

# RECURRENCE AND METASTASES OF A BASAL CELL CARCINOMA IN A VARIABLE SQUIRREL (*CALLOSCIURUS FINLAYSONI FLOWERI*): A CASE REPORT

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## Abstract

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## RECURRENCE AND METASTASES OF A BASAL CELL CARCINOMA IN A VARIABLE SQUIRREL (*CALLOSCIURUS FINLAYSONI FLOWERI*): A CASE REPORT

A dead, 9-year-old, female, Variable squirrel, weighing 190 g, had a skin swelling in the left inguinal area. Surgical excision of a similar skin mass in the right inguinal area had taken place 87 days previously. The squirrel had showed signs of severe dyspnea and inappetence for 7 days prior to death. At necropsy, as well as the skin mass in the left inguinal area, metastases were found in the inguinal lymph node and the lung together with a hemothorax. The tumor based on the clinical data, macroscopic and microscopic lesions was diagnosed as a basal cell carcinoma, Immunohistochemistry showed a positive result for pancytokeratin but was negative for vimentin, indicating that the cellular origin of the tumor was epithelium.

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**Keywords :** basal cell carcinoma, recurrence, metastasis, Variable squirrel

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## บทคัดย่อ

สว่าง เกษแดงสกุลวุฒิ\* อนุเทพ รังสีพิพัฒน์ นพดล พิพัรัตน์ กมกฤษ เทียนคำ วิจิตร บรรณนารา

### รายงานสัตว์ป่วย : การกลับเป็นซ้ำร่วมกับการแพร่กระจายของมะเร็งชนิดเบซัลเซลล์ในกระรอกหลากสี (*Callosciurus finlaysoni floweri*)

กระรอกหลากสีเพศเมีย อายุ 9 ปี น้ำหนัก 190 กรัม มีปัญหาการกลับเป็นซ้ำของก้อนมะเร็งบริเวณผิวหนังของขาหนีบซ้าย หลังจากการผ่าตัดก้อนมะเร็งบริเวณขาหนีบขวาเป็นเวลานาน 87 วัน กระรอกแสดงอาการหายใจลำบากและเบื่ออาหารเป็นเวลา 7 วันก่อนเสียชีวิต ผลการชันสูตรพบก้อนมะเร็งบริเวณขาหนีบซ้าย และมีการแพร่กระจายสู่ปอด และต่อมน้ำเหลืองบริเวณขาหนีบซ้ายร่วมกับภาวะเลือดออกในช่องอก จากอาการทางคลินิก รอยโรคทางมหัพยาธิวิทยา และจุลพยาธิวิทยา ร่วมกับการให้ผลบวกต่อการตรวจหาแอนติเจนของเยื่อบุผิว (pancytokeratin) และให้ผลลบต่อแอนติเจนของเนื้อเยื่อเกี่ยวพัน (vimentin) ด้วยการตรวจด้วยวิธีอิมมูโนฮิสโตเคมี วินิจฉัยว่าเป็นมะเร็งชนิดเบซัลเซลล์

คำสำคัญ : มะเร็งชนิดเบซัลเซลล์ การกลับเป็นซ้ำ การแพร่กระจาย กระรอกหลากสี

## Introduction

Basal cell carcinomas (BCC) are low-grade malignant epithelial tumors and are common in the cat, uncommon in the dog and rare in all other domestic animals (Goldschmidt et al., 1998; Goldschmidt and Hendrick, 2002). The haired skin of the thorax, head and neck are the predilected sites. These tumors are locally invasive but in a few cases they form metastases and can recur (Goldschmidt et al., 1998; Goldschmidt and Hendrick, 2002; Walder and Gross, 1992). A basal cell tumor is a benign form of an epithelial tumor which has been reported in various species of wildlife including the Indian lion (Brown and Davis, 1972), the DeBrazza monkey (Fisher and Robinson, 1976), the black French minilop rabbit (Li and Schlafer, 1992), the Virginia opossum (Toft II et al., 1973), the African lion (White, 1975), and the Japanese monkey (Yanai et al., 1995). Two cases have been described as BCC, one in a Cape clawless otter (Nakamura et al., 2002) and one in a blue-fronted Amazon parrot (Tell et al., 1997). One malignant basal tumor case has been reported in a Djungarian hamster

(Nakao et al., 1999) but there are no previous reports in Variable squirrels. This could be the first report of a BCC in a Variable squirrel (*Callosciurus finlaysoni floweri*) with metastasis and recurrence.

## Materials and Methods

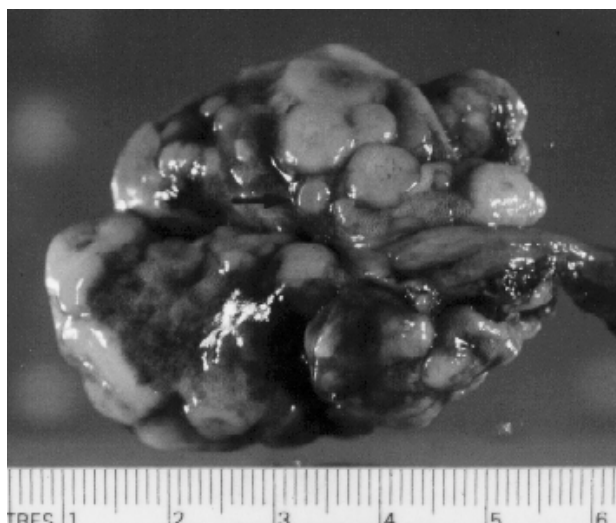
### Case History

A dead 9-year-old, female, Variable squirrel (*Callosciurus finlaysoni floweri*), weighing 190 g, was presented to the Department of Pathology, Faculty of Veterinary Science, Chulalongkorn University for necropsy. The squirrel had previously undergone surgical excision of a BCC (infiltrative type) from the right inguinal area 87 days previous. The squirrel had shown severe dyspnea and inappetence for 7 days before death and had a skin mass in the left inguinal area. The squirrel had been kept in a confined cage, vaccinated annually with rabies vaccine fed with various kind of vegetables and had no history of sun exposure. A complete necropsy was performed. Samples of the skin mass, left inguinal lymph node and lung were fixed in 10% buffered formalin,

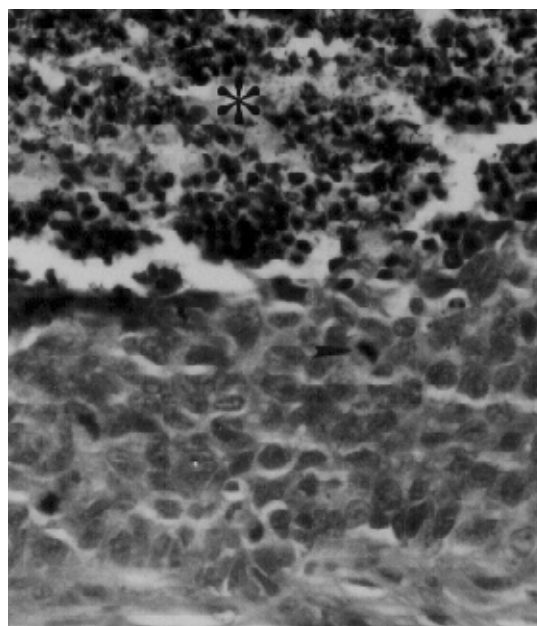
embedded in paraffin and stained with hematoxylin and eosin (H&E). Immunohistochemistry was performed, using the avidin-biotin complex (ABC) method, on formalin-fixed/paraffin-embedded sections of the skin mass, left inguinal lymph node and lung. The primary antibodies used were a polyclonal antibody against pancytokeratin and a monoclonal antibody against vimentin (DAKO, Denmark).

## Results and Discussion

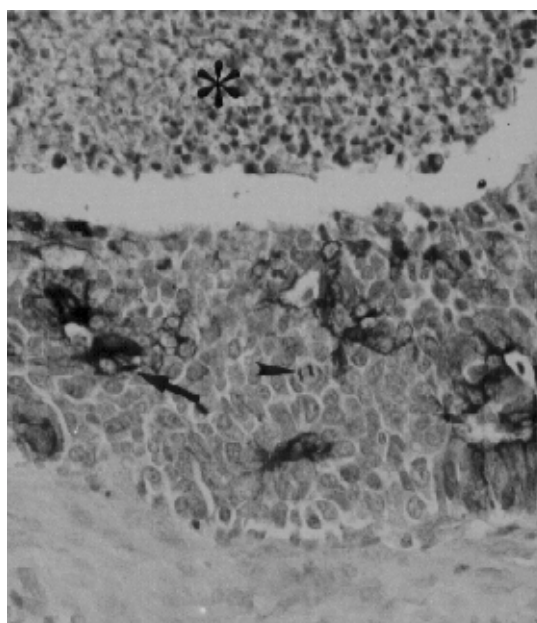
Macroscopically, the subcutaneous mass in the left inguinal area was unlike those seen in the dog and cat, which are found in the thorax, head and neck (Walder and Gross, 1992; Goldschmidt et al., 1998; Goldschmidt and Hendrick, 2002). It was about 2x2.5 cm in size, firm in consistency, white in color and had multiple necrotic foci on its cut surface. There was enlargement of the left inguinal lymph node. Multiple white masses of various sizes, about 0.2-1 cm, were also observed in the lung (Fig.1) together with hemothorax (about 5 ml). Microscopically, the infiltrative mass in the left inguinal area composed of multifocal proliferative cells resembling the basal cells of the epidermis. The tumor cells were arranged into a solid sheath and separated from the surrounding tissue by a compressed zone of fibrous tissue (Fig. 2). The tumor cells at the periphery of the sheath were a low, columnar to



**Figure 1** Multiple metastatic masses (arrow) of basal cell carcinoma were found in the lungs.



**Figure 2** Skin mass, solid sheath of the BCC is separated by a compressing zone of fibrous tissue with necrosis in the center(\*) and mitotic figures; arrowhead (H&E, x 500)



**Figure 3.** Skin mass, tumor cells showed positive results for pancytokeratin in the cytoplasm of the cells (arrow) with necrosis in the center(\*) and mitotic figures; arrowhead (IHC, x 400)

cuboidal shape with a round to oval, hyperchromic nuclei and scanty cytoplasm. The nuclei at the periphery of the mass tended to be palisaded, with the nuclei arranged so that their long axes were perpendicular to the surrounding

connective tissue. Multiple retraction spaces between the tumor cells and the connective tissue were also seen, as previously described in a Japanese monkey (Yanai et al., 1995). Necrotic areas could be observed at the center of the cluster of tumor cells. Mitotic figures were commonly observed throughout the mass. Metastatic tumor cells were also observed in the left inguinal lymph node and lung. There are few cases described with a history of a proven recurrence and metastasis (Goldschmidt et al., 1998; Goldschmidt and Hendrick, 2002). The tumor cells in the lung had a similar morphology to the primary mass but arranged in a cystic pattern. Immunohistochemistry on multiple clusters of the tumor from the skin, lymph node and lung, showed positive results for pancytokeratin in the cytoplasm (Fig. 3) but were negative for vimentin, indicating an epithelial origin for the cells (Nakamura et al., 2002). According to BCC classification. The case was classified as an infiltrative type (Goldschmidt et al., 1998; Goldschmidt and Hendrick, 2002). BCC has been rarely reported in wildlife (Toft II et al., 1973; Nakao et al., 1999; Nakamura et al., 2002), especially in conjunction with metastasis. In humans, BCC is believed to be caused by ultraviolet exposure but the majority of cases seen in the cat occur in non sun-exposed locations of the body (Walder and Gross, 1992). Facial BCC in human-beings does not correlate with site specific, UV-exposure and genetic and environmental factors appear to be involved in the onset of these tumor (Heckmann et al., 2002). In this case, the tumor occurred in the inguinal area which is a non sun-exposed area and the squirrel had no history of sun exposure. Nilsson et al. (2000) reported that increased GLI-1 expression is central to and probably sufficient for, basal cell carcinoma development. In experimental mice, increased expression of platelet-derived growth factor receptor (PDGFR)- $\alpha$  may be an important mechanism by which, mutation in the hedgehog pathway, causes basal cell carcinomas (Xie et al., 2001). Surgical excision is the treatment of choice for BCC (Goldschmidt and Hendrick, 2002). Recurrence in this case was probably caused, not only by the survival of the

tumor cells at the excision site but also by the invasive character of the tumor, as was found in a Cape clawless otter (Nakamura et al., 2002). Based on clinical data, macroscopic and microscopic lesions and immunohistochemistry, the tumor was diagnosed as a recurrent basal cell tumor, with pulmonary metastases.

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