

Osteocalcin application in the diagnosis of canine spinal extradural undifferentiated tumors

Introduction

In the dog, the most common spinal tumors are extradural and malignant; among these, osteosarcomas are the most frequent neoplasms of bone origin.

The difficulties in identifying the type of neoplastic cells and the extracellular matrix production in undifferentiated tumors shows the need to achieve an accurate diagnosis.

The use of biomarkers allows for a precise diagnosis; osteocalcin is a protein specific for the bone tissue, and has been used in human osteosarcoma diagnosis.

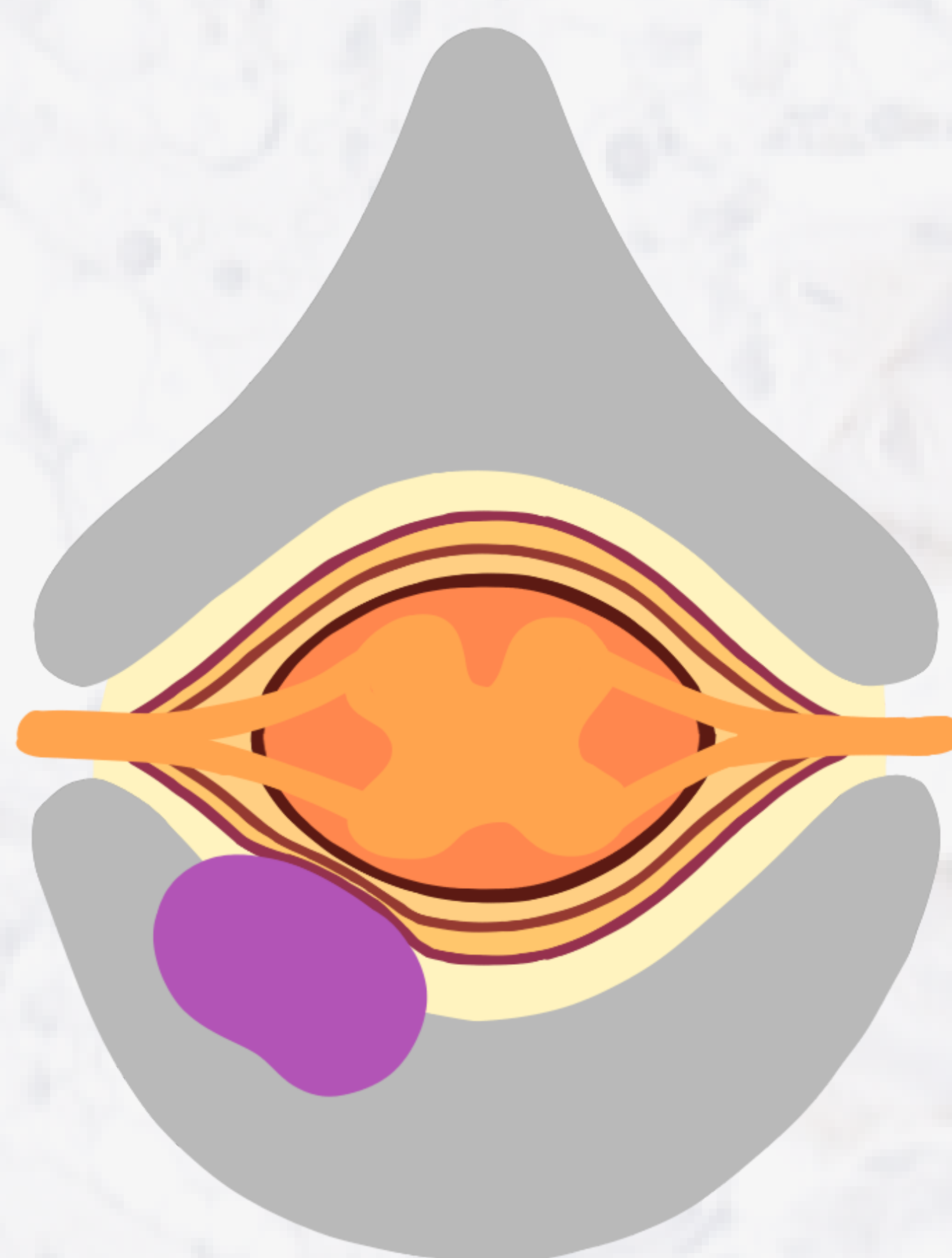


Figure 1. Spinal extradural lesion.
Source: Josep Rosell Colomer.

Aims

- Identify the most specific biomarker for the characterization of cellular population in tumor bones in dogs through an immunohistochemistry test.
- Select and describe histologically a series of spinal extradural tumor cases in dogs.
- Selection of a specific antibody and development of an immunohistochemistry tests on canine normal bone samples.
- Evaluate the effectiveness of the selected biomarker in the diagnosis of spinal extradural sarcomas and osteosarcomas.

Material, methods & results

- Selection of 22 spinal malignant extradural tumors from Unitat de Patologia Murina i Comparada (UPMiC) database (2015 to 2020).
- Microscopic description of the tumors, classified in 8 osteosarcomas (Fig. 2A) and 14 sarcomas (Fig. 2B).
- An immunohistochemistry test with a selected mouse monoclonal anti-osteocalcin antibody performed on normal femur samples from a puppy dog and a rat for a positive control, with an observed reaction on bone matrix, osteoblast and osteocytes (Fig. 3).

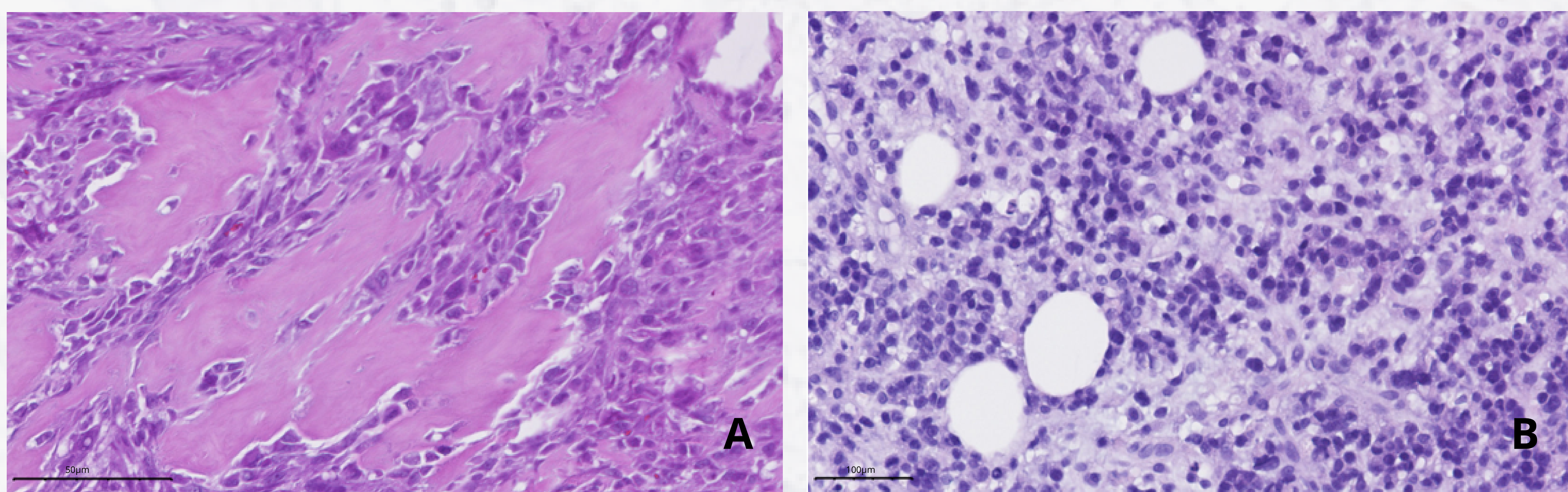


Figure 2. A. Osteosarcoma, spinal extradural, canine. Hematoxylin and eosin stain. B. Sarcoma, spinal extradural, canine. Hematoxylin and eosin stain. Source: UPMiC.

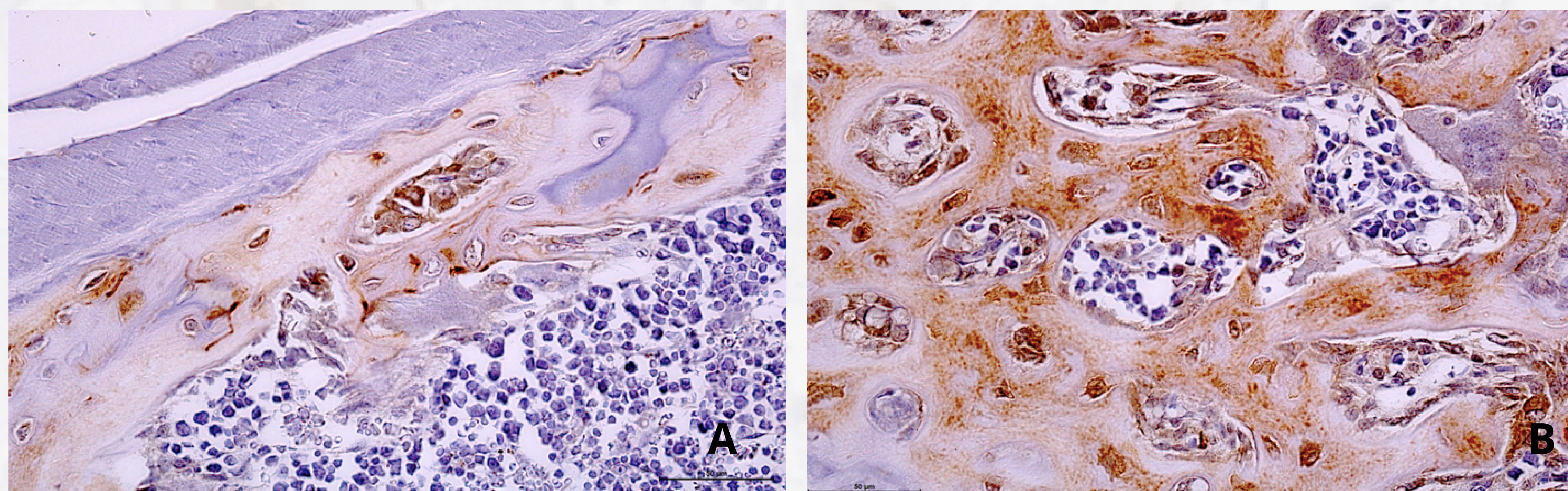


Figure 3. A and B shows a positive osteocalcin reaction on normal dog bone by immunohistochemistry test. Source: UPMiC.

Conclusions & future proposals

- Sarcoma diagnoses prevailed over osteosarcoma cases, stressing the need for a specific biomarker. Osteocalcin is the most suitable one.
- Mouse anti-osteocalcin antibody is expressed in osteoblasts, osteocytes and osteoid matrix in normal dog bone samples.
- The future proposal is to verify the effectiveness of osteocalcin as a biomarker for the diagnosis of canine spinal extradural tumors.

References

- Wehrle-Martinez AS, Dittmer KE, Aberdein D, Thompson KG. 2016. Osteocalcin and Osteonectin Expression in Canine Osteosarcoma. *Vet. Pathol.*53(4):781–787.
- Ramos-Vara JA, Borst LB. 2017. Immunohistochemistry: Fundamentals and Applications in Oncology. From: Meuten DJ, editor. *Tumors in Domestic Animals*. 5th edition. Iowa: John Wiley & Sons Inc. p. 44-87.