

Endocrinology

euvg

Case 1

Signalment: 11y FN DSH

Hx: chronic weight loss

Physical exam: HR 220bpm, left-sided systolic murmur, poor coat

Haematology: N

Bioch: ↑ALT



Problem List:

- ↑ALT
- Weight loss
- Murmur
- Tachycardia
- Poor coat

Main DD ↑ALT or AST:

- Primary hepatopathy (cholangiohepatitis)
- Reactive hepatopathy (**hyperthyroidism**, pancreatitis, heart failure)
- Muscle damage

- Cardiomyopathy (HCM is the most common)
- Myocardial hypertrophy (**hyperthyroidism**, hypertension, acromegaly)
- Changes to blood viscosity (anaemia)

- Cardiomyopathy
- **Hyperthyroidism**
- Fear / pain

Systemic: **hyperthyroidism**, EPI
Dermatological

DD chronic GI signs:

- EXTRA-GI

- Pancreas
- Liver
- Renal
- Thyroid

SNAP or Spec fPL, TLI

AUS, BAST, Toxoplasma IgG IgM

Creat, urine

T4 in cats >6 years

- GI

- Neoplasia
- IBD
- Parasites

AUS, thoracic radiographs

Diagnosis of exclusion
VIT B12 in all chronic GI cases

Fenbendazole 50mg/kg q24h 5 days

Hyperthyroidism:

~100% of hyperthyroid cats have **weight loss**

<60% of cases have: V D, PU/PD, hyperactivity, murmur, gallop, tachycardia

Most common lab abnormality: \uparrow ALT



Case 1

- T4 high at 55 nmol/l (ref 15-40) → **confirms hyperthyroidism**
- Systolic blood pressure high at 190 mmHg → **hypertension**
- Echocardiography: concentric hypertrophy of the LV wall, mild dilation of LA → **HCM or HCM phenotype**

Consensus Statements of the American College of Veterinary Internal Medicine (ACVIM) provide the veterinary community with up-to-date information on the pathophysiology, diagnosis, and treatment of clinically important animal diseases. The ACVIM Board of Regents oversees selection of relevant topics, identification of panel members with the expertise to draft the statements, and other aspects of assuring the integrity of the process. The statements are derived from evidence-based medicine whenever possible and the panel offers interpretive comments when such evidence is inadequate or contradictory. A draft is prepared by the panel, followed by solicitation of input by the ACVIM membership that may be incorporated into the statement. It is then submitted to the Journal of Veterinary Internal Medicine, where it is edited before publication. The authors are solely responsible for the content of the statements.

ACVIM consensus statement guidelines for the classification, diagnosis, and management of cardiomyopathies in cats

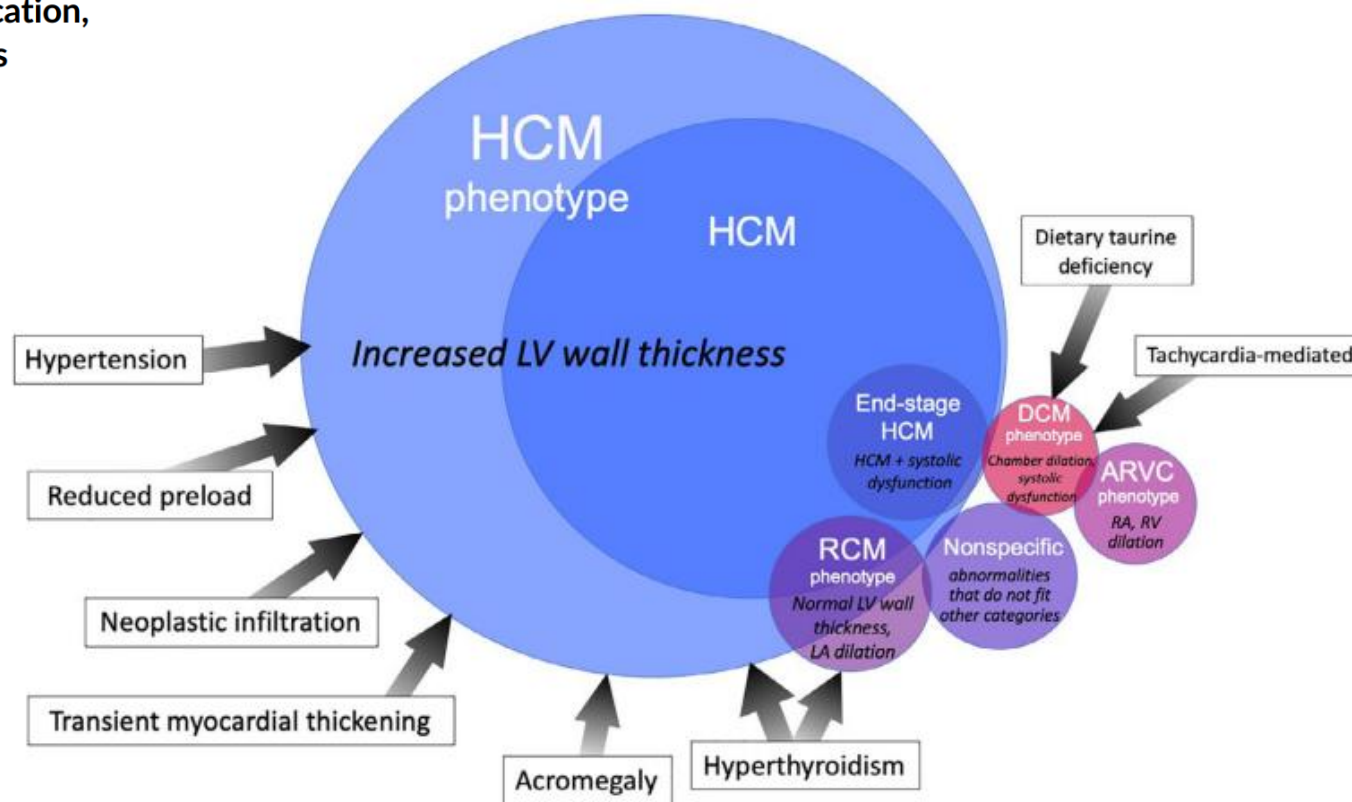


FIGURE 1 Classification of cardiomyopathy phenotypes. (adapted with permission from Clinical Small Animal Internal Medicine, Ed David Bruyette, John Wiley & Son). ARVC, arrhythmogenic right ventricular cardiomyopathy; DCM, dilated cardiomyopathy; End-stage HCM, HCM with systolic dysfunction; HCM, hypertrophic cardiomyopathy; RCM, restrictive cardiomyopathy; TMT, transient myocardial thickening

Diagnosis:

- Hyperthyroidism
- Hypertension
- HCM phenotype

Treatment:

Carbimazole followed by radioactive iodine

Amlodipine 0.625 mg/cat PO q24h

Clopidogrel for LA dilation (to ↓ risk of thromboembolism)

3 months after good control of hyperT4 and hypertension, repeat echocardiogram.

Treatment options for hyperthyroidism:

- 1) carbimazole, methimazole, thiamazole
- 2) Hill's y/d
- 3) Thyroidectomy
- 4) Radioactive iodine = I 131

Anti-thyroid drugs

Pros:

- Cheap

Cons:

- Need to medicate and take blood samples lifelong
- Mass will grow - eventually likely to need higher dose (not cheap anymore!)
- May become carcinoma (resistant to anti-thyroid drugs)
- Side effects: most commonly GI - resolve within a month.

uncommonly haemolytic anaemia, thrombocytopenia, leukopenia, hepatopathy, facial pruritus, lymphadenopathy, M. Gravis - stop immediately

Hill's y/d

Pros:

- Easy

Cons:

- Up to 2 months for T4 to drop to reference
- T4 remains in the upper reference - but goal is lower half of the reference
- When cat becomes anorexic due to another disease, he'll become an uncontrolled hyperthyroid too!
- Cannot eat anything else (must be kept indoors)

Thyroidectomy

Pros:

- Cure (but often only temporary)

Cons:

- GA risk
- Risk of laryngeal nerve damage
- May continue to be hyperthyroid (bilateral or ectopic disease)
- ~75% of hyperthyroid cats have bilateral disease - often hyperthyroid again within 2 years!
- DO NOT REMOVE BOTH THYROID GLANDS, as this will cause hypothyroidism AND hypoparathyroidism
(which requires lifelong medication and blood tests, and can be fatal)

Radioactive Iodine = I131

GOLD STANDARD

Pros:

- Why would you manage a disease lifelong if you can CURE it? Cure includes ectopic, carcinoma, metastasis!!
- Simple (one SC injection then stays in hospital for ~7-10 days)
- Low risk of continuing to be hyperthyroid (5%, resolves after second injection)
- Low risk of needing medication lifelong (15%, only hypothyroid cats who are also azotemic)
- No lifelong blood tests

Cons:

- Cost (but costs the same as ~2 years of medications + blood tests + consults)
- Minimal handling in the first 7-10 days (concern if severe concurrent disease)

Case 2

Signalment: 12y MN DSH

Hx: PU PD polyphagia, weight loss

Physical exam: N

Haematology: N

Bioch: ↑glucose

Problem List:

- PU PD
- polyphagia + weight loss
- ↑ glucose

***rare in the cat**

Most common:

- 2ry NDI: ↓K, ↑Ca, liver, pyelonephritis, steroids, prostatitis*
- Osmotic diuresis: DM, Fanconi & Fanconi-like syndrome *, Addison's*

Less common:

- ↑ GFR: hypertension, hyperthyroidism
- ↓ urea: PU, liver failure
- 1ry or psychogenic PD
- CDI: head trauma, brain tumour.
- 1ry NDI*

- DM
- Stress
- Tumour producing one of the 4 stress hormones

- DM
- Hyperthyroidism
- Maldigestion (EPI)
- Malabsorption (IBD, GI lymphoma)

How do you diagnose DM?

- PU PD PP weight loss + hyperglycaemia + glucosuria
- In dogs you already have a diagnosis.
- In cats, severe hyperglycaemia and glucosuria can be caused with stress → fructosamine.

Further investigations or treat?

Offer both options:

1. Treat first, investigate later if difficult to control.
2. Investigate at the start: T4, vitB12, TLI, spec fPL, AUS, thoracic rads, urine culture, IGF-1 (1month after starting insulin), +-dental polish.

Treatment:

- Long-acting insulin (prozinc or glargine, NOT CANINSULIN)
- **WET low carbohydrate** (<12%, ideally <6%), high protein diet

	ME from carbohydrates	ME from protein	ME from fat
Purina Proplan Veterinary Diets Feline DM - canned	7%	46%	47%
Purina Proplan Veterinary Diets Feline DM - dry	20%	44%	36%
Hill's m/d Feline - canned	14%	43%	43%
Hill's m/d Feline - dry	15%	43%	42%
Hill's w/d Feline - canned	24%	38%	38%
Hill's w/d Feline - dry	37%	41%	22%
Royal Canin Diabetic Feline - canned	15%	47%	38%
Royal Canin Diabetic Feline - dry	26%	45%	29%
Applaws Pate (all flavours)	0%	43%	57%
Applaws Wholesome with Salmon in Jelly	0%	86%	14%
Lily's Kitchen Classic Chicken Dinner - canned	0%	43%	57%
Lily's Organic Fish - canned	0%	40%	60%
Lily's Kitchen Marvelously Mature - dry	39%	30%	32%

You cannot compare % of carbohydrates in DRY and WET diets,
unless you calculate the metabolised energy (ME)

Easy explanation of how to calculate ME from carbs for different diets, and an automatic calculator:

<https://endocrinevet.blogspot.com/2014/01/how-to-calculate-carbohydrate-and.html>

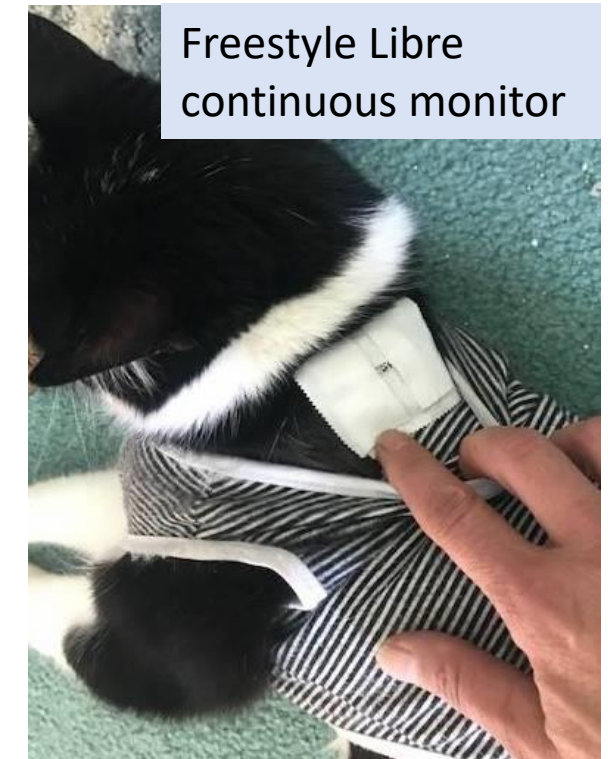
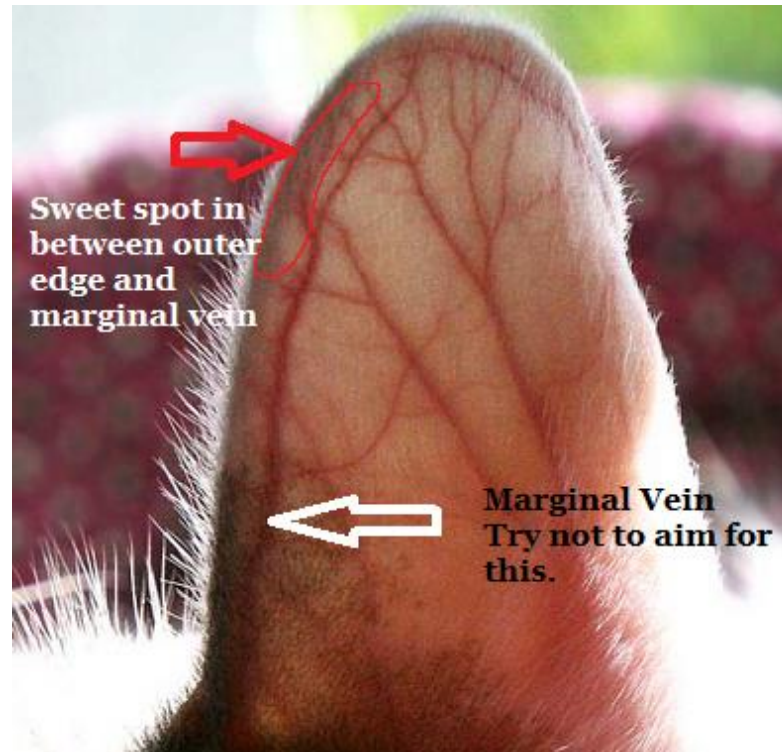
Monitoring requires:

1. Clinical signs

Normal thirst, urination, appetite, weight gain → good control
PD PU polyphagia, weight loss → poor control

2. Glucose curves

It's not possible to interpret a curve without clinical signs, they **must be interpreted TOGETHER!**

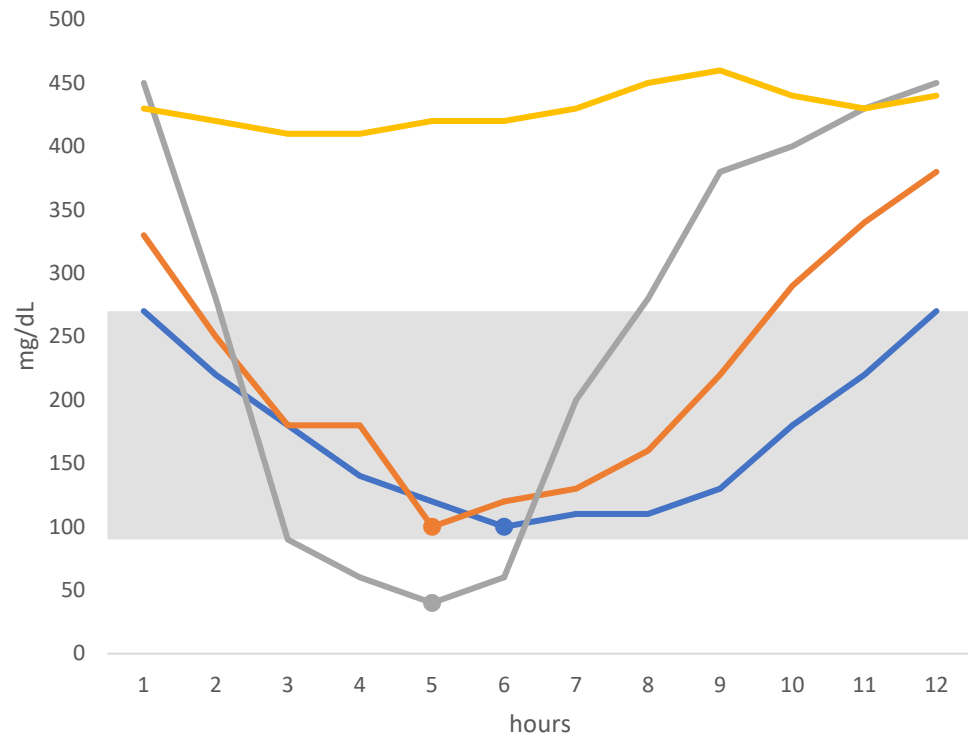


How to interpret a glucose curve - 3 questions:

1. Is the insulin **working**?
2. Is the **nadir** (the lowest BG) appropriate?
3. Is the **duration of action** (period between initial drop and return to baseline or 14 mmol/l (252 mg/dl)) appropriate?

Fructosamine does not answer any of these questions, so I use it for diagnosis but NOT FOR MONITORING.

Exception: aggressive cats where it's not possible to take multiple blood samples.



Nadirs are marked with points.

Food & insulin at 0h and 12h.

Yellow: wrong application or insulin resistance

Grey: Somogyi = rebound hyperglycaemia

Orange: short duration of action

Blue: ideal curve (rarely achieved)

Yellow: ask the owner to show you how he's injecting, storing...
If wrong application ruled out, investigate insulin resistance.

Grey: reduce dose by 25-50%

Orange: if duration <12h and clinical signs of hyperglycaemia,
change to a longer-acting insulin.

Suggested adjustments in insulin dose based on glucose curve results in long-term therapy
(adapted from ISFM and AAHA diabetes management guidelines)

Blood Glucose	Action
Nadir BG <4.5 mmol/l (80 mg/dl)	Reduce insulin dose by 25-50%; Consider longer acting insulin if peak BG >14 mmol/l (252 mg/dl)
Nadir BG 4.5-8.0 mmol/l (80-144 mg/dl) and peak BG >14 mmol/l (252 mg/dl)	If clinical signs are controlled, maintain therapy. If clinical signs are not controlled: Change to a longer acting insulin; If already on long acting insulin, increase dose by 0.5 U/cat q12h
Nadir BG >8.0 mmol/l (144 mg/dl)	Increase insulin by 0.5-1 U/cat q12h
BG 4.5-14 mmol/l (80-252 mg/dl) on all samples throughout the day	Maintain therapy
Pre-insulin BG <4.5 mmol/l (80 mg/dl)	Withhold insulin; if BG rises appreciably later, give 30-50% of previous dose
Pre-insulin BG 4.5-8.0 mmol/l (80-142 mg/dl)	Reduce insulin by 0.5-1 U/cat q12h
Pre-insulin BG 8-10 mmol/l (144-180 mg/dl)	Consider reducing insulin by 0.5 U/cat q12h

DIABETIC REMISSION

Normal blood glucose for >4 weeks without insulin.

Especially in the first 6 months.

Try to avoid relapse: no steroids, WET LOW-CARB diet lifelong.

Factors associated with remission:

- Long-acting insulin
- Wet low-carb diet
- Early control of glycaemia
- Recent steroids
- Home glucose curves (owners want to know!)

Higher remission

No stress affecting results

Cheaper

Owner feels more in control

Priorities on treatment and monitoring of diabetic cats from the owners' points of view

Carolina SC Albuquerque¹ , Bretta L Bauman²,
Janina Rzeznitzek³, Sarah MA Caney⁴
and Daniëlle A Gunn-Moore¹

Abstract

Objectives The aims of this study were to evaluate: owners' perceptions and priorities on the treatment and monitoring of feline diabetes mellitus (DM); the perceived effectiveness of the communication between veterinarians and clients regarding disease management; and the impact DM has on the owners' everyday lives and human–pet bonds.

Methods An initial questionnaire, then an adapted second questionnaire, were available to owners of cats with DM on vetprofessionals.com.

Results A total of 748 questionnaires were completed. At diagnosis, fewer than half of veterinarians discussed how to recognise unstable diabetes (46%) or home blood glucose monitoring (HBGM) (40%). Owners were disappointed that the importance of diet on diabetic remission/stabilisation and HBGM were not discussed. Only

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TOO MUCH INFO - owners will be stressed and retain <50%, so:

Consult with a vet, then follow-up consult with a nurse

Advise to read on forums & websites:

<https://icatcare.org/advice/diabetes-mellitus/>

<https://www.youtube.com/user/iCatCare/videos>

Advice diabetic apps:

RCV Pet Diabetes app

MSD Animal Health's Pet Diabetes Tracker App

Case 3

Signalment: 12y MN DSH

Hx: diagnosed with diabetes 6 months ago, never been controlled (PU PD polyphagia, weight gain)

Physical exam: heart murmur, big cat (6kg).

Haematology: N

Bioch: ↑glucose

Urine: glucose 3+

What's your suspected diagnosis?



A: 7 years old

B: 12 years old
(recent photo)

Uncontrolled diabetes but **GAINING WEIGHT** → acromegaly

1 in 4 or 5 diabetic cats!!!

Diagnosis:

- IGF1 >1000
- Head CT or MRI

Treatment options:

- | | |
|-----------------------|---|
| 1. Hypophysectomy: | gold standard, 85% achieve diabetic remission |
| 2. Pasireotide: | 25% remission |
| 3. Radiation therapy: | often fails to control diabetes |
| 3. Lots of insulin: | will never be well controlled |