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## MELANOMA IN THE SKIN OF A NURSE SHARK (*GINGLYMOSTOMA CIRRATUM*)

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**Abstract:** A female nurse shark, *Ginglymostoma cirratum*, estimated at 27 yr of age had a 5.5-yr history of a 6-cm black, raised nodular skin lesion located on the right side of the proximal tail. The lesion was diagnosed on biopsy as a slow-growing melanoma of the skin with no vascular invasion. The nurse shark was euthanized for systemic illness approximately 4.5 mo after diagnosis of the dermal melanoma. No evidence of metastasis was found on histopathologic evaluation of the skin and viscera.

**Key words:** Elasmobranch, *Ginglymostoma cirratum*, melanoma, neoplasia, nurse shark, skin.

### BRIEF COMMUNICATION

Nurse sharks, *Ginglymostoma cirratum*, are nocturnal, bottom-dwelling animals found off the coasts of North and South America and Africa. The nurse shark is a popular exhibit animal that has been kept in captivity for up to 25 yr with successful breeding. Females are ovoviparous, without yolk-sac placentation.<sup>14</sup> Young are approximately 29 cm in length at birth and females become sexually mature when they reach approximately 2.3 m in length.<sup>3</sup>

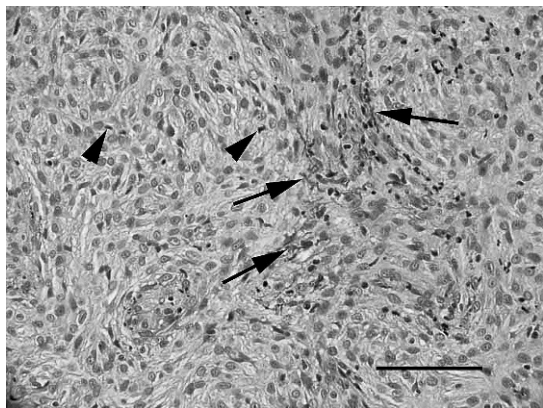
The present case refers to a wild-caught female nurse shark, estimated at 27 yr of age and approximately 1.9 m in length. The shark had been housed at the Indianapolis Zoo for 17 yr. This female was housed in a mixed-species, 170,344-L (45,000-gallon) tank with another nurse shark, five blacktip sharks, one golliath grouper, and five golden travelle jacks. This was an indoor tank with closely regulated water quality. The animal was fed capelin, clams, squid and herring.

The shark had a 5.5-yr history of an irregular black skin lesion on the right side of its tail noted by the keeper staff. The lesion was presumed to be a scar that originated from a bite wound. There was no change in the size or appearance of the lesion until January of 2005. At that time, the

animal was examined due to clinical signs of anorexia, lethargy, and a bloated appearance. The skin lesion was approximately 6 cm in diameter, irregular in shape, dark brown-black and very minimally raised from the surface. The animal was manually restrained in a sling within the exhibit for a physical exam, collection of a blood sample from the caudal vein, ultrasound, cloacal culture, fecal analysis, abdominocentesis, and skin scraping. During the first 1.5 mo after presentation for systemic illness, the skin lesion continued to slowly enlarge, and became more raised from the surface of the skin with 1–2-mm raised off-white to light tan circular lesions spread diffusely over the top of the lesion. Between the raised circular nodules, the surface of the lesion was fuzzy in appearance. Similar skin lesions began to appear on the back, sides, and ventrum of the abdomen and along the tail. These varied in size and texture, ranging from several millimeters to 6 × 7-cm areas of coalescing smaller lesions. None of the new lesions had the fuzzy texture but all were mildly raised, asymmetric, thickened, and rough. Most of the new lesions were dark brown to black although one larger lesion was pale brown to white. A 6-mm punch biopsy of the original fuzzy-textured lesion on the tail was obtained at the margin of the lesion and submitted for histopathologic examination approximately 3 mo after presentation for systemic illness. The biopsy indicated a well-differentiated melanoma of the skin with no vascular invasion. The biopsy comprised interlacing streams of neoplastic spindle cells with scant eosinophilic cytoplasm and vesicular nuclei with prominent nucleoli and up to two mitotic figures per high-powered field. A few of the cells contained cytoplasmic pigment interpreted as melanin or other cutaneous chromatophore pigment (Fig. 1). No vascular inva-

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**Figure 1.** Melanoma, skin, nurse shark. Note streams of neoplastic spindle cells, some with cytoplasmic pigment (arrows) and few with mitotic figures (arrowheads). H&E; bar = 200  $\mu$ m.

sion was noted. Although the tumor interfaced with the overlying epidermis, no junctional activity was noted. The tumor did not extend to the examined margins. Chondro-osseous metaplasia was detected in adjacent dermis.

Immunohistochemical staining for Melan A with a monoclonal antibody (Dako, Carpinteria, California 93013, USA) was done with a non-avidin-biotin detection method (EnVision+, Dako) with a streptavidin-biotin-peroxidase method as previously described.<sup>11</sup> Low numbers of the neoplastic cells corresponding to the pigmented cells in the hematoxylin and eosin (H&E) stained sections had intracytoplasmic positive staining reaction for Melan A, supporting the diagnosis of a melanoma. Culture and cytology of the biopsy site did not detect parasites, pathogenic fungi, or acid-fast bacteria.

Because of the severity of the unrelated systemic illness and the shark's general lack of response to treatment after 5.5 mo, the decision was made to euthanize the shark with pentobarbital sodium (Euthasol euthanasia solution, Virbac Corporation, Fort Worth, Texas 76137, USA; 18 ml i.v.). A necropsy was performed. Histologic examination revealed diffuse, lymphohistiocytic enteritis, coelomitis, multifocal biliary cysts, diffuse intratubular urate stasis, and marked dermal edema. Few areas of epidermal hyperplasia and associated increase in dermal chromatophore density were noted in skin sections corresponding to the dermal masses noted clinically. No new dermal melanomas were seen and there was no evidence of metastasis of the original melanoma.

Changes in cutaneous pigmentation in fish, including melanosis or melanization, are often nonspecific signs secondary to stress, aggression, poor water quality, and various disease conditions, including neoplasia.<sup>4</sup> Chronic cutaneous hyperplasia is often characterized by hyperpigmentation.<sup>5</sup> Pigment cell neoplasms, including melanomas, are occasionally seen in fishes.<sup>5</sup> Melanomas in the skin of nonhybrid variable platyfish, *Xiphophorus variatus*, have been reported to occur as nodular melanotic growths that present in several forms. One form presents as large, intensely black spots along the midlateral line. Fish usually develop these melanomas when they are older and the lesion can be highly malignant and invasive with progressive destruction of muscle tissue.<sup>13</sup>

The Registry of Tumors in Lower Animals<sup>8</sup> lists only a few skin tumors in elasmobranchs, including one fibroma (bull shark, *Carcharhinus leucas*), two squamous papillomas (dusky smooth-hound, *Mustelus canis*, and thornback ray, *Raja clavata*), one fibrosarcoma (blacktip shark, *Carcharhinus limbatus*), and one chondroma (leopard shark, *Stegostoma fasciatum*). In addition, there are reports of an osteoma in the skin of a tawny nurse shark (*Nebrius ferrugineus*),<sup>9</sup> epidermoid carcinoma in a Mediterranean dogfish (*Scyliorhinus canicula*),<sup>14</sup> a mucoepidermoid papilloma in a sand tiger shark (*Carcharias taurus*),<sup>2</sup> an epidermal papilloma in a smooth dogfish (*Mustelus canis*),<sup>15</sup> and a fibropapilloma compatible with an ameloblastoma in a blue shark (*Prionace glauca*).<sup>2</sup> Additional nondermal neoplasms in sharks include a hepatic cholangiocarcinoma and testicular mesothelioma in a blue shark<sup>1</sup> and choroid plexus papilloma in a spiny dogfish (*Squalus acanthias*).<sup>10</sup> There is a report of a malignant melanoma in a thornback ray (*Raja clavata*)<sup>6</sup> and in a common skate (*Raja batis*).<sup>14</sup> Previous older references note a few melanomas in elasmobranchs but the species are not listed nor are the characteristics or behaviors of the lesions mentioned.<sup>7,12</sup> The rarity of reported neoplasms may in part be due to a relative lack of thorough examination of many captive and free-living elasmobranchs, a lack of significant numbers of specimens relative to population sizes, or a combination of the two circumstances.

The nurse shark in this case was euthanized due to an unrelated illness characterized by lethargy, inappetance, and weight loss. There was no evidence of metastasis of the melanoma at the time of its death. The primary skin lesion had been present for numerous years with very little

apparent growth until the shark became systemically ill, when the tumor appeared to enlarge; however, in the presence of other lesions and absence of metastasis, this cutaneous melanoma was considered an incidental finding and was probably benign. It is likely that the other pigmented skin lesions that developed during the shark's illness were secondary to stress and illness. It is important that more information concerning basic biological parameters in elasmobranchs, including incidence of neoplasia, is collected and reported in order to aid in improved care of these species.

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