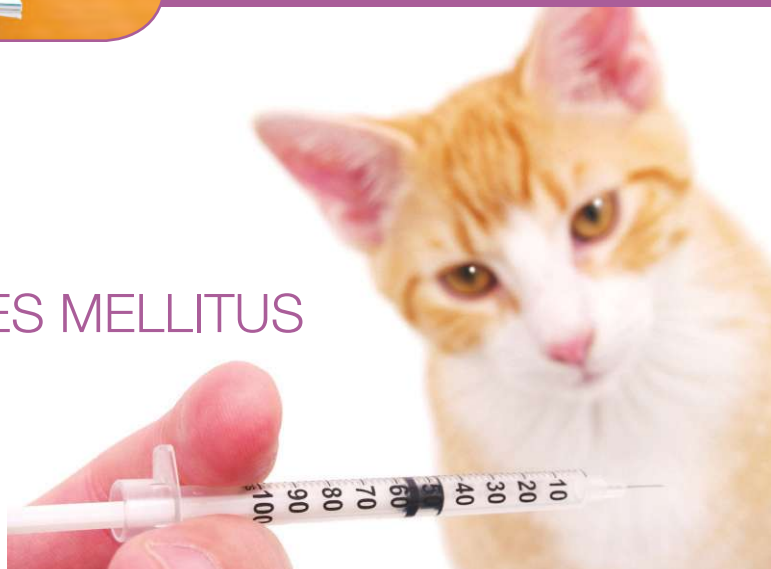




FOCUS ON DIABETES MELLITUS



Diabetes mellitus is a common condition in both dogs and cats, and small animal practitioners need to feel comfortable with the long-term management of these patients. The following 4 abstracts highlight articles that provide useful insight into the management of both feline and canine diabetics.

- The study by Hafner and colleagues looked at placement sites for continuous glucose monitoring systems (CGMS) in cats. CGMS are routinely used in human diabetics and are now appearing in veterinary referral centers and emergency clinics. Successful sensor placement can be problematic, but this study shows that the dorsal neck region is both a reliable and comfortable site for feline patients.
- Borin-Crivellenti and colleagues evaluated the carpal pad as a potential site for blood glucose testing in dogs. As home monitoring becomes a routine part of diabetic management for dogs and cats, information such as this—sample collection techniques—is timely and relevant. Samples were reliably obtained from this site and patient discomfort was minimal. Blood glucose measurements were comparable to those obtained from the ear vein in both diabetic and healthy dogs.
- The study by Niessen and colleagues provides useful insight into the concerns of owners with diabetic dogs. As clinicians, we tend to focus on the pet's immediate health needs, and may fail to consider the owner's worries and perceptions. This report describes owner responses to a series of questions regarding quality of life issues and provides a reliable tool for future clinical studies.
- In the study by Hofer-Inteeworn and colleagues, the impact of hypothyroidism on glucose homeostasis was investigated using dogs with experimentally induced thyroid deficiency. Although hypothyroidism is routinely listed as a cause of insulin resistance, this paper provides the first clear evidence of this association and demonstrates the mechanism. Diabetic dogs with insulin resistance should be screened for hypothyroidism, particularly if weight gain is noted despite persistent hyperglycemia.

Effective care for diabetic patients requires partnership between the owner and the veterinary team. These recent studies improve our ability to manage these patients and provide optimal service to our clients.—Audrey K. Cook, BVM&S, MRCVS, Diplomate ACVIM (Small Animal Internal Medicine) & ECVIM (Companion Animal), Texas A&M College of Veterinary Medicine and Biomedical Sciences



FOCUS ON DIABETES MELLITUS

CONTINUOUS GLUCOSE MONITORING IN CATS

Continuous glucose monitoring systems (CGMS) can be used to measure glucose concentrations in interstitial fluid every 5 minutes for up to 72 hours. In humans, the monitors are often placed in the abdominal para-umbilical region, however, glucose levels from this placement are 20% lower than reference glucose concentrations or readings from sensors placed in the forearm. There are no specific recommendations for sensor placement in cats at this time.

This study evaluated 3 sites for placement of a Guardian Real-Time CGMS (medtronic.com) in 18 client-owned diabetic cats. Monitors were placed in (1) subcutaneous tissue of the lateral chest wall in all cats, (2) subcutaneous tissue of the knee fold in 10 cats, and (3) dorsal neck area in 10 cats. Two cats had all 3 sensors in place at the same time.

The first calibration was evaluated 2 hours after the initialization period per the manufacturer's instructions. After that, calibrations were conducted after 6 hours; then every 10 hours. The AlphaTrak portable blood glucose meter (abbottanimalhealth.com) was used to evaluate glucose concentrations from the capillary blood of the inner pinna, which were used as reference calibrations.

Successful calibrations were achieved in:

- 15/20 (75%) of the sensors placed in the lateral chest wall
- 9/10 (90%) of the sensors placed in the neck region
- 3/10 (30%) sensors in the lower knee region.

Uninterrupted glucose concentration recordings over a 48-hour period occurred in 17/20 (85%) of the sensors placed in the lateral chest wall and in 7/10 (70%) of the sensors placed in alternate locations. One sensor in the lateral chest wall and 1 sensor in the lower knee region were never successfully calibrated; however, sensors were well tolerated in all 3 locations.

Overall, the results of this study indicated that placement of the CGMS in the dorsal neck region was superior to the other sites tested; however, further investigation is needed.

Hafner M, Lutz, Reusch CE, Zini E. Evaluation of sensor sites for continuous glucose monitoring in cats with diabetes mellitus. *J Fel Med Surg* 15:117, 2013; DOI: 10.1177/1098612X12463925.

COLLECTING BLOOD FROM CARPAL PADS

A study was conducted to investigate the feasibility and validity of using the carpal pad in dogs to collect blood for glucose monitoring. Sixty client-owned dogs were used in the study, including 30 healthy dogs and 30 dogs with diabetes mellitus. The metacarpal pad was cleaned with alcohol and a blood sample was obtained with a 25 × 0.77 mm hypodermic needle; an ear vein nick sample was obtained at the same time. The dogs were minimally restrained during sampling.

Glucose was measured with a glucometer that had previously been validated for use in dogs.

- Glucose values were not significantly different between sampling sites and the dogs tolerated both collected methods.
- Twitching was observed in 10% of the dogs during ear sampling and 6.7% during carpal pad sampling. Growling was observed in 2 dogs from both groups (3.3%).

The results of this study indicate that the carpal pad provides a good alternative sampling site for monitoring of blood glucose in diabetic dogs.

Borin-Crivellenti S, Crivellenti Z, Tinucci-Costa M. The carpal pad as an alternative sampling site for blood glucose testing in dogs. *J Small Anim Pract* 53:684-686, 2012.

FOCUS ON DIABETES MELLITUS

QUALITY OF LIFE: DIABETIC PETS & OWNERS

Evaluating quality of life (QoL) in companion animals is important, especially when the animal is suffering from a chronic condition, such as diabetes mellitus (DM). There is a perceived lack of attention by veterinary clinicians and researchers regarding the psychological and social impact of DM on both the animal and the owner.

The authors of this study designed a diabetic pet- and owner-centered, individualized measure of the impact of DM on QoL of diabetic dogs and their owners (DIA-QoL-pet), and had previously validated its use for a diabetic cat population. This study evaluated 101 insulin-treated diabetic dogs and their owners, and included 29 specific DM-associated QoL questions.

Various methods were used to evaluate the survey, which identified specific areas that most negatively impacted dogs and their owners' QoL, including worries/concern about:

- Medical issues, such as diabetes, potential vision problems due to cataracts, and development of hypoglycemia
- Leaving the dog with friends or family or at a kennel
- The negative impact the care associated with a pet's DM will have on the owner's life
- Cost of care and whether the owner will be able to take care of the pet in the future.

Concerns listed in the free comments section included:

- Lack of support from the veterinary team
- Difficulties involved with the monitoring and stabilization process
- Concurrent diseases affecting the dog.

These issues should be considered for future questionnaires. However, many owners felt they had a special bond with their dogs and that living with a pet with DM was a positive experience.

Niessen SJM, Powney S, Guitian J, et al. Evaluation of a quality-of-life tool for dogs with diabetes mellitus. *J Vet Intern Med* 26:953-961, 2012.

CONCURRENT DIABETES MELLITUS & HYPOTHYROIDISM

Dogs are frequently diagnosed with concurrent diabetes mellitus and hypothyroidism. Hypothyroidism has been associated with poor glycemic control in diabetic dogs, but it has been suggested that it is not a common cause of insulin resistance. A study was conducted to:

- Evaluate whether hypothyroidism caused insulin resistance
- Determine the overall effect of hypothyroidism on glucose tolerance in dogs
- Characterize the secretion profiles of hormones that are counter-regulatory to insulin.

Sixteen anestrous mixed-breed bitches were used in the study. Hypothyroidism was chemically induced in 8 of the dogs, with the remaining dogs acting as euthyroid controls.

- An *insulin-modified, frequently sampled IV glucose tolerance test (FSIGT)* and *minimal model analysis* determined basal plasma insulin and glucose concentrations, insulin sensitivity, glucose effectiveness, and disposition index
- *Stimulation and suppression tests* assessed growth hormone response
- *Dual energy x-ray absorptiometry* evaluated body composition
- *Basal serum growth hormone (GH) and insulin-like growth factor-1 (IGF-1) concentrations* and *urine cortisol-to-creatinine concentration ratios* were also measured.

This study suggested that dogs with hypothyroidism had substantial insulin resistance. Hypothyroid dogs were able to maintain glucose tolerance by a compensatory increase in insulin secretion. They also had an increase in abdominal fat and high serum GH and IGF-1 concentrations, which may have affected insulin sensitivity. In dogs with impaired insulin secretion, such as those with diabetes mellitus, concurrent hypothyroidism can have important clinical implications.

Hofer-Inteeworn N, Panciera DL, Monroe WE, et al. Effect of hypothyroidism on insulin sensitivity and glucose tolerance in dogs. *Am J Vet Res* 73:529-538, 2012.