CANINSULIN®

Guidelines for the successful management of the diabetic dog and cat.

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Contents

Goals for Successful CANINSULIN® Therapy

The establishment of a therapeutic regimen at home is the first goal of managing the diabetic patient. Maintenance insulin requirements are greatly affected by diet, activity level, and stress. The sooner the patient and owner become settled into a home therapeutic regimen that minimises stress and where diet and activity level become consistent, the easier the case will be to manage.

The most important goal of managing a diabetic patient is to resolve the clinical signs that are associated with the disease (i.e. polyuria, polydipsia, weight loss, lethargy and polyphagia or inappetence) without causing clinical hypoglycaemia. Perfect glycaemic control cannot be achieved in diabetic pets with intermittent exogenous insulin injections. Aiming for normoglycaemia simply increases the risk of hypoglycaemia. Resolution of the clinical signs will restore normal quality of life to both the patient and its owner. Well controlled diabetic pets are active and alert, maintain optimal body condition, are not polyuric or polydipsic, and have no ketonuria.

The next goal of therapy is to prevent possible long-term diabetic complications, such as hypoglycaemia, blindness, or peripheral neuropathies.

The final goal of therapy is for our patients to enter remission where possible. This may be achieved in 30% or more of 'type 2' diabetic cats with good glycaemic control. It is also possible in a few cases of secondary diabetes mellitus in dogs where the primary disease causing insulin-antagonism is treated or ovariohysterectomy of entire bitches where the diabetes is associated with dioestrus or pregnancy.

Goals of Therapy

Establish a Treatment Regimen

Eliminate Clinical Signs

Minimise Risk of Insulin-Induced Hypoglycaemia

Restore Normal Quality of Life

Prevent Long-Term Disease Complications

Induce Remission Where Possible

Starting Insulin Therapy in the 'Healthy' Diabetic Patient

The 'healthy', uncomplicated diabetic patient is defined as an animal that has early clinical signs of insulin deficiency manifested as polyuria, polydipsia, polyphagia, weight loss, and lethargy, but is otherwise normal. In other words, this is the diabetic who is still compensating for the disease without concurrent electrolyte imbalances, ketoacidosis, renal failure, or gastrointestinal compromise. These patients generally require little or no supportive care and once started on their CANINSULIN® therapy are able to be managed as outpatients.

Dogs

- The healthy 'uncomplicated' diabetic dog is usually started on CANINSULIN® at 0.5 unit per kilogram bodyweight injected subcutaneously twice-daily. All diabetic dogs can be treated with twice-daily administration of CANINSULIN®. In some dogs, it is possible to achieve acceptable diabetic control with once-daily administration.
- Early trial work showed that approximately 60% of diabetic dogs could be stabilised on once-daily CANINSULIN® therapy with a starting dose of 1.0 unit per kilogram bodyweight. However, experience has shown that for intermediate-acting insulin like (CANINSULIN®), 0.5 units per kilogram bodyweight may be a safer starting dose and that many dogs ultimately stabilise better on twice-daily injections. Because the dose required with twice-daily therapy is less insulin per injection than those dogs on a single daily injection, there is reduced risk of hypoglycaemia and better glycaemic control over 24 hours by giving less insulin more often.

Cats

- Cats metabolise insulin faster than dogs, therefore most cats require twice-daily CANINSULIN® injections. Managing the feline diabetic patient can often be difficult and frustrating. Stress hyperglycaemia can make it difficult to interpret blood glucose curves and often leads to inappropriate insulin dose adjustments. Stress hyperglycaemia results from both psychological stress and illness.
- In a substantial proportion of cats, diabetic remission is possible if good glycaemic control can be achieved. Remission occurs most commonly after 1-3 months of insulin therapy and can last months or years.

Insulin Therapy in 'Healthy' Diabetic Patients

Action and Duration of Exogenous Insulin is Unique to Each Patient

Glucose Curves and Owner Records are Essential for Establishing Appropriate Dose and Frequency of Administration

Dogs Often Stabilise Better on Twice-Daily Treatment

Cats Require Twice-Daily Insulin Administration

With Good Glycaemic Control some Cats will go into Remission

Once-Daily CANINSULIN® Regimen (Dogs)

The initial dose for dogs starting CANINSULIN® on once-daily administration is 1 unit per kilogram bodyweight (rounded down to the nearest whole unit) plus a supplemental dose based on bodyweight.

Bodyweight	Dose Supplement	Examples	
		Weight	Total Initial Dose
< 10 kg	1 Unit	6 kg	6 + 1 = 7 units
Approx 10 kg	2 Units	10 kg	10 + 2 = 12 units
12 – 20 kg	3 Units	16 kg	16 + 3 = 19 units
> 20 kg	4 Units	25 kg	25 + 4 = 29 units

Protocol

- After diagnosis, admit the dog to the hospital to begin CANINSULIN® therapy.
- Take a new bottle of CANINSULIN® and start with 1.0 unit/kg plus a supplemental dose of CANINSULIN® once daily.
- Feed one-third to one-half of their daily ration just prior to the insulin injection and the remainder approximately 6-10 hours later.
- On Day 1, take blood glucose measurements every 2 hours. The aim is simply to establish that the initial dose of insulin is lowering the blood glucose without causing hypoglycaemia, or dropping the blood glucose level too quickly. We are not looking for perfect control at this time.
- The dog is ready to go home on this dose if the initial response is satisfactory. Ideally the blood glucose levels should not drop < 8 mmol/L over the entire day and should be > 10 mmol/L before the next dose of CANINSULIN® is due.
- If there is a poor (or excessive) response to the insulin therapy: Refer pg 11 'Trouble-Shooting Problem Diabetic Patients'.
- The insulin dose rate at home should remain the same as at discharge until a further blood glucose curve is performed, unless hypoglycaemia and/or diabetic remission are suspected.
- Schedule a revisit for 2 weeks time to re-assess clinical signs and to perform a blood glucose curve: Refer pg 6 & 7 'Monitoring Diabetic Control' and 'Serial Blood Glucose Curves & Dose Adjustments'.

Twice-Daily CANINSULIN® Regimen (Dogs & Cats)

All cats and most dogs should be started on CANINSULIN® twice-daily.

The starting dose of insulin is 0.25 – 0.5 units per kilogram, twice-daily, rounded down to the nearest whole unit. For obese cats and dogs, use ideal bodyweight to calculate the initial insulin dose.

Dosing every 12 hours is optimal. It is very important that the diabetic patient is given their insulin injections on time. When an injection cannot be given on time it is best to miss that dose completely. Occasionally missing a single injection does not usually cause clinical problems.

Protocol

- After diagnosis, admit the dog/cat to the hospital to begin CANINSULIN® therapy.
- Measure blood glucose level **before** starting insulin therapy.
  - If the blood glucose level is < 20 mmol/L, start CANINSULIN® at 0.25 units/kg bodyweight twice-daily 12 hours apart.
  - If the blood glucose level is > 20 mmol/L, start CANINSULIN® at 0.5 units/kg bodyweight twice-daily 12 hours apart.

Baseline Blood Glucose	Insulin Dosage Twice-daily
< 20 mmol/L	0.25 U/kg bodyweight
> 20 mmol/L	0.5 U/kg bodyweight

- Feed one half of their daily ration just prior to each insulin injection.
- On Day 1, take blood glucose measurements every 2 hours. The aim is simply to establish that the initial dose of insulin is lowering the blood glucose without causing hypoglycaemia, or dropping the blood glucose level too quickly. We are not looking for perfect control at this time.
- The blood glucose levels should not drop < 8 mmol/L over the entire first day and be > 15 mmol/L (cats) and be >10 mmol/L (dogs) before the next 2 consecutive doses are due. If the initial response is satisfactory then the dog/cat is ready to go home on this dose.
- If there is a poor (or excessive) response to the insulin: Refer pg 11 ‘Trouble-Shooting Problem Diabetics’.
- The insulin dose rate at home should remain the same as at discharge until a further blood glucose curve is performed, unless hypoglycaemia and/or diabetic remission are suspected.
- Schedule a revisit for 2 weeks time to re-assess clinical signs and perform a blood glucose curve: Refer pg 6 & 7 ‘Monitoring Diabetic Control’ and ‘Serial Blood Glucose Curves & Dose Adjustments’.

Monitoring Diabetic Control

Hospitalised pets invariably have different feeding and exercise patterns and the stress of hospitalisation can interfere with glycaemic control. Uncomplicated diabetics are better stabilised at home where a normal routine can be established.

Home Monitoring of Clinical Signs

- Because the primary goal of CANINSULIN® therapy is to achieve resolution of clinical signs, it is therefore important to regularly monitor signs such as water intake and bodyweight.
- Owners should be keeping a record every day of their pet's appetite and general demeanour, particularly noting any lethargy. On a weekly basis they should also measure and record a 24-hour water intake.

Urine Testing

- Urine dipstick testing can be helpful to detect diabetic instability. For example, ketonuria may warn of impending clinical ketoacidosis or increasing levels of urine protein may indicate a urinary tract infection.
- It is a good idea to have diabetic pet owners obtain a dipstick reading for glucose and ketones from a random urine sample at least once-a-week. It is preferable that some glucosuria is always present, because persistent negative urine glucose measurements may indicate subclinical hypoglycaemia.
- **The dose of insulin should not be altered based on the results of urine dipstick analysis.** Negative or positive urine glucose correlates very poorly with blood glucose and does not determine the degree of hypoglycaemia.
- The clinical history of the patient's general demeanour, appetite, 24-hour water consumption and weekly urine dipstick reading help to assess clinical control – it is impossible to make accurate dosage adjustments based solely on this information alone. The most accurate way to adjust the insulin dose is by making a blood glucose curve and interpreting the results alongside the patient's history and clinical examination.

Monitoring Diabetic Control

Encourage Owners to Keep a Home Log

Monitor Appetite & General Demeanour daily

Monitor 24-hour Water Consumption & Urine Dipstick Reading Weekly

Never Make Insulin Adjustments Based Only on Urine Dipstick Results

Glucose Curves are Essential in Establishing Appropriate Dose Adjustments & Frequency of Administration

Serial Blood Glucose Curves & Dose Adjustments

Serial Blood Glucose Curve's

A serial blood glucose curve is where a patient's blood glucose levels are measured at regular intervals throughout the day, starting just before the morning insulin dose. The blood glucose results are then plotted against time to produce a curve.

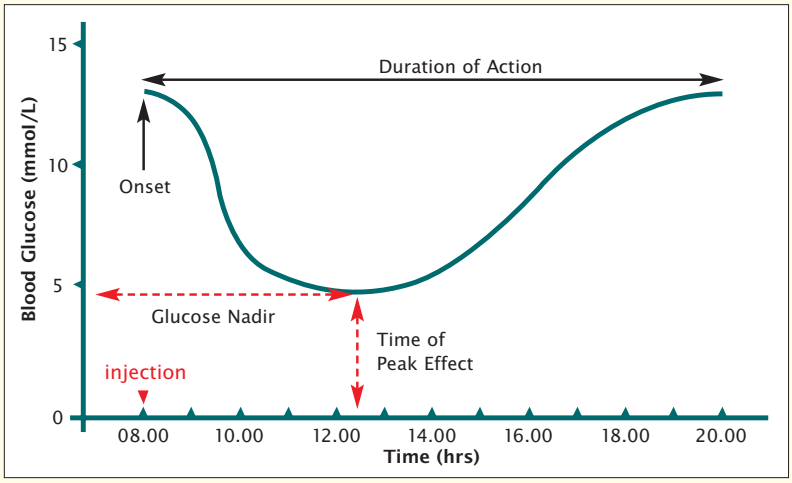
The serial blood glucose curve is performed every 2 to 4 weeks after initiating therapy until clinical signs have resolved and the dose remained unchanged for 2 consecutive examinations. When evaluating a diabetic patient for dosage adjustments it is important to interpret blood glucose curves in conjunction with a physical exam of the patient and to review the owner's home log regarding appetite and general demeanour, signs of lethargy, and 24-hour water intake measurements.

There is day-to-day variability between glucose curves despite patients receiving the same insulin dose and meal. The reasons for inter-day variability may be attributed to variations in the amount of insulin administered, insulin absorption, availability of insulin in the plasma to the insulin receptors, the level of peripheral insulin sensitivity, variations in food intake, and physical activity. Unfortunately, the main causes of variability are patient related and cannot be controlled. Because of daily variability, the results of blood glucose measurements should always be interpreted conservatively.

Protocol to Generate a Blood Glucose Curve

- Obtain a Baseline Blood Glucose reading
- Have the owner administer the usual CANINSULIN® dose and meal. If the owner administers the CANINSULIN®, it provides a good opportunity to review injection technique and insulin handling. Correct any problems. If the patient will not eat, take the pet to a less stressful environment and return to the hospital before the next blood glucose reading is due.
- Aim to obtain blood glucose measurements every 1 – 2 hours, ideally until the next insulin injection is due. Minimise stress and follow the normal feeding and exercise routine as closely as possible while the patient is in hospital.
- Plot the glucose curve.

Graph 1: Example of a Blood Glucose Curve in a diabetic dog.



What to look for?

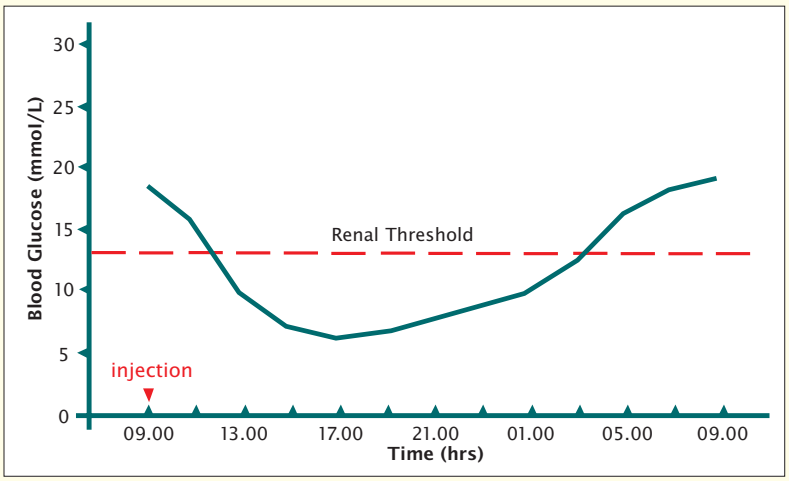
Check the following from the plotted graph.

- The Baseline Blood Glucose – resting blood glucose level just before insulin administration.
- The Nadir – lowest blood glucose reading obtained.
- The pre-insulin blood glucose – the last reading just before the next dose of insulin is due to be given.

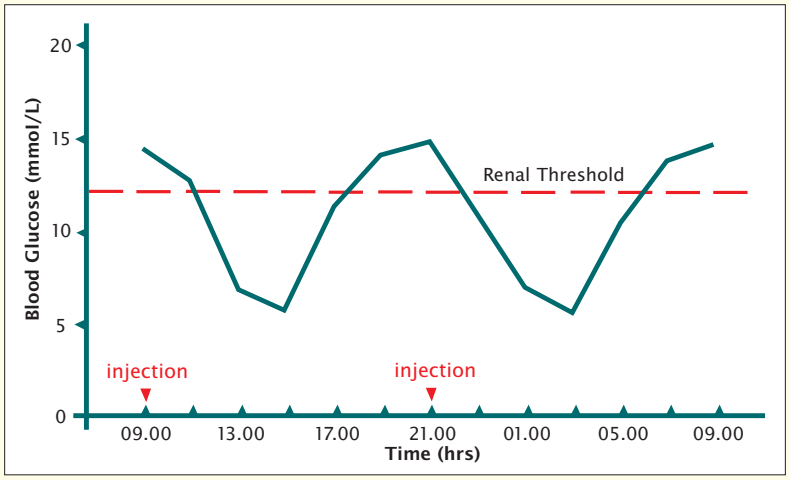
If a patient's nadir falls within the range of 5 – 9 mmol/L and both the baseline and pre-insulin blood glucose values in dogs are greater than 10 mmol/L (pre-insulin values > 15 mmol/L for cats), the patient is likely to have optimal clinical control.

Pharmacodynamic Effects of Subcutaneous CANINSULIN® Administration	Cats	Dogs
Time to nadir of blood glucose (h)	~ 4 hours	6 – 8 hours
Time for blood glucose concentration to return to baseline	~ 10 hours	8 – 24 hours

Graph 2. Serial Blood Glucose Curve in a stabilised dog receiving a once-daily administration of CANINSULIN®



Graph 3. Serial Blood Glucose Curve in a stabilised dog receiving twice-daily administration of CANINSULIN®



Interpreting Blood Glucose Curve results

Blood Glucose Curve Results	Recommended Action
Nadir < 3 mmol/L	Decrease dose by 50%
Clinical Signs of Hypoglycaemia	Decrease dose by 50%
Nadir between 3 – 5 mmol/L	Decrease dose by 10% (Dogs), Decrease by 1 unit (Cats)
Pre-insulin blood glucose < 10 mmol/L (dogs) Pre-insulin blood glucose < 15 mmol/L (cats)	Decrease dose by 10% (Dogs) Decrease by 1 unit (Cats)
Nadir between 5 – 9 mmol/L and Pre-insulin blood glucose for dogs > 10 mmol/L Pre-insulin blood glucose for cats > 15 mmol/L	No Change
Nadir > 9 mmol/L and pre-insulin blood glucose values > 15 mmol/L	If clinical signs present, increase dose by 10% (Dogs) Increase by 1 unit (Cats)
Return to baseline glucose level too soon indicating duration of effect of insulin too short	Increase frequency of insulin administration

- Insulin dose rate changes should be made conservatively. Where indicated, dose increases should be made at 2 – 4 week intervals and at no greater than 10% increases at a time for dogs and, 1 unit at a time for cats.
- The dose of CANINSULIN® should be re-checked, and adjusted if necessary, every 2-4 weeks until clinical signs are resolved and dose is unchanged on 2 consecutive visits. Then re-evaluate the patient every 2 – 4 months, increasing to every 4 – 6 months.
- If water intake is greater than 60 mL/kg/day or the diabetic patient is lethargic or losing weight, adjustment of the patient's insulin dose is probably required.
- If persistent negative glucosuria is recorded, it is also prudent to re-evaluate the insulin dose.

When to Re-evaluate for Insulin Dosage Adjustments	Signs of Good Glycaemic Control
Every 2 – 4 weeks During Initial Stabilisation Period	Water Consumption < 60 mL/kg/day
Water Intake > 60 mL/kg/day	Normal Appetite
Signs of Lethargy	Stable Bodyweight
Weight Loss	Alert and Active Pet
Change in Appetite	Glucosuria, No Ketonuria
Persistent Negative Glucosuria	
Anytime Hypoglycaemia is Suspected	

What to Feed the Diabetic Patient

Good glycaemic control is dependent upon a controlled and consistent dietary intake. Day-to-day variations in the timing, the amount of food, and the carbohydrate content should be minimised in order to maintain consistency and avoid post-prandial hyperglycaemia.

Diets should be individually tailored to suit each diabetic patient. Diets should be palatable, nutritionally balanced, provide sufficient calories tailored to individual needs, and provide consistent carbohydrate content.

Abnormalities in body condition should be addressed when formulating a diet plan. Thin patients should gain weight and obese patients should loose weight. Weight reduction in obese diabetic patients requires careful reduction of caloric intake. In general, reduction of intake to 60 – 70% of caloric requirements for ideal bodyweight will facilitate weight loss.

Another important consideration when formulating a diet plan for a diabetic patient is the presence of concurrent disease, for example renal failure or pancreatitis. These patients will have specific dietary needs depending on the disease and should be addressed when tailoring a diet plan.

Dogs

- Dogs are susceptible to post-prandial hyperglycaemia and therefore the timing of feeding is important to maintain consistency and good glycaemic control. Traditionally, dogs on once-daily CANINSULIN® therapy have been fed one-third to one-half of their daily ration just prior to the insulin injection and the remainder approximately 6-10 hours later, at the time of peak insulin activity (which is determined from the blood glucose curve). For dogs on twice-daily CANINSULIN® therapy, good glycaemic control can be achieved by feeding two meals a day, half their daily ration with each insulin administration.

Cats

- Cats are not susceptible to post-prandial hyperglycaemia when fed typical diets. Therefore the timing of eating relative to insulin administration is not as important as it is for dogs. Many cats prefer to graze throughout the day rather than guzzle their food.
- Obesity is a major contributor to the development of diabetes mellitus in cats and restoration of a normal bodyweight in conjunction with good glycaemic control may allow some diabetic cats to go into remission. A high protein-low carbohydrate diet may improve diabetic control and increase the likelihood of remission. Obese cats that tend to guzzle their food should have their rations divided as described above for dogs on twice-daily therapy.

What to Feed Diabetic Dogs	What to Feed Diabetic Cats
Palatable	High Quality
Nutritionally Balanced	High Protein - Low Carbohydrate
Provide Sufficient Calories	Palatable - Important that Cats Eat
Consistent Carbohydrate Content	Kitten or Growth Formula
Address Individual Needs	Carbohydrate with Lowest Glycaemic Index (Corn & Sorghum better than Rice)
Consistent Amount, Content & Timing	

Trouble-Shooting Problem Diabetic Patients

The unstable diabetic patient will have persistent clinical signs that are associated with either

- **Hyperglycaemia** (i.e. polyuria/polydipsia, polyphagia, weight loss) or
- **Hypoglycaemia** (inappetence, restlessness, negative glucosuria, shivering, disorientation etc.)

Before embarking on an investigation of the cause of the instability, owner compliance issues should be reviewed.

A Owner Compliance Issues

Examine the patient's home log and obtain a history from the owner to determine whether the clinical signs noted are consistent with either hyperglycaemia or hypoglycaemia.

Check owner compliance with regards to:

- **Diet** (consistent amount, content & timing)
- **Exercise** (consistent routine)
- **Timing of injections** (is the insulin being given at the correct time)

It is also useful to review the way CANINSULIN® is being stored and handled and to actually watch the product being prepared for administration by the owner.

- **Storage & Handling Problems**
  - CANINSULIN® is a delicate and friable protein that can be easily damaged by incorrect storage and handling procedures, resulting in decreased product efficacy. Check that the product is being stored correctly (refrigerated, not frozen, no solid particles that will not re-suspend with gentle rolling) and is within its expiry date. Once opened, a vial should be used within 20 days. Check that the owner is correctly re-suspending the insulin before administration (gentle rolling, not shaking the vial). If there is any doubt regarding the efficacy of the insulin due to poor storage or handling techniques then re-start therapy with a new bottle and re-evaluate the patient again in 2 weeks time.

- **Administration Problems**
  - Watch the owner's technique for drawing up and administering the injection. Check that they draw up the correct volume of insulin into the syringe, expelling the air and then successfully injecting the patient subcutaneously (not intradermally). Ensure that the person you are evaluating is the person that normally administers the insulin. Are the correct syringes being used?

Correct any owner compliance problems before proceeding and re-evaluate in 2 weeks.

B Clinical Hyperglycaemia

If the patient still has persistent clinical signs associated with hyperglycaemia (polyuria/polydipsia, polyphagia, weight loss) and there has been good owner compliance it is appropriate to conduct a full clinical examination and to perform a **blood glucose curve.** These steps are essential in order to correctly identify the cause of the instability.

There are several reasons why diabetic patients may fail to stabilise and have persistent clinical signs of hyperglycaemia. These include problems with insulin administration and storage (q.v.), or absorption from the site of injection, inadequate or excessive dosing, and poor insulin sensitivity with concurrent disease complications.

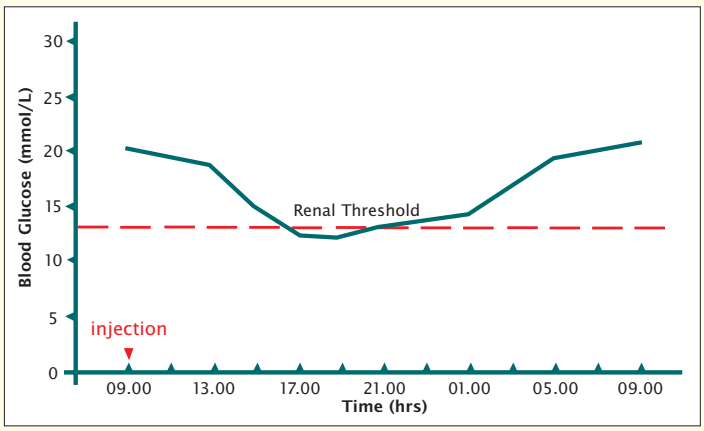
- **Insulin Absorption Problems**

  ➔ Delays in absorption from the site of injection will affect the product efficacy. Check for thickening and fibrosis at the usual injection sites. Correct any dehydration with fluid therapy and change injection sites if there is evidence of fibrosis.

- **Inadequate Insulin Dose**

  ➔ Insufficient insulin dose will not lower the blood glucose to an appropriate nadir. If the blood glucose nadir is too high and the patient's blood glucose is above the renal threshold for most of the day then clinical signs will persist. In such cases a blood glucose curve similar to Graph 4 (below) would be generated.

Graph 4: Example of Inadequate Insulin Dose



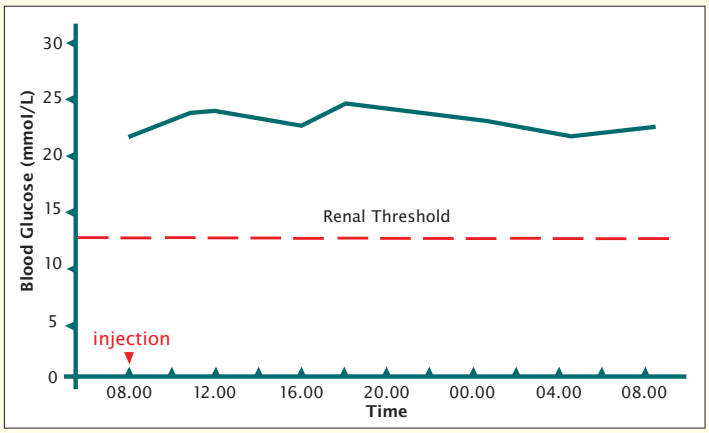
In cases of hyperglycaemia due to inadequate insulin dosage, refer to the Table on Page 9 for recommended dose adjustments.

- **Excessive Insulin Dose (Insulin resistance)**

  ➔ There is a phenomenon in diabetics where excessive insulin dosing, which initially induces hypoglycaemia, can cause a compensatory hyperglycaemia. As the blood glucose falls below the normal range, diabetogenic hormones are released to counter this effect. The blood glucose rises, often dramatically, because there is not enough endogenous insulin to blunt the diabetogenic response. These counter-regulatory mechanisms may result in hyperglycaemia before hypoglycaemia has even been recorded on the serial blood glucose curve. This hyperglycaemia sometimes persists for several days and can be compounded by repeated overdosing.

  ➔ **These patients are hyperglycaemic most of the time and show persistence of clinical signs. These cases are often perceived incorrectly as a failure to respond to insulin and consequently the insulin dose is increased.** This leads to self-perpetuating hypoglycaemia with rebound hyperglycaemia and periods of insulin resistance.

Graph 5: Example of Compensatory Hyperglycaemia Due to Excessive Insulin Dose



In cases where insulin resistance due to overdose is suspected, reduce the dose of insulin by up to 75% or re-start insulin therapy at normal initial doses and re-evaluate a serial blood glucose curve in 2 – 4 weeks time.

➔ Patients with serial blood glucose curves that have a rapid drop of blood glucose over a short period of time, followed by a rapid rise may also be experiencing an excessive insulin dose, or possibly a short duration of action. First check that you are not overdosing by decreasing the dose and re-evaluating the patient again in 2 – 4 weeks time to see if there is a longer duration of action and an improvement in clinical signs such as a reduction in water consumption.

- **Insulin Resistance due to Concurrent Disease**

➔ Most diabetic patients are middle-aged to geriatric; consequently many suffer from concurrent diseases that may interfere and cause insulin resistance. If concurrent disease is suspected then further investigation for possible causes is warranted.

Typical Concurrent Problems Causing Insulin Antagonism

Ketoacidosis
Obesity
Recurrent Infections (Cystitis, Pyoderma, Periodontitis, Otitis, Prostatitis)
Neoplasia
Organ Disease (Renal Failure, Chronic Pancreatitis)
Hyperadrenocorticism
Hyperthyroidism / Hypothyroidism
Dioestrus or Pregnancy

C Clinical Hypoglycaemia

Clinical hypoglycaemia may occur at any stage, even after stabilisation has been achieved. Clinical signs range from hunger initially, then inappetence, restlessness, weakness and shivering, to disorientation and collapse, seizures and coma. This condition may be due to insulin overdose, but may also be triggered by such events as loss of appetite, vomiting, excessive exercise or administration of insulin at irregular intervals.

Correct any owner compliance problems before proceeding and re-evaluate in 2 weeks.

- **Insulin Overdose**

  ➔ Relative insulin overdose causes hypoglycaemia. Resolution of these signs following a meal or glucose administration supports a tentative suspicion for hypoglycaemia, although a blood glucose sample at the time is required for confirmation.

Hypoglycaemic patients generally require a reduction in the dose of insulin; refer to the Table on Page 9 for recommended dose adjustments.

- **Concurrent Disease**

  ➔ Concurrent disease that increases the risk of hypoglycaemia includes exocrine pancreatic insufficiency (EPI), hepatic insufficiency, and any disease that may cause inappetence. If concurrent disease is suspected then further investigation for possible causes is warranted.

If the diabetic patient is unwilling or unable to eat due to illness, administer a lower dose of insulin (approximately 30% of the normal dose) until appetite is restored.

- **Remission**

  ➔ In diabetic cats, hypoglycaemia may herald diabetic remission.

Management of Hypoglycaemia	
At Home	In the Clinic
Feed a meal Rub glucose syrup on the gums Syringe glucose solution into the mouth	1 mL/kg 50% dextrose diluted in an equal volume of saline, given intravenously

Summary Protocol

Initial Stabilisation

Ensure you have an accurate diagnosis

Dogs:

- 1.0 unit/kg plus supplement dose CANINSULIN® once-daily or
- 0.25 – 0.5 units/kg CANINSULIN® twice-daily

Cats:

- 0.25 – 0.5 units/kg CANINSULIN® twice-daily
- Measure blood glucose over the first day to ensure glucose lowering effect without hypoglycaemia
- Make adjustments to insulin dose if nadir < 5 mmol/L or pre-insulin blood glucose for dogs < 10 mmol/L, (< 15 mmol/L for cats)
- Ensure client is fully informed and happy with injection technique and feeding regime
- Send the patient home but warn the owner that stabilisation may take several months

Assessing Diabetic Management

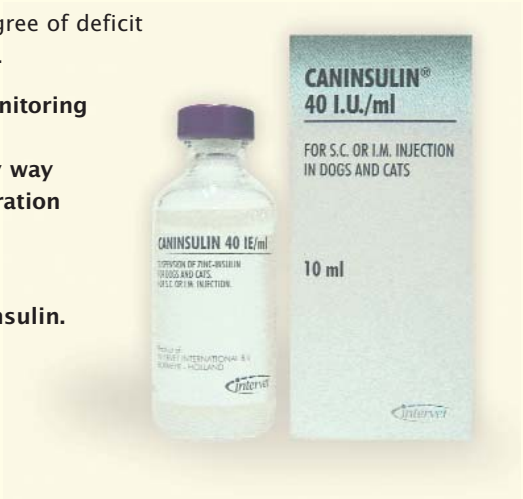
- Re-evaluate the patient after 2 – 4 weeks
- Review the owner's log and question the owner regarding improvements – resolution of clinical signs suggests successful management
- Perform a thorough clinical exam
- Undertake a serial blood glucose curve & make any adjustments to CANINSULIN® dosage as indicated, based on history, exam results and blood glucose curve
- Re-evaluate as required
- Do not alter the dose more frequently than every 2 – 4 weeks unless hypoglycaemia is suspected
- When evaluating a patient for problem stabilisation, always check for administration and storage problems first, then for possible insulin resistance due to excessive dosage – if in doubt decrease the dose

Long-Term Monitoring

- Monitor clinical signs at home (including 24-hour water intake)
- Reassess a stable animal 2-3 times per year
- Reassess immediately if hypoglycaemia is suspected or clinical signs of diabetes reoccur indicating instability
- Patients will enjoy a normal quality of life if successfully managed
- The key to successful diabetic management is client-vet communication

CANINSULIN®

- CANINSULIN® is an aqueous suspension of 40 IU per mL of highly purified porcine insulin.
- CANINSULIN® consists of a mixture of amorphous (30%) and crystalline (70%) zinc insulin. CANINSULIN® is an intermediate acting insulin with a medium duration of activity that is structurally identical to endogenous canine insulin. It is not intended for the treatment of animals with severe acute diabetes presenting in a ketoacidotic state.
- The amorphous fraction will reach peak activity approximately 3 hours after subcutaneous administration and the total effect will last for about 8 hours. Thereafter the effect is maintained by the crystalline fraction, which has a slower onset of action and a maximum effect ranging from 7 to 12 hours following injection. Afterwards, the effect gradually declines to zero.
- The daily dose required in an individual diabetic animal will depend on the degree of deficit in the animals own insulin production and therefore is unique for each patient.
- **The action and duration of exogenous insulin is unique to each patient. Monitoring the patients' clinical response to insulin treatment, which usually includes interpretation of serial blood glucose curves and owner records, is the only way to determine an appropriate dose and frequency of CANINSULIN® administration for each patient.**
- CANINSULIN® must be stored in the refrigerator and protected from light. **CANINSULIN® must never be frozen as this will affect the efficacy of the insulin.**
- Gently re-suspend the product before each use by gently rolling the vial 5 to 6 times. Never shake the vial as this may de-nature the insulin and subsequently affect the efficacy.



CANINSULIN® is backed by an extensive range of both technical and client focused support material. Available for use in your clinic are:

Insulin syringes with 40 units per mL markings, available for use with CANINSULIN® for easy administration.

Technical serial glucose curve chart providing advice on producing a serial glucose curve as well as their interpretation.

Owner's manual and databook providing helpful advice for owners of diabetic pets and an example of a data sheet for patient home monitoring.

CANINSULIN® dog tags that help identify their pet as a diabetic if they become lost.

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