Animal model in preclinical research of lymphoma

ANIMAL MODEL IN LYMPHOMA

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Letter to The Editor

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DEAR EDITOR,

Nowadays, the hamsters are being more and more adopted as pets; moreover, they can be utilized in preclinical research about the chemotherapy in lymphoma [1-7]. Studies about malignancies in small animals have been useful for human oncology, and hamsters are often utilized in studies involving experimentally induced neoplasms [1]. Etiological factors are chemical agents, radiation, virus, and genetic predisposition [2]. Lymphomas represent 8% of the malignancies affecting this rodent, and the incidence is variable according to species and gender, and 4% to 50% appear spontaneously [1,2,6]. Among the Syrian hamsters, the hematopoietic malignancies have the higher frequency, with plasmacytomas being the most commonly found followed by lymphomas [1,2,5]. Worthy of note is the elevated (30% to 80%) incidence of lymphoma and leukemia induced by a polyomavirus of this animal (HaPV) in the neonate Syrian hamsters [1,2]. This transmissible DNA virus causes a multicentric lymphoma with original site in the mesenterium and evolving to a peripheral lymphadenopathy and distant implants [2]. Interestingly, the earliest cancers identified in hominin are 1.7 and 1.98 million years old, while the first discovered tumor in the mammalian species is 254 million years old. Kattner *et al*. highlighted 3 major points:

comparing the distribution of different kinds of cancers in different animals, to better understand human biology; identifying novel cancer resistance and susceptibility mechanisms and their clinical potential; and working with animals may yield incidental findings, which can have scientific value [3]. Following the population aging and progressive growth, the number of cancer new cases by year is estimated to rise from 18.1 million in 2018 to 29.4 million in 2040 [4]. Current cancer animal models include chemical induction and gene programming, and patient-derived xenotransplantation retain primary tumor cells microenvironment; these models are useful for screening of chemotherapy and exploration of gene therapy [4]. Rother *et al.*, reported the cancers detected in 177 hamsters, and epithelial tumors predominated (66%) followed by the hematopoietic (17%), endocrine, and the digestive (1.7%); Syrian hamsters were less affected (52% x 85%) than the dwarf hamsters [5]. Santos *et al.*, described autopsy findings of an spontaneous lymphoma in a Syrian hamster, presenting bone marrow involvement in addition to an elevated count of mononuclear cells in blood sample, which was suggestive of evolution to leukemia [6]. Wentz *et al.*, reported tumors in 40 hamsters: integumentary (60%); reproductive (22.5%), hematopoietic (10%), digestive (5%), and endocrine (2.5%). Lymphomas were most multicentric, affecting lymph nodes, liver, spleen, kidneys, intestine, and skin [7]. Although lymphomas may be classified into multiple histological and phenotypical patterns, the large cell lymphoma is the most common pattern in Syrian hamsters [6,7].

Infectious tumors can be transmitted as allografts between individual hosts, as the Canine transmissible venereal sarcoma in dogs, Sticker's infectious sarcoma in Tasmanian devils, and the Contagious reticulum cell sarcoma in Syrian hamsters [3]. Infectious lymphomas can contribute to study the immune system and improvement of transplantations by reducing graft-versus-host reaction and the immunosuppression 3. With rare exceptions, lymphomas are usually manifested by peripheral enlarged lymph nodes in association with involvement of intestines, liver, kidneys and spleen 1,2,6,7. Microscopic images of lymphoma are variable, only showing immature lymphocytes or greater pleomorphisms, but large lymphocytes represent the most common pattern 1,6. T-cell lymphomas of hamsters are associated with shorter periods of remission as well as of survival time, and more aggressiveness when compared to B-cell lymphomas; because of the late diagnoses, lymphomas of hamsters usually have poor prognoses 2. The scarcity of knowledge about chemotherapy in exotic animals makes difficult the treatment of lymphoma in hamsters; the levels of toxicity established in researches are not the therapeutic ones, and the studied animals are usually in good state of health 2. Besides, in the chemotherapy, it is difficult to determine their body surface, due to small dimensions, and doses of the drugs are calculated by body surface and not weight 2.

The scarce number of necropsy descriptions of lymphoma occurring in hamsters is often related to cases of this hematologic malignancy experimentally induced 6. Despite of some differences in physiology, heredity and immunity between animal models and human beings, this experimental resource constitutes a major tool for the preclinical research in malignant conditions, replacing the role of the human beings 4.

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