

# EVALUATION OF MATRIX METALLOPROTEINASE-9 (MMP-9) AND INTERLEUKIN-6 (IL-6) AS BIOMARKERS FOR PULMONARY PARENCHYMA DAMAGE IN CANINE HEARTWORM

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## Introduction

Matrix metalloproteinases (MMPs), particularly MMP-9, are found in low amounts in healthy adult lungs but are significantly more abundant in various lung diseases in both humans and dogs. Interleukin-6 (IL-6), like other inflammatory cytokines, is elevated in lung diseases in response to infections and tissue damage. However, dysregulated IL-6 synthesis plays a pathological role in chronic inflammation and autoimmunity, actively contributing to the pathogenesis of various lung diseases in humans. To date, no specific studies have been conducted on dogs with heartworm to assess pulmonary parenchyma damage.

The objective of the present study was to evaluate the biomarkers MMP-9 and IL-6 in dogs with heartworm and to investigate their association with the development of pulmonary pathology.

## Materials and Methods

MMP-9 and IL-6 biomarkers were evaluated in 40 dogs with heartworm that underwent cardiopulmonary evaluation prior to adulticide treatment (echocardiography, radiography, microfilariae detection and parasite load determination). The dogs were divided into three groups:

- Group A (n=14): asymptomatic dogs.
- Group B (n=15): symptomatic dogs without significant radiographic alterations in the pulmonary parenchyma.
- Group C (n=11): symptomatic dogs with pulmonary radiographic changes.

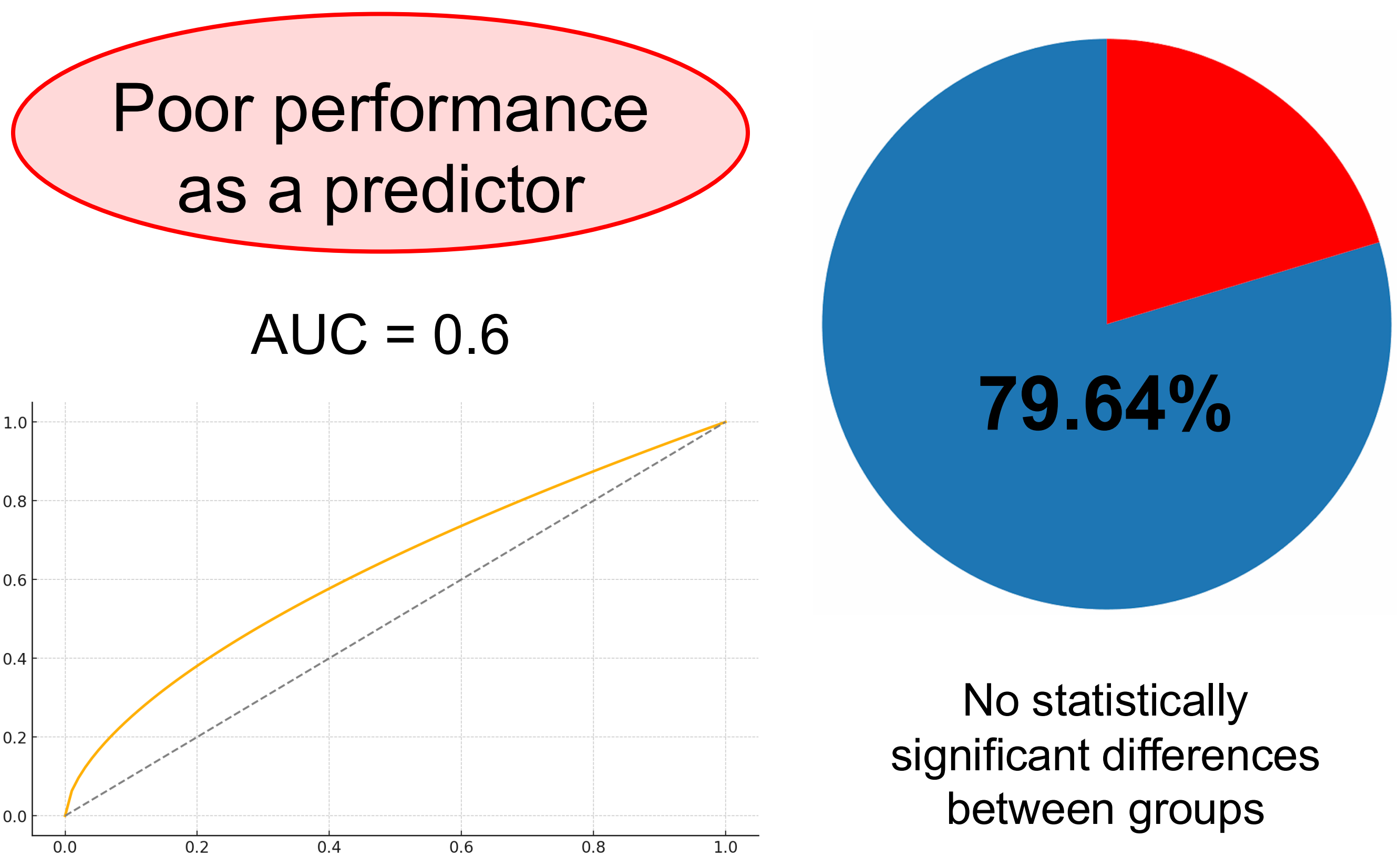


## Discussion and conclusions

These results showed alterations of MMP-9 and IL-6 in a high percentage of infected dogs, even those asymptomatic and with no appreciable radiographic alterations. Furthermore, the immune response in heartworm infection in dogs is predominantly immunosuppressive and Th2-type, with Th2 lymphocytes secreting IL-6, among other cytokines.

Further research is needed, although the results suggest that MMP-9 and IL-6 could serve as useful indicators to objectively assess and monitor the clinical status of pulmonary parenchyma in canine heartworm. To this aim, more studies with larger sample sizes and the inclusion of additional biomarkers are currently in development.

### Matrix Metalloproteinase-9



## Results

MMP-9 and IL-6 were pathologically increased in 79.64% and 88.56% of dogs, respectively. No statistically significant differences were found between groups, although Cohen's d values indicated a moderate effect for IL-6, suggesting a clinically relevant trend. Additionally, no significant differences were found based on parasite load or the presence/absence of microfilariae.

For MMP-9, the area under the receiver operating characteristic curve was 0.6, indicating a poor performance as a predictor. However, for IL-6 was 0.9111, meaning that this biomarker could be a good predictor for the detection of pulmonary pathology in dogs with heartworm.

### Interleukin-6

