

# Management of Diabetes Mellitus in Dogs and Cats





## With you for life... Convenient management of diabetes with Caninsulin®

The goals in managing Diabetes mellitus in dogs and cats are to reduce or eliminate the clinical signs of diabetes and minimize the risk of hypoglycemia. Remission is a goal that can be achieved in some diabetic cats. Dog and cat owners need to understand diabetes management to be able to accomplish these goals.

### Highly purified porcine insulin

Caninsulin is an aqueous suspension of 40 IU/mL of highly purified porcine insulin, consisting of 35% amorphous and 65% crystalline zinc insulin.

Porcine insulin has the same amino acid sequence as canine insulin, making it the first choice for dogs<sup>1,2</sup> and less likely for dogs to develop anti-insulin antibodies.<sup>3</sup>

Porcine insulin is 3 amino acids different from feline insulin and as such has the closest sequence to feline insulin.<sup>4</sup>

The efficacy and safety of Caninsulin has been proven in clinical trials in dogs<sup>5,6</sup> and cats<sup>7,8,9</sup>. Caninsulin also offers you the added security and confidence that come from over 25 years of successful use by veterinarians worldwide.

**Choose Caninsulin first to take advantage** of proven efficacy, reassuring safety, accurate delivery and global expertise and support

An effective choice for both dogs and cats	Caninsulin®	Recombinant Human Insulin
1 <sup>st</sup> veterinary approved insulin for dogs and cats > Security and confidence built on experience and successful use	✓	✗
Identical to canine insulin > 1 <sup>st</sup> choice for dogs – rapid onset and sustained action alleviates clinical signs with low risk of anti-insulin antibodies	✓	✗
Closest match to feline insulin > Good choice for cats – alleviates clinical signs by delivering blood glucose targets with remission possible	✓	✗
Comprehensive and cost effective diabetes care* > Choices to optimize diabetes management and improve compliance	✓	✗
Live support from experienced veterinary professionals > Partnering with you to help improve pet diabetes care around the world	✓	✗

\* Including choice of presentations and U40 insulin syringe or insulin pen as well as a free app - **Pet Diabetes Tracker**.

**Over 25 years**  
of helping vets effectively and safely manage diabetes

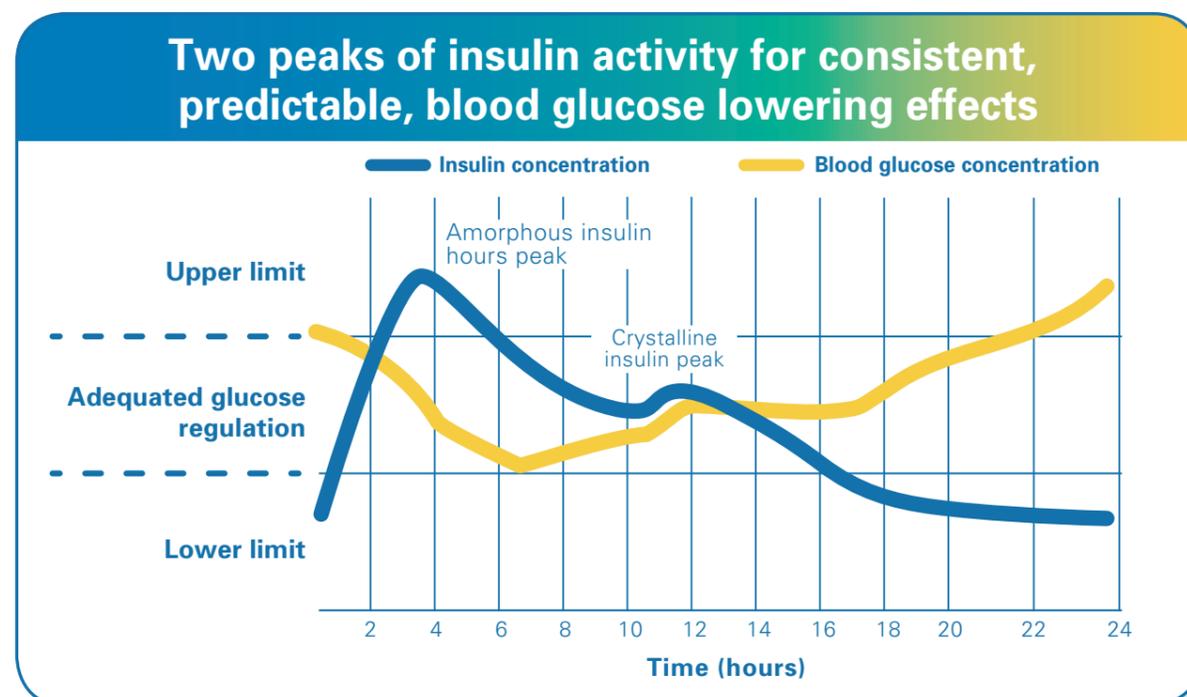
Caninsulin (known as Vetsulin in the USA)  
is available in more than 45 countries

1. Behrend E et al. J Am Anim Hosp Assoc. 2018; 54:1–21. 2. Ackerman N et al. Companion Animal. 2018;23:143-151. 3. Davison LJ et al. J Vet Intern Med 2008;22:1317–1325. 4. Hallden G et al. Archives Biochem Biophys. 1986;247:20-27. 5. Graham PA et al. J Small Anim Pract. 1997;38:434-438. 6. Monroe WE et al. J Vet Intern Med. 2005;19:675-682. 7. Martin GJ, Rand JS. J Feline Med Surg. 2001;3:23–30. 8. Michiels L et al. J Feline Med Surg. 2008;10:439-451. 9. Martin GJ, Rand JS. Vet Rec. 2007;161:88-94.

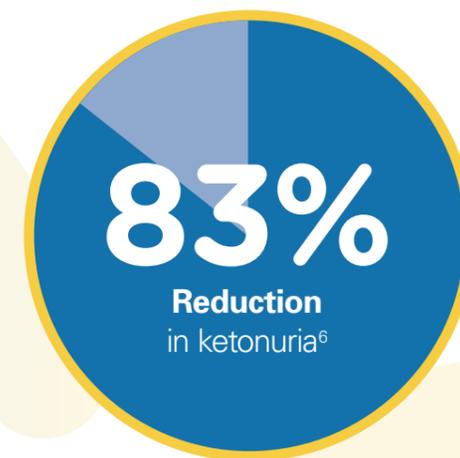
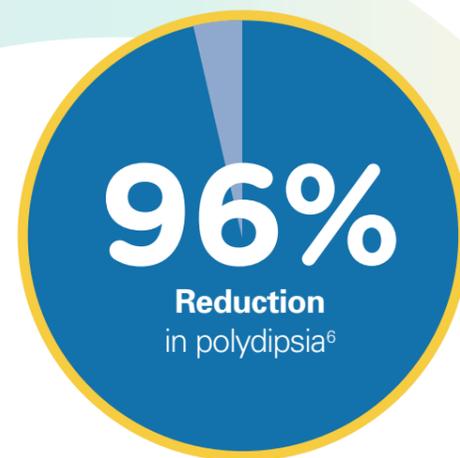
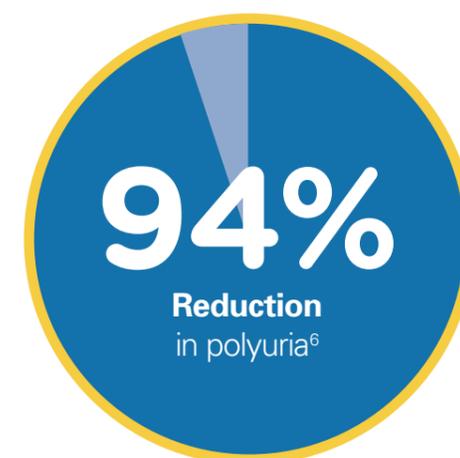
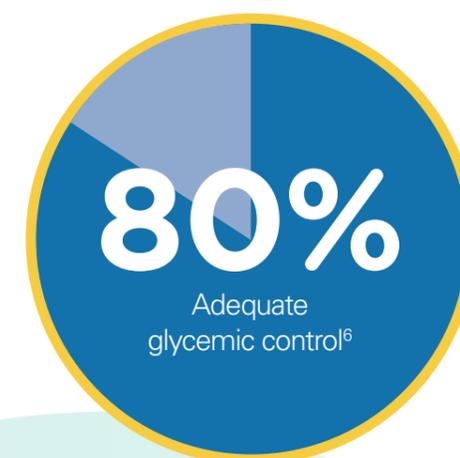
## Benefits of Once or Twice Daily Caninsulin in Dogs

- **Rapid onset of effect** - Amorphous insulin is absorbed rapidly, with activity peaking around 4 hours post-injection<sup>5</sup>
- **Sustained effect** - Crystalline insulin is slowly absorbed, with activity peaking around 11 hours post-injection<sup>5</sup>
- **Duration of effect** - 14 to 24 hours<sup>6,11,12</sup>, long enough for once daily administration in some cases

At least one-third of dogs adequately regulated using once-daily dosing<sup>5,6,10-13</sup>



## Effectively reduces blood glucose and clinical signs of diabetes.<sup>6</sup>



5. Graham PA et al. J Small Anim Pract. 1997;38:434-438. 6. Monroe WE et al. J Vet Intern Med. 2005;19:675-682. 10. Horn B, Mitten RW. Aust Vet J. 2000;78:831-834. 11. Davison LJ et al. Vet Rec. 2005;156:467-471. 12. Fleeman LM, Rand JS, Morton JM. Vet Rec. 2009;164:232-237. 13. Fracassi F et al. Vet Rec. 2018;183:262.

## Benefits of Twice Daily Caninsulin in Cats

- **Rapid onset and sustained effects** - Insulin activity generally peaks between 1.5 and 8 hours post-injection<sup>10,11</sup>
- **Duration of effect** - Effective when administered twice daily<sup>7-9,15</sup>
- **Reassuring safety** - Helps to minimize the risk of hypoglycemia<sup>7-9</sup> compared to twice-daily insulins

Caninsulin provides good to excellent control in the majority of cats<sup>8,9</sup>

### Cats treated with insulin can achieve remission<sup>8,9,14-16</sup>

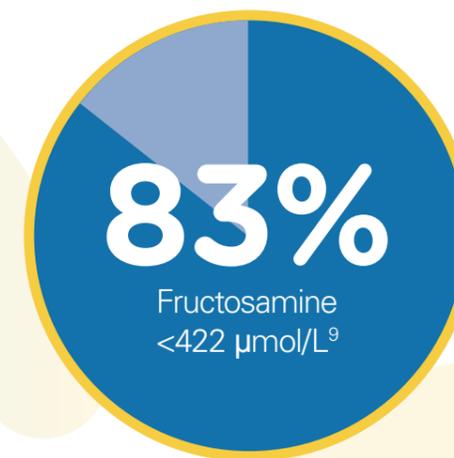
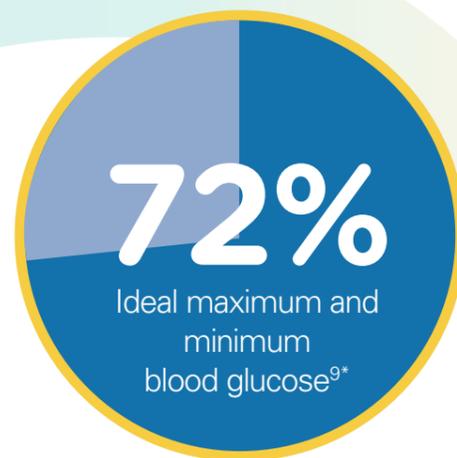
No single factor predicts which cats can achieve remission<sup>14</sup>

Controlled diet and weight loss are very important<sup>14-16</sup>

Remission independent from type of insulin; no large scale, randomized and controlled studies<sup>14,15</sup>

Remission rates of up to 56% have been reported for Caninsulin (without dietary control)<sup>8,9,15</sup>

## Effectively reduces blood glucose and reduces clinical signs of diabetes in cats<sup>7-9</sup>



\* Target minimum (nadir) blood glucose 6.3 mmol/L (113 mg/dL) and maximum blood glucose 20.1 mmol/L (360 mg/dL)

7. Martin GJ, Rand JS. J Feline Med Surg. 2001;3:23-30. 8. Michiels L et al. J Feline Med Surg. 2008;10:439-451. 9. Martin GJ, Rand JS. Vet Rec. 2007;161:88-94. 10. Horn B, Mitten RW. Aust Vet J. 2000;78:831-834. 11. Davison LJ et al. Vet Rec. 2005;156:467-471. 14. Gostelow R et al. Vet J. 2014;202:208-221. 15. Zini E et al. J Vet Intern Med. 2010;24:1314-1321. 16. Sparkes AH et al. ISFM consensus guidelines on the practical management of diabetes mellitus in cats. 2015;17:235-250.

## With you for life... Convenient diabetes management

### Presentations and Storage\*

- 40 IU/mL concentration for more accurate dosing in dogs and cats requiring low doses (<8 IU per injection)
- Caninsulin offers a variety of presentations:
  - 2.5 mL vials
  - 10 mL vials
  - 2.7 mL cartridges
- Store upright and refrigerated, do not freeze

### Dosing\*

- Before first use, vials should be shaken thoroughly until a homogeneous, uniformly milky suspension is obtained
- Before each use, invert the vial or cartridge a few times
- Administer with specific U-40 sterile single-use 0.5 or 1.0 mL insulin syringe (vial) or with 0.5 or 1.0 unit increment VetPen® (cartridge)
- Starting with:
  - 0.5 to 1 IU insulin/kg body weight per dog, once daily
  - 1 to 2 IU per cat per injection, twice daily

### Resources

- Consultation services with an experienced pet diabetes professional
- Free Pet Diabetes Tracker app available for pet owner to monitor and share reports with veterinary team
- Multitude of support material available on [www.caninsulin.com](http://www.caninsulin.com)

\* See package insert for full information.

# WITH YOU FOR LIFE

The first veterinary approved insulin for dogs and cats



## NAME OF THE VETERINARY MEDICINAL PRODUCT

Caninsulin 40 IU/ml Suspension for Injection

## QUALITATIVE AND QUANTITATIVE COMPOSITION

Each ml contains:

Active substance:

Insulin 40 IU

## PHARMACEUTICAL FORM

A white to almost white suspension for injection.

## CLINICAL PARTICULARS

### Target Species

Dogs and cats

Indications for use, specifying the target species

Caninsulin is indicated in cases of diabetes mellitus (insulin deficiency) in dogs and cats, where the required blood glucose levels are achieved by using an individually adjusted dose of Caninsulin.

### Contraindications

Caninsulin is not intended for the treatment of animals with severe acute diabetes presenting in a ketoacidotic state. Caninsulin must not be administered by the intravenous route.

### Special warnings

None.

### Special precautions for use

#### Special precautions for use in animals

It is important to establish a strict feeding schedule in consultation with the owner which will include a minimum of fluctuations and changes. Clinical signs of hunger, increased anxiety, unstable locomotion, muscle twitching, stumbling or sinking in the rear legs and disorientation in the animal indicate hypoglycaemia and require immediate administration of glucose solution or food to restore blood glucose concentrations to normal.

The product must be administered with specific U-40 sterile single-use syringes (vial).

Special precautions to be taken by the person administering the veterinary medicinal product to animals. Accidental self-injection can provoke clinical signs of hypoglycaemia, which should be treated by oral administration of glucose.

In case of accidental self-injection seek medical advice immediately and show the package insert or label to the physician

### Adverse reactions (frequency and seriousness)

Very rare cases of local adverse reactions associated with administration of porcine insulin have been reported in dogs and cats. These reactions are usually mild and reversible. In extreme rare cases, allergic reactions to porcine insulin have been reported.

### Use during pregnancy, lactation or lay

The use of Caninsulin is not contra-indicated during pregnancy or lactation but requires close veterinary supervision to account for changes in metabolic requirements during this period.

### Interaction with other medicinal products and other forms of interactions

Changes in insulin requirements may result from administration of substances which alter glucose tolerance such as corticosteroids and progestagens. Monitoring of glucose levels should be used to adjust dose accordingly. Similarly, changes in diet or exercise routines may alter insulin requirements.

### Amounts to be administered and administration route

Caninsulin should be administered once or twice daily, as appropriate, by subcutaneous injection. 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 and, if required, the product should be gently mixed to maintain a homogeneous, uniformly milky suspension before use. Agglomerates can form in insulin suspensions. Do not use the product if visible agglomerates persist after shaking thoroughly.

When using vials:

A 40 IU/ml insulin syringe should be used.

When using product in cartridges:

The cartridge is designed to be used with VetPen. VetPen is accompanied by package leaflet with detailed instruction for use to be followed.

### Stabilisation phase

Dog: Insulin therapy is initiated with the starting dose of 0.5 IU/kg bodyweight once daily, rounded down to the lowest entire number of units. Some examples are given in the following table.

Dog body weight Starting dose per dog

5kg	2IU once daily
10kg	5IU once daily
15kg	7IU once daily
20kg	10IU once daily

Subsequent adjustment to establish the maintenance dose should be made by increasing or decreasing the daily dose by approximately 10% according to the evolution of the diabetes clinical signs and to the results of serial blood glucose measurement. Alterations in dose should not normally be made more frequently than every 3 to 7 days. In some dogs, the duration of insulin action may require treatment to be administered twice daily. In such cases, the dose per injection must be decreased by 25% so that the total daily dose is less than doubled.

For example, for a 10 kg dog receiving 5 IU once daily, the new dose (rounded down to the nearest whole unit) would be 3 IU per injection initially. The two daily doses should be administered at 12h intervals. Further dose adjustments should be made progressively as previously explained.

To achieve a balance between the generation of glucose and the effect of the product, feeding should be synchronized with the treatment and the daily ration divided into two meals. The composition and quantity of the daily food intake should be constant. In dogs treated once daily, the second meal is usually fed at the time of peak insulin effect.

In dogs treated twice daily, feeding coincides with Caninsulin administration. Each meal should be fed at the same time each day.

Cat: The initial dose is 1 IU or 2 IU/kg per injection based on the baseline blood glucose concentration, as presented in the following table.

### Cats require twice daily administration.

Cat blood glucose concentration Starting dose per cat

<20 mmol/l or <3.6 g/l (<360 mg/dl) 1 IU twice daily

≥20 mmol/l or ≥ 3.6 g/l (≥360 mg/dl) 2 IU twice daily

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The composition and quantity of the daily food intake should be constant.

Subsequent adjustment to establish the maintenance dose should be made by increasing or decreasing the daily dose according to the results of serial blood glucose measurement. Alterations in dose should not normally be made more frequently than every week. Increments of 1 IU per injection are recommended. Ideally, no more than 2 IU should be administered per injection in the first three weeks of treatment. Due to the day-to-day variation in the blood glucose response, and the variations in insulin responsiveness that are seen with time, larger or more frequent increases in dose are not recommended.

### Maintenance phase in dogs and cats

Once the maintenance dose has been reached and the animal is stabilised, a long-term management programme needs to be established. The aim should be to manage the animal in such a way as to minimise the variations in its insulin requirement. This includes clinical monitoring to detect under or overdosage of insulin and adjustment of dose if required. Careful stabilisation and monitoring will help to limit the chronic problems associated with diabetes, including cataracts (dogs), fatty liver (dogs and cats), etc.

Follow up examinations should be performed every 2-4 months (or more often if there are problems) to monitor the animal's health, the owner's records, urine glucose and biochemical parameters (like blood glucose and/or fructosamine concentration). Adjustments to the insulin dose should be made based on interpretation of the clinical signs supported by the laboratory results.

### Overdose

Overdose of insulin results in clinical signs of hypoglycaemia. Owners and veterinarians should be aware of the Somogyi over-swing which is a physiological response to hypoglycaemia. As a partial hypoglycaemia begins to develop a hormonal response is triggered which results in the release of glucose from hepatic glycogen stores. This results in rebound hyperglycaemia, which may also manifest as glucosuria for part of the 24-hour cycle. There is a danger that the Somogyi over-swing will be interpreted as a requirement for an increase in the insulin dose rather than a decrease. This situation can progress to an overdose so large as to cause clinical hypoglycaemic effects.

### Pharmacodynamic properties

Insulin facilitates the uptake of glucose by cells and activates intracellular enzymes involved in the use and storage of glucose, amino acids and fatty acids. Insulin also inhibits catabolic processes such as proteolysis, gluconeogenesis and lipolysis. Diabetes mellitus is characterised by an absolute or relative insulin deficiency leading to persistent hyperglycaemia, and monitoring blood glucose concentration enables assessment of the overall effect of the administered insulin. In diabetic dogs, the action of Caninsulin on blood glucose concentrations, following subcutaneous administration, peaks at about 6-8 hours post-injection and lasts for about 14 to 24 hours. In diabetic cats, the action of Caninsulin on blood glucose concentrations after subcutaneous administration peaks at about 4-6 hours and last for about 8 to 12 hours post-injection.

### Pharmacokinetic particulars

Caninsulin is an insulin of intermediate duration of action that contains both amorphous and crystalline insulin in a 3.5:6.5 ratio. In diabetic dogs, the peak plasma concentration of insulin occurs at about 2-6 hours after subcutaneous injection, and insulin remains above pre-injection level for about 14 to 24 hours. In diabetic cats, the peak plasma concentration of insulin occurs at about 1.5 hours after subcutaneous injection and insulin remains above pre-injection level for about 5 to 12 hours.

### Incompatibilities

None Known.

### Shelf-life

Shelf life: 2 years. Vials: following withdrawal of the first dose, use the product within 42 days. Cartridges: following withdrawal of the first dose, use the product within 28 days.

### Special precautions for storage

Store upright and refrigerated between +2 C and +8 C.

Do not freeze

Protect from light.

After first opening, store below 25°C and away from direct heat or direct light.

### Special precautions for the disposal of unused veterinary medicinal products or waste materials derived from the use of such products

Any unused product or waste material should be disposed of in accordance with national requirements.

Distributed by: Intervet International BV, PO Box 31, 5830AA Boxtmeer, The Netherlands.

## The FIRST veterinary insulin approved for BOTH dogs and cats

- Global leader in veterinary diabetes care
- Tried and trusted in the field
- The first choice insulin for dogs<sup>1,2</sup> suitable for once or twice daily administration
- A good choice for cats with comparable remission rates to other commonly used twice-daily insulins<sup>14,15</sup>
- Flexible options for easy dosing to suit all sizes
- Experience and professional support from the global market leader

### Take advantage of useful resources for your clinic and pet owners:

- [www.caninsulin.com](http://www.caninsulin.com) for your clinic
- [www.pet-diabetes.com](http://www.pet-diabetes.com) for pet owners
- Training Videos and Materials
- Glucose Curve Worksheets
- Pet Diabetes Tracker App
- Sugar & Spike resources



**For general information and pet diabetes management tools, please visit [www.caninsulin.com](http://www.caninsulin.com) or ask your MSD Animal Health Representative today**