

## FREQUENCY OF CANINE TESTICULAR TUMORS: STUDY ON 100 DOGS

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### Summary

Testicular tumours occur both in canine and human species. However, while the incidence of these tumours in man has been constantly investigated and demonstrated an increase during last decades, a few data is published about the frequency of testicular tumours in canine species. The present study attempts to give an up-date on the frequency of testicular tumours in dogs. The histological examination of testes collected at necropsy from 100 dogs revealed the presence of testicular tumours in 21 subjects (21%). A total of 41 tumours were observed: 19 seminomas, 16 interstitial cell tumours and 4 Sertoli cell tumours. Bilateral tumours were detected in 8 of the 21 dogs. Moreover, 5 dogs showed more than one type of testicular tumour.

The results of the present study demonstrate a high frequency of testicular tumours in the dog. Recently, the pathogenesis of human testicular tumours has been associated with the exposure to pesticides and plastic derived phthalates. Further studies are required to investigate if these substances can also play a role in the pathogenesis of canine testicular tumours.

Testicular tumours are common both in canine and in human species (Zheng and others 1996, Kennedy and others 1998). The incidence of testicular tumours in man increased during the second half of the 20<sup>th</sup> century and the environmental exposure has been implicated in the aetiology of these cancers (Ekbom and others 2003). In man, testicular tumours are frequent in youngs whereas, in the canine species, affect mainly old subjects (Maclachlan and Kennedy 2002).

According to the last classification of the Tumour of Domestic Animals, proposed by the World Health Organization (WHO), testicular tumours can derive either from sex-cords stroma, including Sertoli cells and interstitial cells tumours, or from germ cells including seminomas, embryonal carcinoma, gonadoblastoma and teratoma (Kennedy and others 1998). The most common types of tumours reported in dogs are seminoma (SEM), Sertoli cells tumour (SCT) and interstitial cells tumour (ICT) (Kennedy and others 1998). Conversely, in men, SEM is the prevailing type, whereas ICT are rare and SCT are only occasionally reported (Fletcher 2000, Gurarii and others 2002).

The majority of the studies on the incidence of canine testicular tumours are retrospective surveys on testes submitted to histopathological diagnostic Services (Hayes and Pendergrass 1976, Hahn and others 1992). In 1962 Dow published a study based on the examination of testes from unselected dogs submitted for routine autopsy, obtaining an incidence of 16% of testicular tumours. The aim of the present study is to give a new insight on the frequency and the age distribution of testicular tumours in the canine species.

### **Materials and Methods**

This study is based on the examination of 100 unselected male dogs submitted for routine autopsy at the Department of Veterinary Pathology, University of Milan (Italy). The animals, ranging in age from 7 months to 15 years, had no clinical signs of testicular tumour, feminisation or cryptorchidism. At necropsy both testes were collected, cut longitudinally and examined for gross lesions. Representative sections were fixed in 10% neutral buffered formalin, routinely processed through graded alcohol and paraffin embedded. From paraffin blocks, five  $\mu\text{m}$  thick sections were obtained and stained with Hematoxylin and Eosin for histological examination. Neoplastic lesions were classified according to the last histological classification of tumours of the genital system of domestic animals (Kennedy and others 1998).

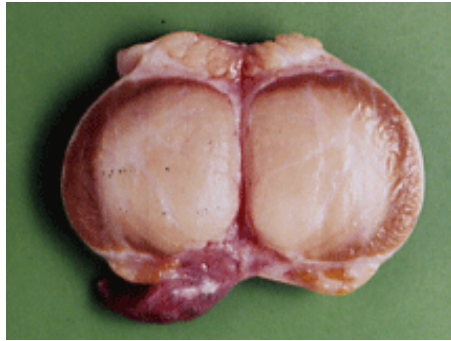
### **Results and Discussion**

Testicular tumours were observed in 21 out of 100 dogs examined (21%). Dogs affected with tumour ranged in age from 6 to 15 years (mean age 9.7 years) and belonged to different breeds (Tab.1).

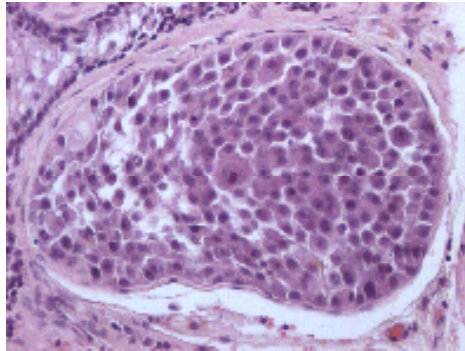
At gross examination, tumours ranged from 2 mm to 3 cm in diameter, however, large nodules could be rarely observed and most of the tumours were recognizable only microscopically. Moreover, since 5 of the 21 dogs affected with testicular cancer showed more than one tumour in the same testis and since 8 dogs were bilaterally affected, a total of 41 testicular cancers were recorded. At histological examination, of the 41 tumours, 19 were SEMs, 16 ICTs, and 6 SCTs.

#### **Seminomas** (Figs. 1, 2)

Of the 19 SEMs recorded, 14 were characterized by intratubular growth pattern while 5 were diffuse. Neoplastic cells were round to polygonal with abundant eosinophilic cytoplasm and large round to oval vesicular nuclei, showing 1-2 prominent magenta nucleoli. Binucleated or multinucleated neoplastic cells were also present. Mitotic figures ranged from 1 to 9 X HPF. Lymphocytic infiltrates, occasionally arranged in pseudofollicular structures, were frequently recognizable scattered within the tumours. Haemorrhages and focal necrosis were rarely associated with diffuse SEMs.



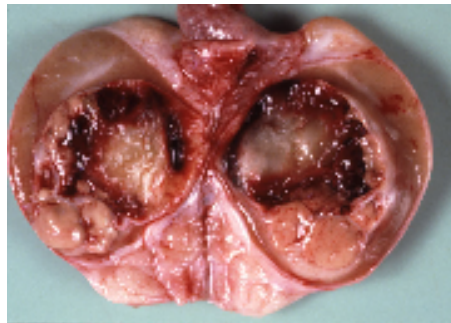
**Fig. 1.** Neoplastic nodule of seminoma replacing testicular parenchyma



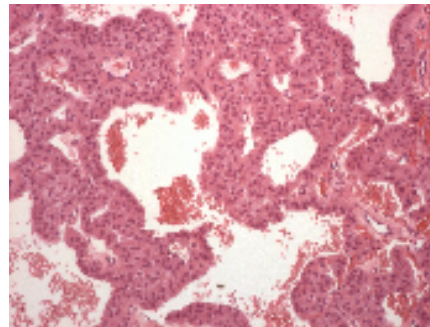
**Fig. 2.** Intratubular seminoma. HE stain, 200X

**Interstitial cell tumours** (Figs. 3, 4)

Of the 16 ICTs recorded, 14 showed solid growth pattern while 2 were angiomatoid. Tumours were composed by medium-sized neoplastic cells with distinct cell borders, finely vacuolated eosinophilic cytoplasm and round to oval small basophilic nuclei, rarely containing a prominent nucleolus. Mitotic figures were rare, ranging from 0 to 1 X HPF. Haemorrhages were frequently observed, particularly in the angiomatoid forms.



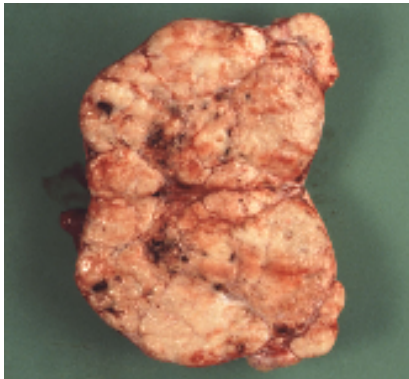
**Fig. 3.** Neoplastic nodules of interstitial cell tumour, with angiomatoid appearance



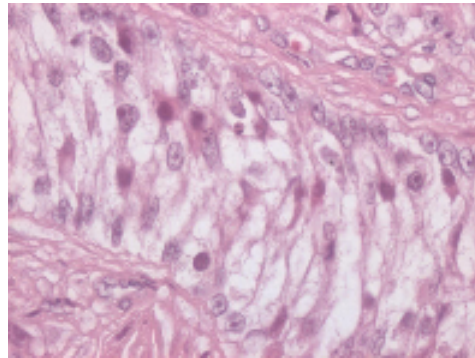
**Fig. 4.** Interstitial cell tumour, angiomatoid type. Note the angiomatoid lacunae filled by erythrocytes. HE stain, 100X

**Sertoli cell tumour** (Figs. 5,6)

Of the 6 SCTs recorded, 5 showed intratubular growth pattern while only 1 was diffuse. Neoplastic cells were elongated with faintly eosinophilic cytoplasm and medium-size, round to oval vesicular nuclei containing a fine chromatin network and a solitary, small, basophilic nucleolus. Mitotic figures were rare, ranging from 0 to 1 X HPF.



**Fig. 5.** Neoplastic nodules of sertolioma replacing and effacing all testicular parenchyma



**Fig. 6.** Intratubular sertolioma. HE stain, 400X

In the 8 dogs with bilateral testicular cancer, different type of neoplasia could be observed (Table 2)

**Breeds** of the dogs affected with testicular cancer.

**Table 1.**

Breed	Number of cases
German Shepherd	7
Cross breed	6
Pointer	2
Boxer	1
Dobermann	1
Schnauzer	1
Cirneco of the Etna	1
Italian Spinone	1
Labrador Retriever	1
<b>TOTAL</b>	<b>21</b>

**Neoplastic types** observed in the 8 dogs with bilateral testicular cancer.

**Table 2.**

N°	Left testis	Right testis
1	SEM	SEM
2	ICT	ICT
3	SEM	SEM
4	ICT	ICT

	SEM	SEM
5	ICT	ICT
6	SEM	SEM SCT
7	ICT SEM SCT	SEM
8	ICT SCT	SEM SCT

According to the literature (Hayes and Pendergrass 1976), in our cases, testicular tumours were more frequently observed in old dogs. Concerning the breed, German Shepherd and cross-breed were the most represented among the 21 dogs with testicular tumours. Several authors indicated the Boxer breed as particularly predisposed to testicular tumour development (Hayes and Pendergrass 1976, Reifinger, 1988), therefore, in our study the high frequency of testicular tumours in German Shepherd and cross-breed may be simply related to the high frequency of these two breed among the dogs examined.

As far as the number of tumour detected is concerned, a total of 41 testicular cancers were recorded, since in the dogs with testicular cancer multiple tumours in the same testis and bilateral forms were frequently observed. Testicular tumours were generally small and most of them were recognizable only at histological examination, suggesting an initial stage of development.

### Conclusions

1. The results of our study are noteworthy, mainly considering that the presence of testicular tumours was evaluated in dogs without any clinical signs of testicular enlargement or cryptorchidism. In a similar study, Dow (1962), demonstrated the presence of testicular tumours in 16% of dogs examined. We obtained a frequency of 21% and this finding suggests an increased incidence of testicular tumours in dogs, during the last forty years.
2. We found a large number of SEMs. The high frequency of SEM in dogs parallels the findings of human literature. Moreover, bilateral SEMs are frequently reported in men and, in our study, 5/8 dog bilaterally affected with testicular tumours showed SEM in both testes.
3. Many reports suggest that environmental exposure to pesticides and plastic derived substances contributes to the origin of seminomas in men (Kristensen, 1996; Koifman, 2002;). Further studies may ascertain if these chemicals could also be involved in the development of testicular tumours in canine species.

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