Vetsulin® (porcine insulin zinc suspension) is an aqueous suspension containing 40 IU per mL of highly purified porcine insulin consisting of 35 percent amorphous and 65 percent crystalline zinc insulin. As a lente insulin, Vetsulin is classified as an intermediate-acting insulin. In cats, the peak activity following subcutaneous administration of Vetsulin is generally expected to be around 4 hours, but can occur between 1.5 and 8 hours. The duration of activity can vary between 8 and 12 hours. The peak, duration of activity, and dose required to adequately control diabetic signs will vary between cats. In general, cats require twice-daily dosing of Vetsulin.

Vetsulin should not be used in dogs or cats known to have a systemic allergy to pork or pork products. Vetsulin is contraindicated during periods of hypoglycemia. Keep out of reach of children. As with all insulin products, careful patient monitoring for hypoglycemia and hyperglycemia is essential to attain and maintain adequate glycemic control and prevent associated complications. Overdosage can result in profound hypoglycemia and death. The safety and effectiveness of Vetsulin in puppies and kittens, breeding, pregnant, and lactating dogs and cats has not been evaluated. See package insert for full information regarding contraindications, warnings, and precautions.

DIAGNOSING FELINE DIABETES MELLITUS

Diagnosing feline diabetes can be challenging. The diagnosis should be based on the presence of classic clinical signs that have been present for several weeks or months, such as polyuria (PU), polydipsia (PD), and weight loss despite a good appetite, coupled with corroborative laboratory tests showing hyperglycemia (>300 mg/dL) and glycosuria. A characteristic clinical sign of advanced feline diabetes is a plantigrade stance.

In cats, stress can induce transient hyperglycemia that makes it harder to diagnose and manage diabetes. Because stress-induced hyperglycemia can result in blood glucose concentrations of 300 mg/dL to 400 mg/dL, it can confound the interpretation of blood glucose results. Persistent hyperglycemia and glycosuria should therefore be present to definitively establish the diagnosis of diabetes. It is also useful to measure serum fructosamine concentrations, since levels of fructosamine are normal in stress-induced hyperglycemia and elevated in sustained hyperglycemia.
During consultation:

- Perform a thorough physical examination and weigh the patient.
- Conduct laboratory testing including complete blood count, urinalysis (including sediment examination), and serum biochemistry profile (including T₄).
- Rule out hyperthyroidism, renal failure, inflammatory bowel disease, pancreatitis, exocrine pancreatic insufficiency, hyperadrenocorticism, growth hormone excess or acromegaly, neoplasia, and hepatic disease.
- Photograph the cat (head and entire body): optional, but often the only way to diagnose subsequent acromegaly.

When health status is known and diabetes mellitus confirmed:

- Explain thoroughly to the cat owner what diabetes mellitus is, that achieving optimal regulation may take time (up to 2 months), and what the implications are for the family. Make sure the cat owner understands the treatment involved, and that the cat should be able to live a happy, healthy life with consistent treatment. This is crucial, as complete cooperation of the cat owner is essential to treatment success.
- Treat existing infections or other medical conditions. Many diseases will affect insulin metabolism.
- Introduce appropriate diet.
- Begin treatment with Vetsulin® (porcine insulin zinc suspension).

STARTING VETSULIN

Vetsulin therapy is ideally prescribed for newly diagnosed diabetic cats or in cases where a change in insulin is indicated. Caution should be exercised when changing from one insulin product to another.

In clinic:

- Weigh the cat to obtain a benchmark for future weight gain or loss.
- Start the cat on an injection of Vetsulin 1 to 2 IU twice daily, at approximately 12-hour intervals. The injection should be given concurrently with or right after meals for cats fed twice daily (no change in feeding schedule is required for cats fed ad libitum).
- Keep the cat hospitalized for the day to verify that the starting dosage does not cause hypoglycemia
- Instruct the cat owner about:
  - Injection technique
  - Parameters to monitor at home
  - How to identify and treat hypoglycemia
  - Preferred diet
- Discharge the cat to the owner’s care for 2–4 weeks. This allows the patient and its owner to get used to injections.

At home, have the cat owner:

- Monitor and record water and food consumption.
- Monitor and record urine glucose and/or ketone bodies.
- Maintain starting dose and frequency of administration for 2–4 weeks (unless there’s evidence of hypoglycemia).
- Return for evaluation 2–4 weeks after starting Vetsulin.

Evaluating glucose accumulation in urine is a useful diagnostic tool in making a definitive diagnosis of diabetes in cats. Since it takes several hours of stress for detectable glucose to accumulate in the urine, glycosuria will not be present in cats with stress-induced hyperglycemia. In addition to the absence of glycosuria, none of the typical clinical signs of diabetes are present in cats with stress-induced hyperglycemia.
At the return visit:

[*] Reweigh the cat.
[*] Obtain the owner’s overall impression of the cat’s progress, especially with regard to PU and PD.
[*] Ideally, perform a serial blood glucose curve, with samples taken every 2 hours for the course of the day, to determine if regulation has been achieved, keeping in mind that cats often present with stress-induced hyperglycemia.
[*] Ideally, the blood glucose values will range between 120 and 300 mg/dL in a well-regulated diabetic cat. The dose will most likely need to be adjusted until adequate regulation is achieved.
[*] Adjust dose in increments of 1 IU per injection (twice daily), if necessary, based on the glucose curve evaluation.
[*] Allow at least 2–4 weeks between dose changes (unless there’s evidence of hypoglycemia).
[*] Monitor fructosamine prior to and 2–3 weeks after dose changes in stressed cats.
[*] Once regulated on Vetsulin, cats should be rechecked every 2–4 months. It’s important to keep in mind that cats, unlike dogs, can go into remission.

**VETSULIN: HANDLE WITH CARE**

Vetsulin, like many other insulin preparations, is a suspension. The active ingredients in Vetsulin are present in the precipitate and in the clear supernatant. Shake the vial thoroughly until a homogeneous, uniformly milky suspension is obtained. Foam on the surface of the suspension formed during shaking should be allowed to disperse before the product is used. If required, the product should be gently mixed to maintain a homogeneous, uniformly milky suspension before use. Clumps or white particles can form in insulin suspensions: do not use the product if visible clumps or white particles persist after shaking thoroughly.

Vetsulin vials should be stored upright in the refrigerator to avoid crystallization around the stopper. Once the vial is opened, use contents within 42 days of first vial puncture and maintain a temperature of 25°C (77°F) or cooler.

In addition, cat owners should be advised not to reuse insulin syringes. One of the main concerns is the potential for bacterial contamination and secondary infection. Also, the silicon coating inside the syringe may contaminate the insulin vial with silicon, resulting in a white precipitate forming in the vial, which may interfere with the biological activity of the insulin.

**VETSULIN: 40 IU/mL CONCENTRATION**

Vetsulin is presented in a 10 mL glass vial at a concentration of 40 IU per mL of suspension, which facilitates more accurate dosing, especially of small pets like cats, and eliminates the need for diluting a higher-concentration human insulin. To avoid dosing errors when administering Vetsulin to cats, it is important to use a U-40 syringe.

**USE OF A SYRINGE OTHER THAN A U-40 SYRINGE WILL RESULT IN INCORRECT DOSING.**

As this potential situation can be fatal, it is strongly advised that veterinarians educate cat owners on the need for and importance of using U-40 syringes with Vetsulin.

**Technical Services:** 1-800-224-5318. If you have a product issue, please be prepared to share the lot number and expiration date of the Vetsulin bottle in use.
In the field effectiveness and safety study, 66 dogs were treated with vetsulin®. Sixty-two dogs were included in the assessment of ADVERSE REACTIONS.

The safety and effectiveness of vetsulin® in puppies and kittens has not been evaluated.

Owners should be advised to observe for signs of hypoglycemia (see Owner Information Sheet). Use of this medication should be stopped immediately and, if necessary, the animal should be given glucose orally or intravenously as dictated by clinical signs. In cases of acute hypoglycemia, the animal should be given 100 mg/kg glucose as a 50% solution and, subsequently, the dosage should be adjusted, if indicated. Any change in insulin should be made cautiously and, when possible, the rate of change should be reduced by 25%.

When the animal is eating, the insulin should be administered during or shortly after feeding.

The blood glucose curve means decreased from 354 mg/dL on Day 0 to 162 mg/dL on Day 60. The mean blood glucose nadir decreased from 321 mg/dL on Day 0 to 99 mg/dL on Day 60. The blood glucose curve means decreased from 370 mg/dL, pre-treatment to 151 mg/dL, 185 mg/dL, and 184 mg/dL at the three treatment periods.

The blood glucose mean was reduced from 370 mg/dL, pre-treatment to 151 mg/dL, 185 mg/dL, and 184 mg/dL at the three treatment periods. The blood glucose mean nadir was reduced from 315 mg/dL, pre-treatment to 93 mg/dL, 120 mg/dL, and 119 mg/dL at the three treatment periods.

The cats were started on vetsulin® at a dose of 0.5 IU/kg plus a body-weight dependent dose supplement once daily. The initial treatment time to reach acceptable glycemic control (Dose determination period) ranged from 5 to 151 days. Dogs were evaluated for 60 days, cats for three times 30 and 60 days. The peaks of activity, duration of activity, and dose required to adequately control diabetic signs vary between individuals and may vary in the same individual from day to day. The time ranges should only be considered as initial guidelines.

EFFECTIVENESS

A total of 66 client-owned dogs were enrolled in and 53 completed the effectiveness and safety field study. The dogs completing the study included 22 breeds of purbred and various mixed-breed dogs ranging in age from 4.8 to 14.9 years, and ranging in weight from 4.2 to 51.3 kg.

In cats, vetsulin® has a single peak of activity. In a laboratory study, 12 healthy adult cats were administered vetsulin® at a dose of 0.5 IU/kg. The peak activity occurred at 0.5 to 1.5 hours and the duration of activity was 8 to 12 hours.

In a laboratory study, 12 healthy adult Beagles were administered vetsulin® at a dose of 0.5 IU/kg. The onset of activity varied from 0.5 to 2 hours; the time to peak activity varied from 1 to 10 hours; and the duration of activity was 8 to 12 hours. In diabetic dogs, the cats were started on activity following subcutaneous administration (the first occurred at 2 to 6 hours and the second at 8 to 14 hours). The duration of activity varies between 14 and 24 hours. In cats, vetsulin® is contraindicated during periods of hypoglycemia. In cats, vetsulin® is supplied as a sterile injectable suspension in multidose vials containing 10 mL of 40 IU/mL porcine insulin zinc suspension.