* Students should eliminated diseases/disorders that do not match Sparky’s symptoms.

DAY 2

* Pass out the Definition, Description and Treatment packet to each group.
* The students will read a summary of the diseases that share the same characteristics as Sparky’s symptoms.
* Students will choose a couple (assign a price for each possible disease) of possible diseases.
* Pass out Disease/Disorder Information Sheets (the number will be different for each group)
* Student groups will complete an information sheet for each plausible disease/disorder.
* They should also decide on what tests should be administered. (They do not fill in test results or treatment)
* Students record their billing cost.
  + They will be given the blood test results and will administer a urinalysis in the next few days

**Assessment**:

* Participation in veterinary assistant groups
* Completion of Triage Charts and Disease/Disorder Information Sheet
* Accurate recording of costs in billing log

**Sources:**

Cat Diseases and Disorders

<http://www.thepetcenter.com/exa/fd.html>

<http://www.vet.cornell.edu/FHC/>

<http://www.petplace.com/cats/feline-diseases-and-conditions/page1.aspx>

**Diagnosing Sparky: Medical History Form**

Owner Unknown Cat Name Sparky

1. Cat Description:

Breed American Short hair Color Black and White

Sex Female (not spayed) Age aprx. 8 (?)

Weight 8 lbs

2. Location Description (where cat was found):

•Abandoned shed with dirt floor

•Plastic saucers of milk were found in the shed, the milk looked fresh

•No other food items were found except for a large bag of onions (several empty onion bags were also in the vicinity)

•8 other cats were in the shed, but ran away and were not contained

3. Cat Shows Symptoms?:

no Loss of appetite no Temperature

no Odor or discharge in ears yes Behavior Change

no Vomiting no Hair loss

no Diarrhea, constipation no Convulsions

no Coughing/sneezing yes Change in water consumption

no Lameness no Trouble urinating

no Runny eyes or nose yes Itching

yes Pale gums yes Frequent urination

**Details about symptoms:**

Sparky is always hungry and drinks constantly, yet she appears underweight and thin. She is very lethargic. Her face appears dirty even after bathing and there are small dark spots on her chin. She scratches her chin quite often. Her stomach feels solid and distended.

4. Cat’s Personality:

Sparky is a very friendly cat. She loves to be around humans and although tired, she makes an attempt to be playful. She has bright, enthusiastic eyes.

Tests Administered: Complete Blood Count (CBC)- results pending.

**Diagnosing Sparky: Triage Chart for Common Cat Diseases**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Vomiting** | **Diarrhea** | **Fever** | **Excessive Urination** | **Weight**  **Loss** | **Excessive**  **Thirst** | **Lethargic/**  **Depressed** | **Increased Appetite** | **Hair Loss** |
| **Hyperthyroidism** | yes | yes | no | yes | yes | yes | no | yes | yes |
| **Feline**  **Immunodeficiency**  **Virus (FIV)** | no | yes | yes | no | yes | yes | no | no | yes |
| **Hyperadrenocorticism** | no | no | no | yes | no | yes | no | yes | yes |
| **Polycystic Kidney Disease (PKD)**  **(Persian breeds)** | yes | yes | no | yes | yes | yes | yes | no | yes |
| **Diabetes**  **Mellitus** | no | no | no | yes | yes | yes | yes | yes | no |
| **Feline Lower**  **Urinary Tract Disease (FLUTD)** | yes | no | no | yes | no | no | yes | no | no |
| **Rhinotracheitis** | no | no | yes | no | no | no | yes | no | no |
| **Panleukipenia**  **(Feline distemper)** | yes | yes | no | no | no | no | no | no | no |

**Name of Cat Veterinary Assistants \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Diagnosing Sparky: Triage Chart for Common Cat Skin Disorders**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Pale Gums | Itching | Open Sores | Comedones  (Black Heads) | Depression/  Lethargic | Fluid Nodules | Location |
| Abscesses | no | no | yes | no | yes | yes | At wound site |
| Regenerative  Anemia | yes | no | no | no | yes | no | Red Blood Cells |
| Folliculitis | no | yes | yes | no | no | yes | Face, neck, head |
| Feline Acne | no | sometimes | no | yes | no | no | Chin |

**Diagnosing Sparky: Diseases/Disorders Information**

**Hyperthyroidism**

Hyperthyroidism is a very common disease afflicting primarily middle-aged and older cats. Also called thyrotoxicosis, hyperthyroidism is caused by an increase in production of thyroid hormones (known as T3 and T4) from enlarged thyroid glands in the cat's neck.

Over time, cats with hyperthyroidism may develop an enlargement and thickening of the left ventricle of the heart. If left untreated and unmanaged, these changes will eventually compromise the normal function of the heart and can even result in heart failure. Hypertension-high blood pressure-is another potential complication of hyperthyroidism and can cause additional damage to several organs, including the eyes, kidneys, heart, and brain

Cats afflicted with hyperthyroidism usually develop a variety of signs, which may be subtle at first but then become more severe as the disease progresses. The most common clinical signs of hyperthyroidism are weight loss, increased appetite, and increased thirst and urination. Hyperthyroidism may also cause vomiting, diarrhea, and hyperactivity. The coat may appear matted or greasy

Your veterinarian will conduct a physical examination. Your cat's neck area will be palpated to check for enlarged glands. Your cat's heart rate and blood pressure may also be checked. If thyroid disease is suspected, your veterinarian will likely order a blood-chemistry panel

**Feline Immunodeficiency Virus (FIV)**

FIV-infected cats are found worldwide, but the prevalence of infection varies greatly. In the United States, approximately 1.5 to 3 percent of healthy cats are infected with FIV.

The primary mode of transmission is through bite wounds. Casual, non-aggressive contact does not appear to be an efficient route of spreading FIV; as a result, cats in households with stable social structures where housemates do not fight are at little risk for acquiring FIV infections. On rare occasions infection is transmitted from an infected mother cat to her kittens, usually during passage through the birth canal or when the newborn kittens ingest infected milk.

Early in the course of infection, the virus is carried to nearby lymph nodes, where it reproduces in white blood cells known as T-lymphocytes. The virus then spreads to other lymph nodes throughout the body, resulting in a generalized but usually temporary enlargement of the lymph nodes, often accompanied by fever.

Antibody tests detect the presence of antibody in the blood of infected cats.

**Hyperadrenocorticism (Cushing’s Disease)**

Cushing's disease is considered a disease of middle age and older dogs and cats. It is much more common in dogs.

Symptoms include increased water consumption and urination**,** increase in appetite, abdominal enlargement: increased panting, recurrent urinary tract infections, or losses in reproductive ability are other symptoms often noted with this disease. Hair loss was one of the most common reasons the owners first brought their dog in for evaluation.

It is recommended that any dog suspected of having Cushing's disease should have a [complete blood count (CBC)](http://www.peteducation.com/article.cfm?cls=0&cat=1474&articleid=987), [blood chemistry panel](http://www.peteducation.com/article.cfm?cls=0&cat=1474&articleid=989), and [urinalysis](http://www.peteducation.com/article.cfm?cls=0&cat=1474&articleid=3136) performed as a routine part of the evaluation.

**Polycystic Kidney Disease (PKD)**

PKD was first reported in 1967. It is an inherited disease in Persian and Persian-cross cats. It is a slowly progressive, irreversible disease.

Kittens are born with abnormal kidneys but do not start to show signs until they are 3 – 10 years old. The kidneys contain small cysts. As the cat ages, the cysts become larger and more numerous. The kidney is not able to function properly and failure occurs.

Symptoms include change in urinary habits, increased water consumption, anorexia, depression, weight loss, and a poor coat. Vomiting, diarrhea, seizures and high blood pressure may also occur.

Kidney failure is generally diagnosed through a urinalysis and a blood chemistry panel. Ultrasound examination can identify the cysts.

There is no treatment for the cysts and removal is not feasible.

Cat breeders have a responsibility to prevent the spread of this disease. Cats used for breeding should be PKD negative. A DNA test can ensure this.

**Diabetes Mellitus**

Diabetes mellitus-also known as "sugar" diabetes-is a complex but common disease in which a cat's body either doesn't produce or doesn't properly use insulin.

Insulin is a hormone produced in the pancreas, is responsible for regulating the flow of glucose from the bloodstream into the cells of the body. When insulin is deficient or ineffective, the cat's body starts breaking down fat and protein stores to use as alternative energy sources. As a result, the cat eats more yet loses weight. Additionally, the cat develops high levels of sugar in the bloodstream, which is eliminated in the urine. In turn, sugar in the urine leads to excessive urination and thirst. Cat owners often notice these four classical signs of diabetes mellitus: ravenous appetite, weight loss, increased urination, and increased water consumption.

While diabetes mellitus can affect any cat, it most often occurs in older, obese cats. Male cats are more commonly afflicted than females.

Diabetes mellitus is diagnosed based on the cat's signs, physical examination findings, laboratory test results, and the persistent presence of abnormally high levels of sugar in the blood and urine. Once diabetes has been diagnosed, immediate treatment is necessary.

Left untreated, diabetes will shorten a cat's lifespan

Most diabetic cats require insulin injections administered under their skin twice daily. The injections can be given at home, preferably at the same time each day.

**Feline Lower Urinary Tract Disease (FLUTD)**

FLUTD affects the cat's urinary bladder and sometimes the urethra (the tube-like structure that leads from the bladder to the outside of the body).

FLUTD is a serious disease and if left untreated, it can result in death. Signs of FLUTD include prolonged squatting or straining in or out of the litter box (some owners may confuse this with signs of constipation) and not producing urine or only a small amount, frequent urination or straining, pain while urinating (meowing or howling), urinating outside of the litter box, blood in the urine, frequent licking of the genital area, vomiting and/or depression. Some cats with FLUTD develop crystals in their urine. In the male cat, these crystals can block his urethra preventing him from urinating even though the bladder still fills. Sometimes, a plug can form and also block the urethra. You may have heard of a male cat with this condition called a 'blocked tom.'

Several factors can contribute to this disease including bacterial or viral infections, trauma, crystals in the urine, bladder stones, tumors of the urinary tract, and [congenital](javascript:popupWin1('/dictionary_term.cfm?term=congenital',%2050,%2050,%20350,%20300)) abnormalities. In many cases, the cause is never discovered

The veterinarian may perform a '[urinalysis](http://www.peteducation.com/article.cfm?cls=0&cat=1474&articleid=3136)' that will indicate if there are crystals, bacteria, blood, or [white blood cells](javascript:popupWin1('/dictionary_term.cfm?term=white%20blood%20cells',%2050,%2050,%20350,%20300)) in the urine; the urine pH and also how concentrated the urine is (called 'specific gravity'). The veterinarian may also take radiographs (X-rays) to look for stones, tumors, or congenital abnormalities. Certain dyes are sometimes passed into the bladder to aid in seeing abnormalities.

**Rhinotracheitis**

'Feline Upper Respiratory Disease Complex' is the term used to describe a condition affecting the mouth, nasal passages, sinuses, and upper airway in cats and kittens. There are multiple causes of feline upper [respiratory](javascript:popupWin1('/dictionary_term.cfm?term=respiratory',%2050,%2050,%20350,%20300)) complex, but 80-90% of the cases are caused by feline herpes-1 (also called feline rhinotracheitis virus)

Feline rhinotracheitis virus is spread through contact with the discharge from the eyes and nose of an infected cat. This usually occurs through direct cat-to-cat contact. Food dishes, hands, bedding, etc., which have been contaminated with infected discharge, can transmit these viruses from one cat to another.

Symptoms usually last for two to four weeks and include sneezing, nasal discharge, conjunctivitis, drooling, abortion, fever, loss of appetite and severe depression.

The diagnosis of feline upper respiratory disease complex is made based on medical history (e.g., vaccination status and possibility of exposure to an infected cat), clinical signs, and rarely through special laboratory tests to determine the exact cause of disease

**Panleukipenia (Feline Distemper)**

Panleukopenia is a severe, highly contagious viral disease of cats, kittens, raccoons, and mink. The panleukopenia virus tends to invade cells which are rapidly growing such as those of the digestive system, bone marrow (which makes blood cells), lymph [tissue](javascript:popupWin1('/dictionary_term.cfm?term=tissue',%2050,%2050,%20350,%20300)), and developing nervous system. This explains the common symptoms of diarrhea, vomiting, low [white blood cell count](http://www.peteducation.com/article.cfm?cls=0&cat=1474&articleid=987), and seizures. A vaccine is available to protect against the disease.

FPV is most commonly transmitted when a susceptible cat has contact with the feces or urine of infected cats. Infected cats shed the virus in their feces and urine up to 6 weeks after they recover. FPV can also be spread by contact with urine- or feces-contaminated items such as food bowls, water dishes, clothing, shoes, hands, bedding, and litter boxes.

Many older cats that are exposed to feline panleukopenia virus do not show symptoms. However, young (3-5 months old) unvaccinated cats can become seriously ill. The onset of symptoms is sudden and cats will start out with fevers of 104-107°F, depression, and will not eat. These symptoms appear so suddenly, some owners think their pet has been poisoned. Three to four days later they will start vomiting and can become severely dehydrated. Severely dehydrated cats may hang their heads over the water bowl, but not drink. Diarrhea can also occur and may be bloody.

Test kits are available to detect the virus in the feces. Blood tests to look for antibodies (proteins produced by the body to destroy foreign invaders such as bacteria and viruses) to the virus can be performed, but these tests are more commonly used for research rather than diagnosis. The virus can also be isolated from the feces or urine, but again, this is a time-consuming and expensive test which is usually performed in research situations.

**Abscesses**

Abscesses are an accumulation of pus and may or may not be caused by an infection. They are often due to bite wounds.

They appear as firm, fluid-filled nodules of varying shapes and sizes with a small crusty area at the puncture site. The cat may have fever, loss of appetite and depression if infection is involved.

A physical exam and a needle aspirate can diagnose an abscess. Surgery may be necessary to open, drain and flush the wound. If the abscess is infected, antibiotics should be administered.

**Regenerative Anemia**

When there are not enough red blood cells, the body is said to be anemic

Some symptoms include pale gums, pale eyes and ears, weakness and depression

Causes can be due tocancer, drugs such as aspirin and ibuprofen, ingestion of toxic materials, ingestion of pennies, Ingestion of onions or bacterial and viral infections

Diagnosis can be made based by acomplete blood test (CBC), a Urinalysis or aBone marrow aspirate. Blood-building vitamins and minerals are the treatment regimen of choice; transfusions will be required in severe cases.

**Folliculitis**

Folliculitis is an infection of the hair follicles and symptoms usually appear on the face, neck and head.

Pustules develop in the hair follicles and open and form crusts. These may itch and develop hair loss.

A skin culture or biopsy can determine an underlying condition such as allergy or FIV.

Antibiotics are usually given for 3-4 weeks.

**Feline Acne**

Feline acne is a common problem seen in cats. It is found on the cat's chin & lips. Often symptoms are so mild they go unnoticed. Acne can affect cats of any age, sex or breed.  In acne, the follicles become blocked with black sebaceous material, causing blackheads. These blackheads may become irritated, swollen & infected, leading to pustules

The exact cause of feline acne isn't known. There are several possible causes however including stress, Plastic food bowls (they are porous & trap bacteria, which is then transferred to the cat's chin), poor grooming habits and [Food allergies](http://www.cat-world.com.au/FoodAllergiesInCats.htm)

Treatment of feline acne depends on the severity of the condition. Removing excess sebum is the aim. Some treatments include: Gentle cleansing with an antibiotic soap, topical Vitamin A or topical retinoids. In more severe cases, cleansing the skin with an ointment or gel containing benzoyl peroxide, or Oral glucocorticoids such as prednisone may be needed.

**Diagnosing Sparky:** **Disease/Disorder Information Sheet**

Cost per form

$ 100.00

Veterinary Assistants:

History

Animal Name Species Patient Number Age Sex

Symptoms-

Diagnosis

Possible Diseases/Disorders- (use a different sheet for each possibility)

Reason this disease/disorder is plausible-

Test that would determine positive diagnosis of disease/disorder-

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Test Results-

Final Diagnosis-

Treatment-

**Diagnosing Sparky: Medical Expenditure Log**

Veterinary Assistants- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Fill out this chart daily

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date | Description  (item, test, situation) | Quantity | Cost per item | Total |
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Total Expenditures- $

**Diagnosing Sparky: Final Treatment Sheet**

Patient-

Veterinary Assistants-

Disease 1-

Treatment-

Disease 2-

Treatment-

Disease 3-

Treatment-

**Diagnosing Sparky: Veterinary Assistants Effort Analysis**

**Fill out this chart daily**

Give yourselves a daily score based on the rubric below

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Name- | Name- | Name- |
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3= On task, Excellent participation and behavior, Shared ideas and collaborated with others, Great team member

2= Not always on task, Participated but let others do most of the sharing/work, Adequate effort and team member

1=Off task quite a bit, Did not contribute to the team. Inadequate effort.