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UROGENITAL CARCINOMAS IN CALIFORNIA SEA LIONS (*Zalophus californianus*)

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ABSTRACT

Although historically rare, reported incidences of neoplastic diseases in marine mammals are on the rise. While increased surveillance likely contributed, it is also suggested that there may be a relationship with chemical pollution of the marine environment (organochlorines) and its accumulation within animal tissues of California Sea Lions (*Zalophus californianus*) and Beluga Whales (*Delphinapterus leucas*).[2,6] Urogenital carcinomas are one of the most frequent malignancies diagnosed in marine mammals submitted for rehabilitation and/or postmortem examination at the Pacific Marine Mammal Center from 1996 to 2007 (51 animals total). The animals are typically presented as anorexic, emaciated, and lethargic with prominent perineal edema, abnormal tail position, rear flipper paresis/paralysis, and occasional rectal prolapse. The neoplastic mass is typically grossly large in size, multinodular, yellow to light brown in color, and commonly necrotic. The masses are composed of nests of neoplastic epithelial cells with prominent squamous metaplasia. Metastatic spread to sublumbar and other lymph nodes and organs in the pelvic, abdominal, and thoracic cavity are frequently encountered. Common sequel is hydronephrosis and hydroureter due to the compression of the ureters by growing tumors. Immunohistochemistry of metastatic carcinomas of genital origin in 10 sea lions of subadult to adult age (up to 15 years of age) revealed the association with a novel *gammaherpesvirus* (Otarine Herpesvirus-1) and suggest venereal transmission, although an underlying immunogenetic (MHC genes) component is suggested.[1,2]

INTRODUCTION

Recent reports suggest increased prevalence of neoplastic diseases in free-ranging California sea lions (*Zalophus californianus*) in the last decade.[2,6] The predominant neoplasms were poorly differentiated carcinomas of urogenital origin, with intracytoplasmic and nuclear virions of a distinct *gammaherpesvirus*, named otarine herpesvirus-1 (OtHV-1). The viral DNA was diagnosed by PCR in all urogenital tumors of examined California seal lions.[4,5] Gammaherpesviruses are known to be oncogenic in some animals, but there are some other etiologies of carcinogenesis that should be considered: genetic (protooncogenes, immunogenetic), environmental (chemical), and pathogenic (other infections).[6] Particularly organochlorines, such as PCBs and DDT (and DDT metabolites) are persistant environmental pollutants that biomagnify and show tendency to accumulate in tissues of marine mammals (especially blubber), with resulting immunosuppressive and reproductive effects.[1,6,7]

MATERIAL AND METHODS

This report includes 51 cases of California sea lions necropsied at the Pacific Marine Mammal Center (PMMC) in a 10-year period (1996-2007) and diagnosed with urogenital neoplasia. All animals were subadult to adult age (up to 15 years of age), and the gender distribution included 48 females and 3 males. All animals were initially found stranded at the Pacific beaches of Southern California, admitted to the PMMC for rehabilitation purposes and eventually died or were euthanized due to the grave prognosis. Postmortem examination was performed at the PMMC; tissue sections were fixed in 10% buffered formalin and processed routinely for histopathology. Histopathological specimens were examined microscopically and sections of the urogenital neoplasia of 10 sea lions were processed for immunohistochemistry.

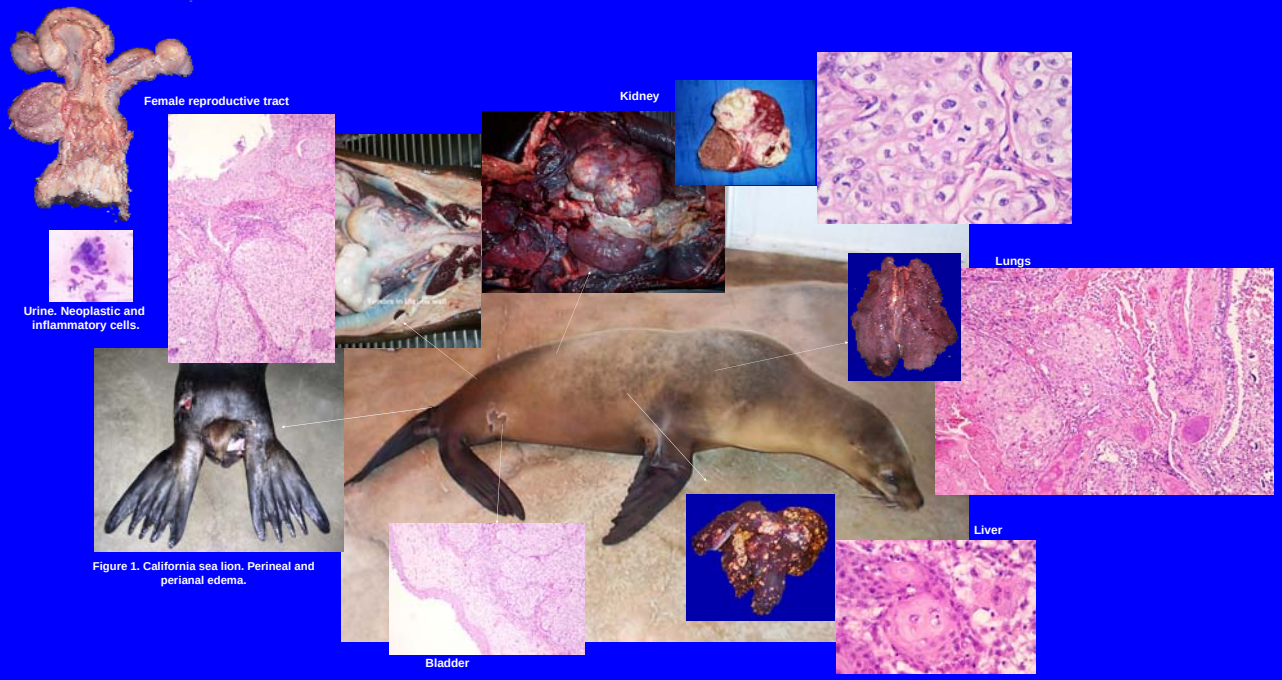

Figure 1. California sea lion. Perineal and perianal edema.

Figure 2. Urogenital carcinoma. Primary and metastatic masses. Histopathology: sheets and nests of infiltrated neoplastic epithelial cells with squamous metaplasia.

RESULTS

The stranded California sea lions admitted to the PMMC are typically presented anorexic, emaciated, and lethargic with prominent perineal and perivulvar edema, abnormal tail position, rear flipper paresis or paralysis, and occasional rectal prolapse (Fig.1). Neoplastic masses found in the urinary or genital tract are typically grossly large in size, multinodular, yellow to light brown in color, and commonly necrotic (Fig. 2). These masses are highly infiltrative and histologically composed of nests and sheets of neoplastic epithelial cells with prominent squamous metaplasia and small numbers of mitotic figures. Keratin pearls are occasionally present. Metastatic spread to primarily sublumbar and other lymph nodes and organs throughout the body (lungs, liver, kidney, spleen) is frequently encountered and composed of numerous irregular pale multifocal to confluent nodules. All 51 cases were diagnosed with metastatic urogenital carcinomas. Immunohistology of the selected sections of primary and metastatic neoplastic sites in 10/51 sea lions was positive for the *gammaherpesvirus* (Otarine Herpesvirus-1).

DISCUSSION

Gross and histopathological findings in the metastatic neoplasia of 51 sexually mature California sea lions necropsied within the last 10 years at the Pacific Marine Mammal Center in Laguna Beach, California, were suggestive of urogenital carcinomas with widespread metastases. These findings are in concordance with the trend of a reported 16% increased incidence of urogenital carcinomas in marine mammals reported previously.[2] Advances in molecular biology and its application in diagnostics have facilitated rapid detection of a novel, tumor-specific *gammaherpesvirus* (otarine herpesvirus-1; OtHV-1) in neoplastic tissues of selected animals. Sexual transmission is highly suspected, but some recent reports suggest that the tumors are associated with high levels of organochlorines (predominantly PCBs) accumulated in the blubber.[6] However, an underlying immunogenetic component (major histocompatibility complex /MHC/ class II locus) should also be considered as a risk factor in cancer development of California sea lions.[1]

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References:
1. Bowen, L. et al. Immunogenetics 2005; 56:846-848
2. Buckles, E.L. et al. J. Comp. Path. 2006; 183-189
3. Gulland F.M.D. et al. J. Wildlife Dis. 1996; 32:250-258
4. King, D.P. et al. Veterinary Microbiol. 2002; 86: 131-137
5. Lipscomb, T.P. et al. Vet Pathol. 2000; 37:609-617
6. Meuten, D.J. Tumors in domestic animals. 2002; 3-44
7. Ylitalo et al. Marine Pollution Bulletin. 2005; 50:30-39