



This case report demonstrates the successful use of PURINA® PRO PLAN® VETERINARY DIETS Feline DM S<sub>T</sub>/Ox Diabetes Management in a diabetic cat.

# Clinical remission of *diabetes mellitus* in a cat treated with insulin and fed a high protein, low carbohydrate clinical diet

Dr Eric Zini

Clinic for Small Animal Internal Medicine,  
University of Zürich, Switzerland

## Case History

A 10-year old, 5 kg neutered male, domestic shorthair cat was referred with a diagnosis of *diabetes mellitus* made six weeks earlier. At that time the owner had brought the cat to the veterinarian because of excessive water intake and urination since two weeks. The cat had lost approximately 0.5 kg during the last three months. On blood work hyperglycemia (glucose: 23 mmol/l, reference range: 5–9 mmol/l) and increased serum fructosamine levels (fructosamine: 524 µmol/l, reference range: 203–299 µmol/l) had been observed. On urinalysis the cat had glucosuria without ketonuria. After diagnosis, the cat was started on porcine derived lente-type insulin, at the dosage of 1 U, given twice a day, and feeding a home-made diet had been recommended. Despite therapy lessening of polyuria and polydipsia were not perceived by the owner.

## Physical examination

The cat had unkempt haircoat and reduced muscular masses. Physical examination was otherwise unremarkable.

## Diagnostic Plan and Results

A blood work, including T4 levels, and urinalysis were performed to identify other disorders that may explain persisting polyuria and polydipsia and decreased body weight, in addition to diabetes mellitus (e.g., hyperthyroidism, renal failure). Serum fructosamine levels were determined to estimate glycemic control during the previous two weeks of therapy.

Serum concentration of glucose was 28.2 mmol/l (reference range: 5–9 mmol/l), fructosamine was 792 µmol/l and alkaline phosphatase 188 U/l (reference range: 16–43 U/l). On urine dipstick the cat had 4+ glucosuria (reference range: negative). The remaining blood work and urinalysis were normal.

## Interpretation of Results

Hyperglycemia and glucosuria together with increased fructosamine levels confirmed the diagnosis of *diabetes mellitus*. Fructosamine levels higher than at first diagnosis likely suggested that glycemic control had been inadequate, at least during the preceding two weeks. Increased levels of alkaline phosphatase are frequently observed in diabetic cats and may have suggested cholestasis due to liver lipodosis. The remaining blood work was normal, indicating that persistence of clinical signs was probably due to ineffective treatment of *diabetes mellitus*.

## Further Plan

On the same day an abdominal ultrasound was performed to characterize liver morphology. Liver size and structure were normal but echogenicity of the parenchyma was increased, which is a common finding in cats with liver lipodosis. The cat was continued on porcine derived lente-type insulin at the previous dosage of 1 U, given twice daily.

On the following morning a glucose curve was performed. At 8:00 am the cat was fed and injected with insulin as above. Glucose levels were measured every two hours from 8:00 am to 6:00 pm. Results of the curve showed that glucose levels were > 20 mmol/l at any time point except at 14:00, where the concentration was 16.5 mmol/l (*Figure 1*).

## Therapy and Follow-Up

Because glycemic control was not adequate the dosage of insulin was increased to 1.5 U, twice a day. In addition, the cat was switched from the home-made diet to PURINA® PRO PLAN® VETERINARY DIETS Feline DM S<sub>T</sub>/Ox Diabetes Management (a high protein, 51% as fed, and low carbohydrate, 17% as fed, formula). The cat accepted Feline DM S<sub>T</sub>/Ox Diabetes Management well from the first day.

After one week of therapy, the owner noticed a reduction of polyuria and polydipsia, and on blood work fructosamine levels were decreased to 580 µmol/l. The dosage of insulin was not modified. Two weeks later clinical signs had disappeared and body weight had increased to 5.2 kg. Fructosamine levels dropped further to 370 µmol/l and, based on the glucose curve, the cat was normoglycemic (*Figure 2*). Administration of insulin was thus stopped and the cat was re-assessed one week later. Glucose levels, even though insulin was not administered, remained normal and fructosamine levels were in the reference range (fructosamine concentration 280 µmol/l).

After two months without insulin therapy the cat was still in clinical remission. The cat was kept on Feline DM S<sub>T</sub>/Ox Diabetes Management.

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Glucose curve in diabetic cat prior to increasing insulin dosage to 1.5 U, twice daily and feeding Feline DM S<sub>T</sub>/Ox Diabetes Management

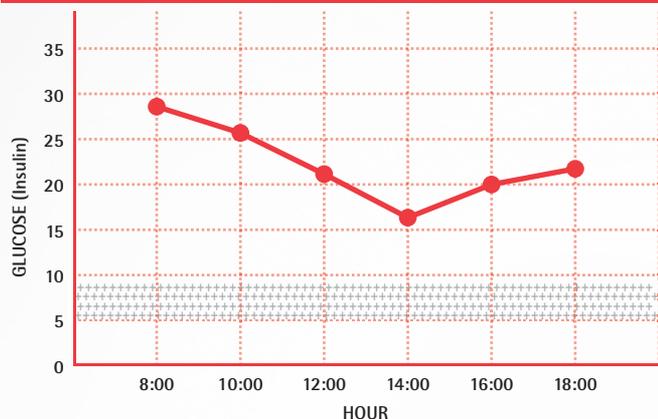


Figure 1. Glucose curve in the diabetic cat prior to increasing insulin dosage to 1.5 U, twice daily, and feeding Feline DM S<sub>T</sub>/Ox Diabetes Management. The reference range for glucose levels is 5-9 mmol/l (grey area).

Glucose curve in the diabetic cat after two weeks of insulin at the dosage 1.5 U, twice daily and feeding Feline DM S<sub>T</sub>/Ox Diabetes Management

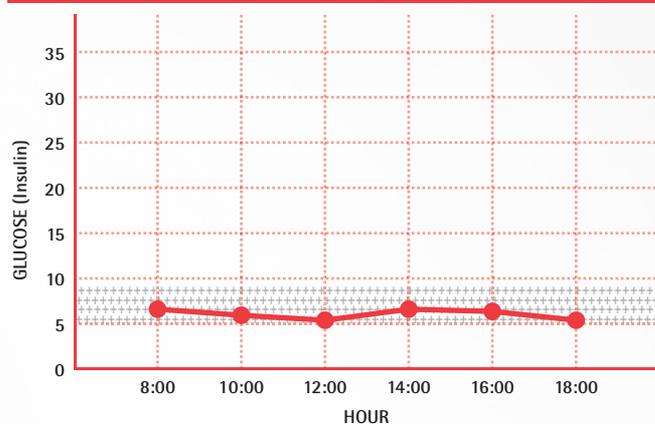


Figure 2. Glucose curve in the diabetic cat after two weeks of insulin at the dosage of 1.5 U, twice daily, and feeding Feline DM S<sub>T</sub>/Ox Diabetes Management. The reference range for glucose levels is 5-9 mmol/l (grey area).

## Discussion

Administration of insulin and dietary management are the mainstays of treatment in cats with diabetes.<sup>1</sup>

In recent years recommendation of diets for the diabetic cats has changed. The cat is a true carnivore which distinguishes it clearly from the omnivorous dog.<sup>2</sup>

The natural diet of wild felids such as mice and birds contains less than 10% of carbohydrates on a dry matter basis. This is very different from many manufactured cat foods which contain high carbohydrate percentage, up to 50%. Cats are metabolically adapted to primarily use protein and fat, and diets high in carbohydrates appear to be unfavourable.

It has been shown that using high-protein-low-carbohydrate diet has beneficial effects on glucose control in diabetic cats, with a 50% reduction of exogenous insulin requirements and an improved rate of recovery.<sup>3</sup>

It is likely that clinical remission of diabetes in the present cat was due to the beneficial effect of Feline DM S<sub>T</sub>/Ox Diabetes Management combined with that of insulin treatment.

Thus, the use of a high-protein-low-carbohydrate diet (e.g., Feline DM S<sub>T</sub>/Ox Diabetes Management) may represent the dietary choice for cats affected by diabetes.



The patient consuming Feline DM S<sub>T</sub>/Ox Diabetes Management.

## References

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2. Kettelhut IC, Foss MC, Migliorini RH: Glucose homeostasis in a carnivorous animal (cat) and in rats fed a high-protein diet. *Am J Physiol* 1980;239:437-44.
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Nestlé Purina would like to thank  
 Dr. Eric Zini at University of Zürich, Switzerland,  
 for providing the details and image of this case.