

Blood Glucose Monitoring in Ferrets

A blood glucose (BG) concentration of <70 mg/dL is suggestive of insulinoma, which represents ~25% of all neoplasms in ferrets. Signs of hypoglycemia in ferrets include stargazing posture, hindlimb weakness, ataxia, lethargy, and ptalism secondary to nausea. Unlike in other species, seizures are uncommon. Because hypoglycemia signs are nonspecific, measurement of BG concentrations is necessary for diagnosis.

The agreement of BG measurements were compared among 4 portable BG meters (PBGMs): 2 human and 2 separate meters of the same veterinary model (1 coded for dogs, 1 for cats). Whole blood samples were collected from 52 ferrets. Nine had a previous diagnosis of insulinoma and were undergoing treatment. One drop of blood was placed on each PBGM; plasma was obtained from the remainder of the sample and processed by laboratory analyzer. Plasma BG concentrations ranged from 41–160 mg/dL. The PBGM coded to test a canine blood sample had the greatest agreement with the laboratory analyzer. All other PBGM underestimated BG concentrations. *Supported in part by Antech Diagnostics, Gulf Coast Veterinary Specialists, and Abbott Laboratories.*

■ Commentary

PBGMs should be used cautiously in ferret medicine. Although PBGMs remain useful for emergency situations, glucose measurement must be confirmed on a validated machine. Treatment should be initiated in symptomatic patients if PBGM suggests hypoglycemia, while cautioning clients that other diagnostics may be recommended if confirmatory tests suggest euglycemia. To prevent misdiagnosis, asymptomatic patients should only be tested with validated analyzers. PBGMs may help monitor response to therapy if the same unit is used serially for a patient. —Sarah Churgin, DVM

■ ■ Source

Evaluation of portable blood glucose meters for measurement of blood glucose concentration in ferrets (*Mustela putorius furo*). Petritz OA, Antinoff N, Chen S, et al. *JAVMA* 242:350-354, 2013.

RESEARCH NOTE: ELISA Test for Measuring Insulin

Feline insulin levels are not reliably measurable. Prior methods for measuring levels were assays developed for measuring human insulin. Feline insulin differs from human insulin by 4 amino acids; therefore, an assay that can distinguish between human and feline insulin may be useful. Insulin was measured in 36 healthy, fasted cats and in 22 diabetic cats to investigate the ability of a commercially available ELISA to measure feline insulin and evaluate its stability. The authors were able to support the use of the feline insulin ELISA. Serum insulin was relatively unstable after 24 hours at 20°C, but samples kept at 2°C–8°C were stable for 4 days. Recovery after spiking and dilution of samples was deemed acceptable, although insulin concentrations in the study cats varied. Position of the samples on the microplate significantly affected results and should be assessed in future ELISA validation studies.

■ ■ Source

Validation of an enzyme-linked immunosorbent assay for measurement of feline serum insulin. Strage EM, Holst BS, Nilsson G, et al. *VET CLIN PATHOL* 41:518-528, 2012.

NADA 141-236, Approved by FDA

CAUTION

Federal law restricts this drug to use by or on the order of a licensed veterinarian.

INDICATION

vetsulin[®] (porcine insulin zinc suspension) is indicated for the reduction of hyperglycemia and hyperglycemia-associated clinical signs in dogs and cats with diabetes mellitus.

CONTRAINDICATIONS

Dogs and cats known to have a systemic allergy to pork or pork products should not be treated with vetsulin[®]. vetsulin[®] is contraindicated during periods of hypoglycemia.

WARNINGS

User Safety: For use in animals only. Keep out of the reach of children. Avoid contact with eyes. In case of contact, immediately flush eyes with copious amounts of water for 15 minutes. Accidental injection may cause clinical hypoglycemia. In case of accidental injection, seek medical attention immediately. Exposure to product may induce a local or systemic allergic reaction in sensitized individuals.

Animal Safety: Owners should be advised to observe for signs of hypoglycemia (see Owner Information Sheet). Use of this product, even at established doses, has been associated with hypoglycemia. An animal with signs of hypoglycemia should be treated immediately. Glucose should be given orally or intravenously as dictated by clinical signs. Insulin should be temporarily withheld and, subsequently, the dosage should be adjusted, if indicated. Any change in insulin should be made cautiously and only under a veterinarian's supervision. Changes in insulin strength, manufacturer, type, species (animal, human) or method of manufacture (rDNA versus animal-source insulin) may result in the need for a change in dosage. Appropriate diagnostic tests should be performed to rule out endocrinopathies in pets that are difficult to regulate (e.g., hyperadrenocorticism in dogs and hyperthyroidism in cats).

PRECAUTIONS

Animals presenting with severe ketoacidosis, anorexia, lethargy, and/or vomiting should be stabilized with short-acting insulin and appropriate supportive therapy until their condition is stabilized. As with all insulin products, careful patient monitoring for hypoglycemia and hyperglycemia are essential to attain and maintain adequate glycemic control and prevent associated complications. Overdosage can result in profound hypoglycemia and death. Progestogens, certain endocrinopathies, and glucocorticoids can have an antagonistic effect on insulin activity. Intact bitches should be ovariohysterectomized. Progestogen and glucocorticoid use should be avoided.

Drug Interactions:

In the US clinical effectiveness studies, dogs and cats received various medications while being treated with vetsulin[®] including antimicrobials, antivirals, antifungals, antihistamines, analgesics, anesthetics/tranquilizers, diuretics, bronchodilators, corticosteroids (cats), NSAIDs, thyroid hormone supplementation, hyperthyroid medication (methimazole), internal and external parasiticides, anti-emetics, dermatological topical treatments and oral supplements, ophthalmic preparations containing antimicrobials and antiinflammatories, and various vaccines. No medication interactions were reported. This drug was not studied in dogs receiving corticosteroids.

Reproductive Safety: The safety and effectiveness of vetsulin[®] in breeding, pregnant, and lactating dogs and cats has not been evaluated.

Use in puppies and kittens: The safety and effectiveness of vetsulin[®] in puppies and kittens has not been evaluated.

ADVERSE REACTIONS

Dogs

In the field effectiveness and safety study, 66 dogs were treated with vetsulin[®]. Sixty-two dogs were included in the assessment of safety. Hypoglycemia (defined as blood glucose < 50 mg/dL) with or without associated clinical signs occurred in 35.5% (22/62) of the dogs at various times during the study. Clinical signs of hypoglycemia were generally mild in nature (described as weakness, lethargy, stumbling, falling down, and/or depression). Disorientation and collapse were reported less frequently and occurred in 16.1% (10/62) of the dogs. Two dogs had a seizure and one dog died during the seizure. Although never confirmed, the presumptive diagnosis was hypoglycemia-induced seizures. In the rest of the dogs, hypoglycemia resolved with appropriate therapy and adjustments in insulin dosage. Seven owners recorded the following observations about the injection site on the home monitoring forms: swollen, painful, sore, and a bleb under the skin. The following clinical observations occurred in the field study following treatment with vetsulin[®] and may be directly attributed to the drug or may be secondary to the diabetic state or other underlying conditions in the dogs: hematuria, vomiting, diarrhea, pancreatitis, non-specific hepatopathy/pancreatitis, development of cataracts, and urinary tract infections.

Cats

In a field effectiveness and safety study, safety data was reported for 78 cats receiving vetsulin[®]. Hypoglycemia (defined as blood glucose < 50 mg/dL) was reported in 61 cats (88 total incidences). Fifteen of the occurrences (involving 13 cats) were associated with clinical signs described as lethargy, diarrhea, decreased appetite/anorexia, vomiting, and hypothermia. One cat had seizures following accidental overdosing by the owner and again during the subsequent dose adjustment period. The cat responded to supportive therapy and had no further hypoglycemic episodes. In all cases of hypoglycemia, the clinical signs resolved following symptomatic treatment and/or dose adjustment. Polyneuropathy was reported in 4 cats. Two injection site reactions were reported: one as a mildly thickened subcutaneous tissue reaction and the second as a mild bruising. The following clinical observations occurred in the field study following treatment with vetsulin[®] and may be directly attributed to the drug or may be secondary to the diabetic state or other underlying conditions in the cats: vomiting, lethargy, diarrhea, decreased appetite/anorexia, pancreatitis, dermal events, respiratory disease, urinary tract disorder, renal disease, dehydration, weight loss, polydipsia, polyuria, behavioral change, and ocular discharge/conjunctivitis. In a smaller field effectiveness and safety study, 14 cats were treated with vetsulin[®]. Hypoglycemia was reported in 6 cats (8 total occurrences). Lethargy not associated with hypoglycemia was reported in 4 cats (6 total occurrences).

The following clinical observations occurred in the field study following treatment with vetsulin[®] and may be directly attributed to the drug or may be secondary to the diabetic state or other underlying conditions in the cats: foul odor to stool, diarrhea, dull coat, rapid, shallow breathing, stiff gait in rear, gallop rhythm, and pruritus with alopecia. During the 1998–2007 period, the following adverse events in 50 cats treated with porcine insulin zinc suspension were reported to Intervet International and Intervet Inc: Death, seizures, lack of effectiveness/dysregulation, hypoglycemia, allergic or skin reaction, lethargy, vomiting/diarrhea, injection pain, hyperthermia, nystagmus, PU/PD, and abnormal behavior. To report suspected adverse drug experiences, call Merck at 1-800-224-5318. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS, or <http://www.fda.gov/AnimalVeterinary>

Additional information about vetsulin[®] and diabetes mellitus can be found at www.vetsulin.com

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