Immunohistochemical expression of matrix metalloproteinase-9 (MMP-9) in equine melanomas

José da Costa Pimenta[1,2,3]; Justina Prada[2,3,4]; Leonor Delgado[5]; Daniela Moreira[5]; Fernanda Garcez[5]; Mário Cotovio[2,3,6]

[1] CIVG–Vasco da Gama Research Center, EUVG–Vasco da Gama University School, 3020-210 Coimbra, Portugal

[2] CECAV–Veterinary and Animal Research Centre, University of Trás-os-Montes and Alto Douro, Vila Real, Portugal

[3] Associate Laboratory for Animal and Veterinary Sciences (AL4AnimalS), Portugal

[4] Veterinary Sciences Department, University of Trás-os-Montes e Alto Douro 5000-801, Vila Real, Portugal

[5] UNIPRO-Oral Pathology and Rehabilitation Research Unit, University Institute of Health Sciences-CESPU (IUCS-CESPU), 4585-116, Gandra, Portugal

[6] I-MVET, Faculty of Veterinary Medicine, Lusófona University, Campo Grande 376, 1749-024 Lisbon, Portugal

Introduction

Melanoma is one of the most frequent tumors in horses, often severely impacting equine's health due to its extensive growth, compression, and obstruction of surrounding structures. Metalloproteinase-9 (MMP-9) is an enzyme that degrade components of the extracellular matrix and basement membrane, being its expression related to tumor expansive growth and invasion of surrounding tissues.

This study aimed to evaluate the immunohistochemical expression of MMP-9 in equine melanomas and its association with tumor behavior.

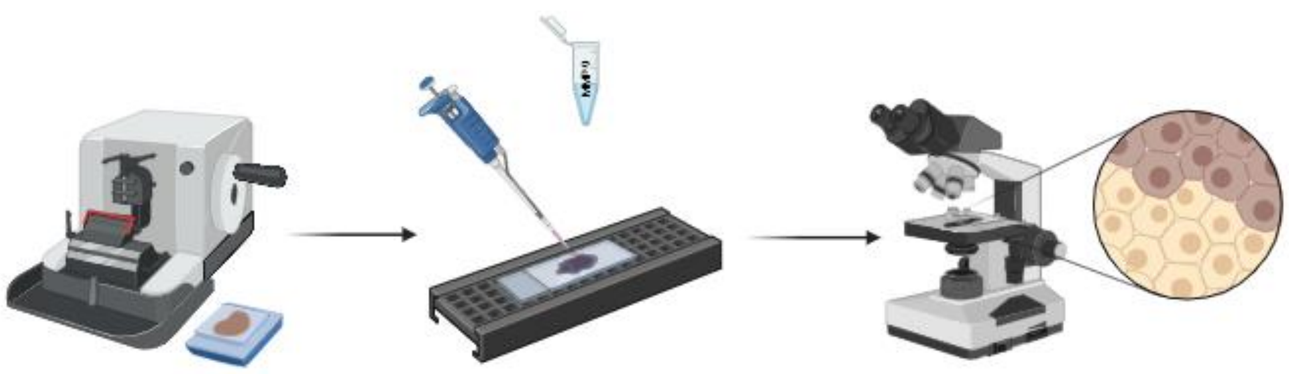
Matherials and Methods

41 melanomas

21 benign, 20 malignant

MMP-9

Dilution – 1:200



Extension

0 - negative
1) 6-20%
2) 21-49%
3) >50%

Intensity

0 - negative
1) Weak
2) Moderate
3) Strong

- Fisher Exact Test and Mann- Whitney Test were performed ($p<0.05$)

Results

- 39% of melanomas (8 benign, 8 malignant) presented an extension of labelling score of 3 (Figure 1); 27% (5 benign, 6 malignant) were scored as 2 and 22% (4 benign, 5 malignant) as 1 (Figure 2).
- No significant differences were found in the extension of labelling between benign and malignant melanomas ($p=0.6$).
- 37% of melanomas (4 benign, 11 malignant) presented an intensity of labelling score of 3; 51% (6 benign, 15 malignant) a score of 2 and 12% (4 benign, 1 malignant) were negative.
- Statistically significant differences were detected in the intensity of labelling between benign and malignant tumors, with malignant melanomas presenting higher intensity of labelling ($p=0.009$).

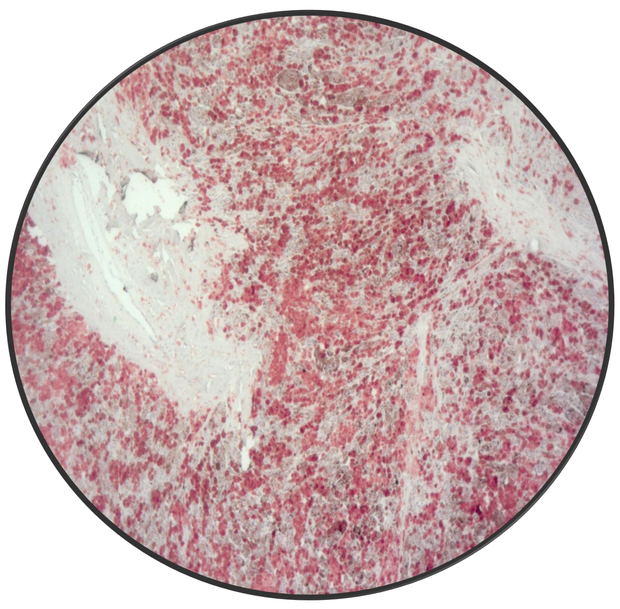


Figure 1 - Immunohistochemistry MMP-9 Extension of labelling of 3 (100X)

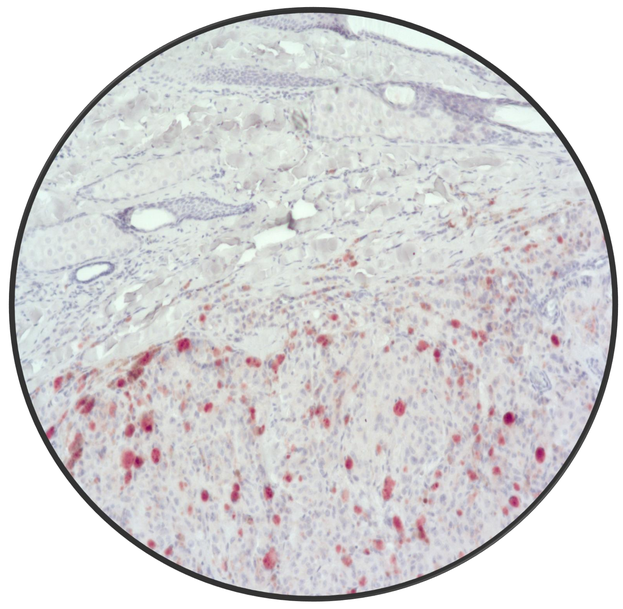


Figure 2 - Immunohistochemistry MMP-9 Extension of labelling of 1 (200X)

Discussion

The MMP-9 expression levels observed in this work suggest that this enzyme may contribute to the mass expansive effect detected in most equine melanomas, as well as to the invasive phenotype presented by some of these tumors, especially the malignant ones.

Clinical Relevance

- The role of MMP-9 may differ between benign and malignant melanomas, which could explain why some tumors are more expansive while others are more invasive.
- Targeting MMP-9 activity may help limit both the expansibility and the invasiveness of some melanomas, thereby reducing the overall clinical impact of equine melanoma.

This work was supported by the projects UIDB/CVT/00772/2020 and LA/P/0059/2020 funded by the Portuguese Foundation for Science and Technology (FCT).