



## Cancer in Ferrets

Pet ferrets suffer from an unusually high incidence of cancer. The most common types are *insulinoma* (islet cell cancer of the pancreas), *lymphoma* (cancer of lymphocytes, a type of white blood cells), *adrenal cancer*, and *various skin tumors*- not necessarily in that order.

In a scientific study done in the last few years it was estimated that 50%-70% of ferrets over the age of 3 will develop adrenal cancer, insulinoma, or both. That is 2/3 of **all** ferrets! Our best tool for combating these cancers is early detection. For this reason, we recommend physical exams every six months for ferrets over 3 years of age.

### Insulinoma

Tumors of the pancreas produce an oversupply of insulin causing low blood sugar. It might be easiest to think of this like the opposite of diabetes. In diabetes there is too *little* insulin and a *high* blood sugar, however, with insulinoma there is too *much* insulin and a *low* blood sugar (which is as or more dangerous). Diagnosis of insulinoma is made with a test that demonstrates a low blood sugar after fasting for 4-5 hours. The fast is necessary to eliminate the possibility that a normal or high blood sugar is due to having just eaten. Alternatively, insulin and blood sugar values may need to be compared to diagnose some cases.

### ***Clinical signs of insulinoma include:***

- Periodic weakness
- Weight loss (often with large appetite)
- Drooling and pawing at the mouth
- Difficult to wake up
- Staring blankly into space with “glassy” eyes
- Mental dullness
- Vomiting
- Seizures
- Coma

### ***There are several treatments for insulinoma:***

1. Surgery to remove the cancer: Some tumors are easily removed while others are spread throughout the organ and cannot be removed. During the surgery, a complete exploratory is done to look for other tumors or abnormalities.
2. Dietary therapy: Small, frequent high protein meals are fed including meat-based baby food, cooked meat, or high protein feline supplements such as A/D. Simple sugars and

carbohydrates should never be fed because they will trigger insulin release from the cancer and can throw your ferret into a hypoglycemic crisis.

3. Medical therapy: Medical therapy involves the use of drugs to increase the blood sugar of your ferret. This is usually effective at controlling the signs for 6-18 months. This does nothing to treat the cancer, however, and ferrets commonly show progressive severity of clinical signs and require gradually increasing doses of drugs.

***Treatment of a hypoglycemic episode:***

If your ferret starts to stare off into space and drool, attempt to feed them to increase their blood sugar. If this is not possible force-feed (gently) them honey or corn syrup and get them to a veterinarian as soon as possible. If the ferret is seizing or is unresponsive, apply honey or corn syrup to the inside of the cheek and contact a veterinarian immediately. Caution: during a seizure the ferret may unknowingly bite down, so take care not to get bitten when placing sugar in their mouths.

***Prevention:***

There are several possibilities that may promote the formation of insulinomas, but the most likely etiology is that of improper diet. A high fat and protein and low to no carbohydrate diet (essentially the “Atkins” diet) is the best diet available for ferrets, as their digestive systems are not built to handle the carbohydrates. Cat and dog foods should be strictly avoided, as well as any sweet or fruit treats. There are many packaged ferret diets on the market, with many that are not of sufficient quality and only a few that are of the proper nutrient ratios. Feel free to ask if a particular food is recommended.

**Adrenal Tumors**

Tumors of the adrenal gland can be one of several types. It is important to determine what type of tumor is present in order to establish the likelihood that the cancer will return, and the effectiveness of drugs that can be used to treat the cancer if it returns. The tumor type is determined by a certified veterinary pathologist when the tumor is mailed to them after the surgery. Other tissues can also be sampled and mailed to the pathologist to determine if the cancer has spread.

***Clinical signs of adrenal cancer include:***

- Hair loss
- Thinning skin
- Swelling of the vulva
- Diarrhea/Straining to defecate
- Prostatic enlargement
- Weight loss
- “Pot-Bellied” appearance
- Depression

This cancer is best diagnosed by: sending a blood sample to a laboratory where certain hormone concentrations are measured or ultrasonographic examination, directly visualizing enlargement of the adrenal glands in the abdomen. X-rays and blood chemistries are also helpful in determining the diagnosis and best treatment option.

***Treatment options include:***

1. Surgery: Surgery can be done to remove the cancerous adrenal gland. This is the best treatment for cancer of the left adrenal gland; however, surgery is more risky when the right adrenal gland is involved due to its proximity to the caudal vena cava (the vein that returns all the blood from the body to the heart). An exploratory is also done to rule out cancer spread and look for other abnormalities.
2. Medical therapy: Anti-Hormone therapy can be used to inhibit the function of the adrenal gland hormone. It doesn't kill the cancer; it just keeps it in check for a period of time (3-10 months).

***Prevention:***

Research has shown that although the risk factors for adrenal neoplasia are present in virtually all spayed or neutered ferrets, early preventative therapy has a very high efficacy. A simple injection of a depot hormone at your ferret's annual examination has shown a great deal of promise at preventing adrenal tumors when started in young animals (under 1 year of age), and with good effect in animals that are older but not yet showing any symptoms.

**Lymphoma**

Lymphoma is the uncontrollable growth of certain blood cells called lymphocytes, and is of great concern since it is the most common cancer of young ferrets. There is suspicion that there may be a transmissible agent that instigates the development of this cancer. The clinical signs of this disease vary with the age of the ferret and the location where the cells attach and start to divide uncontrollably. Diagnosing the disease is often difficult and may require X-rays, ultrasound, bone marrow analysis, blood sampling, and lymph node removal.

***In young ferrets, nonspecific signs usually seen include:***

- Anorexia
- Weight loss
- Rapid onset of weakness
- Acting tired much of the time

-Less common signs of this cancer are **coughing, difficulty breathing, and difficulty defecating**.

In adult ferrets the disease often takes a longer course and the signs are more variable. Again, the signs depend on what organs are infected with the cancer.

***In adult ferrets signs may include:***

- Cycles of inappetence
- Cycles of weakness
- Periods of weight loss
- Swollen lymph nodes
- Chronic diarrhea
- Vomiting
- Difficulty breathing
- Yellowish tinged skin
- Enlarged organs or abdomen
- Difficulty walking

***Treatments include:***

1. Chemotherapy: Lymphoma is not cured by chemotherapy; instead it is just put into remission. These periods of cancer-free life last between 3 months and 5 years. Testing and intermittent chemotherapy will be continued during the remission period to catch the cancer as it returns.
2. Medical therapy: Medical therapy can be used to make ferrets feel better as the cancer progresses.
3. Surgery: Surgical removal of large masses can increase the success of chemotherapy and is warranted in certain circumstances, particularly in cases of intestinal involvement.

-With early detection, remission can be achieved in the majority of cases.

-As the disease progresses it becomes more difficult to treat and the success rates decrease.

-As there is no known prevention, the best advice is to pursue diagnostics as soon as any symptoms develop and seek aggressive, appropriate therapy.