

## Scientific Report

# Hepatocellular carcinoma in a sheep

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## Summary

At necropsy of a five-year-old sheep, a pear shaped, lobular yellow-brownish mass measuring about 12 × 15 × 20 cm was found to involve the right hepatic lobe. Microscopic examination revealed two trabecular and solid patterns of neoplastic hepatocytes. In solid pattern, there were numerous tumoral giant cells that contain one or more large hyperchromatic bizarre-shaped nuclei scattered among clusters of neoplastic hepatocytes. In addition, mitotic figures, dilated sinusoids and large vascular spaces filled with red blood cells were observed in some sections. Based on gross and histopathologic characteristics, the mass was diagnosed as hepatocellular carcinoma.

**Key words:** Hepatocellular carcinoma, Sheep

## Introduction

Hepatocellular carcinomas (HCC) are malignant neoplasms of hepatocytes and occur in numerous species, including cats, dogs, cows, sheep, pigs and horses (Cullen and MacLachlan, 2001; Cullen and Popp, 2002). They are uncommon in all domestic animals but occur more frequently in ruminants, particularly sheep (Cullen and MacLachlan, 2001). The precise incidence of this malignancy in various species is unclear. The age distribution of animals with HCC varies among species (Cullen and Popp, 2002).

To the best of our knowledge, HCC has not been reported in domestic animals in Iran. In this article, we reported on a sheep with HCC with numerous tumoral giant cells in Chaharmahal-o-Bakhtiary province.

## Case presentation

A five-year-old sheep was referred to the Department of Pathobiology, School of Veterinary Medicine, University of Shahrekord. This sheep was necropsied using standard procedures. For histopathologic examination, tissue samples were taken from

hepatic mass and fixed in 10% neutral buffered formalin. They were processed and embedded in paraffin. Sections 5-µm thick were cut and stained with haematoxylin and eosin.

At necropsy, a pear-shaped lobular yellow-brownish mass measuring about 12 × 15 × 20 cm was found to involve the right hepatic lobe. This mass had a well-demarcated border but in some regions, the growth pattern seemed locally invasive.

Histopathologic examination revealed trabecular and solid patterns of neoplastic hepatocytes. In regions with trabecular pattern, neoplastic hepatocytes were similar to normal ones and arranged as thin and thick trabeculae. No connective tissue stroma was seen around the trabeculae. In areas with solid pattern, neoplastic hepatocytes were found with various size clusters with no apparent pattern. There was no lumen in central part of clusters, hence the name "solid pattern". In the latter pattern, there were numerous tumoral giant cells that contained one or more large hyperchromatic bizarre-shaped nuclei scattered among clusters of neoplastic hepatocytes. In addition, mitotic figures, dilated sinusoids and large vascular spaces filled with red

blood cells were seen in some sections. General features of malignancies including cell necrosis, infiltration of inflammatory cells and haemorrhages were observed too.

## Discussion

The clinical signs associated with HCC are nonspecific and include reduced appetite, weight loss, lethargy and weakness. Ultrasonographic examination of affected animals reveals hepatomegaly and focal echogenic masses within the liver (Braun *et al.*, 1997; Cullen and Popp, 2002).

HCCs are usually solitary, often involving an entire lobe, and are well-demarcate. They typically consist of friable, gray-white or yellow-brownish tissue that is subdivided into lobules by multiple fibrous bands (Cullen and MacLachlan, 2001). In this case, general macroscopic features were the same, however the demarcated margin of this tumour was irregular in some regions resembling an invasive growth pattern of malignant tumours.

The histologic appearance of HCC varies considerably, depending on the degree of differentiation of hepatocytes and the histologic arrangement of the cells (Cullen and Popp, 2002). In our case, the degree of differentiation was considerably variable in different sections of the tumour. Cytologic features of low differentiation or malignancy including tumoral giant cells with one or more bizarre-shaped nuclei, nuclear chromatin hyperchromasia and increased nuclear/cytoplasm ratio were

observed. However, the size and shape of the nuclei and cytoplasm of neoplastic hepatocytes closely resembled normal cells in some more differentiated regions. In the simplified categorization of HCC the three major diagnostic categories are adenoid, trabecular and solid patterns that individual masses frequently contain different histologic patterns within different areas (Jones *et al.*, 1997; Cullen and Popp, 2002). In this case, only trabecular and solid patterns were observed.

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