

**PERSISTENT LYMPHOCYTOSIS ASSOCIATED WITH CONCURRENT MULTIPLE VACCINATION IN A GOLDEN RETRIEVER: 3 YEARS FOLLOW-UP**

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**ABSTRACT**

The significance of persistent lymphocytosis in dogs has been defined in some cases including neoplasia or viral, parasitic and rickettsial infections. A 9-month old clinically healthy Golden Retriever breed dog referred to Small Animal Hospital for routine vaccination. Physical examination revealed any abnormalities. Complete blood count (CBC) of the dog revealed leukocytosis with remarkable lymphocytes. A rapid tests for Heartworm, Ehrlichiosis, Leishmaniasis, Toxoplasmosis and Lyme disease were negative. Histopathology revealed normocellular bone marrow. Beta glucan and multivitamin solution were initiated in the dog. There was no fall in lymphocyte counts in follow-up blood controls in following months. The dog unfortunately died in a traffic accident. The case presented here reflects persistent lymphocytosis associated with multiple vaccination within a week in a golden retriever.

**Key Words:** *canine, persistent lymphocytosis, vaccination.*

**INTRODUCTION**

Lymphocytes over >2900  $\mu$ L of blood is an uncommon condition for dogs. Lymphocytosis can result from epinephrin-related physiological reasons, adrenal disorders, neoplasia, post-vaccination or chronic antigenic stimulation (Douglas and Wardrobe, 2011).

Persistent antigenic stimulation in chronic infections such as canine Ehrlichiosis (Weiser et al., 1991), Trypanosomiasis (Barr et al., 1991), Leishmaniasis (Nicolato et al., 2013), Brucellosis (Chacón-Díaz et al., 2015) Aspergillosis (Ferreira et al., 2011), Babesiosis (Furlanello et al., 2005), Blastomycosis (Crews, 2008) and inflammatory reactions usually cause lymphocytosis in dogs. Malignant lymphoma, leukemias and thymoma are the other possible reasons for lymphocytosis (Cecilia et al., 2013; Comazzi, 2015). It is also reported lymphocytosis in Addison disease of dogs (Lanen and Sande, 2014).

The case presented here reflects persistent lymphocytosis associated with multiple vaccination within a week in a golden retriever.

**CASE HISTORY**

A 9-month old, intact male clinically healthy Golden Retriever breed dog referred to Small Animal Hospital of Veterinary Faculty, Ankara University for routine vaccination. The dog had antiparasitic therapy with drugs containing praziquantel, pyrantel and fenbendazole. The dog had also multiple doses of vaccination including distemper, parvoviral enteritis, parainfluenza, adenovirus, bordetella and leptospirosis within a week. Physical examination revealed any abnormalities. Normal heart rate (150 bpm), normal respiratory rate and normothermia (39 C<sup>o</sup>) were observed. Capillary refill time were also under the 2 seconds. Complete blood count (CBC) of the dog revealed leukocytosis with remarkable lymphocytes (Table 1). A rapid tests for Heartworm, Ehrlichiosis, Leishmaniasis, Toxoplasmosis and Lyme disease were negative. Blood smears did not show any intra-erythrocyte pathogens. Fecal flotation and Baermann wetzel technique of feces were also negative for parasites. Total T4, free T4 and cortisol levels were within the reference ranges (Table 1). Thoracic (Figure 1) and tracheal radiographs (Figure 2) were performed to rule out thoracic disease such as thymoma. Following medications were initiated in the dog: Beta glucan (1 ml PO for 7 days) and multivitamin solution (1 ml PO for 7 days). CBC in the 2nd week of the therapy was shown in table 2. Follow-up CBC controls in each month of the dog were shown in table 3. Histopathology revealed normocellular bone marrow as well (Figure 3). In follow-up CBC

controls of the case in following years, there was no fall in lymphocyte counts and the dog was also clinically healthy. The dog unfortunately died in a traffic accident at the end of the third year.

**Table 1.** Remarkable lymphocytosis in CBC results of the case

	Results	Reference Ranges*
WBC ( $10^9/l$ )	<b><u>21.14</u></b>	6-17
LYM ( $10^9/l$ )	<b><u>10.63</u></b>	0.9.5
MONO ( $10^9/l$ )	0.26	0.2-1.5
GRA ( $10^9/l$ )	10.25	3.5-12
LYM (%)	50.3	12-30
MONO (%)	1.2	3-10
GRA (%)	48.5	62-87
RBC ( $10^{12}/l$ )	4.26	5.5-8.5
HGB (g/dl)	8.5	12-18
HCT (%)	30.14	37-55
MCV (fl)	71	60-72
MCH (pg)	20	19.5-25.5
MCHC (g/dl)	28.2	32-38.5
RDWC (%)	20.5	-
PLT ( $10^9/l$ )	477	200-500
PCT (%)	0.54	-
PDWc (%)	40	-
fT4/tT4 (pmol/l/ $\mu$ g/dl)	17/1.9	12-22/1.3-2.9
Cortizol ( $\mu$ g/dl)	3	1-7

**Table 2.** CBC results of the case in the 2nd week of therapy

	Results	Reference Ranges*
WBC ( $10^9/l$ )	<b><u>14.89</u></b>	6-17
LYM ( $10^9/l$ )	<b><u>8.13</u></b>	0.9.5
MONO ( $10^9/l$ )	0.20	0.2-1.5
GRA ( $10^9/l$ )	6.55	3.5-12
LYM (%)	54.6	12-30
MONO (%)	1.3	3-10
GRA (%)	44	62-87
RBC ( $10^{12}/l$ )	4.29	5.5-8.5
HGB (g/dl)	8.6	12-18
HCT (%)	30.74	37-55
MCV (fl)	72	60-72
MCH (pg)	20	19.5-25.5
MCHC (g/dl)	27.8	32-38.5
RDWC (%)	19.6	-
PLT ( $10^9/l$ )	485	200-500
PCT (%)	0.49	-
PDWc (%)	36.4	-

**Table 3.** CBC controls in following months after therapy.

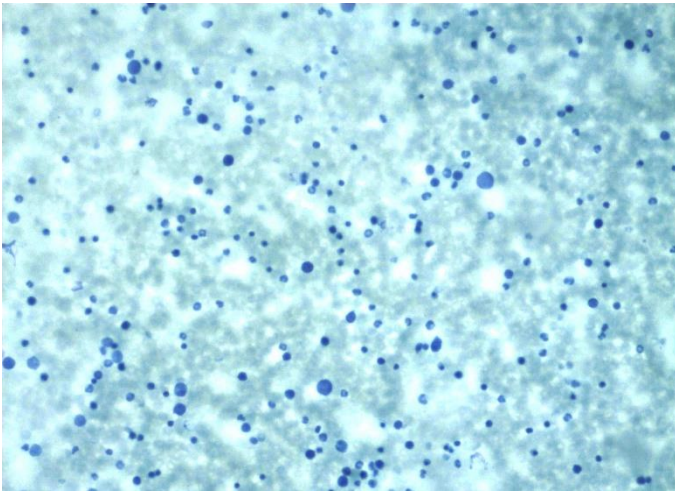
	WBC ( $10^9/l$ )	LYM ( $10^9/l$ )	LYM (%)	RBC ( $10^{12}/l$ )
1st month	16.41	<u>9.09</u>	<u>55.4</u>	5.03
2nd month	<u>17.94</u>	<u>10.64</u>	<u>59.3</u>	5.02
3rd month	15.79	<u>7.02</u>	<u>44.5</u>	6.25
4th month	<u>17.84</u>	<u>9.53</u>	<u>53.4</u>	5.14
Reference ranges	6-17	0.9-5	12-30	5.5-8.5



**Figure 1.** Normal thoracic graphy of the dog. No thymic mass observed.



**Figure 2.** Normal tracheal and laryngeal view.



**Figure 3.** Normocellular bone marrow aspirate.

## DISCUSSION

Physiological reasons, Addison disease (Lanen and Sande, 2014), neoplasia, post-vaccination and chronic antigenic stimulation can usually cause lymphocytosis in dogs (Douglas and Wardrobe, 2011). Chronic infections including canine ehrlichiosis (Weiser et al., 1991), trypanosomiasis (Barr et al., 1991), leishmaniasis (Nicolato et al., 2013), brucellosis (Chacón-Díaz et al., 2015) aspergillosis (Ferreira et al., 2011), babesiosis (Furlanello et al., 2005) and blastomycosis (Crews, 2008) have been also reported as the other possible reasons of lymphocytosis in dogs. Antigenic stimulation, inflammatory reactions, thymoma, lymphoma and leukemias have induced persistent lymphocytosis as well (Cecilia et al., 2013; Comazzi, 2015).

In the case presented here, chronic infections including Heartworm, Ehrlichiosis, Leishmaniasis, Toxoplasmosis and Lyme disease were ruled out with rapid test kits. Blood smears also showed no pathogens. Performing thoracic and tracheal radiographs also ruled out possible thymoma induced lymphocytosis. Thyroid and cortisol levels were within reference ranges. Bone marrow biopsy also revealed no malignancy including lymphoma and leukemias.

Vaccination associated reaction has been considered a cause of reactive lymphocytosis in animals, but evidence for this phenomenon has not been proved in studies (Avery and Avery, 2007). The case presented here closely reflects this phenomenon in a dog after multiple doses of vaccination including distemper, parvoviral enteritis, parainfluenza, adenovirus, bordetella and leptospirosis.

Absence of flow cytometry in the case was a limitation in differential diagnosis of reactive and neoplastic lymphocytes.

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