



DISEASE IN WILDLIFE OR EXOTIC SPECIES

Parotid Salivary Gland Basal Cell Adenocarcinoma in a Big-eared Opossum (*Didelphis aurita*)

J. Díaz-Delgado^{*,†}, A. A. C. Coimbra[‡], C. dos Santos-Cirqueira[†],
 T. C. Sanches[‡], J. M. Guerra^{*}, A. S. de Oliveira[‡], C. Di Loretto[†],
 T. Zwarg[‡], R. Ressio[†], L. Rivas[‡], M. Sansone[†], F. O. Nagamori[†],
 C. Kanamura[†], P. S. Gonçalves[†], N. C. C. A. Fernandes[†], K. R. Groch^{*}
 and J. L. Catão-Dias^{*}

* Departamento de Patologia, Faculdade de Medicina Veterinária e Zootecnia, Universidade de São Paulo, Av. Prof. Orlando Marques de Paiva 87, † Instituto Adolfo Lutz, Centro de Patologia, Brasil, Av. Dr. Arnaldo, 351 - 7 Andar, Sala 706, Pacaembú and ‡ Divisão Técnica de Medicina Veterinária e Manejo da Fauna Silvestre, IV Portão 7A, Av. Quarto Centenário, Parque Ibirapuera, São Paulo, São Paulo, Brazil

Summary

The opossum (family Didelphidae) is a marsupial endemic to the Americas. Apart from the South American short-tailed opossum (*Monodelphis domestica*) and the Virginia opossum (*Didelphis virginiana*), there is considerable lack of knowledge about the health and diseases of most opossum species. Among these, the big-eared opossum (*Didelphis aurita*) is found in Argentina, Brazil and Paraguay. Natural and experimental studies have shown this species to be susceptible to infectious agents with zoonotic potential and the animals may play a role in transmission of such agents. However, neoplasia appears to be uncommon in this species. We describe the gross, microscopical and immunohistochemical features of a parotid salivary gland basal cell adenocarcinoma in a free-living big-eared opossum. This case represents the first report of salivary gland neoplasia in opossums.

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The opossum (family Didelphidae) is a marsupial endemic to the Americas (Voss and Jansa, 2009). Except for the South American short-tailed opossum (*Monodelphis domestica*) and the Virginia opossum (*Didelphis virginiana*), there is considerable lack of knowledge about the health and diseases of most opossum species. Among these, the big-eared opossum (*Didelphis aurita*) is found in Argentina, Brazil and Paraguay, typically inhabiting forests, but also peri-urban and urban areas (Nowak, 1999). Natural and experimental studies have shown this species to be susceptible to infectious agents, some of which bear zoo-

notic potential, including *Leishmania* spp. (Monteiro, 2010), rabies virus (Bacchiaga, 2014), *Rickettsia rickettsii* (Horta et al., 2009), *Sarcocystis* spp. (Cesar, 2011) and *Toxoplasma gondii* (Pena et al., 2011). The big-eared opossum may also play a role in transmission of some of these organisms. In contrast, neoplasia appears to be rare in this species. Conversely, a variety of spontaneously arising neoplasms have been documented in the Virginia opossum, in particular pulmonary adenocarcinomas (Pope and Donnell, 2017).

In man and many animal species, the salivary glands comprise of three paired major glands (i.e. the parotid, submandibular and sublingual salivary gland) and the minor glands, which are numerous

Correspondence to: J. Díaz-Delgado (e-mail: josue.diaz101@alu.ulpgc.es).

and widely distributed throughout the mouth and oropharynx and may be present in the upper respiratory and sinonasal tracts and the paranasal sinuses (Eveson *et al.*, 2005). The functional unit of salivary glands is the secretory acinus, which includes serous, mucous or mixed epithelium and related ducts (i.e. the intercalated, striated and interlobular excretory ducts) and myoepithelial cells. The major salivary glands of opossums consist of parotid, submandibular, molar and greater and lesser sublingual glands. The morphological and histochemical features of fetal and postnatal development to adult stage of these glands in opossums have been studied in detail (Krause, 1998).

Salivary gland neoplasia (SGN) is relatively common in man, but is rare in animals with occasional reports in cattle, sheep, goats, horses, dogs and cats (Uzal *et al.*, 2016). Both in man and animals, SGN is usually unilateral and the parotid and mandibular glands are affected most commonly. Benign tumours predominate in man, but in animals carcinomas are more commonly recognized, particularly in older animals (Eveson *et al.*, 2005; Munday *et al.*, 2017). SGN may display remarkable intratumour morphological and immunohistochemical diversity. To the best of the authors' knowledge, SGN is yet to be described in opossums. This report describes the gross, microscopical and immunohistochemical features of a basal cell adenocarcinoma (BAC) of the right parotid salivary gland in a free-living big-eared opossum.

A 1.62 kg adult female, free-living big-eared opossum was found cachectic and obtunded and died shortly after. The animal was subjected to necropsy examination at the Technical Division for Veterinary Medicine and Management of Wild Animals (DEPAVE-3), São Paulo City Department of Green Areas and the Environment (SVMA), Brazil. Representative samples of major organs (i.e. adrenal glands, brain, heart, intestines, kidneys, liver, lung, lymph nodes, oesophagus, ovaries, pancreas, salivary glands, skeletal muscle, skin, spleen, stomach, urinary bladder and uterus) were collected, fixed in 10% neutral buffered formalin and submitted to the Instituto Adolfo Lutz, Pacaembú, São Paulo, Brazil. The tissues were processed routinely and embedded in paraffin wax. Sections (5 µm) were stained with haematoxylin and eosin (HE). Additionally, periodic acid–Schiff stain with and without diastase digestion was applied to salivary gland sections.

On necropsy examination, there was an 8.5 × 8 × 8 cm circumscribed, pale yellow to brown, firm subcutaneous mass in the right ventrolateral aspect of the neck (Fig. 1). On cut surface, the mass was largely solid and had a lobulated appearance



Fig. 1. Right aspect of the neck and retromandibular region. A large, well-circumscribed, pale yellow to brown, firm mass expands the subcutis. Bar, 5 cm. Inset: the mass has a solid and lobulated appearance with scattered necrotic foci on cut surface. Bar, 5 cm.

with occasional variably-sized cystic structures and necrotic foci. Other relevant gross findings were generalized alopecic and crusting dermatitis associated with *Sarcoptes* spp. mites, severe axial and appendicular muscle atrophy with depletion of fat depots and multifocal, discrete granulomatous enterocolitis associated with unidentified acanthocephalans. Parasitological analysis of intestinal contents revealed a moderate burden of oxyurids and *Ancylostoma* spp. and a low burden of coccidia.

Microscopically, the mass consisted of a moderately well-demarcated, non-encapsulated and lobulated epithelial neoplasm arising from the right parotid salivary gland (Fig. 2). Tumour cells were arranged in solid nests, lobules, trabeculae or tubuloglandular formations with cystically-dilated lumina, supported by thin fibrovascular septa (Fig. 2). The tumour showed considerable intratumoural pleomorphism. A first neoplastic pattern (representing 95% of the tumour tissue) consisted of well-differentiated cuboidal to polygonal, peripherally palisading basaloid cells with mild eosinophilic cytoplasm and round basal euchromatic nuclei. These were accompanied by serous polygonal epithelial cells with moderate eosinophilic granular (PAS-positive, diastase resistant) cytoplasm and central to paracentral euchromatic nuclei (Figs. 2 and 3). Neoplastic tubuloglandular structures were largely formed of these two cell types (Fig. 3). A second tumour pattern (representing approximately 4% of the tumour tissue) consisted of closely packed, small basaloid cells with darker cytoplasm and depolarized round to oval euchromatic nuclei with up to two nucleoli (Fig. 2). A third pattern (representing approximately 1% of the tumour tissue) included aggregates of cells identical to well-

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