

### **INSULINOMA IN THE FERRET**

The pancreas is an important endocrine organ which has two main functions. One is to produce enzymes, such as amylase and lipase, to help digest food. The other is to produce hormones, such as insulin and glucagon, which regulate blood sugar levels and the metabolism of fat.

You have probably heard of diabetes, or diabetes mellitus, in which there is a lack of insulin production by the beta cells of the pancreas. In this disease, blood sugar levels become high because insulin is necessary to allow tissues to take up glucose.

Ferrets are prone to getting tumors in the pancreas of the insulin producing cells. These tumors are called insulinomas and they secrete abnormally large quantities of insulin regardless of whether or not it is needed by the ferret's body. Insulin levels become abnormally high driving their blood glucose levels down. Symptoms of insulinoma in the ferret include lethargy, sleeping a lot, clawing at the mouth, excessive drooling, weakness in the hind legs, and even seizures in severe cases.

A diagnosis is made by performing a simple blood glucose test, just like diabetics use. A normal blood glucose level in a ferret is 80-120 mg/dl. Confirmation of the disease may include a blood insulin assay or biopsy of a pancreatic nodule during surgery.

Though there is no cure for insulinoma, most ferrets can be maintained on oral medications. Prednisone is given to stimulate the liver to make more glucose. Proglycem (diazoxide) is given to help block the activity of the excessive insulin. If your ferret's blood glucose is in the 50-80 mg/dl range, oral medication is the best treatment option. Therapy will be necessary for the rest of the ferret's life. Each ferret responds differently to the oral medication so your ferret will need to have its blood glucose checked periodically in order to monitor treatment and make adjustments in the dosing.

Some insulinomas become so large or so numerous that blood glucose levels cannot be maintained on oral therapy alone. Surgery can be performed to remove a portion of the pancreas. This reduces the volume of insulin secreting tissue. Unfortunately, there are usually many tumors of varying size throughout the pancreas. Therefore, insulinomas cannot be completely removed during surgery. In addition, there is some life threatening complications associated with this surgery. Also, we have found that most ferrets still need oral therapy even after successful removal of some of these tumors.