



## Case report

# T-cell lymphoma in a ferret (*Mustela putorius furo*)

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### Abstract

A 12 years old ferret was attended with clinical history of prostration and anorexia. The animal died a few hours after consultation. After necropsy, a histopathological exam of a liver tumor was carried out. The morphologic diagnosis was consistent with multicentric lymphoma. Immunohistochemical exam of the neoplastic cells was made additionally, and confirmed the diagnosis of T-cell lymphoma.

**Key Words:** lymphoma, T-cell lymphoma, ferret, exotic animals, neoplasia

### Introduction

The popularity of the ferret (*Mustela putorius furo*) as a pet has increased significantly in the recent years. The ferret is not an animal of the Brazilian fauna. Although the number of ferrets imported into Brazil is still small, some Brazilians have already adopted the species as a pet. Recent studies reported that in the 80s, from 10 to 12 million ferrets lived as companion animals in the United States of America. Along with this growth in the popularity of the ferrets as a pet, there is an increased willingness of their owners to pursue advanced medical care. As owners become more informed, veterinarians are obligated to offer them an even greater range of options for diagnosis and treatment (5, 1). In general ferrets need treatment and therapy support mainly for gastrointestinal, cardiac, endocrine and neoplastic disorders (10). Although there are no available statistics for the actual incidence of neoplasia in pet ferrets, reports of many types of neoplasia in ferrets have emerged in the last 15 years (1). The most prevalent neoplasms in ferrets are related to the endocrine and hematopoietic systems; insulinomas, carcinomas and lymphomas has been the most reported (7). Lymphoma is the third most common malignancy in the domestic ferret, it is a hematopoietic tumor defined as a proliferation of malignant lymphoid cells that primarily affects lymph nodes or solid visceral organs such as liver or spleen (4, 8, 10).

In ferrets the lymphoma can be classified according to age onset, cell type and organ system affected. In general, the most common form of lymphoma, the lymphocytic form, occurs in animals older than 3 years. Affected ferrets typically have a chronic course of the disease which involves mostly the visceral organs, especially the spleen, liver, kidneys and lymph nodes. Clinical signs include lethargy, progressive weight loss, prostration and anorexia. Neoplastic lymphocytes are usually mature and well differentiated (6, 10). Ferrets younger than 2 years generally develop the lymphoblastic form of lymphoma with acute onset of clinical signs caused by large mediastinal masses that displace the heart and lungs dorsocaudally. In this case, neoplastic lymphocytes are usually large, atypical and immature (6). Pleural effusion may occur and the main sign associated with this condition is dyspnea (10). Depending on the cell type, lymphoma can be categorized as T-cell or B-cell based on immunohistochemical staining of the lymphocytes (1). Although several potential causes of ferret lymphoma have been suggested, no definitive etiology has been determined. Among the main causes, there are viral diseases, genetic predisposition and exposure to carcinogenic (6, 11). Cytological examination of cells from effusion or masses is a useful diagnostic procedure; nevertheless the histopathologic conclusion is often required. Laboratory abnormalities will vary according to the organs affected (1). Chemotherapy protocols from the dogs and cats medicine has been adapted for the treatment of ferrets

with lymphoma, although only 10% present improvement.

### Case report

A 12 years old male ferret (*Mustela putorius furo*) was brought to the Veterinary Hospital Pet Care in São Paulo with a history of 4 days of prostration and anorexia. The owner had acquired the animal as a youngling and denied any morbid antecedent. Moderate dehydration, hypothermia, prostration and hypocolored oral mucosis could be detected during clinical examination. A firm structure at the mesogastric region was found upon abdominal palpation.

An ultrasound exam was requested in order to evaluate the abdominal organs. The exam revealed the liver with well-defined and regular outlines, increased size, and homogeneous echotexture, except for the presence of a round, isoechogenic area with approx. 3,7cm x 3,31cm in the parenchyma with habitual echogenicity (Figure 1). The spleen had also an increased size, homogeneous echotexture, except for the presence of a round area with coarse texture with approx. 4,77cm x 4,21cm and habitual echogenicity (Figure 1).

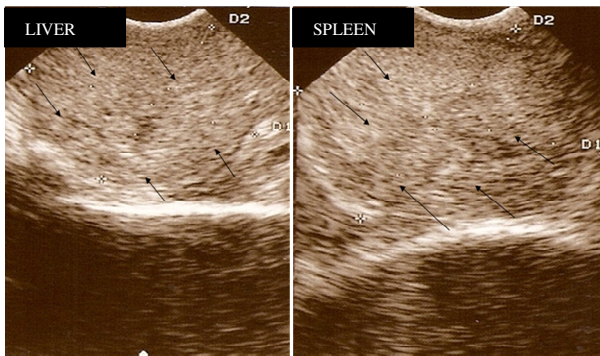


Figure 1. Ultrasound image of tumoral formation (arrows) on ferret liver and spleen (*Mustela putorius furo*).

Initial therapy was symptomatic and consisted of endovenous fluid therapy (physiological solution 0,9%, 2 ml/Kg/hour) and re-establishing of body temperature. Nevertheless, the patient died a few hours after the beginning of the treatment. During necropsy splenomegaly and hepatomegaly were observed. The spleen presented a nodular formation measuring approx. 3,5cm diameter, dark red, friable, with invasive growth and poorly defined. Microscopically, the spleen showed proliferation of round cells with high ratio cytoplasm / nucleus (Figure 2). Cells presented loose chromatin and prominent nucleoli and high pleomorfism, nuclear atypia and frequent mitosis. Atypical multifocal mitosis were observed. Hemorrhagic and mineralized areas were also found. Neoplastic cells with the morphology similar to those found in the spleen were detected in the periportal region of the liver (Figure 3). The morphologic diagnosis based on the histopathological alterations was compatible with lymphoma.



Figure 2. Photomicrography of the spleen. Proliferation of round cells with high cytoplasm-chromatin ratio can be seen. The cells presented loose chromatin and prominent nucleoli and high pleomorfism, atypia and mitotic rate. Atypical and multifocal mitosis could also be observed. H&E. Obj. 40x.

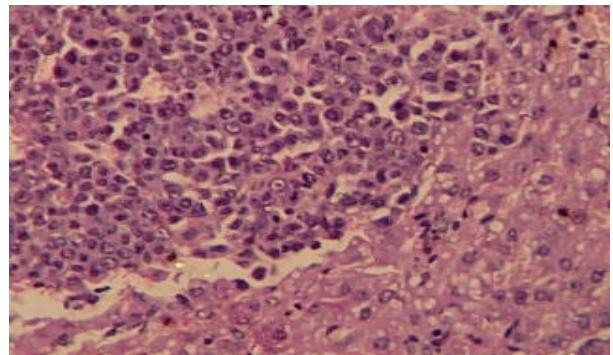


Figure 3. Photomicrography of the liver. Proliferation of round cells with high cytoplasm-nucleus rate can be seen. The cells presented loose chromatin and prominent nucleoli and high pleomorfism, atypia and mitotic rate. H & E. Obj. 20x.

This material was sent to the Laboratory of Veterinary Pathology (Vetpat), in Campinas for immunohistochemistry. The immunophenotyping of the neoplasia was done using CD79a and CD3 antibodies, establishing a final diagnosis of T-cell lymphoma (Figure 4).

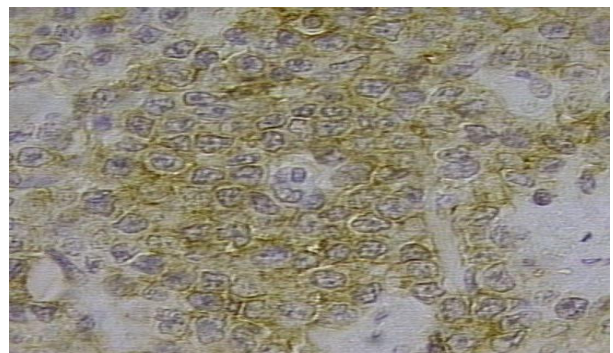


Figure 4. Photomicrography of the spleen. Immunopositivity of CD3 in the neoplastic cells. Advanced. Obj. 40x.

## Discussion and Conclusion

The use of immunohistochemistry in the small animal diagnostic routine has already become reality, allowing more accuracy and precision in both diagnosis and prognosis.

The immunohistochemical exam performed on the tumor has made it possible to accurately classify it as a T-cell lymphocytic lymphoma. A study carried out in Japan on 20 ferrets with histological lymphoma diagnosis including the multicentric, gastrointestinal, mediastinal and cutaneous types showed, that 88,9% (16/18) of the lymphomas were originated by T-cells and only 11,1% (2/18) by B-cells (9). Another study carried out in the USA on 10 young ferrets with the mediastinal lymphoma type, revealed that nine animals presented the neoplasia originated by T lymphocytes (3). In these cases, the animals presented a quite aggressive clinical course of the illness. It is known that on dogs, T-cell lymphomas use to have a substantially more unfavorable prognosis, than mature B cells neoplasias (2). Thus, the correct lymphoma classification and immunophenotyping is extremely important in order to establish a precise diagnosis and prognosis of this illness in veterinary medicine. The treatment of lymphomas on ferrets consists of chemotherapy protocols adapted from the dogs and cats medicine. Chemotherapy drugs such as Vincristine, Cyclophosphamide, L-asparaginase, Doxorubicine, Methotrexane and Chlorambucil have been used with variable regression success in lymphomas (6). Alike other species, ferrets are subject to chemotherapy side effects. Leucopenia, anemia and pancytopenia may be caused by myelosuppressive drugs and sometimes the patient must be treated for the rest of his life in order to avoid sepsis (1).

Despite reports revealing that only 10% of the ferrets have responded well to chemotherapy treatment, the animal's longevity after diagnosis of the illness may reach up to 23 months (6, 10).

The search for exotic animals as companion pets has been growing lately, thus obliging veterinarians to specialize themselves more and more and also to look for more specific diagnosis and treatment methods for those species.

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