

Neutrophil inclusions in a dog

Contributors

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Specimen

EDTA whole blood

Signalment

7-year-old neutered mixed-breed male dog

History

The dog was presented to the emergency care unit of the National Veterinary School of Toulouse due to apathy, anorexia, presumed abdominal effusion and polyuria/polydipsia for 2 weeks and was referred to the internal medicine unit.

Four years ago, an inflammatory bowel disease responsive to hypoallergenic diet was suspected. Two years ago, a cutaneous mast cell tumor was excised, and five months ago a suspected hepatic infiltration of the tumor prompted initiation of a chemotherapy protocol (vinblastine, lomustine, and prednisolone). Two months ago, immediately following the last chemotherapy session, a decline in the general condition (hyporexia/anorexia, diarrhea, weight loss) necessitated management at another clinical facility due to the holiday period at the National Veterinary School of Toulouse. The animal's condition continued to deteriorate, leading to consultation at the emergency unit of the National Veterinary School of Toulouse.

Clinical findings

The admission clinical exam revealed a 5% dehydration, tachypnea and an uncomfortable abdominal palpation with abdominal distension.

A complete blood cell count (CBC) with the Sysmex XN-V (Sysmex, Kobe, Japan) and including a blood smear examination (Table 1, Figures 1 and 2), as well as a complete biochemistry panel (Table 2) (Vitros XT3400, Ortho Clinical Diagnostics Inc; CUBE-VET, scil for CRP measurement) and a hemostasis panel (STA Compact Max 3, Stago) were performed. An abdominal ultrasound revealed an effusion and some intestinal changes suggestive of a chronic enteropathy. The complete analysis of the effusion was suggestive of a low protein transudate (0.70.10⁹ nucleated cells/L; total proteins <10 g/L *via* refractometry).

A first thoracic X-ray was unremarkable except losing contrast due to presence of an abdominal effusion.

Table 1 - Hematology results (Sysmex XN-V®, Sysmex)

Variable	Result		Reference Interval
RBC ($\cdot 10^{12}/L$)	4.26		5.20-7.90
HCT (L/L)	0.279		0.35-0.52
HGB (g/dL)	10.3		12.4-19.2
MCV (fL)	65.5		60.0-71.0
MCH (pg)	24.2		21.9-26.3
MCHC (g/dL)	36.9		34.4-38.1
RDW-CV (%)	14.7		13.2-19.1
RET (%)	1.51		0.30-2.37
RET ($\cdot 10^9/L$)	64.3		19.4-150.1
WBC ($\cdot 10^9/L$)	70.03		5.60-20.40
Differential count	Sysmex	Manual	
Neutrophils ($\cdot 10^9/L$)	67.38*	65.10	2.90-13.60
Band cells ($\cdot 10^9/L$)	-	3.5	0-0.30
Lymphocytes ($\cdot 10^9/L$)	0.01*	0.00	1.10-5.30
Monocytes ($\cdot 10^9/L$)	2.38*	3.50	0.40-1.60
Eosinophils ($\cdot 10^9/L$)	0.14	1.40	0.10-3.10
Basophils ($\cdot 10^9/L$)	0.12**	1.40	Rares
PLT-O ($\cdot 10^9/L$)	62		108-562
Direct Coombs Test	Negative		-

Abbreviations: HGB, hemoglobin; HCT, hematocrit; μ HCT, microhematocrit; MCH, mean corpuscular hemoglobin; MCHC, mean corpuscular hemoglobin concentration; MCV, mean cell volume; PLT-O, optical platelet count; RBC, red blood cell count; RET, reticulocytes; RDW-CV, red cell distribution width (coefficient of variation); WBC, white blood cell count; *, error flag; **basophils count not validated with Sysmex XN-V

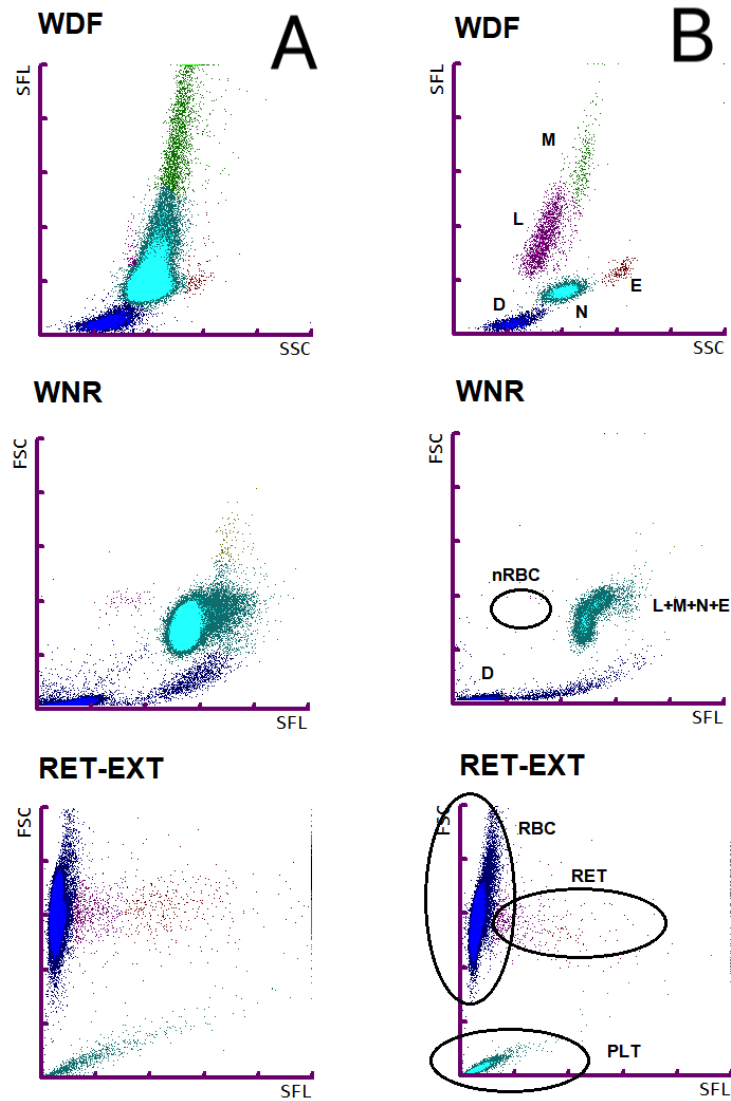


Figure 1 - Sysmex XN-V® scattergrams from EDTA-blood specimens.

A: 7-year-old neutered mixed-breed male dog. **B:** Healthy dog for cell identification.

Abbreviations: WDF, WBC differential scattergram; WNR, WBC count scattergram; RET (EXT), Reticulocyte extended scattergram; D, debris; E, eosinophils; L, lymphocytes; M, monocytes; N, neutrophils; nRBC, nucleated red blood cells; PLT, platelets; RET, reticulocytes; RBC, red blood cells; WBC, white blood cells.

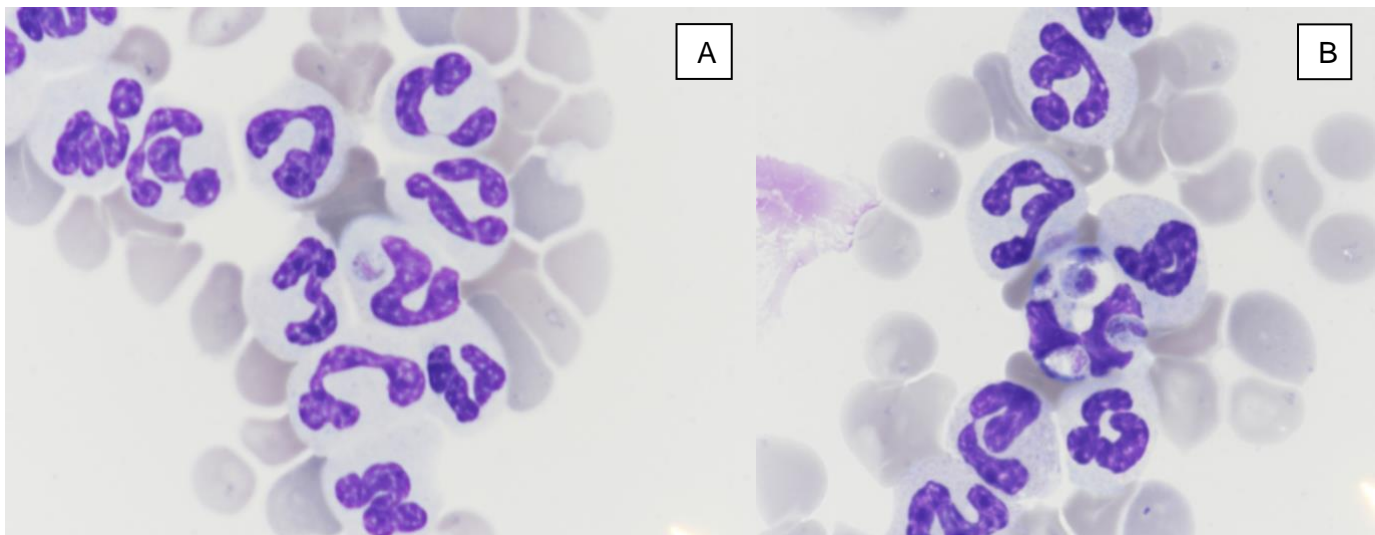


Figure 2 – A, B: Photomicrographs of the peripheral blood smear of the dog (May-Grünwald Giemsa stain x1000, oil)

Table 2 - Biochemistry and Hemostasis results (Vitros XT3400, Ortho Clinical Diagnostics Inc.; CUBE-VET, scil; STA Compact Max 3, Stago).

Variable	Result	Reference Interval
Glucose (mmol/L)	5.5	3.7-8.2
Urea (mmol/L)	4.7	1.6-10.9
Creatinine (umol/L)	42	44-133
Na (mmol/L)	130	138-148
K (mmol/L)	4.5	3.2-5.0
Cl (mmol/L)	110	110-118
P (mmol/L)	1.1	0.7-2.6
Mg (mmol/L)	0.4	0.7-1.0
Ca (mmol/L)	1.7	2.4-3.0
CO ₂ total (mmol/L)	19	16-25
Total Proteins (g/L)	26	48-66
Albumin (g/L)	14	23-39
A/G	1.17	>0.80
Cholesterol (mmol/L)	2.5	3.3-9.3
Triglycerides (mmol/L)	1.2	0.2-1.3
ASAT (U/L)	185	1-37
ALAT (U/L)	388	3-50
CK (U/L)	415	25-467
ALP (U/L)	848	20-155
GGT (U/L)	143	5-25
Total bilirubin (µmol/L)	27.2	1.7-12.0
NH ₃ (µmol/L)	32	0-98
PT (sec)	9.6	7.3-9.9
aPTT (sec)	18.1	12.9-16.9
Fibrinogen (g/L)	2.49	1.3-4.7
Anti-thrombin III (%)	59	102-191
PDF (mg/L)	<5	0-5
CRP (mg/L)	11.7	<10

Questions

1 – Based on the CBC results and the WDF and WNR scattergrams, what could be the main causes behind the alert flags and how would you confirm it?

2 – Based on the blood smear examination, what are the main differential diagnosis regarding the neutrophil's inclusions?

3 – What is the most relevant test to determine the nature of the inclusions?