

**UROCYSTITIS IN DOGS (CLINICAL AND LABORATORY DIAGNOSTICS)****N. I. BOIKO**, Candidate of veterinary Sciences, associate Professor**S. I. HOLOPURA**, Candidate of veterinary Sciences, associate Professor**B.V. POPADIUK**, postgraduate student**M. M. KOSHCHAVKA**, postgraduate student*National University of Life and Environmental Sciences of Ukraine*

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**Abstract.** *The dog`s breed tendency who are get sick the most with urocystitis is analyzed. It have been identified that dogs with diagnosed cystitis have subfebrile fever, moderate tachycardia and tachypnea anxiety when urging for urination, strangury, polakuria, involuntary excretion of muddy urine, and some of them were diagnosed with an increase in volume and pain of the prostate gland. There are significant changes in the morphological blood composition were found in dog's blood, namely low erythrocyte count and low hemoglobin content, and significantly higher leukocyte count, neutrophilia with bands growth and the appearance of young neutrophils compared to healthy animals. In the serum of dogs suffering from urocystitis was revealed a moderate increase in protein due to the increase globulin fraction, increased activity of ALT, AsAT, ALP and decrease of the total calcium and inorganic phosphorus content.*

*A sharp increase in hydrogen index, turbidity, sometimes impurity mucus and a sharp odor of ammonia, protein urobilinogen, bilirubin, nitrites, the appearance of a large amount of sediment in the form of a clot of pus and mucus have been revealed in dogs urine with urinary cystitis.*

**Key words:** *cystitis, urethritis, stranguria, polakiuria, proteinuria, urobilinogenuria, pyuria*

Among the all urinary tract diseases, an inflammation of the bladder mucous membrane (cystitis) is diagnosed the most frequently, which is found in all species of animals. Infection is the main reason of cystitis emerging. Mostly they are representatives of the pathogenic microflora that inhabits in the surface of the animals`s mucous membranes and under certain conditions can cause the development of an inflammatory process:

*Esherihia coli, Staphilococcus sp. Streptococcus pyogenes. Arcanobacterium pyogenes. Microorganisms that have a tendency to the urinary system can cause the development of the bladder inflammation: Corynebacterium urealyticum. Microorganisms are resistant to antibiotic therapy and are accompanied by prostatitis, epididymitis and cystitis: Micoplasma canis. The*

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representatives of fungi - *Candida tropicalis* and unicellular saprophytic algae of the genus *Rrothecak* and others [1, 2, 3].

The bladder mucous membrane is resistant to infection, that's why it can be prone to cystitis when there are other factors such as impaired process of the bladder emptying, immunity decreasing (IgA deficiency), inflammation of the genital organs, giving to animals substances which irritate bladder mucosa (urotropin), endo- or exogenous glucocorticoids overdose. Urocystitis, in which the inflammatory process extends not only to the bladder mucous membrane, but also urethra experienced more often. [3, 4].

In the long course of disease and lack of treatment, infectious factors from the bladder enter the ascending path into the kidneys, which can lead to the development of pyelonephritis. Often pyelonephritis is bilateral, that can cause danger to the animal life. In addition, complications include disorders of the general condition of the body with azotemia, bladder urinary paralysis, secondary formation of urinary stone, etc. [3, 5].

Therefore, improving of diagnostic methods for prescribing effective treatment of urocystitis in animals is an extremely urgent problem in veterinary medicine.

**Goal.** To study the basic

morphological and biochemical parameters of blood and urine with urocystitis in dogs.

#### **Materials and research methods.**

Blood for hematological examination was collected in the morning before feeding from the subcutaneous vein of the forearm in an amount of at least 2.0 ml. Vacuum tubes with EDTA were used for blood sampling. Blood smears were stained with the Diff Quik Express Method (Leukodif-200 Reagent Set). All blood biochemical parameters were determined using a Labline – 010 biochemical analyzer. Counting the total number of cells (erythrocytes and leukocytes) was performed according to the conventional method in a counting chamber (hemocytometer) with Goryayev grid. The leukogram was deduced by counting 200 cells through three methods.

Urine was examined no later than 3 hours after selection. CANON EOS 550 D SLR, NDPL-1 (2X) Adaptation Camera and Canon EOS Digital Special Computer Program [7] were used to display the images on the monitor and to capture them. All macro- and microphotographs were taken in the conditions of the educational-scientific laboratory of Therapy and Clinical Diagnosis Department. Statistical processing of research results was conducted using the Microsoft Excel 2003 computer program.

**Research results.** The research had

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taken at the Small Animal Clinic ESP(Educational, scientific and production) Clinical Center "Vetmedservice" during 2015–2016. In the experimental group (n = 17) animals were selected for the symptoms that were characteristic of urocystitis: anxiety when urging for urination, stranguria, polakiuria, involuntary urinary excretion, etc. The animals` age was within 7 months - 3 years, but most of the animals

(15 animals) were at the age of active puberty.

Analyzing the breeds of animals, it was found that urocystitis is affected by dogs of different breeds: Shitsu (n = 3), Beagles (n = 5), Yorkshire terriers (n = 5), and inbreds (n = 4).

During clinical examination, a subfebrile fever, a moderate tachycardia and tachypnea, were revealed in dogs (table. 1).

### 1. Indicators of clinical examination of dogs with urocystitis

№	Indicator	Groups of animals			
		Clinically healthy (n=5)		Patients with urocystitis (n=17)	
		Lim	M±m	Lim	M±m
1.	Body temperature	37,5–39,0	38,5±	39,0–39,6	39,3±0,6
2.	Pulse rate	100–130	110±	90–135	118,3±6,0
3.	Respiratory rate	18–26	22±	28–35	31,3±3,1

Some dogs from the study group were diagnosed with an increase in volume and soreness of the prostate gland.

A research of the dogs` blood suffering from urocystitis showed that the number of erythrocytes and their hemoglobin content were at the lower limit of the physiological norm. The number of leukocytes in the blood of these animals was significant higher than in

clinically healthy animals, which indicated the development of inflammatory process (Table 2).

The animals blood leukogram with cystitis was characterized by pronounced neutrophilia with the growth of rod-cores and the appearance of young neutrophils. The number of eosinophils, basophils and monocytes was within physiological fluctuations.

## 2. Morphological parameters of dogs blood suffering from urocystitis

№	Indicator	Groups of animals			
		Clinically healthy (n = 5)		Patients with urocystitis (n = 17)	
		Lim	M±m	Lim	M±m
1.	The number of red blood cells, T/l	5,3–10	±	4,6–6,8	5,4±0,8
2.	Hemoglobin content g/l	120–150	±	100–135	115,3±5,2
3.	Number of leukocytes, g/l	8,5–10	±	10–16	13,1±1,9
Neutrophils	metamyelocyte	0	±	1–4	2,1±0,3
	band	1–4	±	6–10	7,2±0,5
	segmented	55–75	±	59–70	61,3±2,8
	basophilus	0–2	±	–	–
	eosinophils	1–5	±	3–7	4,1±0,3
	monocytes	1–4	±	4–6	3,3±0,5
	lymphocytes	20–40	±	19–25	22,2±1,6

The biochemical parameters of blood in dogs with urocystitis also had some differences from healthy animals. There was a moderate increase in protein in the dogs' blood with urocystitis due to an increase in the globulin fraction (Table 3).

## 3. Biochemical parameters of dogs' blood suffering from urocystitis

№	Indicator	Groups of animals			
		Clinically healthy (n = 5)		Patients with urocystitis (n = 17)	
		Lim	M±m	Lim	M±m
1.	ALT, IU/l	10–60	±	25–63	47,2±3,4
2.	AsAT, IU/l	10–50	±	17–74	36,3±3,1
3.	Alkaline phosphatase, IU/l	30–140	±	60–120	88,5±4,8
4.	Bilirubin, comm. µmol /l	0–3	±	1,5–2,7	2,3±0,6
5.	Creatinine, µmol /l	80–160	±	84–110	101,2±3,6
6.	Urea, Mmol /l	4–11	±	6–12	8,2±0,3
7.	α- amylase, IU/l	500–1650	±	640–110	70,5±3,5
8.	Total protein, g/l	55–80	±	66–78	70,4±3,5
9.	Glucose, Mmol /l	3–6	±	3,0–4,2	3,1±0,4
10.	Calcium, Mmol /l	2,2–3,0	±	1,8–2,5	2,1±0,1
11.	Phosphor, Mmol /l	1,0–2,8	±	0,9–2,5	1,6±0,1

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Some animals showed a tendency to increase enzymes activity: ALT, AsAT and ALP, which showed the development of dystrophic changes in the parenchymal organs, as well as a moderate decrease in the content of total calcium and inorganic phosphorus. Other biochemical parameters of blood (glucose level,  $\alpha$ -amylase activity, bilirubin content,

creatinine and urea) were within physiological fluctuations.

*Urinalysis* involved the use of physico-chemical methods. The relative urine density with urocystitis did not differ significantly higher than in clinically healthy ones. More often, this indicator was close to normal values (Table 4).

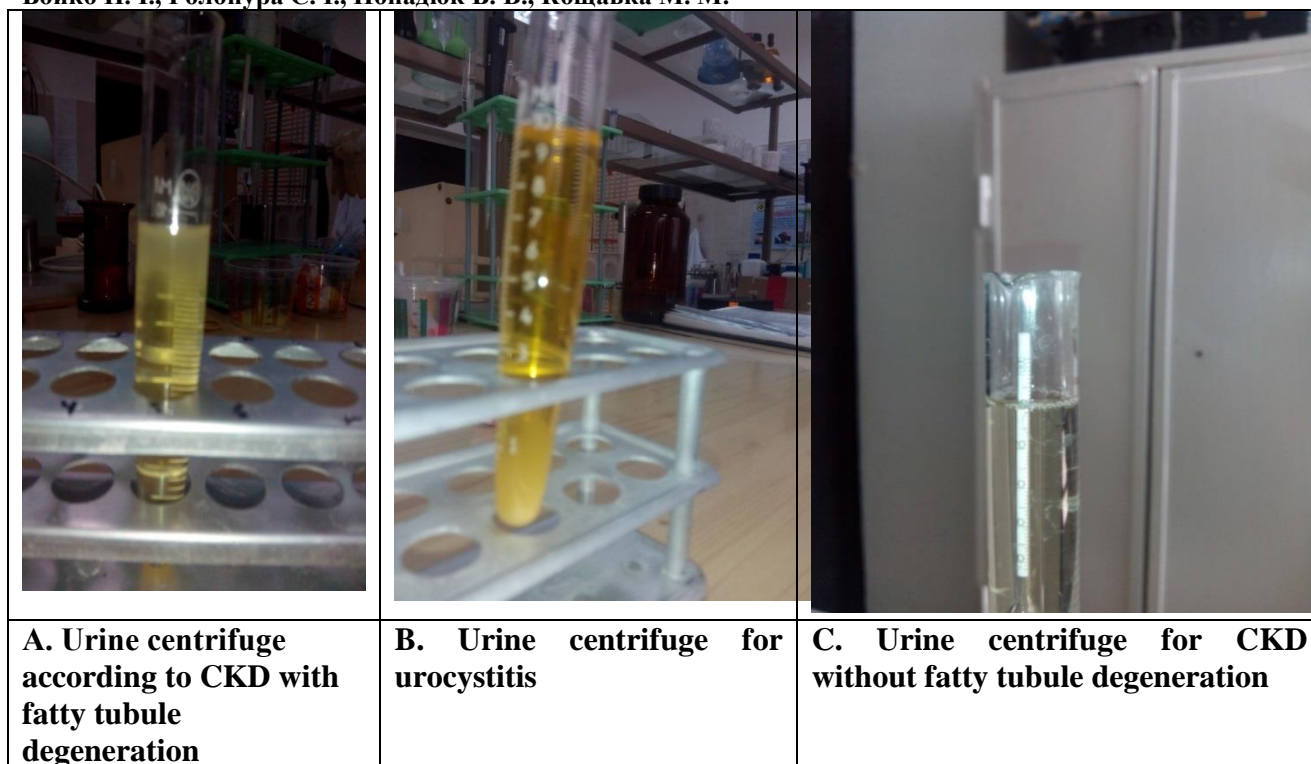
#### 4. Physical urine characteristics of dogs suffering from urocystitis

Indicator	Clinically healthy (n = 5)		Patients with urocystitis(n = 17)	
	Lim	M±m	Lim	M±m
The density of blood plasma	1,015–1,040	1,03±0,002	1,040–1,060	1,05±0,001
pH	5,8–6,3	6,0±0,06	6,9–8,0	7,0 ±0,5
Color	Saturated yellow	-	Yellow with a pinkish tinge	
Transparency	Transparent	-	Turbid, sometimes with mucus impurities	
Smell	Specific No odors	-	Specific, sometimes with the smell of alkaline fermentation	

There is a sharp increase in the hydrogen index (pHP) was identified in dogs who have urocystis. While in clinically healthy animals this figure was 6.0 and the urine was acidic, in sick dogs the urine became neutral and alkaline, with an average pH of 7.0. In dogs with urocystitis signs urine turbidity was observed, sometimes found mucus impurities. In the case of pH higher than

7.5 was showed a sharp odor of ammonia, indicating the development of alkaline fermentation in the bladder.

After centrifugation of urine from dogs with symptoms of urocystitis noted the appearance of a large amount of sediment in the form of a clot of pus and mucus that descended to the bottom of the test tube (Fig. 1C).



**Fig. 1. Centrifuges of sediment of the animals urine**

In a biochemical research of dogs urine suffering from urocystitis it was revealed that protein (0.3 - 1.5 g / l) was present in 17 samples (100 %), 13 of them (76 %) have urobinogen and bilirubin, and 2 (11 %) - nitrites (Table

5). The appearance of nitrite indicates reproduction in the urogenital tract of microflora (staphylococcus, proteus, Klebsiella, pseudomonas group), which is capable of destroying urea [6].

### 5. Chemical characteristics of dogs` urine suffering from urocystitis

Indicator	Clinically healthy (n = 5)		Patients with urocystitis (n = 17)	
	Lim	M±m	Lim	M±m
Protein, g/l	-	0	0,3-1,5	1,0±0,3
Glucose, Mmol/l	-	0	-	-
Urobilinogen, µmol /l	-	0	33-66	40,4±4,1
Bilirubin, µmol /l	-	0	8,6-33	15,3±3,2
Nitrites	-	0	+ - ++	+
Ketone bodies, Mmol/l	-	0	-	-

**Conclusions:**

1. The dogs who have urocystitis, the following clinical symptoms are observed: anxiety when urging for urination, strangury, polakiuria, involuntary discharge of cloudy urine.

2. It was disclosed that in dogs with urocystitis in the blood increases the number of leukocytes with a shift of the

nucleus to the left, increases the activity of AST, ALT, AP appears proteinuria, urobilinogenuria, bilirubinuria.

3. Urine indicators are characterized by an increase in the pH to 7.0 and even higher (8.0), the appearance of a sharp odor of ammonia, the presence of protein, urobilinogen, bilirubin and nitrites.

**References**

1. Sobolev V.E. (2012). Tsystyt Sobak [Dogs cystitis]. Part 1/ Russian Veterinary Journal 4, 46-48.

2. Sobolev V.E. (2012). Tsystyt Sobak [Dogs cystitis]. Part 2 / Russian Veterinary Journal 5, 35-37.

3. Nimand H.G, Suter P.B. (2004). Bolezni sobak [Dog Disease]. Moscow: LLC "Watercolor Print". 601-604.

4. Wingfield V.E. (2000). Sekrety` neotlozhnoj veterinarnoj pomoshhi [Secrets of emergency veterinary care].

M.: "Publishing House Binom" "Nevsky Dialect". 455-458.

5. Beinbridge J., Elliot J. (2008). Nefrologiya i urologiya sobak i koshek [Nephrology and urology of dogs and cats]. Moscow: "Aquarium-Print". 272.

6. Levchenko V. I., Vlizlo V. V., Kondrakhin I.P. and all. (2002). Veterinarna kli`ni`chna bi`okhi`mi`ya [Veterinary Clinical Biochemistry]. Bila Tserkva. 400.

**УРОЦИСТИТ У СОБАК (КЛІНІКО-ЛАБОРАТОРНА ДІАГНОСТИКА)**

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***Анотація.** Проаналізовано, породну схильність собак, які найчастіше хворіють на уроцистит. Встановлено, що у собак з діагностованим циститом проявляється субфебрильна температура, помірна тахікардія і тахіпноє неспокій при позивах до сечовиділення, странгурія, полакіурія, мимовільне виділення мутної сечі, а в окремих із них діагностували збільшення в об'ємі та болючість передміхурової залози. У крові собак, хворих на уроцистит виявлено значні зміни в морфологічному складі крові, а саме низьку кількість еритроцитів та низький вміст гемоглобіну і значно вищу кількість лейкоцитів, нейтрофілію зі зростанням паличкоядерних та появою юних нейтрофілів порівняно із здоровими тваринами. У сироватці крові собак, хворих на уроцистит виявлено помірне збільшення білка за рахунок збільшення глобулінової фракції, підвищення активності АлАТ, АсАТ, ЛФ та зниження вмісту загального кальцію і неорганічного фосфору.*

*У собак, хворих на уроцистит у сечі виявили різке збільшення водневого показника, помутніння сечі, іноді домішки слизу та різкий запах аміаку, білок*

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*уробіліноген, білірубін, нітрити, появу значної кількості осаду у вигляді згустку гною та слизу.*

**Ключові слова:** *цистит, уретрит, странгурія, полакіурія, протеїнурія, уробіліногенурія, піурія*