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УДК 619:616
DOI: 10.12345/22266070_2021_2_9

MODERN ALGORITHMS FOR THE DIAGNOSIS OF FELINE VIRAL LEUKEMIA

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Feline leukemia virus (FeLV) does not always cause the clinical manifestation of the disease and this is the main difficulty in diagnosing, interpreting the results of studies and predicting the outcome of this disease. As a result of the conducted studies, it was established that the doubtful and positive results of the Vet Expert FeLV Ag rapid test for the p27 FeLV antigen in feline viral leukemia should be confirmed using PCR for the detection of FeLV proviral DNA.

Key words: feline viral leukemia, diagnostics, Vet Expert FeLV Ag rapid test, retroviruses, FeLV Ag.

СОВРЕМЕННЫЕ АЛГОРИТМЫ ДИАГНОСТИКИ ВИРУСНОЙ ЛЕЙКЕМИИ КОШЕК

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Вирус лейкемии кошек (FeLV) не всегда вызывает клиническое проявление болезни и в этом состоит основная сложность диагностики, интерпретации результатов исследований и прогнозировании исхода данного заболевания. В результате проведённых исследований установлено, что сомнительный и положительный результаты экспресс-теста Vet Expert FeLV Ag на антиген p27 FeLV при вирусной лейкемии кошек должны быть подтверждены с использованием ПЦР для обнаружения провирусной ДНК FeLV.

Ключевые слова: вирусная лейкемия кошек, диагностика, экспресс-тест Vet Expert FeLV Ag, ретровирусы, FeLV Ag.

ВИРУСТЫҚ ЛЕЙКОЗДЫ ДИАГНОСТИКАЛАУДЫҢ ЗАМАНАУИ АЛГОРИТМДЕРІ

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Фелий лейкемиясы вирусы (FeLV) әрдайым аурудың клиникалық көрінісін тудырмайды және бұл диагноздың, зерттеу нәтижелерін түсіндірудің және осы аурудың нәтижесін болжаудың негізгі қиындығы. Жүргізілген зерттеулер нәтижесінде felv вирустық лейкемиясы кезінде vetexpert FeLV AG антигеніне p27 felv экспресс-тестінің күмәнді және оң нәтижелері felv провирустық ДНҚ-ны анықтау үшін ПТР-мен расталуы керек екендігі анықталды.

Түйінді сөздер: вирустық лейкемия, диагностика, Vet Expert felv Ag жедел сынағы, ретровирустар, FeLV Ag.

For modern veterinary medicine, the problem of combating infectious diseases of domestic animals, a special place among which belongs to viral pathology, remains very urgent. Feline viral leukemia is increasingly being diagnosed among cats in the city of Ufa. This disease is highly infectious and can be fatal. Feline leukemia virus (FeLV) does not always cause clinical manifestation of the disease, and this is the main difficulty in diagnosing, interpreting research results and predicting the outcome of this disease. In this regard, the use of timely research methods for viral leukemia in cats is an urgent problem in veterinary medicine, since early diagnosis and early treatment start are the basis for antiepizootic measures that allow rational and effective therapy and predict the further course and outcome of the disease.

Viral immunodeficiencies and animal leukemias are infections that are not amenable to therapy and specific prophylaxis. These diseases have been reported in cattle and cats.

Feline leukemia virus (FeLV) is a disease that affects the hemolymphopoietic system in cats. This is a large group of RNA viruses that infect vertebrates and even invertebrates. The family name indicates the presence of an RNA-dependent DNA polymerase (reverse transcriptase) in the virions, which ensures DNA synthesis on a virion matrix. The virus can be manifested in 2 forms – endogenous (non-pathogenic) and exogenous (pathogenic).

Feline leukemia virus is a retrovirus, but safe for humans. The virus can wake up and cause the disease a long time after the initial infection [1, p. 397-399].

The causative agents of these diseases are RNA-containing viruses of the Retroviridae family, which parasitize the cells of the immune system. The resulting pathological changes lead to a variety of morphofunctional disorders at the cellular, tissue, organ and organism levels, which is expressed by polymorphism of clinical manifestations and reduces the effectiveness of existing methods for diagnosing these infections.

Viral immunodeficiency and leukemia are today one of the most common causes of death in cats, which is associated with the high contagiousness of diseases and pronounced alterative processes in various organs and tissues of the animal.

In Russia, the overall incidence rate is 15-20.7%, occurs in 20% of households, shelters and nurseries with group keeping cats, compared to 2010, when the incidence rate covered 13.7% [2 p.63].

Fundamental studies on the study of the etiology, pathogenesis, clinical and pathomorphological manifestations of infections, as well as in the field of diagnosis, control and prevention of these diseases in animals have been carried out by a number of foreign and domestic scientists. Virusogenetic theory L.A. Zilber (1968) and the viral immunogenetic theory of V.P. Shishkov (1988) made it possible not only to establish the etiopathogenesis of retroviral infections, but also to develop serological methods for detecting infected animals. The discovery of the polymerase chain reaction (1983) made it possible to further isolate, sequenced, determine the taxonomic position and study the genetic diversity of the causative agents of viral immunodeficiency and leukemia in animals.

Despite many years of experience and numerous attempts, so far it has not been possible to create effective vaccines that protect animals from infection with retroviral infections. Due to economic inexpediency and low efficiency, the therapy of these diseases in animals has not become widespread. In this regard, the system of measures for the control of retroviral infections in animals is currently based on diagnostics and restrictive measures.

The high degree of spread of viral immunodeficiencies and leukemias among animals, due to the low efficiency of existing diagnostic and preventive measures, indicates the need to study these diseases, especially in terms of their tendency towards a combined course, as well as the need to improve methods for identifying these pathogens and methods of controlling the spread of pathogens. [3.4].

The purpose and objectives of the research. The purpose of this work is to study the effectiveness of modern methods for diagnosing viral leukemia in cats. To achieve this goal, the following tasks were identified: 1. To determine the effectiveness of preliminary diagnostic methods with an assessment of

clinical signs and changes in the general clinical analysis of blood; 2. To evaluate the diagnostic value of the ICA test for FeLV Ag and PCR-Real-time for the detection of FeLV DNA.

Material and research methods. The object of the study was 12 cats of different breeds and age with a diagnosis of viral leukemia of cats undergoing treatment in the veterinary clinics of the State Budgetary Institution “Ufa City Veterinary Station” and the “University Veterinary Clinic of the Belarusian State Agrarian University” (Ufa).

The scheme for the diagnosis of viral leukemia in cats is presented in Table 1.

Table 1 – Diagnosticscheme

Groupofanimals	Nickname, age, breed of animal	Useddiagnosticmethods				
		Takinganamnesis	Assessmentofclinicalsigns	Generalclinical bloodtest	Express test to identify feline leukemia virus antigen VetExpert FeLVAg	PCR- Real-time
1	Kim, 3 months old, maine coon					
	Hulk, 6 months old, Scottish fold					
	Milka, 4 monthsold, mongrel					
	Varya, 7 monthsold, mongrel					
	Oscar, 1 yearold, bengal					
	Julia, 3 yearsold, outbred					
2	Dina, 4 yearsold, mongrel					
	Vrungel, 5 years old, Russian blue					
	Zlata, 4.5 years old, Maine Coon					
	Simka, 3.5 years old, devonrex					
	Daniel, 1.5 years old, Scottish Fold					
	Marquis, 2 years old, British Fold					

To diagnose viral leukemia in cats, the following was performed:

- collecting a general anamnesis,
- clinical examination of the patient,
- a general clinical blood test on the Abacus Junior Vet hematology analyzer with an assessment of ESR, hematocrit, hemoglobin, erythrocytes, platelets and leukogram,
- rapid test for the detection of feline leukemia virus antigen Vet Expert FeLV Ag,
- detection of FeLV proviral DNA in whole venous blood by real-time PCR using a PCR-LEUKEMIA-CAT-FACTOR reagent kit (cat. No. D14817-VET).

In the first group of cats, the diagnosis of viral leukemia included: taking anamnesis, evaluating clinical signs and a complete blood count, as well as performing an express test for detecting feline leukemia virus antigen Vet Expert FeLV Ag. In the second group of cats, positive and doubtful results according to the Vet Expert FeLV Ag express test were confirmed by the Real-time PCR method by detecting proviral DNA in whole blood.

Research results. The diagnosis of viral leukemia in cats was started with taking a life history and anamnesis of the disease: age? Gender? living conditions and feeding? did the cat get sick before and with what? Is the animal vaccinated? does the cat have contact with street animals? time and circumstances of the disease? treatment data?

When evaluating clinical signs, we found that in all individuals the oral mucosa was anemic, weakness, lethargy and apathy were recorded. In three patients, constipation was observed, in five patients – diarrhea, in seven individuals – a complete refusal to eat, in six patients anorexia, dehydration and muffling of heart tremors were established.

The next stage of the study was to assess the severity of damage to the hematopoietic and lympho-reticular system. When studying the indicators of the general blood analysis, we found that all cats had a

reduced content of hemoglobin and hematocrit, eight individuals had lymphocytosis and erythrocytosis, and four individuals had lymph – and erythropenia.

When performing the Vet Expert FeLV Ag express test, p27 FeLV antigen was detected in 58% of cats (6 cats from the first experimental group and one cat from the second experimental group), and a questionable result was found in 42% of cats (5 individuals of the second experimental group).

When performing real-time PCR for the detection of FeLV proviral DNA in whole venous blood in one cat with a positive Vet Expert FeLV Ag express test and in five cats with a dubious result of the Vet Expert FeLV Ag express test, 100% of the samples turned out to be positive, which finally confirmed the diagnosis of feline viral leukemia.

Conclusions. 1. For the diagnosis of viral leukemia in cats, it is necessary to use the data of a general anamnesis and take into account the fact that viral leukemia in cats may be asymptomatic or with non-specific clinical signs. When evaluating pathological changes in hematological parameters, it was found that in cats with a pronounced decrease in hematocrit, there is a predominantly increase in the absolute number of lymphocytes. However, the decrease in hematocrit and the number of erythrocytes does not always correlate with changes in the lymphocytic system.

2. The questionable and positive results of the Vet Expert FeLV Ag rapid test for p27 FeLV antigen in cats should be confirmed using PCR to detect FeLV proviral DNA.

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