“Smokey,” a five-year-old male neutered ferret, is brought to your hospital for a physical examination. Although your associate saw this ferret only three months ago for a yearly check-up, since then, the owner says that “Smokey” has become slightly less active. That is why “Smokey” is here to see you today. At his appointment three months ago “Smokey” had no unusual physical examination findings and the owners had no complaints about anything out of the ordinary at home with “Smokey.” There are no other pets in the house and “Smokey” was acquired from a local pet store as a kit and has no health issues his entire life. Usually, “Smokey” spends the day in his large cage that has a litter pan, a hammock, and a hide box. When the owners come home, “Smokey” is allowed out to run around the “ferret-proof” living room with supervision.

From talking with the owners, it becomes apparent that “Smokey” is not acting like his normal-self. When the owners come home, instead of bounding out of his cage, “Smokey” stays in his hammock or takes a look around at the open door, and decides to stay inside his enclosure. Not content to let him sleep in the cage, once they are home, “Smokey’s” owners pick him up out of his enclosure, put him on the living room floor and start playing with him. After a few minutes, he seems to perk up a little, especially now that they are coaxing him to run around by offering him some ferret treats. They report that he does seem more energetic after he eats, but he is less interested in eating his food compared to when he used to finish his dinner quickly. To further encourage “Smokey” to eat, they have started giving him a little bit of meat-based baby food in jars as a way to get him to eat more of his dry food.

Your physical examination of “Smokey” is fairly normal except for a couple of unusual findings that you discuss with the owners. When you place “Smokey” on the carpeting to watch him walk, he does seem less active than your associate reported a few months ago. Also, you can hear a grade II heart murmur on the left side of his thorax. You tell “Smokey’s” owners that you are not exactly sure what is wrong but in an older ferret that is less active, insulinoma disease has to be high on your rule out list. Likewise, heart disease is known to occur in older ferrets and there is a heart murmur present now. Finally, you remind them that there may be other causes then those two you just listed that are responsible for “Smokey’s” condition and murmurs are not always associated with serious or clinical heart disease in a ferret. Therefore, you recommend a CBC and biochemistry profile along with whole body radiographs. “Smokey’s” owners agree to the plan...
and they leave him with you for the day. Radiographs are taken and the blood work is sent off to a laboratory. The radiographs show an enlarged heart silhouette and some pleural effusion. An echocardiogram confirms that heart disease, specifically dilated cardiomyopathy, is present and "Smokey" is in the early stages of heart failure. He is started on appropriate medications for the dilated cardiomyopathy and associated pleural effusion. We also let the owners know that at this point, we are not sure if the heart disease is the only reason for the weakness "Smokey" was exhibiting at home since we do not have the blood tests back yet. We tell the owners we have a bit of a dilemma. We could start him on prednisone for a presumptive insulinoma since he has the signs and signalment for an insulinoma, but you are concerned about the potential effect prednisone might have on pre-load for his heart. Since "Smokey"'s laboratory results will not be back until tomorrow, you decide to send "Smokey" home on just his heart medications and will call the owners with the results and update any medications at that time. The results come back late the next day and the CBC is normal. The biochemistry panel has only one abnormal result. The blood glucose concentration is reported to be 40 mg/dl. The laboratory reports the normal range to be between 85 and 150 and so 40 mg/dl appears to be very low. Here is the dilemma- if "Smokey"s blood glucose is truly 40 mg/dl, then he needs surgery to debulk the disease in his pancreas and/or medication to combat the low glucose. Both forms of treatment have serious implications to a ferret with heart failure.

Insulinaoma is a common disease in pet ferrets. The incident rate is unknown but it is not an exaggeration to state that probably at least 50% of pet ferrets will develop this disease, if they live long enough. Insulinaoma may be present for months before owners notice a change in their ferret's behavior. The changes are due to hypoglycemia. Signs of disease include varying amounts of lethargy, drooling, difficulty to wake from sleep, and ataxia. It is believed the disease is due to malignant beta cells in the pancreas that will eventually spread to the liver and lymph nodes. It can take months to years before these malignant cells spread from the pancreas to other organs and during that time, ferrets can have a decent quality of life with the proper treatment. There are both surgical and medical approaches to treatment for insulinaoma disease in ferrets. Surgical treatment involves removing the masses in the pancreas, usually via a partial pancreatectomy. Surgery is a debulking procedure rather than removal of the entire malignant tumor. If there is spread of this disease beyond the pancreas, surgical treatment is not advised. Medical treatment is aimed at increasing the blood glucose concentration. Two of the most commonly used medications are prednisone and diazoxide. Medical treatment controls the signs of this disease (which are due to the hypoglycemia) but will not prevent eventual metastasis of the malignant cells. As the disease progresses, increases in the amount of medication given is necessary to fight the hypoglycemia. Once the ferret develops resistant to the highest doses of the medications, only a surgical approach will alleviate the signs of disease. Neither surgery nor medications will cure this disease but surgery can provide a longer survival time.

Ferrets acclimate to the hypoglycemia, therefore, owners may miss the subtle signs at the start of this disease. So when the laboratory reports a blood glucose concentration of 40 mg/dl, is it not unusual that the ferret did not appear sicker- both at home and in your office due to this ability to acclimate to the hypoglycemia. But now we have a treatment dilemma. If the blood glucose concentration is 40 mg/dl, then treatment must be started. Both diazoxide and prednisone are reported to increase pre-load which is something that we would try to avoid in a ferret with heart failure. Plus, with a 40 mg/dl concentration, it is likely we would need to start at the higher end of the dose of these medications, potentially increasing the risk of improperly effecting pre-load. Surgery, on a ferret with heart failure, will make this ferret a more challenging anesthetic patient. Neither choice for treatment brings a smile to your face! The questions are, is insulinaoma treatment necessary and would having an Abaxis Vetscan have improved your care of this patient?

**“Would having an Abaxis Vetscan have improved your care of this patient?”**

*The answer is yes for two reasons.*

Let’s first answer the question- “would having an Abaxis Vetscan have improved your care of this patient?” The answer is yes for two reasons. First, we recommend ferrets over the age of three visit the veterinarian twice a year and at each visit, have a biochemistry panel performed. Since insulinaoma disease is so common in ferrets over the age of three, you can pick up early insulinaoma disease during a visit, just by running a biochemistry panel. This disease is so insidious that the blood glucose concentration can be low for weeks or months before the owners notice a problem. If an in-house biochemistry panel had been performed three months ago when
“Smokey” visited for a health check, it is possible the diagnosis of an insulinoma could have been made at that time. That would have been before the cardiac disease and he would have been a better candidate for anesthesia and surgery. Now there is a suspicion of a diagnosis of insulinoma but “Smokey” is in heart failure. An early diagnosis three months ago would have put “Smokey” at much less risk for a poor anesthetic outcome than he is now if he has an insulinoma and if surgery is performed. The second reason that having an Abaxis Vetscan would have improved care is because there is doubt that the 40 mg/dl truly represents what the blood glucose concentration was at the time of venipuncture. Since the sample was not spun down, whole blood was sent to the laboratory, and the sample was run at least 24 hours after venipuncture, there is a good chance the value is artificial. A blood glucose of 40 mg/dl would require medical treatment at a high dose of medication that could negatively affect treatment of his heart failure or surgery with anesthesia for the debulking procedure.

In fact, “Smokey” ended up the evening before he was to come back for a recheck at an emergency hospital due to his tail being stepped on as he was more active than he has been in weeks and was running around in the living room. The emergency clinic ran a vetscan rotor and to everyone’s surprise, his blood glucose was 80 mg/dl! What caused the difference? The whole blood was run immediately and the result was unaffected by transport, time and most importantly, blood cells lowering the blood glucose concentration. In the end, “Smokey” had a normal blood glucose concentration and did not have an insulinoma. His treatment for heart failure greatly improved his quality of life but unnecessary surgery and medication were avoided because a precise measurement of his blood glucose via the Vetscan was performed.