

## CYTOLOGICAL DIAGNOSIS OF CANINE CUTANEOUS HISTIOCYTIC PROLIFERATIVE DISORDERS

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### Abstract

*Canine cutaneous histiocytic proliferative disorders are increasingly seen in general practice and they pose as both diagnostic and therapeutic challenges for veterinary clinicians. This study aims to evaluate and describe the epidemiology and morphological features of the histiocytic proliferative disorders in dogs as well as to emphasize the importance of the cytological examination in the diagnostic approach.*

*The study was conducted over a period of 5 years (2008-2012) in the Department of Pathological Anatomy of the Faculty of Veterinary Medicine Bucharest and comprises a total of 130 cases of dogs with cutaneous lesions that had been diagnosed with cutaneous histiocytic proliferative disorders. The cytologically examined samples were obtained by fine needle technique (78%), either with or without aspiration, and by surgical biopsy (22%). The slides were obtained by sliding, imprinting or squeezing and either classical or quick May-Grünwald Giemsa (MGG) staining techniques were used. 26 cases were both cytologically and histologically examined.*

*During this period a number of 3855 dogs were specifically examined out of which 1381 (35.8%) had cutaneous lesions. Of the 1381 dogs presenting cutaneous lesions, 130 (9.4%) were diagnosed with different histiocytic lesions.*

*Of the 130 cases evaluated in this study, 80 (61.5%) were males and 50 (38.5%) were females, indicating that males are more prone to developing this type of lesions. The most frequently affected body regions were the trunk (37%) and the limbs (37%). 9.2% of the total number of cases had multicentric lesions. After cytological examination and according to the latest classification of the histiocytic diseases in dogs, the following lesions were diagnosed: canine cutaneous histiocytoma (54%), histiocytic sarcoma (29%), malignant histiocytosis (6.2%), reactive histiocytosis (5.4%) and atypical histiocytoma (5.4%).*

**Key words:** cutaneous histiocytic disorders, canine, cytological diagnosis.

### INTRODUCTION

Canine cutaneous histiocytic disorders comprise reactive and neoplastic proliferations of macrophages and dendritic cells (Langerhans cells), the antigen-presenting cells in the skin and include the following: canine cutaneous histiocytoma, histiocytic sarcoma, malignant histiocytosis, reactive histiocytosis and atypical histiocytoma (Moore et al., 2006, Grant, 2012). As canine histiocytic disorders are becoming increasingly diagnosed in general practice, this study aims to analyse the epidemiology and morphology of the various histiocytic lesions in dogs and to assess the importance of the cytological examination in the diagnostic approach.

### MATERIALS AND METHODS

This retrospective study was conducted over a period of 5 years (2008-2012) in the

Department of Pathological Anatomy of the Faculty of Veterinary Medicine Bucharest.

The study consists of a total of 130 cases of dogs presenting cutaneous lesions that had been diagnosed as cutaneous histiocytic proliferative disorders. The samples for cytological examination were obtained by fine needle technique (78%), either with or without aspiration, and by surgical biopsy (22%). The slides were obtained by sliding, imprinting or squeezing and either classical or quick May-Grünwald Giemsa (MGG) staining techniques were used. 26 cases were both cytologically and histologically examined.

### RESULTS AND DISCUSSIONS

During the 5 years time frame 3855 dogs were specifically examined, out of which 1381 (35.8%) had cutaneous lesions. Of the 1381

dogs presenting cutaneous lesions, 130 (9.4%) presented various cutaneous histiocytic lesions.

Table 1 Total of cases evaluated since 2008 until 2012

Year	Total of evaluated cases	Total of cases presenting cutaneous lesions		Total of cases presenting cutaneous histiocytic lesions	
		Number	Percentage	Number	Percentage
2008	735	277	37.7%	16	5.7%
2009	700	218	31%	19	8.7%
2010	807	236	29.5%	30	12.7%
2011	901	359	39.8%	29	8.1%
2012	712	291	40.8%	36	12.3%
<b>Total</b>	<b>3855</b>	<b>1381</b>	<b>35.8%</b>	<b>130</b>	<b>9.4%</b>

Our study evaluates the 130 cases presenting cutaneous histiocytic lesions and all the data presented in this article is referring strictly to these.

Of the 130 evaluated cases, 80 (61.5%) were males and 50 (38.5%) were females, indicating that males are more prone to developing this type of lesions. In this context a male:female ratio of 1.6:1 was observed, although no sex predisposition is mentioned by other studies (Meuten, 2002, Gross, 2005, Moore, 2009).

The most frequently affected body regions were the trunk (37%) and the limbs (37%), followed by head (14.5%) and neck (11.5%). 9.2% of the total number of cases had multicentric lesions.

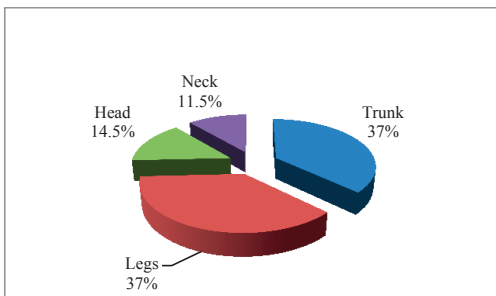


Figure 1. Localization of the cutaneous histiocytic proliferative disorders in dogs

According to the most recent classification of cutaneous histiocytic disorders in dogs, the histiocytic lesions diagnosed by cytological examination were the following: canine cutaneous histiocytoma-CCH (54%), histiocytic sarcoma-HS (29%), malignant histiocytosis-MH (6.2%), reactive histiocytosis-RH (5.4%) and atypical histiocytoma-AH (5.4%).

After evaluating the cases that underwent both cytological and histological examination, a 6.15% margin of error was calculated.

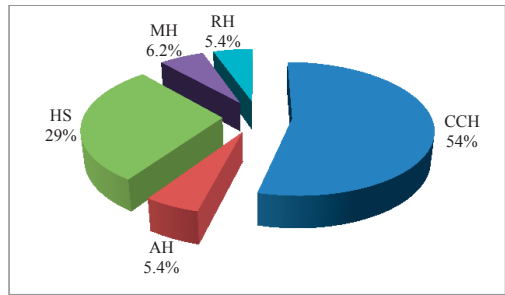


Figure 2. Cutaneous histiocytic proliferative disorders diagnosed by cytological examination in dogs

Canine cutaneous histiocytoma is a benign round cell tumour seen mainly in young dogs, mostly occurring in dogs less than 5 years of age. Cytological examination revealed monomorphic round cells, presenting mild anisocytosis, with round, slightly indented nuclei. The chromatin is finely granulated and the nucleolus can only be rarely noticed. In general the diagnosis does not pose any difficulties unless the histiocytoma is examined during its regression phase when lymphocytes outnumber the histiocytoma cells and careful evaluation for diagnosis is warranted in such cases as confusion with inflammatory processes can occasionally occur (Baker, 2000).

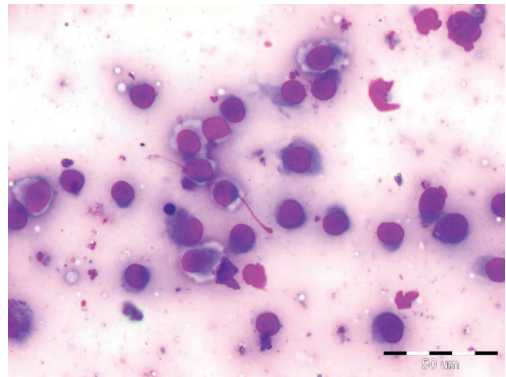


Figure 3. Canine cutaneous histiocytoma. Monomorphic round cells, with round, occasionally indented nuclei, with mild anisocytosis and indistinct nucleolus. MGG stain, x400

Cutaneous histiocytic sarcomas are fairly common in dogs and mostly located on extremities and in periarticular regions. These are malignant neoplasms originating within the subcutis from dermal dendritic cells extending into the dermis (Raskin, 2010). Regarding the cases evaluated in our study, the cytological examination revealed a mixture of large

pleomorphic round and spindle cells, with round to oval, indented nuclei, with evident nucleoli and condensed coarse chromatin and abundant basophilic cytoplasm with occasional cytoplasmic vacuolation. Occasional binucleation could be noticed. Differential diagnosis must be established with other histiocytic neoplasms, amelanotic melanoma, as well as other sarcoma types by histopathological examination and immunohistochemistry (Gross et al. 2005).

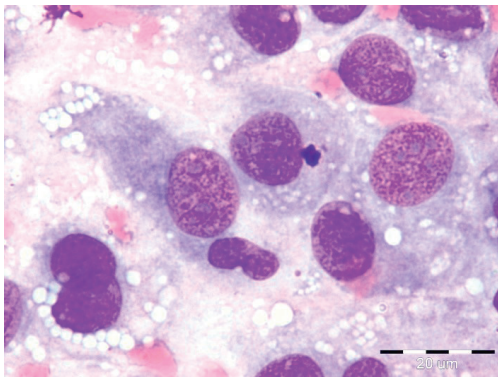


Figure 4. Histiocytic sarcoma. Round and spindle cells, with round to oval nuclei, with one or several nucleoli and abundant and vacuolated cytoplasm. MGG stain, x1000.

Malignant histiocytosis is quite often cytologically misdiagnosed as histiocytic sarcoma. Gross et al. (2005) describes this type of neoplasm as being synonym with histiocytic sarcoma or dendritic cell sarcoma. Meuten (2002) mentions that this tumour is the most aggressive syndrome in the spectrum of histiocytic diseases and the most obscure in origin. In our study, the cytological diagnosis was established based on the presence of anaplastic cells, presenting anisocytosis and anisokaryosis, severe cyto- and karyomegaly, as well as numerous multinucleated giant cells with diskaryosis. The extracellular space consists of oxyphylic extracellular matrix.

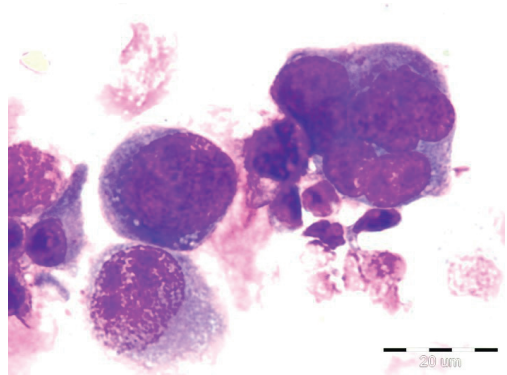


Figure 5. Malignant histiocytosis. Anaplastic tumoral cells presenting anisocytosis, anisokaryosis, karyomegaly and multinucleation. MGG stain, x1000.

Reactive histiocytosis is a proliferative cutaneous lesion seen in dogs of different ages or breeds. Placing this type of lesion in a certain category is still under debate and Gross et al. (2005) mentions it among the noninfectious granulomatous and pyogranulomatous nodular lesions. The most recent WHO classification places it among the intermediate histiocytic tumors (Sharif, 2006). Establishing a diagnosis can become challenging because dendritic cells are most often accompanied by numerous neutrophils and macrophages.

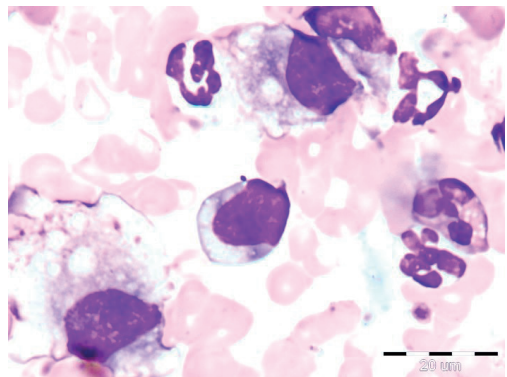


Figure 6. Reactive histiocytosis. Round cells, with round to oval, indented and folded, eccentrically placed nuclei and abundant vacuolated cytoplasm. MGG stain, x1000

Atypical histiocytoma is relatively uncommon. Along the years this type of lesion caused a lot of controversy and at some point it was labelled as either reticulum cell sarcoma, plasmacytoma, round cell tumour or

mielocytoma (Moulton, 1990). It occurs in adult and senior dogs, an aspect which facilitates differential diagnosis from canine cutaneous histiocytoma considering that these two lesions do share similar morphological features. Cytological examination revealed monomorphic round cells, similar in shape and size, with round to oval, occasionally eccentrically placed nuclei and with moderate amount of vacuolated and granular cytoplasm.

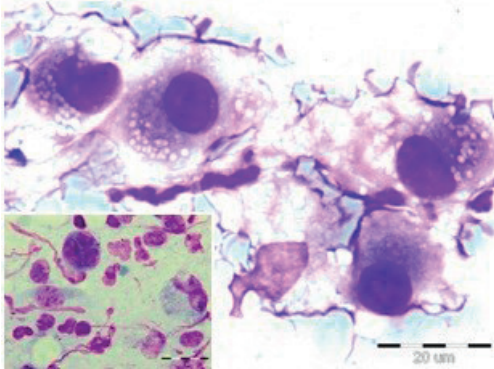


Figure 7. Atypical histiocytoma. Monomorphic round cells, with eccentric nuclei and vacuolated cytoplasm, bi- and multinucleated cells. MGG stain, x400

When referring to canine cutaneous histiocytic proliferative disorders establishing a diagnosis by cytological examination can be achieved quite easily. The above-mentioned lesions were described as part of different categories in order to help orientate the diagnosis, nevertheless definitive diagnosis can only be achieved by immunohistochemical analysis.

## CONCLUSIONS

A total of 3855 dogs were specifically examined and 1381 (35.8%) had cutaneous lesions. Of the 1381 dogs with cutaneous lesions, 130 (9.4%) had different histiocytic lesions. 80 (61.5%) were males and 50 (38.5%) were females. The most frequently affected body regions were the trunk (37%) and the limbs (37%). 9.2% of the total number of cases had multicentric lesions. After cytological examination, the following lesions were diagnosed: canine cutaneous histiocytoma (54%), histiocytic sarcoma (29%), malignant histiocytosis (6.2%), reactive histiocytosis (5.4%) and atypical histiocytoma (5.4%).

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