



#### INTERNAL MEDICINE

**SOUTHFIELD** | 29080 Inkster Rd, Southfield MI 48034

P 248.354.6660

F 248.354.0303

**AUBURN HILLS** | 3412 E Walton Blvd, Auburn Hills MI 48326

P 248.371.3713

F 248.371.3714

**ANN ARBOR** | 4126 Packard Rd, Ann Arbor MI 48108

P 734.971.8774

F 734.971.1783

**GRAND RAPIDS** | 1425 Michigan St NE Suite F, Grand Rapids MI 49503

P 616.284.5300

F 616.284.5320

Caitlin Barry-Heffernan, DVM, DACVIM

Lauren Boyd, DVM, DACVIM

Marc Elie, DVM, DACVIM

Yoojin Kim, DVM

Jessica Romine, DVM, DACVIM

Kristopher Sharpe, DVM, DACVIM

Wednesday, February 6, 2019

Dr. Cheryl Good

Dearborn Family Pet Care

24909 Michigan Ave.

Dearborn, MI 48124

fax: (313) 561-0077; phone: (313) 561-5920

Dear Dr. Good and Klusell family:

Thank you for the referral of David Klusell and "Paris". Below is a summary of their visit to BluePearl Veterinary Partners.

**Client:** David Klusell **Patient:** Paris **Exam Date and Time:** 2/6/2019 17:42 **Case #:** 157846-1

**BluePearl Hospital:** Southfield

**Client Phone:** (313) 680-9629

#### DIAGNOSES:

1. Insulin resistant diabetes mellitus - Hypersomatotropism/acromegaly, less likely chronic pancreatitis, primary intestinal disease, hyperadrenocorticism, occult pyelonephritis, non-visualized neoplasia, persistent Somogyi effect
2. Recent sneezing and stertor - Viral upper respiratory infection, less likely neoplasia, polyp, chronic rhinitis, foreign body, tooth root abscess
3. Liver nodule - Neoplasia, granuloma, regenerative nodule
4. Prominent small intestines - Individual variant, inflammatory bowel disease, other
5. Mild degenerative kidney changes
6. Hypoechoic pancreas - Previous vs less likely active pancreatitis

**HISTORY:** Paris, a 10 Yrs. 6 Mos. old Spayed Female Siamese, was presented today for evaluation of insulin-resistant diabetes mellitus.

Paris has generally been a healthy cat. She is indoor only, and the only cat in her household. She does not travel outside of Michigan and has no major medical or surgical history.

In August of 2018, Paris was diagnosed with diabetes mellitus, following a period of polyuria and polydipsia. Initial chemistry profile showed a blood glucose of 423 mg/dL and no other abnormalities. CBC was within normal limits, and fructosamine was increased at 441 umol/L. Paris was initially treated with ProZinc twice daily, but had persistent clinical signs. When she remained unregulated on 8 units of ProZinc twice daily in October, she was transitioned to glargine.

Paris's glargine was gradually increased based on persistent clinical signs and high blood glucose readings (primarily am and pm, some curves) over the subsequent months. On 1/3/19, while receiving 4.5 units glargine twice daily, CBC was within normal limits. Chemistry showed persistent hyperglycemia (402 mg/dL) and no other abnormalities, while total T4 was normal at 0.8 and PLI was very mildly elevated at 3.6. Urine culture on 1/7/19 was negative.

On 1/29/19, Paris developed upper respiratory signs (sneezing and wheezing). She was prescribed azithromycin, which she is currently receiving. Her sneezing has slightly decreased in frequency since starting this medication. Paris was noted to have progressive difficulty jumping, and her glargine was increased to 6 units twice daily on 1/30/19.

At home, Paris is ravenous for food. She has lost a small amount of weight since her diabetes diagnosis (initially about 12 pounds). She has had mild diarrhea since starting azithromycin, but no vomiting. Her thirst and urination are slightly

increased from her historic baseline, but improved from her initial diagnosis of diabetes. While her sneezing has decreased, Paris's purr sounds different (more nasal than previous), and she is mildly lethargic at home. She is receiving 6 units glargine twice daily and azithromycin once daily. She eats primarily canned DM food, but also receives treats. No changes in her facial appearance have been noted.

**PHYSICAL EXAMINATION:** T: 100.3 F P: 184 bpm R: 32 bpm mm: pink CRT: <2 seconds Weight: 11.32 pounds Hydration: Adequate BCS: 6/9  
Eyes, ears, nose and throat: Eyes clean and clear; no nasal or aural discharge; no thyroid slip; moderate calculus and gingivitis; no facial asymmetry or pain; symmetric retropulsion; air flow present through both nares  
Peripheral lymph nodes: No peripheral lymphadenopathy  
Cardiovascular: Regular rhythm, no murmur ausculted, femoral pulses strong and synchronous  
Respiratory: Normal bronchovesicular sounds bilaterally; eupneic; no stridor or stertor appreciated  
Abdomen: Soft and non-painful; prominent intestines, no masses appreciated  
Genito-Urinary: Externally normal spayed female, bladder small and soft; both kidneys smooth and normal in size  
Integument: Good coat, no skin lesions or ectoparasites  
Musculoskeletal: Ambulatory x 4; moderately dropped right hock, mildly dropped left hock  
Neurologic: Mentally appropriate; menace and palpebral intact OU; no nystagmus or strabismus  
Rectal: Not performed

### **IMAGING FINDINGS:**

#### **2/6/2019 Complete Abdominal Ultrasound:**

The liver appears normal in size. A homogenous, hypoechoic nodule is present in the left side of the liver (1.23 cm diameter).

The gall bladder is moderately distended and free of debris. The wall is not thickened and the bile duct is not distended.

The spleen appears normal.

The left and right kidneys are normal in size, measuring 4.14 cm and 4.10 cm in length, respectively. The right renal pelvis is mildly dilated (0.12 cm) and the cortical margin is mildly irregular bilaterally.

The left and right adrenal glands appear normal in size and shape, measuring 0.33 cm and 0.34 cm at their respective caudal poles.

The urinary bladder is moderately full and appears free of stones or masses.

The stomach and small intestines appear normal in layering with thickness measuring 0.28-0.43 cm. The intestines are overall slightly prominent and more easily visualized than would be expected.

The colon appears normal in thickness (0.13 cm).

The pancreas is mildly hypoechoic and rounded. The surrounding mesentery is normal.

No lymphadenopathy or free fluid is observed.

### **Clinical Impression:**

- 1. Liver nodule - Neoplasia (cystadenoma, hepatocellular carcinoma) vs granuloma vs regenerative nodule**
- 2. Prominent small intestines - Individual variant vs inflammatory bowel disease, other**
- 3. Mild degenerative kidney changes bilaterally**
- 4. Hypoechoic pancreas - Previous vs less likely active pancreatitis**

### **LABORATORY DIAGNOSTICS:**

Insulin-like growth factor 1 (IGF1) - Results pending

### **ASSESSMENT:**

Paris has been diagnosed with diabetes mellitus. This is an endocrine disorder in which the body does not produce enough insulin, leading to high blood sugar concentrations but inadequate glucose use by the body. This leads to increased thirst and urination, increased appetite, and weight loss. Cats are most commonly similar to human type 2 diabetics. This means that while insulin production from the pancreas is decreased, the body is also resistant to using what insulin is produced. With appropriate therapy, many cats may enter diabetic remission. Even in cats who need ongoing insulin therapy, most diabetic patients ultimately have a good quality of life.

Feline diabetes is not regulated as tightly as human diabetes, as cats are not reported to develop several of the long term consequences reported in humans (diabetic nephropathy and painful neuropathy). Associated with their diabetes, cats may develop pancreatitis and rarely ketoacidosis (a life-threatening metabolic disturbance, often provoked by another disease process in addition to diabetes). Daily glucose monitoring is not required or recommended in feline diabetic patients.

Determining a cat's optimal dose of insulin takes time (usually 1-2 months). Cats become more sensitive to their insulin over time, and dose increases should not be made any more frequently than once weekly. Our goals of insulin therapy are for Paris to have normal thirst and urination, a normal appetite, and a stable weight. Blood glucose curves, urine testing, and fructosamine may help in this assessment, but her clinical signs are the most important marker of her diabetic control. Because insulin may last a variable amount of time in each cat, glucose curves or interstitial glucose monitoring will be needed to determine whether Paris's insulin is lasting an appropriate amount of time for her.

Paris is currently insulin resistant, which is diagnosed when feline diabetics are still unregulated despite >5 units of insulin twice daily. Possible causes of insulin resistance in cats include infections (commonly of the urinary tract), pancreatitis, cancer, and endocrine disease. More recently acromegaly (excess growth hormone) has been increasingly recognized in insulin-resistant feline diabetics. A blood test was submitted today for assess for this disorder, and we will contact you with results when they are available. So far, Paris's testing has shown no evidence of significant cancer, infection, or inflammatory disease to explain her signs.

Paris had a small nodule on her liver today. This is unlikely to be the cause of her insulin resistance, though it should be monitored. If it increases significantly in size, surgical removal should be considered.

**DIET:** You may increase Paris's daily intake to 1.25 cans of DM twice daily (477 kcal per day). This may need to be decreased again once Paris's diabetes is well controlled. Paris should be fed as close to 12 hours apart as possible each day, and should receive her insulin immediately after eating.

To help keep her feeling full longer, Paris may receive a small amount of DM kibble (no more than 1/8 cup per day) in a puzzle feeder to keep her occupied and stop her from ingesting all of the kibble at once.

Paris should have unlimited access to water at all times, as her diabetes makes her more prone to dehydration than a normal cat.

#### **MEDICATIONS:**

1. Glargine (Lantus) - Increase to give 6.5 units under the skin twice daily, immediately after meals. Gently roll prior to use.
2. Azithromycin - Continue to give once daily until gone, or as previously directed by Dr. Good.

#### **MEDICATION INFORMATION:**

1. Glargine is a long-acting insulin. It is generally well tolerated, but may cause weakness, collapse and seizures if too much is given.
2. Azithromycin is an antibiotic effective in treating most upper respiratory infections. It may cause nausea, vomiting, and diarrhea.

#### **INSULIN CARE AND ADMINISTRATION:**

Insulin should be stored on a shelf in the refrigerator, not on the door (to minimize temperature fluctuations). The insulin should be inspected prior to each use for any changes in color or consistency. If these are noted, a new bottle should be obtained.

Glargine should be gently rolled prior to administration. Properly cared for and stored, insulin may remain good for up to 3 months.

#### **MONITORING:**

Please monitor Paris at home for any lethargy, weakness, vomiting, diarrhea, or other unusual signs, and contact us if these are seen. Paris should be evaluated by a veterinarian promptly if her appetite declines, as her diabetes puts her at increased risk of dehydration.

If Paris has any weakness, tremoring, or collapse, feed her as soon as you are able. If you cannot feed her, rub honey or Karo syrup on her gums and bring her to the nearest emergency veterinarian.

If possible, you may use KetoDiastix to monitor Paris's urine 2-3 times per week. She should always have some glucose in her urine, and should never have ketones. If Paris's urine is NEGATIVE for glucose or POSITIVE for ketones, please contact us right away.

Daily glucose monitoring is not required or recommended in feline diabetics. However, home glucose curves can be very helpful in assessing diabetic control. To perform a glucose curve, Paris should have her glucose checked just prior to her morning meal and insulin administration. Glucose should be checked every 2-3 hours thereafter until her

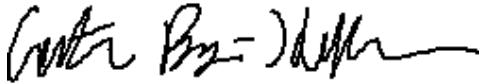
next meal and insulin administration. Because human monitors are not calibrated for animals, only the AlphaTrak monitor should be used.

**FOLLOW-UP:**

1. We will contact you with the results of Paris's IGF1 when they are available (in 7-10 days) and discuss next steps at this time.
2. If Paris's IGF1 is normal, next steps might include submission of a GI panel (folate, cobalamin, and TLI) to assess for early primary intestinal disease.
3. Please perform a blood glucose curve on Paris in 7-10 days and email results to us at [info.southfield@bluepearlvet.com](mailto:info.southfield@bluepearlvet.com).
4. Paris should have a recheck ultrasound (at least of her liver) in 2-3 months, to monitor the size of her liver nodule.

Please do not hesitate to contact us with any questions or concerns.

Sincerely,



Caitlin Barry-Heffernan, DVM, DACVIM (Small Animal Internal Medicine)

**ADDENDUM on 2/15/2019** at 19:08:14 from **Caitlin A. Barry-Heffernan, DVM**

Paris's insulin-like growth factor (IGF-1) is diagnostic for acromegaly/hypersomatotropism at 325 nmol/L (normal 12-92). Acromegaly is a disorder of too much growth hormone within the body. In cats, it is most commonly due to a benign growth within the pituitary gland in the brain.

Growth hormone has many effects throughout the body. It antagonizes insulin, causing insulin-resistant diabetes mellitus. It also ultimately causes enlargement of many organs and bones, leading to a change in facial structure and size. It may cause thickening of the heart muscle and enlargement of the kidneys, which may ultimately cause dysfunction of these organs. Diabetic cats with acromegaly often have very high insulin requirements (up to 25 U or more twice daily). Insulin can be increased as needed until signs of diabetes are controlled.

Definitive treatment of acromegaly ultimately requires addressing the cause within the brain. Definitive treatment may consist of surgical removal of the pituitary gland (very uncommon within the United States) or radiation therapy of the pituitary gland (increasingly performed). Several different approaches to radiation therapy exist (definitive vs stereotactic). Prior to these treatments being performed, Paris would need imaging of her brain (an MRI and CT scan). If you are interested in pursuing these diagnostics and treatments, I would recommend a consultation at Purdue University, MedVet Cincinnati, or the University of Wisconsin, Madison, as these hospitals have the most advanced planning and therapeutic equipment for radiation therapy.

An alternative to surgery or radiation therapy is treatment with pasireotide, an injectable medication that blocks the effects of growth hormone within the body. We are currently investigating whether the long-acting version of this medication is available for use. The short-acting version (administered under the skin twice daily) is cost prohibitive for long term use. We will contact you next week to discuss whether this medication may be an option for Paris.

An alternative to definitive treatment or any treatment of Paris's acromegaly at all is simply managing her diabetes, and monitoring her at home. Once her optimal insulin dose is determined, she may do well for years with appropriate management, though we cannot say for sure.

Please perform a blood glucose curve on Paris this weekend and email results to [info.southfield@bluepearlvet.com](mailto:info.southfield@bluepearlvet.com). Depending on these results, we may recommend increasing Paris's insulin dose.