SUPPORTING INFORMATION

Hematological and biochemical alterations in geriatric dogs: a short-interval clinical screening study[†]

Erni Sulistiawati*, Henny Endah Anggraeni, Muhammad Haikal Adhim, Mardoto, Muzakkii Rizqullah Farhan Zain, Zakiyyan Rasya Al Haitami, Tarishah Aulia Nisaa, Jodhy Anggara Putra, Raisha Ramadanti, Difla Aisyah Mallayeka

Veterinary Study Program of Veterinary Paramedic, IPB University, Bogor, Indonesia

S1 Results of Haematology Assessment of the Geriatrics Dogs

Hematological evaluation revealed marked alterations in leukocyte and platelet profiles in geriatric dogs, with a predominance of lymphocytic patterns. White blood cell (WBC) counts vary between individuals and sampling times, ranging from leukopenia to leukocytosis. Differential counts consistently demonstrated pronounced absolute and relative lymphocytosis, accompanied by granulopenia, particularly neutropenia. This hematological pattern suggests chronic immune stimulation or age-related immune dysregulation, which is commonly observed in geriatric dogs and may reflect persistent inflammatory, infectious, or stress-related processes in the body. Red blood cell (RBC) parameters were largely within the reference ranges; however, selected dogs exhibited reduced hemoglobin (Hb), hematocrit (HCT), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC), indicating the presence of mild normocytic to hypochromic anemia in certain individuals, consistent with age-associated reductions in erythropoietic efficiency. Platelet counts were notably decreased in most dogs at both sampling points, confirming persistent thrombocytopenia, with concomitant reductions in plateletcrit (PCT) and variable large platelet cell counts (P-LCC), which may reflect impaired platelet production, increased peripheral consumption, or chronic inflammatory states commonly encountered in geriatric patients. Collectively, these hematological findings highlight subclinical but clinically relevant alterations in the immune, erythroid, and platelet compartments, underscoring the value of routine complete blood count monitoring for the early detection of systemic age-related physiological decline in geriatric dogs.

Table S1. Hematology Assessment of the Geriatrics Dogs

Parameters	CANDY ♀/10 yo		ALPHA ♂/10 yo		MILI ♀/10 yo		MOLI ♀/10 yo		BOY ♂/10 yo		LULU ♀/10 yo		Unit	Normal Range
	5/11/24	12/12/24	5/11/24	12/12/24	5/11/24	12/12/24	5/11/24	12/12/24	5/11/24	12/12/24	5/11/24	12/12/24		
White Blood Cells (WBC)	11.55	16.86	5.94	5.77	8.46	17.38	8.69	0.06	15.34	13.34	8.59	8,01	10^9/L	6.00 - 17.00
LYM	10.58	14.67	4.89	3.93	7.68	15.36	6.81	-	14.11	12.02	7.45	6.78	10^9/L	0.80 - 5.30
MID	0.49	1.18	0.47	1.04	0.42	1.03	1.19	-	0.6	0.62	0.55	0.69	10^9/L	0.00 - 1.50
GRA	0.47	1.01	0.58	0.8	0.36	1	0.68	-	0.63	0.7	0.59	0.56	10^9/L	3.20 - 12.30
LYM	91.7	87	82.2	68.2	90.8	88.4	78.4	-	92	90.1	86.7	84.4	%	9.0 - 40.0
MID	4,3	7.0	7.9	18.0	5.0	5.9	13.7	-	3.9	4.7	6.5	8.6	%	0.0 - 10.0
GRA	4.0	6.0	9.9	13.8	4.2	5.7	7.9	-	4.1	5.2	6.8	7.0	%	43.0 - 85.0
Red Blood Cells (RBC)	8.27	7.36	7.12	7.45	7.76	6.1	7.19	0.16	7.83	8.1	8.21	7.49	10^{12}/L	5.10 - 8.50
Haemoglobin (Hb)	151	138	137	143	142	78	133	3	144	153	153	143	g/L	110 - 195
Haematocrit (HCT)	59.5	53.4	53.6	54.6	51.0	35.4	53.1	1.1	55.5	57.5	59.8	55.1	%	32.5 - 58.0
MCV	72	72.5	75.2	73.3	65.8	58	73.9	73.6	70.9	71	72.8	73.6	fL	60.0 - 76.0
MCH	18.3	18.8	19.2	19.2	18.3	12.8	18.5	22	18.4	18.9	18.7	19.1	pg	20.0 - 27.0
MCHC	254	259	255	262	278	221	250	299	259	266	256	259	g/L	300 - 380
RDW-CV	15.5	15.1	13.7	13.4	16	21.3	15.1	12.7	14.4	14.6	14.8	14.2	%	10.8 - 17.2
RDW-SD	58.7	57.7	54	51.6	54.7	65.5	59.5	50.3	52.8	54.2	56.7	55.4	fL	29.1 - 46.3
Thrombocyte (PLT)	20	80	116	75	77	71	160	27	35	183	76	38	10^9/L	117 - 490
MPV	7.0	12.5	11.0	10.4	11.7	11.2	10.5	7.7	7.6	12.6	10.9	8.8	fL	7.6 - 14.1
PDW	17.3	19.2	16.7	18.2	17.3	17.6	16	17.2	17	17.3	17.8	17.2	%	0.1 - 30.0
PCT	0.014	0.1	0.127	0.078	0.09	0.08	0.169	0.02	0.027	0.231	0.083	0.033	%	0.090 - 0.580
P-LCC	4	40	49	29	41	41	65	6	7	100	34	12	10^9/L	25 - 148
P-LCR	18.2	49.5	42,4	38.5	53.4	56.8	40.2	23.5	21.3	54.3	44.8	32.7	%	11.5 - 55.0

Note: red colour text indicates an abnormality

S2 Results of Blood Biochemistry Test of the Geriatrics Dogs

The serum biochemical profiles of the six geriatric dogs demonstrated several age-associated subclinical alterations during the two examination periods of this study. Mild to moderate increases in aspartate aminotransferase (AST) levels were observed in most dogs, often without concurrent elevations in alanine aminotransferase (ALT) levels, suggesting a non-hepatic origin, such as age-related muscular changes, rather than primary liver dysfunction. Total protein and globulin concentrations tended to fluctuate, with several dogs exhibiting hyperglobulinemia and reduced albumin-to-globulin (A/G) ratios, which may reflect the chronic inflammatory or immunological processes commonly encountered in geriatric patients. Blood urea nitrogen (BUN) levels were consistently elevated above the reference range in all dogs, whereas creatinine concentrations remained within normal limits, indicating a possible reduction in renal functional reserve, dehydration, or increased protein catabolism, rather than overt renal failure. Alkaline phosphatase (ALP), cholesterol, and gamma-glutamyl transferase (GGT) levels were largely within the reference ranges, suggesting preserved hepatobiliary function in most individuals. Hypoglycemia episodes were detected in several dogs, which may be associated with altered metabolic regulation or feeding patterns in geriatric animals. Overall, these biochemical findings underscore the presence of subtle but clinically relevant physiological alterations in aging dogs, reinforcing the importance of routine blood monitoring for the early detection and management of age-related systemic changes.

Table S2. Results of Blood Chemistry Examinations of the Geriatrics Dogs

Parameters	CANDY ♀/10 yo		ALPHA ♂/10 yo		MILI ♀/10 yo		MOLI ♀/10 yo		BOY ♂/10 yo		LULU ♀/10 yo		Unit	Normal Range
	5/11/24	12/12/24	5/11/24	12/12/24	5/11/24	12/12/24	5/11/24	12/12/24	5/11/24	12/12/24	5/11/24	12/12/24		
Aaspartate Aminotransferase (AST)	53	55	39	42	55	56	55	37	58	62	50	60	U/L	24 - 37
Alanine Aminotransferase (ALT)	34	33	22	22	32	39	41	45	40	38	34	32	U/L	8.2 - 57.3
Total Protein	8.7	7.2	6.7	6.6	6.5	6.3	7.5	7.7	8.8	6.0	6.6	5.3	g/dL	5.4 - 7.5
Albumin	4.7	3.0	2.7	2.7	3.5	2.5	4.0	3.0	4.0	2.7	4.5	2.9	g/dL	2.6 - 4.0
Globulin	4.0	4.2	4.0	3.9	3.0	3.8	3.5	4.7	4.8	3.3	2.1	2.4	g/dL	2.7-4.4
Ratio A/G	1.2	0.7	0.7	0.7	1.2	0.7	1.1	0.6	0.8	0.8	2.1	1.2		0.6-1.1
Total Bilirubin	-	0.16	0.37	-	0.05	0.2	0.1	-	0.26	-	0.37	-	mg/dL	0.07 - 0.61
Alkaline Phosphatase (ALP)	42	26	61	48	43	61	183	72	29	16	33	12	U/L	10.6 - 100.7
Cholesterol	136	168	103	113	190	141	178	218	173	113	190	116	mg/dL	115.6 - 252.7
GGT	2	4	1	7	2	5	3	5	3	8	1	1	U/L	1.0 - 9.7
Blood Urea Nitrogen (BUN)	39.4	27.3	26.3	22.9	48.6	14.8	43.3	49.9	36.9	19.4	74.3	28.6	mg/dL	10 - 20
Creatinine	1.2	1.1	1	1.3	1.5	1.1	0.9	0.9	1.4	1.4	1	1.1	mg/dL	1 - 2
Glucose	96.6	<60	<60	72.7	91.1	79.6	85.8	65.6	<60	<60	78.9	66.4	mg/dL	60 - 100

Note: (-) inspection was not carried out; red colour text indicates an abnormality