Nitric oxide in feline chronic kidney disease and hypertension

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Nitric oxide (NO) is a potent vasodilator reported to be decreased in humans with chronic kidney disease (CKD). Endogenous NO deficiency may contribute to the development of hypertension in cats with CKD. Feline hypertension is treated with amlodipine besylate, which induces NO production in cell culture. NO measurement is technically challenging, and the metabolite nitrite is often used to assess NO production *in vivo*. The aim of this study was to determine blood nitrite concentration in healthy, CKD and hypertensive (HT) cats, and to assess potential changes in nitrite with treatment of hypertension.

All cats were examined at two London-based first opinion practices. Healthy cats had unremarkable physical examination, plasma biochemistry, total T4 and urinalysis. CKD diagnosis was based on plasma creatinine concentration >177 µmol/L on two visits or in conjunction with USG<1.035. Hypertension was diagnosed when systolic blood pressure (SBP) ≥170 mmHg on two consecutive visits or SBP≥160mmHg combined with hypertensive retinopathy. HT cats were sampled at diagnosis (baseline visit) and again once SBP <160 mmHg (controlled visit). Hypertension was treated with amlodipine (0.625–1.25 mg/cat/day). The HT-group consisted of CKD, hyperthyroid and idiopathic hypertensive cats. Immediately after venepuncture ferricyanide preservative solution was added to heparinised blood to prevent breakdown of nitrite. Sample analysis was performed using ozone chemiluminescence, and the technique was validated by determining the assay´s precision, reproducibility, and dilutional parallelism. Blood nitrite concentrations in healthy, CKD, and HT cats were compared using an ANOVA; a paired T-test was used to compare hypertensive and controlled visit. Results are presented as mean±SD.

Intra-assay CV was 9.69±7.25% (n=117, in triplicate); inter-assay CV 20.9±16.1% (n=9, in duplicate). Dilutional parallelism indicated mean recovery of 115±34% (n=3). Thirty healthy, 27 CKD and 12 HT cats were included. There was no significant difference between groups (Healthy: 324.0±88.6, CKD: 352.2±16.9, HT: 419.4±198.3 nM, P=0.17), nor between baseline and controlled visits (419.4±198.3; 414.1±223.1 nM respectively, P=0.95).

This study found no evidence for lower endogenous NO production in CKD cats or of NO deficiency being a factor in the development of hypertension. Treatment with amlodipine besylate did not increase blood nitrite concentration. These results, however, should be interpreted in light of the validation. Measured nitrite concentrations were lower than in humans, which could have affected the accuracy of the technique. Future work should therefore also focus on other factors involved in NO metabolism.

The kinetics of weight loss in obese client-owned cats

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Generally, studies investigating weight management in obese cats only assess certain aspects of the weight loss process and, frequently, only focus on the early stages of weight loss. Whilst such information is helpful, it might not properly reflect a complete weight management regime. The aim of the current study was to examine the kinetics of a complete weight management cycle in obese client-owned cats.

Cats referred to the Royal Canin Weight Management Clinic, University of Liverpool, for the management of obesity, were eligible for inclusion. All cats were followed until they had either completed (i.e. reached target weight) or the programme was discontinued. Rate of weight loss, percentage weight lost, energy intake, and number of cats remaining on the programme were assessed at different time points.

A total of 62 cats were included, with median age of 90 months (range 16–156 months), consisting mainly of the domestic shorthair breed (56/62). Both male (38) and female (24) cats were included, and the majority were neutered. Rate of weight loss steadily decreased throughout the weight loss period (d28: 1.0 ±0.67%/wk; d56: 0.6 ±0.56%/wk; d84: 0.4 ±0.40%/wk; d168: 0.4 ±0.22%/wk; d252 0.3 ±0.27%/wk; d672: 0.0 ±0.19%/wk; *P*<0.001). The energy intake required to maintain weight loss also progressively decreased (*P*<0.001). By day 84, mean ±sd weight loss was 8±5.0%, and compliance was good, but most had not reached target weight (5% completed, 84% ongoing, 11% discontinued). Thereafter, more cats completed, but the number of discontinuing also increased (d252: 16±5.7% weight loss, 27% completed, 40% ongoing, 33% discontinued; d672: 25±3.5% weight loss; 44% completed, 5% ongoing, 51% discontinued).

Initial weight loss is good in obese cats but, thereafter, steadily worsens. Thus, studies examining only the first few months of weight loss are not fully representative of the entire weight loss process.