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## Malignant Melanoma in a Captive Red Deer (*Cervus elaphus elaphus*)

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**ABSTRACT:** We report a case of malignant melanoma in a captive red deer (*Cervus elaphus elaphus*). The primary lesion was on the plantar aspect of the right pastern and infiltrated the surrounding skin, but not underlying tendons or bone. Diffuse metastasis to the regional lymph nodes had occurred. Histologically, lesions were characterized by large numbers of variably pigmented epithelioid cells with a high degree of nuclear atypia and many mitotic figures. This is the first reported case of this neoplasm in red deer.

**Key words:** Case report, *Cervus elaphus elaphus*, malignant melanoma, melanosarcoma, neoplasia, red deer.

A 4-yr-old female red deer (*Cervus elaphus elaphus*), obtained as a fawn and housed in an indoor research facility, had mild right hind limb lameness. A dark, roughly circular, plaque-like mass was present on the plantar aspect of the right pastern, accompanied by a slight outward deviation of the dewclaws and of the surrounding hair. Lameness resolved completely after a few days. As part of routine monitoring, the animal was checked twice daily for progression of the lesion and clinical signs. The lesion was also closely examined during routine blood sampling procedures conducted under sedation (xylazine hydrochloride, Xylamax®, Bimeda-MTC, Cambridge, Ontario, Canada, 1.5 mg/kg body weight intramuscularly; azaperone, Stresnil®, Janssen Pharmaceutica, Mississauga, Ontario, Canada, 0.1 mg/kg body weight intramuscularly). Based on the location and extent of the lesion, the anticipated difficulty in postoperative management of this animal, and absence of lameness or other clinical signs, surgical resection was not undertaken. Over the course of the following year, the only clinical manifestation was occasional lameness,

which would resolve after a few days. Eventually, the lameness persisted, and was accompanied by periods of mild bleeding attributed to incidental trauma to the enlarging mass on the leg, and the animal was euthanized (sodium pentobarbital, Euthanyl Forte®, Bimeda-MTC, 100 mg/kg body weight intravenously).

At necropsy, the deer was in excellent body condition. The lesion on the affected hind limb was approximately 5×7 cm in dimension, roughly wedge-shaped, black, firm, raised, and originated from the skin between the dewclaws, displacing them outward (Fig. 1). There were irregular coalescing areas of excoriation and ulceration, with some hemorrhage, over approximately 50% of the plantar aspect of the lesion. The lesion appeared to infiltrate the surrounding skin, but was easily dissected from the underlying flexor tendons and bone. On cut surface, the lesion was homogeneously black, with the exception of some white fibrous septa, and exuded a black “inky” liquid. The right popliteal, internal and external iliac, and mammary lymph nodes were similarly affected diffusely, without obvious septa on cut surface, and exhibited varying degrees of hypertrophy (Figs. 2, 3). No other abnormalities were observed. Representative sections of all affected tissues were fixed in 10% neutral buffered formalin for histologic evaluation. Paraffin sections were cut at 5 μm, and sections were stained with hematoxylin and eosin. Histologically, the neoplastic cell population was similar in both the cutaneous mass and lymph nodes, and was characterized by diffuse infiltration by a discrete cell population of epithelioid cells with large nuclei, very

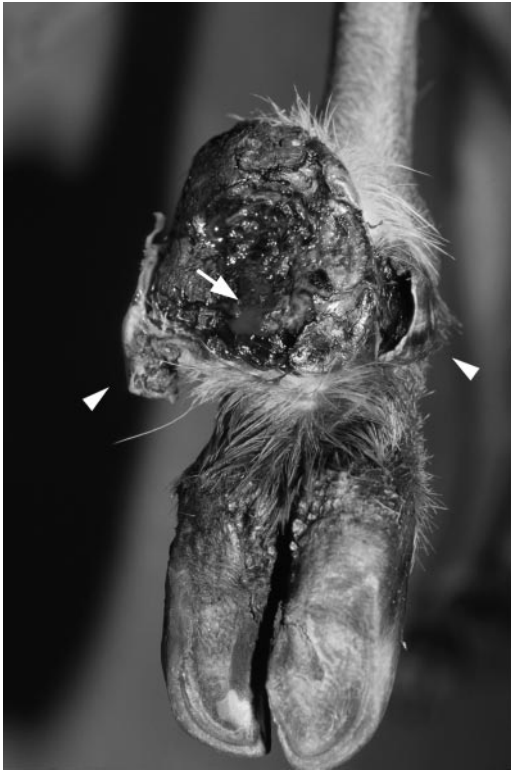


FIGURE 1. Plantar aspect of right pastern with melanoma in situ illustrating severe ulceration and hemorrhage (arrow), and outward displacement of dewclaws (arrowheads).

large nucleoli, and variable amounts of intracytoplasmic melanin (Fig. 4). There was also a high degree of nuclear atypia, multiple nucleoli were common, binucleate cells were frequent, and many mitotic fig-

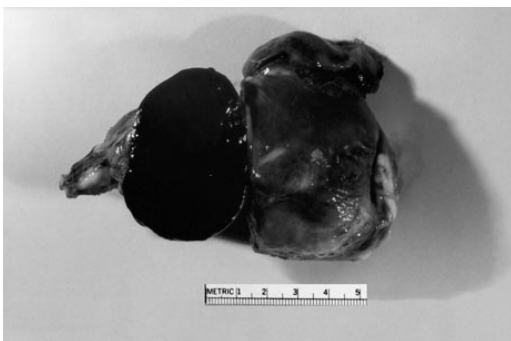


FIGURE 2. Popliteal lymphadenopathy in affected limb illustrating diffuse metastatic involvement and subsequent loss of normal architecture on cut surface.



FIGURE 3. External iliac lymphadenopathy in affected limb illustrating diffuse metastatic involvement of the lymph node.

ures ( $8.0 \pm 2.2$  per high-power field) were present. Avidin-biotin complex immunoperoxidase histochemical staining (Benchmark® automated staining system, Ventana Medical Systems, Tucson, Arizona, USA) of sections of both primary neoplasm and lymph node yielded consistently high levels of expression of both vimentin and S-100 in the neoplastic cells, with variable levels of expression of Melan A (anti-vimentin antibody from Sigma-Aldrich Canada Ltd., Oakville, Ontario, Canada; anti-S-100 antibody from Chemicon International, Inc., Temecula, California, USA; anti-Melan A antibody from Novocastra Laboratories, Ltd., Newcastle upon Tyne, UK). The final diagnosis was malignant

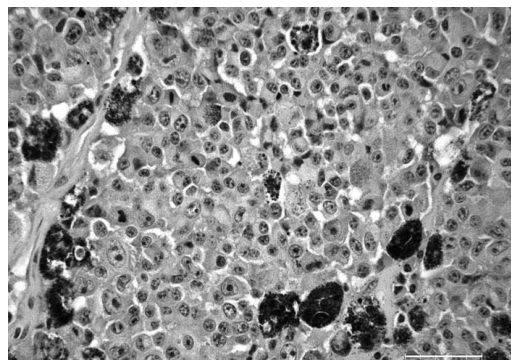


FIGURE 4. Photomicrograph of melanoma within lymph node, with nuclear atypia, anisocytosis, anisocaryosis, multiple mitoses, and variable amounts of pigmentation. Hematoxylin and eosin stain.

melanoma (melanosarcoma) with metastasis.

Melanomas are most common in dogs, gray horses, and some lines of miniature swine, occur occasionally in other swine, goats, and cattle, and rarely occur in cats and sheep. They are usually cutaneous in origin. Common sites affected vary with species, but neoplasms can occur anywhere melanocytes are located (Yager and Scott, 1993; Goldschmidt and Hendrick, 2002). The malignant neoplasm reported in this paper appears to have arisen from cutaneous tissue, and had metastasized to regional lymph nodes, presumably via lymphatic vessels.

There are relatively few reports of neoplasia in deer, either free-ranging or captive. Cutaneous fibromas of viral etiology are the most commonly reported tumor in white-tailed deer (*Odocoileus virginianus*); however, a variety of other benign and malignant neoplasms have also been documented (Cosgrove et al., 1983). Cutaneous fibromas also have been reported infrequently in all other species of North American deer, and in red deer, roe deer (*Capreolus capreolus*), and fallow deer (*Dama dama*) (Cosgrove and Fay, 1981). Among the various other neoplasms documented in deer, lymphoid neoplasia appears to be the most common, and has been reported in roe deer (Woodford, 1966; Elvestad and Henriques, 1985; Aguirre et al., 1999), fallow deer (Jennings, 1969; McDiarmid, 1975), red deer (Jennings, 1969; Elvestad and Henriques, 1985), white-tailed deer (Cosgrove et al., 1981), and a Formosan sika deer (*Cervus nippon taiouanus*) (Heuschele et al., 1985). A case of malignant melanoma of the palpebral conjunctiva in a captive fallow deer in Japan was recently published as the first report of a melanocytic tumor in deer or other wild ruminants (Sakai et al., 2001). To our knowledge, the case pre-

sented here is the first such report in red deer.

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