Spontaneous Fibrosarcoma in a Djungarian Hamster (Phodopus sungorus)

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A 1.5-y-old female Djungarian hamster (Phodopus sungorus) presented with a large subcutaneous mass surrounding the right shoulder. Radiography revealed dislocation of the right humeral articulation and osteolytic lesions of the right scapula. Histologically, the mass was composed of spindle to stellate cells arranged in fascicles interwoven with delicate collagen fibers, and neoplastic cells infiltrated the bone, skeletal muscle, and subcutaneous tissues. Neoplastic cells stained intensely positive for vimentin and negative for S100 protein, neurofilament, and desmin. A minority of neoplastic cells (10% to 20%) stained moderately for smooth muscle actin. The mass was diagnosed as a fibrosarcoma. Although fibrosarcomas are relatively common in dogs and cats, this is the first report of fibrosarcoma in a domestic Djungarian hamster.

Abbreviations: D hamster, Djungarian hamster; GL cells, ganglion cell-like cells; SMA, smooth muscle actin

Djungarian (D; Russian, Siberian) hamsters (Phodopus sungorus) originally come from Siberia, northern Kazakhstan, northern China, and Mongolia.3 This species is smaller than the Syrian (Golden) hamster (Mesocricetus auratus), is sometimes referred to as the dwarf hamster, and has the unusual characteristic of a ventral sebaceous (midventral scent) gland.10 Because D hamsters are susceptible to chemical carcinogens and oncogenic viruses, they are used for cancer research and cytogenetic studies.7 Laboratory D hamsters show a high incidence of neoplastic disease.3 For example, they are reported to develop atypical fibromas composed of ganglion cell-like (GL) cells.1,5 Because these tumors are androgen-dependent, they generally occur in males and occur less frequently in females.1 GL cells in D hamsters may be derived from intrinsic undifferentiated mesenchymal cells in the dermis or subcutaneous adipose tissue.5

To our knowledge, this is the first report of spontaneous fibrosarcoma in domestic D hamsters.

Case Report

A 1.5-y-old female domestic D hamster (Phodopus sungorus) weighing 77.8 g was presented with a subcutaneous mass surrounding the right shoulder; the mass was interfering with its gait. The mass had first been noticed about 3 mo previously by the owner and had enlarged to involve the right forelimb within some weeks. The hamster had been purchased at a pet store and housed in a wire cage, fed a commercial seed mix, with free access to water. Radiography revealed dislocation of the right humeral articulation and osteolytic lesions of the right scapula. Cyto logic examination of the mass was performed by fine-needle aspiration. The Giemsa-stained cytologic specimen revealed spindle mesenchymal cells with anisokaryosis and anisonucleosis. The practitioner considered that surgical excision of the mass was not possible. The hamster died 1 wk after presentation, and autopsy was performed. The mass was adherent to the right thoracic wall and difficult to dissect out (Figure 1). It measured 50 × 45 × 35 mm, weighed 25 g, and had an irregular surface. The cut surface of the mass was whitish gray with necrosis. No nodules were observed in other organs.

The mass was fixed in 10% neutral buffered formalin, embedded in paraffin, sectioned at 5 μm, and stained with hematoxylin and eosin, Masson trichrome, and Alcian blue (pH 2.5) according to standard histopathologic methods. Additional sections were processed for immunohistochemistry (horseradish peroxidase enzyme-labeled polymer, EnVision System, Dako, Tokyo, Japan). The primary antibodies were mouse monoclonal antipig vimentin (Dako, diluted 1:100), rabbit polyclonal anticow S100 protein (Dako, diluted 1:1000), mouse monoclonal antihuman smooth muscle actin (Dako, diluted 1:50), mouse monoclonal antihuman desmin (Dako, diluted 1:50), and mouse monoclonal antibody antihuman smooth muscle actin (SMA; Dako, Tokyo, Japan, diluted 1:50). Normal peripheral nerves, skeletal muscle, and vascular smooth muscle in tissues adjacent to the mass served as internal tissue controls to confirm crossreactivity of antibodies to hamster tissues.

Histologically, the mass was composed of spindle to stellate cells arranged in fascicles interwoven with delicate collagen fibers that stained blue with Masson trichrome (Figure 2). The mass was highly cellular, and multinucleated giant cells were scattered throughout it. Neoplastic cells exhibited eosinophilic cytoplasm and indistinct cell borders with moderate anisocytosis. Spindle-shaped to oval nuclei showed moderate anisokaryosis and atypia with 1 to 2 nucleoli, with 13 mitoses per 10 high-power (40×) fields. Regionally, stellate cells were loosely arranged in an extracellular mucinous matrix, and a substance that stained blue with Alcian blue. Neoplastic cells had invaded bone, skeletal muscle, and subcutaneous tissues (Figure 3). Subcutaneous peripheral nerves were present in the periphery of the mass. The mass ex-
neoplasms, whereas the presence of regional SMA-positive cells suggested myofibroblastic differentiation. SMA expression in neoplastic cells appears in no more than 5% of fibrosarcomas. However, focal expression of SMA may be a characteristic of fibrosarcomas in D hamsters. Myofibroblastic sarcomas are histologically similar to fibrosarcomas. Because most neoplastic cells stain positive for SMA in myofibroblastic sarcomas, we accepted a diagnosis of myofibroblastic sarcoma in the present case. Some fibrosarcomas have variable amounts of mucinous ground substance. Although the focal myxomatous area suggested myxosarcoma, the histologic and immunohistochemical findings supported a diagnosis of fibrosarcoma in the case we present.

In dogs and cats, fibrosarcomas are infiltrative and recurrent, but metastasis is uncommon. Similarly, infiltration of bone, skeletal muscle, and subcutaneous tissues was noted in the present case. However, the present case is unusual in terms of the large size of the mass in relation to body size.

Discussion

Histologic and immunohistochemical findings led to a diagnosis of fibrosarcoma. During the diagnostic process, fibrosarcomas must be differentiated from malignant peripheral nerve sheath tumors and leiomyosarcomas. In the present case, immunohistochemistry excluded the possibility of neurogenic and myogenic neoplasms, whereas the presence of regional SMA-positive cells suggested myofibroblastic differentiation. SMA expression in neoplastic cells appears to present in no more than 5% of fibrosarcomas. However, focal expression of SMA may be a characteristic of fibrosarcomas in D hamsters. Myofibroblastic sarcomas are histologically similar to fibrosarcomas. Because most neoplastic cells stain positive for SMA in myofibroblastic sarcomas, we accepted a diagnosis of myofibroblastic sarcoma in the present case. Some fibrosarcomas have variable amounts of mucinous ground substance. Although the focal myxomatous area suggested myxosarcoma, the histologic and immunohistochemical findings supported a diagnosis of fibrosarcoma in the case we present.
In laboratory-maintained D hamsters, skin tumors usually are classified as spontaneous or induced by chemical carcinogens or oncogenic viruses. Squamous cell carcinoma, papilloma, fibroma, and fibrosarcoma have been reported as spontaneous skin tumors.\textsuperscript{3,8} However, the morphologic features of fibrosarcomas in D hamster had not been described previously. The literature contained no reports on the occurrence of these tumors in this species. This report is the first description of morphologic studies of spontaneous fibrosarcomas in D hamsters.

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**References**