STATE UNIVERSITY PAULISTA

SCHOOL OF VETERINARY MEDICINE AND ANIMAL SCIENCES

**HEMATOLOGICAL, GASOMETRIC AND BIOCHEMICAL PARAMETERS IN THE INDUCTION OF BRAIN DEATH IN WISTAR RATS**

NAYARA MARIA GIL MAZZANTE

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**Dedication**

I dedicate this work to my friend Jessica Milk Fogaça that gave me strength to continue in this academic path for another time of my life.

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Try to live in serenity, taking care of your own things and working with your hands, as we have recommended. Thus you will live in honor in the presence of those outside and you will not be burdened with anyone (1 Thess 4:11-12).

Whatever you do, do with all your heart as for the Lord and not for men (Col 3:23). Consecrate to the Lord all that he does, and his plans will be successful (Pr 16**:3).**

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**ABBREVIATIONS**

PORTUGUESE (Brazil)

AAN - American Academy of Neurology

ALT - Alanine Aminotransferase

AST - Aspartate Aminotransferase

Ca2+ – Cálcio

CEMIB - Multidisciplinary Center for Biological Research CEUA - Committee on Ethics in the Use of Animals CFM - Federal Council of Medicine

CHCM - Concentration of Corpuscular Hemoglobin Cl-- Chlorine

Creat – Creatinina

CID - Intravascular Disseminated Coagulation

COBEA - Brazilian College of Animal Experimentation

CK - Creatine kinase

CK-MB - Creatine kinase - MB

DC - Cardiac output

FA - Alkaline Phosphatase

FC - Heart Rate

FMB - Botucatu Medical School

G0 - Control group (before brain death)

G1 - Groups with brain death induction (group immediately after brain death induction)

G2 - Groups with brain death induction (group 1 h after brain death induction)

GGT - Gamma Glutamil Transferase

Hb – Hemoglobina

HCM - Mean Corpuscular Hemoglobin

HCO3 – Bicarbonato

He – Hemácia

Ht - Hematocrit

K+ – Potássio

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Lac - Lactate

M0 - Moment 0 (before brain death)

M1 - Moment 1 (immediately after the induction of brain death)

M2 - Moment 2 (1 hour after the induction of brain death)

ME - Brain death

MLG - Generalized Linear Models

Na+ – Sódio

PA - Blood Pressure

PAM - Mean Blood Pressure

PAS - Systolic Blood Pressure

pCO2- Carbon Dioxide partial pressures pH - Hydrogen potential of blood

pO2- Partial pressures of Oxygen

PIC - Intracranial Pressure

PT - Total Plasma Protein

PT sérica - Total Serum Protein

sO2- oxygen saturation index

TCE - Cranial-Encephalic Trauma

UNICAMP - Universidade Estadual de Campinas UNIPEX - Experimental Research Unit VCM - Volume Corpuscular Medium VD - Right Ventricle

ENGLISH (USA)

BD – “Brain death” (Morte cerebral)

RDW - Red Cell Distribution Width (Red Cell Distribution Amplitude)

SAS - Statistical Analysis System (SAS)

UDDA - Uniform Determination of Death Act (Uniform Death Determination Act)

WH - Wistar Rats (Wistar Rats)

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MAZZANTE, N.M.G. **Hematological, gasometric and biochemical** parameters in the induction of brain death in Wistar rats. Botucatu, 2021. p. 80. Thesis (PhD) - Faculty of Veterinary Medicine and Zootechnics, Campus of Botucatu, State University of São Paulo.

**SUMMARY**

Brain death (ME) is defined as the complete and irreversible loss of brain functions. In veterinary medicine, data are scarce and more studies are needed to determine the timing of ME more accurately. Even in human medicine where more data are available, there is still no consensus on its determination among countries. The objective of this study was to evaluate the hematological, biochemical and gasometric parameters in Wistar rats to help understand the parameters on brain death and make more reliable, as well as reduce early diagnosis errors. 15 adult male Wistar (*Rattus norvergicus rats were used*; HanUnib:WH) that were randomly distributed in three groups, with five animals each: the control group (G0), evaluation performed before the ME; and two groups (G1 and G2) which were induced at different times, the first with evaluation immediately after induction and 1 hour after induction, respectively. Venous blood samples were collected for hemogram and biochemical tests, and also arterial blood for gasometry of each rat at the time related to the group they belonged. Significant statistical values were observed (P<0.05) in relation to the segmented, where the means of G1>G2 and G0>G2; monocytes, where G2>G1 and G0>G1; creatinina, onde G2>G0; AST, onde G1>G0; potassium, where G2>G0 and HCO3, where G0>G1. In addition, it was observed that there is an individual response of each organism to brain death which makes its precise determination a challenge.

**Keywords:** brain death, Wistar rats, hematological analysis.

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MAZZANTE, N.M.G. **Hematological, gasometric and biochemical parameters in the induction of brain death in Wistar rats.** Botucatu, 2021. p. 80. Thesis (Doctorate)

– School of Veterinary Medicine and Animal Science, Botucatu Campus, Sao Paulo State University.

**ABSTRACT**

Brain death (BD) is defined as the complete and irreversible loss of brain functions. In veterinary medicine, the data regarding is scarce and further studies are needed to determine more precisely the moment of BD. In human medicine, even though data is available, there is no consensus regarding the exact point of BD among the countries. This study aims to evaluate the hematologic, biochemical and gasometric parameters in Wistar rats to help develop a better understanding regarding the brain death parameters and make them more reliable, in addition to decreasing the number of misdiagnosis early. Fifteen adult male Wistar rats (*Rattus norvergicus*; HanUnib:WH) were randomly distributed into three groups of five animals in each: the control group (G0) with the evaluation performed before BD; and two groups (G1 and G2) which BD was induced in different moments, the first with the evaluation immediately after the induction and one hour after induction, respectively. Samples of venous and arterial blood were collected for the complete blood count and the biochemical assay, and for the blood gas assay. The samples were collected at the appropriate time according to the group each rat belonged to. Statistically significant mean values were observed (P<0,05) for segmented, where the means of G1>G2 and G0>G2; monocytes, where G2>G1 e G0>G1; creatinine, where G2>G0; AST, where G1>G0; potassium, where G2>G0; and CHCO3, where G0>G1. In addition, it was observed that there is an individual response from each organism to brain death, which makes its precise determination even more challenging.

**Keywords:** brain death, Wistar rats, hematologic analysis.

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**1. INTRODUCTION**

Brain death (ME) is defined as the complete and irreversible loss of brain functions. In 1980 the Uniform Death Determination Law (UDDA) proposed a legal definition of death, which says that "an individual who has sustained irreversible cessation of circulation and respiratory functions, or irreversible cessation of all functions of the entire brain, including the brainstem, is dead" (ABRAM et al., 1981).

However, the criteria for determining ME vary between countries, so that each has a national law or guideline and thus there is no standardization of these criteria. In 50% of the countries, clinical examination is sufficient to determine brain death, but additional tests are required in the remaining 50% (CITERIO et al., 2014).

The social transformations and the evolution of medicine in Brazil led the Federal Council of Medicine (CFM) to update the criteria for diagnosis of ME in 2017 with Resolution n°2.173, of 23 November, which replaces the n°1.408/97. In the changes made were included, the requirements for the patient to meet specific physiological prerequisites and for the doctor to provide care to the patient before starting procedures to diagnose cerebral death and perform complementary tests, as well as the need for specific training for doctors who make this diagnosis (BRAZIL, 2017; CFM, 1997).

The constant change is necessary, because a factor that hinders the determination of the moment of EM is that there are significant complex pathophysiological changes, which involve: excitation of sympathetic nerves, hormonal imbalance, hemodynamic instability and metabolic disorder with the release of cytokines, which have peaks at different times due to the type of reaction and severity of the lesion. Such changes induce irreversible damage to the organs and always have a pro-inflammatory environment (CHEN et al., 2016).

Thus, after ME there is a significant increase in the activation of the complement system, apoptosis and expression of pro-inflammatory cytokines and chemokines, as well as increased immune responses, particularly those pro-inflammatory mediated by cytokines (IL-1ß, IL-2, IL-6, IL-10 and IL-13), which are time dependent and can

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be observed in experimental models after induced brain death (ESMAEILZADEH et al., 2017).

In human medicine, ME is widely studied, mainly because the patient with such a condition is a potential organ donor, but there is still no consensus on its determination among countries. Data are scarce and more studies are needed to determine the time of brain death more accurately.

In the literature, there was a lack of research on ME in animals. The social importance of animals and the growing demand for scientific data for the determination of death and its establishment in animals became important to veterinarians, given the increase in the animal market (agricultural, Pet market, among others) and evolution of veterinary medicine (autonomous, clinics, hospitals and research).

Therefore, the present work proposes to evaluate the hematological, biochemical and gasometric parameters in rats, since these can be determinants for the condition of ME and help elucidate about its concept, as well as reduce errors in an early diagnosis.

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**2. LITERATURE REVIEW**

**2.1. Brain death**

Death is far from being an easy subject to approach and manage, especially in the present day (ELIAS, 2001). In ancient Greece, the heart muscle was considered as the center of human emotions, until that time, death was determined using cardiopulmonary criteria (MORSCH, 2020).

Until the end of the 19th century, the moment when one stopped breathing was the moment of death. Then, with the discovery of stethoscope and auscultation, it was based on cardiac arrest (MURPHY, 1993). It was in the 1950s, driven by advances in intensive care medicine such as cardiopulmonary resuscitation and mechanical ventilation, that the concept of ME first emerged (MOLLARET and GOULON, 1959).

In 1968, in the United States, Harvard University formed the Ad Hoc committee that elaborated the first criteria for brain death, being determined that the until then "irreversible coma" could be replaced by "stop of vital functions" and would be adopted as a criterion for the definition of death (Ad Hoc Committee, 1968).

The Commission in 1981, after extensive review, concluded that brain death should be endorsed as legal death, and produced the Uniform Determination of Death, which established that "an individual who has sustained irreversible disruption of circulation and respiratory functions, or irreversible cessation of functions of the entire brain, including the brainstem, is killed" (ABRAM et al., 1981).

The American Neurology Association (AAN) defined ME with three cardinal signs, these being: disruption of brain functions, including brainstem, coma or lack of response and apnea (WIJDICKS et al., 2010).

**2.2 Legislation**

In Brazil, the CFM, in resolution no. 1.346/91, defines ME as the total and irreversible cessation of brain functions, with known and undisputed cause (CFM, 1996).

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To declare ME we must know what are the most frequent causes of coma in humans, which are: cranial trauma (TBI) in the context of car accidents or aggressions, subarachnoid hemorrhage linked to aneurysm rupture, diffuse brain injury after reversed cardiorespiratory arrest, massive spontaneous cerebral hemorrhage, large ischemic lesions, meningoencephalitis and fulminant encephalitis, acute liver failure due to viral hepatitis, toxic or Reye’s syndrome (ANDRÉ, 2002).

The diagnosis of cerebral death is clinical and its verification must be carried out using precise, well-established, standardized criteria that can be performed by doctors throughout the national territory. Confirmation can be done by the apnea test; In addition, auxiliary tests should be considered when the apnea test cannot be completed or is inconclusive according to CFM resolution no. 2,173/17 (KUMAR, 2016).

The procedures for the determination of ME should be initiated in all patients who present non-perceptive coma, absence of supra-spinal reactivity understood as absence of photomotor, corneo-palpebral, oculocephalic, caloric and cough vestibule with two clinical examinations by different qualified doctors and persistent apnea (absence of respiratory movements in the presence of hypercapnia, PaCO2greater than 55 mmHg) was performed once by two doctors of the Brazilian Federation in accordance with resolution no . 2.173/17 (BRASIL, 2017).

The patient must present the following prerequisites in his clinical picture: presence of brain lesion of known and irreversible cause; absence of treatable factors that would confuse the diagnosis; treatment and observation in the hospital for a minimum of six hours; temperatura corporal superior a 35°C; and arterial oxygen saturation above 94%, systolic blood pressure (SBP) greater than or equal to 100 mmHg or mean blood pressure (MAP) greater than or equal to 65 mmHg for adults; However, in the case of children, the parameters are slightly different, with a longer observation period cited in resolution n°2.173/17 (BRASIL, 2017).

After the diagnosis, verified by two doctors not participating in the removal and transplantation teams, the removal of tissues, organs or parts of the human body intended for transplantation or treatment may be performed (BRASIL, 1997).

The American Academy of Neurology (AAN) instituted evidence-based practice parameters in 1995 that was updated in 2010, with an approach

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Step-by-step algorithmic determination of brain death. The apnea test (clinical examination), auxiliary test (electrocardiogram - ECG), time for declaration, number and qualification of medical examiners and differences for children were criteria used in these protocols (WIJDICKS, 1995; WIJDICKS, 2002).

Brazilian criteria are conservative and safer than that of other countries, for example, in Germany ME is diagnosed by only one doctor and a complementary examination, while in the United States, the complementary examination is optional (CABEÇA, 2017). In Brazil, the following procedures for ME determination are mandatory: two clinical tests that confirm non-perceptive coma and absence of brain stem function; Apnea test that confirms the absence of respiratory movements after maximum stimulation of the respiratory centers; complementary examination that proves the absence of brain activity (BRAZIL, 2017).

Hospital policies in the United States for determining ME are still widely variable and not entirely consistent with the parameters of contemporary practice. Hospitals should be encouraged to implement the 2010 ANA guidelines to ensure 100% accurate and appropriate determination of ME (GREER, 2016).

In adults, there are no published reports of recovery from neurological diseases after a diagnosis of ME using the criteria revised in the 1995 NAG practice parameter. Complex spontaneous motor movements and false-positive fan actuation may occur in patients with ME. There is insufficient evidence to determine the minimally acceptable observation period to ensure that functions have ceased irreversibly. The diffusion of oxygenation to determine apnea is safe, but there is insufficient evidence to determine the comparative safety of the techniques used for this test. There is also insufficient evidence to determine whether the most recent auxiliary tests accurately confirm the cessation of function of the whole brain (WIJDICKS, 2010).

There are substantial differences in perceptions and practices for ME determination around the world. The identification of discrepancies, improvement of gaps in medical education and formalization of protocols in low-income countries provide the first pragmatic steps to reconcile these variations. It remains questionable whether a harmonized and uniform standard for brain death worldwide can be achieved (WAHLSTER, 2015).

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The patient with ME is a challenge to the clinical staff of the hospital and medicine in general, whether human or veterinary, as well as for researchers.

**2.3. Physiological process of brain death**

Brain death is a complex process, an inflammatory state that leads to cellular and molecular disturbances altering the physiology and biochemistry of organic systems. It progresses due to cerebral ischemia that evolves in the rostrocaudal direction until involving regions of the midbrain, bridge and spinal cord (TUTTLE-NEWHALL, 2003; HEVESI, 2006).

There is a systemic inflammatory response that can worsen and lead to disseminated intravascular coagulation, all mediated by inflammatory mediators of an ischemic brain, ischemic reperfusion injury, metabolic changes that occur during the catecholamine storm and an improperly restored cardiovascular state. In addition, it produces sudden changes in blood pressure, hypoxemia, hypothermia, coagulopathy, electrolyte and hormonal disorders (MURUGAN et al., 2008; TUTTLE-NEWHALL, 2003).

The brain death culminates with the cerebral herniation through the foramen magnum, before that, extreme increases in intracranial pressure occur, accompanied by the triad of Cushing, but when this mechanism fails, ischemia progression occurs which, when reaching the marrow, interrupts vagal activity, leading to short-lived unrestrained sympathetic autonomic response or "autonomic storm", which is characterized by tachycardia, hypertension, hyperthermia and increased cardiac output (DC) (HEVESI, 2006; JIANG, 1990).

Then the autonomic storm ceases, resulting in a loss of sympathetic tone, with deep vasodilation and depression of cardiac function, which if untreated, in 72 hours should progress to asystole (JIANG, 1990).

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**3. OBJETIVOS**

**3.1. General**

Evaluate the hematological, biochemical and gasometric parameters in rats in an attempt to help understand about the concept of brain death and make it more reliable, as well as reduce errors in an early diagnosis.

**3.2. Specific**

Compare the values of hematological, biochemical, gasometric parameters between groups G0 (before), G1 (soon after) and G2 (1 hour after) the induction of cerebral death.

**3.3. Justification**

Death is far from being an easy to approach and manage theme (ELIAS, 2001). In Brazil, the Federal Council of Medicine, in resolution n°1.346/91, defines brain death as the total and irreversible cessation of brain functions, with known and undisputed cause (CFM, 1996). Brain death is a complex process, an inflammatory state that leads to cellular and molecular disturbances altering the physiology and biochemistry of organic systems. It progresses due to a cerebral ischemia that evolves in the rostrocaudal direction until involving regions of the midbrain, bridge and spinal cord (TUTTLE-NEWHALL, 2003; HEVESI, 2006).

The diagnosis of cerebral death is clinical and its verification should be performed using precise, well-established, standardized criteria that can be performed by doctors throughout the national territory (KUMAR, 2016). Therefore, it is important to determine the condition of brain death and lead to a consensus on its concept in order to reduce errors in early diagnosis.

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**4. MATERIAL AND METHODS**

**4.1. Experimental design and collection of samples**

The protocols used in this study are in accordance with the Ethical Principles in Animal Research adopted by the Brazilian College of Animal Experimentation (COBEA) and were approved by the Committee on Ethics in the Use of Animals (CEUA) of the Faculty of Medicine (FMB) of UNESP, Campus de Botucatu, protocol n°1284/2019 - CEUA.

Fifteen *adult male* rats (Rattus norvergicus) Wistar of the HanUnib:WH strain, acquired from the Multidisciplinary Center for Biological Research of the State University of Campinas (CEMIB - UNICAMP), were used. The animals were housed in the Experimental Unit Central Experimentation Biotério (UNIPEX) located at the FMB (Fig.1) in polypropylene cages covered with metal grating in a room maintained at 22°C and 55% humidity under a light-dark cycle condition (Fig. 2).

Food and water were provided ad libitum *(Fig.* 3) and environmental enrichment was carried out with PVC pipes and paper pellets during the experimental period.



**Figure 1.**UNIPEX Central Experimentation Facility located at the FMB

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**Figure 2.**Housing in polypropylene cages covered with metal grating in room with humidity and temperature controlled

**Figure 3.**Animals in polypropylene cages with food and water ad libitum *.*

The individual body weight of the animals was recorded once a week until before induction of ME, in order to verify the health, reallocation of the number of animals by cages and welfare of them.

After a period of acclimation of two weeks, the animals were randomly distributed into three groups, each group with five animals: the control group (G0), before brain death; and groups with cerebral death induction, these being the group immediately after the induction of brain death (G1) and the group 1 h after the induction of brain death (G2).

Before the induction of brain death, the animals were submitted to anesthesia, initially in an induction box with isofluorane (9 - 5%) (Fig. 4) and then placed in an isofluorane mask (5 - 2.5%) (Fig. 5), followed by intubation with a 14G or 16G catheter (Fig. 6) and were kept in the inhalation anesthesia circuit with isofluorane a (3 - 1.5%) (Fig. 7).

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**Figure 4**. Induction box with isofluorane (9 - 5%).



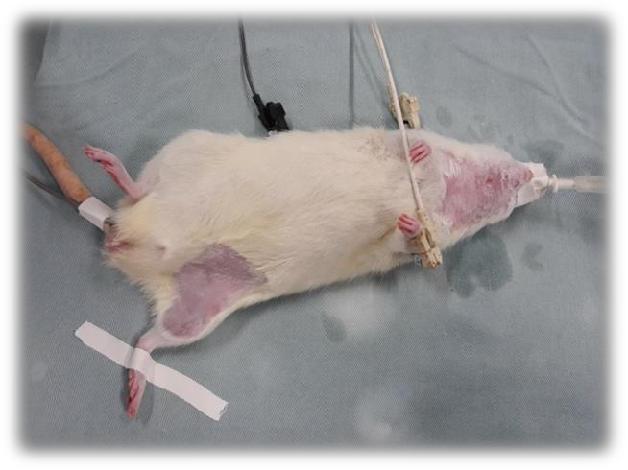
**Figure 5.**Animal with isofluorane mask (5 - 2.5%).



|  |  |  |  |
| --- | --- | --- | --- |
| **Figure 6.**Intubation with catheter | **Figura7.** | Circuit | of |
| 14G or 16G. | anesthesia | inhaled | with |
|  | isofluorane (3 - 1,5 %). | |  |

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The trichotomy and asepsis (Figure 8) were performed with chlorhexidine degermante and 70% alcohol in the region of access to the aorta artery and femoral vein. An access was performed in the aorta and femoral vein with 24G catheter and a circuit with three-way tap to monitor blood pressure and collect arterial blood for hemogasometry; in addition to the collection of venous blood for hemogram and biochemical tests respectively.



**FIGURE 8.**Trichotomy and asepsis.

The animals with MAP > 70 mmHg were used for the analysis of cytokines (IL-1, IL-2, IL-6, IL-10, IL-13, TNF, HAND-2 and MCP-1) and hematological, biochemical and hemagasometric parameters; animals that did not present stable MAP were removed from the experiment.

Blood samples were collected from each animal at the time related to the group they belonged to, G0 collected at moment 0 (M0 - before brain death), G1 collected at moment 1 (M1 - immediately after induction of brain death) and G2 collected at moment 2 (M2 - 1 hour after induction of brain death).

**4.2. Processing of samples**

Venous blood samples were collected from the femoral vein (Figure 9) in a 0.5ml tube with EDTA and stored in a refrigerator (6 - 10°C), for subsequent erythrogram (red blood cells, hemoglobin, hematocrit, mean corpuscular volume, mean corpuscular hemoglobin concentration, mean corpuscular hemoglobin, total plasma protein, amplitude of the distribution of the

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red and platelets) and leucogram (total leukocytes, neutrophils, segmented, lymphocytes, eosinophils, monocytes).



**FIGURE 9.**Access of the femoral vein.

The processing was performed in the hematological analyzer Hemacounter 60-RT 7600 (Hemogram®, China). The hematocrit was performed by centrifugation of the microhematocrit at 12,000 rpm for 5 minutes, and platelet counting with manual counting method with dilution of 20 μl blood in 2ml of Brecher and subsequent counting in Neubauer chamber. Differential leukocyte count was performed in blood smears stained with panotype (Laborclin ®) under immersion optical microscopy (1,000x increase).

The biochemical analysis was processed in the BS200E (Myindray®, Brazil) after venous blood samples from the femoral vein were obtained in a dry tube and packaged in a refrigerator (6 - 10°C), then centrifuged at 2,500 rpm for 5 minutes for subsequent urea analysis, creatinine, alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, gamma glutamyl transferase, total serum protein, albumin, globulin, creatine kinase, creatine kinase - MB.

The hemogasometry was performed on the ABL80 Flex - BASIC version (RADIOMETER®) after arterial blood samples collected from the aorta (Figure 10) were obtained in 1 ml heparinized syringes (volume collected 0.7 ml) and immediately packaged in a styrofoam container containing crushed ice for immediate analysis of blood gases (pH, pCO2, pO2), electrolytes and metabolites (Na+, K+, Ca2+, Cl-, Lac) and derived values ( HCO3e sO2).

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**FIGURE 10.**Access of the aorta artery.

**4.3. EM induction model**

In the present study, ME induction was performed according to the protocol used by Esmaeilzadeh et al. (2017), in which a Fogarty 14G catheter (Baxter Health Corp., CA, USA) was inserted by frontolateral trepanation into the skull of animals with the aid of a surgical drill (Figure 11) See also. Intracranial pressure (ICP) was increased by slow inflation with 400 to 700 μl of saline solution (saline serum).

The balloon catheter inflated with 100 μl of saline solution and after 1 minute, the balloon was inflated again adding 100 μl of solution and this procedure was repeated until ME was confirmed by the absence of corneal reflexes, Fixed pupils maximally dilated and 60 seconds of apnea.

Subsequently, all animals had body temperature (thermal mattress), blood pressure (BP - sphygmomanometer) and heart rate (HR - multiparameter monitor), monitored during the period in which they belonged to the group, and the animals of the groups after induction of brain death were kept on life support. For this, after the induction of ME the animals were removed from anesthesia and mechanically breathed.

After ME the animals were kept in heated infusion of sodium chloride 0.9%, at a rate of 3 to 5ml/kg/h, and dopamine infusion (5mcg/kg/min up to 15mcg/kg/min), where bolus was used when necessary.

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**FIGURE 11.**Frontolateral trepanation in the skull of the animal where the Fogarty 14G Catheter was inserted for increase of ICP by slow inflation with saline solution.

**4.4. Statistical analyses**

The descriptive statistics were calculated: mean, median, standard deviation, standard error, minimum and maximum of the variables analyzed for each of the groups studied. As a comparison method, generalized linear models were adjusted for continuous variables, considering the Gamma distribution, due to its flexibility to adjust data with asymmetric distributions. The groups studied were compared two by two to test the differences observed in the group averages (multiple Tukey-Kramer comparisons) of the database variables.

In addition, the descriptive statistics were calculated: mean, median, standard deviation and standard deviation of the mean, minimum and maximum for all continuous variables, considering the groups studied. As a bivariate analysis, the Spearman correlation coefficients for the variables were calculated. Due to the asymmetry in the distribution of data, the variables collected were used to compare the effects due to the groups, through generalized linear models (MLG), using the Gamma asymmetry distribution. If there is a statistically significant difference in the groups, multiple Tukey comparisons are used to find which groups differ statistically from each other. To study the relationship between variables together, generalized linear models using the Gamma distribution were adjusted considering the main variable in relation to all the others. The analyses

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statistics were performed in the SAS (Statistical Analysis System), version 9.3, using the Proc GENMOD procedure, considering the level of significance of the tests equal to 5% (p value <0.05).

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**5. RESULTS AND DISCUSSION**

We discuss below the results found in the multiple comparisons of Tukey-Kramer in relation to the tests of Erythrogram, Leucogram, Biochemical and Hemogasometry. It is known that it is important to maintain a strict control of changes in laboratory tests, especially during the diagnosis of ME (AGNOLO et al., 2010; NOGUEIRA, 2008).

In relation to the values of the experimental animals obtained from the Erythrogram, no differences were observed (P<0.05) in the comparison between groups 0, 1 and 2 of the values of Red blood cells (He), Hemoglobin (Hb), Hematocrit (Ht), Mean Corpuscular Volume (MWC), Mean Corpuscular Hemoglobin (MCCH), Mean Corpuscular Hemoglobin (MCH), Total Plasma Protein (PT), Red Cell Distribution Width (RDW) and Platelets (Table 1 - Appendix, Figure 12 and 13).

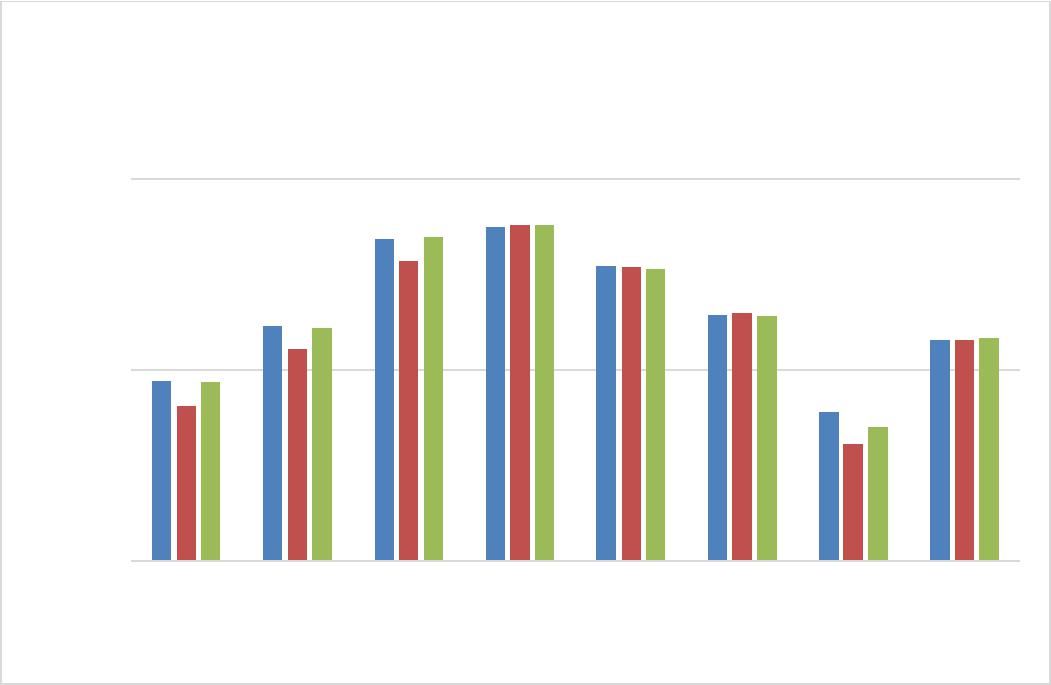
However, when we observed the values of the variables of the Erythrogram examination of the animals in each group individually (Table 5 - Annex), it was found that in most of the animals of this study there was a tendency to polycythemia, mainly in group 2 (G2) when compared with the reference values obtained by FIOCRUZ (2004), but if we compare with the reference values of Lima et al. (2014) the values of this study are within the normal range, with the exception of the animal 7 of group 1 that presented an anemia and hypoproteinemia. As well, Esmaeilzadeh et al. (2017), where hemoglobin and hematocrit concentrations decreased after induction of ME.

In addition, it was observed that animals of group 1 (G1) tend to thrombocytopenia, similar to Vasconcelos et al. (2014), which concluded in their study that 38.5% of organ donors presented anemia and 30.8% thrombocytopenia.

This is justified by the fact that after ME, coagulation disorders are common, with its main causes being the release of thromboplastin, fibrinogen from damaged and necrotic brain tissue, CID (Disseminated Intravascular Coagulation), characterized by the decrease of platelets and circulating coagulation factors due to large volumes of water replacement (NOGUEIRA, 2008).

We can also observe normal values of VCM and CHCM in all groups of this study.

33



1.00E+09

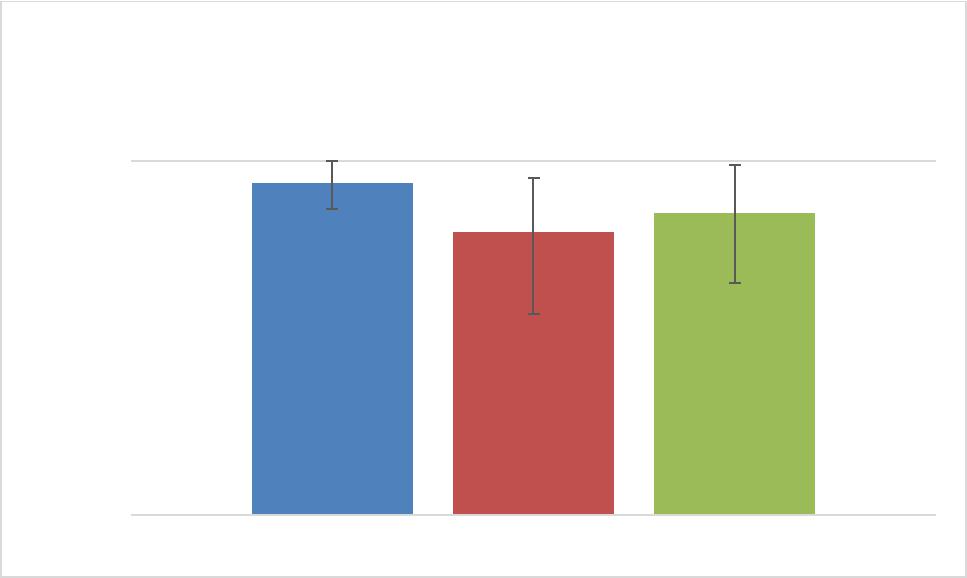
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1.00E+07

He Hb Ht VGM CHCM HCM PT RDW

 G0 G1 G2

**FIGURE 12.**Comparison between the G0, G1 and G2 of the mean values of the Erythrogram (He, Hb, Ht, VGM, CHCM, HCM, PT, RDW).



 G0 G1 G2

1.00E+10

8.65E+09 6.30E+09 7.12E+09

1.00E+09

Platelets

**FIGURE 13.**Comparison between the G0, G1 and G2 of the mean values of Plaqueta.

In the Leucogram (Table 2 - Appendix) it was observed that in comparisons between groups 0, 1 and 2 of the values of Total Leukocytes, Segmented, Lymphocytes, Eosinophiles

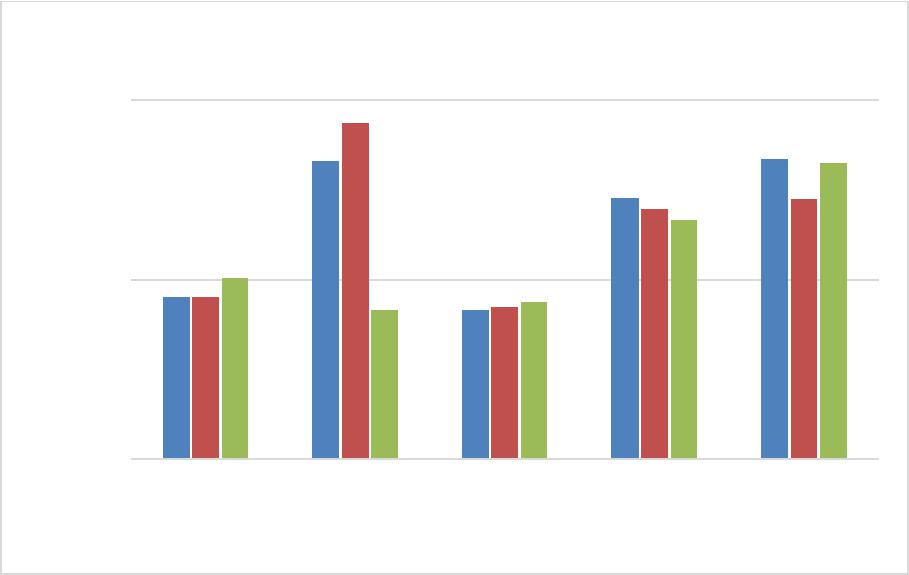
34

and monocytes, obtained from the experimental animals, showed variation of values (P<0.05) of Segmented and Monocytes (Figure 14).

When comparing the values of the means of the groups of Segmented (Table 2

-Annex), differences in the values (P<0.05) were observed between groups 1 and 2, where the mean of group 1 was higher than group 2; in addition to groups 2 and 0, where the mean of group 2 was lower than group 0 (Figure 15).

In the comparisons between the averages of the groups of the Monocyte values (Table 2 - Annex), differences in values (P<0.05) were observed between groups 1 and 2, in which group 1 obtained the lower average than group 2; and also in relation to group 1 and 0, where group 1 had a lower average than group 0 (Figure 16).



1.00E+10

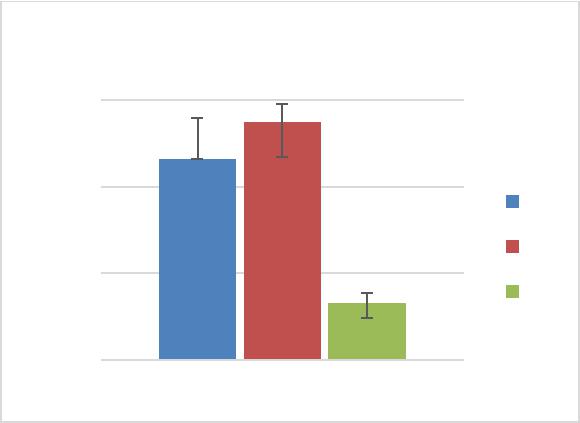
1.00E+08

1.00E+06

Leuc Seg Linf Eos Mon

 G0 G1 G2

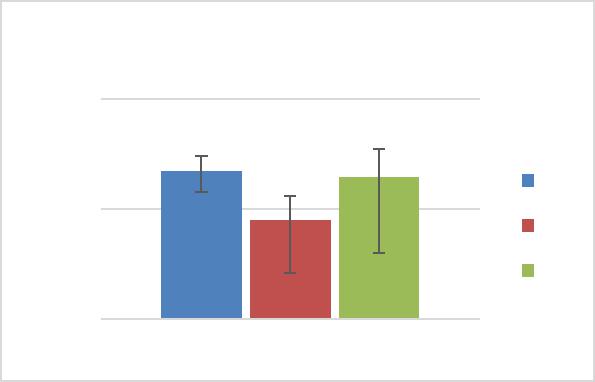
**FIGURE 14**. Comparison between the G0, G1 and G2 of the mean values of the Leucogram (Leukocytes, Segmented, Lymphocytes, Eosinophils, Monocytes).



|  |  |  |  |
| --- | --- | --- | --- |
| 1E+10 |  |  |  |
| 1E+09 |  | G0 |  |
|  |  |  |
|  |  | G1 |  |
| 1E+08 |  | G2 |  |
|  |  |  |
| 2E+09 | 6E+09 | 5E+07 |  |
| 1E+07 |  |  |  |
|  | Seg |  |  |

**FIGURE 15**. Comparison between the G0, G1 and G2 of the average values of Segmented.

35



1E+10

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | G0 |  |
| 1E+09 |  | G1 |  |
|  |  |  |
|  |  | G2 |  |
| 2E+09 | 8E+08 | 2E+09 |  |
| 1E+08 |  |  |  |
|  | Mon |  |  |

**FIGURE 16**. Comparison between the G0, G1 and G2 of mean monocyte values.

Regarding the analysis of the values of the variables of the Leucogram examination of the animals in each group individually (Table 6), it was observed that two animals (A6 and A11), of group 1 and 2 respectively, presented leukocytosis (WEISS and WARDROP, 2010). In potential human donors, 66.2% presented leukocytosis (VASCONCELOS et al., 2014).

This fact occurs because the ME produces an inflammatory state, in addition to the activation of inflammatory mediators, such as thromboxanes and leukocyte factors (RECH and RODRIGUES, 2007).

The increase in the number of circulating hematopoietic precursor cells, followed by bone marrow dysfunction are observed in victims of some type of severe trauma, hemorrhagic shock or burn. Stroke induces a systemic inflammatory response, and later immunosuppression (BADAMI, et al., 2007; DENES, et al., 2011).

MENEGAT (2016) observed that leukopenia induced by brain death in rats reflected a reduction in the number of lymphocytes, monocytes and granulocytes.

On the Biochemical Examination, table 3 (Appendix) shows comparisons between groups 0, 1 and 2 of the values of Urea, Creatinine (Creat), Alanine Aminotransferase (ALT), Glutamic-Oxalacetic Transaminase or Aspartate Aminotransferase (AST), Alkaline Phospfatase (FA), Gamma Glutamil Transferase (GGT), Total Serum Protein (PTs), Albumin, Globuline, Creatine Kinase (CK), Creatine Kinase - MB (CK-MB) obtained from the experimental animals (Figure 17), of which the only ones that had variation of the values (P<0,05) are Creatinine and AST.

Comparisons between the averages of groups 0, 1 and 2 of the values of creatinine obtained from experimental animals (Table 3 - Annex) showed differences

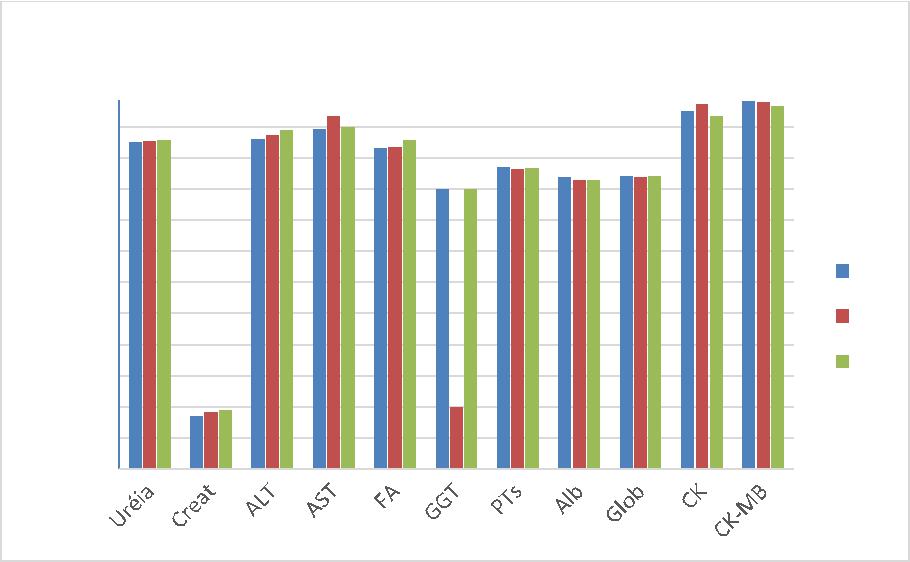
36

(P<0.05) in relation to the comparison between groups 2 and 0, where it was observed that group 2 had a higher mean than group 0 (Figure 18 ).

Vasconcelos et al. (2014) observed that 44.6% of potential organ donors had alterations in renal function, urea and creatinine values. The higher the blood glucose, the higher the serum creatinine, but our work did not measure the parameter blood glucose (NOGUEIRA, 2008).

A factor that may affect renal function is hemodynamic instability, hypotension leads to decreased perfusion (WESTPHAL et al., 2011a). Another factor that can affect the kidney and lead to sudden increase of plasma creatinine, which is widely used as an indicator of acute renal failure, in addition to changes in diuresis volume is rhabdomyolysis (NOGUEIRA e PEREIRA, 2007).

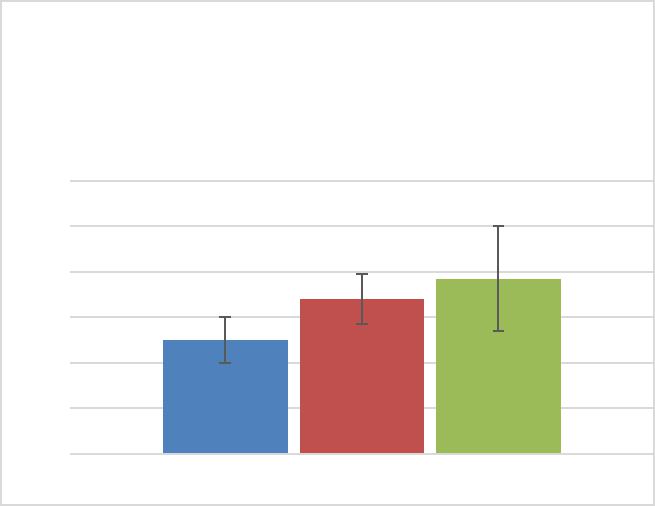
Differences in the mean values (P<0.05) were also observed between groups 0 and 1 in relation to AST, where group 1 obtained a higher mean than group 0 (Table 3 - Annex, Figure 19).



|  |  |  |
| --- | --- | --- |
| 1.0E+09 |  |  |
| 1.0E+08 |  |  |
| 1.0E+07 |  |  |
| 1.0E+06 |  |  |
| 1.0E+05 | G0 |  |
| 1.0E+04 |  |
|  |  |
| 1.0E+03 | G1 |  |
| 1.0E+02 | G2 |  |
| 1.0E+01 |  |
|  |  |
| 1.0E+00 |  |  |
| 1.0E-01 |  |  |
| 1.0E-02 |  |  |

**FIGURE 17.**Comparison between the G0, G1 and G2 of the mean values of the Biochemical Examination (Urea, Creatinine, ALT, AST, FA, GGT, PTserum, Albumin, Globulin, CK and CK-MB).

37



 G0 G1 G2

1,20

1,00

0,80

0,60

0,40

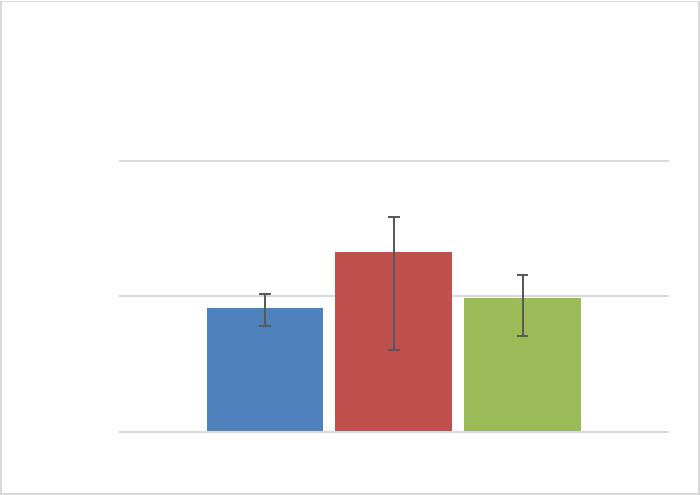
0,20

0,50 0,68 0,77

0,00

Creat

**FIGURE 18.**Comparison between the G0, G1 and G2 of the mean values of creatinine.



 G0 G1 G2

1.0E+10

1.0E+09

8.26E+08 2.14E+09 9.68E+08

1.0E+08

AST

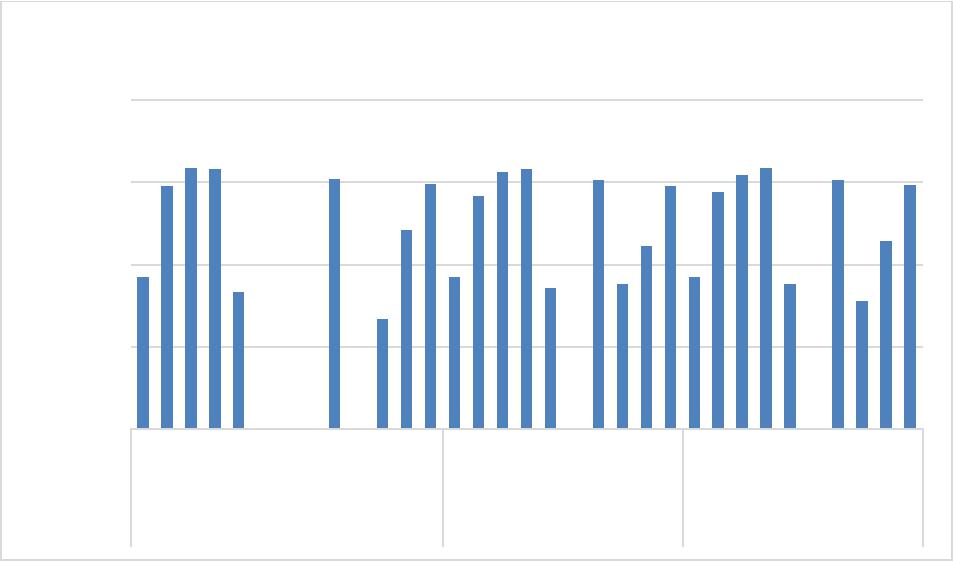
**FIGURE 19.**Comparison between the G0, G1 and G2 of the mean values of AST.

Regarding the comparisons between groups 0, 1 and 2 in relation to the Gasometry test, it can be observed that the values of potential Hydrogen of the blood (pH), partial pressures of Carbon Dioxide (pCO2), partial pressures of Oxygen (pO2), Sodium (Na+), Calcium (Ca2+), Chlorine (Cl-), oxygen saturation index (sO2) and lactate (Lac) did not differ (P<0.05) (Table 4 - Appendix, Figure 20).

Differences in the mean values (P<0.05) were observed between groups 2 and 0, where group 2 had a higher mean than group 0 in relation to potassium (K+) values (Table 4, Figure 21). In addition, table 4 (Annex) also shows comparisons between groups 1 and 0 of the bicarbonate values (HCO3) obtained from experimental animals; where they were observed

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differences between the values of the means (P<0.05), with the mean of group 1 being smaller than that of group 0 (Figure 22).



1.00E+10

1.00E+09

1.00E+08

1.00E+07

1.00E+06

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| pH | pO2 | K+ | Ca+ | Cl- | Lac | sO2 |
|  |  |  | 0 |  |  |  |

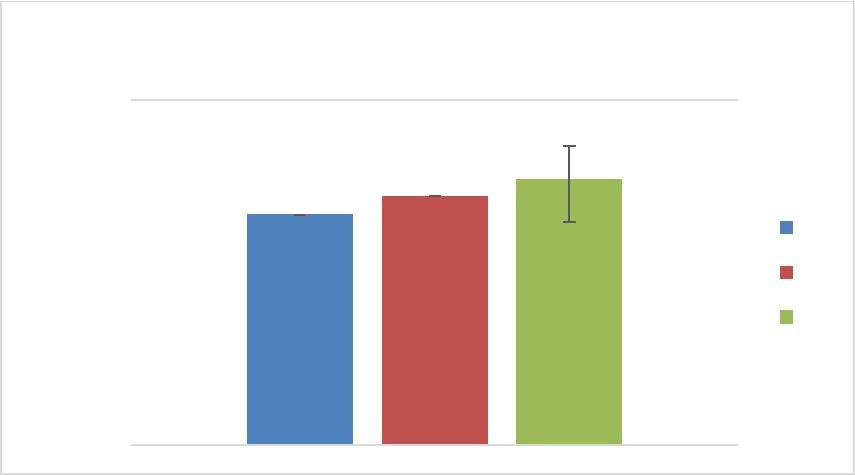
|  |
| --- |
| pCO2Na+Ca+LacsO2 |

1

|  |
| --- |
| pCO2Na+Ca+LacsO2 |

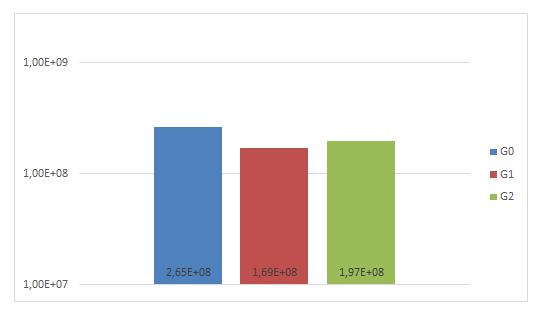
2

**FIGURA 20.** Comparação entre o G0, G1 e G2 dos valores médios do Exame de Gasometris (pH, pCO2, pO2, K+, Ca2+, Cl-, Lactato, Na+, sO2).



|  |  |  |
| --- | --- | --- |
| 1.00E+08 |  |  |
|  |  | G0 |
|  |  | G1 |
|  |  | G2 |
| 4.65E+07 | 5.26E+07 | 5.88E+07 |
| 1.00E+07 |  |  |
| **FIGURE 21.**Comparison between the mean values of K+ in G0, G1 and G2. | | |

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**FIGURE 22.**Comparison between the G0, G1 and G2 of the mean values of HCO3.

In general, the gasometry examination (Table 8) showed that most animals had a low hydrogen potential (pH), increased partial oxygen pressure (PaO2) and carbon dioxide partial pressure (PaCO2).

In addition, it was observed that some animals had decreased bicarbonate (HCO3) values and oxygen saturation index (sO2) had a tendency to increase.

Thus, we have in most animals a tendency to respiratory acidosis and in some animals metabolic acidosis. Acid-base disorders are associated with a higher risk of organ and system dysfunction, and metabolic acidosis is an indicator of unfavorable clinical evolution (ROCCO, 2003; BARBOSA, 2006).

The lungs seek balance compensation to preserve a physiologically acceptable pH when the renal ability to maintain homeostasis is lost (VIEGAS, 2012). But the lung tissue can be affected by pathophysiological changes, endocrine changes and inflammatory reaction caused by ME (MASCIA et al., 2008).

Guetti and Marques (2008) observed that the imbalance of perfusion ventilation and hypoxemia are the main manifestations of pulmonary alterations, due to intense adrenergic discharge, which leads to increased venous return to the right ventricle with consequent increase in pulmonary flow, which together with the elevation of pressure of the left atrium due to intense peripheral vasoconstriction, leads to an increase in capillary hydrostatic promoting rupture of capillaries with interstitial edema and alveolar hemorrhage.

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Abnormal values of partial oxygen pressure promote the release of tumor necrosis factor alpha and interleukin 1-beta, which are inflammatory cytokines that mediate lung lesions (NOGUEIRA e PEREIRA, 2007).

According to Mascia et al. (2008) and Botha et al. (2008), 30 to 45% of potential donors develop lung injury, among the most frequent, acute lung injury (APL) or acute respiratory distress syndrome (ARDS). Nogueira and Pereira (2007) observed that 69.2% presented hyperoxia due to oxidative stress of the clinical picture of brain death.

In relation to the lactate values of this study, they had a tendency to increase. This is mainly due to altered energy metabolism, when the excessive prolongation of anaerobic metabolism exceeds the ability to remove lactate, metabolic acidosis develops, which can be severe along with fatigue, even when the buffer mechanisms are well developed (WESTPHAL et al., 2011a; BEARD e HINCHCLIFF, 2002).

Hodgson and Rose (1994) concluded that the anaerobic threshold is commonly reached when the lactate concentration is between 2 and 4 mmol/L. However, in this study we can observe even higher lactate values.

In addition, it was observed that the sodium values tended to increase in most animals, potassium had an increase in only one animal, calcium had a decrease in all animals and chlorine had a tendency to increase in its majority.

In contrast, Westphal et al. (2011b) observed that hyperkalemia and hypomagnesia are common ME disorders, which can lead to arrhythmia.

Progressive dysfunction of the hypothalamic-pituitary axis occurs after ME and in 80% of cases Diabetes insipidus, due to a decline in circulating antidiuretic hormone (HOWLETT et al., 1989). The polyuria resulting from this endocrine/metabolic change can lead to serious electrolyte disorders such as hypernatremia, hypokalemia, hypocalcemia, hypophosphatemia and hypomaguinesemia (NOGUEIRA, 2008).

In the work of Vasconcelos et al. (2014) with possible human donors, it was observed that 47.7% presented hypernatremia, similar to the values obtained in this work.

In the bivariate analysis, the first analysis of the nine variables of the Group 0 Erythrogram using the Spearman Test obtained positive correlation regarding the variables hemoglobin and platelets, as well as MCV and CMH (Table 14 and 15 - Appendix).

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Group 1 obtained Red Blood Cells and Hemoglobin, Red Blood Cells and Hematocrit, Red Blood Cells and CHCM, Red Blood Cells and PT, Hemoglobin and Platelets, Hemoglobin and Hematocrit, Hemoglobin and PT, Hematocrit and PT, CHCM and Platelets, PT and Platelets with positive correlation (Table 16 and 17 - Appendix). Group 2 obtained Hematite and Hemoglobin, Hematite and Hematocrit, Hemoglobin and Hematocrit, Hematite and Hematocrit, Hematite and Haematocrit and Hematocrit and Platelet with positive correlation (Table 18 and 19 - Appendix).

The comparison between Groups 1, 2 and 3 of the Spearman test obtained a positive correlation between the variables Red blood cells and hemoglobin, Red blood cells and hematocrit, Red blood cells and PT, Hemoglobin and Hematocrit, Hemoglobin and PT, Hemoglobin and Platelets, Hematocrit and PT, Hematocrit and Platelet, VCM and HCM, PT and Platelets; and negative correlation between RBCs and MVC (Table 20 - Appendix). In the multivariate analysis using Red Blood Cells as a response variable, only the Hematocrit was significant, with positive relation (Table 21 - Appendix).

When we do these analyses the variables that are likely to have correlation would be the Red blood cells, Hemoglobin, Hematocrit; CHCM, HCM, PPT and Platelets. As discussed previously, we have some factors such as anemia, polycythemia, hypotrotheemia, thrombocytopenia, among others, which may be linked to significant changes in these values and their correlations in ME.

The second analysis of the five variables of the Group 0 Leukocyte using the Spearman Test resulted in positive correlation between the variables Leukocytes and Lymphocytes (Table 22 and 23 - Appendix), as well as Group 1 (Table 24 and 25 - Appendix) and Group 2 (Table 26 and 27 - Appendix).

In the comparison between Group 1, 2 and 3 of the Spearman test, the variables Leukocytes and Lymphocytes, Leukocytes and Monocytes, Lymphocytes and Monocytes showed positive correlation; but the Segmented and Monocytes resulted in negative correlation (Table 28 - Appendix). In the multivariate analysis using leukocytes as response variable, the segmented and lymphocytes were significant and obtained negative and positive relationships respectively (Table 29 - Appendix).

The negative correlation between segmented and monocytes (P=0.0272) (Table 28 - Appendix), indicates that if one of them increases, the other decreases. Although there is a correlation between these variables, it was not observed in the values of this work, which indicates that the change in their values between groups is true, since the value of

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Segmented tend to decrease as the time of ME as well as the values of monocytes.

The comparison between leukocytes and other variables, evidenced positive correlation with monocyte values (P=0.0126) (Table 28 - Annex), ie, the values of leukocytes tend to increase along with that of monocytes. This fact may indicate that the leukocyte values, although subtly increased in the present study, could be more significant if the number of experimental animals were larger, or if the animals were kept longer after ME.

The third analysis of eleven variables of the Biochemical Group 0 using the Sperman test, obtained positive correlation between creatinine and AF, pTserum and albumin, CK and CK-MB; , however, a negative correlation was analyzed between ALT and PTseric (Table 30 and 31 - Appendix). In Group 1, a positive correlation was observed between serum creatinine and PT, creatinine and albumin, creatinine and globulin, AST and CK, serum creatinine and albumin and serum PTt and globulin (Table 32 and 33 - Appendix). Group 2 showed positive correlation between Urea and ALT, pTserum and albumin, globulin and CK-MB; but a negative correlation was observed between Urea and AST, ALT and AST (Table 34 and 35 - Annex).

In the comparison between Groups 1, 2 and 3 of the Sperman Test, a positive correlation was observed between the variables Creatinine and FA, PTseric and Albumin, PTseric and Globuline, PTseric and CK, PTseric and CK-MB, Albumin and Globuline, Albumin and CK-MB, Globulin and CK, Globulin and CK-MB, and CK and CK-MB (Table 36

- Annex). In the multivariate analysis using AF as response variable to creatinine, GGT, CK and CK-MB with significant results (Table 37 - Appendix).

We can say that in relation to the values of the variables of the biochemical examination we have some that has a greater correlation with each other, such as Urea and Creatinine; ALT, AST, FA e GGT; PT, Albumin and Globulin; CK and CK-MB. And of these, all may be related to ME in greater or lesser degree depending on the time and level of involvement of organs (kidney, liver and heart).

Although the creatinine and AST variables did not correlate with each other (Table 36), in this study an increase in the AST dosage was observed with differences in the mean values (P<0.05) between groups, which may indicate that AST values increase immediately after ME, and that, due to the interdependence between these variables, the difference between the groups is true.

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Still with regard to biochemical parameters, creatinine has a positive correlation with the variable AF (P = 0.0144) (Table 36), although it did not show different values in comparisons between means between groups, showed a slight increase in its measurement when analyzed among animals of group 1 and 2 (Figure 17). This interdependence between creatinine and AF may indicate that the AF enzyme may increase as the time of ME is increased, or if the number of experimental animals was greater.

The fourth analysis of the ten variables of the Group 0 Gas test using the Sperman Test, obtained a negative correlation between lactate and HCO3 (Table 38 and 39 - Appendix ). In Group 1, a positive correlation was observed between pCO2e Na+, pCO2e Ca2+, Na+ and Ca2+, pO2e sO2; , however, obtained a negative correlation between pH and pCO2, pH and pCO2 , pH and Na+, pO2e K+, K+, and sO2(Table 40 and 41 - Appendix). Group 2 obtained positive correlation between pH and HCO3, pO2e Na+, K+ and lactate ; and negative correlation between pO2e Ca2+, K+ and Cl-, Cl-and Lactate ( Table 42 and 43 - Appendix).

Positive correlation between the variables pCO2e HCO3, pO2e sO2, K+and Lactate was observed in comparison between Groups 1, 2 and 3 of the Sperman Test , as well as negative correlation between pH and Na+, K+and Cl-, Lactate and HCO3 (Table 44 - Appendix). In the multivariate analysis using pH as response variable, significant results were observed for pCO2, pO2, Na+, K+, Cl-, Lactate and sO2 (Table 45 - Appendix).

In the ME, the values of Gas tend to vary considerably, as already seen, because the lung is one of the first organs to suffer from changes in the body. Thus, we can observe in this analysis that the absence of interdependence between HCO3e K+ variables indicate independent and true variations between groups.

Passos et al. (2014) found several hemodynamic disorders and cardiovascular, pulmonary, renal, endocrine, metabolic, nutritional and temperature control changes.

The deleterious effects caused by ME can be multiple and cause various complications in the body, being important its early detection to avoid progressive somatic deterioration of the organism and better function of organs (SILVA, SILVA, RAMOS, 2010; VASCONCELOS, 2014).

The fact that we do not have more significant results in relation to the values of many variables can be attributed to the experimental model used, which although interesting to evaluate a short period of time, taking into account the speed in

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diagnosis of ME, may not bring major changes in the tests up to 1 hour after brain death, in addition to the number of animals (n) used.

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**6. CONCLUSION**

The segmented, monocyte, creatinine, AST, potassium and HCO3values should be taken into account to help in the greater understanding of brain death, but more studies are needed to correlate these data with the early diagnosis of ME (up to 1 hour after ME).

We can observe that several variables are correlated and are linked to the changes resulting from ME. In addition, it was observed that there is an individual response of each organism to brain death which makes its early and precise determination a challenge.

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**TRABALHO(S) CIENTÍFICOS (S) – SEÇÃO 1**

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**HEMATOLOGICAL, GASOMETRIC AND BIOCHEMICAL PARAMETERS IN THE INDUCTION OF BRAIN DEATH IN RATS**

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**ANNEX**

**TABLE 1.**Comparisons between groups 0, 1 and 2 of the values for Red blood cells (He), Hemoglobin (Hb), Hematocrit (Ht), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin Concentration (MCCL), Mean Corpuscular Hemoglobin (MCCL), Total Plasma Protein (PT), Red Cell Distribution Width (RDW) and Platelets of the Erythrogram obtained from experimental animals. Group least squares mean differences, fit for multiple comparisons - Tukey-Kramer of variables.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Group | \_Group | Estimate | Error | Valor z | Pr | ˃ | Adj P |
|  |  |  |  | Standard |  | z |  |  |
|  |  |  |  |  |  |  |  |  |
| He | 1 | 2 | -0.2860 | 0.1385 | -2.06 | 0.0390 |  | 0.0973 |
| He | 1 | 0 | -0.2953 | 0.1469 | -2.01 | 0.0445 |  | 0.1098 |
| He | 2 | 0 | -0.00930 | 0.1469 | -0.06 | 0.9495 |  | 0.9978 |
| Hb | 1 | 2 | -0.2579 | 0.1354 | -1.91 | 0.0568 |  | 0.1372 |
| Hb | 1 | 0 | -0.2765 | 0.1436 | -1.93 | 0.0542 |  | 0.1315 |
| Hb | 2 | 0 | -0.01857 | 0.1436 | -0.13 | 0.8971 |  | 0.9908 |
| Ht | 1 | 2 | -0.2850 | 0.1295 | -2.20 | 0.0278 |  | 0.0710 |
| Ht | 1 | 0 | -0.2706 | 0.1373 | -1.97 | 0.0488 |  | 0.1195 |
| Ht | 2 | 0 | 0.01433 | 0.1373 | -0.10 | 0.9169 |  | 0.9940 |
| VCM | 1 | 2 | 0.006614 | 0.03373 | 0.20 | 0.8445 |  | 0.9790 |
| VCM | 1 | 0 | 0.02887 | 0.03578 | 0.81 | 0.4198 |  | 0.6988 |
| VCM | 2 | 0 | 0.02225 | 0.03578 | 0.62 | 0.5340 |  | 0.8081 |
| CHCM | 1 | 2 | 0.02000 | 0.01799 | 1.11 | 0.2662 |  | 0.5067 |
| CHCM | 1 | 0 | -0.01331 | 0.01908 | -0.70 | 0.4855 |  | 0.7650 |
| CHCM | 2 | 0 | -0.03331 | 0.01908 | -1.75 | 0.0808 |  | 0.1883 |
| HCM | 1 | 2 | 0.02765 | 0.03999 | 0.69 | 0.4893 |  | 0.7685 |
| HCM | 1 | 0 | 0.01527 | 0.04242 | 0.36 | 0.7189 |  | 0.9311 |
| HCM | 2 | 0 | -0.01238 | 0.04242 | -0.29 | 0.7703 |  | 0.9541 |
| PT | 1 | 2 | -0.2016 | 0.2363 | -0.85 | 0.3037 |  | 0.6700 |
| PT | 1 | 0 | -0.3842 | 0.2507 | -1.53 | 0.1253 |  | 0.2755 |
| PT | 2 | 0 | -0.1827 | 0.2507 | -0.73 | 0.4662 |  | 0.7465 |
| RDW | 1 | 2 | -0.03441 | 0.02608 | -1.32 | 0.1870 |  | 0.3843 |
| RDW | 1 | 0 | -0.01010 | 0.02767 | -0.37 | 0.7150 |  | 0.9291 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | 52 |
| RDW | 2 | 0 | 0.02431 | 0.02767 | 0.88 | 0.3795 | 0.6537 |
| Platelets | 1 | 2 | -0.1220 | 0.2091 | -0.58 | 0.5594 | 0.8288 |
| Platelets | 1 | 0 | -0.3171 | 0.2218 | -1.43 | 0.1527 | 0.3254 |
| Platelets | 2 | 0 | -0.1951 | 0.2218 | -0.88 | 0.3790 | 0.6531 |

Group 0 (G0) - control group, before brain death. Group 1 - group immediately after induction of brain death. Group 2 - 1-hour group after induction of brain death. The significance level adopted for statistical tests was 5% (p<0.05).

**TABLE 2.**Comparisons between the groups 0, 1 and 2 of the values of Total Leukocytes, Segmented, Lymphocytes, Eosinophils and Leucocyte Monocytes obtained from experimental animals. Group least squares mean differences, fit for multiple comparisons - Tukey-Kramer of variables.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Group | \_Group | Estimate | Error | Valor z | Pr | ˃ | Adj P |
|  |  |  |  | Standard |  | z |  |  |
|  |  |  |  |  |  |  | |  |
| Leukocytes | 1 | 2 | -0.4788 | 0.3086 | -1.55 | 0.1208 | | 0.2670 |
| Leukocytes | 1 | 0 | 0.02027 | 0.3273 | 0.06 | 0.9506 | | 0.9979 |
| Leukocytes | 2 | 0 | 0.4991 | 0.3273 | 1.52 | 0.1273 | | 0.2793 |
| Segmented | 1 | 2 | 4.8179 | 0.8869 | 5.43 | <.0001 | | <.0001\* |
| Segmented | 1 | 0 | 0.9925 | 0.9407 | 1.06 | 0.2913 | | 0.5420 |
| Segmented | 2 | 0 | -3.8245 | 0.9407 | -4.07 | <.0001 | | 0.0001\* |
| Lymphocytes | 1 | 2 | -0.1416 | 0.3453 | -0.41 | 0.6816 | | 0.9114 |
| Lymphocytes | 1 | 0 | 0.06694 | 0.3662 | 0.18 | 0.8550 | | 0.9817 |
| Lymphocytes | 2 | 0 | 0.2086 | 0.3662 | 0.57 | 0.5690 | | 0.8363 |
| Eosinophils | 1 | 2 | 0.2800 | 0.3098 | 0.90 | 0.3660 | | 0.6378 |
| Eosinophils | 1 | 0 | -0.4601 | 0.3463 | -1.33 | 0.1841 | | 0.3794 |
| Eosinophils | 2 | 0 | -0.7401 | 0.3463 | -2.14 | 0.0326 | | 0.0825 |
| Monocytes | 1 | 2 | -0.9122 | 0.3619 | -2.52 | 0.0117 | | 0.0314\* |
| Monocytes | 1 | 0 | -1.0284 | 0.3838 | -2.68 | 0.0074 | | 0.0202\* |
| Monocytes | 2 | 0 | -0.1162 | 0.3838 | -0.30 | 0.7621 | | 0.9607 |

Group 0 (G0) - control group, before brain death. Group 1 - group immediately after induction of brain death. Group 2 - 1-hour group after induction of brain death. The significance level adopted for statistical tests was 5% (p<0.05).

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**TABLE 3.**Comparison between groups 0, 1 and 2 in relation to values of Urea, Creatinine, Alanine Aminotransferase (ALT), Aspartate Aminotransferase (AST), Alkaline Phosphatase (FA), Gamma Glutamil Transferase (GGT), Total Serum Protein (PtThIA), Albumin, Globulin, Creatine Kinase (CK) and Creatine kinase - MB (CK-MB) from the Biochemical Examination obtained from experimental animals. Group least squares mean differences, fit for multiple comparisons - Tukey-Kramer of variables.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Group | \_Group | Estimate | Error | Valor z | Pr | ˃ | Adj P |
|  |  |  |  | Standard |  | z |  |  |
|  |  |  |  |  |  |  |  |  |
| Urea | 1 | 2 | -0.05071 | 0.1513 | -0.34 | 0.7375 |  | 0.9400 |
| Urea | 1 | 0 | 0.07189 | 0.1513 | 0.48 | 0.6348 |  | 0.8831 |
| Urea | 2 | 0 | 0.1226 | 0.1513 | 0.81 | 0.4179 |  | 0.6967 |
| Creatinine | 1 | 2 | -0.1210 | 0.1460 | -0.83 | 0.4071 |  | 0.6850 |
| Creatinine | 1 | 0 | 0.2935 | 0.1460 | 2.01 | 0.0444 |  | 0.1096 |
| Creatinine | 2 | 0 | 0.4146 | 0.1460 | 2.84 | 0.0045 |  | 0.0126\* |
| ALT | 1 | 2 | -0.3916 | 0.2849 | -1.37 | 0.1692 |  | 0.3542 |
| ALT | 1 | 0 | 0.2354 | 0.2849 | 0.83 | 0.4087 |  | 0.6867 |
| ALT | 2 | 0 | 0.6270 | 0.2849 | 2.20 | 0.0277 |  | 0.0710 |
| AST | 1 | 2 | 0.7952 | 0.3469 | 2.29 | 0.0219 |  | 0.0568 |
| AST | 1 | 0 | 0.9538 | 0.3469 | 2.75 | 0.0060 |  | 0.0164\* |
| AST | 2 | 0 | 0.1586 | 0.3469 | 0.46 | 0.6474 |  | 0.8911 |
| FA | 1 | 2 | -0.5406 | 0.2725 | -1.98 | 0.0472 |  | 0.1161 |
| FA | 1 | 0 | 0.08733 | 0.2725 | 0.32 | 0.7486 |  | 0.9449 |
| FA | 2 | 0 | 0.6280 | 0.2725 | 2.30 | 0.0212 |  | 0.0551 |
| GGT | 1 | 2 | -0.06188 | 0.05020 | -1.23 | 0.2177 |  | 0.4339 |
| GGT | 1 | 0 | -0.06188 | 0.05020 | -1.23 | 0.2177 |  | 0.4339 |
| GGT | 2 | 0 | 1.03E-17 | 0.05020 | 0.00 | 1.0000 |  | 1.0000 |
| pTseric | 1 | 2 | -0.06744 | 0.1127 | -0.60 | 0.5497 |  | 0.8210 |
| pTseric | 1 | 0 | -0.1588 | 0.1127 | -1.41 | 0.1589 |  | 0.3364 |
| pTseric | 2 | 0 | -0.09135 | 0.1127 | -0.81 | 0.4177 |  | 0.6966 |
| Albumin | 1 | 2 | -0.01026 | 0.1774 | -0.06 | 0.9539 |  | 0.9982 |
| Albumin | 1 | 0 | -0.2044 | 0.1774 | -1.15 | 0.2493 |  | 0.4821 |
| Albumin | 2 | 0 | -0.1942 | 0.1774 | -1.09 | 0.2739 |  | 0.5177 |
| Globulin | 1 | 2 | -0.1121 | 0.08407 | -1.33 | 0.1824 |  | 0.3765 |
| Globulin | 1 | 0 | -0.1197 | 0.08407 | -1.42 | 0.1546 |  | 0.3288 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | 54 |
| Globulin | 2 | 0 | -0.00755 | 0.08407 | -0.09 | 0.9285 | 0.9956 |
| CK | 1 | 2 | 0.8398 | 0.5325 | 1.58 | 0.1148 | 0.2556 |
| CK | 1 | 0 | 0.5379 | 0.5325 | 1.01 | 0.3125 | 0.5705 |
| CK | 2 | 0 | -0.3019 | 0.5325 | -0.57 | 0.5707 | 0.8377 |
| CK-MB | 1 | 2 | 0.2818 | 0.5311 | 0.53 | 0.5956 | 0.8563 |
| CK-MB | 1 | 0 | -0.1141 | 0.5311 | -0.21 | 0.8299 | 0.9749 |
| CK-MB | 2 | 0 | -0.3959 | 0.5311 | -0.75 | 0.4559 | 0.7363 |

Group 0 (G0) - control group, before brain death. Group 1 - group immediately after induction of brain death. Group 2 - 1-hour group after induction of brain death. The significance level adopted for statistical tests was 5% (p<0.05).

**TABLE 4.**Comparisons between groups 0, 1 and 2 of the potential values of Hydrogen in blood (pH), partial pressures of Carbon Dioxide (pCO2), partial pressures of Oxygen ( pO2), Sodium (Na+), Potassium (K+), Calcium (Ca2+), Chlorine (Cl-), Bicarbonate (HCO3), Oxygen saturation index (sO2) and Lactate (Lac) of the Gasometry Examination obtained from experimental animals. Group least squares mean differences, fit for multiple comparisons - Tukey-Kramer of variables.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | Group | \_Group | Estimate | Error | Valor z | Pr | ˃ | Adj P |
|  |  |  |  | Standard |  | z |  |  |
|  |  |  |  |  |  |  |  |  |
| pH | 1 | 2 | 0.009914 | 0.01131 | 0.88 | 0.3807 |  | 0.6550 |
| pH | 1 | 0 | -0.00225 | 0.01131 | -0.20 | 0.8421 |  | 0.9784 |
| pH | 2 | 0 | - 0.01217 | 0.01131 | -1.08 | 0.2820 |  | 0.5291 |
| pCO2 | 1 | 2 | -0.1050 | 0.1696 | -0.62 | 0.5361 |  | 0.8098 |
| pCO2 | 1 | 0 | -0.2833 | 0.1696 | -1.67 | 0.0949 |  | 0.2167 |
| pCO2 | 2 | 0 | - 0.1784 | 0.1599 | -1.12 | 0.2648 |  | 0.5047 |
| pO2 | 1 | 2 | 0.05930 | 0.2467 | 0.24 | 0.8100 |  | 0.9686 |
| pO2 | 1 | 0 | -0.1398 | 0.2467 | -0.57 | 0.5710 |  | 0.8379 |
| pO2 | 2 | 0 | - 0.1991 | 0.2467 | -0.81 | 0.4197 |  | 0.6987 |
| Na+ | 1 | 2 | -0.03917 | 0.03026 | -1.29 | 0.1955 |  | 0.3983 |
| Na+ | 1 | 0 | -0.01639 | 0.03026 | -0.54 | 0.5880 |  | 0.8507 |
| Na+ | 2 | 0 | 0.02277 | 0.03026 | 0.75 | 0.4517 |  | 0.7320 |
| K+ | 1 | 2 | -0.1118 | 0.08867 | -1.26 | 0.2071 |  | 0.4171 |
| K+ | 1 | 0 | 0.1234 | 0.08867 | 1.39 | 0.1641 |  | 0.3454 |
| K+ | 2 | 0 | 0.2352 | 0.08867 | 2.65 | 0.0080 |  | 0.0218\* |
| Ca2+ | 1 | 2 | -0.08385 | 0.1660 | -0.51 | 0.6135 |  | 0.8688 |
| Ca2+ | 1 | 0 | 0.09934 | 0.1660 | 0.60 | 0.5496 |  | 0.8210 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | 55 |
| Ca2+ | 2 | 0 | 0.1832 | 0.1660 | 1.10 | 0.2698 | 0.5119 |
| Cl- | 1 | 2 | 0.001892 | 0.02855 | 0.07 | 0.9472 | 0.9976 |
| Cl- | 1 | 0 | -0.04256 | 0.02855 | -1.49 | 0.1360 | 0.2952 |
| Cl- | 2 | 0 | -0.04445 | 0.02855 | -1.56 | 0.1194 | 0.2644 |
| HCO3 | 1 | 2 | -0.1543 | 0.1449 | -1.06 | 0.2869 | 0.5360 |
| HCO3 | 1 | 0 | -0.4483 | 0.1449 | -3.09 | 0.0020 | 0.0056\* |
| HCO3 | 2 | 0 | -0.2940 | 0.1449 | -2.03 | 0.0425 | 0.1054 |
| sO2 | 1 | 2 | -0.03002 | 0.04842 | -0.62 | 0.5352 | 0.8091 |
| sO2 | 1 | 0 | -0.06678 | 0.04842 | -1.38 | 0.1678 | 0.3517 |
| sO2 | 2 | 0 | -0.03676 | 0.04842 | -0.76 | 0.4477 | 0.7280 |
| Lac | 1 | 2 | 0.4624 | 0.4742 | 0.98 | 0.3295 | 0.5926 |
| Lac | 1 | 0 | 0.9479 | 0.4742 | 2.00 | 0.0456 | 0.1125 |
| Lac | 2 | 0 | 0.4855 | 0.4742 | 1.02 | 0.3059 | 0.5618 |

Group 0 (G0) - control group, before brain death. Group 1 - group immediately after induction of brain death. Group 2 - 1-hour group after induction of brain death. The significance level adopted for statistical tests was 5% (p<0.05).

**TABLE 5.**Analysis of the values of the variables of the Erythrogram examination of the animals in each group.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **ERYTHROGRAM** | | |  |  |  |
| **A** | **G** | **He** | **Hb** | **Ht** | **VCM** | **CHCM** | **HCM** | **PT** | **RDW** | **Platelets** |
| 1 | 0 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 2 | 0 | 9,53 | 17,7 | 53 | 55,6 | 33,4 | 18,6 | 6,2 | 14,0 | 994,850 |
| 3 | 0 | 8,03 | 16,0 | 46 | 57,3 | 34,8 | 19,9 | 5,6 | 15,3 | 707,000 |
| 4 | 0 | 9,35 | 16,8 | 48 | 51,3 | 35,0 | 18,0 | 6,2 | 14,8 | 797,900 |
| 5 | 0 | 7,86 | 16,9 | 47 | 59,8 | 36,0 | 21,5 | 6,2 | 13,6 | 962,025 |
| 6 | 1 | 5,98 | 12,3 | 36 | 60,2 | 34,2 | 20,6 | 4,0 | 15,3 | 669,125 |
| 7 | 1 | 3,00 | 6,0 | 18 | 60,0 | 33,3 | 20,0 | 0,8 | 14,1 | 224,725 |
| 8 | 1 | 7,27 | 14,1 | 42 | 57,8 | 33,6 | 19,4 | 4,8 | 14,1 | 621,150 |
| 9 | 1 | 7,59 | 13,4 | 39 | 51,4 | 34,4 | 17,7 | 5,0 | 13,5 | 681,750 |
| 10 | 1 | 8,51 | 18,1 | 50 | 58,8 | 36,2 | 21,3 | 6 | 14,4 | 954,450 |
| 11 | 2 | 9,03 | 16,2 | 51 | 56,5 | 31,8 | 17,9 | 5,0 | 15,3 | 454,500 |
| 12 | 2 | 7,06 | 14,5 | 42 | 59,5 | 34,5 | 20,5 | 4,2 | 14,6 | 732,250 |
| 13 | 2 | 9,65 | 18,5 | 54 | 56,0 | 34,3 | 19,2 | 5,4 | 15,2 | 701,950 |
| 14 | 2 | 8,7 | 17,9 | 53 | 60,9 | 33,8 | 20,6 | 6,2 | 15,0 | 1131,200 |
| 15 | 2 | 8,62 | 15,6 | 46 | 53,4 | 33,9 | 18,1 | 4,4 | 13,8 | 540,350 |

1. Animal, G: Group, He: Hematite (106/μL), Hb: Hemoglobin (g/dL), Ht: Hematocrit (%), VCM: Mean Corpuscular Volume (fL), CHCM: Mean Corpuscular Hemoglobin Concentration (%), HCM: Mean Corpuscular Hemoglobin (pg), PT: Plasmattotal Protein (%), RDW: Red Cell Distribution Width (Red Cell Distribution Amplitude - %), Platelets (/μL). Group 0 (G0) - control group, before brain death. N: number of samples, Group 1 - group immediately after the induction of brain death. Group 2 - 1-hour group after induction of brain death.

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**TABLE 6:** Analysis of the values of the variables of the Leucogram examination of the animals in each group.

**LEUCOGRAM**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **A** | **G** | **Leuc** | **Segm** | **Linf** | **Eos** | **Mon** |
| 1 | 0 |  |  |  |  |  |
| 2 | 0 | 8,800 | 1,848 | 6,600 | 88 | 264 |
| 3 | 0 | 4,600 | 828 | 3,634 | 0 | 138 |
| 4 | 0 | 5,800 | 1,740 | 3,654 | 232 | 174 |
| 5 | 0 | 6,200 | 1,364 | 4,526 | 0 | 310 |
| 6 | 1 | 15,700 | 4,239 | 11,147 | 157 | 157 |
| 7 | 1 | 2,700 | 621 | 1,998 | 54 | 27 |
| 8 | 1 | 5,800 | 580 | 5,162 | 0 | 58 |
| 9 | 1 | 4,600 | 920 | 3,496 | 92 | 46 |
| 10 | 1 | 3,600 | 684 | 2,808 | 0 | 108 |
| 11 | 2 | 21,500 | 6,665 | 14,405 | 0 | 430 |
| 12 | 2 | 5,400 | 2,592 | 2,646 | 54 | 108 |
| 13 | 2 | 9,700 | 4,365 | 4,947 | 97 | 291 |
| 14 | 2 | 7,800 | 4,446 | 3,198 | 78 | 78 |
| 15 | 2 | 7,900 | 4,661 | 3,160 | 0 | 79 |

1. Animal, G: Group, Leuc: Leukocytes, Segm: Segmented, Linf: Lymphocytes, Eos: Eosinophils, Mon: Monocytes. Group 0 (G0) - control group, before brain death. N: number of samples, Group 1 - group immediately after the induction of brain death. Group 2 - 1-hour group after induction of brain death.

**TABLE 7.**Analysis of the values of the variables of the biochemical examination of the animals in each group.

**Biochemical**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **G** | **Ur** | **Creat** | **ALT** | **AST** | **FA** | **GGT** | **PTs** | **Alb** | **Glob** | **CK** | **CK-MB** |
| 1 | 0 | 27,0 | 0,39 | 69,0 | 111,0 | 11,0 | <1,0 | 4,2 | 1,6 | 2,6 | 233,0 | 494,9 |
| 2 | 0 | 37,0 | 0,59 | 53,0 | 88,0 | 30,0 | <1,0 | 4,4 | 2,1 | 2,3 | 87,0 | 129,1 |
| 3 | 0 | 35,0 | 0,71 | 38,0 | 93,0 | 32,0 | <1,0 | 5,5 | 2,9 | 2,6 | 585,0 | 1459,5 |
| 4 | 0 | 30,0 | 0,52 | 20,0 | 63,0 | 23,0 | <1,0 | 5,8 | 2,9 | 2,9 | 472,0 | 896,3 |
| 5 | 0 | 32,0 | 0,34 | 31,0 | 58,0 | 7,0 | <1,0 | 5,3 | 2,4 | 2,9 | 177,0 | 402,0 |
| 6 | 1 | 33,0 | 0,64 | 60,0 | 99,0 | 36,0 | <1,0 | 3,7 | 1,3 | 2,4 | 218,0 | 647,5 |
| 7 | 1 | 29,0 | 0,53 | 28,0 | 51,0 | 15,0 | <1,0 | 2,8 | 1,2 | 1,6 | 27,0 | 27,8 |
| 8 | 1 | 41,0 | 0,67 | 98,0 | 331,0 | 26,0 | <1,0 | 4,7 | 2,3 | 2,4 | 454,0 | 1306,8 |
| 9 | 1 | 42,0 | 0,81 | 25,0 | 131,0 | 22,0 | <1,0 | 5,4 | 2,7 | 2,7 | 297,0 | 373,9 |
| 10 | 1 | 28,0 | 0,77 | 56,0 | 460,0 | 13,4 | 0,7 | 4,9 | 2,2 | 2,7 | 1665,0 | 661,1 |
| 11 | 2 | 55,0 | 1,11 | 155,0 | 26,0 | 43,0 | <1,0 | 3,7 | 1,1 | 2,6 | 412,0 | 657,4 |
| 12 | 2 | 29,0 | 0,56 | 45,0 | 117,0 | 18,0 | <1,0 | 4,1 | 1,7 | 2,4 | 53,0 | 115,8 |
| 13 | 2 | 18,0 | 0,91 | 57,0 | 150,0 | 57,0 | <1,0 | 4,5 | 2,1 | 2,4 | 181,0 | 162,6 |
| 14 | 2 | 39,0 | 0,61 | 61,0 | 101,0 | 40,0 | <1,0 | 6,0 | 2,8 | 3,2 | 400,0 | 1111,0 |
| 15 | 2 | 41,0 | 0,67 | 77,0 | 90,0 | 35,0 | <1,0 | 4,7 | 2,1 | 2,6 | 103,0 | 229,3 |

1. Animal, G: Group, Ur: Urea (mg/dL), Creat: Creatinine (mg/dL), ALT: Alanine Aminotransferase (UI/L), AST: Aspartate Aminotransferase (UI/L), FA: Phosphatase Alkali (UI/L), GGT: Gamma Glutamil Transferase (UI/L), PTs: Total Serum Protein (g/dL), Alb: Albumina (g/dL), Globulin: Globuline (g/dL), CK: Creatine kinase (UI/L), CK-MB: Creatine kinase - MB. N: number of samples, Group 1 - group immediately after the induction of brain death. Group 2 - 1-hour group after induction of brain death.

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**TABLE 8:** Analysis of the values of the variables of the gasometric examination of the animals in each group.

**Gas**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **G** | **pH** | **pCO2** | **pO2** | **Na+** | **K+** | **Ca2+** | **Cl-** | **Lac** | **HCO3** | **sO2** |
| 1 | 0 | 6,97 | 132,7 | 142 | 152 | 4,16 | 0,93 | 108 | 1,2 | 29,1 | 96,7 |
| 2 | 0 | 7,09 | 82,0 | 99 | 153 | 4,63 | 0,43 | 110 | 2,9 | 24,0 | 93,9 |
| 3 | 0 | 7,24 | 63,2 | 170 | 147 | 4,74 | 0,72 | 117 | 1,3 | 26,4 | 99,2 |
| 4 | 0 | 7,10 | 78,9 | 180 | 149 | 4,81 | 0,85 | 109 | 5,2 | 23,1 | 98,9 |
| 5 | 0 | 7,16 | 86,1 | 168 | 137 | 4,89 | 0,90 | 108 | 0,6 | 29,7 | 98,9 |
| 6 | 1 | 6,92 | 91,0 | 157 | 154 | 5,16 | 1,07 | 103 | 5,3 | 17,8 | 97,3 |
| 7 | 1 | 7,24 | 41,0 | 63 | 145 | 5,43 | 0,93 | 110 | 7,4 | 17,0 | 87,7 |
| 8 | 1 | 7,12 | 69,7 | 208 | 149 | 4,65 | 0,79 | 111 | 4,7 | 17,7 | 99,4 |
| 9 | 1 | 6,97 | 70,9 | 187 | 151 | 4,82 | 0,95 | 104 | 6,9 | 15,6 | 98,7 |
| 10 | 1 | 7,23 | 40,8 | 45 | 127 | 6,22 | 0,49 | 101 | 4,6 | 16,4 | 73,0 |
| 11 | 2 | 6,74 | 75,9 | 143 | 154 | 8,23 | 0,72 | 94 | 9,5 | 9,8 | 94,3 |
| 12 | 2 | 7,08 | 70,4 | 157 | 156 | 4,61 | 0,58 | 112 | 0,5 | 20,1 | 98,4 |
| 13 | 2 | 7,03 | 56,6 | 134 | 151 | 6,11 | 1,13 | 104 | 6,2 | 14,4 | 97,2 |
| 14 | 2 | 7,16 | 87,4 | 124 | 144 | 5,69 | 1,03 | 108 | 1,2 | 30,0 | 97,3 |
| 15 | 2 | 7,12 | 77,7 | 64 | 150 | 4,75 | 1,14 | 110 | 0,8 | 24,3 | 82,8 |

1. Animal, G: Group, pH: Hydrogen potential of the blood, pCO2: partial pressures of Carbon Dioxide (mmHg), pO2: partial pressures of Oxygen (mmHg), Na+: Sodium (mmol/L), K+: Potassium (mmol/L), Ca+: Calcium (mmol/L), Cl-: Chlorine (mmol/L), Lac: Lactate (mmol/L), COH3: Bicarbonate (P), sO2: oxygen saturation index (%). N: number of samples, Group 1 - group immediately after the induction of brain death. Group 2 - 1-hour group after induction of brain death.

**TABLE 9:** Statistical analysis of the mean, standard deviation, standard error, minimum, average and maximum of the variables of the Erythrogram examination.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Group** | **Variable** | **N** | **Average** |  | **Deviation** | **Error** | **Minimum** | **Average** | **Maximum** |
|  |  |  |  |  | **Standard** | **Standard** |  |  |  |
| 0 | He | 4 | 8.6925000 | 0.8690368 | | 0.4345184 | 7.8600000 | 8.6900000 | 9.5300000 |
| 0 | Hb | 4 | 16.8500000 | 0.6952218 | | 0.3476109 | 16.0000000 | 16.8500000 | 17.7000000 |
| 0 | Ht | 4 | 48.5000000 |  | 3.1091264 | 1.5545632 | 46.0000000 | 47.5000000 | 53.0000000 |
| 0 | VCM | 4 | 56.0000000 | 3.5767769 | | 1.7883885 | 51.3000000 | 56.4500000 | 59.8000000 |
| 0 | CHCM | 4 | 34.8000000 |  | 1.0708252 | 0.5354126 | 33.4000000 | 34.9000000 | 36.0000000 |
| 0 | HCM | 4 | 19.5000000 | 1.5513435 | | 0.7756718 | 18.0000000 | 19.2500000 | 21.5000000 |
| 0 | PT | 4 | 6.0500000 |  | 0.3000000 | 0.1500000 | 5.6000000 | 6.2000000 | 6.2000000 |
| 0 | RDW | 4 | 14.4250000 | 0.7675719 | | 0.3837860 | 13.6000000 | 14.4000000 | 15.3000000 |
| 0 | Platelets | 4 | 865.4437500 | 136.3090795 | | 68.1545398 | 707.0000000 | 879.9625000 | 994.8500000 |
| 1 | He | 5 | 6.4700000 | 2.1410862 | | 0.9575228 | 3.0000000 | 7.2700000 | 8.5100000 |
| 1 | Hb | 5 | 12.7800000 |  | 4.3768710 | 1.9573962 | 6.0000000 | 13.4000000 | 18.1000000 |
| 1 | Ht | 5 | 37.0000000 | 11.8321596 | | 5.2915026 | 18.0000000 | 39.0000000 | 50.0000000 |
| 1 | VCM | 5 | 57.6400000 |  | 3.6204972 | 1.6191356 | 51.4000000 | 58.8000000 | 60.2000000 |
| 1 | CHCM | 5 | 34.3400000 | 1.1304866 | | 0.5055690 | 33.3000000 | 34.2000000 | 36.2000000 |
| 1 | HCM | 5 | 19.8000000 |  | 1.3693064 | 0.6123724 | 17.7000000 | 20.0000000 | 21.3000000 |
| 1 | PT | 5 | 4.1200000 | 1.9879638 | | 0.8890444 | 0.8000000 | 4.8000000 | 6.0000000 |
| 1 | RDW | 5 | 14.2800000 |  | 0.6572671 | 0.2939388 | 13.5000000 | 14.1000000 | 15.3000000 |
| 1 | Platelets | 5 | 630.2400000 | 261.6306991 | | 117.0048056 | 224.7250000 | 669.1250000 | 954.4500000 |
| 2 | He | 5 | 8.6120000 | 0.9576899 | | 0.4282920 | 7.0600000 | 8.7000000 | 9.6500000 |
| 2 | Hb | 5 | 16.5400000 | 1.6471187 | | 0.7366139 | 14.5000000 | 16.2000000 | 18.5000000 |
| 2 | Ht | 5 | 49.2000000 | 5.0695167 | | 2.2671568 | 42.0000000 | 51.0000000 | 54.0000000 |
| 2 | VCM | 5 | 57.2600000 | 2.9720363 | | 1.3291351 | 53.4000000 | 56.5000000 | 60.9000000 |
| 2 | CHCM | 5 | 33.6600000 | 1.0784248 | | 0.4822862 | 31.8000000 | 33.9000000 | 34.5000000 |
| 2 | HCM | 5 | 19.2600000 | 1.2778889 | | 0.5714893 | 17.9000000 | 19.2000000 | 20.6000000 |
| 2 | PT | 5 | 5.0400000 | 0.8049845 | | 0.3600000 | 4.2000000 | 5.0000000 | 6.2000000 |
| 2 | RDW | 5 | 14.7800000 | 0.6099180 | | 0.2727636 | 13.8000000 | 15.0000000 | 15.3000000 |
| 2 | Platelets | 5 | 712.0500000 | 260.7727291 | | 116.6211098 | 454.5000000 | 701.9500000 | 1131.20 |

He: Hematites, Hb: Hemoglobin, Ht: Hematocrit, MVC: Mean Corpuscular Volume, CHCM: Concentration of

Mean Corpuscular Hemoglobin, HCM: Mean Corpuscular Hemoglobin, PT: Total Protein, RDW: Red Cell Distribution Width (Amplitude of Red Blood Cell Distribution), Platelets. Group 0 (G0) - control group, before brain death. N: number of samples, Group 1 - group immediately after the induction of brain death. Group 2

- group of 1 h after induction of brain death.

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**TABLE 10:** Statistical analysis of the mean, standard deviation, standard error, minimum, average and maximum of the variables of the Leucogram examination.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Group** | **Variable** | **N** | **Average** | **Deviation** |  | **Error** | **Minimum** | **Average** | **Maximum** |
|  |  |  |  | **Standard** |  | **Standard** |  |  |  |
| 0 | Leuc | 4 | 6.3500000 | 1.7691806 | 0.8845903 | | 4.6000000 | 6.0000000 | 8.8000000 |
| 0 | Seg | 4 | 208.2380000 | 413.1747187 |  | 206.5873594 | 1.3640000 | 1.7940000 | 828.0000000 |
| 0 | Linf | 4 | 4.6035000 | 1.3944532 | 0.6972266 | | 3.6340000 | 4.0900000 | 6.6000000 |
| 0 | Eos | 4 | 80.0000000 | 109.4958142 |  | 54.7479071 | **0** | 44.0000000 | 232.0000000 |
| 0 | Mon | 4 | 221.5000000 | 79.3032156 | 39.6516078 | | 138.0000000 | 219.0000000 | 310.0000000 |
| **1** | Leuc | **5** | 6.4800000 | 5.2817611 | 2.3620754 | | 2.7000000 | 4.6000000 | 15.7000000 |
| **1** | Seg | **5** | 561.8478000 | 338.3600956 |  | 151.3192349 | 4.2390000 | 621.0000000 | 920.0000000 |
| **1** | Linf | **5** | 4.9222000 | 3.6694847 | 1.6410435 | | 1.9980000 | 3.4960000 | 11.1470000 |
| **1** | Eos | **5** | 60.6000000 | 66.4590099 |  | 29.7213728 | **0** | 54.0000000 | 157.0000000 |
| **1** | Mon | **5** | 79.2000000 | 52.8176107 | 23.6207536 | | 27.0000000 | 58.0000000 | 157.0000000 |
| **2** | Leuc | **5** | 10.4600000 | 6.3579085 | 2.8433431 | | 5.4000000 | 7.9000000 | 21.5000000 |
| **2** | Seg | **5** | 4.5458000 | 1.4460518 | 0.6466940 | | 2.5920000 | 4.4460000 | 6.6650000 |
| **2** | Linf | **5** | 5.6712000 | 4.9592945 | 2.2178639 | | 2.6460000 | 3.1980000 | 14.4050000 |
| **2** | Eos | **5** | 45.8000000 | 44.4994382 | 19.9007538 | | **0** | 54.0000000 | 97.0000000 |
| **2** | Mon | **5** | 197.2000000 | 157.4252203 | 70.4026988 | | 78.0000000 | 108.0000000 | 430.0000000 |

Leuc: Leukocytes, Seg: Segmented, Linf: Lymphocytes, Eos: Eosinophils, Mon: Monocytes. Group 0 (G0) - group

control, before brain death. N: number of samples, Group 1 - group immediately after the induction of brain death. Group 2 - 1-hour group after induction of brain death.

**TABLE 11.** Statistical analysis of the mean, standard deviation, standard error, minimum, average and maximum of the variables of the biochemical examination.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Group** | **Variable** | **N** | **Average** | **Deviation** |  | **Error** | **Minimum** | **Average** | **Maximum** |
|  |  |  |  | **Standard** |  | **Standard** |  |  |  |
| 0 | Urea | 5 | 32.2000000 | 3.9623226 |  | 1.7720045 | 27.0000000 | 32.0000000 | 37.0000000 |
| 0 | Creat | 5 | 0.5100000 | 0.1498332 | 0.0670075 | | 0.3400000 | 0.5200000 | 0.7100000 |
| 0 | ALT | 5 | 42.2000000 | 19.1755052 |  | 8.5755466 | 20.0000000 | 38.0000000 | 69.0000000 |
| 0 | AST | 5 | 82.6000000 | 21.9840852 | 9.8315818 | | 58.0000000 | 88.0000000 | 111.0000000 |
| 0 | FA | 5 | 20.6000000 | 11.1937483 |  | 5.0059964 | 7.0000000 | 23.0000000 | 32.0000000 |
| 0 | GGT | 5 | 1.0000000 | 0 | 0 | | 1.0000000 | 1.0000000 | 1.0000000 |
| 0 | PTs | 5 | 5.0400000 | 0.7021396 |  | 0.3140064 | 4.2000000 | 5.3000000 | 5.8000000 |
| 0 | Alb | 5 | 2.3800000 | 0.5540758 | 0.2477902 | | 1.6000000 | 2.4000000 | 2.9000000 |
| 0 | Glob | 5 | 2.6600000 | 0.2509980 |  | 0.1122497 | 2.3000000 | 2.6000000 | 2.9000000 |
| 0 | CK | 5 | 310.8000000 | 209.2921403 | 93.5982906 | | 87.0000000 | 233.0000000 | 585.0000000 |
| 0 | CK-MB | 5 | 676.3600000 | 517.0533125 | 231.2332710 | | 129.1000000 | 494.9000000 | 1459.50 |
| 1 | Urea | 5 | 34.6000000 | 6.5802736 | 2.9427878 | | 28.0000000 | 33.0000000 | 42.0000000 |
| 1 | Creat | 5 | 0.6840000 | 0.1108152 | 0.0495580 | | 0.5300000 | 0.6700000 | 0.8100000 |
| 1 | ALT | 5 | 53.4000000 | 29.5431887 | 13.2121157 | | 25.0000000 | 56.0000000 | 98.0000000 |
| 1 | AST | 5 | 214.4000000 | 173.8441831 |  | 77.7454822 | 51.0000000 | 131.0000000 | 460.0000000 |
| 1 | FA | 5 | 22.4800000 | 9.1352066 | 4.0853886 | | 13.4000000 | 22.0000000 | 36.0000000 |
| 1 | GGT | 5 | 0.9400000 | 0.1341641 |  | 0.0600000 | 0.7000000 | 1.0000000 | 1.0000000 |
| 1 | PTs | 5 | 4.3000000 | 1.0416333 | 0.4658326 | | 2.8000000 | 4.7000000 | 5.4000000 |
| 1 | Alb | 5 | 1.9400000 | 0.6580274 |  | 0.2942788 | 1.2000000 | 2.2000000 | 2.7000000 |
| 1 | Glob | 5 | 2.3600000 | 0.4505552 | 0.2014944 | | 1.6000000 | 2.4000000 | 2.7000000 |
| 1 | CK | 5 | 532.2000000 | 651.6553537 |  | 291.4291338 | 27.0000000 | 297.0000000 | 1665.00 |
| 1 | CK-MB | 5 | 603.4200000 | 470.1146849 | 210.2416786 | | 27.8000000 | 647.5000000 | 1306.80 |
| 2 | Urea | 5 | 36.4000000 | 13.8491877 | 6.1935450 | | 18.0000000 | 39.0000000 | 55.0000000 |
| 2 | Creat | 5 | 0.7720000 | 0.2317758 | 0.1036533 | | 0.5600000 | 0.6700000 | 1.1100000 |
| 2 | ALT | 5 | 79.0000000 | 44.0000000 | 19.6773982 | | 45.0000000 | 61.0000000 | 155.0000000 |
| 2 | AST | 5 | 96.8000000 | 45.5927626 | 20.3897033 | | 26.0000000 | 101.0000000 | 150.0000000 |
| 2 | FA | 5 | 38.6000000 | 14.1173652 | 6.3134776 | | 18.0000000 | 40.0000000 | 57.0000000 |
| 2 | GGT | 5 | 1.0000000 | 0 | 0 | | 1.0000000 | 1.0000000 | 1.0000000 |
| 2 | PTs | 5 | 4.6000000 | 0.8717798 |  | 0.3898718 | 3.7000000 | 4.5000000 | 6.0000000 |
| 2 | Alb | 5 | 1.9600000 | 0.6228965 | 0.2785678 | | 1.1000000 | 2.1000000 | 2.8000000 |
| 2 | Glob | 5 | 2.6400000 | 0.3286335 | 0.1469694 | | 2.4000000 | 2.6000000 | 3.2000000 |
| 2 | CK | 5 | 229.8000000 | 167.2444319 | 74.7939837 | | 53.0000000 | 181.0000000 | 412.0000000 |
| 2 | CK-MB | 5 | 455.2200000 | 425.0871699 |  | 190.1047616 | 115.8000000 | 229.3000000 | 1111.00 |

Urea, Creat: Creatinine, ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, FA: Alkaline Phosphatase,

GGT: Gamma Glutamil Transferase, PTs: Total serum protein, Alb: Albumin, Glob: Globuline, CK: Creatine

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kinase, CK-MB: Creatine kinase MB. N: number of samples, Group 1 - group immediately after induction of brain death. Group 2 - 1-hour group after induction of brain death.

**TABLE 12.** Statistical analysis of the mean, standard deviation, standard error, minimum, average and maximum of the variables of the gas test.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Group** | **Variable** | **N** | **Average** | **Deviation** |  | **Error** | **Minimum** | **Average** | **Maximum** |
|  |  |  |  | **Standard** |  | **Standard** |  |  |  |
| 0 | pH | 5 | 7.1120000 | 0.0993479 |  | 0.0444297 | 6.9700000 | 7.1000000 | 7.2400000 |
| 0 | pCO2 | 5 | 91.7000000 | 31.4711773 | 14.0743384 | | 57.7000000 | 83.2000000 | 142.0000000 |
| 0 | pO2 | 5 | 151.8000000 | 32.6833291 |  | 14.6164291 | 99.0000000 | 168.0000000 | 180.0000000 |
| 0 | Na+ | 5 | 147.6000000 | 6.3874878 | 2.8565714 | | 137.0000000 | 149.0000000 | 153.0000000 |
| 0 | K+ | 5 | 4.6460000 | 0.2879757 | 0.1287866 | | 4.1600000 | 4.7400000 | 4.8900000 |
| 0 | Ca+ | 5 | 0.7660000 | 0.2042792 |  | 0.0913564 | 0.4300000 | 0.8500000 | 0.9300000 |
| 0 | Cl- | 5 | 110.4000000 | 3.7815341 | 1.6911535 | | 108.0000000 | 109.0000000 | 117.0000000 |
| 0 | Lac | 5 | 2.2400000 | 1.8609138 | 0.8322259 | | 0.6000000 | 1.3000000 | 5.2000000 |
| 0 | HCO3 | 5 | 26.4600000 | 2.9500847 | 1.3193180 | | 23.1000000 | 26.4000000 | 29.7000000 |
| 0 | sO2 | 5 | 97.5200000 | 2.2587607 |  | 1.0101485 | 93.9000000 | 98.9000000 | 99.2000000 |
| 1 | pH | 5 | 7.0960000 | 0.1467310 | 0.0656201 | | 6.9200000 | 7.1200000 | 7.2400000 |
| 1 | pCO2 | 5 | 69.0750000 | 21.3099937 |  | 10.6549969 | 40.6000000 | 71.9000000 | 91.9000000 |
| 1 | pO2 | 5 | 132.0000000 | 73.7495763 | 32.9818132 | | 45.0000000 | 157.0000000 | 208.0000000 |
| 1 | Na+ | 5 | 145.2000000 | 10.6864400 |  | 4.7791213 | 127.0000000 | 149.0000000 | 154.0000000 |
| 1 | K+ | 5 | 5.2560000 | 0.6176811 | 0.2762354 | | 4.6500000 | 5.1600000 | 6.2200000 |
| 1 | Ca+ | 5 | 0.8460000 | 0.2224410 | 0.0994786 | | 0.4900000 | 0.9300000 | 1.0700000 |
| 1 | Cl- | 5 | 105.8000000 | 4.4384682 | 1.9849433 | | 101.0000000 | 104.0000000 | 111.0000000 |
| 1 | Lac | 5 | 5.7800000 | 1.2911235 |  | 0.5774080 | 4.6000000 | 5.3000000 | 7.4000000 |
| 1 | HCO3 | 5 | 16.9000000 | 0.9219544 | 0.4123106 | | 15.6000000 | 17.0000000 | 17.8000000 |
| 1 | sO2 | 5 | 91.2200000 | 11.2270655 |  | 5.0208963 | 73.0000000 | 97.3000000 | 99.4000000 |
| 2 | pH | 5 | 7.0260000 | 0.1669731 | 0.0746726 | | 6.7400000 | 7.0800000 | 7.1600000 |
| 2 | pCO2 | 5 | 76.7200000 | 13.7548900 |  | 6.1513738 | 59.2000000 | 73.9000000 | 97.2000000 |
| 2 | pO2 | 5 | 124.4000000 | 35.8789632 | 16.0455601 | | 64.0000000 | 134.0000000 | 157.0000000 |
| 2 | Na+ | 5 | 151.0000000 | 4.5825757 |  | 2.0493902 | 144.0000000 | 151.0000000 | 156.0000000 |
| 2 | K+ | 5 | 5.8780000 | 1.4578477 | 0.6519693 | | 4.6100000 | 5.6900000 | 8.2300000 |
| 2 | Ca+ | 5 | 0.9200000 | 0.2550490 |  | 0.1140614 | 0.5800000 | 1.0300000 | 1.1400000 |
| 2 | Cl- | 5 | 105.6000000 | 7.1274119 | 3.1874755 | | 94.0000000 | 108.0000000 | 112.0000000 |
| 2 | Lac | 5 | 3.6400000 | 4.0240527 |  | 1.7996111 | 0.5000000 | 1.2000000 | 9.5000000 |
| 2 | HCO3 | 5 | 19.7200000 | 7.9609673 | 3.5602528 | | 9.8000000 | 20.1000000 | 30.0000000 |
| 2 | sO2 | 5 | 94.0000000 | 6.4424374 |  | 2.8811456 | 82.8000000 | 97.2000000 | 98.4000000 |

pH: Hydrogen potential of the blood, pCO2: partial pressures of Carbon Dioxide, pO2: partial pressures of

Oxygen, Na+: sodium values, K+: potassium values, Ca+: calcium values, HCO3: bicarbonate values, sO2:

oxygen saturation index.

**TABLE 13.** Reference Values.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **FIOCRUZ** | | **LIMA (2014) Full text** | **CARVALHO** | **WEISS, D. J.,** |
| **(Unit)** | **(2004)** | |  | **(2009)** | **WARDROP, K. J.** |
|  |  |  |  |  | **(2010)** |
| **Hematocrit (%)** | 28 | – 50 | 23,80 – 51,90 |  | 39,6 – 52,5 |
| **Hemoglobin (g/dL)** | 7,2 – 16 | | 10,2 – 17,80 |  | 13,7 – 17,6 |
| **Hematimetria** | 3,3 | – 8,3 | 4,72 – 10,25 |  | 7,27 – 9,65 |
| **(106/μL)** |  |  |  |  |  |
| **CHGM (%)** | 26 | – 35 | 31,60 – 37,8 |  | 32,9 – 37,5 |
| **VGM (f)** | 46 – 60 (µ3) | | 43,60 – 52,60 |  | 8,9 – 57,9 |
| **CHM (pg)** |  |  | 15,19 – 17,0 |  | 17,1 – 20,4 |
| **Plaquetas (103/µL)** |  |  | 727 - 1351 |  |  |
| **RDW (%)** |  |  |  |  | 11,1 – 15,2 |
| **Leucometria** | 4-12 | | 3,41 – 13,70 |  | 1,96 – 8,25 |
| **(103/μL)** |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | 60 |
|  |  |  | |  |
| **Neutrophil (%)** | 10-45 | 4,00 – 49,90 | | 0.22 - 1.57 (x103/ μL) |
| **Lymphocyte (%)** | 40-82 | 43,10 – 93,7 | | 1.41 - 7.11 (x103/ μL) |
| **Eosinophile (%)** | 0 - 7 | 0,00 | – 3,60 | 0.01 - 0.16 (x103/ μL) |
| **Monócito (%)** | 0 - 8 | 1,00 – 15,20 | | 0.03 - 0.18 (x103/ μL) |
| **PT (g/dL)** |  | 4,00 – 6,9 | |  |
| **Albumin (g/dL)** |  | 2,00 – 3,5 | |  |
| **Globulin (g/dL)** |  | 2,10 | – 5,40 |  |
| **Urea (mg/dL) Sodium** |  | 26 | – 58 |  |
| **Creatinine (mg/dL) Blood pressure** |  | 0,24 | – 1,20 |  |
| **ALT (U/L)** |  | 38 | – 82 |  |
| **AST (U/L)** |  | 61 - 210 | |  |
| **FA (U/L)** |  | 56 – 153 | |  |
| **GGT** |  | 1 | – 6 |  |
| **pH** |  |  |  | 7,5 |
| **pCO2 (mmHg)** |  |  |  | 34,1 |
| **pO2(mmHg )** |  |  |  | 85,8 |
| **Sodium (mmol/L)** |  | 125 | – 143 |  |
| **Potassium (mmol/L)** |  | 3,9 | – 7,9 |  |
| **Calcium (mmol/L)** |  | 4,8 | – 9,8 |  |
| **Cloro(mmol/L)** |  | 101 - 106 | |  |
| **Lactate (mmol/L)** |  | 0,4 | – 2,2 |  |
| **HCO3 (P)** |  |  |  | 27,2 |
| **sO2(%)** |  |  |  | 97,1 |

**TABLE 14:** Descriptive statistics of the variables in the Group 0 Erythrogram.

**Simple Statistics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Average** | **Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  | **Standard** |  |  |  |
|  |  |  |  |  |  |  |
| **He** | 4 | 8.69250 | 0.86904 | 8.69000 | 7.86000 | 9.53000 |
|  |  |  |  |  |  |  |
| **Hb** | 4 | 16.85000 | 0.69522 | 16.85000 | 16.00000 | 17.70000 |
|  |  |  |  |  |  |  |
| **Ht** | 4 | 48.50000 | 3.10913 | 47.50000 | 46.00000 | 53.00000 |
|  |  |  |  |  |  |  |
| **VCM** | 4 | 56.00000 | 3.57678 | 56.45000 | 51.30000 | 59.80000 |
|  |  |  |  |  |  |  |
| **CHCM** | 4 | 34.80000 | 1.07083 | 34.90000 | 33.40000 | 36.00000 |
|  |  |  |  |  |  |  |
| **HCM** | 4 | 19.50000 | 1.55134 | 19.25000 | 18.00000 | 21.50000 |
|  |  |  |  |  |  |  |
| **PT** | 4 | 6.05000 | 0.30000 | 6.20000 | 5.60000 | 6.20000 |
|  |  |  |  |  |  |  |
| **RDW** | 4 | 14.42500 | 0.76757 | 14.40000 | 13.60000 | 15.30000 |
|  |  |  |  |  |  |  |
| **Platelets** | 4 | 865.44375 | 136.30908 | 879.96250 | 707.00000 | 994.85000 |

He: Hemácias (106/µL), Hb: Hemoglobina (g/dL), Ht: Hematócrito (%), VCM: Volume Corpuscular Médio (fL),

CHCM: Mean Corpuscular Hemoglobin Concentration (%), HCM: Mean Corpuscular Hemoglobin (pg), PT: Total Protein (%), RDW: Red Cell Distribution Width (Red Cell Distribution Amplitude - %), Platelets (/μL).

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**TABLE 15.** Spearman correlation performed between the variables of the Group 0 Erythrogram.

**Spearman’s Correlation Coefficients (N = 4)**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **He** | **Hb** | **Ht** | **VCM** | **CHCM** | **HCM** | **PT** | **RDW** | **Platelets** |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **He** | 1.00000 | 0.40000 | 0.80000 | -0.80000 | -0.80000 | -0.80000 | 0.25820 | 0.20000 | 0.40000 |  |
|  |  |
|  |  | 0.6000 | 0.2000 | 0.2000 | 0.2000 | 0.2000 | 0.7418 | 0.8000 | 0.6000 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Hb** | 0.40000 | 1.00000 | 0.80000 | 0.00000 | -0.20000 | 0.00000 | 0.77460 | -0.80000 | 1.00000 |  |
|  |  |
|  | 0.6000 |  | 0.2000 | 1.0000 | 0.8000 | 1.0000 | 0.2254 | 0.2000 | <.0001\* |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Ht** | 0.80000 | 0.80000 | 1.00000 | -0.60000 | -0.40000 | -0.60000 | 0.77460 | -0.40000 | 0.80000 |  |
|  |  |
|  | 0.2000 | 0.2000 |  | 0.4000 | 0.6000 | 0.4000 | 0.2254 | 0.6000 | 0.2000 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **VCM** | -0.80000 | 0.00000 | -0.60000 | 1.00000 | 0.40000 | 1.00000 | -0.25820 | -0.40000 | 0.00000 |  |
|  |  |
|  | 0.2000 | 1.0000 | 0.4000 |  | 0.6000 | <.0001\* | 0.7418 | 0.6000 | 1.0000 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **CHCM** | -0.80000 | -0.20000 | -0.40000 | 0.40000 | 1.00000 | 0.40000 | 0.25820 | -0.40000 | -0.20000 |  |
|  |  |
|  | 0.2000 | 0.8000 | 0.6000 | 0.6000 |  | 0.6000 | 0.7418 | 0.6000 | 0.8000 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **HCM** | -0.80000 | 0.00000 | -0.60000 | 1.00000 | 0.40000 | 1.00000 | -0.25820 | -0.40000 | 0.00000 |  |
|  |  |
|  | 0.2000 | 1.0000 | 0.4000 | <.0001\* | 0.6000 |  | 0.7418 | 0.6000 | 1.0000 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **PT** | 0.25820 | 0.77460 | 0.77460 | -0.25820 | 0.25820 | -0.25820 | 1.00000 | -0.77460 | 0.77460 |  |
|  |  |
|  | 0.7418 | 0.2254 | 0.2254 | 0.7418 | 0.7418 | 0.7418 |  | 0.2254 | 0.2254 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **RDW** | 0.20000 | -0.80000 | -0.40000 | -0.40000 | -0.40000 | -0.40000 | -0.77460 | 1.00000 | -0.80000 |  |
|  |  |
|  | 0.8000 | 0.2000 | 0.6000 | 0.6000 | 0.6000 | 0.6000 | 0.2254 |  | 0.2000 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Platelets** | 0.40000 | 1.00000 | 0.80000 | 0.00000 | -0.20000 | 0.00000 | 0.77460 | -0.80000 | 1.00000 |  |
|  |  |
|  | 0.6000 | <.0001\* | 0.2000 | 1.0000 | 0.8000 | 1.0000 | 0.2254 | 0.2000 |  |  |

He: Hemácias (106/µL), Hb: Hemoglobina (g/dL), Ht: Hematócrito (%), VCM: Volume Corpuscular Médio (fL),

CHCM: Mean Corpuscular Hemoglobin Concentration (%), HCM: Mean Corpuscular Hemoglobin (pg), PT: Total Protein (%), RDW: Red Cell Distribution Width (Red Cell Distribution Amplitude - %), Platelets (/μL).

**TABLE 16.** Descriptive statistics of the variables in the Group 1 Erythrogram.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | **Simple Statistics** | |  |  |
|  |  |  |  |  |  |  |  |
|  | **Variables** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |  |
|  | **He** | 5 | 6.47000 | 2.14109 | 7.27000 | 3.00000 | 8.51000 |
|  |  |  |  |  |  |  |  |
|  | **Hb** | 5 | 12.78000 | 4.37687 | 13.40000 | 6.00000 | 18.10000 |
|  |  |  |  |  |  |  |  |
|  | **Ht** | 5 | 37.00000 | 11.83216 | 39.00000 | 18.00000 | 50.00000 |
|  |  |  |  |  |  |  |  |
|  | **VCM** | 5 | 57.64000 | 3.62050 | 58.80000 | 51.40000 | 60.20000 |
|  |  |  |  |  |  |  |  |

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|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Simple Statistics** | |  |  |
|  |  |  |  |  |  |  |
| **Variables** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **CHCM** | 5 | 34.34000 | 1.13049 | 34.20000 | 33.30000 | 36.20000 |
|  |  |  |  |  |  |  |
| **HCM** | 5 | 19.80000 | 1.36931 | 20.00000 | 17.70000 | 21.30000 |
|  |  |  |  |  |  |  |
| **PT** | 5 | 4.12000 | 1.98796 | 4.80000 | 0.80000 | 6.00000 |
|  |  |  |  |  |  |  |
| **RDW** | 5 | 14.28000 | 0.65727 | 14.10000 | 13.50000 | 15.30000 |

**Platelets** 5 630.24000 261.63070 669.12500 224.72500 954.45000

He: Hemácias (106/µL), Hb: Hemoglobina (g/dL), Ht: Hematócrito (%), VCM: Volume Corpuscular Médio (fL),

CHCM: Concentration of Mean Corpuscular Hemoglobin (%), HCM: Mean Corpuscular Hemoglobin (pg), PT:

Total protein (%), RDW: Red Cell Distribution Width (Red Blood Cell Distribution Amplitude - %), Platelets (/μL).

**TABLE 17**. Spearman correlation performed between the variables of the Group 1 Erythrogram.

**Spearman’s correlation coefficients (N = 5)**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **He** | **Hb** | **Ht** | **VCM** | **CHCM** | **HCM** | **PT** | **RDW** | **Platelets** |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **He** | 1.00000 | 0.90000 | 0.90000 | -0.60000 | 0.90000 | 0.10000 | 1.00000 | -0.10260 | 0.90000 |  |
|  |  |
|  |  | 0.0374\* | 0.0374\* | 0.2848 | 0.0374\* | 0.8729 | <.0001\* | 0.8696 | 0.0374\* |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Hb** | 0.90000 | 1.00000 | 1.00000 | -0.50000 | 0.70000 | 0.20000 | 0.90000 | 0.05130 | 0.70000 |  |
|  |  |
|  | 0.0374\* |  | <.0001\* | 0.3910 | 0.1881 | 0.7471 | 0.0374\* | 0.9347 | 0.1881 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Ht** | 0.90000 | 1.00000 | 1.00000 | -0.50000 | 0.70000 | 0.20000 | 0.90000 | 0.05130 | 0.70000 |  |
|  |  |
|  | 0.0374\* | <.0001\* |  | 0.3910 | 0.1881 | 0.7471 | 0.0374\* | 0.9347 | 0.1881 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **VCM** | -0.60000 | -0.50000 | -0.50000 | 1.00000 | -0.30000 | 0.70000 | -0.60000 | 0.82078 | -0.30000 |  |
|  |  |
|  | 0.2848 | 0.3910 | 0.3910 |  | 0.6238 | 0.1881 | 0.2848 | 0.0886 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **CHCM** | 0.90000 | 0.70000 | 0.70000 | -0.30000 | 1.00000 | 0.30000 | 0.90000 | 0.15390 | 1.00000 |  |
|  |  |
|  | 0.0374\* | 0.1881 | 0.1881 | 0.6238 |  | 0.6238 | 0.0374\* | 0.8048 | <.0001\* |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **HCM** | 0.10000 | 0.20000 | 0.20000 | 0.70000 | 0.30000 | 1.00000 | 0.10000 | 0.87208 | 0.30000 |  |
|  |  |
|  | 0.8729 | 0.7471 | 0.7471 | 0.1881 | 0.6238 |  | 0.8729 | 0.0539 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **PT** | 1.00000 | 0.90000 | 0.90000 | -0.60000 | 0.90000 | 0.10000 | 1.00000 | -0.10260 | 0.90000 |  |
|  |  |
|  | <.0001\* | 0.0374\* | 0.0374\* | 0.2848 | 0.0374\* | 0.8729 |  | 0.8696 | 0.0374\* |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **RDW** | -0.10260 | 0.05130 | 0.05130 | 0.82078 | 0.15390 | 0.87208 | -0.10260 | 1.00000 | 0.15390 |  |
|  |  |
|  | 0.8696 | 0.9347 | 0.9347 | 0.0886 | 0.8048 | 0.0539\* | 0.8696 |  | 0.8048 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Platelets** | 0.90000 | 0.70000 | 0.70000 | -0.30000 | 1.00000 | 0.30000 | 0.90000 | 0.15390 | 1.00000 |  |
|  |  |
|  | 0.0374\* | 0.1881 | 0.1881 | 0.6238 | <.0001\* | 0.6238 | 0.0374\* | 0.8048 |  |  |

He: Hemácias (106/µL), Hb: Hemoglobina (g/dL), Ht: Hematócrito (%), VCM: Volume Corpuscular Médio (fL),

CHCM: Concentration of Mean Corpuscular Hemoglobin (%), HCM: Mean Corpuscular Hemoglobin (pg), PT:

Total protein (%), RDW: Red Cell Distribution Width (Red Blood Cell Distribution Amplitude - %), Platelets (/μL).

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**TABLE 18.** Descriptive statistics of the variables in the Group 2 Erythrogram.

**Simple Statistics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **He** | 5 | 8.61200 | 0.95769 | 8.70000 | 7.06000 | 9.65000 |
|  |  |  |  |  |  |  |
| **Hb** | 5 | 16.54000 | 1.64712 | 16.20000 | 14.50000 | 18.50000 |
|  |  |  |  |  |  |  |
| **Ht** | 5 | 49.20000 | 5.06952 | 51.00000 | 42.00000 | 54.00000 |
|  |  |  |  |  |  |  |
| **VCM** | 5 | 57.26000 | 2.97204 | 56.50000 | 53.40000 | 60.90000 |
|  |  |  |  |  |  |  |
| **CHCM** | 5 | 33.66000 | 1.07842 | 33.90000 | 31.80000 | 34.50000 |
|  |  |  |  |  |  |  |
| **HCM** | 5 | 19.26000 | 1.27789 | 19.20000 | 17.90000 | 20.60000 |
|  |  |  |  |  |  |  |
| **PT** | 5 | 5.04000 | 0.80498 | 5.00000 | 4.20000 | 6.20000 |
|  |  |  |  |  |  |  |
| **RDW** | 5 | 14.78000 | 0.60992 | 15.00000 | 13.80000 | 15.30000 |
|  |  |  |  |  |  |  |
| **Platelets** | 5 | 712.05000 | 260.77273 | 701.95000 | 454.50000 | 1131 |

He: Hemácias (106/µL), Hb: Hemoglobina (g/dL), Ht: Hematócrito (%), VCM: Volume Corpuscular Médio (fL),

CHCM: Concentration of Mean Corpuscular Hemoglobin (%), HCM: Mean Corpuscular Hemoglobin (pg), PT:

Total protein (%), RDW: Red Cell Distribution Width (Red Blood Cell Distribution Amplitude - %), Platelets (/μL).

**TABLE 19.** Spearman correlation performed between the variables of the Group 2 Erythrogram.

**Spearman’s correlation coefficient (N = 5)**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **He** | **Hb** | **Ht** | **VCM** | **CHCM** | **HCM** | **PT** | **RDW** | **Platelets** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | **He** | 1.00000 | 0.90000 | 0.90000 | -0.20000 | -0.40000 | -0.30000 | 0.70000 | 0.80000 | -0.30000 |  |
|  |  |  |
|  |  |  | 0.0374\* | 0.0374\* | 0.7471 | 0.5046 | 0.6238 | 0.1881 | 0.1041 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Hb** | 0.90000 | 1.00000 | 1.00000 | 0.00000 | -0.30000 | 0.10000 | 0.90000 | 0.60000 | 0.10000 |  |
|  |  |  |
|  |  | 0.0374\* |  | <.0001\* | 1.0000 | 0.6238 | 0.8729 | 0.0374\* | 0.2848 | 0.8729 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Ht** | 0.90000 | 1.00000 | 1.00000 | 0.00000 | -0.30000 | 0.10000 | 0.90000 | 0.60000 | 0.10000 |  |
|  |  |  |
|  |  | 0.0374\* | <.0001\* |  | 1.0000 | 0.6238 | 0.8729 | 0.0374\* | 0.2848 | 0.8729 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | **VCM** | -0.20000 | 0.00000 | 0.00000 | 1.00000 | -0.10000 | 0.70000 | 0.30000 | 0.20000 | 0.70000 |  |
|  |  |  |
|  |  | 0.7471 | 1.0000 | 1.0000 |  | 0.8729 | 0.1881 | 0.6238 | 0.7471 | 0.1881 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | **CHCM** | -0.40000 | -0.30000 | -0.30000 | -0.10000 | 1.00000 | 0.40000 | -0.50000 | -0.50000 | 0.40000 |  |
|  |  |  |
|  |  | 0.5046 | 0.6238 | 0.6238 | 0.8729 |  | 0.5046 | 0.3910 | 0.3910 | 0.5046 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | **HCM** | -0.30000 | 0.10000 | 0.10000 | 0.70000 | 0.40000 | 1.00000 | 0.30000 | -0.30000 | 1.00000 |  |
|  |  |  |
|  |  | 0.6238 | 0.8729 | 0.8729 | 0.1881 | 0.5046 |  | 0.6238 | 0.6238 | **<.0001\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | **PT** | 0.70000 | 0.90000 | 0.90000 | 0.30000 | -0.50000 | 0.30000 | 1.00000 | 0.50000 | 0.30000 |  |
|  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

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**Spearman’s correlation coefficient (N = 5)**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **He** | **Hb** | **Ht** | **VCM** | **CHCM** | **HCM** | **PT** | **RDW** | **Platelets** |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  | 0.1881 | 0.0374\* | 0.0374\* | 0.6238 | 0.3910 | 0.6238 |  | 0.3910 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **RDW** | 0.80000 | 0.60000 | 0.60000 | 0.20000 | -0.50000 | -0.30000 | 0.50000 | 1.00000 | -0.30000 |  |
|  |  |
|  | 0.1041 | 0.2848 | 0.2848 | 0.7471 | 0.3910 | 0.6238 | 0.3910 |  | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Platelets** | -0.30000 | 0.10000 | 0.10000 | 0.70000 | 0.40000 | 1.00000 | 0.30000 | -0.30000 | 1.00000 |  |
|  |  |
|  | 0.6238 | 0.8729 | 0.8729 | 0.1881 | 0.5046 | <.0001\* | 0.6238 | 0.6238 |  |  |

He: Hemácias (106/µL), Hb: Hemoglobina (g/dL), Ht: Hematócrito (%), VCM: Volume Corpuscular Médio (fL),

CHCM: Mean Corpuscular Hemoglobin Concentration (%), HCM: Mean Corpuscular Hemoglobin (pg), PT: Total Protein (%), RDW: Red Cell Distribution Width (Red Cell Distribution Amplitude - %), Platelets (/μL).

**TABLE 20.** Spearman correlation performed between the variables of the Group 1, 2 and 3 Erythrogram.

**Spearman’s correlation coefficient ( N = 14)**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Hemacias** | **Hemoglobin** | **Hematocrito** | **VCM** | **CHCM** | **HCM** | **PT** | **RDW** | **Platelets** |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Hemacias** | 1.00000 | 0.81538 | 0.91952 | -0.54286 | -0.01538 | -0.39824 | 0.68526 | 0.16796 | 0.38901 |  |
|  |  |
|  |  | **0.0004\*** | **<.0001\*** | **0.0449\*** | 0.9584 | 0.1585 | **0.0068\*** | 0.5660 | 0.1692 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Hemoglobin** | 0.81538 | 1.00000 | 0.94378 | -0.12527 | 0.29670 | 0.15182 | 0.79205 | 0.14144 | 0.67912 |  |
|  |  |
|  | **0.0004\*** |  | **<.0001\*** | 0.6696 | 0.3030 | 0.6044 | **0.0007\*** | 0.6296 | **0.0076\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Hematocrito** | 0.91952 | 0.94378 | 1.00000 | -0.21830 | 0.01764 | -0.07395 | 0.74110 | 0.22506 | 0.55127 |  |
|  |  |
|  | **<.0001\*** | **<.0001\*** |  | 0.4534 | 0.9523 | 0.8016 | **0.0024\*** | 0.4392 | **0.0410\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **VCM** | -0.54286 | -0.12527 | -0.21830 | 1.00000 | -0.08132 | 0.84929 | -0.21136 | 0.24973 | 0.10769 |  |
|  |  |
|  | **0.0449\*** | 0.6696 | 0.4534 |  | 0.7823 | **0.0001\*** | 0.4682 | 0.3892 | 0.7140 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **CHCM** | -0.01538 | 0.29670 | 0.01764 | -0.08132 | 1.00000 | 0.36304 | 0.36933 | -0.08177 | 0.49451 |  |
|  |  |
|  | 0.9584 | 0.3030 | 0.9523 | 0.7823 |  | 0.2020 | 0.1937 | 0.7811 | 0.0722 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **HCM** | -0.39824 | 0.15182 | -0.07395 | 0.84929 | 0.36304 | 1.00000 | 0.06125 | 0.08850 | 0.40484 |  |
|  |  |
|  | 0.1585 | 0.6044 | 0.8016 | **0.0001\*** | 0.2020 |  | 0.8352 | 0.7635 | 0.1510 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **PT** | 0.68526 | 0.79205 | 0.74110 | -0.21136 | 0.36933 | 0.06125 | 1.00000 | -0.06264 | 0.82320 |  |
|  |  |
|  | **0.0068\*** | **0.0007\*** | **0.0024\*** | 0.4682 | 0.1937 | 0.8352 |  | 0.8315 | **0.0003\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **RDW** | 0.16796 | 0.14144 | 0.22506 | 0.24973 | -0.08177 | 0.08850 | -0.06264 | 1.00000 | -0.07956 |  |
|  |  |
|  | 0.5660 | 0.6296 | 0.4392 | 0.3892 | 0.7811 | 0.7635 | 0.8315 |  | 0.7869 |  |
|  |  |  |  |  |  |  |  |  |  |  |
| **Platelets** | 0.38901 | 0.67912 | 0.55127 | 0.10769 | 0.49451 | 0.40484 | 0.82320 | -0.07956 | 1.00000 |  |
|  |  |
|  | 0.1692 | **0.0076\*** | **0.0410\*** | 0.7140 | 0.0722 | 0.1510 | **0.0003\*** | 0.7869 |  |  |

He: Hemácias (106/µL), Hb: Hemoglobina (g/dL), Ht: Hematócrito (%), VCM: Volume Corpuscular Médio (fL),

CHCM: Mean Corpuscular Hemoglobin Concentration (%), HCM: Mean Corpuscular Hemoglobin (pg), PT: Total Protein (%), RDW: Red Cell Distribution Width (Red Cell Distribution Amplitude - %), Platelets (/μL).

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**TABLE 21.** Multivariate analysis with generalized linear models using the gamma distribution comparing the relationship of the response variable red blood cells with the other variables in the erythrogram.

**Analysis of Maximum Likelihood Parameter Estimates**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameters** |  | **DF** | **Estimate** | **Standard Error** | **Wald’s 95% confidence limit** | | **Chi-Square of Wald** | **Pr > Chi-Square** |
|  |  |  |  |  |  |  |  |  |
| **Intercept** |  | 1 | 0.3644 | 17.4957 | -33.9266 | 34.6553 | 0.00 | 0.9834 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **1** | 1 | 0.0427 | 0.0297 | -0.0155 | 0.1009 | 2.07 | 0.1500 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **2** | 1 | 0.0832 | 0.0514 | -0.0176 | 0.1840 | 2.62 | 0.1055 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **0** | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | . | . |
|  |  |  |  |  |  |  |  |  |
| **Hematocrit** |  | 1 | 0.0176 | 0.0074 | 0.0032 | 0.0321 | 5.75 | **0.0165\*** |
|  |  |  |  |  |  |  |  |  |
| **VCM** |  | 1 | 0.0047 | 0.3030 | -0.5892 | 0.5987 | 0.00 | 0.9875 |
|  |  |  |  |  |  |  |  |  |
| **CHCM** |  | 1 | 0.0420 | 0.5180 | -0.9733 | 1.0572 | 0.01 | 0.9354 |
|  |  |  |  |  |  |  |  |  |
| **HCM** |  | 1 | -0.0642 | 0.8951 | -1.8185 | 1.6902 | 0.01 | 0.9429 |
|  |  |  |  |  |  |  |  |  |
| **PT** |  | 1 | 0.1009 | 0.0634 | -0.0234 | 0.2252 | 2.53 | 0.1115 |
|  |  |  |  |  |  |  |  |  |
| **RDW** |  | 1 | -0.0012 | 0.0202 | -0.0407 | 0.0383 | 0.00 | 0.9538 |
|  |  |  |  |  |  |  |  |  |
| **Platelets** |  | 1 | -0.0001 | 0.0002 | -0.0005 | 0.0002 | 0.63 | 0.4273 |
|  |  |  |  |  |  |  |  |  |
| **Scale** |  | 1 | 851.8008 | 321.8875 | 406.1412 | 1786.484 |  |  |

He: Hemácias (106/µL), Hb: Hemoglobina (g/dL), Ht: Hematócrito (%), VCM: Volume Corpuscular Médio (fL),

CHCM: Concentration of Mean Corpuscular Hemoglobin (%), HCM: Mean Corpuscular Hemoglobin (pg), PT:

Total protein (%), RDW: Red Cell Distribution Width (Red Blood Cell Distribution Amplitude - %), Platelets (/μL).

**TABLE 22.** Descriptive statistics of the variables in the Group 0 Leucogram.

**Simple Statistics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **Leuc** | 4 | 6.35000 | 1.76918 | 6.00000 | 4.60000 | 8.80000 |
|  |  |  |  |  |  |  |
| **Segm** | 4 | 208.23800 | 413.17472 | 1.79400 | 1.36400 | 828.00000 |
|  |  |  |  |  |  |  |
| **Linf** | 4 | 4.60350 | 1.39445 | 4.09000 | 3.63400 | 6.60000 |
|  |  |  |  |  |  |  |
| **Eos** | 4 | 80.00000 | 109.49581 | 44.00000 | 0 | 232.00000 |
|  |  |  |  |  |  |  |
| **Mon** | 4 | 221.50000 | 79.30322 | 219.00000 | 138.00000 | 310.00000 |

N: Number of animals, Leuc: Leukocytes, Segm: Seged, Linf: Lymphocytes, Eos: Eosinophils, Mon: Monocytes.

**TABLE 23.** Spearman correlation performed between the variables of the Group 0 Leucogram.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Leuc** | **Segm** | **Linf** | **Eos** | **Mon** |  |
|  |  |  |  |  |  |  |  |
|  | **Leuc** | 1.00000 | -0.40000 | 1.00000 | 0.21082 | 0.80000 |  |
|  |  |  |
|  |  |  | 0.6000 | **<.0001\*** | 0.7892 | 0.2000 |  |
|  |  |  |  |  |  |  |  |

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|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Leuc** | **Segm** | **Linf** | **Eos** | **Mon** |  |
|  |  |  |  |  |  |  |
| **Segm** | -0.40000 | 1.00000 | -0.40000 | -0.10541 | -0.80000 |  |
|  |  |
|  | 0.6000 |  | 0.6000 | 0.8946 | 0.2000 |  |
|  |  |  |  |  |  |  |
| **Linf** | 1.00000 | -0.40000 | 1.00000 | 0.21082 | 0.80000 |  |
|  |  |
|  | **<.0001\*** | 0.6000 |  | 0.7892 | 0.2000 |  |
|  |  |  |  |  |  |  |
| **Eos** | 0.21082 | -0.10541 | 0.21082 | 1.00000 | -0.10541 |  |
|  |  |
|  | 0.7892 | 0.8946 | 0.7892 |  | 0.8946 |  |
|  |  |  |  |  |  |  |
| **Mon** | 0.80000 | -0.80000 | 0.80000 | -0.10541 | 1.00000 |  |
|  |  |
|  | 0.2000 | 0.2000 | 0.2000 | 0.8946 |  |  |

Leuc: Leukocytes, Segm: Segmented, Lymphocytes, Eos: Eosinophils, Mon: Monocytes.

**TABLE 24.** Descriptive statistics of the variables in the Group 1 Leucogram.

**Simple Statistics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **Leuc** | 5 | 6.48000 | 5.28176 | 4.60000 | 2.70000 | 15.70000 |
|  |  |  |  |  |  |  |
| **Segm** | 5 | 561.84780 | 338.36010 | 621.00000 | 4.23900 | 920.00000 |
|  |  |  |  |  |  |  |
| **Linf** | 5 | 4.92220 | 3.66948 | 3.49600 | 1.99800 | 11.14700 |
|  |  |  |  |  |  |  |
| **Eos** | 5 | 60.60000 | 66.45901 | 54.00000 | 0 | 157.00000 |
|  |  |  |  |  |  |  |
| **Mon** | 5 | 79.20000 | 52.81761 | 58.00000 | 27.00000 | 157.00000 |

N: Number of animals, Leuc: Leukocytes, Segm: Seged, Linf: Lymphocytes, Eos: Eosinophils, Mon: Monocytes.

**TABLE 25.** Spearman correlation performed between the variables of the Group 1 Leucogram.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Leuc** | **Segm** | **Linf** | **Eos** | **Mon** |  |
|  |  |  |  |  |  |  |  |
|  | **Leuc** | 1.00000 | -0.60000 | 1.00000 | 0.41039 | 0.70000 |  |
|  |  |  |
|  |  |  | 0.2848 | **<.0001\*** | 0.4925 | 0.1881 |  |
|  |  |  |  |  |  |  |  |
|  | **Segm** | -0.60000 | 1.00000 | -0.60000 | -0.20520 | -0.50000 |  |
|  |  |  |
|  |  | 0.2848 |  | 0.2848 | 0.7406 | 0.3910 |  |
|  |  |  |  |  |  |  |  |

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|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Leuc** | **Segm** | **Linf** | **Eos** | **Mon** |  |
|  |  |  |  |  |  |  |
| **Linf** | 1.00000 | -0.60000 | 1.00000 | 0.41039 | 0.70000 |  |
|  |  |
|  | **<.0001\*** | 0.2848 |  | 0.4925 | 0.1881 |  |
|  |  |  |  |  |  |  |
| **Eos** | 0.41039 | -0.20520 | 0.41039 | 1.00000 | 0.15390 |  |
|  |  |
|  | 0.4925 | 0.7406 | 0.4925 |  | 0.8048 |  |
|  |  |  |  |  |  |  |
| **Mon** | 0.70000 | -0.50000 | 0.70000 | 0.15390 | 1.00000 |  |
|  |  |
|  | 0.1881 | 0.3910 | 0.1881 | 0.8048 |  |  |

Leuc: Leukocytes, Segm: Segmented, Lymphocytes, Eos: Eosinophils, Mon: Monocytes.

**TABLE 26.** Descriptive statistics of the variables in the Group 2 Leucogram.

**Simple Statistics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **Leuc** | 5 | 10.46000 | 6.35791 | 7.90000 | 5.40000 | 21.50000 |
|  |  |  |  |  |  |  |
| **Segm** | 5 | 4.54580 | 1.44605 | 4.44600 | 2.59200 | 6.66500 |
|  |  |  |  |  |  |  |
| **Linf** | 5 | 5.67120 | 4.95929 | 3.19800 | 2.64600 | 14.40500 |
|  |  |  |  |  |  |  |
| **Eos** | 5 | 45.80000 | 44.49944 | 54.00000 | 0 | 97.00000 |
|  |  |  |  |  |  |  |
| **Mon** | 5 | 197.20000 | 157.42522 | 108.00000 | 78.00000 | 430.00000 |

N: Number of animals, Leuc: Leukocytes, Segm: Segmented, Linf: Lymphocytes, Eos: Eosinophils, Mon: Monocytes

**TABLE 27.** Spearman correlation performed between the variables of the Group 2 Leucogram.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Leuc** | **Segm** | **Linf** | **Eos** | **Mon** |  |
|  |  |  |  |  |  |  |  |
|  | **Leuc** | 1.00000 | 0.70000 | 0.90000 | -0.20520 | 0.70000 |  |
|  |  |  |
|  |  |  | 0.1881 | **0.0374\*** | 0.7406 | 0.1881 |  |
|  |  |  |  |  |  |  |  |
|  | **Segm** | 0.70000 | 1.00000 | 0.60000 | -0.66689 | 0.20000 |  |
|  |  |  |
|  |  | 0.1881 |  | 0.2848 | 0.2189 | 0.7471 |  |
|  |  |  |  |  |  |  |  |
|  | **Linf** | 0.90000 | 0.60000 | 1.00000 | 0.05130 | 0.60000 |  |
|  |  |  |
|  |  | **0.0374\*** | 0.2848 |  | 0.9347 | 0.2848 |  |
|  |  |  |  |  |  |  |  |
|  | **Eos** | -0.20520 | -0.66689 | 0.05130 | 1.00000 | -0.15390 |  |
|  |  |  |
|  |  |  |  |  |  |  |  |

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|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Leuc** | **Segm** | **Linf** | **Eos** | **Mon** |  |
|  |  |  |  |  |  |  |
|  | 0.7406 | 0.2189 | 0.9347 |  | 0.8048 |  |
|  |  |  |  |  |  |  |
| **Mon** | 0.70000 | 0.20000 | 0.60000 | -0.15390 | 1.00000 |  |
|  |  |
|  | 0.1881 | 0.7471 | 0.2848 | 0.8048 |  |  |

Leuc: Leukocytes, Segm: Segmented, Lymphocytes, Eos: Eosinophils, Mon: Monocytes.

**TABLE 28.** Spearman correlation performed between the variables of the Group 1, 2 and 3 Leucogram.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Leuc** | **Segm** | **Linf** | **Eos** | **Mon** |  |
|  |  |  |  |  |  |  |
| **Leuc** | 1.00000 | -0.49780 | 0.75991 | 0.20658 | 0.64609 |  |
|  |  |
|  |  | 0.0701 | **0.00168** | 0.4786 | **0.0126\*** |  |
|  |  |  |  |  |  |  |
| **Segm** | -0.49780 | 1.00000 | -0.30110 | -0.35499 | -0.58746 |  |
|  |  |
|  | 0.0701 |  | 0.2955 | 0.2130 | **0.0272\*** |  |
|  |  |  |  |  |  |  |
| **Linf** | 0.75991 | -0.30110 | 1.00000 | 0.16032 | 0.65567 |  |
|  |  |
|  | **0.0016\*** | 0.2955 |  | 0.5840 | **0.0109\*** |  |
|  |  |  |  |  |  |  |
| **Eos** | 0.20658 | -0.35499 | 0.16032 | 1.00000 | 0.05044 |  |
|  |  |
|  | 0.4786 | 0.2130 | 0.5840 |  | 0.8640 |  |
|  |  |  |  |  |  |  |
| **Mon** | 0.64609 | -0.58746 | 0.65567 | 0.05044 | 1.00000 |  |
|  |  |
|  | **0.0126\*** | **0.0272\*** | **0.0109\*** | 0.8640 |  |  |

Leuc: Leukocytes, Segm: Segmented, Lymphocytes, Eos: Eosinophils, Mon: Monocytes.

**TABLE 29.** Multivariate analysis with generalized linear models using the gamma distribution comparing the relationship of the variable response leukocytes with the other variables of the Leucogram.

**Analysis of Maximum Likelihood Parameter Estimates**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** |  | **DF** | **Estimate** | **Error** | **95% Confidence Limit** | | **Chi-Square of** | **Pr > Qui-** |
|  |  |  |  | **Standard** | **Wald** |  | **Wald** | **Square** |
|  |  |  |  |  |  |  |  |  |
| **Intercept** |  | 1 | 1.4587 | 0.1531 | 1.1586 | 1.7589 | 90.73 | <.0001 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **1** | 1 | -0.1782 | 0.1252 | -0.4236 | 0.0672 | 2.03 | 0.1547 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **2** | 1 | 0.1668 | 0.1021 | -0.0334 | 0.3669 | 2.67 | 0.1025 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **0** | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | . | . |
|  |  |  |  |  |  |  |  |  |
| **Segm** |  | 1 | -0.0005 | 0.0002 | -0.0008 | -0.0001 | 6.20 | **0.0128\*** |
|  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  | 69 |
|  |  |  |  | |  | |  |
|  |  | **Analysis of Maximum Likelihood Parameter Estimates** | | | | |  |
|  |  |  |  |  |  |  |  |
| **Parameter** | **DF** | **Estimate** | **Error** | **95% Confidence Limit** | | **Chi-Square of** | **Pr > Qui-** |
|  |  |  | **Standard** | **Wald** |  | **Wald** | **Square** |
|  |  |  |  |  |  |  |  |
| **Linf** | 1 | 0.1335 | 0.0167 | 0.1008 | 0.1662 | 64.06 | **<.0001\*** |
|  |  |  |  |  |  |  |  |
| **Eos** | 1 | 0.0001 | 0.0006 | -0.0012 | 0.0014 | 0.02 | 0.8918 |
|  |  |  |  |  |  |  |  |
| **Mon** | 1 | -0.0007 | 0.0006 | -0.0018 | 0.0004 | 1.63 | 0.2015 |
|  |  |  |  |  |  |  |  |
| **Scale** | 1 | 68.0300 | 25.6502 | 32.4909 | 142.4423 |  |  |

Leuc: Leukocytes, Segm: Segmented, Lymphocytes, Eos: Eosinophils, Mon: Monocytes.

**TABLE 30.** Descriptive statistics of the variables of the Biochemical Examination of Group 0.

**Simple Statistics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **Urea** | 5 | 32.20000 | 3.96232 | 32.00000 | 27.00000 | 37.00000 |
|  |  |  |  |  |  |  |
| **Creatinine** | 5 | 0.51000 | 0.14983 | 0.52000 | 0.34000 | 0.71000 |
|  |  |  |  |  |  |  |
| **ALT** | 5 | 42.20000 | 19.17551 | 38.00000 | 20.00000 | 69.00000 |
|  |  |  |  |  |  |  |
| **AST** | 5 | 82.60000 | 21.98409 | 88.00000 | 58.00000 | 111.00000 |
|  |  |  |  |  |  |  |
| **FA** | 5 | 20.60000 | 11.19375 | 23.00000 | 7.00000 | 32.00000 |
|  |  |  |  |  |  |  |
| **GGT** | 5 | 1.00000 | 0 | 1.00000 | 1.00000 | 1.00000 |
|  |  |  |  |  |  |  |
| **PT** | 5 | 5.04000 | 0.70214 | 5.30000 | 4.20000 | 5.80000 |
|  |  |  |  |  |  |  |
| **Albumin** | 5 | 2.38000 | 0.55408 | 2.40000 | 1.60000 | 2.90000 |
|  |  |  |  |  |  |  |
| **Globulin** | 5 | 2.66000 | 0.25100 | 2.60000 | 2.30000 | 2.90000 |
|  |  |  |  |  |  |  |
| **CK** | 5 | 310.80000 | 209.29214 | 233.00000 | 87.00000 | 585.00000 |
|  |  |  |  |  |  |  |
| **CKMB** | 5 | 676.36000 | 517.05331 | 494.90000 | 129.10000 | 1460 |

Urea, Creat: Creatinine, ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, FA: Alkaline Phosphatase,

GGT: Gamma Glutamil Transferase, PTs: Total serum protein, Alb: Albumin, Glob: Globuline, CK: Creatine

kinase, CK-MB: Creatine kinase MB.

**TABLE 31.** Spearman correlation performed between the variables of the Biochemical Examination of Group 0.

**Spearman’s correlation coefficient, N = 5**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Urea** | **Creat** | **ALT** | **AST** | **FA** | **GGT** | **PT** | **Alb** | **Glob** | **CK** | **CKMB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Urea** | 1.00000 | 0.60000 | 0.00000 | - | 0.60000 | . | 0.10000 | 0.20520 | - | - | - |  |
|  |  |
|  |  |  |  | 0.20000 |  |  |  |  | 0.52705 | 0.30000 | 0.30000 |  |
|  |  | 0.2848 | 1.0000 |  | 0.2848 | . | 0.8729 | 0.7406 |  |  |  |  |
|  |  |  |  | 0.7471 |  |  |  |  | 0.3615 | 0.6238 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Creat** | 0.60000 | 1.00000 | 0.10000 | 0.40000 | 1.00000 | . | 0.30000 | 0.41039 | - | 0.40000 | 0.40000 |  |
|  |  |
|  |  |  |  |  |  |  |  |  | 0.57975 |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  | 70 |  |
|  |  |  |  |  | | | |  |  |  |  |  |
|  |  |  |  | **Spearman’s correlation coefficient, N = 5** | | | |  |  |  |  |  |
|  |  |  |  | **Prob > |r| under H0: Rho=0** | | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Urea** | **Creat** | **ALT** | **AST** | **FA** | **GGT** | **PT** | **Alb** | **Glob** | **CK** | **CKMB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0.2848 |  | 0.8729 | 0.5046 | **<.0001\*** | . | 0.6238 | 0.4925 | 0.3056 | 0.5046 | 0.5046 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **ALT** | 0.00000 | 0.10000 | 1.00000 | 0.80000 | 0.10000 | . | - | - | - | - | - |  |
|  |  |
|  |  |  |  |  |  |  | 0.90000 | 0.82078 | 0.79057 | 0.30000 | 0.30000 |  |
|  | 1.0000 | 0.8729 |  | 0.1041 | 0.8729 | . |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **0.0374\*** | 0.0886 | 0.1114 | 0.6238 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **AST** | -0.20000 | 0.40000 | 0.80000 | 1.00000 | 0.40000 | . | - | - | - | 0.30000 | 0.30000 |  |
|  |  |
|  |  |  |  |  |  |  | 0.50000 | 0.41039 | 0.63246 |  |  |  |
|  | 0.7471 | 0.5046 | 0.1041 |  | 0.5046 | . |  |  |  | 0.6238 | 0.6238 |  |
|  |  |  |  |  |  |  | 0.3910 | 0.4925 | 0.2522 |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **FA** | 0.60000 | 1.00000 | 0.10000 | 0.40000 | 1.00000 | . | 0.30000 | 0.41039 | - | 0.40000 | 0.40000 |  |
|  |  |
|  |  |  |  |  |  |  |  |  | 0.57975 |  |  |  |
|  | 0.2848 | **<.0001\*** | 0.8729 | 0.5046 |  | . | 0.6238 | 0.4925 | 0.3056 | 0.5046 | 0.5046 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **GGT** | . | . | . | . | . | . | . | . | . | . | . |  |
|  |  |
|  | . | . | . | . | . | . | . | . | . | . | . |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PT** | 0.10000 | 0.30000 | - | - | 0.30000 | . | 1.00000 | 0.97468 | 0.57975 | 0.60000 | 0.60000 |  |
|  |  |
|  |  |  | 0.90000 | 0.50000 |  |  |  |  |  |  |  |  |
|  | 0.8729 | 0.6238 |  |  | 0.6238 | . |  | **0.0048\*** | 0.3056 | 0.2848 | 0.2848 |  |
|  |  |  | **0.0374\*** | 0.3910 |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Alb** | 0.20520 | 0.41039 | - | - | 0.41039 | . | 0.97468 | 1.00000 | 0.48666 | 0.66689 | 0.66689 |  |
|  |  |
|  |  |  | 0.82078 | 0.41039 |  |  |  |  |  |  |  |  |
|  | 0.7406 | 0.4925 | 0.0886 | 0.4925 | 0.4925 | . | **0.0048\*** |  | 0.4058 | 0.2189 | 0.2189 |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Glob** | -0.52705 | - | - | - | - | . | 0.57975 | 0.48666 | 1.00000 | 0.31623 | 0.31623 |  |
|  |  |
|  |  | 0.57975 | 0.79057 | 0.63246 | 0.57975 |  |  |  |  |  |  |  |
|  | 0.3615 |  |  |  |  | . | 0.3056 | 0.4058 |  | 0.6042 | 0.6042 |  |
|  |  | 0.3056 | 0.1114 | 0.2522 | 0.3056 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CK** | -0.30000 | 0.40000 | - | 0.30000 | 0.40000 | . | 0.60000 | 0.66689 | 0.31623 | 1.00000 | 1.00000 |  |
|  |  |
|  |  |  | 0.30000 |  |  |  |  |  |  |  |  |  |
|  | 0.6238 | 0.5046 | 0.6238 | 0.6238 | 0.5046 | . | 0.2848 | 0.2189 | 0.6042 |  | **<.0001\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CKMB** | -0.30000 | 0.40000 | - | 0.30000 | 0.40000 | . | 0.60000 | 0.66689 | 0.31623 | 1.00000 | 1.00000 |  |
|  |  |
|  |  |  | 0.30000 |  |  |  |  |  |  |  |  |  |
|  | 0.6238 | 0.5046 | 0.6238 | 0.6238 | 0.5046 | . | 0.2848 | 0.2189 | 0.6042 | **<.0001\*** |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

Urea, Creat: Creatinine, ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, FA: Alkaline Phosphatase,

GGT: Gamma Glutamil Transferase, PTs: Total serum protein, Alb: Albumin, Glob: Globuline, CK: Creatine

kinase, CK-MB: Creatine kinase MB.

**TABLE 32.** Descriptive statistics of the variables of the Biochemical Examination of Group 1.

**Simple Statistics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **Urea** | 5 | 34.60000 | 6.58027 | 33.00000 | 28.00000 | 42.00000 |
|  |  |  |  |  |  |  |
| **Creatinine** | 5 | 0.68400 | 0.11082 | 0.67000 | 0.53000 | 0.81000 |
|  |  |  |  |  |  |  |
| **ALT** | 5 | 53.40000 | 29.54319 | 56.00000 | 25.00000 | 98.00000 |
|  |  |  |  |  |  |  |
| **AST** | 5 | 214.40000 | 173.84418 | 131.00000 | 51.00000 | 460.00000 |
|  |  |  |  |  |  |  |
| **FA** | 5 | 22.48000 | 9.13521 | 22.00000 | 13.40000 | 36.00000 |
|  |  |  |  |  |  |  |

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|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Simple Statistics** | |  |  |
|  |  |  |  |  |  |  |
| **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **GGT** | 5 | 0.94000 | 0.13416 | 1.00000 | 0.70000 | 1.00000 |
|  |  |  |  |  |  |  |
| **PT** | 5 | 4.30000 | 1.04163 | 4.70000 | 2.80000 | 5.40000 |
|  |  |  |  |  |  |  |
| **Albumin** | 5 | 1.94000 | 0.65803 | 2.20000 | 1.20000 | 2.70000 |
|  |  |  |  |  |  |  |
| **Globulin** | 5 | 2.36000 | 0.45056 | 2.40000 | 1.60000 | 2.70000 |
|  |  |  |  |  |  |  |
| **CK** | 5 | 532.20000 | 651.65535 | 297.00000 | 27.00000 | 1665 |
|  |  |  |  |  |  |  |
| **CKMB** | 5 | 603.42000 | 470.11468 | 647.50000 | 27.80000 | 1307 |

Urea, Creat: Creatinine, ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, FA: Alkaline Phosphatase,

GGT: Gamma Glutamil Transferase, PTs: Total serum protein, Alb: Albumin, Glob: Globuline, CK: Creatine

kinase, CK-MB: Creatine kinase MB.

**TABLE 33.** Spearman correlation performed between the variables of the Biochemical Examination of Group 1.

**Spearman’s correlation coefficient, N = 5**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Urea** | **Creat** | **ALT** | **AST** | **FA** | **GGT** | **PT** | **Alb** | **Glob** | **CK** | **CKMB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Urea** | 1.00000 | 0.40000 | -0.10000 | -0.10000 | 0.60000 | 0.70711 | 0.40000 | 0.70000 | 0.15811 | -0.10000 | 0.00000 |  |
|  |  |
|  |  | 0.5046 | 0.8729 | 0.8729 | 0.2848 | 0.1817 | 0.5046 | 0.1881 | 0.7995 | 0.8729 | 1.0000 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Creat** | 0.40000 | 1.00000 | -0.30000 | 0.70000 | -0.20000 | -0.35355 | 1.00000 | 0.90000 | 0.94868 | 0.70000 | 0.30000 |  |
|  |  |
|  | 0.5046 |  | 0.6238 | 0.1881 | 0.7471 | 0.5594 | **<.0001\*** | **0.0374\*** | **0.0138\*** | 0.1881 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **ALT** | -0.10000 | -0.30000 | 1.00000 | 0.30000 | 0.50000 | 0.00000 | -0.30000 | -0.10000 | -0.26352 | 0.30000 | 0.80000 |  |
|  |  |
|  | 0.8729 | 0.6238 |  | 0.6238 | 0.3910 | 1.0000 | 0.6238 | 0.8729 | 0.6684 | 0.6238 | 0.1041 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **AST** | -0.10000 | 0.70000 | 0.30000 | 1.00000 | -0.30000 | -0.70711 | 0.70000 | 0.60000 | 0.73786 | 1.00000 | 0.80000 |  |
|  |  |
|  | 0.8729 | 0.1881 | 0.6238 |  | 0.6238 | 0.1817 | 0.1881 | 0.2848 | 0.1546 | **<.0001\*** | 0.1041 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **FA** | 0.60000 | -0.20000 | 0.50000 | -0.30000 | 1.00000 | 0.70711 | -0.20000 | 0.10000 | -0.26352 | -0.30000 | 0.20000 |  |
|  |  |
|  | 0.2848 | 0.7471 | 0.3910 | 0.6238 |  | 0.1817 | 0.7471 | 0.8729 | 0.6684 | 0.6238 | 0.7471 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **GGT** | 0.70711 | -0.35355 | 0.00000 | -0.70711 | 0.70711 | 1.00000 | -0.35355 | 0.00000 | -0.55902 | -0.70711 | -0.35355 |  |
|  |  |
|  | 0.1817 | 0.5594 | 1.0000 | 0.1817 | 0.1817 |  | 0.5594 | 1.0000 | 0.3273 | 0.1817 | 0.5594 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PT** | 0.40000 | 1.00000 | -0.30000 | 0.70000 | -0.20000 | -0.35355 | 1.00000 | 0.90000 | 0.94868 | 0.70000 | 0.30000 |  |
|  |  |
|  | 0.5046 | **<.0001\*** | 0.6238 | 0.1881 | 0.7471 | 0.5594 |  | **0.0374\*** | **0.0138\*** | 0.1881 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Alb** | 0.70000 | 0.90000 | -0.10000 | 0.60000 | 0.10000 | 0.00000 | 0.90000 | 1.00000 | 0.73786 | 0.60000 | 0.40000 |  |
|  |  |
|  | 0.1881 | **0.0374\*** | 0.8729 | 0.2848 | 0.8729 | 1.0000 | **0.0374\*** |  | 0.1546 | 0.2848 | 0.5046 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Glob** | 0.15811 | 0.94868 | -0.26352 | 0.73786 | -0.26352 | -0.55902 | 0.94868 | 0.73786 | 1.00000 | 0.73786 | 0.31623 |  |
|  |  |
|  | 0.7995 | **0.0138\*** | 0.6684 | 0.1546 | 0.6684 | 0.3273 | **0.0138\*** | 0.1546 |  | 0.1546 | 0.6042 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CK** | -0.10000 | 0.70000 | 0.30000 | 1.00000 | -0.30000 | -0.70711 | 0.70000 | 0.60000 | 0.73786 | 1.00000 | 0.80000 |  |
|  |  |
|  | 0.8729 | 0.1881 | 0.6238 | **<.0001\*** | 0.6238 | 0.1817 | 0.1881 | 0.2848 | 0.1546 |  | 0.1041 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  | 72 |  |
|  |  |  |  |  | | | |  |  |  |  |  |
|  |  |  |  | **Spearman’s correlation coefficient, N = 5** | | | |  |  |  |  |  |
|  |  |  |  |  | **Prob > |r| under H0: Rho=0** | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Urea** | **Creat** | **ALT** | **AST** | **FA** | **GGT** | **PT** | **Alb** | **Glob** | **CK** | **CKMB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CK** | 0.00000 | 0.30000 | 0.80000 | 0.80000 | 0.20000 | -0.35355 | 0.30000 | 0.40000 | 0.31623 | 0.80000 | 1.00000 |  |
| **MB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | 1.0000 | 0.6238 | 0.1041 | 0.1041 | 0.7471 | 0.5594 | 0.6238 | 0.5046 | 0.6042 | 0.1041 |  |  |

Urea, Creat: Creatinine, ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, FA: Alkaline Phosphatase,

GGT: Gamma Glutamil Transferase, PTs: Total serum protein, Alb: Albumin, Glob: Globuline, CK: Creatine

kinase, CK-MB: Creatine kinase MB.

**TABLE 34.** Descriptive statistics of the variables of the Biochemical Examination of Group 2.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Simple Statistics** | |  |  |
|  |  |  |  |  |  |  |
| **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **Urea** | 5 | 36.40000 | 13.84919 | 39.00000 | 18.00000 | 55.00000 |
|  |  |  |  |  |  |  |
| **Creatinine** | 5 | 0.77200 | 0.23178 | 0.67000 | 0.56000 | 1.11000 |
|  |  |  |  |  |  |  |
| **ALT** | 5 | 79.00000 | 44.00000 | 61.00000 | 45.00000 | 155.00000 |
|  |  |  |  |  |  |  |
| **AST** | 5 | 96.80000 | 45.59276 | 101.00000 | 26.00000 | 150.00000 |
|  |  |  |  |  |  |  |
| **FA** | 5 | 38.60000 | 14.11737 | 40.00000 | 18.00000 | 57.00000 |
|  |  |  |  |  |  |  |
| **GGT** | 5 | 1.00000 | 0 | 1.00000 | 1.00000 | 1.00000 |
|  |  |  |  |  |  |  |
| **PT** | 5 | 4.60000 | 0.87178 | 4.50000 | 3.70000 | 6.00000 |
|  |  |  |  |  |  |  |
| **Albumin** | 5 | 1.96000 | 0.62290 | 2.10000 | 1.10000 | 2.80000 |
|  |  |  |  |  |  |  |
| **Globulin** | 5 | 2.64000 | 0.32863 | 2.60000 | 2.40000 | 3.20000 |
|  |  |  |  |  |  |  |
| **CK** | 5 | 229.80000 | 167.24443 | 181.00000 | 53.00000 | 412.00000 |
|  |  |  |  |  |  |  |
| **CKMB** | 5 | 455.22000 | 425.08717 | 229.30000 | 115.80000 | 1111 |

Urea, Creat: Creatinine, ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, FA: Alkaline Phosphatase,

GGT: Gamma Glutamil Transferase, PTs: Total serum protein, Alb: Albumin, Glob: Globuline, CK: Creatine

kinase, CK-MB: Creatine kinase MB.

**TABLE 35.** Spearman correlation performed between the variables of the Biochemical Examination of Group 2.

**Spearman’s correlation coefficient, N = 5**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Urea** | **Creat** | **ALT** | **AST** | **FA** | **GGT** | **PT** | **Alb** | **Glob** | **CK** | **CKMB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Urea** | 1.00000 | 0.40000 | 0.90000 | -1.00000 | -0.10000 | . | -0.20000 | -0.35909 | 0.63246 | 0.50000 | 0.60000 |  |
|  |  |  |
|  |  |  | 0.5046 | **0.0374\*** | **<.0001\*** | 0.8729 | . | 0.7471 | 0.5528 | 0.2522 | 0.3910 | 0.2848 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Creat** | 0.40000 | 1.00000 | 0.70000 | -0.40000 | 0.80000 | . | -0.40000 | -0.35909 | 0.05270 | 0.70000 | 0.30000 |  |
|  |  |  |
|  |  | 0.5046 |  | 0.1881 | 0.5046 | 0.1041 | . | 0.5046 | 0.5528 | 0.9329 | 0.1881 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **ALT** | 0.90000 | 0.70000 | 1.00000 | -0.90000 | 0.30000 | . | -0.10000 | -0.20520 | 0.63246 | 0.70000 | 0.70000 |  |
|  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  | 73 |  |
|  |  |  |  |  | | | |  |  |  |  |  |
|  |  |  |  | **Spearman’s correlation coefficient, N = 5** | | | |  |  |  |  |  |
|  |  |  |  |  | **Prob > |r| under H0: Rho=0** | | |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Urea** | **Creat** | **ALT** | **AST** | **FA** | **GGT** | **PT** | **Alb** | **Glob** | **CK** | **CKMB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **0.0374\*** | 0.1881 |  | **0.0374\*** | 0.6238 | . | 0.8729 | 0.7406 | 0.2522 | 0.1881 | 0.1881 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **AST** | -1.00000 | -0.40000 | -0.90000 | 1.00000 | 0.10000 | . | 0.20000 | 0.35909 | -0.63246 | -0.50000 | -0.60000 |  |
|  |  |
|  | **<.0001\*** | 0.5046 | **0.0374\*** |  | 0.8729 | . | 0.7471 | 0.5528 | 0.2522 | 0.3910 | 0.2848 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **FA** | -0.10000 | 0.80000 | 0.30000 | 0.10000 | 1.00000 | . | -0.10000 | 0.05130 | 0.00000 | 0.70000 | 0.30000 |  |
|  |  |
|  | 0.8729 | 0.1041 | 0.6238 | 0.8729 |  | . | 0.8729 | 0.9347 | 1.0000 | 0.1881 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **GGT** | . | . | . | . | . | . | . | . | . | . | . |  |
|  |  |
|  | . | . | . | . | . | . | . | . | . | . | . |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PT** | -0.20000 | -0.40000 | -0.10000 | 0.20000 | -0.10000 | . | 1.00000 | 0.97468 | 0.52705 | -0.10000 | 0.40000 |  |
|  |  |
|  | 0.7471 | 0.5046 | 0.8729 | 0.7471 | 0.8729 | . |  | **0.0048\*** | 0.3615 | 0.8729 | 0.5046 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Alb** | -0.35909 | -0.35909 | -0.20520 | 0.35909 | 0.05130 | . | 0.97468 | 1.00000 | 0.43259 | -0.05130 | 0.35909 |  |
|  |  |
|  | 0.5528 | 0.5528 | 0.7406 | 0.5528 | 0.9347 | . | **0.0048\*** |  | 0.4669 | 0.9347 | 0.5528 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Glob** | 0.63246 | 0.05270 | 0.63246 | -0.63246 | 0.00000 | . | 0.52705 | 0.43259 | 1.00000 | 0.57975 | 0.94868 |  |
|  |  |
|  | 0.2522 | 0.9329 | 0.2522 | 0.2522 | 1.0000 | . | 0.3615 | 0.4669 |  | 0.3056 | **0.0138\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CK** | 0.50000 | 0.70000 | 0.70000 | -0.50000 | 0.70000 | . | -0.10000 | -0.05130 | 0.57975 | 1.00000 | 0.80000 |  |
|  |  |
|  | 0.3910 | 0.1881 | 0.1881 | 0.3910 | 0.1881 | . | 0.8729 | 0.9347 | 0.3056 |  | 0.1041 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CK** | 0.60000 | 0.30000 | 0.70000 | -0.60000 | 0.30000 | . | 0.40000 | 0.35909 | 0.94868 | 0.80000 | 1.00000 |  |
| **MB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0.2848 | 0.6238 | 0.1881 | 0.2848 | 0.6238 | . | 0.5046 | 0.5528 | **0.0138\*** | 0.1041 |  |  |

Urea, Creat: Creatinine, ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, FA: Alkaline Phosphatase,

GGT: Gamma Glutamil Transferase, PTs: Total serum protein, Alb: Albumin, Glob: Globuline, CK: Creatine

kinase, CK-MB: Creatine kinase MB.

**TABLE 36.** Spearman correlation performed between the variables of the Biochemical Examination of Group 1, 2 and 3.

**Spearman’s correlation coefficient, N = 15**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Urea** | **Creat** | **ALT** | **AST** | **FA** | **GGT** | **PT** | **Alb** | **Glob** | **CK** | **CKMB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Urea** | 1.00000 | 0.37243 | 0.27907 | -0.24866 | 0.38640 | 0.30985 | 0.18100 | 0.14555 | 0.16335 | 0.16637 | 0.28265 |  |
|  |  |
|  |  | 0.1716 | 0.3138 | 0.3715 | 0.1548 | 0.2611 | 0.5186 | 0.6047 | 0.5608 | 0.5534 | 0.3074 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Creat** | 0.37243 | 1.00000 | 0.34495 | 0.33959 | 0.61662 | -0.24766 | 0.01432 | -0.03411 | -0.05288 | 0.39321 | 0.19839 |  |
|  |  |
|  | 0.1716 |  | 0.2080 | 0.2156 | **0.0144\*** | 0.3735 | 0.9596 | 0.9039 | 0.8515 | 0.1471 | 0.4784 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **ALT** | 0.27907 | 0.34495 | 1.00000 | 0.16786 | 0.46071 | 0.00000 | -0.30054 | -0.42332 | -0.13664 | 0.11429 | 0.23929 |  |
|  |  |
|  | 0.3138 | 0.2080 |  | 0.5499 | 0.0839 | 1.0000 | 0.2764 | 0.1159 | 0.6273 | 0.6851 | 0.3904 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **AST** | -0.24866 | 0.33959 | 0.16786 | 1.00000 | -0.05000 | -0.43301 | 0.20930 | 0.21704 | 0.01093 | 0.30000 | 0.16786 |  |
|  |  |
|  | 0.3715 | 0.2156 | 0.5499 |  | 0.8595 | 0.1069 | 0.4541 | 0.4372 | 0.9692 | 0.2773 | 0.5499 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **FA** | 0.38640 | 0.61662 | 0.46071 | -0.05000 | 1.00000 | 0.30929 | -0.01610 | -0.06637 | -0.13482 | 0.10714 | 0.18214 |  |
|  |  |
|  | 0.1548 | **0.0144\*** | 0.0839 | 0.8595 |  | 0.2620 | 0.9546 | 0.8142 | 0.6319 | 0.7039 | 0.5159 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  | 74 |  |
|  |  |  |  |  | | | |  |  |  |  |  |
|  |  |  |  | **Spearman’s correlation coefficient, N = 15** | | | |  |  |  |  |  |
|  |  |  |  |  | **Prob > |r| under H0: Rho=0** | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Urea** | **Creat** | **ALT** | **AST** | **FA** | **GGT** | **PT** | **Alb** | **Glob** | **CK** | **CKMB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **GGT** | 0.30985 | -0.24766 | 0.00000 | -0.43301 | 0.30929 | 1.00000 | -0.12394 | -0.06214 | -0.22089 | -0.43301 | -0.18558 |  |
|  |  |
|  | 0.2611 | 0.3735 | 1.0000 | 0.1069 | 0.2620 |  | 0.6599 | 0.8259 | 0.4289 | 0.1069 | 0.5079 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PT** | 0.18100 | 0.01432 | -0.30054 | 0.20930 | -0.01610 | -0.12394 | 1.00000 | 0.96676 | 0.78115 | 0.56172 | 0.57603 |  |
|  |  |
|  | 0.5186 | 0.9596 | 0.2764 | 0.4541 | 0.9546 | 0.6599 |  | **<.0001\*** | **0.0006\*** | **0.0293\*** | **0.0246\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Alb** | 0.14555 | -0.03411 | -0.42332 | 0.21704 | -0.06637 | -0.06214 | 0.96676 | 1.00000 | 0.63869 | 0.52557 | 0.55068 |  |
|  |  |
|  | 0.6047 | 0.9039 | 0.1159 | 0.4372 | 0.8142 | 0.8259 | **<.0001\*** |  | **0.0104\*** | **0.0442\*** | **0.0334\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Glob** | 0.16335 | -0.05288 | -0.13664 | 0.01093 | -0.13482 | -0.22089 | 0.78115 | 0.63869 | 1.00000 | 0.55385 | 0.53745 |  |
|  |  |
|  | 0.5608 | 0.8515 | 0.6273 | 0.9692 | 0.6319 | 0.4289 | **0.0006\*** | **0.0104\*** |  | **0.0322\*** | **0.0388\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CK** | 0.16637 | 0.39321 | 0.11429 | 0.30000 | 0.10714 | -0.43301 | 0.56172 | 0.52557 | 0.55385 | 1.00000 | 0.90357 |  |
|  |  |
|  | 0.5534 | 0.1471 | 0.6851 | 0.2773 | 0.7039 | 0.1069 | **0.0293\*** | **0.0442\*** | **0.0322\*** |  | **<.0001\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CK** | 0.28265 | 0.19839 | 0.23929 | 0.16786 | 0.18214 | -0.18558 | 0.57603 | 0.55068 | 0.53745 | 0.90357 | 1.00000 |  |
| **MB** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0.3074 | 0.4784 | 0.3904 | 0.5499 | 0.5159 | 0.5079 | **0.0246\*** | **0.0334\*** | **0.0388\*** | **<.0001\*** |  |  |

Urea, Creat: Creatinine, ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, FA: Alkaline Phosphatase,

GGT: Gamma Glutamil Transferase, PTs: Total serum protein, Alb: Albumin, Glob: Globuline, CK: Creatine

kinase, CK-MB: Creatine kinase MB.

**TABLE 37.** Multivariate analysis with generalized linear models using the gamma distribution comparing the relationship of the variable response AF with the other variables of the biochemical examination.

**Analysis of Maximum Likelihood Parameter Estimates**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** |  | **DF** | **Estimate** | **Error** | **95% Confidence Limit** | | **Chi-Square of** | **Pr > Qui-** |
|  |  |  |  | **Standard** | **Wald** |  | **Wald** | **Square** |
|  |  |  |  |  |  |  |  |  |
| **Intercept** |  | 1 | 25.4071 | 7.9325 | 9.8596 | 40.9546 | 10.26 | 0.0014 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **1** | 1 | 0.1958 | 0.3741 | -0.5374 | 0.9289 | 0.27 | 0.6007 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **2** | 1 | -0.1432 | 0.2538 | -0.6407 | 0.3543 | 0.32 | 0.5727 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **0** | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | . | . |
|  |  |  |  |  |  |  |  |  |
| **Urea** |  | 1 | -0.0356 | 0.0185 | -0.0718 | 0.0006 | 3.72 | 0.0539 |
|  |  |  |  |  |  |  |  |  |
| **Creat** |  | 1 | 3.4431 | 0.8545 | 1.7683 | 5.1178 | 16.24 | **<.0001\*** |
|  |  |  |  |  |  |  |  |  |
| **ALT** |  | 1 | 0.0094 | 0.0090 | -0.0082 | 0.0270 | 1.09 | 0.2975 |
|  |  |  |  |  |  |  |  |  |
| **AST** |  | 1 | -0.0037 | 0.0024 | -0.0083 | 0.0010 | 2.41 | 0.1207 |
|  |  |  |  |  |  |  |  |  |
| **GGT** |  | 1 | -24.4526 | 8.2656 | -40.6529 | -8.2523 | 8.75 | **0.0031\*** |
|  |  |  |  |  |  |  |  |  |
| **PT** |  | 1 | 0.0579 | 0.3669 | -0.6612 | 0.7771 | 0.02 | 0.8746 |
|  |  |  |  |  |  |  |  |  |
| **Alb** |  | 1 | 0.6115 | 0.7033 | -0.7670 | 1.9900 | 0.76 | 0.3846 |
|  |  |  |  |  |  |  |  |  |
| **Glob** |  | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | . | . |
|  |  |  |  |  |  |  |  |  |
| **CK** |  | 1 | -0.0055 | 0.0017 | -0.0089 | -0.0022 | 10.43 | **0.0012\*** |
|  |  |  |  |  |  |  |  |  |
| **CKMB** |  | 1 | 0.0019 | 0.0006 | 0.0007 | 0.0030 | 10.74 | **0.0010\*** |

**Scale** 1 20.9347 7.5842 10.2919 42.5832

75

Urea, Creat: Creatinine, ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, FA: Alkaline Phosphatase,

GGT: Gamma Glutamil Transferase, PTs: Total serum protein, Alb: Albumin, Glob: Globuline, CK: Creatine

kinase, CK-MB: Creatine kinase MB.

**TABLE 38**. Descriptive statistics of the variables of the Group 0 Gas Test.

**Simple Statistics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **pH** | 5 | 7.11200 | 0.09935 | 7.10000 | 6.97000 | 7.24000 |
|  |  |  |  |  |  |  |
| **pCO2** | 5 | 88.58000 | 26.14320 | 82.00000 | 63.20000 | 132.70000 |
|  |  |  |  |  |  |  |
| **pO2** | 5 | 151.80000 | 32.68333 | 168.00000 | 99.00000 | 180.00000 |
|  |  |  |  |  |  |  |
| **Na** | 5 | 147.60000 | 6.38749 | 149.00000 | 137.00000 | 153.00000 |
|  |  |  |  |  |  |  |
| **K** | 5 | 4.64600 | 0.28798 | 4.74000 | 4.16000 | 4.89000 |
|  |  |  |  |  |  |  |
| **Ca2** | 5 | 0.76600 | 0.20428 | 0.85000 | 0.43000 | 0.93000 |
|  |  |  |  |  |  |  |
| **Cl** | 5 | 110.40000 | 3.78153 | 109.00000 | 108.00000 | 117.00000 |
|  |  |  |  |  |  |  |
| **Lac** | 5 | 2.24000 | 1.86091 | 1.30000 | 0.60000 | 5.20000 |
|  |  |  |  |  |  |  |
| **HCO3** | 5 | 26.46000 | 2.95008 | 26.40000 | 23.10000 | 29.70000 |
|  |  |  |  |  |  |  |
| **sO2** | 5 | 97.52000 | 2.25876 | 98.90000 | 93.90000 | 99.20000 |

pH: Hydrogen potential of blood, pCO2: partial pressures of Carbon Dioxide (mmHg), pO2: pressures

parciais de Oxigênio (mmHg), Na+: Sódio (mmol/L), K+: Potássio (mmol/L), Ca+: Cálcio (mmol/L), Cl-: Chlorine

(mmol/L), Lac: Lactate (mmol/L), HCO3: Bicarbonate (P), sO2: oxygen saturation index (%).

**TABLE 39.** Spearman correlation performed between the variables of the Group 0 Gas Test.

**Spearman’s correlation coefficient, N = 5**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **pH** | **pCO2** | **pO2** | **Na** | **K** | **Ca2** | **Cl** | **Lac** | **HCO3** | **sO2** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pH** | 1.00000 | -0.70000 | 0.60000 | -0.80000 | 0.70000 | -0.30000 | 0.46169 | -0.10000 | 0.10000 | 0.87208 |  |
|  |  |
|  |  | 0.1881 | 0.2848 | 0.1041 | 0.1881 | 0.6238 | 0.4338 | 0.8729 | 0.8729 | 0.0539 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pCO2** | -0.70000 | 1.00000 | -0.60000 | 0.20000 | -0.30000 | 0.70000 | -0.87208 | -0.60000 | 0.60000 | -0.61559 |  |
|  |  |
|  | 0.1881 |  | 0.2848 | 0.7471 | 0.6238 | 0.1881 | 0.0539 | 0.2848 | 0.2848 | 0.2690 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pO2** | 0.60000 | -0.60000 | 1.00000 | -0.60000 | 0.60000 | 0.10000 | 0.15390 | 0.30000 | -0.30000 | 0.82078 |  |
|  |  |
|  | 0.2848 | 0.2848 |  | 0.2848 | 0.2848 | 0.8729 | 0.8048 | 0.6238 | 0.6238 | 0.0886 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Na** | -0.80000 | 0.20000 | -0.60000 | 1.00000 | -0.80000 | -0.30000 | 0.15390 | 0.50000 | -0.50000 | -0.82078 |  |
|  |  |
|  | 0.1041 | 0.7471 | 0.2848 |  | 0.1041 | 0.6238 | 0.8048 | 0.3910 | 0.3910 | 0.0886 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **K** | 0.70000 | -0.30000 | 0.60000 | -0.80000 | 1.00000 | 0.00000 | -0.10260 | -0.10000 | 0.10000 | 0.56429 |  |
|  |  |
|  | 0.1881 | 0.6238 | 0.2848 | 0.1041 |  | 1.0000 | 0.8696 | 0.8729 | 0.8729 | 0.3217 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Ca2** | -0.30000 | 0.70000 | 0.10000 | -0.30000 | 0.00000 | 1.00000 | -0.87208 | -0.60000 | 0.60000 | 0.05130 |  |
|  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

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**Spearman’s correlation coefficient, N = 5**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **pH** | **pCO2** | **pO2** | **Na** | **K** | **Ca2** | **Cl** | **Lac** | **HCO3** | **sO2** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0.6238 | 0.1881 | 0.8729 | 0.6238 | 1.0000 |  | 0.0539 | 0.2848 | 0.2848 | 0.9347 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Cl** | 0.46169 | -0.87208 | 0.15390 | 0.15390 | -0.10260 | -0.87208 | 1.00000 | 0.56429 | -0.56429 | 0.28947 |  |
|  |  |
|  | 0.4338 | 0.0539 | 0.8048 | 0.8048 | 0.8696 | 0.0539 |  | 0.3217 | 0.3217 | 0.6366 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Lac** | -0.10000 | -0.60000 | 0.30000 | 0.50000 | -0.10000 | -0.60000 | 0.56429 | 1.00000 | -1.00000 | -0.10260 |  |
|  |  |
|  | 0.8729 | 0.2848 | 0.6238 | 0.3910 | 0.8729 | 0.2848 | 0.3217 |  | **<.0001\*** | 0.8696 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **HCO3** | 0.10000 | 0.60000 | -0.30000 | -0.50000 | 0.10000 | 0.60000 | -0.56429 | -1.00000 | 1.00000 | 0.10260 |  |
|  |  |
|  | 0.8729 | 0.2848 | 0.6238 | 0.3910 | 0.8729 | 0.2848 | 0.3217 | **<.0001\*** |  | 0.8696 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **sO2** | 0.87208 | -0.61559 | 0.82078 | -0.82078 | 0.56429 | 0.05130 | 0.28947 | -0.10260 | 0.10260 | 1.00000 |  |
|  |  |
|  | 0.0539 | 0.2690 | 0.0886 | 0.0886 | 0.3217 | 0.9347 | 0.6366 | 0.8696 | 0.8696 |  |  |

pH: Hydrogen potential of blood, pCO2: partial pressures of Carbon Dioxide (mmHg), pO2: pressures

parciais de Oxigênio (mmHg), Na+: Sódio (mmol/L), K+: Potássio (mmol/L), Ca+: Cálcio (mmol/L), Cl-: Chlorine

(mmol/L), Lac: Lactate (mmol/L), HCO3: Bicarbonate (P), sO2: oxygen saturation index (%).

**TABLE 40.** Descriptive statistics of the variables of the Group 1 Gas Test.

**Simple Statistics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **pH** | 5 | 7.09600 | 0.14673 | 7.12000 | 6.92000 | 7.24000 |
|  |  |  |  |  |  |  |
| **pCO2** | 5 | 62.68000 | 21.60803 | 69.70000 | 40.80000 | 91.00000 |
|  |  |  |  |  |  |  |
| **pO2** | 5 | 132.00000 | 73.74958 | 157.00000 | 45.00000 | 208.00000 |
|  |  |  |  |  |  |  |
| **Na** | 5 | 145.20000 | 10.68644 | 149.00000 | 127.00000 | 154.00000 |
|  |  |  |  |  |  |  |
| **K** | 5 | 5.25600 | 0.61768 | 5.16000 | 4.65000 | 6.22000 |
|  |  |  |  |  |  |  |
| **Ca2** | 5 | 0.84600 | 0.22244 | 0.93000 | 0.49000 | 1.07000 |
|  |  |  |  |  |  |  |
| **Cl** | 5 | 105.80000 | 4.43847 | 104.00000 | 101.00000 | 111.00000 |
|  |  |  |  |  |  |  |
| **Lac** | 5 | 5.78000 | 1.29112 | 5.30000 | 4.60000 | 7.40000 |
|  |  |  |  |  |  |  |
| **HCO3** | 5 | 16.90000 | 0.92195 | 17.00000 | 15.60000 | 17.80000 |
|  |  |  |  |  |  |  |
| **sO2** | 5 | 91.22000 | 11.22707 | 97.30000 | 73.00000 | 99.40000 |

pH: Hydrogen potential of blood, pCO2: partial pressures of Carbon Dioxide (mmHg), pO2: pressures

parciais de Oxigênio (mmHg), Na+: Sódio (mmol/L), K+: Potássio (mmol/L), Ca+: Cálcio (mmol/L), Cl-: Chlorine

(mmol/L), Lac: Lactate (mmol/L), HCO3: Bicarbonate (P), sO2: oxygen saturation index (%).

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**TABLE 41.** Spearman correlation performed between the variables of the Group 1 Gas Test.

**Spearman’s correlation coefficient, N = 5**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **pH** | **pCO2** | **pO2** | **Na** | **K** | **Ca2** | **Cl** | **Lac** | **HCO3** | **sO2** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pH** | 1.00000 | -0.90000 | -0.50000 | -0.90000 | 0.50000 | -0.70000 | 0.20000 | 0.10000 | -0.30000 | -0.50000 |  |
|  |  |
|  |  | **0.0374\*** | 0.3910 | **0.0374\*** | 0.3910 | 0.1881 | 0.7471 | 0.8729 | 0.6238 | 0.3910 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pCO2** | -0.90000 | 1.00000 | 0.60000 | 1.00000 | -0.60000 | 0.90000 | 0.10000 | 0.30000 | 0.40000 | 0.60000 |  |
|  |  |
|  | **0.0374\*** |  | 0.2848 | **<.0001\*** | 0.2848 | **0.0374\*** | 0.8729 | 0.6238 | 0.5046 | 0.2848 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pO2** | -0.50000 | 0.60000 | 1.00000 | 0.60000 | -1.00000 | 0.30000 | 0.70000 | 0.10000 | 0.20000 | 1.00000 |  |
|  |  |
|  | 0.3910 | 0.2848 |  | 0.2848 | **<.0001\*** | 0.6238 | 0.1881 | 0.8729 | 0.7471 | **<.0001\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Na** | -0.90000 | 1.00000 | 0.60000 | 1.00000 | -0.60000 | 0.90000 | 0.10000 | 0.30000 | 0.40000 | 0.60000 |  |
|  |  |
|  | **0.0374\*** | **<.0001\*** | 0.2848 |  | 0.2848 | **0.0374\*** | 0.8729 | 0.6238 | 0.5046 | 0.2848 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **K** | 0.50000 | -0.60000 | -1.00000 | -0.60000 | 1.00000 | -0.30000 | -0.70000 | -0.10000 | -0.20000 | -1.00000 |  |
|  |  |
|  | 0.3910 | 0.2848 | **<.0001\*** | 0.2848 |  | 0.6238 | 0.1881 | 0.8729 | 0.7471 | **<.0001\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Ca2** | -0.70000 | 0.90000 | 0.30000 | 0.90000 | -0.30000 | 1.00000 | 0.00000 | 0.60000 | 0.30000 | 0.30000 |  |
|  |  |
|  | 0.1881 | **0.0374\*** | 0.6238 | **0.0374\*** | 0.6238 |  | 1.0000 | 0.2848 | 0.6238 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Cl** | 0.20000 | 0.10000 | 0.70000 | 0.10000 | -0.70000 | 0.00000 | 1.00000 | 0.40000 | 0.20000 | 0.70000 |  |
|  |  |
|  | 0.7471 | 0.8729 | 0.1881 | 0.8729 | 0.1881 | 1.0000 |  | 0.5046 | 0.7471 | 0.1881 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Lac** | 0.10000 | 0.30000 | 0.10000 | 0.30000 | -0.10000 | 0.60000 | 0.40000 | 1.00000 | -0.10000 | 0.10000 |  |
|  |  |
|  | 0.8729 | 0.6238 | 0.8729 | 0.6238 | 0.8729 | 0.2848 | 0.5046 |  | 0.8729 | 0.8729 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **HCO3** | -0.30000 | 0.40000 | 0.20000 | 0.40000 | -0.20000 | 0.30000 | 0.20000 | -0.10000 | 1.00000 | 0.20000 |  |
|  |  |
|  | 0.6238 | 0.5046 | 0.7471 | 0.5046 | 0.7471 | 0.6238 | 0.7471 | 0.8729 |  | 0.7471 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **sO2** | -0.50000 | 0.60000 | 1.00000 | 0.60000 | -1.00000 | 0.30000 | 0.70000 | 0.10000 | 0.20000 | 1.00000 |  |
|  |  |
|  | 0.3910 | 0.2848 | **<.0001\*** | 0.2848 | **<.0001\*** | 0.6238 | 0.1881 | 0.8729 | 0.7471 |  |  |

pH: Hydrogen potential of blood, pCO2: partial pressures of Carbon Dioxide (mmHg), pO2: pressures

parciais de Oxigênio (mmHg), Na+: Sódio (mmol/L), K+: Potássio (mmol/L), Ca+: Cálcio (mmol/L), Cl-: Cloro

(mmol/L), Lac: Lactate (mmol/L), HCO3: Bicarbonate (P), sO2: oxygen saturation index (%).

**TABLE 42.** Descriptive statistics of the variables of the Group 2 Gas Test.

**Simple Statistics**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |  |
|  | **pH** | 5 | 7.02600 | 0.16697 | 7.08000 | 6.74000 | 7.16000 |
|  |  |  |  |  |  |  |  |
|  | **pCO2** | 5 | 73.60000 | 11.31128 | 75.90000 | 56.60000 | 87.40000 |
|  |  |  |  |  |  |  |  |
|  | **pO2** | 5 | 124.40000 | 35.87896 | 134.00000 | 64.00000 | 157.00000 |
|  |  |  |  |  |  |  |  |
|  | **Na** | 5 | 151.00000 | 4.58258 | 151.00000 | 144.00000 | 156.00000 |
|  |  |  |  |  |  |  |  |

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**Simple Statistics**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Average** | **Standard Deviation** | **Mediana** | **Minimum** | **Maximum** |
|  |  |  |  |  |  |  |
| **K** | 5 | 5.87800 | 1.45785 | 5.69000 | 4.61000 | 8.23000 |
|  |  |  |  |  |  |  |
| **Ca2** | 5 | 0.92000 | 0.25505 | 1.03000 | 0.58000 | 1.14000 |
|  |  |  |  |  |  |  |
| **Cl** | 5 | 105.60000 | 7.12741 | 108.00000 | 94.00000 | 112.00000 |
|  |  |  |  |  |  |  |
| **Lac** | 5 | 3.64000 | 4.02405 | 1.20000 | 0.50000 | 9.50000 |
|  |  |  |  |  |  |  |
| **HCO3** | 5 | 19.72000 | 7.96097 | 20.10000 | 9.80000 | 30.00000 |
|  |  |  |  |  |  |  |
| **sO2** | 5 | 94.00000 | 6.44244 | 97.20000 | 82.80000 | 98.40000 |

pH: Hydrogen potential of blood, pCO2: partial pressures of Carbon Dioxide (mmHg), pO2: pressures

parciais de Oxigênio (mmHg), Na+: Sódio (mmol/L), K+: Potássio (mmol/L), Ca+: Cálcio (mmol/L), Cl-: Cloro

(mmol/L), Lac: Lactate (mmol/L), HCO3: Bicarbonate (P), sO2: oxygen saturation index (%).

**TABLE 43.** Spearman correlation performed between the variables of the Group 2 Gas Test.

**Spearman’s correlation coefficient, N = 5**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **pH** | **pCO2** | **pO2** | **Na** | **K** | **Ca2** | **Cl** | **Lac** | **HCO3** | **sO2** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pH** | 1.00000 | 0.70000 | -0.60000 | -0.70000 | -0.60000 | 0.30000 | 0.60000 | -0.60000 | 1.00000 | 0.20000 |  |
|  |  |
|  |  | 0.1881 | 0.2848 | 0.1881 | 0.2848 | 0.6238 | 0.2848 | 0.2848 | **<.0001\*** | 0.7471 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pCO2** | 0.70000 | 1.00000 | -0.60000 | -0.70000 | -0.10000 | 0.20000 | 0.10000 | -0.10000 | 0.70000 | -0.20000 |  |
|  |  |
|  | 0.1881 |  | 0.2848 | 0.1881 | 0.8729 | 0.7471 | 0.8729 | 0.8729 | 0.1881 | 0.7471 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pO2** | -0.60000 | -0.60000 | 1.00000 | 0.90000 | 0.00000 | -0.90000 | 0.00000 | 0.00000 | -0.60000 | 0.60000 |  |
|  |  |
|  | 0.2848 | 0.2848 |  | **0.0374\*** | 1.0000 | **0.0374\*** | 1.0000 | 1.0000 | 0.2848 | 0.2848 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Na** | -0.70000 | -0.70000 | 0.90000 | 1.00000 | -0.10000 | -0.70000 | 0.10000 | -0.10000 | -0.70000 | 0.30000 |  |
|  |  |
|  | 0.1881 | 0.1881 | **0.0374\*** |  | 0.8729 | 0.1881 | 0.8729 | 0.8729 | 0.1881 | 0.6238 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **K** | -0.60000 | -0.10000 | 0.00000 | -0.10000 | 1.00000 | 0.10000 | -1.00000 | 1.00000 | -0.60000 | -0.40000 |  |
|  |  |
|  | 0.2848 | 0.8729 | 1.0000 | 0.8729 |  | 0.8729 | **<.0001\*** | **<.0001\*** | 0.2848 | 0.5046 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Ca2** | 0.30000 | 0.20000 | -0.90000 | -0.70000 | 0.10000 | 1.00000 | -0.10000 | 0.10000 | 0.30000 | -0.70000 |  |
|  |  |
|  | 0.6238 | 0.7471 | **0.0374\*** | 0.1881 | 0.8729 |  | 0.8729 | 0.8729 | 0.6238 | 0.1881 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Cl** | 0.60000 | 0.10000 | 0.00000 | 0.10000 | -1.00000 | -0.10000 | 1.00000 | -1.00000 | 0.60000 | 0.40000 |  |
|  |  |
|  | 0.2848 | 0.8729 | 1.0000 | 0.8729 | **<.0001\*** | 0.8729 |  | **<.0001\*** | 0.2848 | 0.5046 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Lac** | -0.60000 | -0.10000 | 0.00000 | -0.10000 | 1.00000 | 0.10000 | -1.00000 | 1.00000 | -0.60000 | -0.40000 |  |
|  |  |
|  | 0.2848 | 0.8729 | 1.0000 | 0.8729 | **<.0001\*** | 0.8729 | **<.0001\*** |  | 0.2848 | 0.5046 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **HCO3** | 1.00000 | 0.70000 | -0.60000 | -0.70000 | -0.60000 | 0.30000 | 0.60000 | -0.60000 | 1.00000 | 0.20000 |  |
|  |  |
|  | **<.0001\*** | 0.1881 | 0.2848 | 0.1881 | 0.2848 | 0.6238 | 0.2848 | 0.2848 |  | 0.7471 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **sO2** | 0.20000 | -0.20000 | 0.60000 | 0.30000 | -0.40000 | -0.70000 | 0.40000 | -0.40000 | 0.20000 | 1.00000 |  |
|  |  |
|  | 0.7471 | 0.7471 | 0.2848 | 0.6238 | 0.5046 | 0.1881 | 0.5046 | 0.5046 | 0.7471 |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

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pH: Hydrogen potential of blood, pCO2: partial pressures of Carbon Dioxide (mmHg), pO2: pressures

parciais de Oxigênio (mmHg), Na+: Sódio (mmol/L), K+: Potássio (mmol/L), Ca+: Cálcio (mmol/L), Cl-: Cloro

(mmol/L), Lac: Lactate (mmol/L), HCO3: Bicarbonate (P), sO2: oxygen saturation index (%).

**TABLE 44.** Spearman correlation performed between the variables of the Group 1, 2 and 3 Gas Test.

**Spearman’s correlation coefficient, N = 15**

**Prob > |r| under H0: Rho=0**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **pH** | **pCO2** | **pO2** | **Na** | **K** | **Ca2** | **Cl** | **Lac** | **HCO3** | **sO2** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pH** | 1.00000 | -0.42473 | -0.24933 | -0.84636 | 0.03943 | -0.17325 | 0.48691 | -0.30135 | 0.37455 | 0.02513 |  |
|  |  |
|  |  | 0.1145 | 0.3702 | **<.0001\*** | 0.8891 | 0.5369 | 0.0657 | 0.2751 | 0.1690 | 0.9292 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pCO2** | -0.42473 | 1.00000 | 0.14656 | 0.28827 | -0.28929 | 0.26655 | -0.15122 | -0.33601 | 0.60714 | 0.11628 |  |
|  |  |
|  | 0.1145 |  | 0.6022 | 0.2974 | 0.2957 | 0.3369 | 0.5906 | 0.2208 | **0.0164\*** | 0.6798 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **pO2** | -0.24933 | 0.14656 | 1.00000 | 0.16398 | -0.33244 | -0.05192 | 0.19280 | 0.05009 | 0.00894 | 0.92480 |  |
|  |  |
|  | 0.3702 | 0.6022 |  | 0.5592 | 0.2260 | 0.8542 | 0.4912 | 0.8593 | 0.9748 | **<.0001\*** |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Na** | -0.84636 | 0.28827 | 0.16398 | 1.00000 | -0.32050 | -0.02063 | -0.05235 | 0.12903 | -0.28290 | -0.05202 |  |
|  |  |
|  | **<.0001\*** | 0.2974 | 0.5592 |  | 0.2442 | 0.9418 | 0.8530 | 0.6467 | 0.3069 | 0.8539 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **K** | 0.03943 | -0.28929 | -0.33244 | -0.32050 | 1.00000 | 0.21467 | -0.72190 | 0.55228 | -0.48571 | -0.32916 |  |
|  |  |
|  | 0.8891 | 0.2957 | 0.2260 | 0.2442 |  | 0.4423 | **0.0024\*** | **0.0328\*** | 0.0664 | 0.2309 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Ca2** | -0.17325 | 0.26655 | -0.05192 | -0.02063 | 0.21467 | 1.00000 | -0.22543 | 0.10474 | 0.06977 | -0.05018 |  |
|  |  |
|  | 0.5369 | 0.3369 | 0.8542 | 0.9418 | 0.4423 |  | 0.4192 | 0.7103 | 0.8049 | 0.8590 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Cl** | 0.48691 | -0.15122 | 0.19280 | -0.05235 | -0.72190 | -0.22543 | 1.00000 | -0.47389 | 0.44466 | 0.35709 |  |
|  |  |
|  | 0.0657 | 0.5906 | 0.4912 | 0.8530 | **0.0024\*** | 0.4192 |  | 0.0743 | 0.0968 | 0.1914 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **Lac** | -0.30135 | -0.33601 | 0.05009 | 0.12903 | 0.55228 | 0.10474 | -0.47389 | 1.00000 | -0.79357 | -0.12981 |  |
|  |  |
|  | 0.2751 | 0.2208 | 0.8593 | 0.6467 | **0.0328\*** | 0.7103 | 0.0743 |  | **0.0004\*** | 0.6447 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **HCO3** | 0.37455 | 0.60714 | 0.00894 | -0.28290 | -0.48571 | 0.06977 | 0.44466 | -0.79357 | 1.00000 | 0.22719 |  |
|  |  |
|  | 0.1690 | **0.0164\*** | 0.9748 | 0.3069 | 0.0664 | 0.8049 | 0.0968 | **0.0004\*** |  | 0.4155 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| **sO2** | 0.02513 | 0.11628 | 0.92480 | -0.05202 | -0.32916 | -0.05018 | 0.35709 | -0.12981 | 0.22719 | 1.00000 |  |
|  |  |
|  | 0.9292 | 0.6798 | **<.0001\*** | 0.8539 | 0.2309 | 0.8590 | 0.1914 | 0.6447 | 0.4155 |  |  |

pH: Hydrogen potential of blood, pCO2: partial pressures of Carbon Dioxide (mmHg), pO2: pressures

parciais de Oxigênio (mmHg), Na+: Sódio (mmol/L), K+: Potássio (mmol/L), Ca+: Cálcio (mmol/L), Cl-: Chlorine

(mmol/L), Lac: Lactate (mmol/L), HCO3: Bicarbonate (P), sO2: oxygen saturation index (%).

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**TABLE 45.** Multivariate analysis with generalized linear models using the gamma distribution comparing the relationship of the variable response pH with the other variables of the gas test.

**Analysis of Maximum Likelihood Parameter Estimates**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** |  | **DF** | **Estimate** | **Error** | **95% Confidence Limit** | | **Chi-Square of** | **Pr > Qui-** |
|  |  |  |  | **Standard** | **Wald** |  | **Wald** | **Square** |
|  |  |  |  |  |  |  |  |  |
| **Intercept** |  | 1 | 1.9327 | 0.0271 | 1.8796 | 1.9858 | 5084.09 | <.0001 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **1** | 1 | 0.0031 | 0.0016 | -0.0001 | 0.0062 | 3.56 | 0.0592 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **2** | 1 | 0.0087 | 0.0023 | 0.0042 | 0.0133 | 14.17 | 0.0002 |
|  |  |  |  |  |  |  |  |  |
| **Group** | **0** | 0 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | . | . |
|  |  |  |  |  |  |  |  |  |
| **pCO2** |  | 1 | -0.0002 | 0.0001 | -0.0003 | -0.0000 | 5.77 | **0.0163\*** |
|  |  |  |  |  |  |  |  |  |
| **pO2** |  | 1 | -0.0001 | 0.0000 | -0.0002 | -0.0000 | 14.17 | **0.0002\*** |
|  |  |  |  |  |  |  |  |  |
| **Na** |  | 1 | -0.0017 | 0.0002 | -0.0021 | -0.0013 | 64.66 | **<.0001\*** |
|  |  |  |  |  |  |  |  |  |
| **K** |  | 1 | -0.0046 | 0.0013 | -0.0071 | -0.0021 | 12.83 | **0.0003\*** |
|  |  |  |  |  |  |  |  |  |
| **Ca2** |  | 1 | -0.0045 | 0.0027 | -0.0097 | 0.0008 | 2.75 | 0.0975 |
|  |  |  |  |  |  |  |  |  |
| **Cl** |  | 1 | 0.0024 | 0.0003 | 0.0019 | 0.0030 | 69.52 | **<.0001\*** |
|  |  |  |  |  |  |  |  |  |
| **Lac** |  | 1 | 0.0018 | 0.0005 | 0.0008 | 0.0029 | 11.50 | **0.0007\*** |
|  |  |  |  |  |  |  |  |  |
| **HCO3** |  | 1 | 0.0006 | 0.0004 | -0.0002 | 0.0013 | 2.27 | 0.1316 |
|  |  |  |  |  |  |  |  |  |
| **sO2** |  | 1 | 0.0004 | 0.0002 | 0.0000 | 0.0008 | 4.75 | **0.0293\*** |
|  |  |  |  |  |  |  |  |  |
| **Scale** |  | 1 | 475735.0 | 173713.8 | 232568.2 | 973150.1 |  |  |

pH: Hydrogen potential of blood, pCO2: partial pressures of Carbon Dioxide (mmHg), pO2: pressures

parciais de Oxigênio (mmHg), Na+: Sódio (mmol/L), K+: Potássio (mmol/L), Ca+: Cálcio (mmol/L), Cl-: Chlorine

(mmol/L), Lac: Lactate (mmol/L), HCO3: Bicarbonate (P), sO2: oxygen saturation index (%).