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VENOUS BLOOD TO MEASURE DOGS GLYCEMIA ON THE PORTABLE GLUCOMETER - 166

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Introduction
Glucose is constantly used by cells as source of energy, and for that reason it is necessary to maintain its blood concentration in balance (Bush 2004). Altered glucose levels result in negative consequences for the body, so the most appropriate way of reducing those complications is trying to maintain its concentration in normal values. That can be accomplished by the measurements of its concentration. The different techniques for monitoring glucose in blood can be classified as laboratorial or portable. The first option is more reliable; however since it generally has larger costs, its use is restricted to clinical analysis laboratories and hospitals (Pricks et al. 2003). Other disadvantage is the need of larger volumes of blood to accomplish the test (Gross et al. 2002). With the intention of facilitating the accomplishment of the test, in the seventies the first portable monitor was developed. It initially was manufactured so that human diabetic patients could monitor there blood glucose along the day (Mael et al. 2005). However it is necessary to emphasize that those equipments are not only used by diabetic patients, but also by medical professionals with the purpose to evaluate the effectiveness of treatments and to adjust diets, exercises and medical prescriptions, so that patients can reach the best glycemic control (Larin et al. 2002, Pickup et al. 2005). Glucose monitors offers a lot of benefits when compared to laboratorial analyzers (Cohn et al. 2000), since they are smaller and, portable, easy to handle and request the use of a small amount of blood (Wess & Reusch 2000). Others advantages are the speeds with in the results are obtained and the fact that the test is cheaper (Pricks et al. 2003). The great majority of equipments where projected for samples of capillary blood (Casella 2003, Kumar et al. 2004, Boyd et al. 2005) and as well as in humans, that sample can be collected on the ears of animals (Mael et al. 2005). Trying to minimize patient’s pain during puncture of capillary vessels, samples of blood collected in veins to accomplish other laboratorial tests, have frequently been used in human medicine to determine glycemia on portable glucometers (Cohn et al. 2000, Kumar et al. 2004). Based on the importance of methods that can measure glucose concentration, the aim of this study was to evaluate the use of venous blood to measure glycemia in dogs using a portable glucometer.

Materials and Methods
Samples of venous and capillary blood were collected from 36 dogs at the Veterinary Hospital of the Federal Rural University of Pernambuco (UFRPE) after approval of the experiment by the commission of animal care and welfare. Collection of capillary blood was accomplished through a puncture on the animals ear produced by a disposable needle (caliber 25 x 0.7 mm). With the patient’s ear leaning on one hand of the operator, the blood drop created by the puncture was applied on the test strip previously introduced in the glucose monitor. In 26 seconds the monitor determined the amount of blood glucose. After the test using capillary blood, a sample of three mL of blood was collected from cephalic or saphenous vein with a sterile syringe. Major part of collected blood was conditioned in a tube containing anticoagulant and sent to the clinical laboratory of UFRPE, where it was submitted to other routine tests (e.g. blood count). Inside the barrel of the syringe, was maintained a small part of the sample (approximately 0.4 mL) and then, the plunger was pressed to create a drop of blood that was applied on another test strip, and the following step where the same as described for the test with capillary blood. The glucometer and test strip used in this study were Accu-chek® Advantage Blood Glucose Meter and Accuchek® Comfort Curve Diabetes Test Strips, respectively. The descriptive statistics were calculated for the variables considered in this study (value of glucose with capillary and venous blood samples). The comparison among them were accomplished by variance analysis in a completely random design (Silva & Silva 1999) using the SYSTAT software (Demo version).

Results
The results of glycemia varied among 67 to 93 mg/dL (average of 77.55 mg/dL) and coefficient of variation of 7.71% using samples of capillary blood, and from 65 to 92 mg/dL (average 74.58 mg/dL) and coefficient of variation of 7.69% for venous blood. The analysis of variance accepts the nullity hypothesis, indicating no difference among the two methods, that is, that they are statistically similar, corroborating with a research accomplished by Wess & Reusch (2000) where they demonstrated similar results in glucose concentrations obtained with samples of capillary and venous blood.

Discussion
In agreement with Boyd et al. (2005), the use of venous blood to dose blood glucose on glucometers that were projected for capillary blood, allows fast therapeutic measures to be taken during the initial phase of critical patients’ treatment. In those cases, the procedure has the advantage of not requesting a capillary sample and, therefore, minimizes patient’s discomfort. That is a benefit, because the stress caused by the biggest number of punctures can alter the results obtained with the glucometer. Migliorini & Kettellhut (1999) mention that when the organism is submitted to a stressful situation, the nervous system releases catecholamines that results in the activation of glycoegenolysis and, consequently, a transitory hyperglycemia. Also in agreement with Shibata et al. (2004), the pain associated with blood collection to accomplish glycemia dosage is a significant problem, and a technique that causes less pain would be best. Another important verification made by Kumar et al. (2004) is that in patients with deficient circulation or deep dehydration, it is more difficult to obtain a representative sample of capillary blood on the ear. Briggs & Cornell (2004) reinforce that idea as they recommend that critically patients should not be tested with glucometers. Animals used in this research were randomly chosen and, consequently, attempts of collecting capillary blood in dehydrated patients or with reduced vascularization were made. In those cases, was observed more difficulty to obtain a blood sample of enough size, even the amount requested by the glucometer being very small (4 µL), indicating other disadvantage of the method when using venous blood.

Conclusions
Samples of venous blood can be used in the portable glucometer Accu-chek® Advantage to measure glucose concentration in dogs, even though the equipment was preferentially developed for capillary blood.

References

**Keywords:** portable glucometer, glycemia, glucose.