Forty month-follow up of renal function in cats fed a high-protein diet

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Introduction

Chronic kidney disease (CKD) is common in cats, with prevalence increasing with age.[1,2] Etiology of CKD remains unclear. Among nutritional factors, intake of highly available phosphorus excesses has been demonstrated causing kidney damage or dysfunction in cats.[3] Despite the absence of evidence of any deleterious effect of high-protein diets on the renal function[4,5], there are still concerns regarding the safety of such diets in healthy adult cats. Besides blood analyses commonly performed in vet practices for renal function assessment, symmetric dimethylarginine (SDMA) has been shown to be an accurate kidney biomarker, not affected by protein intake or lean body mass.[6-8]

The objective of this study was to follow up selected parameters of the renal function in adult cats fed a dry high-protein diet for 40 months.

Animals, materials and methods

Ten healthy adult European cats (31±6 month old) previously fed a standard maintenance diet[a], were fed exclusively a new high-protein diet[b] (Tables 1 and 2). The daily rations were calculated to maintain cats' body weight. Fasting blood samples were collected at the start of the study (M0) and then every 2-3 months for 40 months, meaning 19 time points.

Six serum parameters were measured to assess the renal function. Statistical comparisons were performed between each time and M0 for each renal parameter, by ANOVA with repeated measures and Friedman tests, with a 5% significance level.

[a] Virbac Vet Complex™ adult neutered cat with duck
[b] Virbac Veterinary™ HPM adult neutered cat

Table 1: Composition of the previous and test diets

Previous:	Dehydrated animal protein, maize, animal fat, maize protein, wheat, bean hulls, beet pulp, linseed, egg, defated soybean, FOS, borage seed, wheat bran, artichoke leave, minerals.
Test:	Dehydrated pork and poultry protein, potato starch, hydrolysed animal protein, bean hulls, pea, animal fat, lignocellulose, minerals, linseed, beet pulp, rice, FOS, psyllium fibre, chitosan, artichoke leave, pasteurised Lactobacilli.

Table 2: Characteristics of the previous and test diets

Nutritional characteristics	Previous	Test
Metabolisable Energy (ME) (kcal/100g as fed)	381	363
Protein (% ME)	32	46
Fat (% ME)	38	34
Carbohydrate (% ME)	30	20
Calcium (g/Mcal)	2.62	3.58
Phosphorus (g/Mcal)	2.10	2.75
Sodium (g/Mcal)	1.05	1.93

Results

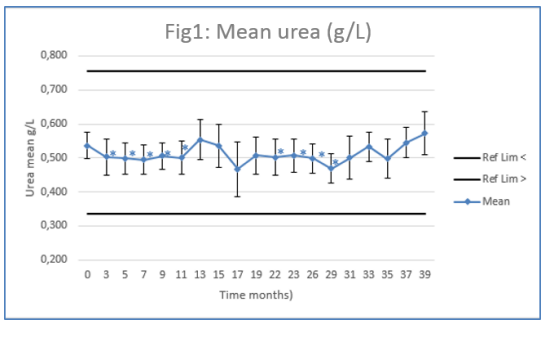
Palatability of the new diet was high, food consumption was correct and the digestive tolerance was good in all cats. Cats remained healthy throughout the study, no side effect in relation with the food has been reported.

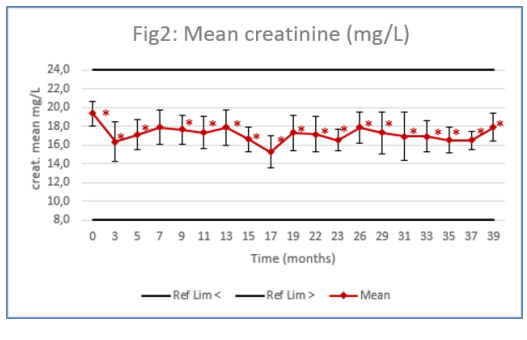
First, regarding the 5 usual kidney parameters, individual values remained within the reference ranges over the study, except for urea in 1 sample (0.21 g/L at M17), albumin in 23 samples of the 10 cats (41 to 45 g/L, all before M20), and phosphates in 1 sample (77.6 mg/L at M13). These exceptions, very close to the reference values and without any correlation between them, were considered incidental and due to biological variability of the markers. The mean values showed some significant changes at some time points *vs* M0: decrease for urea, creatinine and albumin, increase for total proteins, and both decrease and increase for phosphates (Table 3 and Figures 1 and 2).

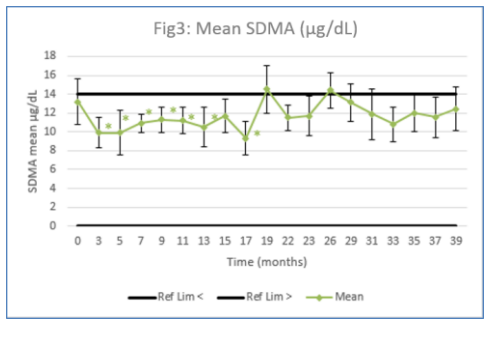
Secondly, regarding SDMA individual results, 7 cats presented minor increases (15-18 µg/dL) at 1 to 5 time points during the study, meaning a total of 19 high values out of 190 samples or 10%. Four of these cats had already high baseline SDMA concentrations (15-17 µg/dL at M0). High SDMA values were never successive in time nor correlated with other abnormal parameters or clinical signs. These 7 cats could be considered as patients with a sub-clinic decline in their renal function, without any degradation throughout the study despite the change in their diet.

Table 3: Mean values and standard deviations after 11,23, 31 and 40 months feeding the test diet (*: significant difference compared to M0)

Serum renal parameters	M0	M11	M23	M31	M40	Laboratory ref ranges
Urea (g/L)	0.53±0.04	0.50±0.04*	0.51±0.05*	0.50±0.06	0.57±0.06	0.34-0.76
Creatinine (mg/L)	19.4±1.3	17.3±1.7*	16.5±1.1*	16.9±2.6*	17.7±1.5*	8.0-24.0
Total proteins (g/L)	68.1±5.8	72.0±3.8	67.0±5.4	70.7±4.4	67.9±4.8	57-89
Albumin (g/L)	43.2±5.6	38.1±1.8*	33.9±2.4*	33.2±2.1*	32.1±2.3*	22-40
Phosphates (mg/L)	49.2±10.0	44.1±7.4*	46.0±4.8	44.6±5.5	58.1±8.4*	31-75
SDMA (µg/dL)	13.2±2.4	11.2±1.4*	11.7±2.1	11.9±2.7	12.3±2.3	0-14







Conclusion

Our results confirmed that a high-protein content in a balanced diet had no negative impact on the renal biomarkers in the long term in healthy adult cats.

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