

**Maria Kambur**

Doctor of Veterinary Sciences, Professor  
 Sumy National Agrarian University, (Sumy, Ukraine)  
 ORCID: 0000-0002-4864-5292  
[mariia.kambur@snau.edu.ua](mailto:mariia.kambur@snau.edu.ua)

**Andriy Zamazyi**

Doctor of Veterinary Sciences, Professor  
 Poltava State Agrarian Academy, (Poltava, Ukraine)  
 ORCID: 0000-0003-3138-0424  
[ganavar@ukr.net](mailto:ganavar@ukr.net)

**Oleksandr Kalashnyk,**

PhD  
 Sumy National Agrarian University, (Sumy, Ukraine)  
 ORCID: 0000-0003-2354-3473  
[oleksandr.kalashnyk@snau.edu.ua](mailto:oleksandr.kalashnyk@snau.edu.ua)

**Evgenia Livoschenko**

PhD  
 Sumy National Agrarian University, (Sumy, Ukraine)  
 ORCID: 0000-0001-5826-4824  
[yevheniia.livoshchenko@snau.edu.ua](mailto:yevheniia.livoshchenko@snau.edu.ua)

**Larysa Plyuta**

PhD  
 Sumy National Agrarian University, (Sumy, Ukraine)  
 ORCID: 0000-0001-8935-4873  
[larysa.plyuta@snau.edu.ua](mailto:larysa.plyuta@snau.edu.ua)

**Lidiya Kovalenko**

PhD  
 Sumy National Agrarian University, (Sumy, Ukraine)  
 ORCID: 0000-0002-4350-2284  
[lidiia.kovalenko@snau.edu.ua](mailto:lidiia.kovalenko@snau.edu.ua)

*The article describes the efficiency of aseptic arthritis treatment in horses by means of tiotriazolini and dexamethasone. To substantiate the therapeutic effectiveness of the selected drugs, the research was conducted on 12, 18, 24-month horses in the dynamics of aseptic arthritis development and the disease course. The results of the research indicate that the injection of solutions of tiotriazolini and polyvinylpyrrolidone intraarterially to prevent the clinical inflammation signs contributed for the improvement of the animals' general condition after the 3rd injection. The synoviocytogram was already characterized by positive shifts on the 10th day after the second injection of dexamethasone novocaine-based solution with the addition of laevomycesin, which proves the advisability of treating horses of different age groups with aseptic arthritis by means of tiotriazolin and dexamethasone.*

**Key words:** horses, synovial fluid, aseptic arthritis, erythrocytes, leukocytes, synoviocytogram.

DOI: <https://doi.org/10.32845/bsnau.vet.2020.2.2>

**Introduction.** Currently, despite a sufficient number of different methods for treating arthritis, their therapeutic effectiveness remains very low (up to 50%). The reason for this condition, in our opinion, is that the recommendations of treatment methods do not take into account age features of the body's responsiveness and the inflammatory process course in horses Koziy, R.V., S. Yoshimura, R. Dickinson, et al. (2019). First, it is impossible to research the body's resistibility without taking into account age-specific peculiarities of animal development. These features in a growing organism are only formed at a certain level of general physiological maturity. The body of the younger and older age has a different susceptibility to diseases and the ability to respond to the pathogens' impact

Zamazy A.A. etc. (2002), Izdepsky V.I. etc. (2002).

The second important issue is studying the aseptic arthritis and tendinitis pathogenesis in horses, taking into account age dynamics of the synovial fluid's nonspecific resistance factors Stekolnikov A.A., etc. (1996).

Based on the research that substantiated the use of the domestic tiotriazolini drug to treat aseptic arthritis in cattle and obtained high therapeutic effectiveness Rublenko S.V. (1997), we used this drug for treating horses suffering from aseptic arthritis. Use of this drug group in laboratory and domestic animals showed that they have expressed anti-inflammatory and immune-stimulating features. In the treatment scheme we used polyvinylpyrrolidone having strong lubricity properties. Due

to its high viscosity (within 7-15 cm), being injected into the joint, it reduces the dynamic friction coefficient, greatly improves sliding between the joint's surfaces, improves suspension features of the articular cartilage. Polyvinylpyrrolidone reduces and prevents destructive changes in the cartilage. It is able to reduce the collagen fibers disorganization in the synovial membrane, to increase regenerative processes in it, to promote secretion of the synovial fluid and to normalize permeability of the synovial membrane, it has the ability to form an interposition film on the synovial membrane and thereby prevent the fibrin deposition and the adhesions formation.

Proceeding from the above, the therapeutic correction of the lubrication and joint friction processes is pathogenetically justifiable Zamazy A.A., (2004). The said drug is also capable of complex formation at the expense of its amide groups. It binds toxins, inflammatory mediators, lysosomal enzymes and provides for their elimination from the joint cavity. Due to its ability to form complexes, this drug is used as a solvent and various drugs carrier. It prolongs the action of corticosteroids, various antimicrobials and anesthetics by 2-3 times, which reduces their toxic effects on the joint tissues. Tiotriazolini affects Robinson C. S. et al. (2017) the nonspecific and specific mechanisms of the immune system activation Borisevich V.B. (1991).

Its non-specific action is associated with its active influence on the protein molecules metabolism and on the total metabolism as well, with an active effect on the metabolism of molecular protein structures and on the metabolism as a whole, on increasing the functional and metabolic activity of neutrophilic granulocytes. Improvement of intercellular interactions and the drug's antioxidant action leads to normalizing the function of the immunocompetent cells' receptor apparatus, which is characterized by stimulation of T and B - lymphocytic systems Kannegieter N.J. (2009). To treat animals of the second group we used "Dexamethasone" synthetic glucocorticosteroid.

This drug has a strong immunosuppressive, anti-allergic effect, has a non-specific anti-inflammatory effect. Corticosteroid drugs have become widely used due to their inhibitory effect on the inflammation mechanism and its further development. The use of this group drugs is primarily due to their ability to reduce lysosomal membranes' permeability, to prevent the proteolytic enzymes release and to bind active centers of enzyme molecules.

Their anti-inflammatory action Wormstrand B. et al., (2018) is due to inhibition of the inflammatory mediators release (histamine, serotonin and bradykinin), as well as inhibition of the of oxygen radicals formation, disturbance of the processes of lipid peroxidation in the inflammatory focus, resulting in the improved metabolic processes in tissues Rose R. J. (1983), Hamm D., Jones E.W. (1988). Dexamethasone was used in the novocaine - based 0.5% solution, the use of which can be considered a physiological method of treatment, since this drug permits to maximize the use of the body's protective mechanisms.

**The purpose** of the work was to research the synoviocytogram changes in treating the horses with aseptic arthritis by means of the tiotriazolini and dexamethasone drugs.

**Materials and methods.** The research was carried out

at farms of the Poltava and Sumy regions: "Yuvileynyi" instructional farm in the village of Brechkivka, ZAT "Zlagoda" in Kirovo, on the base of Chutove Horse Ranch in Chutove, ZAT "Sumy Horse Ranch" in Patriotovka, Department of Anatomy, Normal and Pathological Animal Physiology of Sumy NAU.

The research was performed on the material of 12, 18, 24-month old horses in the dynamics of aseptic arthritis development and course, four heads in each age group. The scheme of treating horses with acute aseptic arthritis (the first group of 4 animals in each age group) was as follows: after the joint emptying, its cavity was injected with 2 ml of 2% thiotriazoline solution and 15 ml of 15% polyvinylpyrrolidone solution with addition of levomitsetin (0.5 g) every 3 days until the inflammatory process resolution.

The second group (12 horses) consisted of animals with experimental aseptic arthritis, the treatment of which was carried out according to the following procedure: after the joint emptying, it was injected with 1 ml of dexamethasone solution and 5 ml of 0.5% novocaine solution with addition of 0.5 g. levomitsetin into its cavity every 3 days until the clinical recovery.

Sampling of synovial fluid was carried out by puncture of the tarsal joint and stabilized with a 3.8% sodium citrate solution with the ratio of 9:1. The following methods were used in the study: statistical, using the computer VS Excel 2010 software. The received digital material was statistically processed using the S Excel 2010 software to define the arithmetic mean (M), the statistical error of the arithmetic mean (m). The probability of the difference (p) between the arithmetic meanings of the two variation series was determined by the reliability criterion (t) and by the Student's tables. The difference between the two values was considered probable with equal possibility  $p < 0.05; 0.01; 0.001$ .

The applied instrumental methods included the animal synovial fluid studies in all the experimental groups by generally accepted microscopic methods both for native and stained preparations. The «ABXMICROS-60-OT» hematological analyzer, France, was used.

**Results of the study and their discussion.** This article is a continuation of studies on the aseptic arthritis treatment in horses, and describes changes in the synovial fluid composition with application of the above drugs. The previous article described the data of clinical observations and the blood indices changes.

Analyzing the data of the tables, we can conclude that the use of these drugs for therapeutic purposes contributed to the synoviocytogram restoration.

Aseptic arthritis in the horses of the first group was accompanied by a reduction of the lymphocytes percentage in the synoviocytogram by 1.49 times ( $p < 0.001$ ) on the 7th day and mounted on the 10th day of the disease, which was by 1.46 times ( $p < 0.001$ ) lower than in clinically healthy animals.

Later, the percentage of lymphocytes slowly increased, and on the 17th day it was by 19.25% lower than that before the disease ( $p < 0.001$ ). The percentage of monocytes, on the contrary, increased on the 7th day, and from the 7th to the 17th day the percentage of monocytes gradually reduced to  $5.00 \pm 0.82\%$ , which was not reliably higher than in clinically healthy animals.

Table 1

**Synoviocytogram of 12 months aged horses with aseptic arthritis, in percent**

Day of the disease course	Lymphocytes	Monocytes	Neutrophils	Synoviocytes	Histiocytes
Clinically healthy animals	88.25±0.96	3.50±0.58	4.50±0.58	0.75±0.50	0.00±0.00
	87.25±1.26	3.75±0.96	5.50±0.58	0.75±0.50	0.00±0.00
3rd	73.75±1.71***	5.50±0.58	10.00±0.82**	0.25±0.50	4.75±0.50***
	75.25±1.71**	5.75±0.96	10.25±1.26*	0.50±0.58	5.25±0.50***
7th	59.25±1.50***	10.00±1.41*	19.75±0.96***	0.0±0.0	8.75±0.96***
	73.50±1.73**	5.25±0.50	8.75±0.96*	0.50±0.58	5.25±0.50***
10th	60.50±1.91***	9.75±0.50**	18.00±0.82***	0.0±0.0	7.25±0.96***
	79.75±1.26*	4.25±0.50	6.25±0.50	0.50±0.58	3.50±0.58**
13th	63.25±0.96***	7.25±0.50**	16.00±0.82***	0.50±0.58	6.50±0.58***
17th	69.00±1.41***	5.00±0.82	14.50±0.58***	0.25±0.50	4.25±0.50***

Note: 1) \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ , in comparison with clinically healthy animals; 2) numerator – the first group, denominator – the second group

The total percentage of neutrophils in the animals synoviocytogram at 12 months of age increased by 4.39 times ( $p < 0.001$ ) on the 7th day, until the 17th day the percentage of neutrophils gradually reduced and amounted to  $14.50 \pm 0.58\%$ , remaining by 3.22 times higher ( $p < 0.001$ ) than in clinically healthy animals. The percentage of histiocytes in synovial fluid of the diseased animals increased to  $8.75 \pm 0.96\%$  on the 7th day, with their absence in clinically healthy animals ( $p < 0.001$ ). Subsequently, till the 17th day, there was a reduction in the percentage of cells in this group. In animals suffering from aseptic arthritis, the percentage of unclassified cells in synoviocytogram reduced when treated with a solution of tiotriazoloni solution based on polyvinylpyrrolidone, but these

changes are unreliable. In the 12-months aged horses of the second group, the lymphocyte content in the synoviocytogram reduced by 1.16 times till the 3rd day. The dual application of the dexamethasone solution till the 10th day of the disease course contributed to an increase in the percentage of lymphocytes, but still remained by 1.09 times lower ( $p < 0.05$ ) than in clinically healthy animals, which coincides with the results obtained by a number of authors (Stekolnikov AA, Krasnova NL, 1996; Borisevich V.B., 1991).

The percentage of monocytes increased from  $3.75 \pm 0.96\%$  in clinically healthy animals to  $5.75 \pm 0.96\%$  on the 3rd day, but already till the 10th day it reduced to  $4.25 \pm 0.50\%$  (table 2).

Table 2

**Synoviocytogram of 18 months aged horses with aseptic arthritis, in percent**

Day of the disease course	Lymphocytes	Monocytes	Neutrophils	Synoviocytes	Histiocytes
Clinically healthy animals	77.75±0.96	5.50±0.58	10.75±0.96	0.75±0.50	0.00±0.00
	76.75±0.96	5.75±0.50	12.75±0.96	0.75±0.50	0.00±0.00
3rd	61.25±1.50***	9.00±0.82*	22.00±0.82***	1.00±0.82	5.25±0.50***
	60.50±2.08**	8.75±0.96	22.50±1.29**	0.50±0.58	5.75±0.96**
7th	52.75±1.50***	9.50±0.58**	28.25±0.96***	0.75±0.50	7.50±0.58***
	63.00±0.82***	6.75±0.96	19.00±0.82**	0.25±0.50	5.50±0.58***
10th	55.10±1.00***	8.25±0.96	26.25±0.50***	0.50±0.58	6.25±0.50***
	67.00±1.41**	6.00±0.82	17.75±1.26*	0.25±0.50	5.00±0.82***
13th	64.25±1.89**	6.25±0.96	24.00±0.82***	0.25±0.50	4.25±0.50**
17th	67.75±1.26**	5.25±0.50	22.25±1.71***	0.25±0.50	3.50±0.58**

Note: 1) \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ , in comparison with clinically healthy animals; 2) numerator – the first group, denominator – the second group

In the first group animals, during the inflammation development, shifts in the synoviocytogram were characterized by a decrease in the lymphocytes percentage and an increase in the percentage of neutrophils until the 7th day. Under the influence of drugs in the first group, the percentage of lymphocytes in animals at 12 months of age slowly increased to the 17th day, but remained by 19.25% below the rate of the intact animals.

In the horses of 18 and 24 months of age, this index remained by 10-16.25% lower than in clinically healthy animals, which coincides with the research of other authors (Stekolnikov AA, Krasnova NL, 1996; Robinson, C. S.; Singer, E. R.; Piviani, M.; Rubio-Martinez, L. M., 2017). On the 17th day of treatment, a decrease in the percentage of histiocytes was observed to  $4.25 \pm 0.50\%$ . An increase in the percentage of neutrophils, monocytes and histiocytes with aseptic inflammation of the joints was observed by a number of researchers, which is consistent with the data of other authors.

In animals of various ages (group 2), the cellular composition of the synovial fluid recovered better under the

influence of intra-arterial injections of dexamethasone in novocaine-based 0.5% solution.

The experimental aseptic arthritis development was accompanied by reducing of the lymphocytes content in the synovia and by an increase in the percentage of neutrophils, monocytes, occurrence of histiocytes, established by the following authors (Wormstrand B, Ostevik L, Ekman S, Olstad K. 2018).

The histiocytes percentage on the 3rd day was  $5.25 \pm 0.50\%$ , with their absence in clinically healthy animals ( $p < 0.001$ ) and on the 10th day it remained at the level of  $3.50 \pm 0.58\%$  ( $p < 0,01$ ).

The cellular composition of synovia in the treatment of 18 and 24 months aged horses with aseptic arthritis using a solution of dexamethasone in 0.5% novocaine-based solution repeats the dynamics of changes in the synoviocytogram of the 12 months aged animals (second group, table 3). Thus, in horses of the second group, the cellular composition of synovial fluid was more efficiently restored.

Table 3

## Synoviocytogram of 24 months aged horses with aseptic arthritis, in percent

Day of the disease course	Lymphocytes	Monocytes	Neutrophils	Synoviocytes	Histocytes
Clinically healthy animals	74.00±1.41	5.00±0.82	13.25±1.26	0.75±0.96	0.00±0.00
	74.25±0.96	5.25±0.96	13.25±1.26	0.25±0.50	0.00±0.00
3 rd	61.00±1.41**	7.25±0.50	23.25±0.96**	0.25±0.50	5.50±0.58***
	59.75±1.26**	8.75±0.96	23.50±1.29**	0.25±0.50	6.75±0.96***
7 th	50.75±1.71***	8.25±0.96	29.00±0.82***	0.00±0.00	9.50±0.58***
	64.25±0.96***	7.50±0.58	21.00±1.83**	0.00±0.00	5.25±0.50***
10 th	52.00±1.41***	8.00±0.82	27.25±0.96***	0.25±0.50	8.25±0.96***
	67.00±1.41*	6.75±0.50	20.00±1.41**	0.75±0.50	4.00±0.82***
13 th	52.75±0.50***	7.50±0.58	26.75±0.96**	0.25±0.50	7.00±0.82***
17 th	57.75±1.50**	5.25±0.50	22.50±1.29**	0.75±0.50	5.75±0.50***

Note: 1) \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ , in comparison with clinically healthy animals; 2) numerator – the first group, denominator – the second group.

In animals of the studied age groups there was a reduction of the lymphocytes percentage in the synoviocytogram until the 3rd day of the aseptic arthritis development. The dual use of the dexamethasone solution contributed to an increase in the lymphocytes percentage, but their content remained lower on the 10th day than in clinically healthy animals. An increase of the monocytes percentage on the 3rd day was observed, and until the 10th day their content reduced, but it was unreliable. The neutrophil content in the synovial fluid of sick horses was growing before the treatment. On the 10th day, under the influence of the of dexamethasone novocaine-based solution the neutrophils level decrease was observed, which is consistent with the results of other authors' research (Zamaziy A.A., Peredera R.V., 2002; Koziy, R.V., S. Yoshimura, R. Dickinson, et al., 2019).

Studies indicate that by the third day after the introduction of the irritant drugs showed deterioration in both groups of animals. Animals were mainly in the supine position, reluctantly summed with considerable effort. Ending injuries in a static position, they kept hanging on her crops and livestock or hitch. Most horses there limp medium degree, and some - high. Passive motion in the joint was painful.

Animals recorded increase overall body temperature (up to 38,7-38,9 °C), and pulse rate and respiration were respectively 50-54 and 14-18. Locally noted the increase in volume on joint 3,5-4,1 cm, its contours are smoothed. Swelling of tissue was spilled, testate consistency, hot to the touch, pain. Inversion joints were filled with palpable and fluctuant. In joint puncture allocated a significant amount of synovial fluid liquid consistency, opaque, from straw yellow to dark yellow.

After injection of medications (for 7 days, the development of inflammation) general condition of the animals of the first group improved, but the horses were still somewhat suppressed, long lay. Total body temperature they used to be within the normal range (37,7-38,5°C) but the pulse rate (49-52 beats per minute) and respiration (12-17) remained elevated. In some animals while driving carts limb lameness was observed moderate and try to resist ending ill at ease, but with passive movements were still painful. When the local joint study volume decreased by 0,7-1,0 cm., Tissues were tistuvatoyi consistency, the local temperature dropped in some animals.

In the study the animals of the first group on the 10th day of the inflammatory process (after the third drug administration) was observed to improve the general condition of the animals. This significantly reduced the volume of the patient's joint, but signs of inflammation have not disappeared. Most horses while driving moderate lameness was observed

while at rest sick limb partially involved in the resistance. When the local study discovered a further decrease of the affected joints, compared with a previous study on 1.5-2.0 cm. This swelling of tissue was limited, they are somewhat compacted consistency, the local temperature and pain were reduced.

After 13 days, the horses of the group was noted significant improvement in overall condition. Joints were distinct, but their capacity was slightly increased, compacted tissue, inversion fulfilled, and when they puncture stand out enough synovial fluid viscous consistency, but it was a bit cloudy. To monitor therapeutic efficacy us further (17 day) conducted sampling of blood and synovial fluid.

In the second group of animals after using dexamethasone solution of novocaine (on the seventh day of inflammation) showed significant improvement in overall condition. At this time, the volume decreased by painful joint 1,3-2,1 cm., But signs of inflammation persist. Most of the animals during the movement observed moderate lameness and resting sick limb partially participated in the resistance. When the local tissue swelling study was limited, compacted consistency, the local temperature and pain decreased, but passive movements were still quite painful. After the second drug administration (10 day treatment) observed no signs of inflammation, a significant decrease of joint (another 0.8-1.5 cm).

Thus, these clinical observations suggest that the use of dexamethasone in combination with 0.5% solution of novocaine leads to a rapid recovery animals (after two injections), while thiotriazolol together with polyvinylpyrrolidone ensure the recovery of sick animals only 13- per day, which is consistent with findings of other authors (Wormstrand B, Ostevik L, Ekman S, Olsstad K. (2018).

As a result of the research we have found that the use of drugs for therapeutic purposes specified amount contributed to the restoration of blood cells, but the dynamic changes the number of red blood cells, haemoglobin and white blood cells had different age groups of animals (Table. 4). Since the content of red blood cells of sick animals 12 months of age on the third day of inflammation significantly decreased to  $7,88 \pm 0,03$  T / L ( $p < 0.01$ ), which coincides with the results of several authors White-Lewis S, Johnson R, Ye S, Russell C. (2019).

On the seventh day of treatment was observed to increase the number of red blood cells to  $12,09 \pm 0,06$  t / L ( $p < 0.001$ ), and further use of the solution to Thiotriazolol polyvinyl helped reduce the number of red blood cells (17 day) to  $8,71 \pm 0,09$  t / l at  $8,60 \pm 0,03$  t / l in clinically healthy animals. Similar results regarding erythrocyte count changes

were observed in the blood of patients with aseptic arthritis horses 18 and 24 months of age, and set the following authors

Yoshimura S, Koziy RV, Dickinson R, Moshynskyy I, McKenzie JA, Simko E, Bracamonte JL. (2020).

Table 4

**Changes in the content of red blood cells and haemoglobin in the treatment of horses suffering from aseptic arthritis.**

Day disease	Age animals months.					
	12 (n = 4)		18 (n = 4)		24 (n = 4)	
	Red blood cells, T / L	Haemoglobin, g / l	Red blood cells, T / L	Haemoglobin, g / l	Red blood cells, T / L	Haemoglobin, g / l
Clinically healthy animals	8,60 ± 0,03	14,4 ± 0,10	8,63 ± 0,02	14,6 ± 0,09	7,90 ± 0,03	14,6 ± 0,04
	8,64 ± 0,11	14,4 ± 0,11	8,65 ± 0,07	14,5 ± 0,11	7,85 ± 0,08	14,6 ± 0,09
Third	I 7,88 ± 0,03 ***	13,2 ± 0,09 ***	7,82 ± 0,03 ***	13,5 ± 0,05 ***	7,04 ± 0,05 ***	13,2 ± 0,08 ***
	II 7,67 ± 0,10 ***	13,2 ± 0,10 ***	7,84 ± 0,09 ***	13,4 ± 0,16 ***	6,98 ± 0,11 ***	13,1 ± 0,07 ***
7th	I 12,09 ± 0,06 ***	13,4 ± 0,07 ***	11,89 ± 0,04 ***	13,5 ± 0,09 ***	11,43 ± 0,03 ***	13,1 ± 0,08 ***
	II 12,19 ± 0,21 ***	13,7 ± 0,14 **	11,20 ± 0,17 ***	13,5 ± 0,06 ***	8,31 ± 0,23 *	13,3 ± 0,09 ***
10th	I 9,94 ± 0,04 **	13,8 ± 0,11 **	10,09 ± 0,05 ***	13,9 ± 0,10 **	9,57 ± 0,08 ***	13,7 ± 0,06 ***
	II 9,0 ± 0,12	14,1 ± 1,14	8,93 ± 0,10	14,2 ± 0,16	8,00 ± 0,19	14,3 ± 0,19
13th	9,03 ± 0,04 ***	14,2 ± 0,10	9,05 ± 0,04 **	14,1 ± 0,07	8,25 ± 0,09	14,3 ± 0,07
17th	8,71 ± 0,09	14,4 ± 0,06	8,86 ± 0,10	14,5 ± 0,05	7,97 ± 0,05	14,5 ± 0,08

Note: 1) \* P < 0.05; \*\* P < 0.01; \*\*\* P < 0.001 compared with clinically healthy animals; 2) the numerator - the first group, the denominator - the second group

In addition to changes in the number of red blood cells, observed changes in the amount of haemoglobin in animals of all ages. By the 3rd day haemoglobin decreased significantly (p < 0.001) in the blood of horses 12 months of age to 13,2 ± 0,09 g / l. A significantly (p < 0.001) reduction in haemoglobin during this period was observed in horses 24 months of age. Treatment resulted in a gradual increase in haemoglobin in the blood and 13 day reached the level of this indicator in clinically healthy animals.

The dynamic effect on the recovery of erythropoiesis we found when using a solution of dexamethasone in patients with other animal groups. Horses at 12 months of age, the number of

erythrocytes on the third day of treatment was reduced to 7,67 ± 0,10 T / L (p < 0.001), 18 months of age - up to 7,84 ± 0,09 T / L (p < 0.001) and 24 months - up to 6,98 ± 0,11 T / l and 7-day study showed significant increase of this indicator in animals of all ages. The results of our research and the research of other authors Chapman HS, Richardson DW, Orved KF. (2019) found that after using double dexamethasone solution for 10 days decreased levels of red blood cells to that of inherent clinically healthy animals.

Another picture changes observed in the number of leukocytes in the first group of horses of all ages (Table. 5).

Table 5

**Changes in blood leukocyte content in the treatment of animals suffering from arthritis, aseptic, g, l**

Day disease	Age animals months.		
	12	18	24
Clinically healthy animals	8,91 ± 0,05	8,76 ± 0,09	8,70 ± 0,07
	8,93 ± 0,01	8,88 ± 0,12	8,75 ± 0,11
Third	10,91 ± 0,09 ***	10,81 ± 0,05 ***	10,13 ± 0,06 ***
	11,00 ± 0,13 ***	10,61 ± 0,11 ***	10,18 ± 0,10 ***
7th	14,50 ± 0,19 ***	13,55 ± 0,11 ***	13,48 ± 0,09 ***
	9,35 ± 0,15	9,86 ± 0,14 **	9,85 ± 0,11 **
10th	12,85 ± 0,11 ***	10,24 ± 0,09 ***	12,10 ± 0,09 **
	8,95 ± 0,11	8,85 ± 0,11	8,88 ± 0,14
13th	10,81 ± 0,11 ***	10,05 ± 0,04 ***	10,08 ± 0,10 ***
17th	9,13 ± 0,12	9,05 ± 0,09	9,00 ± 0,10

Note: 1) \* P < 0.05; \*\* P < 0.01; \*\*\* P < 0.001 compared with clinically healthy animals; 2) the numerator - the first group, the denominator - the second group

The development of aseptic arthritis was accompanied by a significant (p < 0.001) increase in the number of white blood cells on the third day of the first group of horses, and on the seventh day to 13,48 ± 0,09-14,50 ± 0,19 g / l (p < 0.001), which is 1.33 times higher than the 3rd day of the disease.

Only on the 10th day after the 2nd single use medical drugs, the number of white blood cells in animals first group began to decline, a sign of early recovery leukopoiesis and on the 17th day it reached the level of clinically healthy animals, which is consistent with findings of other authors Koziy RV, Yoshimura S, Dickinson R, Rybicka JM, Moshynskyy I, Ngeleka M, Bracamonte JL, Simko E. (2019).

The use of dexamethasone to treat horses suffering from arthritis aseptic a significant impact on the number of leukocytes, which was characterized by gradual reduction to the

10th day of leukocytes content compared to those of intact animals.

Leukograms experimental animals characterized by dynamic changes segmented neutrophils, lymphocytes and monocytes.

The content of segmented neutrophils in horses first group (Table. 6) increased to 45,50 ± 1,29-52,25 ± 1,25 (1,27-1,31 in the fold, p < 0.01). Later thiotriastolin polyvinyl contributed to reduction in the percentage of this group of cells to that of intact animals.

The content of monocytes during treatment increased in 1,40-1,85 times to 7 th day since the beginning of inflammation and gradually decreased to 4,00 ± 0,82% on the 17th day.

The development of aseptic joint inflammation accompanied by a probable decrease in the number of

lymphocytes in 1,32-1,42 times ( $p < 0.01$ ) in the 7th day, followed by a gradual increase in the percentage of data cells to that of clinically healthy animals.

Leukogram animal with aseptic arthritis (second group), characterized by a decrease in the contents of lymphocytes to the 3rd day of the disease ( $p < 0.01$ ), with a gradual increase, starting from the 10th day, and the content segmented neutrophils significantly ( $p < 0, 01$ ) increased the 3rd day at 8-

9,25% with a gradual decrease to  $36,25 \pm 0,96$ - $43 \pm 0,82\%$  on the 10th day of treatment, coinciding with studies by other authors White-Lewis S, Johnson R, Ye S, Russell C. (2019).

In this group of horses 18 and 24 months of age in leukogram biggest changes were observed in the number of neutrophils and lymphocytes and dynamics of consistent changes percent of the white blood cells of horses 12 months of age.

Table 6

**Leucogram 12-month-old horses suffering from aseptic arthritis percentage**

Day disease	Bazofily	Eosinophils	Neutrophils		Lymphocytes	Monocytes
			coli nuclear	segment nuclear		
Clinically healthy animals	-	$3,25 \pm 0,50$	$4,25 \pm 0,50$	$34,75 \pm 1,71$	$54,00 \pm 1,41$	$3,75 \pm 0,96$
	-	$3,25 \pm 0,50$	$4,25 \pm 0,50$	$35,25 \pm 1,26$	$54,00 \pm 2,00$	$3,25 \pm 0,50$
Third	-	$3,50 \pm 0,58$	$4,50 \pm 0,58$	$39,00 \pm 0,82$	$47,25 \pm 1,89$	$5,75 \pm 0,96$
	-	$2,50 \pm 0,58$	$5,25 \pm 0,50$	$44,50 \pm 1,29^{**}$	$42,50 \pm 1,91^{**}$	$4,75 \pm 0,50$
7th	-	$3,25 \pm 0,50$	$5,00 \pm 0,82$	$45,50 \pm 1,29^{**}$	$41,00 \pm 1,41^{**}$	$5,25 \pm 0,50$
	-	$2,25 \pm 0,50$	$5,00 \pm 0,82$	$40,76 \pm 0,96^*$	$48,00 \pm 0,82$	$4,00 \pm 0,82$
10th	-	$3,50 \pm 0,58$	$4,50 \pm 0,58$	$42,25 \pm 1,26^*$	$45,00 \pm 0,82^{**}$	$4,75 \pm 0,50$
	-	$2,50 \pm 0,58$	$4,25 \pm 0,50$	$36,25 \pm 0,96$	$53,50 \pm 1,29$	$3,50 \pm 1,00$
13th	-	$3,00 \pm 0,58$	$4,25 \pm 0,50$	$40,75 \pm 0,96$	$47,75 \pm 1,50^*$	$4,25 \pm 0,50$
17th	-	$3,25 \pm 0,96$	$3,75 \pm 0,50$	$39,00 \pm 1,15$	$50,00 \pm 1,41$	$4,00 \pm 0,82$

Note: 1) \*  $P < 0.05$ ; \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$  compared with clinically healthy animals; 2) the numerator - the first group, the denominator - the second group

### Conclusion.

1. The use of dexamethasone novocaine-based solution in the treatment of various aged animals with experimental aseptic arthritis is more likely to contribute to the restoration of the lymphocytic and neutrophilic series cells percentage in the synoviocytogram than the thiotriazoloni solution with polyvinylpyrrolidone.

2. Treatment of various age groups horses with aseptic arthritis by means of thiotriazoloni and dexamethasone preparations should be carried out taking into account changes in the cellular synovias composition that are associated with the mobilization of protective mechanisms in the animal body aimed at eliminating the inflammatory process.

3. Use of dexamethasone with novocaine solution facilitates faster recover animals joint volume decreases by 0.8-1.5 cm after two injections, unlike Thiotriazoloni use in combination with polyvinyl ensure that the recovery of sick animals only 13 -in day.

4. Treatment of horses Thiotriazoloni drugs and dexamethasone different age groups of patients with aseptic arthritis conduct to reflect changes in the cellular composition of blood associated with the mobilization of defense mechanisms in animals aimed at eliminating inflammation. In the future research in this direction will allow timely diagnosis and conduct effective treatment of horses suffering from aseptic arthritis.

### References

1. Koziy RV, Yoshimura S, Dickinson R, Rybicka JM, Moshynskyy I, Ngeleka M, Bracamonte JL, Simko E. (2019) Use of standard diagnostic techniques to determine eradication of infection in experimental equine septic arthritis. *Can J Vet Res.*, 83(1), 24-33.
2. Zamazyi A.A., Peredera R.V. (2002). Changes in the cellular composition and some enzymes in the synovial fluid in horses with age. *Horse breeding and equestrian sport*, 3, 25-26.
3. Izdepsky V.I., Zamazyi A.A., Rublenko A.G. Stotsky A.G., Chernyak S.V., Chornozub N.P. (2002). The properties of synovia are normal and with aseptic arthritis. *Veterinary medicine*, 3, 41-44.
4. Stekolnikov AA, Krasnova NL (1996). Treatment and prevention of tendinitis in horses. *Veterinary medicine*, 11, 39-41
5. Rublenko SV (1997). State of proteolytic and fibrinolytic system in synovial fluid of young cattle in norms and in aseptic arthritis: Abstract. Dis. of PhD. 21 p.
6. Zamazyi A. A. (2004). Likuvannia aseptychnykh artrytiv u konei [Treatment of aseptic arthritis in horses] *Visnyk SNAU [Bulletin of SNAU]*, 7 (12), 44-46. (in Ukrainian)
7. Borisevich V.B. (1991). Technological diseases of agricultural animals. *Problems of surgical pathologists s. animal: Abstract. doc. All-Union. Scientific Conf.* 65-68.
8. White-Lewis S, Johnson R, Ye S, Russell C. (2019) An equine-assisted therapy intervention to improve pain, range of motion, and quality of life in adults and older adults with arthritis: A randomized controlled trial. *Appl Nurs Res.*, 49:5-12. <https://doi.org/10.1016/j.apnr.2019.07.002> .
9. Glass K, Watts AE. (2017) Septic Arthritis, Physitis, and Osteomyelitis in Foals. *Vet Clin North Am Equine Pract.* 33(2), 299-314. <https://doi.org/10.1016/j.cveq.2017.03.002> .
10. Chapman HS, Richardson DW, Ortvad KF. (2019). Arthrodesis of the metacarpophalangeal and metatarsophalangeal joints to treat osteoarthritis in 17 horses. *Vet Surg.* 2019, 48(5), 850-857. <https://doi.org/10.1111/vsu.13236> .

11. Yoshimura S, Koziy RV, Dickinson R, Moshynskyy I, McKenzie JA, Simko E, Bracamonte JL. (2020) Use of serum amyloid A in serum and synovial fluid to detect eradication of infection in experimental septic arthritis in horses. *Can J Vet Res.*, 84(3) 198-204. PMID: PMC7301682.

12. Robinson, C. S.; Singer, E. R.; Piviani, M.; Rubio-Martinez, L. M. (2017. )Are Serum Amyloid A or D-Lactate Useful to Diagnose Synovial Contamination or Sepsis in Horses. *Vet. Rec.* , 181(16), 425, DOI: <https://doi.org/10.1136/vr.104386>

13. Wormstrand B, Ostevik L, Ekman S, Olstad K. (2018). Septic arthritis/osteomyelitis may lead to osteochondrosis-like lesions in foals. *Vet Pathol.* ; 55: 693– 702. <https://doi.org/10.1177/0300985818777786>

**М. Камбур**, Сумський НАУ

**А. Замазій**, Полтавська державна аграрна академія

**О. Калашник**, Сумський НАУ

**Л. Плюта**, Сумський НАУ

**Є. Лівощенко**, Сумський НАУ

**Л. Коваленко**, Сумський НАУ

**Синовіоцитограма коней за умов лікування асептичних артритів.**

У статті описано ефективність лікування асептичного артрит у коней за допомогою тіотриазоліну та дексаметазону. Для обґрунтування терапевтичної ефективності вибраних лікарських засобів дослідження проводилося на 12, 18, 24-місячних конях у динаміці розвитку асептичного артрит та перебігу захворювання. Результати дослідження вказують на те, що застосування розчинів тіотриазоліну та полівінілпіролідону інтраартеріально сприяло тому, що після 3-ї ін'єкції запобігання клінічним ознакам запалення спостерігалось поліпшення загального стану тварин. Синовіоцитограма характеризувалася позитивними зрушеннями вже на 10-й день після другого введення розчину дексаметазону на основі новокаїну з додаванням левоміцетину, що доводить доцільність лікування коней різних вікових груп з асептичним артритом за допомогою препаратів тіотриазоліну та дексаметазону.

**Ключові слова:** коні, синовіальна рідина, асептичний артрит, еритроцити, лейкоцити, синовіоцитограма.

Дата надходження до редакції: 21.09.2020 р.