The AAHA Diabetes Guidelines: Update on Diabetes in Dogs and Cats

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Questions to Consider:

What are the major risk factors for diabetes in cats and dogs?

How is feline diabetes different from canine?

How is dietary therapy of cats different from dogs?

What is a major goal of treatment?

What insulins are best for dogs? Which ones are best for cats?

What are the best ways to monitor therapy?

What are the key differences in monitoring cats?

What is Diabetes Mellitus?

“Starvation in the face of plenty” or “sweet urine” – due to the lack of insulin (dogs) or insulin effectiveness (cats)
Canine Diabetes Mellitus

Type I or IDDM
- >50% have autoantibodies
- Most like LADA in humans

Other specific types
- 28% have chronic pancreatitis

Diestrus or progesterone induced in intact females

Type II diabetes in dogs is rare

Rand et al 2004

Feline Diabetes Mellitus

85-90% of cats are type II diabetics
- Insulin resistance due to obesity or drugs
- Impaired insulin secretion

Other causes
- Chronic pancreatitis
- Islet amyloidosis

Fleeman et al, 2004
Rand et al, 2008

Obesity is the Most Important Risk Factor for Feline Diabetes
What Are the Causes Insulin Resistance in Cats?

Hormonal
- Obesity, acromegaly, hyperthyroidism, hyperadrenocorticism

Infection related
- Periodontal disease, UTI

Drug related
- Steroids, megesterol (Ovaban), somogyi effect (chronic insulin overdose)

Breeds With Increased Risk

Known genetic risk
- Keeshonds
- Australian terriers
- Cairn terriers
- Miniature Pinschers
- Burmese (cats)

Frequently affected (suspect genetic predisposition)
- Poodles
- Dachshunds
- Miniature Schnauzers
- Beagles
- Domestic shorthair cats

Breeds with Low Risk of Diabetes

Cocker Spaniels
German Shepherds
Collies
Pekingese
Rottweilers
Boxers
Most purebred cats
Why Do Dogs With Diabetes Require Insulin and Cats May Not?

What is a Typical Diabetic?

Dogs: Spayed female, middle aged, small breeds, thin

Cats: Male, neutered, indoor/inactive, middle aged to older, obese

Typical History?

Polyuria/polydipsia/polyphagia
Weight loss
Cats are obese (but are losing weight), dogs are thin
Normal activity/attitude (except ketoacidotic diabetics - DKA)
May present for evaluation of urinary problem (e.g. hematuria, urinating in house)
Differences in Clinical Disease of Dogs vs Cats

Dogs are more likely to develop cataracts

Peripheral neuropathies are more likely to develop in cats

How Do We Make a Diagnosis of Diabetes in the Dog?

How is diagnosis of diabetes in cats different?

A Cat Presents to Your Clinic and Has a Glucose of 185, What Are the Possible Reasons?

Stress hyperglycemia

Sub-clinical diabetes
**What are the Causes of Persistent Hyperglycemia in Cats?**

- Insulin available but target organs unresponsive (insulin resistance)
- Stress hyperglycemia
- High carbohydrate diets (especially highly digestible carbs) can cause prolonged post-prandial hyperglycemia (Cave et al 2006)
- No insulin produced (beta cell down-regulation or loss/destruction of beta cells)

**Subclinical vs Clinical Diabetes**

- Cats and dogs in early stage of developing diabetes
- May appear healthy, have a stable weight (cats are often obese)
- Must distinguish stress hyperglycemia from other causes in cats, as persistent hyperglycemia causes hyperinsulinemia (the first step in the process of becoming a Type II diabetic)

**Lab Evaluation of Diabetics**

- CBC, Chemistry Panel
  - Non-specific CBC: mild leukocytosis
  - Hyperglycemia, increased SAP/ALT, hypercholesterolemia
  - Liver function studies not needed unless low albumin or very high ALT/GGT/SAP
  - Fatty liver syndrome common
- Urinalysis – essential
  - Glucosuria, bacteriuria (culture)
- Other lab tests: T₄, PLI/TLI, cobalamin (cats)
- Imaging, Blood pressure (cats)
Once a Diagnosis Is Made, What Are the Two Most Important Components of Therapy?

Dietary management
Insulin therapy

Goals of Managing A Diabetic Dog

Reduce or control clinical signs
- PU/PD/PP, weight gain

Prevent complications of disease
- Cataracts, DKA, neuropathies

Maintain quality of life for both dog and owner

Major Difference in Goals for Cats

Goals are similar for quality of life, prevention of complications and reduction of signs

Type II diabetes in cats is a reversible condition with the proper combination of diet, insulin therapy and monitoring – so… the most important difference is the goal to achieve clinical remission in cats
Dietary Therapy in Dogs

 Normalize body weight
 Feed palatable food so that intake is predictable
 Maintain consistency in caloric content and timing of meals
 Minimize post-prandial blood glucose concentrations

Goals of Dietary Therapy in Diabetic Cats: Same but Different Approach

 Normalize body weight – essential to correction of insulin resistance
 Maintain consistency in caloric content of meals but increase frequency
 Minimize postprandial blood glucose
 Reverse to pre-clinical state

What Is the Best Way to Minimize Post-Prandial Hyperglycemia in the Cat?

 Feed a high protein (>45%), low carbohydrate diet
Timed Feeders: Control Intake but Decrease Risk of Hypoglycemia with Meals Every Six Hours

What Is the Best Diet Choice in Canine Diabetics?
A diet that the dog will consistently eat, that normalizes body weight, is not high fat (pancreatitis), does not have high sugar levels (soft moist), and has modest amounts of mixed fiber

Starting Insulin Therapy
First choose an insulin
- Cats: Glargine, PZI
- Dogs: NPH, Porcine Zinc (Lente) insulin suspension
Select a starting dose:
BE CONSERVATIVE!!
- Cats 1 U/cat (1/4 U/kg lean)
- Dogs: 1/2 U/kg q12h
Choosing an Insulin

Intermediate acting insulins (human recombinant NPH, e.g., Humulin or Novolin N, or porcine zinc (lente) insulin suspension, e.g., Vetsulin if it becomes available) give acceptable results in dogs given twice daily.

Long acting insulins (Glargine or PZI) are better for cats and more likely to achieve remission – intermediate acting insulin can be used but often are too short acting and more likely to cause hypoglycemia.

- Starting with BID administration improves remission.

Keys to Insulin Therapy in Dogs

There are no insulins for dogs that are consistently effective for once/day dosing:
- Dogs require BID insulin dosing.

Consistent diet, timing of insulin, and exercise are keys to effective management.

Control common causes of insulin ineffectiveness: UTI, thyroid or adrenal disease, dental/skin/ear infections.

Why Glargine in Cats?

Insulin analogues (not recombinant)

Absorption is slow because it forms hexamers in the sub-Q that are pH dependent that must be broken down to release the insulin.

Slow absorption and effect reduce the risk of hypoglycemic crisis in cats and increase the control of glucose over time (better chance for remission) – also require less frequent monitoring of BG.
What Is the MOST Serious Adverse Effect of Insulin Therapy?

Hypoglycemia

Why is this so difficult to detect in cats?

Monitoring Insulin Therapy: The Owner’s Role

Monitor clinical signs
Monitor urine glucose
  - Negative = hypoglycemia….
  - Positive or ketones – need to reassess
Home monitoring with glucometers
  - Mid-day blood glucose – essential for cats that have severe stress hyperglycemia or travel issues
  - Excellent way to monitor glargine due to long action, lack of short term nadir

Monitoring Options

- Use a monitor the owner is comfortable with
- Animal vs human monitors: pros and cons
Home Monitoring is Ideal in Cats and Easy to Learn

Monitoring the Response to Insulin: The Veterinarian’s Part...

- Overall health maintenance
- Fructosamine
  - Gives “snapshot” of 21 day period – but doesn’t replace curve in dogs or when diagnosing insulin issues
- Blood glucose curves (dogs)
  - Day-to-day variation is enormous
  - Use with Hx, PE, and body wt changes
  - Use with caution in cats – best if home

Evaluating the Blood Glucose Curve
Key Management Points

Be cautious with adjustments until the owner and pet have established their routine.

Tailor the monitoring to the dog or cat and owner but encourage home monitoring.

Treat the pet, not the lab results — especially in assessment of curves in cats done in the clinic.

Cats are prone to development of hypoglycemia due to diabetic remission so insulin therapy and monitoring should be planned with this in mind.
Summary Points

- Minimize complicating factors
- Reduce owner and pet stress
- Don’t seek perfection with glucose levels or curves
- Seek quality of life – reduce PU/PD and PP, normalize body weight
- In cats, use diet (and insulin) to achieve clinical remission

Questions?

Instructions for CE Certificate

1. To complete the evaluation, please go to the following website:
   http://www.keysurvey.com/survey/139266/1246/

2. After completing the evaluation, you will automatically be linked to the Continuing Education Certificate. The CE certificate can only be accessed after the evaluation is completed.

3. Download the CE Certificate (in pdf format) to your computer and print enough copies for those persons viewing the web conference with you.

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If you have any questions about completing the evaluation or accessing your CE certificate, please email us at webconference@aahanet.org or call 800/252-2242.
Questions to the Speakers

Please email your questions to webconference@aahanet.org by Tuesday, December 7, 2010.

Dr. Zoran will provide written responses to all of the questions and they will be posted on AAHA's website by Sunday, December 19, 2010.

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