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Introduction

Acute leukaemia (AL) is a group of malignancies deriving from immature hematopoietic cells. Studies on changes in leukocyte counts in dogs with AL are scarce and conducted on a relatively small number of patients.

Previously, we have demonstrated that acute myeloid leukaemia (AML) is associated with a poorer prognosis than other subtypes of canine AL. Moreover, we have also shown that Golden Retrievers and Labrador Retrievers are over-represented in some AL subtypes and that dogs with AML are younger than dogs with acute lymphoblastic leukaemia (ALL).

The aim of this study was to determine leukocyte counts in a large group of dogs with various AL subtypes.

Results and discussion

STUDY POPULATION (Figure 3)

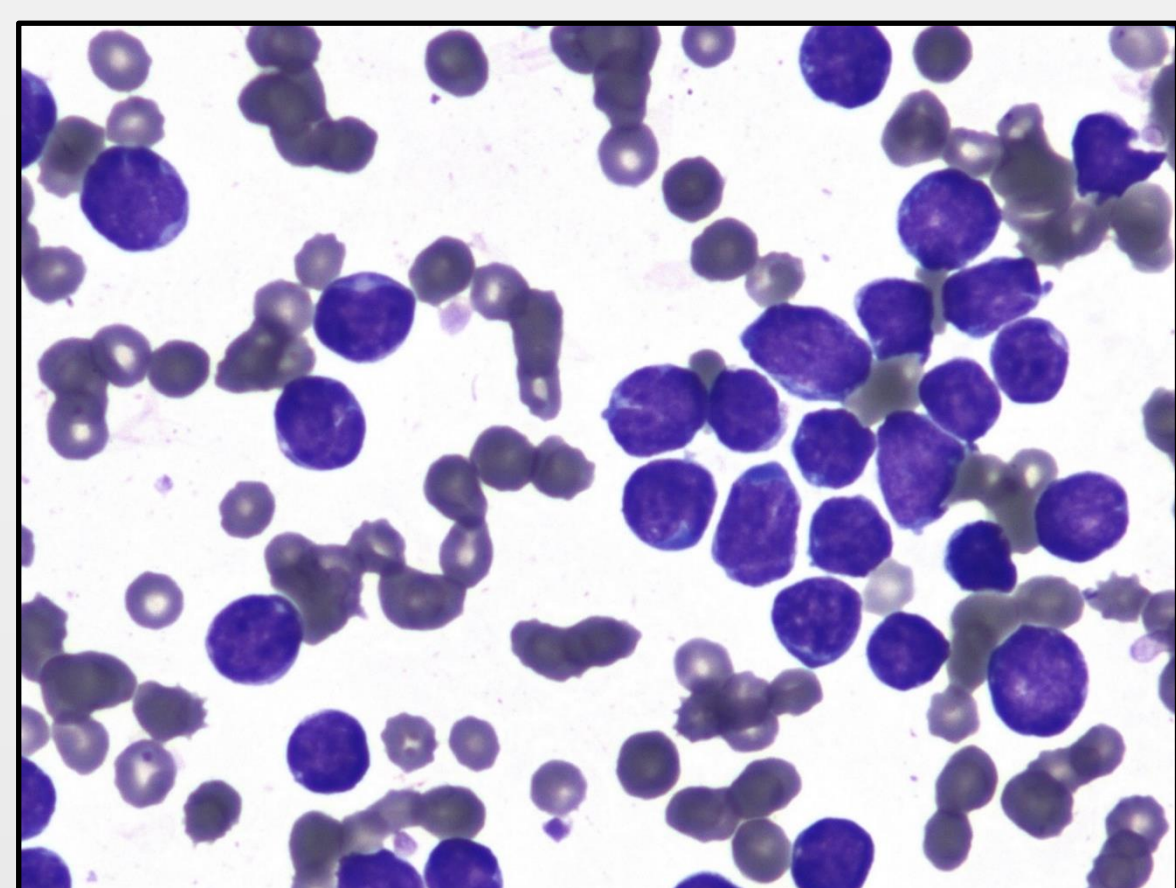
- ALL: 152/223 (68%) (higher % than reported by other groups)
- AML: 38/223 (17%), AUL: 33/223 (15%)

LEUKOCYTE COUNT (Figure 4)

- All dogs with AL: $67.91 \times 10^9/L$ (range: $2.51-907.77 \times 10^9/L$)
- Higher in ALL ($75.52 \times 10^9/L$ (range: $6.21-907.77 \times 10^9/L$)) than in AML ($52.31 \times 10^9/L$ (range: $2.51-254.02 \times 10^9/L$)) ($P=0.049$) (previously not reported)
- Tended to be higher in ALL than in AUL ($53.98 \times 10^9/L$ (range: $3.35-574.8 \times 10^9/L$; $P=0.076$))

PREVALENCE OF LEUKOCYTE CHANGES (Figure 5)

- Leukocytosis was present in 195/223 (87.4%) of dogs with AL; ALL: 137/152 (90.1%), AML: 33/38 (86.8%), AUL: 25/33 (75.8%)
- Leukocyte count was within limits in 25/223 (11.2%) of AL dogs; ALL: 15/152 (9.9%), AML: 4/38 (10.5%), AUL: 6/33 (18.2%)
- Leukopenia was observed in 3/223 (1.3%) of AL cases; ALL: 0/152 (0%), AML: 1/38 (2.6%), AUL: 2/33 (6.1%)
- Higher in AUL than ALL ($P=0.031$), not different between AUL and AML ($P=0.594$) or between ALL and AML ($P=0.2$) (conflicting data – Davis et al. 2017 and Novacco et al. 2019)



Subtype	Cell lineage markers
ALL	CD3, CD5, CD8, CD21, CD79a
AML	CD14, anti-neut (CADO48A), myeloperoxidase (MPO)
AUL	Lack of expression of cell lineage markers

Figure 1. Peripheral blood smear from a dog with an acute leukaemia (50x objective, Hemacolor staining)

Table 1. Markers used for classification of acute leukaemia in flow cytometry

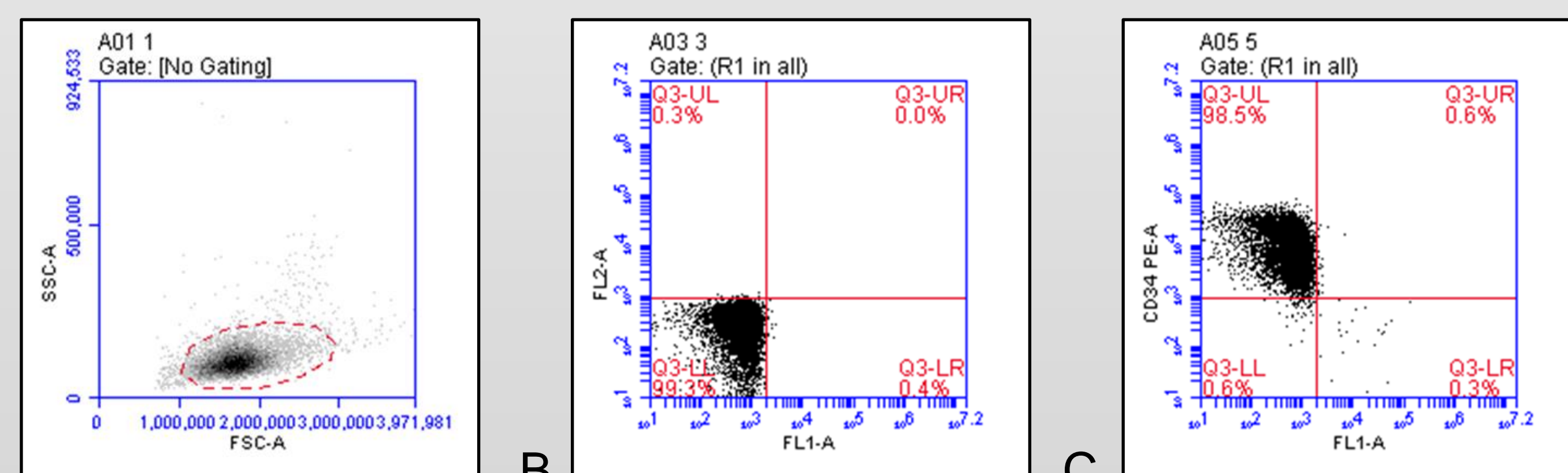


Figure 2. Representative dot plots of flow cytometric immunophenotyping of peripheral blood from a dog with acute leukaemia:

- A. gating of lymphocytes – forward scatter (FSC) vs. side scatter (SSC)
 B. isotype control for CD34 C. gating of CD34 positive cells – test sample

Materials and methods

- Study population – dogs with AL (CD34+) diagnosed between 2013 and 2017 by:
 - haematology – Sysmex XT-2000iV and blood smear (Figure 1)
 - flow cytometry – BD Accuri™ C6 (Figure 2)
- The disease was subclassified as (Table 1):
 - acute lymphoblastic leukaemia (ALL)
 - acute myeloid leukaemia (AML)
 - acute undifferentiated leukaemia (AUL)
- Data are presented as median (range). Leukocyte counts were compared between AL subtypes using the Mann Whitney U test and the proportion of dogs with leukocytosis/leukopenia was compared between groups using the Fisher's Exact test.

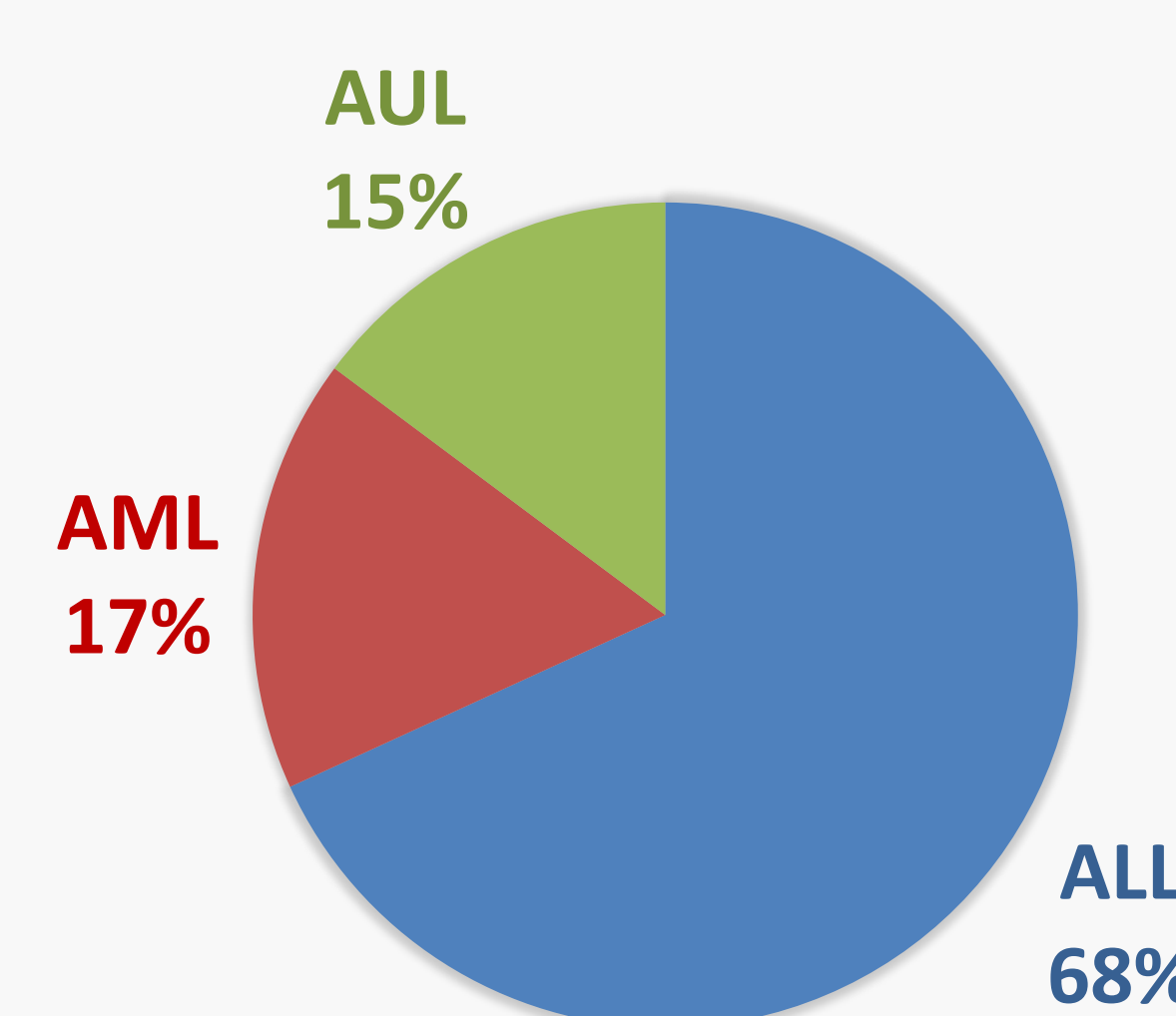


Figure 3. Frequency of acute leukaemia subtypes in dogs (n=223)

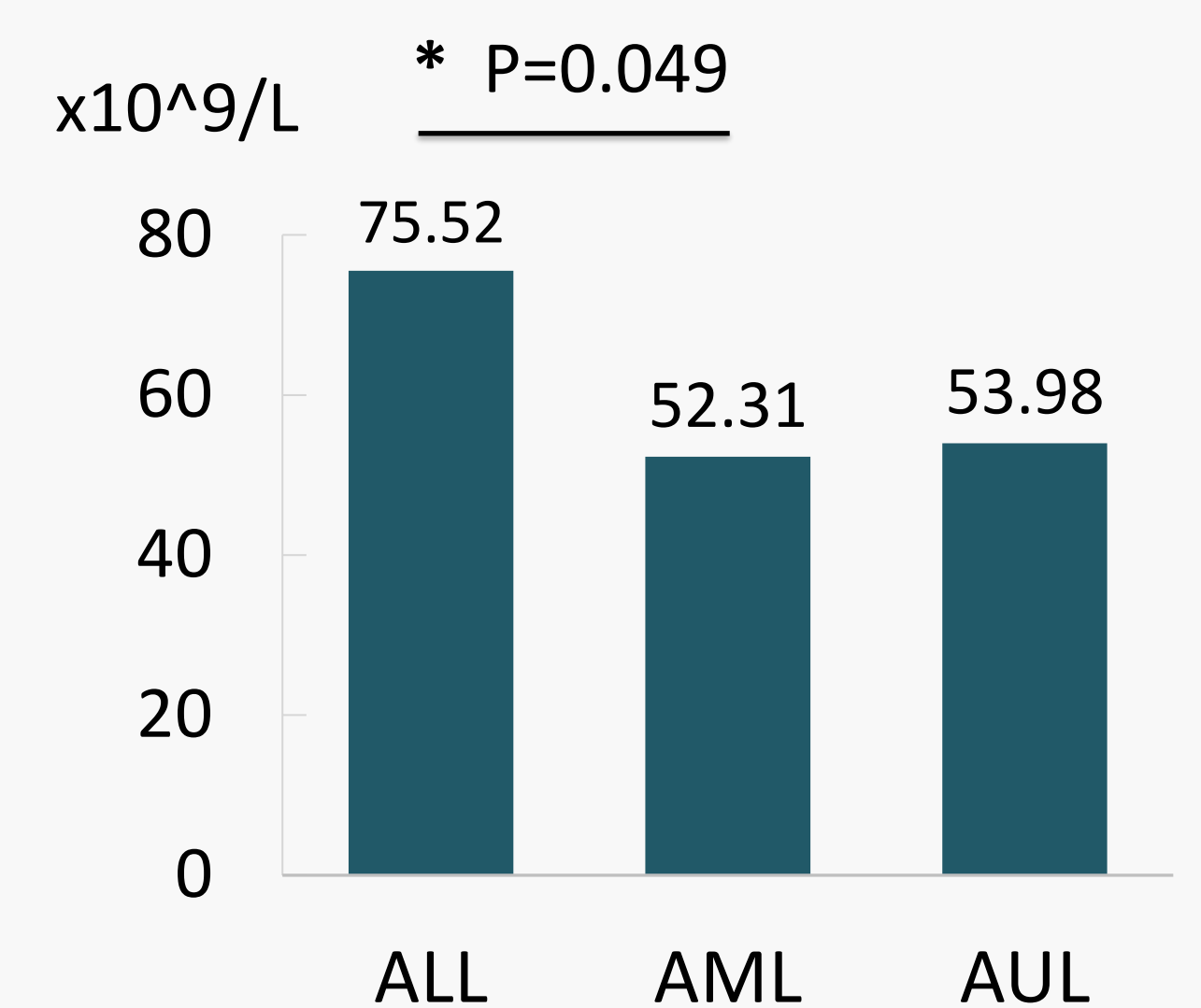


Figure 4. Leukocyte counts in dogs with various subtypes of acute leukaemia (median)

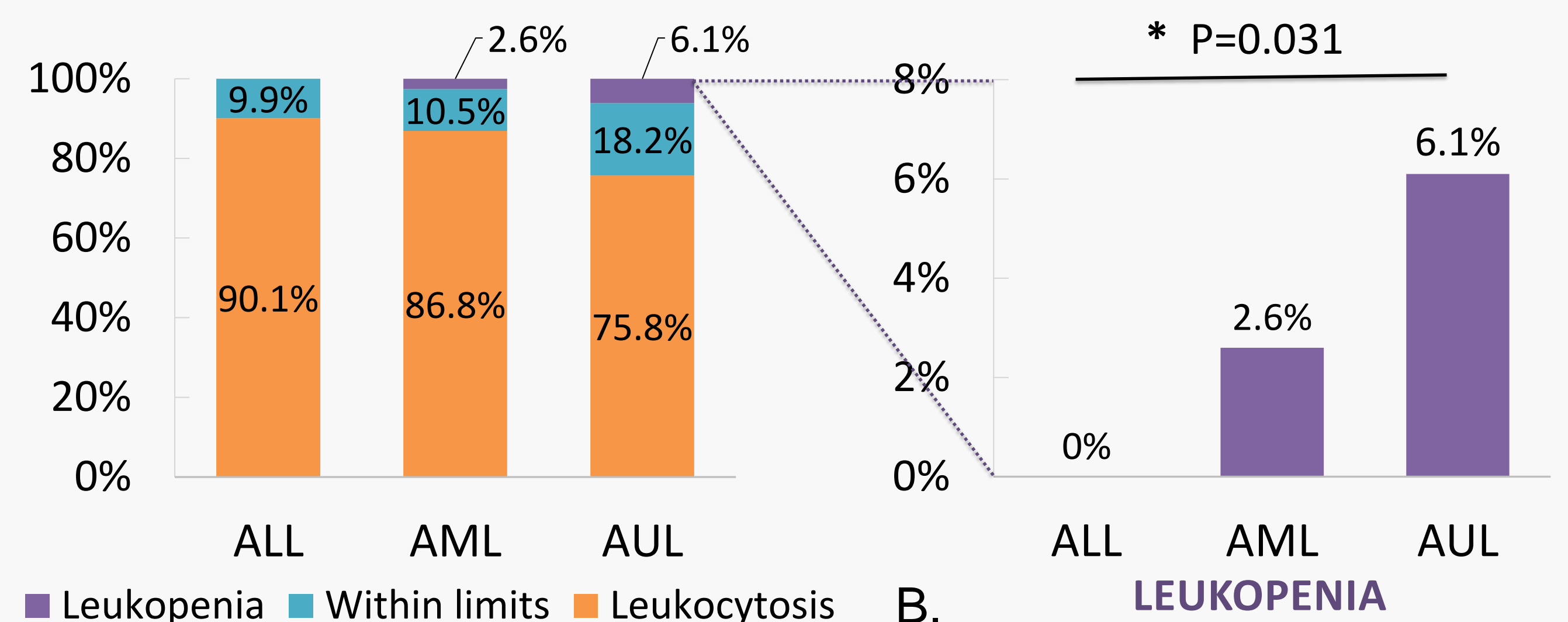


Figure 5. Frequencies of all leukocytes changes (A) and frequency of leukopenia (B) in dogs with various subtypes of acute leukaemia

Conclusion

- Leukocyte counts are significantly higher in ALL than AML
- Leukopenia is more common in AUL than ALL