

Letters to the Editor

Human versus veterinary POC glucometers

Accuracy of point-of-care (POC) glucometers is a topic of great concern in both human and veterinary medicine, and I would like to thank Tauk et al¹ for their recent study investigating the accuracy of POC glucometers when used to analyze canine and feline blood samples. I was surprised to see that a human POC glucometer was used in this study, given that there are species-specific variations in glucose distribution between the cellular and plasma portions of blood.² For instance, compared with humans, dogs and cats have a significantly greater percentage of glucose in the plasma portion of their blood. Because reference ranges are generally based on plasma glucose concentrations, most POC glucometers for which whole blood samples are used perform a calculation based on this distribution to report an estimated plasma glucose concentration.³ Human and veterinary POC glucometers use the same technology, but different algorithms are applied after measurement to report values relevant for the species.⁴ Multiple studies^{5,6} have been performed demonstrating the accuracy of veterinary POC glucometers for use in dogs and cats. There are also reports questioning the accuracy of human and veterinary POC glucometers for use in veterinary species, but a variety of environmental, physiologic, and operational factors must be considered when evaluating POC glucometer accuracy.³ As the authors mentioned, the POC glucometer used in their study was specifically designed for use with whole blood. Obtaining measurements with serum or plasma is essentially an extreme example of decreased Hct, which is known to increase the glucose concentration reported by most POC glucometers.^{3,4} Because of these issues, I wonder whether the authors considered the possibilities that the whole blood measure-

ments may have been inaccurate because of species differences in glucose distribution and that the serum and plasma POC glucometer measurements could have been higher (and therefore closer to the reference method values) because of the much higher proportion of glucose within the plasma portion of blood.

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1. Tauk BS, Drobatz KJ, Wallace KA, et al. Correlation between glucose concentrations in serum, plasma, and whole blood measured by a point-of-care glucometer and serum glucose concentration measured by an automated biochemical analyzer for canine and feline blood samples. *J Am Vet Med Assoc* 2015;246:1327–1333.
2. Higgins PJ, Garlick RL, Bunn HF. Glycosylated hemoglobin in human and animal red cells. Role of glucose permeability. *Diabetes* 1982;31:743–748.
3. Tonyushkina K, Nichols JH. Glucose meters: a review of technical challenges to obtaining accurate results. *J Diabetes Sci Technol* 2009;3:971–980.
4. Lane SL, Koenig A, Brainard BM. Formulation and validation of a predictive model to correct blood glucose concentrations obtained with a veterinary point-of-care glucometer in hemodiluted and hemoconcentrated canine blood samples. *J Am Vet Med Assoc* 2015;246:307–312.
5. Cohen TA, Nelson RW, Kass PH, et al. Evaluation of six portable blood glucose meters for measuring blood glucose concentration in dogs. *J Am Vet Med Assoc* 2009;235:276–280.
6. Zini E, Moretti S, Tschuor F, et al. Evaluation of a new portable glucose meter designed for the use in cats. *Schweiz Arch Tierheilkd* 2009;151:448–451.

The authors respond:

The authors thank Dr. Clemmons for her critical reading and insightful comments. Indeed, a point-of-care (POC) glucometer validated for use in human beings was included in our study. We decided to include this specific POC glucometer because it is used throughout the University of Pennsylvania veterinary teaching hospital. The reason this specific POC glucometer is used in our hospital is purely financial, and we suspect other veterinary hospitals are also influenced by financial considerations when choosing equipment. This study's findings may be useful for other institutions in which this device is used. However, one of the study's limitations is that only one POC glucometer was investigated. Future studies of other POC glucometers are needed to investigate their accuracy when serum or plasma from dogs or cats is used.

It is possible that POC glucometer measurements obtained with whole blood in this study were inaccurate because of species differences in glucose distribution between the cellular and plasma portions of blood. However, none of the POC glucometers (whether validated for use in dogs, cats, or humans) investigated in the studies^{1,2} cited by Dr. Clemmons showed better agreement between whole blood measurements and the gold standard measurement of blood glucose concentration than was

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documented in our study. Future studies may confirm our hypothesis that blood glucose measurement with other POC glucometers can be improved by the use of plasma or serum, rather than whole blood.

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