Two year-follow up of renal function in healthy cats fed a high-protein dry 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[1-2], there are still concerns regarding the safety of such diets in healthy adult cats. Besides blood biochemistry analyses commonly performed in vet practices for renal function assessment, symmetric dimethylarginine (SDMA) has been shown to be an accurate, early, sensitive and precise kidney biomarker, not affected by dietary protein intake or lean body mass.[6-8]

The objective of this study was to follow up selected parameters of the renal function in healthy adult cats fed with a high-protein diet for 2 years.

Animals, materials and methods

Twenty 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 2 years.

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

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.

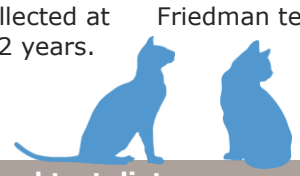
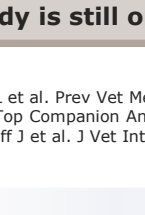


Table 1: Composition of the previous and test diets

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



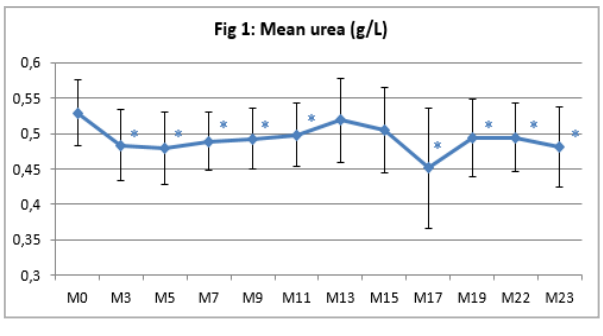
Results

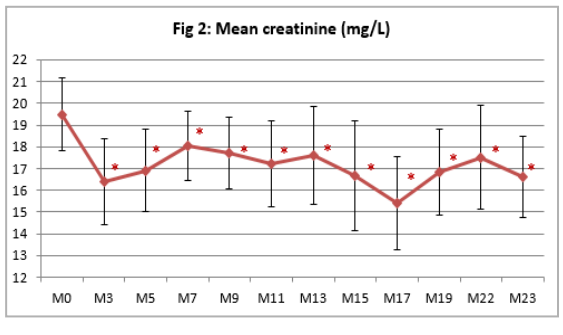
First, regarding usual kidney parameters, individual values remained within the reference ranges over the study, except for urea in 2 out of 220 samples (0.21-0.25 g/L), creatinine in 1 sample (25.1 mg/L), albumin in 31 samples of 15 cats (41-46 g/L), and phosphates in 1 sample (77.6 mg/L). These exceptions did not show any correlation between them, and can be considered incidental and due to biological variability of the biomarkers. **Mean values** for some criteria showed significant changes vs M0, but always remaining within the physiological ranges over the study: decreases for urea, creatinine and albumin, and increase for total proteins (Table 3 and Figures 1 to 3).

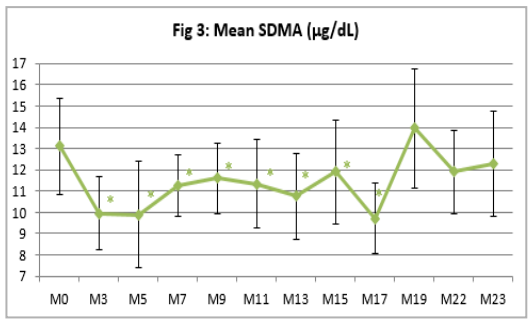
Secondly, regarding SDMA individual results, 7 cats presented each a minor increase (15-19 µg/dL) at only one occasion, and not correlated with other abnormal parameters or clinical signs. Two cats had regularly high SDMA levels, from 15 to 20 µg/dL, over the study. Their baseline SDMA concentrations were already high (14 and 17 µg/dL respectively). Only 1 of these 2 cats presented at one occasion (M15) the association of high SDMA (20 µg/dL) and high creatinine (25.1 mg/L) concentrations. These 2 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. SDMA analyses allowed the detection of these 2 cats.

Table 3: Mean values and standard deviations after 7, 13, 17 and 24 months feeding the test diet (*: significant difference compared to M0)

Serum renal parameters	M0	M7	M13	M17	M24	Laboratory ref ranges
Urea (g/L)	0.53±0.05	0.49±0.04*	0.52±0.06	0.45±0.08*	0.48±0.06*	0.34-0.76
Creatinine (mg/L)	19.5±1.7	18.0±1.6*	17.6±2.3*	15.4±2.1*	16.6±1.9*	8.0-24.0
Total proteins (g/L)	67.6±4.9	72.7±4.0*	70.7±5.5	68.9±5.0	66.7±5.0	57-89
Albumin (g/L)	42.1±5.9	37.1±2.0*	37.8±3.5*	34.7±2.6*	33.2±2.5*	22-40
Phosphates (mg/L)	48.3±8.6	46.1±5.9	46.8±10.4	48.4±7.8	47.2±5.9	31-75
SDMA (µg/dL)	13.1±2.2	11.3±1.4*	10.8±2.0*	9.7±1.7*	12.3±2.5	0-14







Conclusion

These results confirm that a high-protein content in a balanced diet has no negative impact on the renal function in the long term in healthy adult cats. The study is still on-going, results will be communicated at a later stage.

Ref: [1]Hughes KL et al. Prev Vet Med 2002. [2]Greene JP et al. JAVMA 2014. [3]Dobenecker B et al. J Fel Med Surg 2018. [4]Laflamme DP. Top Companion Anim Med 2008. [5]Finco DR et al. Am J Vet Res 1998. [6]Relford R et al. Vet Clin Small Anim 2016. [7]Braff J et al. J Vet Intern Med 2014. [8]Hall JA et al. J Vet Intern Med 2014.

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