EFFICIENCY OF CANINE ERYTHROCYTE TRANSFUSION AFTER HYPOTHERMIC STORAGE WITH THE ADDITION OF AN ANTIOXIDANT BY HEMATOLOGICAL AND BIOCHEMICAL PARAMETERS

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Red blood cell transfusion is an important method of treating anemia in veterinary medicine, especially in severe forms of diseases accompanied by acute or chronic blood loss. In cases where red blood cell transfusion is life-saving, it is critical to ensure that they are stored for a certain period of time with minimal loss of functional cell activity. Preservation of red blood cells under hypothermic conditions allows to extend their shelf life, which is extremely important in clinical practice. However, one of the main challenges of transfusion medicine is to maintain the viability and functional properties of red blood cells after prolonged storage.

N-acetylcysteine (NAC) is known for its antioxidant and membrane-stabilizing properties, which makes it a promising agent for preserving the functional properties of red blood cells during long-term storage. This study aims to evaluate the hematological and biochemical parameters of dogs after transfusion of erythrocytes stored at low temperatures with the addition of NAC.

The aim of the study was to evaluate the effect of transfusion of red blood cells stored in hypothermic conditions for 21 days with the addition of N-acetylcysteine on the clinical condition, as well as hematological and biochemical parameters of dogs. Particular attention was paid to the absence of side effects after the procedure and the stability of the main indicators of homeostasis.

The study involved dogs with diagnosed anemia who underwent transfusion of red blood cells stored at 0-4 °C for 21 days with the addition of NAC. The clinical condition of the animals was monitored for 10 days after the procedure. Hematological parameters (hemoglobin, hematocrit, red blood cell count), biochemical parameters (transaminases, bilirubin, creatinine, urea) and general clinical condition of dogs (body temperature, cardiovascular, respiratory and neurological systems) were evaluated.

The transfusion of red blood cells stored with the addition of NAC was successful, with no side effects detected during 10 days of observation. No increase in the average rectal temperature, gastrointestinal, cardiovascular, respiratory system or neurological disorders were observed in dogs. There were also no acute signs of incompatibility. This confirms the safety of the transfusion and the effectiveness of the use of NAC as a component for red blood cell preservation.

Prior to transfusion, dogs with anemia had a 49.00% decrease in hemoglobin, 50.17% decrease in red blood cells, and a 51.7% decrease in hematocrit compared to healthy animals. After transfusion of red blood cell mass, hematocrit increased by 28.83%, hemoglobin level increased by 30.64%, and red blood cell count increased by 82.81%. The data obtained indicate effective compensation of anemia, which indicates the recovery of hematological parameters after the procedure.

A biochemical blood test revealed significant changes in liver and kidney function. The level of ALT and AST decreased by 9.38% and 6% after the first day, and after 10 days, the indicators returned to physiological norm, indicating the absence of hepatic complications. Bilirubin levels after transfusion decreased by 38.75% after the first day and by 43.17% on day 10, indicating the restoration of the normal process of hemoglobin destruction.

Creatinine and urea, which are markers of kidney function, also decreased by 48.10% and 41.61%, respectively, indicating that there was no kidney damage after transfusion. This is especially important for dogs with concomitant chronic kidney or liver problems, as well as for geriatric patients.

The results obtained indicate that transfusion of red blood cells stored in hypothermic conditions with the addition of NAC is safe and effective for the treatment of anemia in dogs. The use of NAC allows preserving the functional properties of red blood cells and preventing the development of complications, which is especially important for dogs with chronic diseases. Hematological and biochemical parameters obtained after transfusion indicate an improvement in the health of animals, which indicates the feasibility of further application of this method in clinical practice.

CONTENT OF LIPID PEROXIDATION PRODUCTS AND CATALASE ACTIVITY IN THE BRAIN TISSUE OF Cr(VI)-INTOXICATED RATS UNDER THE ACTION OF ETHYLTHIOSULPHANILATE

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Cr(VI) is a representative of heavy metals, classified as a global environmental pollutant and a potent toxicant to living organisms [Zhang, 2024]. The negative impact of Cr(VI) compounds is accompanied by neurotoxicity [Wise, 2022], the main reason for which is the persistent Cr(VI)-induced production of ROS and disruption of the pro/antioxidant balance in brain cells. Mammalian brain cells have a high percentage of unsaturated fats and a less effective antioxidant defense system, which causes increased sensitivity of the corresponding cells to the degrading effects of ROS [Saleh, 2022].The use of antioxidant compounds is considered to be one of the effective methods of counteracting Cr(VI)-induced neurotoxicity caused by ROS hyperproduction [Tripathi, 2023]. Ethylthiosulfanylate (ETS) belongs to the class of thiosulfonate compounds, which are synthetic analogues of natural sulfur organic bioactive compounds extracted from plants of the *Alliaceae* family. ETS is characterized by antiradical, antioxidant properties *in vitro* and *in vivo* [Liubas, 2022], and also reduces the level of Cr(VI)-induced oxidative stress in rat liver [Kotyk, 2020].

Therefore, the aim of the study was to investigate the content of lipid hydroperoxides and catalase activity in the brain tissue of Cr(VI)-intoxicated rats under the action of ethylthiosulfanylate.

The study was conducted in the Laboratory of biochemistry adaptation and ontogenesis of animals of the Institute of Animal Biology of the NAAS on male *Wistar* laboratory rats weighing 135 ± 5 g. The animals were divided into 5 groups of 5 rats each: Group 1 (control group) – received intraperitoneal injection of 150 μl of physiological saline once daily for 2 weeks; Group 2 – was injected intraperitoneally with $K_2Cr_2O_7$ dissolved in physiological saline solution (2.5 mg Cr(VI)/kg body weight) once daily for 2 weeks; Group 3 – was administrated intragastrally with 1000 μl of sunflower oil once daily for 2 weeks and then injected intraperitoneally with 150 μl of physiological saline once daily for 2 weeks; Group 4 – was administrated intragastrally with 1000 μl of oil solution of ETS (ethylthiosulfanylate) (100 mg/kg body weight) once daily for 2 weeks and then injected intraperitoneally with 150 μl of physiological saline once daily for 2 weeks. Group 5 – was administrated intragastrally with 1000 μl of oil solution of ETS (100 mg/kg body weight) once daily for 2 weeks and then injected intraperitoneally with $K_2Cr_2O_7$ solution (2.5 mg Cr(VI)/kg body weight) once daily for 2 weeks. The material for the study was rat brain. In brain tissue homogenates, the content of lipid hydroperoxides (SU/g tissue) and catalase activity (mmol/min ×mg protein) were determined. Mathematical and statistical (ANOVA) calculations were performed using *Microsoft Excel* software packages.

The content of lipid hydroperoxides significantly increased, while catalase activity significantly decreased in the brain tissue of rats of the experimental group 2 by 81 and 54%, respectively, compared to the control (group 1). Similarly, the level of lipid hydroperoxides significantly increased,