

## A case of feline paraneoplastic alopecia associated with a pancreatic adenocarcinoma

*Een geval van paraneoplastische alopecia bij de kat, geassocieerd met een adenocarcinoma van de pancreas*

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### ABSTRACT

A 12-year-old intact male Domestic Shorthair cat is described with anorexia, diarrhea and lethargy. Alopecia was noted around the nasal planum, the eyes and the mouth, and on the medial forelimbs and ventral abdomen. The footpads were soft and painful. There was no pruritus. The skin of the forelimbs had a shiny appearance. Euthanasia was requested by the owner and necropsy revealed an adenocarcinoma of the pancreas with metastatic lesions in the liver and the omentum. Post-mortem examination of the skin revealed marked follicular atrophy and miniaturization. The cat in this report had a glistening alopecia, despite the presence of the stratum corneum and the absence of pruritus.

### SAMENVATTING

In dit artikel wordt een 12 jaar oude, intacte, mannelijke kat beschreven met anorexie, diarree en sufheid. Een uitgesproken alopecia werd vastgesteld rond het planum nasale, de ogen, de mond en ter hoogte van de mediale voorpoten en het abdomen. De voetzolen waren zacht en pijnlijk. De kat had geen jeuk en de huid van de voorpoten had een glanzend uitzicht. De eigenaar vroeg om de kat te euthanaseren en bij de autopsie werd een adenocarcinoma van de pancreas gevonden, met uitzaaiingen in de lever en het omentum. Bij het post mortem onderzoek van de huid werden een uitgesproken atrofie en een miniaturisatie van de haarfollikels vastgesteld.

### INTRODUCTION

Cutaneous paraneoplastic syndromes (PNSs) in dogs and cats have been described in a recent article (Turek, 2003). PNSs are neoplasm-related disorders that occur at a site distinct from the primary tumor or its metastases. Many paraneoplastic syndromes have been recognized in human medicine, but only a few have been reported in veterinary medicine. In the cat, three clinical entities have been recognized: paraneoplastic alopecia associated with pancreatic, biliary or hepatocellular carcinoma, exfoliative dermatitis associated with thymoma, and superficial necrolytic dermatitis associated with pancreatic adenocarcinoma.

This paper describes a cat with a pancreatic adenocarcinoma that presented with acute onset of symmetrical alopecia. Twenty-one cats have been reported with this paraneoplastic condition (Brookes *et al.*, 1994; Pascal-Tenorio *et al.*, 1997; Godfrey, 1998; Barrs *et al.*, 1999; Tasker *et al.*, 1999; Bordeau *et al.*, 2000; Mauldin *et al.*, 2002; Marconato *et al.*, 2007). The chief complaints were acute, symmetrical alopecia and systemic illness such as weight loss and lethargy. A characteristic clinical sign reported in many of these cats was shiny skin. The histopathology was

characterized by follicular miniaturization and loss of stratum corneum.

### CASE REPORT

A 12-year-old intact male Domestic Shorthair cat was presented with a history of anorexia and diarrhea present for several days. There was no previous medical history except for routine annual vaccinations. Physical examination revealed dehydration (approximately 7%) and lethargy. The cat was normothermic, and the heart and respiratory rates were within normal limits. An irregular and slightly endurated liver was detected on abdominal palpation. Fine needle aspiration biopsy of the liver was not diagnostic. Feline leukemia and feline immunodeficiency virus tests were both negative (Witness, Synbiotics, Lyon). A complete blood count revealed a leucocytosis of  $17.5 \times 10^9/l$  (reference range  $5.0-15.0 \times 10^9/l$ ), a neutrophilia of  $16.4 \times 10^9/l$  (reference range  $3.6-10.5 \times 10^9/l$ ), a lymphopenia of  $0.770 \times 10^9/l$  (reference range  $0.9 - 4.2 \times 10^9/l$ ) and a mild thrombocytopenia of  $157 \times 10^9/l$  (reference range  $175-500 \times 10^9/l$ ). Serum biochemical abnormalities included an aspartate aminotransferase of 61 IU/l (reference range below



**Figure 1.** Cat with paraneoplastic alopecia. Note alopecia around eye and planum nasale.



**Figure 2.** Cat with paraneoplastic alopecia. Note perioral alopecia.



**Figure 3.** Cat with paraneoplastic alopecia. Note alopecia of the medial aspects of the forelimb and ventral abdomen.



**Figure 4.** Cat with paraneoplastic alopecia. Glistening appearance of the medial skin of the forelimb.

46 IU/l), an alanine aminotransferase of 81 IU/l (reference range below 43 IU/l) and a mild hypernatremia of 159 mEq/l (reference range 145-158 mEq/l). The cat was hospitalized and treated with amoxicillin/clavulanic acid 8.75 mg/kg SC q24h (Synulox, Pfizer). Intravenous fluid therapy was initiated to correct dehydration. The next day the cat was eating again and was sent home at the owner's request. The cat was readmitted three days later with severe depression. Upon admission, alopecia was noted, mainly around the eyes, the commissures of the mouth, the nasal planum, the medial sides of the forelimbs and the ventral abdomen (Figures 1 to 3). A glistening appearance of the medial skin of the forelimbs was noted (Figure 4). Hairs could easily be epilated. There was no pruritus. The footpads were soft and painful on palpation. Differential diagnoses for symmetrical alopecia included spontaneous alopecia and self-induced alopecia, the self-induced form being related to a pruritic condition or to psychogenic behavior. Multiple skin scrapings were negative for *Demodex cati* or *Demodex gatoi*. Scotch tape preparation was negative for *Malassezia* and coat brushings negative for ectoparasites. As hairs could easily be epilated, with normal microscopic appearance of the tips, self-induced alopecia was excluded from the differential list. A pre-

sumptive diagnosis of paraneoplastic alopecia was made based on the combination of dermatological (acute onset of ventral orientated, symmetrical alopecia with glistening skin) and systemic signs (lethargy, endurated liver and abnormal biochemical profile). Given the grave prognosis, the owner requested euthanasia. On necropsy, a mass was found in the pancreas. Multiple small masses were observed in the liver and omentum (Figure 5). Histopathology of the pancreas confirmed an adenocarcinoma. Multiple samples of the skin (medial forelimb, abdomen, nasal planum, periocular, paw, perioral) were submitted for histopathology. The features present in all these skin specimens were marked follicular atrophy and miniaturization (Figure 6).

## DISCUSSION

Paraneoplastic alopecia in the cat is a rare condition that has been described in 21 cats (Brookes *et al.*, 1994; Pascal-Tenorio *et al.*, 1997; Godfrey, 1998; Barrs *et al.*, 1999; Tasker *et al.*, 1999; Bordeau *et al.*, 2000; Mauldin *et al.*, 2002; Marconato *et al.*, 2007). The associated neoplasia was a pancreatic adenocarcinoma, a cholangiocarcinoma or a hepatocellular carcinoma. The age of the affected cats va-



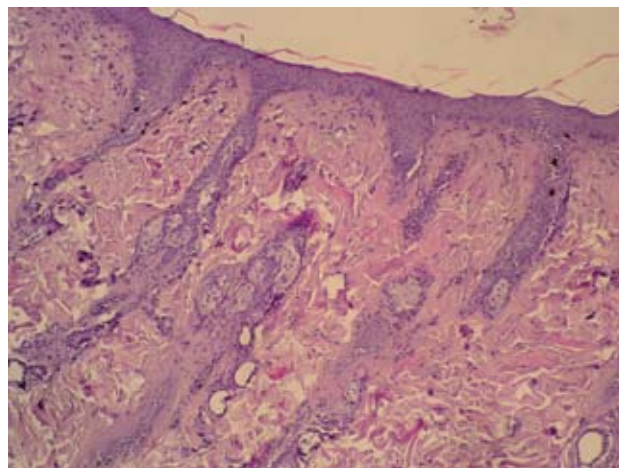
**Figure 5. Pancreas and liver of a cat with paraneoplastic alopecia. Note the primary tumor of the pancreas and metastatic spread to the liver.**

ried from 7 to 16 years. Most of the cats had a history of lethargy and anorexia. Complete blood count and serum biochemistry were usually unremarkable. The skin lesions reported include mainly alopecia, especially on the ventral abdomen and the medial sides of the limbs, sometimes with a glistening appearance, and in some cats also the wrinkled appearance typical of soft painful paws. The hairs on non-alopecic areas were easy to epilate. The most obvious histopathological sign was follicular miniaturization. Five of the twenty-one cats were reported to be pruritic, and thirteen of them were not. (For the other three, pruritus was not discussed.) In one cat the pruritus disappeared after treatment with ketoconazole for a concurrent *Malassezia* dermatitis (Godfrey, 1998). Pruritus has been proposed as the cause of the loss of the stratum corneum, which has been observed in some cases. The exposure of the more reflective stratum granulosum was a possible explanation for the glistening appearance of the skin (Pascal-Tenorio *et al.*, 1997; Barrs *et al.*, 1999).

In the cat of this report, there was no pruritus and the stratum corneum was still present on sectioned glistening skin, therefore other factors could have been responsible for the shiny skin. In a study of one cat, Pascal-Tenorio *et al.* (1997) could not demonstrate abnormal production of insulin, glucagon, somatostatin or adrenocorticotrophic hormone by immunohistochemical staining of the pancreatic tumor.

Paraneoplastic alopecia has a grave prognosis. Most cats are euthanized within months due to progressive clinical signs. Only one cat had a temporary improvement after removal of the pancreatic carcinoma, but was euthanized eighteen weeks post-surgery due to a metastatic spread to the liver, pancreas, spleen and peritoneum (Tasker *et al.*, 1999).

In summary, a paraneoplastic condition should be suspected in any case of acute hair loss around the eyes, planum nasale, commissures of the mouth, medial forelimbs and ventral abdomen, especially if the skin has a glistening appearance and the cat suffers from systemic signs.



**Figure 6. Section from a skin specimen of a cat with paraneoplastic alopecia showing follicular atrophy and miniaturization. H&E (x 40).**

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