Insulin Use and Monitoring in Diabetic Patients

VetTechPrep

Insulin is produced by the pancreas and aids in glycemic control. When a meal is ingested, the blood glucose level rises and the pancreas releases insulin to keep blood glucose at a steady level. Insulin helps to properly store and utilize the glucose. Diabetes is a condition in which the pancreatic beta cells do not produce enough insulin (Type I) or the body is resistant to insulin's effects (Type II), resulting in a blood glucose level that is too high. Injectable insulin is given to decrease blood glucose. (Oral hypoglycemics, such as glipizide, are typically ineffective in pets.)

Insulin Types

There are several types of insulin.

Short-acting insulin (such as **Humulin-R**), also known as **regular insulin**, is typically used in cases of **diabetic ketoacidosis,** for more immediate control of blood glucose due to its rapid effect.

Intermediate- or longer-acting insulin (such as **Humulin-N**), is most often used in dogs for **maintenance** control.

"Peakless" insulin, such as **glargine (Lantus)** is often used in cats and is the recommended choice in this species.

Diabetic Regulation

Most diabetic pets need insulin injections twice a day, preferably 12 hours apart.

When insulin is given, the blood glucose starts to go down. **The lowest point** that the blood glucose reaches after insulin (before it starts to increase again) **is called the nadir**. The nadir helps to determine if the animal is on the proper dose of insulin.

Glucose Curve

A glucose curve can be performed to assess glycemic control, and determine whether adjustments in insulin dosing are needed. To perform a glucose curve, the blood glucose is typically checked in the morning, prior to feeding and giving insulin. After feeding and giving insulin, the blood glucose is then checked every 1-2 hours for 12 hours. If the pet shows signs of poor glycemic control, the clinician can adjust the insulin dosage. Typically, a nadir that is too high requires an increase in insulin dosing.

Fructosamine

Another method of glucose monitoring that is useful, especially in fractious or nervous pets, is a fructosamine level. The fructosamine represents an average blood glucose over the prior two weeks and is a measure of protein-bound glucose during that time period.

Stress can cause a release of catecholamines, leading to a falsely elevated blood glucose level. This can make it hard to interpret a glucose curve in stressed or excited patients. Fructosamine levels can provide a better indication of long-term glycemic control in anxious pets.

Dosing and Proper Handling

Insulin must be handled with care. It **should never be shaken** (the exception to this is Vetsulin - according to the package insert it may be shaken to mix thoroughly). It should be **refrigerated** and gently rolled between the fingertips prior to drawing up and administering.

Insulin is dosed in "**units.**" Insulin **syringes should always correspond to the insulin concentration** (i.e. U-100 insulin syringes should be used with U-100 insulin). Some pet insulin brands are U-40 (or 40 U/mL) and require U-40 insulin syringes (e.g. PZI and Vetsulin/Caninsulin).

Insulin is typically given **subcutaneously**. It may be given via IV infusion or intramuscularly in dehydrated or critical patients.

Hypoglycemia

If the insulin dose is too high, or in the case of an insulin overdose, the blood glucose can drop to a dangerous level. Symptoms of hypoglycemia include vomiting, ataxia, weakness, tremoring, dazed mentation, seizures, or death. Owners of diabetic pets should be instructed to look for signs of hypoglycemia. If signs occur, the owner should give their pet Karo™ syrup and seek immediate veterinary care.

If an owner is unsure whether the insulin injection went in, or if they notice the fur is wet where they gave the injection, they should NEVER re-dose the insulin. It is best to wait until the next regularly scheduled dose. Hypoglycemia is far more dangerous than hyperglycemia.

Most pet owners, with proper instruction and guidance, are able to give their pets insulin injections at home. Client communication and helping these owners is an important responsibility of veterinary technicians.