

## HAEMATOLOGICAL ALTERNATION INDUCED AFTER SUBCUTANEOUS ADMINISTRATION OF IODIXANOL IN PERSIAN SQUIRRELS

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### ABSTRACT

Persian Squirrel (*Sciurus anomalus*) is a small rodent which lives in oak forest of the North West and West provinces of Iran. The present study was carried out to investigate hematological alterations induced after single subcutaneous administration of iodixanol thirteen hundred mg iodine per kilogram body weight in ten healthy squirrels. Blood samples were collected from treated animals from jugular vein into K<sub>2</sub>EDTA tubes 24 hour and after treatment were analyzed for hematological parameters (total leukocyte count, differential leukocyte count, total erythrocyte count, Hemoglobin, HCT, MCV, MCH, MCHC, RDW and MPV) analysis. The results of the study clearly demonstrated that single subcutaneous administration of iodixanol in diagnostic dose produced non-significant difference ( $p < 0.05$ ) in values of hematological parameters in squirrel when compared with control values (0 day). Lack of clinical signs of adverse reactions and absence of significant difference hematological alteration following subcutaneous administration may be open a new avenue for use of iodixanol in contrast studies.

**Keywords:** Hematological, Subcutaneous, Iodixanol, Persian Squirrel

### INTRODUCTION

Persian Squirrel (*Sciurus anomalus*) is a small rodent which lives in oak forest of the North West and West provinces of Iran (Firouz, 2000). Intravenous urography is the basic radiographic method for evaluating disorders of urinary system. Despite improvements in techniques and equipment for obtaining venous access, it is not always possible to achieve a secure peripheral or central intravenous therefore another methods of administration of contrast media is desired: intraosseous, (Saglam *et al.*, 2004) intramuscular (Hodge and Knotek *et al.*, 2004) and subcutaneous (Cerny *et al.*, 1976).

Iodixanol is a contrast agent, sold under the trade name Visipaque. Visipaque is commonly used as a contrast agent during coronary angiography. It is the only iso-osmolar contrast agent, with an osmolality of 290 mOsm/kg H<sub>2</sub>O, the same as blood.

It is highly biocompatible and possesses certain advantages over conventional agents (Scgalm, 1967). It is excreted mainly by the kidneys. Nonionic agents permit the generation of procoagulants, which (on repeat injection) are theoretically capable of causing clotting even in unclottable mixtures. All of these properties impact physiologic status and may cause adverse effects. Renal toxicity and allergic reactions due to contrast materials have not yet been identified. In addition, the concept of increased risk for thrombosis with nonionic material is controversial. Ionic agents are reported to have antithrombotic potential, whereas nonionic agents are considered to be more thrombogenic. Cardiovascular thrombotic complications (eg, coronary embolus, transient ischemic attack, or stroke) may occur during catheterization.

### MATERIALS AND METHODS

This study was performed on ten clinically healthy adult Persian squirrels. Squirrels were kept for two weeks prior to study. All 10 squirrels were included in both control and test studies. All necessary managemental practices were followed so that the squirrels remained free from stress and diseases. In this period they were subjected to clinical examinations in order to exclude the possibility of any disease. Blood samples were collected from treated animals from jugular vein into K<sub>2</sub>EDTA tubes for

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hematological analyses. Plasma was separated after centrifugation of blood samples at 1600 revolutions per minute (rpm) for 10 minutes. The plasma samples were transferred to cryo-vials (3 ml capacity) and then stored at 2-8°C until assayed for enzyme estimation. Blood smear for determination of Differential Leukocyte Count (DLC) were prepared from fresh blood at the time of blood collection [9, 10]. Values of the hematological parameters including White Blood Cell (WBC) count, differential leucocyte counts (neutrophils, lymphocytes, monocytes, eosinophils, and basophils), Red Blood Cell (RBC) count, hemoglobin (HGB) concentration, hematocrit (HCT), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), mean Corpuscular Hemoglobin Concentration (MCHC), Red Cell Distribution Width (RDW) and Mean Platelet Values (MPV) analysis. The samples were analyzed by using automatic hematology analyzer (Medonic CA 620/530 VET, Boule Medical AB, Sweden). 14 days later thirteen hundreds mg of iodine per kilogram body weight of iodixanol was injected subcutaneously over shoulder joint. Blood sample was prepared 24 hours after injection of iodixanol. The hematological and biochemical parameters were calculated. Data generated on various parameters were subjected to statistical analysis by paired t- test, using SPSS version 16.0 for window.

## RESULTS AND DISCUSSION

### Results

**Table 1: Mean ±SD of hematologic values of squirrel before and after subcutaneous injection of iodixanol**

Hematology					
Parameter	Before Injection	Post Injection	Parameter	Before Injection	Post Injection
<b>Hct</b> %	41.22±4.30	40.08±5.83	<b>DIFF.</b>		
<b>Hb</b> g/dL	14.28±2.06	14.73±2.11	<b>Seg</b> ×10 <sup>3</sup> /μL	2.92±0.09	3.01±1.10
<b>RBC</b> ×10 <sup>6</sup> /μL	7.48±0.98	7.26±1.50	<b>Band</b> ×10 <sup>3</sup> /μL		
<b>MCV</b> fl	52.13±3.84	52.94±2.73	<b>Lymph</b> ×10 <sup>3</sup> /μL	2.37±0.20	2.14±0.11
<b>MCHC</b> %	33.00±1.40	34.23±1.27	<b>Mono</b> ×10 <sup>3</sup> /μL	0.11±0.02	0.10±0.04
<b>NRBC</b>	0	0	<b>Eos</b> ×10 <sup>3</sup> /μL	0	0
<b>Retic</b> %	0.60±0.08	0.05±0.10	<b>Baso</b> ×10 <sup>3</sup> /μL	0.1±0.06	0.11±0.08
<b>WBC</b> ×10 <sup>3</sup> /μL	5.40±0.92	5.30±0.45	<b>Plt</b> ×10 <sup>3</sup> /μL	422.00±13.00	431.00±18.00

Values of the hematological parameters before and after iodixanol treatment (Thirteen hundred mg iodine per kilogram body weight) in squirrel, including white blood cell (WBC) count, differential leucocyte counts (neutrophils, lymphocytes, monocytes, eosinophils, and basophils), red blood cell (RBC) count, hemoglobin (HGB) concentration, hematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red cell distribution width (RDW) and mean platelet values (MPV) are presented in Table 1. Mean value of all hematological parameters observed in the study when compared with control values (0 day), have been

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found no significant ( $p < 0.05$ ). All animals were not exhibited any local or systemic adverse reactions after subcutaneous injection of iodixanol in squirrel. Animals did not show change in behavior and pain on palpation during study period.

### **Discussion**

Squirrel is a wild mammal which is kept as a companion animal. It became very usual to keep squirrel as a companion animal in Iran.

Radiography is used to diagnose abnormalities in squirrel. Use of contrast media in exotic species is largely extrapolated from experiences in dogs and cats. Because of species differences in physiology and anatomic structure, caution should be exercised when utilizing these techniques in exotic animal medicine (Capello, 2008).

Iodixanol is a contrast agent, sold under the trade name Visipaque. Visipaque is commonly used as a contrast agent during coronary angiography (Stass and Kubitz, 1999, Von and Schlüter, 1999). It is the only iso-osmolar contrast agent, with an osmolality of 290 mOsm/kg H<sub>2</sub>O, the same as blood. Safety of iodixanol following single dose subcutaneous administration given at the rate of thirteen hundreds mg of iodine per kilogram body weight in squirrel was monitored by studying various hematological parameters. The hematological indices included the determination of Haemoglobin (Hb), Packed Cell Volume (PCV), Total Erythrocyte Count (TEC), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), Total Leukocyte Count (TLC) and Differential Leukocyte Count (DLC). The results of the present study indicate non-significant differences (no alteration) in the values of these parameters estimated when compare with 0 day sample collection.

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