

## Cytological and Pathomorphological Studies on Basal Cell Carcinoma in Skin of New Zealand White Rabbit

**D. Basheer Ahamad\*, S.Azmi, Shilpa Sood\*\*, S. Sivaseelan\*\*\* and B. Puvarajan\***

\*Veterinary College and Research Institute, TANUVAS, Orathanadu 614 625. Tamil Nadu, India

\*\*Sher-e Kashmir University of Agricultural Sciences and Technology of Jammu, R.S.Pura. 181 102. Jammu, India

\*\*\*Veterinary College and Research Institute, Tamil Nadu Veterinary and Animal Sciences University, Namakkal, Tamil Nadu, India

### Abstract

An adult male New Zealand White rabbit showed firm, whitish yellow neoplastic growth with necrotic foci. Based on cytological examination, the neoplastic growth was diagnosed as epithelial cell in origin with vesicular nucleus with anisokaryosis. The histopathological examination revealed the palisading neoplastic basaloid cells were showing solid, uniform with hyperchromatic and or vacuolated in appearance formed islands with abundant eosinophilic homogeneous ground substances and it was diagnosed as basal cell carcinoma.

**Key words:** Rabbit, Basal cell carcinoma, Cytology, Histopathology

### Introduction

Basal cell carcinoma (BCC) is a distinct undifferentiated low-grade malignant epithelial tumors of skin. Basal cell tumours are made up of almost entirely of basal cells (Moulton, 1999). It is common in the cat, uncommon in the dog and rare in all other domestic animals including rabbits (Goldschmidt *et al.*, 1998; Goldschmidt and Hendrick, 2002). The tumor cells are nevertheless able to invade and destroy the surrounding tissue (Buechner *et al.*, 1997) 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). Basal cell carcinomas are the result of sun damage to the skin. Basal cell carcinomas enlarge slowly and steadily and can invade neighboring tissue, like the eye, but they usually do not spread to distant parts of the body (metastasize). A basal cell tumor has been already reported in domestic animals such as buffaloes (Sadana *et al.*, 1978) dog (Roberts *et al.*, 1986; Seiler, 1982), cats (Jorger, 1988)), wildlife Indian lion (Brown and Davis, 1972), the DeBrazza monkey (Fisher and Robinson, 1976), the

Virginia opossum (Toft II *et al.*, 1973), the African lion (White, 1975), and the Japanese monkey (Yanai *et al.*, 1995). Cape clawless otter (Nakamura *et al.*, 2002) and blue-fronted Amazon parrot (Tell *et al.*, 1997). One malignant basal tumor case has been reported in a Djungarian hamster (Nakao *et al.*, 1999) and Variable squirrels (*Callosciurus finlaysoni floweri*) (Kedangsakonwut *et al.*, 2003). 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). It is also recorded in eye lid (Roberts *et al.*, 1986) ear (Nayak *et al.*, 1989). However no literature was available about the BCC in neck region of rabbit.

### Materials and Methods

A 3 year-old male New Zealand White rabbit carcass was presented for post mortem examination with the history of severe dyspnea and anorexia for 4 days before death and had a progressive skin mass with an open wound in the dorsal part of neck area for the last three months. A complete necropsy was performed. Samples of the skin growth was collected for cytological examination by Leishman staining and for histopathological examination tissues from various locations were collected and fixed in 10% buffered formalin, embedded in paraffin and stained with H&E staining.

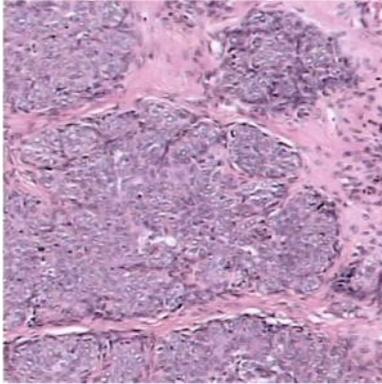
### Results and Discussion

Grossly, the subcutaneous mass in the dorsal portion of neck area was 5.35 x 3.65 cm in size, firm in consistency, whitish yellow in color and had multiple necrotic foci on its cut surface with foul smelling.

---

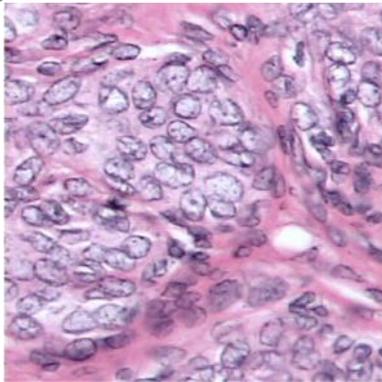
\* Email: dbahamad@gmail.com

Cytological examination of the growth revealed cells of epithelial cells in origin with anisocytosis and anisokaryosis with vesicular nucleus. Histologically, various areas of hyperplastic to neoplastic changes of basal cell in the skin were observed. The infiltrative mass in the neck area composed of multifocal proliferative cells resembling the basal cells of the epidermis. Initially, in the peripheral layer of the growth in skin revealed proliferation and clumps of neoplastic nuclei with scanty cytoplasm which were surrounded by mild fibrous tissue proliferation (Fig.1).



**Fig.1. Basal cell carcinoma in rabbits: Islands of vesicular neoplastic cells embedded in eosinophilic ground substances H&E X100**

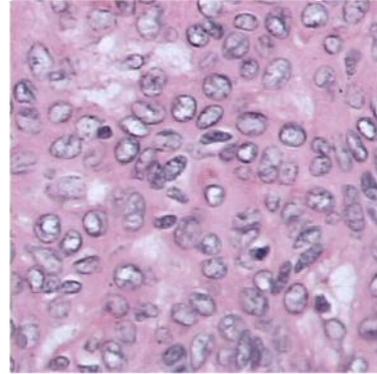
The palisading neoplastic basaloid cells were showing solid, uniform with hyperchromatic and or vacuolated in appearance formed islands with abundant eosinophilic homogeneous ground substances. (Fig.2).



**Fig.2. Basal cell carcinoma in rabbits: Islands of vesicular neoplastic cells infiltrating the basement membrane H&E X400**

The dermis was completely filled with the neoplastic cells lined with palisading basaloid cells. The neoplastic cells were in cuboidal with a round to oval, vacuolated

nuclei and scanty cytoplasm which showed anisocytosis and anisokaryosis (Fig.3).



**Fig.3. Basal cell carcinoma: Vesicular neoplastic cells with anisocytosis and anisokaryosis H&E X400**

Moreover, the nuclei contained multiple nucleoli. The nuclei at the periphery of the mass tend to be palisaded with the nuclei arranged so that their long axes were perpendicular to the surrounding connective tissue. The tumour cells were arranged into a solid sheath and separated from the surrounding tissue by a compressed zone of fibrous tissue. Necrotic areas could be observed at the center of the cluster of tumor cells. Mitotic figures were commonly observed throughout the mass. Multiple retraction spaces between the tumor cells and the connective tissue were also seen. Anisocytosis, anisokaryosis with vacuolated nucleus recorded in the present study was also reported in a Japanese monkey (Yanai *et al.*, 1995) and Variable squirrels (Kedangsakonwut *et al.*, 2003). Necrotic areas could be observed at the center of the cluster of tumor cells. Mitotic figures were commonly observed throughout the mass.

Present case was classified as a solid pattern of BCC situated locally in skin. 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 tumour occurred in the neck area which is a sun-exposed area and the rabbit had

history of sun exposure as grazing in the rural areas. 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)- may be an important mechanism by which, mutation in the hedgehog pathway, causes basal cell carcinomas (Xie *et al.*, 2001). Based on clinical signs, macroscopical, cytological and microscopical lesions, the neoplastic growth in the skin of the male New Zealand White rabbit was diagnosed as a invasive basal cell carcinoma with highly proliferative in nature.

### References

- Brown, R. J. and Davis, R.D. 1972. Basal cell tumor in an Indian lion. *J. Wild. Dis.* **8**: 237-238.
- Buechner, S A, Wernli, M , Harr, T. , Hahn S., Itin. P. and Erb. P. 1997. Regression of basal cell carcinoma by intralesional interferon-alpha treatment is mediated by CD95 (Apo-1/Fas)-CD95 ligand-induced suicide. *J. Clin. Invest.* **100(11)**: 2691-2696 doi: 10.1172/JCI119814
- Fisher. L. F. and Robinson, F.R. 1976. Basal cell tumor in a DeBrazza monkey. *Veterinary Pathology.* **13**: 449-450.
- Goldschmidt, M.H. and Hendrick, M.J. 2002. Tumors of the skin and soft Tissues. In: Tumors in Domestic Animals. 4th edn. D.J. Meuten (eds.), Ames, Iowa, Iowa State University Press. 45-117.
- Goldschmidt, M..H, Dunstan, R.W., Stannard, A.A., von Tscherner, C., Walder, E.J. and Yager, J.A. 1998. Histological classification of epithelial and melanocytic tumors of the skin of domestic animals. WHO Bulletin. 2nd edn. Vol. III, Armed Forces Institute of Pathology, Washington. 15-106.
- Heckmann, M., Zogelmeier, F. and Konz, B. 2002. Frequency of facial basal cell carcinoma does not correlate with site-specific UV exposure. *Arch. Dermatol.* **138(11)**: 1494- 1497.
- Jorger, K. 1988. Skin tumours in cats. Occurrence and prevalence in specimens (biopsies 1984-1987) at the Zurich Institute of Veterinary Pathology. *Schweizer Archiv fur Tierheilkunde.* **130(10)**: 559-569
- Julini, M. and Bertolotti, P.P. 1986. Basal cell carcinoma in a rabbit. *Obiettivi-e Documenti Veterinari.* **7(9)**: 67-68 (Abstract).
- Kesdangakonwut, S., Rungsipipat, A., Pirarat, N., Teankum, K., Banlunara, W.. 2003. Recurrence and metastases of a basal cell carcinoma in a variable squirrel (*callosciurus finlaysoni floweri*): A case report. *Thai J. Vet. Med.* **33 (4)**: 103-107.
- Kokuuslu, C. and Samsar, E. 1974. Basal cell carcinoma in a rabbit. *Veteriner Fakultesi Dergisi.* **21(1/2)**: 157-159
- Li, X. and Schlafer, D.H. 1992. A spontaneous skin tumor in a black French minilop rabbit. *Lab. Ani. Sci.* **429(1)**: 94-95.
- Nair, N. R., Katiyar, A. K., Bandopadhyay, A. C. 1990. Basal cell carcinomas in a rabbit. *Indian Journal of Veterinary Surgery.* **11(2)**: 70-71
- Nakamura, K., Tanimura, H., Katsurragi, K., Shibahara, T. and Kadota, K. 2002. Differentiated basal cell carcinoma in a Cape clawless otter (*Aonyx capensis*). *J. Comparative Pathol.* **123**: 223-227.
- Nakao, K., Sato, T., Shirai, W. and Matsuo, K. 1999. Malignant basal cell tumor in a Djungarian hamster. *J. Vet. Med. Sci.* **61(2)**: 191-193.
- Nayak, N. C., Chakrabarti, T. and Chakrabarti, A. 1989. Basal cell carcinoma on the ear of a bitch. *Indian Vet. J.* **66(6)**: 567
- Nilsson, M, Uden, A.B, Krause, D., Malmqwist, U., Raza, K., Zaphiropoulos, P. G. and Toftgard, R. 2000. Induction of basal cell carcinomas and trichoepitheliomas in mice overexpressing GLI-1. *Proc. Nat. Acad. Sci.* **97(7)**: 3438-3443.

- Roberts, S. M, Severin, G.A, Lavach, J.D. 1986. Prevalence and treatment of palpebral neoplasms in the dog: 200 cases (1975-1983). *J American Vet. Med Assoc.* **189(10)**: 1355-1359.
- Sadana, J R, Mahajan, S K, Kumar, V R . 1978. A note on basal cell carcinoma in a buffalo. *Indian J. Animal Sci.* **48(9)**: 684-685
- Seiler, R.J. 1982). Granular basal cell tumors in the skin of three dogs: a distinct histopathologic entity. *Vet.Pathol.* **19(1)**: 23-29
- Tell, L.A., Woods L. and Mathews K.G. 1997. Basal cell carcinoma in a blue-fronted Amazon parrot (*Amazon aestiva*). *Avian Dis.* **41**: 755-759.
- Tell, L.A., Woods, L. and Mathews, K.G. 1997. Basal cell carcinoma in a blue-fronted Amazon parrot (*Amazona aestiva*). *Avian Dis.* **41**: 3, 755-759
- Toft II JD, Puck GJ and Bullock B C. 1973. Basal cell tumor in a Virginia opossum (*Didelphis marsupialis*). *Lab. Ani. Sci.* **23(3)**: 431-433.
- Walder EJ and Gross TL. 1992. Basal cell tumor. In: *Veterinary Dermatopathology*. T.L Gross, P.J. Ihrke and E.J. Walder (edn.), Missouri, Mosby Year Book, Inc. 343-350.
- White GL. 1975. A basal cell epithelioma in an African lion. *Vet. Med. Small Ani. Clin.* **70(9)**: 1096.
- Xie J, Aszterbaum M, Zhang X, Bonifas JM, Zachary C, Epsteine E and McCormick F. 2001. A role of PDGFR- in basal cell carcinoma proliferation. *Proc. Natl. Acad. Sci.* **98(16)**: 9255-9259.
- Yanai T, Wakabayashi S, Masegi T, Iwasaki T, Yamazoe K, Ishikawa K and Ueda K. 1995. Basal cell tumor in a Japanese monkey (*Macaca fuscata*). *Vet. Pathol.* **30**: 318-320.