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# Early Symptoms of Malignancy in the Appearance of Melanoma in Dogs

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The aim of this study is identification of risk groups, early detection, and prevention of melanoma of the skin in dogs. The pathogenetic basis of occurrence and development of melanoma is most frequently due to preexisting pigmented nevi, especially in the case of trauma. Early diagnosis of melanoma should be based on the consideration of the background conditions of the tumor and knowledge of symptoms of malignancy of melanocytic nevi. The earliest signs of malignant transformation of melanocytic nevi are the disappearance of the skin pattern on the surface of nevi; the appearance of shiny, glossy surface; the occurrence of asymmetries or irregularities of the shape of the borders of the nevus; its horizontal growth; and the appearance of subjective sensations of itching or burning sensation in the nevus.

**Keywords**

Melanoma; Symptoms of malignancy; Dogs; Melanocytic tumors; Clinical symptoms

**Introduction**

Melanocytic tumors develop from melanocytes, constituting the basal layer of the epidermis or of the epithelium of the mucous membrane of the mouth, and produce specific polypeptide melanin. Typical for melanoma is the accumulation of melanin in tumor cells, although there are so-called amelanotic melanomas [1,2].

Melanoma is a quite frequently diagnosed pathology in dogs and, according to the literature, ranges from 2 to 9% of all malignant tumors in these animals [3].

Melanoma occurs in 5-9% cases of skin tumors in dogs [4,5] and, in this case, often has a less aggressive clinical course [6]. The majority of melanomas on mucous membrane of oral cavity of dogs are highly malignant [7,8].

In a study conducted in fifties of XX century by Gorlin *et al.*, it was shown that melanoma is a primary malignant tumor of the oral cavity in dogs [9]. Later these results were confirmed by other studies [10,11].

The melanoma is diagnosed in 30-40% of the cases, cytological and morphological analysis of tumors of the mucosa of the oral cavity, and, in these cases, is almost always malignant [12,13].

Mucosal melanoma of the oral cavity most commonly occurs in dogs older than 10 years [14,15].

According to foreign literature, the pathology is more common in small breeds, especially Cocker Spaniels, Poodles, and Scotch Terriers, Dachshunds, and dogs of other breeds with strong pigmentation of the mucous membrane of the mouth and skin. Some discrepancy of data on breed predisposition of dogs to the occurrence of melanoma can be attributed to the severity of the population of each breed in the country where the study was conducted [16].

**Methods**

The studies were performed from 2013 to 2016 at the Department of Epizootology, Parasitology and the LFI West of Kazakhstan Agrarian-Technical University; and clinical studies were conducted in veterinary clinics in the city of Uralsk. The objects of the study were dogs with melanoma of the skin. To study the symptoms of the malignancy of melanomas, we examined the data of 247 ill primary dogs with

melanoma of the skin. The combination and frequency of occurrence of clinical symptoms at start of the treatment for these dogs is presented in Table 3.

**Results and Discussion**

For the period from 2013 to 2016 in the veterinary clinics, JSC "Talap" and PE "Vinnikova," 643 dogs with suspected melanoma and melanocytoma were examined.

Among them, melanoma of the skin was discovered in 247 dogs (21.8% of the total number of examined dogs) and melanocytoma in 164 dogs (10% of the total number of examined dogs). The total number of cases of melanoma and melanocytoma amounted to 411 dogs. The dogs have been subjected to full examination, including hematological, cytological, and histological examination. We identified and confirmed 247 pathological cases with malignant neoplasms and 22 cases of benign.

Thus, 60.09% of all tumors amounted to malignant neoplasms and 39.9% were benign.

Outpatient examination of dogs is available in most examination superficial tumor localizations.

Thus, the dogs are most commonly affected by neoplasms of the oral cavity (30.9), followed by the lips (18.6%), head area (16.5%), eye (3.8%), torso (8.7%), and lower limbs (21.7%). See Table 1.

Melanoma and melanocytoma in dogs diagnosed in different age groups (Table 2).

In dogs the tumor was identified at the age of:

0-3 years – 23 cases (5.6% of all dogs with tumors), including 0 malignant (0% of patients in this age group) and 23 benign (100%);

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The tumour localization	The number		
	Common	Malignant	Benign
The oral cavity	127	82	45
Lips	75	45	30
The head area	68	35	33
Eyes	16	11	5
Corpus	36	23	13
Lower extremities	89	51	38
<b>All dogs with tumors</b>	<b>411</b>	<b>247</b>	<b>164</b>

Table 1: The incidence of dogs with melanoma and melanocytoma

The tumour localization and the age of the animal	The number		
	Common	Malignant	Benign
0-3 years	23	0	23
3-6 years	68	41	27
6-9 years	196	121	75
9-12 years	86	62	24
12 years and older	38	23	15
<b>All dogs with tumors</b>	<b>411</b>	<b>247</b>	<b>164</b>

Table 2: Distribution of the incidence of melanoma and melanocytoma in dogs depending on age

3-6 years – 68 cases (16.5%), 41 of them malignant (60.3%) and 27 benign (39.7%);  
 6-9 years – 196 cases (47.6%), 121 of them malignant (61.7%) and 75 benign (38.2%);  
 9-12 years – 86 cases (21%) 62 of them malignant (72%) and 24 benign (27%);  
 12 years and older – 38 cases (9.2%) 23 of them malignant (65%) and 15 benign (35%).

Thus, in the first place are the dogs in the age of 6-9 years that most often develop melanoma and melanocytoma. Second are the dogs in the age group of 9-12 years. The average age of the dogs with tumors is approximately 9.4 years. In the adult dogs (12 years and older), the incidence of malignancies outnumber benign tumors. In the youngest age group (0-3 years), malignant neoplasm was not detected.

Noteworthy is the fact that, at the beginning of treatment, 105 (60%) of 247 dogs already had ulceration of the epidermis above the tumor, or bleeding from its surface. This fact indicates late diagnosis. It should be emphasized that Table 3 displays relatively late symptoms that accompany the primary tumor, since they had already taken place before the surgical treatment of the patients. There is no doubt that at the beginning of the disease, that is, before the first call to the vet, symptoms of primary melanomas of the skin in dogs had to be somewhat different. For the efficiency of early clinical diagnosis of the primary tumor, the early symptoms of malignancy of melanocytic nevi must be identified and their prognostic significance must be evaluated.

We carried out the analysis of anamnestic and clinical data of newly diagnosed dogs with skin melanoma. They were examined and treated. All of them had a melanoma developed on the background of long-existing pigment spots. Table 4 presents the early clinical symptoms (from the point of view of owners of dogs) of malignancy of long-existing pigment spots and their prognostic significance. As can be seen from the table, the most frequent symptoms of malignancy of

Clinical symptoms	The number of sick dogs
Itching in the region of the tumor	22
The bleeding surface of the tumor	73
Ulceration of the epidermis over the tumor	32
Discoloration of the tumor, including depigmentation	12
Infiltrative or purulent inflammation in the surrounding tissues	7
Uniform throughout the growth of the tumor	13
The emergence of child nodules in the skin around the tumor	6
The emergence of small exophytic nodules on the surface of the tumor	16
The absence of symptoms	11
A complex of symptoms, including ulceration of the epidermis and bleeding	55
<b>Total</b>	<b>247</b>

Table 3: Clinical symptoms that accompany a primary skin melanoma in dogs at the start of treatment

Clinical symptoms	The number of sick dogs	
	The absolute number	%
Horizontal growth	52	40
Vertical growth of pigment spots	31	24
Bleeding	12	9
Peeling of the surface	7	6
Discoloration age spots	6	5
Itching	5	4
Asymptomatic	4	3
Ulceration of the surface	3	2
Oozing surfaces	2	2
Inflammation in the area of pigment spots	2	2
The appearance of satellites in the surrounding skin of the pigmentation	1	1
A change in texture age spots	1	1
The appearance of asymmetry (festinately) edges of the spots	1	1
<b>Total</b>	<b>127</b>	<b>100</b>

Table 4: First clinical signs (the earliest from the point of view of the owners of dogs) of malignancy of pigment spots and their prognostic significance

#	Dogs	Type of prevention
1	Dogs that have contact with various chemical carcinogens and ionizing radiation	Primary
2	Dogs with the pigmentation of the organism (dog breed: Cocker Spaniel, Poodle, Scottish Terrier, Dachshund and other dog breeds with strong pigmentation of the mucous membrane of the mouth and skin	Primary
3	Dogs with a genetically determined or acquired immunodeficiency	Primary
4	Dogs taking hormonal drugs for a long time.	Primary
5	Dogs which spots are constantly exposed to trauma, as well as dogs with once traumatized nevi skin	Secondary

Table 5: Groups of melanoma risk

pigmented spots were horizontal growth, vertical growth, and bleeding of the surface of the pigment spots.

Study of prognosis in patients with primary cutaneous melanoma allowed us to evaluate the prognostic significance of clinical symptoms of malignancy of pigmented skin spots. This gave us the basis to submit a list of these symptoms in the order of their predictive “weighting” Perhaps the following sequence of clinical symptoms to some extent is arbitrary and may not always be the case in each patient with primary skin melanoma. However, from our point of view, such an increase in clinical symptoms is a reflection of pathogenetic changes in the nevus – melanoma, that is, clinical manifestation stages of tumor progression.

On the basis of our observations and literature data, we compiled a table consisting of the groups that are in the risk of primary cutaneous melanoma. It lists the types of dogs that most likely have the appearance of melanoma of the skin (Table 5).

## Conclusions

Obviously, the first of the following symptoms below correspond to the initial stages of transformation spots in melanoma. On the contrary, the presence of the last clinical symptom in this list suggests that the patient has a melanoma with deep invasion of the skin and poor prognosis of the disease.

1. The disappearance of the skin pattern on the surface of the pigment spots.
2. The appearance of shiny, glossy surface spots.
3. The appearance of asymmetry or imperfection in the shape (festinate) edges of the spots, that is, the change in its shape.
4. Horizontal growth of pigment spots.
5. The emergence of a subjective feeling of itching or burning sensation in the area pigment spots.
6. Peeling of the surface spots with the formation of a dry “crust.”
7. The absence or loss of hair on the surface of pigment spots.
8. Partial (irregular) or complete color change pigment spots – melanoma (the emergence of the so-called related sites depigmentation).
9. The appearance of small nodules of a point on the surface of the pigment spots – melanoma.
10. Vertical growth of pigment spots – melanoma above the surrounding tissues.
11. A change in texture age spots – melanoma-defined palpation, its softening.
12. Ulceration of the epidermis over the pigment spot of melanoma.
13. The phenomenon of inflammation in the area of pigment spots – melanoma and its surrounding tissues.

14. The oozing of the surface spots of melanoma.

15. Bleeding spots of melanoma.

16. Child appearance of pigmented or pink entities (satellites) in the skin pigment around the spots of melanoma.

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