



Letter to the Editor

Histological Classification in Canine Mammary Tumors: Back to Basics

Aline Alvarenga da Rocha¹, Maria de Fátima Gärtner^{2,3*}

¹Institute of Biomedical Science Abel Salazar, University of Porto, Porto, Portugal; Rua Jorge Viterbo Ferreira 228, 4050-313, Porto, Portugal

²Institute of Molecular Pathology and Immunology of the University of Porto; Rua Júlio Amaral de Carvalho, 45, 4200-135, Porto, Portugal

³i3S, Instituto de Investigação e Inovação, Rua Alfredo Allen 208, 4200-135, Porto, Portugal

***Corresponding Author:** Fátima Gärtner, Institute of Molecular Pathology and Immunology of the University of Porto; Rua Júlio Amaral de Carvalho, 45, 4200-135, Porto, Portugal; i3S, Instituto de Investigação e Inovação, Rua Alfredo Allen 208, 4200-135, Porto, Portugal

Received: 16 April 2021; **Accepted:** 26 April 2021; **Published:** 22 September 2021

Citation: Aline Alvarenga da Rocha, Maria de Fátima Gärtner. Histological Classification in Canine Mammary Tumors: Back to Basics. Archives of Veterinary Science and Medicine 4 (2021): 67-70.

Histopathological examination of a tumor is essential, and all neoplasms must be diagnosed microscopically, which means that all the histological features from the tumor must be taken part to reach the final diagnosis [1]. This evaluation allows us to infer prognostic factors that must be considered basic in the therapeutic orientation of these lesions. Additionally, it has been well described that breast cancer and canine mammary tumors share similarities regarding morphology and biological behavior. For that reason, the histological classification of breast cancer in women was successfully adapted for mammary

tumors and it has been well used in the routine practice of small animals. Tumors present histological and clinical features, such as time of growth, single or multiple nodules, ulceration, inflammation and many others.

All these characteristics provide information regarding the tumor and are important to evaluate the tumor. For that reason, any clinical information is important to reach the final diagnosis. However, histological classification remains the most valuable tool in veterinary oncology [2].

In order to understand tumor biology and its occurrence, it is also necessary to understand the role of small animals in society. For the past decades, there has been an enormous shift on the importance of pets in people's lives. People are living a loner and longer life in big cities; the importance of work for women has changed as well. In fact, women are postponing pregnancy and many couples already have chosen pets over children. For instance, in Brazil, the population of pets is bigger than the population of children. With this being said, pets have become part of their families. As a result, they are treated as family members. This specific change in human behavior has already changed their daily life and will be a part of the future generations to come.

With the increase of pet's life span, the occurrence of tumors in dogs and cats have been increasing as well. According to data from all over the world, small animals are getting a better care by their owners, and, consequently, a longer life. It is well described in the literature that companion animals have a longer life expectancy due to better nutrition, regular visits to the veterinarian and as a consequence protection against infectious diseases by routine vaccination. Moreover, pet owners have acquired a broader knowledge concerning diseases that affect both animals and humans. Nowadays, there are campaigns to raise awareness on breast cancer in women and canine mammary tumors, such as "Pink October". Additionally, with the increase of their life span, dogs and cats are also exposed to the same environmental agents as humans [3]. In fact, studies have demonstrated that the use of tobacco by the owners could be linked to lymphoma in dogs, while other studies have shown that pyrethroids are linked

to the occurrence of mammary tumors in female dogs [4, 5]. All this data provides information on how our lives are intrinsically connected with each other. As a result, veterinary oncology has become a matter of great interest for both veterinarians and pet owners.

Scientists increasingly dedicate their careers to the goal of rising knowledge on veterinary oncology, in view to accomplish policies dedicated to One Health approach. In addition, pet owners are willing to spend a big amount of money with cancer treatment on their pets. On this regard, veterinary oncology has been evolving rapidly, especially when it comes to diagnosis. Early diagnosis is the main focus both in human and veterinary oncology. For canine mammary tumors this data is crucial, once it is known that tumors with more than 3cm of diameter tend to have a higher mitotic activity – when compared with benign neoplasms – and tend to have a malignant behavior and, consequently, a worse prognosis. For that reason, histological assessment is important in order to differentiate benign tumors from malignant tumors [6]. It is known that molecular and genetic tests are being successfully adapted in veterinary medicine. All these techniques allow the detection of individual or familiar biological molecules as specific markers of different types of tumor. In the routine practice of small animals, this would be a great reveal. As a young pathologist and a scientist, I see with a lot of enthusiasm its application. However, the applicability of these techniques is still scarce, especially because of its high cost. For that reason, its applicability remains in the research centers. Many of these techniques are not available in the routine practice of small animals. With the exception of the immunohistochemistry, that is the most accessible

technique and is available in private and public laboratories. However, this technique has difficulties when it comes to specific markers for animals and still is expensive for most owners. It is up to the clinician to convince the owner to do the immunohistochemical test, what is not an easy task. Moreover, results could be inconclusive, which makes even harder this task.

However, we still hold this valuable tool in our hands that provides information regarding tumor characteristics. The histological classification is applied using a classic routine technique called Hematoxylin-Eosin (HE), that has been widely used across the world both in humans and animals. This technique has already been standardized and provides information regarding cellular morphology and tumor architecture. In fact, the basic training program by any pathologist requires learning from this specific routine staining technique. With this, the literature recommends that all tumors must be evaluated using the histological classification what should include the histological type and histological grade. Both these classifications should mainly provide information regarding cell proliferation, architecture, lymphatic invasion, mitosis activity, necrosis, tubule formation, nuclear pleomorphism and others. The main reason to add these two classifications up is to provide more information on the biological behavior of the tumor. Additionally, there has been a huge effort on adding the follow-up study into the research, which means that all the clinical information is incorporated with the histological classification. In breast cancer, those follow-up studies have been successfully performed, once the life span in humans is bigger than in dogs and it is easier to get all that information regarding the

patient. In veterinary, follow-up studies are still a challenge. According to the literature, the average follow-up period should last two years after the diagnosis and, sometimes information is loss during this period. In some cases, the animal dies before the follow-up period finishes. For that reason, it is requisite that pathologists and clinicians have a close and direct relationship – the presence of the owner is also crucial. For instance, one study comprising 229 female canine mammary tumors demonstrated that the histological classification plus the follow-up study could be used as a prognostic tool [7]. It was not possible to add a follow-up information in our study, but the histological type and histological grade from our tumor samples were statistically significant.

In conclusion, it has been demonstrated that the HE technique is a powerful tool in veterinary oncology, as well as the histological classification for mammary tumors and could be successfully applied in the routine of pathologists. Nevertheless, other innovative techniques are very expensive and many times impossible to apply in routine use in veterinary medicine, thereby histopathology analysis is a more viable alternative for attaining a meaningful and cost-effective diagnosis and prognosis of canine malignant tumors. That is the reason I think we need to go back to basics.

References

1. Withrow SJ, Vail DM. Introduction. In *Small Animal Clinical Oncology* (Fourth ed., pp. xv-xvii). Canada: Saunders, Elsevier (2007).
2. Goldschmidt M, Peña L, Rasotto R, et al. Classification and grading of canine

- mammary tumors. Vet Pathol 48 (2011): 117-131.
3. Andrade FH, Figueiroa FC, Bersano PR, et al. Malignant mammary tumor in female dogs: environmental contaminants. Diagn Pathol 5 (2010).
 4. Pinello KC, Niza-Ribeiro J, Fonseca L, et al. Incidence, characteristics and geographical distributions of canine and human non-Hodgkin's lymphoma in the Porto region (North West Portugal). Vet J 245 (2019): 70-76.
 5. Brandão YDO, Colodel MM, Silva GND, et al. Spontaneous mammary carcinomas in female dogs: association between the immunohistochemical degree of aggressiveness of tumors, intensity of DNA damage and residues of pyrethroids. Open Journal of Pathology 3 (2013): 133-137.
 6. Rasotto R, Berlato D, Goldschmidt MH, et al. Prognostic Significance of Canine Mammary Tumor Histologic Subtypes: An Observational Cohort Study of 229 Cases. Vet Pathol 54 (2017): 571-578.
 7. Nunes FC, Campos CBd, Bertagnolli AC. Aspectos Epidemiológicos das Neoplasias Mamárias Caninas. In G. D. Cassali (Ed.), Patologia mamária canina: do diagnóstico ao tratamento (pp. 27-31). São Paulo: MedVet (2017).



This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC-BY\) license 4.0](https://creativecommons.org/licenses/by/4.0/)