*American Journal of Applied Sciences (ISSN: 2321 – 089X)*

*Volume 12 – Issue 1 , 2021*

# Electrophoretic characteristics of cats with FeLV infection

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***ABSTRACT – Feline leukemia virus (FeLV) is common pathogen in cats worldwide. High prevalence rate of FeLV infection has been reported in Croatia.This retrospective study aimed to determine serum protein electrophoresis changes in samples from client-owned cats with FeLV infection. Serum protein electrophoresis detected changes in the electrophoretic fractions in all FeLV+ cats. The most common abnormalities detected by serum protein electrophoresis were decreased levels of $\beta_2$-globulins and increased values of $\alpha_2$- and $\gamma$-globulins in FeLV+ cats. Albumin and $\alpha_1$-globulin values were normal in most FeLV+ cats.These results suggest that serum protein electrophoresis is a valuable diagnostic test to evaluate the variety of changes in serum proteins of FeLV+ cats. These research findings cannot be directly extrapolated to the general population because of the low number of cats included in this study. Therefore, further research using a larger cat population is required.***

**Keywords—**Electrophoresis, feline leukemia virus, cat

## 1. INTRODUCTION

FeLV induce immunosuppression, which leads to the development of secondary infections, lymphoma and other neoplastic diseases (Gomez-Lucia *et al.,* 2020).

FeLV infection is common in domestic cats (Gleich & Hartmann, 2009), and early diagnosis can improve diagnosis and treatment outcomes. Inexpensive tools to substantiate a suspected FeLV infection can facilitate the diagnostic process and allow the monitoring of the disease course. Electrophoresis is such an easily available tool (Miró *et al.,* 2007). In Croatia, high prevalence rate of FeLV infection has been reported (Kučer *et al.,* 2000; Perharić *et al.,* 2018) but data on changes in the electrophoretic fractions in FeLV infection (Beer *et al.,* 2000) in Croatia are limited. More data on changes in electrophoretic fractions that are characteristic for FeLV infection may improve the diagnosis of this disease in cats and provide epidemiologic information about FeLV infection in Croatia.

Therefore, this study aimed to determine changes in electrophoretic fractions of client-owned cats with FeLV infection.

## 2. MATERIALS AND METHODS

### *2.1. Animals*

This study enrolled 7 cats that were included in a previous epidemiological study (Raukar, 2021), in which the prevalence of FeLV was determined.Blood sampling and methods for the detection of FeLV infection have been described in this epidemiological study (Raukar, 2021), but the laboratory results of SPE were not presented in this previous study.Therefore, laboratory results of serum protein fractions of FeLV+ cats are described in the current study. Veterinarians collected blood samples from regular patients in their daily work during practice in veterinary clinics in Varaždin and Zagreb in north-west Croatia.

### *2.2. Ethical consideration*

This study did not include animal experiments, and therefore there was no legal basis for issuing approval on the study (Ministry of Agriculture of the Republic of Croatia, Reference numbers: 525-6-08-3 BBŠ; 525-6-08-5 BBŠ).

### *2.3. Sampling*

From each of the 7 individual client-owned cats, 1 ml of whole venous blood was aseptically sampled for SPE into tubes that did not contain anticoagulants. Before centrifugation, blood samples were left for 30 min standing at room temperature to allow the blood to clot. After 30 min, serum was obtained by centrifugation at 4,500 rpm for 5 min. The serum was pipetted into another tube, and the samples were stored at −20°C. Samples were transported on dry ice within 48 h after collection to the Faculty of Veterinary Medicine, Vienna, Austria, where diagnostic tests were conducted in the Clinical Pathology Platform.

### *2.4. Serum protein electrophoresis*

SPE was performed using the fully automated system Interlab Genio® (Menarini, Austria). Samples were automatically transferred to cellulose acetate strips which were inserted into a migration chamber containing a buffer solution (Interlab-Serum protein® buffer solution) for, 15 min at a voltage of 140 V, stained for 300 s (Interlab-Serum protein® staining solution), destained for 180 s, cleared for 120 s, and dried for 820 s. The staining was performed with Ponceau Red and analyzed using a photometric device. The curves were analyzed using the Elfolab 5.x software.

## 3. RESULTS

### *3.1. Serum protein electrophoresis*

#### 3.1.1. Albumin

Six of the seven FeLV+ cats (85.7%) had normal albumin levels, and one had decreased values.

#### 3.1.2. $\alpha_1$-globulins

Six out of seven FeLV+ animals (85.7%) had $\alpha_1$-globulin concentrations within the physiological range, and one had decreased values.

#### 3.1.3. $\alpha_2$-globulins

Four out of seven FeLV+ cats (57.1%) had increased $\alpha_2$-globulin levels which varied from up 1.2 to 1.7 g/dl, whereas three had normal values.

#### 3.1.4. $\beta_1$-globulins

Normal $\beta_1$-globulin values were detected in all seven FeLV+ cats.

#### 3.1.5. $\beta_2$-globulins

Six of seven FeLV+ cats (85.7%) had decreased $\beta_2$-globulin levels which varied from up 0.5 to 0.7 g/dl, and one had normal values.

#### 3.1.6. $\gamma$-globulins

Three of seven FeLV+ animals (42.9%) had increased levels of $\gamma$-globulin which varied from up 2.8 to 4.8 g/dl, and four had normal values.

### *3.2. Health status*

Five of seven FeLV+ cats (71.4%) had no clinical signs suggestive of FeLV infection.

## 4. DISCUSSION

The most frequently detected SPE abnormality was decreased $\beta_2$-globulin levels in cats with FeLV infection in this study. In contrast with my results, β-globulin values were normal in FeLV+ cats in Croatian (Beer *et al.,* 2000) and Spanish (Miró *et al.,* 2007) studies.

Increased $\alpha_2$-globulin values were also frequently observed in this study similar to the results of studies in Croatia (Beer *et al.,* 2000) and Spain (Miró *et al.,* 2007). Based on the fact that the elevated $\alpha_2$-globulin concentrations have important diagnostic value because many proteins, such as $\alpha_1$-acid-glycoprotein and haptoglobin, which migrate into the $\alpha_1$- and $\alpha_2$-globulins fractions, are considered markers of acute inflammatory disease (Beer *et al.,* 2000; Miró *et al.,* 2007), it can be concluded that the elevated $\alpha_2$-globulin concentrations in FeLV+ cats indicate acute inflammation (Beer *et al.,* 2000). One of these acute-phase proteins, haptoglobin, has been reported to be elevated in FeLV-infected cats (Rosa & Mestrinho, 2019).

Hypogammaglobulinemia is frequently observed in FeLV-infected cats (Miró *et al.,* 2007; Gleich & Hartmann, 2009). By contrast, hypergammaglobulinemia was frequently observed in FeLV+ cats in presented study. Some reports indicated that hypergammaglobulinemia in cats with FeLV infection may result from secondary infections (Miró *et al.,* 2007). In contrast with my results, a study in Spain (Miró *et al.,* 2007) reported low γ-globulin levels in most FeLV+ cats. In another studies conducted in Spain (Doménech *et al.,* 2011; Gomez-Lucia *et al.,* 2020), high γ-globulin levels were observed in FeLV+ cats.

Clinical signs suggestive of FeLV infection were not observed in most cats in this study. Based on the fact that all these cats showed SPE abnormalities, it can be concluded that the results of serum protein electrophoresis may be useful diagnostic aids in diagnosis of FeLV infection and providing epidemiologic information about FeLV infection in Croatia. In contrast with my results, in a Spanish study (Miró *et al.,* 2007) clinical signs were observed in 44.00% of the FeLV+ cats.

The research findings and conclusions in this study cannot be directly extrapolated to the general population because ofthe low number of cats included in this study. In addition, no electrophoretic studies of serum proteins have been conducted in Croatia in a substantial number of FeLV-infected cats.

## 5. CONCLUSION

SPE abnormalities were observed in all FeLV+ cats. The most common abnormalities detected by SPE were decreased levels of $\beta_2$-globulin, and increased values of $\alpha_2$- and γ-globulins in FeLV+ cats. These results suggest that SPE is a valuable diagnostic test for evaluating changes in serum proteins in patients with FeLV infection. However, this study is underpowered for statistical analyses. Reliable conclusions could not be drawn on the basis of the low number of cats studied. Therefore, further research using a larger cat population is required.

### Conflict of Interest Statement

The author declares that there is no conflict of interest.

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## LIST OF ABBREVIATIONS

FeLV: feline leukemia virus

SPE: serum protein electrophoresis