



**TUMOR CASE SERIES IN DOGS AT THE UNIVERSITY VETERINARY  
CLINIC OF UFNT BETWEEN 2018 AND 2024<sup>1</sup>**

**CASUÍSTICA DE TUMORES DE CÃES ATENDIDOS NA CLÍNICA  
VETERINÁRIA UNIVERSITÁRIA DA UFNT, ENTRE 2018 E 2024**

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## ABSTRACT

The increase in life expectancy and changes in the lifestyle of companion animals have contributed to the increasing number of neoplasia cases in dogs, with malignant tumors being the most frequent and leading cause of death in these animals. Several factors are involved in tumor development, including genetic predisposition, age, and reproductive status. Given the scarcity of data on canine neoplasms in the state of Tocantins and the high number of observed cases, this study aimed to investigate the prevalence and epidemiological aspects of tumors in dogs treated at the University Veterinary Clinic (UVC) of the Universidade Federal do Norte do Tocantins (UFNT) between 2018 and 2024. Medical records from the UVC-UFNT were analyzed, and information on breed, sex, age, reproductive status, history of contraceptive use, tumor location, affected organ system, and histological type was collected. During the evaluated period, 88 dogs were diagnosed with neoplasms. Most animals were mixed breed (51.1%), followed by Rottweiler (9.1%), Pinscher (7.9%), Pit Bull (5.7%), and Poodle (5.7%). A predominance of females (80.6%) and nonneutered animals (76.13%) was observed. Epithelial neoplasms predominated in the mammary region and reproductive system, with a significant association between sex and tumors of epithelial and mesenchymal origin ( $p < 0.05$ ). The lack of information regarding contraceptive use in a large proportion of medical records limits the analysis of this factor. These results reinforce the greater predisposition of nonneutered and elderly female dogs to the development of neoplasms, highlighting the importance of early spaying as a preventive measure.

**Keywords:** Epidemiology. Neoplasms. Veterinary oncology.

## RESUMO

O aumento da expectativa de vida e as mudanças no estilo de vida dos animais de companhia têm contribuído para o crescimento dos casos de neoplasias em cães, sendo as malignas as mais frequentes e a principal causa de óbito nesses animais. Diversos fatores estão envolvidos no desenvolvimento tumoral, como predisposição genética, idade e estado reprodutivo. Diante da escassez de dados sobre neoplasias caninas no Tocantins e do elevado número de casos observados, este estudo teve como objetivo investigar a prevalência e os aspectos epidemiológicos de tumores em cães atendidos na Clínica Veterinária Universitária (CVU) da Universidade Federal do Norte do Tocantins (UFNT) entre 2018 e 2024. Foram analisadas fichas de

atendimento da CVU-UFNT, coletando-se informações sobre raça, sexo, idade, estado reprodutivo, histórico de uso de contraceptivos, localização tumoral, sistema orgânico afetado e tipo histológico. No período avaliado, 88 cães foram diagnosticados com neoplasias. A maioria dos animais era sem raça definida (51,1%), seguida por Rottweiler (9,1%), Pinscher (7,9%), Pitbull (5,7%) e Poodle (5,7%). Observou-se predominância de fêmeas (80,6%) e de animais não castrados (76,13%). As neoplasias epiteliais predominaram na região mamária e no sistema reprodutivo, com associação significativa entre sexo e tumores de origem epitelial e mesenquimal ( $p < 0,05$ ). A ausência de informações sobre o uso de contraceptivos em grande parte dos prontuários limitou a análise desse fator. Os resultados reforçam a maior predisposição de fêmeas não castradas e idosas ao desenvolvimento de neoplasias, destacando a importância da castração precoce como medida preventiva.

**Palavras-chave:** Epidemiologia. Neoplasias. Oncologia veterinária.

## INTRODUCTION

Veterinary oncology has been continuously developing due to the large number of neoplasms affecting small domestic animals, which is probably due to the advanced age of these animals and, in many cases, the lack of early neutering (Estralioto; Conti, 2019). Neoplasia is the excessive proliferation of abnormal cells and occurs when these cells lose control during the mitotic process and form abnormal masses that, even after the interruption of the stimulus, continue to multiply (Daleck; Nardi, 2016).

Neoplasms can be classified as malignant or benign, with malignant neoplasms being invasive and tending to form metastases, whereas benign neoplasms are considered stable; that is, they do not present metastatic characteristics and have slower growth (Estralioto; Conti, 2019).

Malignant tumors are the main cause of death in companion animals (Inoue; Sugiura, 2022). The prevalence of these diseases has increased in recent years, with one of the main reasons being the increase in the life expectancy of companion animals (Vail; Thamm; Liptak, 2020). The most common neoplasms in dogs are those of the skin, mammary gland, and genital, gastrointestinal, hematopoietic, and lymphatic systems (Pinello et al, 2022).

As a genetic disease, several genomic alterations are believed to be associated with a neoplastic predisposition; however, biological, physical, and chemical carcinogens may be the main causes (Kiupel, 2017). Tobacco smoke and pesticides

are associated with canine lymphoma, and solar exposure is associated with cutaneous squamous cell carcinoma (Cridge et al., 2022). The use of contraceptives in female dogs that are not spayed or are spayed later in life is associated with the development of mammary tumors and obesity (Goldschmidt; Pena; Zappulli, 2017).

The establishment of a database plays an important role in the development of prevention and control strategies for this disease and has been used in epidemiological studies to examine the risk factors, types, and incidence of neoplasms (Dhein et al, 2024). The progression and development of neoplasms are related to many factors that are still not well studied but can be explained through these databases (Dhein et al, 2024).

Given the scarcity of information on neoplasms in dogs in the state of Tocantins, combined with the high number of cases observed in clinical practice, this study aimed to describe the frequency of tumors in dogs treated at the University Veterinary Clinic (UVC) of the Universidade Federal do Norte do Tocantins (UFNT) between 2018 and 2024. Furthermore, this study sought to determine tumor frequency in relation to breed, age, sex, reproductive status, and related causal cofactors, such as history of contraceptive use, as well as to investigate the associations between these epidemiological characteristics and different tumor types, classified as round cell, mesenchymal, or epithelial tumors. Finally, the relationships between the anatomical region and the affected organ system and the diagnosed tumor type were analyzed, enabling comparisons with the literature and contributing to the understanding of the occurrence of tumors in dogs in this geographic region.

## **MATERIALS AND METHODS**

### **Study Design**

For this study, the clinical records of dogs referred for oncological care at the UVC-UFNT, located at BR-153, km 112, Araguaína, Tocantins, Brazil, between 2018 and 2024 were analyzed. These records included patients' clinical evaluations and the results of laboratory tests.

To obtain the data, the records of the animals were carefully selected on the basis of suspected or confirmed oncological cases. Records of animals with a confirmed diagnosis of neoplasia by histopathological examination were included in the study.

## **Data Collection**

The database for statistical analysis was structured via Microsoft Excel®, which is based on previously completed medical records. Data related to patient identification, breed (with or without a defined breed), age (up to 5 years and over 5 years), sex (male/female), reproductive status (neutered or intact), history of contraceptive use, tumor location (abdomen, head, dorsum, scrotum, mammary gland, limb, thorax, and vulva), affected organ system (digestive, locomotor, reproductive, integumentary, and urinary), and diagnosis obtained through histopathological examination were tabulated. Access to the medical records of patients from the UVC and the collected information was restricted to technical aspects related to the subject, disregarding information that could expose the owners, veterinarians, and the animals themselves. The study was approved by the Ethics Committee on the Use of Animals at UFNT (CEUA-UFNT Process no. 016/2024).

## **Data Analysis**

Breed, age, sex, reproductive status, history of contraceptive use, tumor location, and the affected organ system were evaluated by relative frequency (percentage) and associated with tumor types (round cell, mesenchymal, and epithelial tumors) through chi-square or Fisher's exact tests, with significance set at  $p \leq 0.05$ . Microsoft Excel® and Bioestat® 5.0 software were used to perform the statistical analysis.

## **Results and Discussion**

During the analyzed period, from 2018–2024, 88 dogs with neoplasms were recorded, totaling 98 diagnosed tumors among 7,664 general consultations. These data highlight the importance of detailed monitoring of neoplastic cases, as the occurrence of multiple tumors in the same animal is not uncommon (Table 1).

**Table 1:** Analysis of the frequency of tumors in dogs treated at UVC-UFNT. Distribution of oncological cases, number of characterized neoplasms, proportion of neoplasia cases, and total number of consultations during the period from 2018--2024.

<b>Year</b>	<b>Oncological cases</b>	<b>Neoplasms</b>	<b>Proportion of neoplasia cases</b>	<b>Total number of consultations</b>
2018	10	11	0.86%	1,248
2019	4	4	0.31%	1,309
2020	3	4	0.85%	466
2021	7	8	0.73%	1,103
2022	34	37	2.87%	1,290
2023	20	23	1.86%	1,236
2024	10	10	0.99%	1,012
<b>Total</b>	<b>88</b>	<b>97</b>	<b>1.27%</b>	<b>7,664</b>

**Source:** Medical records of the UVC-UFNT, 2025.

An annual variation in the incidence of oncological cases was observed, with an emphasis on the year 2022, which presented the highest number of diagnoses, totaling 34 cases and 37 neoplasms, representing a peak in the studied period. In contrast, the year 2020 recorded the lowest number of cases (3), concomitant with a marked reduction in the total number of consultations (466), possibly influenced by external factors such as the COVID-19 pandemic.

When analyzing the total number of consultations performed by the UVC each year, regardless of the main complaint, the proportion of neoplasia cases remained low. Despite this, in recent decades, the occurrence of cancer in dogs has increased significantly. Studies indicate that approximately 50% of animals that reach 10 years of age or older die as a result of cancer (Bergman; Clifford, 2019).

The frequency of tumors between mixedbred animals (51.7%) and purebred animals (48.3%) was similar, as shown in Table 2. The most frequent breeds were Rottweiler, Pinscher, Pit Bull, Poodle, Dachshund, German Shepherd, Shih Tzu, and Brazilian Terrier.

**Table 2:** Number of neoplasia diagnoses in dogs by breed at CVU-UFNT during the period from 2018--2024.

Breed	2018	2019	2020	2021	2022	2023	2024	Total (%)
Mixed breed	3	1	2	5	15	12	7	45 (51.1)
Rottweiler		1			4	3		8 (9.1)
Pinscher	4				2	1		7 (7.9)
Pitbull					4		1	5 (5.7)
Poodle					3	1	1	5 (5.7)
Dachshund				1	1		1	3 (3.4)
German Shepherd	1		1		1			3 (3.4)
Shih Tzu				1		2		3 (3.4)
Brazilian Terrier					1	1		2 (2.3)
Alaskan Malamute	1							1 (1.1)
Belgian Malinois					1			1 (1.1)
Border Collie		1						1 (1.1)
Bull Terrier		1						1 (1.1)
Chow Chow					1			1 (1.1)
Golden Retriever					1			1 (1.1)
Shar-pei							1	1 (1.1)
<b>Total</b>	<b>9</b>	<b>4</b>	<b>3</b>	<b>7</b>	<b>34</b>	<b>20</b>	<b>11</b>	<b>88</b>

**Source:** Medical records of the UVC-UFNT, 2025.

Studies have shown a greater predisposition to the occurrence of neoplasms in certain breeds, especially Bernese and Boxer dogs (Kok et al, 2019; Nascimento et al, 2020). In the case of Boxers, as well as other brachycephalic breeds, an increased risk of neoplasm development has been associated with genetic predisposition (Nascimento et al, 2020). However, there were no records of consultations involving Bernese or Boxer dogs at the UVC, possibly due to the low frequency of breeding of these animals in the region.

The analysis of the sex data revealed that females were more frequently affected by neoplasms, representing 80.6% (n = 71) of the cases, whereas males accounted for 19.3% (n = 17) of the cases, as shown in Table 3.

Sex represents a predisposing factor for the development of neoplasms, with female dogs being more frequently affected than males are, as evidenced in this study. The male–female ratio found in this study was 0.22 for the total number of neoplasms, differing from that reported by Tedardi et al. (2016), who reported a ratio of 0.51. With respect to reproductive status, the occurrence of neoplasms was greater in

nonneutered animals, accounting for 76.13% (n = 67) of the cases, whereas neutered animals represented 23.86% (n = 21) of the cases (Table 3).

**Table 3:** Frequency of dogs diagnosed with neoplasms at UVC-UFNT during the period from 2018--2024, classified by sex and reproductive status.

Year	Sex		Reproductive status	
	Female (%)	Male (%)	Neutered (%)	Intact (%)
2018	9 (10.2)	1 (1.1)	1 (1.1)	9 (10.2)
2019	3 (3.4)	1 (1.1)	3 (3.4)	1 (1.1)
2020	1 (1.1)	2 (2.3)	1 (1.1)	2 (2.3)
2021	7 (8)	0 (0)	3 (3.4)	4 (4.5)
2022	28 (31.8)	6 (6.8)	7 (8.0)	27 (30.7)
2023	16 (18.2)	4 (4.5)	5 (5.7)	15 (17.0)
2024	7 (8)	3 (3.4)	1 (1.1)	9 (10.2)
<b>Total</b>	<b>71 (80.6%)</b>	<b>17 (19.3%)</b>	<b>21 (23.86%)</b>	<b>67 (76.13%)</b>

The protective effect of spaying/neutering against oncogenesis occurs because the administration of exogenous hormones can stimulate the production of growth hormone in the mammary gland, exposing mammary tissue to the action of progesterone. This prolonged exposure to progesterone, which has a carcinogenic effect when its levels remain elevated for long periods, may favor the development of malignant neoplasms (Torres; Iturriaga; Cruz, 2021).

Hormonal factors, especially those related to ovarian hormones, obesity at an early age and the intake of fat or protein of animal origin, are associated with an increased risk of mammary cancer development in both female dogs and women (Torres; Iturriaga; Cruz, 2021). In addition, spaying performed after the fourth oestrus does not reduce the risk of mammary neoplasia in canine species (Marchi et al., 2022).

Regarding the history of contraceptive drug use, 5.6% (n = 4) of the females diagnosed with tumors had a recorded history of use, whereas 19.7% (n = 14) had no such history. However, most cases (74.7%, n = 53) were classified as missing information according to the patients' medical records, as shown in Table 4.

**Table 4:** Number and percentage of female dogs diagnosed with neoplasms at UVC-UFNT during the period from 2018--2024, classified by history of contraceptive use.

Year	Contraceptive use		
	Yes (%)	No (%)	Not reported (%)
2018	1 (1.4)	6 (8.5)	2 (2.8)
2019	0 (0)	1 (1.4)	2 (2.8)
2020	0 (0)	0 (0)	1 (1.4)
2021	0 (0)	0 (0)	7 (10)
2022	1 (1.4)	1 (1.4)	26 (36.6)
2023	1 (1.4)	2 (2.8)	13 (18.3)
2024	1 (1.4)	4 (5.6)	2 (2.8)
<b>Total</b>	<b>4 (5.6%)</b>	<b>14 (19.7%)</b>	<b>53 (74.7%)</b>

**Source:** Medical records of the UVC-UFNT, 2025.

The use of progestogens presents several contraindications, ranging from mild adverse effects, such as increased appetite, obesity, and behavioral changes, to more severe manifestations (Rajathy et al, 2019). Among these, the following stand out: cystic endometrial hyperplasia complex, pyometra, mammary neoplasms, hyperglycemia, acromegaly, benign mammary hyperplasia, failures in parturition induction, hepatitis, adrenal dysfunctions, and developmental disorders (Rajathy et al, 2019). In addition, female dogs that received exogenous progestogens before oestrus presented a 2.3-fold greater risk of developing mammary neoplasia (Daleck; Nardi, 2016). Despite the known adverse effects, including the increased risk of mammary neoplasms (Rajathy et al., 2019), the analysis of the relationship between the use of progestogens and the development of neoplasms has been limited by the scarcity of data in medical records.

In defining neoplastic types by histopathological evaluation, it was possible to verify that the most frequent neoplasms were of the epithelial type (such as carcinomas), followed by round cell neoplasms, in dogs (Table 5).

**Table 5:** Number and percentage of histopathological diagnoses of neoplasms in dogs at UVC-UFNT between 2018 and 2024.

<b>Histopathological diagnosis</b>	<b>Total (%)</b>
Carcinoma in mixed mammary tumor	23 (23.7)
Mammary adenocarcinoma	12 (12.4)
Cutaneous mastocytoma	9 (9.3)
Squamous cell carcinoma	9 (9.3)
Benign mixed mammary tumor	5 (5.2)
Lipoma	5 (5.2)
Sarcoma	5 (5.2)
Hemangiosarcoma	4 (4.1)
Osteosarcoma	4 (4.1)
Cutaneous papillary carcinoma	3 (3.1)
Mammary adenoma	3 (3.1)
Cordonal trichoblastoma	2 (2.1)
Fibrosarcoma	2 (2.1)
Hemangioma	2 (2.1)
Epithelioma	1 (1.0)
Fibroanexial hamartoma	1 (1.0)
Hemangiopericytoma	1 (1.0)
Mammary fibroma	1 (1.0)
Mammary melanocytoma	1 (1.0)
Meningioma	1 (1.0)
Papillary renal carcinoma	1 (1.0)
Round cell neoplasm	1 (1.0)
Vulvar transmissible venereal tumor	1 (1.0)
<b>Total</b>	<b>97 (100)</b>

**Source:** Medical records of the UVC-UFNT, 2025.

In dogs, the neoplasms most frequently diagnosed are cutaneous mastocytomas, followed by mammary carcinomas (Estralioto; Conti, 2019). However, the data obtained in the present study revealed a distinct profile, with a higher incidence of mammary carcinomas followed by cutaneous mastocytomas.

For tumor origin typing, the neoplasms were classified according to cell type into three categories: round cell, mesenchymal, and epithelial tumors. Information regarding the distribution of these types according to the affected body region in dogs is presented in Table 6.

**Table 6:** Number and percentage of neoplasms diagnosed in dogs at UVC-UFNT during the period from 2018--2024, classified by cell origin and affected region.

Cell Type	Region								Total (%)
	Abdomen	Head	Dorsum	Scrotum	Mamary gland	Limb	Thorax	Vulva	
<b>Epithelial</b>	5 (5.2) <sup>a</sup>	4 (4.1) <sup>a</sup>	0 (0) <sup>a</sup>	0 (0) <sup>a</sup>	49 (50.5) <sup>a</sup>	1 (1.0) <sup>a</sup>	0 (0) <sup>a</sup>	0 (0) <sup>a</sup>	<b>59 (60.8)</b>
<b>Mesenchymal</b>	6 (6.2) <sup>a</sup>	2 (2.1) <sup>a</sup>	1 (1.0) <sup>a</sup>	1 (1.0) <sup>a</sup>	10 (10.3) <sup>b</sup>	4 (4.1) <sup>a</sup>	1 (1.0) <sup>a</sup>	2 (2.1) <sup>a</sup>	<b>27 (27.8)</b>
<b>Round cell</b>	2 (2.1) <sup>a</sup>	2 (2.1) <sup>a</sup>	3 (3.1) <sup>a</sup>	0 (0) <sup>a</sup>	1 (1.0) <sup>b</sup>	1 (1.0) <sup>a</sup>	1 (1.0) <sup>a</sup>	1 (1.0) <sup>a</sup>	<b>11 (11.3)</b>
<b>Total (%)</b>	<b>13 (13.4)</b>	<b>8 (8.2)</b>	<b>4 (4.1)</b>	<b>1 (1.0)</b>	<b>60 (61.8)</b>	<b>6 (6.2)</b>	<b>2 (2.1)</b>	<b>3 (3.1)</b>	<b>97 (100)</b>

Different letters in the same column indicate statistically significant differences among cell types for the same anatomical region (Fisher's test;  $p \leq 0.05$ ).

**Source:** Medical records of the UVC-UFNT, 2025.

The region most frequently affected by neoplasms was the mammary gland ( $n = 60$ ; 61.8%), which may explain the greater occurrence of tumors in females (80.6%) than in males (19.3%). The second most affected region was the abdomen ( $n = 13$ ; 13.4%), followed by the head ( $n = 8$ ; 8.2%), limbs ( $n = 6$ ; 6.2%), dorsum ( $n = 4$ ; 4.1%), vulva ( $n = 3$ ; 3.1%), thorax ( $n = 2$ ; 2.1%), and scrotum ( $n = 1$ ; 1.0%).

Mammary neoplasms were predominantly composed of cells of epithelial origin, accounting for 50.5% of the cases, demonstrating a strong preference for this region ( $p \leq 0.05$ ). Otherwise, the abdominal, limb, head, dorsum, scrotum, thorax, and vulva regions remained more homogeneous, with no predominant cell type.

In the present study, the most frequent site of neoplasms was the mammary tissue, which corroborates the findings of Dhein et al. (2024), in which the mammary gland and the skin were the two most prevalent tumor locations. These results are also consistent with those of previous studies, such as those of Rajathy et al. (2019), which indicate that the mammary gland is one of the three main anatomical sites affected by neoplasms in female dogs.

When the tumor type in relation to the affected system in dogs was analyzed, the reproductive system was the most frequently affected ( $n = 64$ ; 65.9%), followed by the integumentary ( $n = 26$ ; 26.8%), locomotor ( $n = 4$ ; 4.1%), digestive ( $n = 1$ ; 1.0%), urinary ( $n = 1$ ; 1.0%), and nervous ( $n = 1$ ; 1.0%) systems, as shown in Table 7.

**Table 7:** Number and percentage of neoplasms diagnosed in dogs at UVC-UFNT during the period from 2018--2024, classified by cell origin and affected system.

Cell Type	System						Total (%)
	Digestive	Locomotor	Reproductive	Integumentary	Urinary	Nervous	
Epithelial	0 (0) <sup>a</sup>	1 (1.0) <sup>a</sup>	49 (50.5) <sup>a</sup>	8 (8.2) <sup>ab</sup>	1 (1.0) <sup>a</sup>	0 (0) <sup>a</sup>	<b>59 (60.8)</b>
Mesenchymal	0 (0) <sup>a</sup>	2 (2.1) <sup>a</sup>	13 (13.4) <sup>b</sup>	11 (11.3) <sup>a</sup>	0 (0) <sup>a</sup>	1 (1.0) <sup>a</sup>	<b>27 (27.8)</b>
Round cell	1 (1.0) <sup>a</sup>	1 (1.0) <sup>a</sup>	2 (2.1) <sup>b</sup>	7 (7.2) <sup>b</sup>	0 (0) <sup>a</sup>	0 (0) <sup>a</sup>	<b>11 (11,3)</b>
<b>Total (%)</b>	<b>1 (1.0)</b>	<b>4 (4.1)</b>	<b>64 (65.9)</b>	<b>26 (26.8)</b>	<b>1 (1.0)</b>	<b>1 (1.0)</b>	<b>97 (100)</b>

Different letters in the same column indicate statistically significant differences among cell types for the same system (Fisher's test;  $p \leq 0.05$ ).

Source: Medical records of the UVC-UFNT, 2025.

The test revealed a significant association between the variables reproductive system and epithelial cell type ( $p \leq 0.05$ ), indicating that neoplasms of epithelial origin were more prevalent in the reproductive system than were neoplasms of mesenchymal or round cell origin. In the integumentary system, mesenchymal cell tumors are preferable to round cell neoplasms.

The epidemiological characteristics of the age, sex, breed, reproductive status, and contraceptive use of dogs diagnosed with neoplasms between 2018 and 2024, in relation to cell origin, are presented in Table 8.

**Table 8:** Epidemiological characteristics of dogs diagnosed with neoplasms in relation to the cellular origin of the neoplasms between 2018 and 2024 at UVC-UFNT.

Epidemiological characteristics and cellular origin	Parameter	
<b>Age</b>	<b>Up to 5 years</b>	<b>Over 5 years</b>
Round cell	3 (3.1%) <sup>a</sup>	8 (8.2%) <sup>a</sup>
Mesenchymal	2 (2.1%) <sup>a</sup>	25 (25.7%) <sup>a</sup>
Epithelial	5 (5.2%) <sup>a</sup>	54 (55.7%) <sup>a</sup>
<b>Total</b>	<b>10 (10.4%)</b>	<b>87 (89.6%)</b>
<b>Sex</b>	<b>Male</b>	<b>Female</b>
Round cell	5 (5.2%) <sup>a</sup>	6 (6.2%) <sup>a</sup>
Mesenchymal	10 (10.3%) <sup>a</sup>	17 (17.5%) <sup>b</sup>
Epithelial	3 (3.1%) <sup>a</sup>	56 (57.7%) <sup>b</sup>
<b>Total</b>	<b>18 (18.6%)</b>	<b>79 (81.4%)</b>
<b>Breed</b>	<b>Purebred</b>	<b>Mixed-breed</b>
Round cell	5 (5.2%) <sup>a</sup>	6 (6.2%) <sup>a</sup>
Mesenchymal	13 (13.4%) <sup>a</sup>	14 (14.4%) <sup>a</sup>
Epithelial	29 (29.9%) <sup>a</sup>	30 (30.9%) <sup>a</sup>

<b>Total</b>	<b>47 (48.5%)</b>	<b>50 (51.5%)</b>	
<b>Reproductive status</b>	<b>Neutered</b>	<b>Intact</b>	
Round cell	2 (2.1%) <sup>a</sup>	9 (9.3%) <sup>a</sup>	
Mesenchymal	8 (8.2%) <sup>a</sup>	19 (19.6%) <sup>a</sup>	
Epithelial	13 (13.4%) <sup>a</sup>	46 (47.4%) <sup>a</sup>	
<b>Total</b>	<b>23 (23.7%)</b>	<b>74 (76.3%)</b>	
<b>Contraceptive use</b>	<b>Yes</b>	<b>Not reported</b>	<b>No</b>
Round cell	--	4 (5.6%)	1 (1.4%)
Mesenchymal	2 (2.8%)	12 (17%)	2 (2.8%)
Epithelial	2 (2.8%)	37 (52.1%)	11 (15.5%)
<b>Total</b>	<b>4 (5.6%)</b>	<b>53 (74.7%)</b>	<b>14 (19.7%)</b>

Different letters in the same row indicate a statistically significant difference between cell types for the evaluated parameter (Fisher's exact test and/or chi-square test;  $p \leq 0.05$ ).

**Source:** Medical records of the UVC-UFNT, 2025.

Epithelial cell neoplasms were the most common type in dogs older than 5 years (55.7%) when compared with younger dogs (5.2%). However, no significant difference was observed when the test was applied. The confidence intervals of the proportions were wide, especially in the younger age group, reflecting the small sample size ( $n = 10$ ), which reduced the power to detect moderate differences. Therefore, on the basis of the available data, it was not possible to conclude that the distribution of epithelial tumors differed between the age groups considered.

The statistical analysis revealed significant differences ( $p \leq 0.05$ ) between males and females regarding epithelial and mesenchymal neoplasms, with a greater occurrence of these tumor types in females. In contrast, round cell neoplasms presented a similar distribution between sexes, with no differences.

When evaluating breed, reproductive status, and contraceptive use, no differences were observed among the tumor cellular origins studied. This finding may be attributed to the low number of animals evaluated, particularly regarding contraceptive use, as a large proportion of cases lacked information on the history of contraceptive substance administration.

## CONCLUSION

Our study revealed that most affected dogs were nonspayed females older than five years, highlighting the role of reproductive and hormonal factors, as well as age, in tumor development. Epithelial tumors, especially carcinomas, are the most

common, predominating in the mammary region and reproductive system, with a significant association between sex and epithelial and mesenchymal cell tumors.

Analysis of the results suggests that epithelial tumors are more common in this hospital population in Tocantins and that the increase in the occurrence of various neoplasms is associated with greater longevity in these animals. Older and nonspayed females have a greater risk of developing neoplasms, particularly mammary carcinomas, reinforcing the importance of early spaying as a preventive measure and of considering epidemiological factors in the evaluation, diagnosis, and clinical management of tumors in dogs. Furthermore, mixed-breed animals account for most tumor cases, suggesting that they may be more predisposed to developing tumors and/or reflecting the profile of clinical patients.

Continuous assessment of the epidemiological aspects associated with the diagnosis of neoplasms can contribute to the identification of possible carcinogenic factors and the risk of developing different types of neoplasms.

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