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[Am J Vet Res.](#) 2010 May;71(5):501-7.

Fluid balance, glomerular filtration rate, and urine output in dogs anesthetized for an orthopedic surgical procedure.

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Abstract

OBJECTIVE: To determine fluid retention, glomerular filtration rate, and urine output in dogs anesthetized for a surgical orthopedic procedure. **ANIMALS:** 23 dogs treated with a tibial plateau leveling osteotomy. **PROCEDURES:** 12 dogs were used as a control group. Cardiac output was measured in 5 dogs, and 6 dogs received carprofen for at least 14 days. Dogs received oxymorphone, atropine, propofol, and isoflurane for anesthesia (duration, 4 hours). Urine and blood samples were obtained for analysis every 30 minutes. Lactated Ringer's solution was administered at 10 mL/kg/h. Urine output was measured and glomerular filtration rate was estimated. Fluid retention was measured by use of body weight, fluid balance, and bioimpedance spectroscopy. **RESULTS:** No difference was found among control, cardiac output, or carprofen groups, so data were combined. Median urine output and glomerular filtration rate were 0.46 mL/kg/h and 1.84 mL/kg/min. Dogs retained a large amount of fluids during anesthesia, as indicated by increased body weight, positive fluid balance, increased total body water volume, and increased extracellular fluid volume. The PCV, total protein concentration, and esophageal temperature decreased in a linear manner. **CONCLUSIONS AND CLINICAL RELEVANCE:** Dogs anesthetized for a tibial plateau leveling osteotomy retained a large amount of fluids, had low urinary output, and had decreased PCV, total protein concentration, and esophageal temperature. Evaluation of urine output alone in anesthetized dogs may not be an adequate indicator of fluid balance.

[Am J Vet Res.](#) 2010 Mar;71(3):374-80.

In vitro comparison of plain radiography, double-contrast cystography, ultrasonography, and computed tomography for estimation of cystolith size.

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Abstract

OBJECTIVE: To compare accuracy of estimates of cystolith size obtained by means of plain radiography, double-contrast cystography, ultrasonography, and computed tomography. **SAMPLE POPULATION:** 30 canine cystoliths ranging from 1 to 11 mm in diameter with various mineral compositions. **PROCEDURES:** A bladder phantom model was created by filling a rubber balloon with saline (1% NaCl) solution and positioning it on top of a 2% gelatin cushion at the bottom of a water-filled 4-quart container. Cystoliths were individually placed in the bladder phantom and imaged by each of the 4 techniques. For each image, cystolith size was measured by 2 radiologists with computerized calipers, and size estimates were compared with actual cystolith size. **RESULTS:** Mean cystolith size estimates obtained by means of radiography, cystography, and computed tomography did not differ significantly from each other. However, for ultrasonographic images, mean +/- SD difference between actual and estimated cystolith size (2.95 +/- 0.73 mm) was significantly higher than mean difference for radiographic, cystographic, and computed tomographic images. For ultrasonography, mean +/- SD percentage overestimation in cystolith size was 68.4 +/- 51.5%. **CONCLUSIONS AND CLINICAL RELEVANCE:** Results indicated that measurements of cystolith size obtained by means of ultrasonography may overestimate the true size. This suggests that cystolith size estimates obtained by means of ultrasonography should be interpreted with caution whenever cystolith size may influence patient management.

[Am J Vet Res.](#) 2010 Mar;71(3):288-92.

Effect of semen in urine specimens on urine protein concentration determined by means of dipstick analysis.

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Abstract

OBJECTIVE: To determine the effect of semen in urine specimens on urine protein concentration measured by means of dipstick analysis. **SAMPLE POPULATION:** 14 urine samples from 3 adult castrated male dogs and 14 semen samples from 7 adult sexually intact male dogs. **PROCEDURES:** Serial dilutions of the whole ejaculate or spermatozoa-free seminal fluid in urine were created, and unaltered and diluted urine samples were analyzed by means of a commercially available dipstick; pH and specific gravity of the samples were also measured. Spermatozoa and WBC counts of the semen samples and protein concentration of the seminal fluid were determined. **RESULTS:** Protein concentrations determined by means of dipstick analysis of urine

samples to which whole ejaculate (dilutions of 1:1, 1:2, 1:16, 1:64, and 1:256) or seminal fluid (dilutions of 1:1, 1:2, 1:16, and 1:64) had been added were significantly higher than concentrations in unaltered urine samples. All 13 samples to which whole ejaculate was added at a dilution of 1:2 and 10 of 12 samples to which seminal fluid was added at a dilution of 1:2 were positive for blood on dipstick analysis. There was no significant linear correlation between spermatozoa or WBC count of the semen sample and protein concentration of the spermatozoa-free seminal fluid. **CONCLUSIONS AND CLINICAL RELEVANCE:** Results suggested that regardless of whether spermatozoa were present, semen contamination could result in false-positive results for protein and blood during dipstick analysis of urine samples from sexually intact male dogs.

[Am J Vet Res.](#) 2010 Feb;71(2):241-7.

Assessment of urinary N-acetyl-beta-D-glucosaminidase activity in geriatric cats with variable plasma creatinine concentrations with and without azotemia.

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Abstract

OBJECTIVE: To validate a non-automated technique for the measurement of urinary N-acetyl-beta-D-glucosaminidase (NAG) activity in cats and assess the correlation between NAG index, plasma creatinine concentration, and proteinuria. **ANIMALS:** 197 client-owned cats (> or = 9 years old; 119 neutered males and 78 neutered females) of which 103 had previously been determined to have chronic kidney disease (CKD). **PROCEDURES:** Preliminary assay validation was performed for a non-automated colorimetric technique for quantification of NAG activity. The effect of storage of samples was examined. A cross-sectional study was performed to assess urinary NAG index in cats with variable plasma creatinine concentrations and with proteinuria, as quantified by use of the urine protein-to-creatinine ratio (UP:C). **RESULTS:** Interassay coefficients of variance (CVs) in cats with low (mean, 0.64 U/L), medium (mean, 4.38.U/L), and high (mean, 8.48 U/L) urine NAG activity were 25.9%, 14.4%, and 25.1%, respectively, but intra-assay CVs were < 20%. Urine NAG activity was stable for 4 freeze-thaw cycles and for storage at -20 degrees C. There was no significant difference in log NAG index when cats (n = 197) were grouped according to plasma creatinine concentration, but a moderate positive correlation was found between log NAG index and log UP:C (r2 = 0.259). **CONCLUSIONS AND CLINICAL RELEVANCE:** N-acetyl-beta-D-glucosaminidase activity can be quantified in feline urine by use of a non-automated colorimetric technique. However, data should be interpreted cautiously because of high interassay CVs. The NAG index in cats with CKD may be indicative of ongoing lysosomal activity rather than active proximal tubular cell damage.

[Am J Vet Res.](#) 2010 Feb;71(2):235-40.

Evaluation of a urine dipstick test for confirmation or exclusion of proteinuria in dogs.

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Abstract

OBJECTIVE: To evaluate a urine dipstick test as a possible replacement for urine protein-to-creatinine (UPC) ratio for identifying proteinuria in dogs. **SAMPLE POPULATION:** 507 urine samples from adult dogs. **PROCEDURES:** Urine dipstick, UPC ratio, specific gravity (USG), and sediment testing were performed on 507 samples. With UPC ratio as the reference criterion, diagnostic accuracy of the urine dipstick test was calculated for the entire data set and for urine samples grouped by USG (< or = 1.012 or > 1.012; < 1.030 or > or = 1.030). A UPC ratio < 0.2 was used to indicate absence of proteinuria. **RESULTS:** The sensitivity of the urine dipstick test for detection of proteinuria was > 90% when 0 mg of protein/dL (a 0+ result) was used to indicate a negative test result, and the specificity ranged from 40% to 60%, depending on the USG. Sensitivity decreased to a range of 56% to 81% when 30 mg of protein/dL (a 1+ result) was used as the cutoff, depending on the USG, but the specificity increased to > 90%. The likelihood of correctly identifying nonproteinuric dogs was low when the USG was < or = 1.012, particularly when samples with a 1+ result were considered negative. **CONCLUSIONS AND CLINICAL RELEVANCE:** For dogs with a dipstick-test result of 1+ and USG < or = 1.012, proteinuria should be assessed by use of the UPC ratio; dogs with a USG value > 1.012 are likely nonproteinuric. When used together, the urine dipstick test and USG measurement were reliable as a rapid alternative to UPC ratio determination in dogs in this study.

[Am J Vet Res.](#) 2009 Nov;70(11):1426-32.

Effects of renal autograft ischemia and reperfusion associated with renal transplantation on arterial blood pressure variables in clinically normal cats.

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Abstract

OBJECTIVE: To evaluate the effect of renal autograft ischemia and reperfusion associated with renal transplantation on pulse rate and pressure and arterial blood

pressure variables in clinically normal cats. ANIMALS: 10 cats. PROCEDURES: A radiotelemetric implant was placed in each cat to measure hemodynamic variables; baseline data were recorded before surgery. Standard heterotopic renal implantation and contralateral nephrectomy were performed (day 0). Autografts were stored in cold sucrose phosphate solution for 30 minutes (n = 5) or 3 hours (5); cats were anephric during this period. Hemodynamic variables were recorded every 5 minutes for up to 16 days after surgery; mean daily values were calculated. RESULTS: Data from 6 cats were available for analysis. Two cats developed ureteral obstructions and became azotemic at 111 and 197 hours after kidney reperfusion. Mean serum creatinine and BUN concentrations were greater than baseline values on days 1 and 2. Although changes from baseline hemodynamic values were detected in some cats, arterial blood pressure measurements did not change significantly from baseline at any time point. Compared with baseline data, mean pulse rate was increased on days 1 and 2 and days 6 through 12; mean pulse pressure was increased on days 1 and 2. CONCLUSIONS AND CLINICAL RELEVANCE: In clinically normal cats, hypertension was not induced by clinically relevant periods of ischemia-reperfusion injury of renal autografts and was not an inherent consequence of the transplantation process. Causes of marked posttransplantation hypertension in cats with chronic kidney disease require further investigation.

[Am J Vet Res.](#) 2009 Nov;70(11):1401-6.

Prevalence of urovirulence genes *cnf*, *hlyD*, *sfa/foc*, and *papGIII* in fecal *Escherichia coli* from healthy dogs and their owners.

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Abstract

OBJECTIVE: To determine the prevalence of 4 urovirulence genes in fecal *Escherichia coli* isolates from healthy dogs and their owners and to determine whether detection of *E coli* strains with these genes was associated with a history of urinary tract infection (UTI). SAMPLE POPULATION: 61 healthy dog-owner pairs and 30 healthy non-dog owners. PROCEDURES: A fecal specimen was obtained from each participant, and 3 colonies of *E coli* were isolated from each specimen. A multiplex PCR assay was used to detect 4 genes encoding virulence factors: cytotoxic necrotizing factor (*cnf*), hemolysin (*hlyD*), s-fimbrial and F1C fimbriae adhesin (*sfa/foc*), and pilus associated with pyelonephritis G allele III (*papGIII*). Human participants completed a questionnaire to provide general information and any history of UTI for themselves and, when applicable, their dog. RESULTS: 26% (16/61) of dogs, 18% (11/61) of owners, and 20% (6/30) of non-dog owners had positive test results for ≥ 1 *E coli* virulence gene. One or more genes were identified in fecal *E coli* isolates of both dog and owner in 2% (1/61) of households. There was no difference in the detection of any virulence factor between dog-owner pairs. Female

owner history of UTI was associated with detection of each virulence factor in E coli strains isolated from their dogs' feces. **CONCLUSIONS AND CLINICAL RELEVANCE:** Dogs and humans harbored fecal E coli strains possessing the genes *cnf*, *hlyD*, *sfa/foc*, and *papGIII* that encode urovirulence factors. It was rare for both dog and owner to have fecal E coli strains with these virulence genes.

[Am J Vet Res.](#) 2009 Nov;70(11):1315-22.

Measurement of plasma renin concentration in cats by use of a fluorescence resonance energy transfer peptide substrate of renin.

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Abstract

OBJECTIVE: To evaluate the use of a commercially available 5-carboxyfluorescein-based, intramolecularly quenched, fluorescence resonance energy transfer (FRET) peptide substrate of renin for measurement of plasma renin concentration in cats. **SAMPLE POPULATION:** Plasma samples obtained during a previous study of renal autograft ischemia-reperfusion injury in 10 cats and samples of fetal bovine serum containing recombinant human renin (rh-renin). **PROCEDURES:** Experiments involving samples of fetal bovine serum containing rh-renin were conducted to identify a suitable control vehicle, optimal substrate concentration, and appropriate duration of incubation. With the use of the identified assay conditions, a standard curve was constructed to allow conversion of relative fluorescent units into values of renin concentration (ng/mL). Subsequently, plasma samples obtained from cats before and after renal autograft ischemia-reperfusion injury were assayed to determine endogenous renin concentration. **RESULTS:** Under conditions of a 1:50 substrate dilution and 4-hour incubation period, the assay detected small amounts of rh-renin in fetal bovine serum. A linear relationship ($R(2) = 0.996$) between the relative fluorescent units generated and exogenous rh-renin concentration was evident. The assay detected renin in plasma samples obtained from cats after renal autograft ischemia-reperfusion, and renin concentrations on days 1 and 2 after transplant differed significantly. **CONCLUSIONS AND CLINICAL RELEVANCE:** The study data indicated that the assay involving the FRET peptide substrate of renin is potentially a rapid and specific method for measurement of plasma renin concentration in cats.

[Am J Vet Res.](#) 2009 Sep;70(9):1135-40.

Evaluation of serum iohexol clearance for use in predicting carboplatin clearance in cats.

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Abstract

OBJECTIVE: To determine whether a glomerular filtration rate (GFR) assay based on serum iohexol clearance can be used to predict carboplatin clearance in cats.
ANIMALS: 10 cats with tumors. **PROCEDURES:** GFR was measured concurrently by use of plasma clearance of technetium Tc 99m-labeled diethylenetriaminepentaacetic acid ((99m)Tc-DTPA) to yield GFR(99mTc-DTPA) and serum clearance of iohexol to yield GFR(Iohexol). A single dose of carboplatin was administered IV as a bolus. Dose was calculated by use of a target value for the area under the plasma platinum concentration-versus-time curve (AUC(Target)) and estimation of platinum clearance (CL(PT)) derived from GFR(99mTc-DTPA) as follows: $\text{dose} = \text{AUC}(\text{Target}) \times 2.6 \times \text{GFR}(99\text{mTc-DTPA}) \times \text{body weight}$, where AUC(Target) is 2.75 min.mg.mL(-1). Plasma platinum concentrations were measured via atomic absorption spectrophotometry. Values for GFR(99mTc-DTPA) and GFR(Iohexol) were compared by use of least-squares regression and Bland-Altman analysis. Least-squares regression was used to determine whether CL(PT) could be predicted from GFR(99mTc-DTPA) or GFR(Iohexol) (or both). **RESULTS:** GFR(99mTc-DTPA) and GFR(Iohexol) were strongly correlated ($r = 0.90$), but GFR(Iohexol) values were significantly larger by a factor of approximately 1.4. Platinum clearance had a significant linear relationship to GFR(99mTc-DTPA) ($\text{CL}(\text{PT}) = 2.5 \times \text{GFR}(99\text{mTc-DTPA})$) and to GFR(Iohexol) ($\text{CL}(\text{PT}) = [1.3 \times \text{GFR}(\text{Iohexol})] + 1.4$). **CONCLUSIONS AND CLINICAL RELEVANCE:** In cats, serum iohexol clearance was an accurate predictor of CL(PT) and can be used to calculate the carboplatin dose as follows: $\text{dose} = \text{AUC}(\text{Target}) \times ([1.3 \times \text{GFR}(\text{Iohexol})] + 1.4) \times \text{body weight}$.

[Am J Vet Res.](#) 2009 Sep;70(9):1108-16.

Comparison of clonal relatedness and antimicrobial susceptibility of fecal Escherichia coli from healthy dogs and their owners.

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Abstract

OBJECTIVE: To determine prevalence of within-household sharing of fecal Escherichia coli between dogs and their owners on the basis of pulsed-field gel electrophoresis (PFGE), compare antimicrobial susceptibility between isolates from dogs and their owners, and evaluate epidemiologic features of cross-species sharing by use of a questionnaire. **SAMPLE POPULATION:** 61 healthy dog-owner pairs and 30 healthy control humans. **PROCEDURES:** 3 fecal E coli colonies were isolated from

each participant; PFGE profiles were used to establish relatedness among bacterial isolates. Susceptibility to 17 antimicrobials was determined via disk diffusion. A questionnaire was used to evaluate signalment, previous antimicrobial therapy, hygiene, and relationship with dog. RESULTS: A wide array of PFGE profiles was observed in E coli isolates from all participants. Within-household sharing occurred with 9.8% prevalence, and across-household sharing occurred with 0.3% prevalence. No behaviors were associated with increased clonal sharing between dog and owner. No differences were found in susceptibility results between dog-owner pairs. Control isolates were more likely than canine isolates to be resistant to ampicillin and trimethoprim-sulfamethoxazole. Owners and control humans carried more multidrug-resistant E coli than did dogs. CONCLUSIONS AND CLINICAL RELEVANCE: Within-household sharing of E coli was detected more commonly than across-household sharing, but both direct contact and environmental reservoirs may be routes of cross-species sharing of bacteria and genes for resistance. Cross-species bacterial sharing is a potential public health concern, and good hygiene is recommended.

[Am J Vet Res.](#) 2009 Jul;70(7):826-30.

Effects of meloxicam on plasma iohexol clearance as a marker of glomerular filtration rate in conscious healthy cats.

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Abstract

OBJECTIVE: To investigate the effect of therapeutic dosages of meloxicam on the plasma clearance of iohexol in healthy, euvoletic, conscious cats fed a sodium-replete diet. ANIMALS: 6 healthy adult neutered male cats. PROCEDURES: For each treatment period in a masked, randomized, crossover study, cats were administered either no treatment or meloxicam. Iohexol clearance studies were performed before the treatment period began (baseline) and on the final day of the treatment period. Iohexol concentrations were determined by use of a high-performance liquid chromatography assay, and plasma iohexol clearance as a marker of glomerular filtration rate was calculated by use of a 1-compartment model. RESULTS: No significant treatment effect was detected. Mean \pm SE iohexol clearance for cats administered meloxicam (3.31 \pm 0.27 mL/min/kg) was not significantly different from mean baseline value for the meloxicam treatment period (3.07 \pm 0.32 mL/min/kg). CONCLUSIONS AND CLINICAL RELEVANCE: In this study, short-term meloxicam administration did not measurably alter the glomerular filtration rate as assessed via plasma clearance of iohexol. This suggests that renal prostaglandins in cats did not have a measurable effect on glomerular filtration rates in healthy, euvoletic, conscious states as determined on the basis of methods used in this study.

[Am J Vet Res.](#) 2009 Jun;70(6):770-6.

Phase I evaluation of carboplatin by use of a dosing strategy based on a targeted area under the platinum concentration-versus-time curve and individual glomerular filtration rate in cats with tumors.

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Abstract

OBJECTIVE: To determine whether a carboplatin dose calculation that is based on a targeted area under the concentration-versus-time curve (AUC(Target)) and individual glomerular filtration rate (GFR) accurately predicts carboplatin-associated myelotoxicoses in tumor-bearing cats, and to determine the maximum tolerated AUC(Target). **ANIMALS:** 32 cats with tumors. **PROCEDURES:** In each cat, plasma clearance of technetium Tc 99m-labeled diethylenetriaminepentaacetic acid was measured to assess GFR. Carboplatin was administered IV. The dose was calculated by use of an equation as follows: $\text{Dose} = \text{AUC}(\text{Target}) \times 2.6 \times \text{GFR} \times \text{body weight}$. Initial AUC(Target) was 2.0 min.mg.mL(-1) and was increased in increments of 0.50 min.mg.mL(-1) in cohorts of 3 cats. To assess myelotoxic effects, CBCs were performed weekly for > or = 4 weeks. Following identification of the maximum tolerated AUC(Target), additional cats were treated at that AUC(Target) and plasma platinum concentrations were measured in 6 cats. **RESULTS:** The AUC(Target) values ranged from 2.0 to 3.0 min.mg.mL(-1). Neutropenia was the dose-limiting toxicosis, and the maximum tolerated AUC(Target) was 2.75 min.mg.mL(-1). Nineteen cats received this dose of carboplatin; 13 became neutropenic, but only 1 developed severe neutropenia (< 500 neutrophils/microL), and none had neutropenia-associated clinical signs. In the cats that had plasma platinum concentration determined, the difference between AUC(Target) and the measured value ranged from -0.23 to 0.31 min.mg.mL(-1) (median, 0.20 min.mg.mL(-1)). **CONCLUSIONS AND CLINICAL RELEVANCE:** In cats, carboplatin-associated myelotoxicoses were accurately and uniformly predicted by use of the proposed dosing strategy. The maximum tolerated AUC(Target) for a single dose of carboplatin was 2.75 min.mg.mL(-1).

[Am J Vet Res.](#) 2009 Jun;70(6):741-9.

Urinary iodide concentration in hyperthyroid cats.

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Abstract

OBJECTIVE: To compare concentrations of urinary iodide (UI) in euthyroid and untreated hyperthyroid cats. **ANIMALS:** 118 euthyroid and 88 hyperthyroid client-owned cats from 2 nonreferral veterinary practices. **PROCEDURES:** Iodide concentration was measured in 5 urine samples collected every 3 to 12 months from selected cats, and variability of results between euthyroid cats and hyperthyroid cats prior to the diagnosis of hyperthyroidism was evaluated via 1-way ANOVA, after logarithmic transformation of UI concentrations (logUIs). The UI concentration in hyperthyroid cats was measured at diagnosis and 2 to 6 weeks and 3 to 6 months after treatment for hyperthyroidism. The pretreatment logUI in hyperthyroid cats was compared with that in euthyroid cats, taking into account the effects of renal function on UI concentration. Iodine intake was estimated in euthyroid cats following calculation of the volume of daily urine output, with a fixed value for iodine concentration in feces. **RESULTS:** The variability of UI concentrations did not differ significantly between hyperthyroid (n = 10) and euthyroid (8) cats. The logUI increased 2 to 6 weeks after initiation of treatment in hyperthyroid cats (n = 80) and was lower in azotemic versus nonazotemic cats. Hyperthyroid cats had a lower logUI than euthyroid cats, and there was no evidence of deficient iodine intake in euthyroid cats. **CONCLUSIONS AND CLINICAL RELEVANCE:** The logUI was lower in cats with azotemia and with untreated hyperthyroidism, compared with that in euthyroid cats from the same population. Additional studies are needed to determine whether iodine intake plays a role in the development of hyperthyroidism in cats.

Journal of the American Animal Hospital Association (May 09 to May 2010)

[J Am Anim Hosp Assoc.](#) 2010 May-Jun;46(3):209-14.

Bilateral ureteral ectopia with renal dysplasia and urolithiasis in a dog.

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Abstract

A 7-month-old, 4.3-kg, spayed female bichon frise was referred for evaluation of chronic urinary incontinence. Abdominal radiographs revealed calculi within the right kidney and ureter. An ultrasound revealed a small right kidney. An abdominal computed tomography scan with contrast revealed that the left ureter was extramurally ectopic, inserting into the proximal urethra. A right intramural ectopic ureter was identified during cystotomy. Ureteronephrectomy was performed on the

right, and ureteroneocystostomy was performed on the left. A telephone conversation with the owner 4 months after surgery revealed that the dog exhibited no evidence of urine dribbling, and urinary continence was maintained well on phenyl-propanolamine (1.75 mg/kg orally q 12 hours). This is the first report of successful surgical management of bilateral ureteral ectopia with concurrent, unilateral, renal dysplasia and urolithiasis.

[J Am Anim Hosp Assoc.](#) 2010 May-Jun;46(3):203-8.

Heterobilharzia americana Infection and Glomerulonephritis in a Dog.

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Abstract

Schistosomiasis is an uncommonly reported disease that usually causes weight loss, anemia, and gastrointestinal signs. A 6-year-old, neutered male dog developed membranoproliferative glomerulonephritis concurrent with infection with the trematode parasite *Heterobilharzia americana*. At presentation, the dog had proteinuria, hypoalbuminemia, hyperglobulinemia, and anemia. Diagnosis was based upon the histopathological appearance of the kidney. Clinical signs, biochemical and hematological abnormalities, and proteinuria resolved following treatment with fenbendazole and praziquantel. Fecal examination by saline sedimentation, miracidia hatching, or *Heterobilharzia* polymerase chain reaction assay may be indicated when examining a dog that is presented with unexplained glomerulonephritis and is from an endemic area.

[J Am Anim Hosp Assoc.](#) 2009 Nov-Dec;45(6):301-4.

Unilateral hydronephrosis and partial ureteral obstruction by entrapment in a granuloma in a spayed dog.

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Abstract

A 6-year-old, spayed female dog had hydronephrosis and incomplete ureteral occlusion on the left side. An end-to-side ureteral anastomosis was performed. The incomplete ureteral occlusion was determined to be related to an ovarian pedicle granuloma formation and was presumably related to a reaction to the suture material used for ovariohysterectomy (OVH) performed 5 years prior to

presentation. Azotemia and hydronephrosis were dramatically improved after surgery, and renal function has been well maintained for 3 years. To the authors' knowledge, a chronic partial ureteral occlusion associated with an ovarian pedicle granuloma from an OVH has not been reported.

[J Am Anim Hosp Assoc.](#) 2009 Nov-Dec;45(6):277-83.

Phimosis in cats: 10 cases (2000-2008).

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Abstract

Medical records of 10 cats diagnosed with phimosis were reviewed. The most common clinical signs exhibited were stranguria and pollakiuria, which occurred in eight out of 10 cats. The diagnosis of phimosis was made from physical examination alone in all cats. Eight of the 10 cats had surgical widening of the preputial orifice. Seven of these eight cats had follow-up of $>$ or $=$ 1 month, consisting of communications with the owner or referring veterinarian, who revealed resolution of preoperative clinical signs that were attributed to phimosis.

[J Am Anim Hosp Assoc.](#) 2009 Sep-Oct;45(5):249-52.

Syndrome of inappropriate antidiuretic hormone secretion associated with congenital hydrocephalus in a dog.

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Abstract

A 13-month-old, male bichon frise was examined for the investigation of intermittent seizures, ataxia, abnormal behavior, polyuria, and polydipsia. At presentation, clinical and neurological examinations were unremarkable with the exception of mild truncal ataxia and a domed skull. Severe hyponatremia and hypoosmolality were identified, and following diagnostic testing a diagnosis of the syndrome of inappropriate antidiuretic hormone secretion (SIADH) was made. Magnetic resonance imaging revealed changes consistent with severe hydrocephalus. Water restriction resulted in increased serum osmolality and a reduction in severity of clinical signs. The current case report documents SIADH associated with hydrocephalus in a dog. Structural brain disease should be excluded before a diagnosis of idiopathic SIADH is made.

Journal of the American Veterinary Medical Association (May 09 to May 2010)

[J Am Vet Med Assoc.](#) 2010 May 1;236(9):975-7.

Laparoscopy for percutaneous tube cystostomy in dogs.

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Abstract

OBJECTIVE: To describe a laparoscopic technique for percutaneous tube cystostomy in dogs. **DESIGN:** Prospective cohort study. **ANIMALS:** 8 healthy mixed-breed dogs. **PROCEDURES:** A laparoscope portal and 2 instrumental portals were created in the abdomen of anesthetized dogs that were in dorsal recumbency. Intracorporeal suturing was performed to place 2 simple interrupted sutures between the ventral body wall and urinary bladder. A purse-string suture was placed in the urinary bladder wall approximately 1 cm cranial to the 2 simple interrupted sutures. A stab incision was made into the urinary bladder in the middle of the purse-string suture; an 8F Foley catheter was inserted through the stab incision and into the urinary bladder. Two other sutures were placed between the ventral body wall and bladder 1 cm cranial to the Foley catheter to create a cystopexy. The Foley catheter was secured to the skin with a finger-trap suture and was attached to a closed urine collection bag. All dogs underwent follow-up laparoscopy 1 month later. **RESULTS:** Median time for laparoscopic percutaneous tube cystostomy was 85 minutes (range, 72 to 103 minutes); there were no major intraoperative or postoperative complications. On follow-up laparoscopy, focal fibrous adhesions between the ventral body wall and bladder were observed in all dogs and omentum attached to the cystopexy site was observed in 2 dogs. **CONCLUSIONS AND CLINICAL RELEVANCE:** In this study, a laparoscopic percutaneous tube cystostomy was accomplished in healthy dogs by use of a 3-portal technique and appeared to be an effective and safe procedure.

[J Am Vet Med Assoc.](#) 2010 Apr 15;236(8):874-9.

Comparison of urine dipstick, sulfosalicylic acid, urine protein-to-creatinine ratio, and species-specific ELISA methods for detection of albumin in urine samples of cats and dogs.

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Abstract

OBJECTIVE: To evaluate the use of dipstick, sulfosalicylic acid (SSA), and urine protein-to-creatinine ratio (UP:C) methods for use in detection of canine and feline albuminuria. **DESIGN:** Evaluation study. **SAMPLE POPULATION:** 599 canine and 347 feline urine samples. **PROCEDURES:** Urine was analyzed by use of dipstick, SSA, and UP:C methods; results were compared with those for a species-specific ELISA to determine sensitivity, specificity, positive predictive value (PPV), negative predictive value, and positive and negative likelihood ratios. **RESULTS:** Positive results for dipstick and SSA tests (trace reaction or greater) in canine urine had moderate specificity (dipstick, 81.2%; SSA, 73.3%) and poor PPV (dipstick, 34.0%; SSA, 41.8%). Values improved when stronger positive results ($\geq 2+$) for the dipstick and SSA tests were compared with ELISA results (specificity, 98.9% and 99.0% for the urine dipstick and SSA tests, respectively; PPV, 90.7% and 90.2% for the dipstick and SSA tests, respectively). Data obtained for cats revealed poor specificity (dipstick, 11.0%; SSA, 25.4%) and PPV (dipstick, 55.6%; SSA, 46.9%). Values improved slightly when stronger positive test results ($\geq 2+$) were used (specificity, 80.0% and 94.2% for the dipstick and SSA tests, respectively; PPV, 63.5% and 65.2% for the dipstick and SSA tests, respectively). The UP:C had high specificity for albuminuria in dogs and cats (99.7% and 99.2%, respectively) but low sensitivity (28.7% and 2.0%, respectively). **CONCLUSIONS AND CLINICAL RELEVANCE:** Caution should be used when interpreting a positive test result of a dipstick or SSA test for canine or feline albuminuria.

[J Am Vet Med Assoc.](#) 2010 Apr 1;236(7):763-6.

Frequency of incomplete urolith removal, complications, and diagnostic imaging following cystotomy for removal of uroliths from the lower urinary tract in dogs: 128 cases (1994-2006).

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Abstract

OBJECTIVE: To determine the effectiveness of cystotomy for complete removal of urocystoliths and urethroliths in dogs, the types and frequency of diagnostic imaging performed to verify complete urolith removal, the complications that develop as a result of cystotomy, and predictors of each of these variables. **DESIGN:** Retrospective case series. **ANIMALS:** 128 dogs that underwent a cystotomy for removal of urocystoliths, urethroliths, or both from 1994 through 2006. **PROCEDURES:** The

following data were obtained from medical records: sex, body weight, number and locations of lower urinary tract uroliths identified in preoperative and postoperative imaging reports, types of imaging used for urolith detection, number of uroliths recovered during cystotomy, quantitative urolith composition, and major complications attributable to cystotomy. Objective criteria were applied to determine whether a cystotomy failed or succeeded and whether appropriate imaging was performed. Associations between potential prognostic factors and outcomes were statistically assessed. RESULTS: Effectiveness of cystotomy could be determined in 44 (34%) dogs, of which 9 (20%) had incomplete removal of uroliths. Appropriate postoperative imaging was performed for only 19 (15%) dogs, of which 8 had incomplete removal. Dogs with both urethroliths and urocystoliths were more likely to have a failed cystotomy than dogs with only urethroliths or urocystoliths. Complications developed in 5 (4%) dogs. CONCLUSIONS AND CLINICAL RELEVANCE: Cystotomy was a safe and effective surgical procedure for removal of lower urinary tract uroliths in most dogs. Failure to remove all uroliths occurred in a substantial percentage of patients.

[J Am Vet Med Assoc.](#) 2010 Feb 15;236(4):424-9.

Association between naturally occurring chronic kidney disease and feline immunodeficiency virus infection status in cats.

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Abstract

OBJECTIVE: To investigate the association between naturally occurring chronic kidney disease (CKD) and FIV infection status in cats in Australia. DESIGN: Case-control study. ANIMALS: 73 cats with CKD and 69 cats without historical, physical, or clinicopathologic evidence of CKD. PROCEDURES: Cats were tested for serum antibodies against FIV glycoprotein 40 (gp40) by use of an immunomigration assay. Information regarding age, breed (purebred or domestic), and sex was obtained from medical records. Analysis was performed on data from cats stratified into 2 age categories (< 11 years old and ≥ 11 years old). Univariable and then multivariable analyses were performed to investigate the relationship between CKD and the study variable (FIV infection), the latter analysis accounting for breed (purebred or domestic), sex, and veterinary hospital of origin. RESULTS: Results of multivariable analysis revealed that younger cats with CKD (< 11 years old) were significantly more likely to have positive test results for serum antibodies against FIV gp40 than were cats without CKD. No significant associations were found between CKD and FIV infection, breed, sex, or hospital of origin among older (≥ 11 years old) cats in the multivariable analysis. CONCLUSIONS AND CLINICAL RELEVANCE: Among cats < 11 years of age, those with CKD were significantly more likely to have positive test results for serum antibodies against FIV gp40 than were cats without CKD. It cannot

be definitively established from results of this study whether infection with FIV preceded the development of CKD, and the role, if any, of FIV in the establishment or progression of CKD remains to be determined.

[J Am Vet Med Assoc.](#) 2010 Jan 15;236(2):193-200.

Evaluation of trends in urolith composition and characteristics of dogs with urolithiasis: 25,499 cases (1985-2006).

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Abstract

OBJECTIVE: To evaluate trends in urolith composition and urolithiasis in dogs during the past 21 years. DESIGN: Retrospective case series. SAMPLE POPULATION: 25,499 uroliths and the dogs from which they were obtained. PROCEDURES: Database of the Gerald V. Ling Urinary Stone Analysis Laboratory was searched from January 1985 through December 2006. All uroliths from dogs and the accompanying submission forms were evaluated. Age, sex, breed, and urolith location were recorded. RESULTS: Minerals identified in uroliths included struvite, calcium oxalate (CaOx), urate, apatite, brushite, cystine, silica, potassium magnesium pyrophosphate, sulfa drug, xanthine, and newberyite. Although more struvite-containing uroliths were submitted during this period, a significant decrease in the proportion of struvite-containing uroliths submitted as a percentage of all uroliths submitted was detected. Also, a significant increase in the proportion of CaOx-containing uroliths submitted over time was detected. There was a significant nonlinear decrease in submission of urate-, silica-, and cystine-containing uroliths. The CaOx-, cystine-, and silica-containing uroliths were obtained significantly more often from male dogs; struvite- and urate-containing uroliths were obtained significantly more often from female dogs. CONCLUSIONS AND CLINICAL RELEVANCE: An increase in the proportion of CaOx uroliths submitted over time was detected. Reasons for long-term changes in this trend were likely multifactorial and could have included alterations in diet formulations and water consumption and possibly the fact that people favor ownership of breeds more prone to developing CaOx-containing uroliths. The decrease in metabolic uroliths could have been related to better breeding practices and increased awareness of results of genetic studies.

[J Am Vet Med Assoc.](#) 2010 Jan 1;236(1):83-7.

Association between outcome and organ system dysfunction in dogs with sepsis: 114 cases (2003-2007).

Kenney EM, Rozanski EA, Rush JE, deLaforcade-Buress AM, Berg JR, Silverstein DC, Montealegre CD, Jutkowitz LA, Adamantos S, Ovbey DH, Boysen SR, Shaw SP.

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Abstract

OBJECTIVE: To determine whether multiple organ dysfunction syndrome (MODS) could be identified in dogs with sepsis secondary to gastrointestinal tract leakage, and whether the number of affected organ systems was significantly associated with mortality rate. **DESIGN:** Multicenter retrospective case series. **ANIMALS:** 114 dogs. **PROCEDURES:** Medical records for dogs treated surgically because of sepsis secondary to gastrointestinal tract leakage between 2003 and 2007 were reviewed. Sepsis was diagnosed on the basis of results of bacterial culture of peritoneal fluid, gross evidence of gastrointestinal tract leakage at surgery, or both. Renal dysfunction was defined as a $>$ or $=$ 0.5 mg/dL increase in serum creatinine concentration after surgery. Cardiovascular dysfunction was defined as hypotension requiring vasopressor treatment. Respiratory dysfunction was defined as a need for supplemental oxygen administration or mechanical ventilation. Hepatic dysfunction was defined as a serum bilirubin concentration $>$ 0.5 mg/dL. Dysfunction of coagulation was defined as prolonged prothrombin time, prolonged partial thromboplastin time, or platelet count $<$ or $=$ 100,000/microL. **RESULTS:** 89 (78%) dogs had dysfunction of 1 or more organ systems, and 57 (50%) dogs had MODS. Mortality rate increased as the number of dysfunctional organ systems increased. Mortality rate was 70% (40/57) for dogs with MODS and 25% (14/57) for dogs without. **CONCLUSIONS AND CLINICAL RELEVANCE:** Results indicated that MODS, defined as dysfunction of at least 2 organ systems, can be identified in dogs with sepsis and that organ system dysfunction increased the odds of death.

[J Am Vet Med Assoc.](#) 2009 Dec 15;235(12):1450-5.

Rate and frequency of recurrence of uroliths after an initial ammonium urate, calcium oxalate, or struvite urolith in cats.

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Abstract

OBJECTIVE: To determine frequency of and interval until recurrence after initial ammonium urate, calcium oxalate, and struvite uroliths in cats and whether breed, age, or sex was associated with increased risk for urolith recurrence. **DESIGN:** Case-control study. **ANIMALS:** 4,435 cats with recurrent uroliths. **PROCEDURES:** To identify

recurrence of uroliths in cats for which uroliths were submitted for analysis at the Minnesota Urolith Center in 1998, the facility's database was searched for urolith resubmissions from the same cats between 1998 and 2003. Risk factors and differences in mean interval until recurrence were assessed. RESULTS: Of 221 cats with ammonium urate uroliths in 1998, 29 (13.1%) had a first and 9 (4.1%) had a second recurrence. Mean interval until recurrence was 22 and 43 months for the first and second recurrence, respectively. Of 2,393 cats with calcium oxalate uroliths in 1998, 169 (7.1%) had a first, 15 (0.6%) had a second, and 2 (0.1%) had a third recurrence. Mean interval until recurrence was 25, 38, and 48 months for the first, second, and third recurrence, respectively. Of 1,821 cats with struvite uroliths in 1998, 49 (2.7%) had a first and 3 (0.2%) had a second recurrence. Mean interval until recurrence was 29 months for first and 40 months for second recurrences. CONCLUSIONS AND CLINICAL RELEVANCE: These results provided insights into the frequency of urolith recurrence in cats. Because some uroliths associated with recurrent episodes probably were not submitted to our facility, our data likely represented an underestimation of the actual recurrence rate.

[J Am Vet Med Assoc.](#) 2009 Nov 1;235(9):1067-8.

Diversion of the urine stream by surgical modification of the preputial ostium in a dog.

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Abstract

CASE DESCRIPTION: A 1.4-year-old sexually intact male Standard Poodle was evaluated with a history of urinating on its left forelimb and lower portion of the thorax. CLINICAL FINDINGS: Physical examination revealed that the dog had an unusually elevated (tucked) abdominal wall and prominent dome-shaped thoracic wall. These anatomic changes altered the angle of the urine stream, resulting in the dog's soiling the xiphoid region of the thorax and left forelimb. TREATMENT AND OUTCOME: The dorsal half of the preputial ostium was closed surgically to divert the urine stream in a ventral direction. The ventral portion of the ostium was reciprocally enlarged. Postoperatively, the dog urinated in a downward direction, eliminating urine contact with the body. CLINICAL RELEVANCE: The preputial orifice (ostium) plays an important role in the shape and direction of the urine stream exiting the penile urethra. Dogs with an elevated abdominal wall and prominent dome-shaped thorax may be prone to contamination of the lower portion of the thorax and forelimbs with urine during normal micturition. Partial closure of the dorsal preputial ostium, with reciprocal enlargement of the lower half of the orifice, can create a deflective barrier that effectively diverts the urine stream in a ventral direction.

[J Am Vet Med Assoc.](#) 2009 Aug 1;235(3):288-91.

Massive transfusion and surgical management of iatrogenic aortic laceration associated with cystocentesis in a dog.

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Abstract

CASE DESCRIPTION: A 4-year-old 29-kg (63.8-lb) spayed female Husky crossbred was referred for emergency treatment because of catastrophic hemorrhagic shock following attempts at cystocentesis for investigation of suspected urinary tract infection. **CLINICAL FINDINGS:** On arrival at the hospital, clinicopathologic assessments revealed rapidly decreasing PCV and worsening hypoproteinemia, compared with findings immediately prior to referral. The dog had severe hyperlactemia. Ultrasonography revealed the presence of free fluid in the abdomen; the fluid appeared to be blood (determined via abdominocentesis). **TREATMENT AND OUTCOME:** Urgent surgical exploration was undertaken. Two small lacerations in the ventral aspect of the abdominal aorta just dorsal to the bladder were identified and repaired. Multiple transfusions of packed RBCs (5 units) and fresh frozen plasma (3 units) were administered, and autotransfusion of blood (1.2 L) from the abdomen was performed. The dog recovered well from surgery and anesthesia, but developed signs of severe pain and swelling of both hind limbs, which were attributed to reperfusion injury following aortic occlusion during surgery. Treatment included administration of S-adenosylmethionine (23 mg/kg [10.5 mg/lb], PO, q 24 h) and analgesia; 5 days after surgery, the hind limb problems had resolved and treatments were discontinued. **CLINICAL RELEVANCE:** In the dog of this report, aortic laceration secondary to cystocentesis was successfully treated with a combination of surgery and massive transfusion; the development of reperfusion injury was an interesting and reversible complication of surgery. The possibility of damage to intra-abdominal structures should be investigated if a dog becomes acutely ill after cystocentesis.

[J Am Vet Med Assoc.](#) 2009 May 15;234(10):1279-85.

Efficacy and safety of laser lithotripsy in fragmentation of urocystoliths and urethroliths for removal in dogs.

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Abstract

OBJECTIVE: To characterize the efficacy and safety of laser lithotripsy in the fragmentation of urocalculi and urethroliths for removal in dogs. **DESIGN:** Prospective case series. **ANIMALS:** 100 dogs with naturally occurring urocalculi and urethroliths. **PROCEDURES:** Via cystoscopy, laser lithotripsy was performed to fragment uroliths. Basket retrieval and voiding urohydropropulsion were used to remove fragments. Postprocedural contrast cystography was performed to assess efficacy and safety. In 40 dogs, midstream urine samples were collected just prior to laser lithotripsy (day 0) and on days 1, 3, and 11 after laser lithotripsy to assess inflammation. **RESULTS:** Urolith removal was complete in 82% of dogs (52/66 with only urocalculi, 17/17 with only urethroliths, and 13/17 with urocalculi and urethroliths). Urolith removal was incomplete in 18 dogs; of these dogs, 9, 6, and 3 had urolith fragments ≥ 3 mm, 1 to < 3 mm, and < 1 mm in diameter, respectively. Sex (female) was the most significant predictor for success. Median procedure time was 72 minutes. Two dogs developed urinary tract obstruction following laser lithotripsy. Hematuria was detected in 53% of dogs on day 0 and in 84%, 13%, and 3% of dogs on days 1, 3, and 11, respectively. Leukocyturia was detected in 13% of dogs on day 0 and in 47%, 0%, and 3% of dogs on days 1, 3, and 11, respectively. **CONCLUSIONS AND CLINICAL RELEVANCE:** Results suggested that use of laser lithotripsy was a safe and effective alternative to surgical removal of urocalculi and urethroliths in dogs.

Journal of the Feline Medicine and Surgery (May 09 to May 2010)

[J Feline Med Surg](#). 2010 May 7. [Epub ahead of print]

Determination of optimal sampling times for a two blood sample clearance method using (51)Cr-EDTA in cats.

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Abstract

Estimation of the glomerular filtration rate (GFR) is a useful tool in the evaluation of kidney function in feline medicine. GFR can be determined by measuring the rate of tracer disappearance from the blood, and although these measurements are generally performed by multi-sampling techniques, simplified methods are more convenient in clinical practice. The optimal times for a simplified sampling strategy with two blood samples (2BS) for GFR measurement in cats using plasma (51)chromium ethylene diamine tetra-acetic acid ((51)Cr-EDTA) clearance were investigated. After intravenous administration of (51)Cr-EDTA, seven blood samples

were obtained in 46 cats (19 euthyroid and 27 hyperthyroid cats, none with previously diagnosed chronic kidney disease (CKD)). The plasma clearance was then calculated from the seven point blood kinetics (7BS) and used for comparison to define the optimal sampling strategy by correlating different pairs of time points to the reference method. Mean GFR estimation for the reference method was 3.7+/-2.5ml/min/kg (mean+/-standard deviation (SD)). Several pairs of sampling times were highly correlated with this reference method ($r^2 \geq 0.980$), with the best results when the first sample was taken 30min after tracer injection and the second sample between 198 and 222min after injection; or with the first sample at 36min and the second at 234 or 240min (r^2 for both combinations=0.984). Because of the similarity of GFR values obtained with the 2BS method in comparison to the values obtained with the 7BS reference method, the simplified method may offer an alternative for GFR estimation. Although a wide range of GFR values was found in the included group of cats, the applicability should be confirmed in cats suspected of renal disease and with confirmed CKD. Furthermore, although no indications of age-related effect were found in this study, a possible influence of age should be included in future studies. Copyright © 2010 ISFM and AAFP. Published by Elsevier Ltd. All rights reserved.

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(99m)Tc-DTPA diuretic renal scintigraphy in cats with nephroureterolithiasis.

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Abstract

The purpose of this study was to evaluate results of diuretic renal scintigraphy in 32 feline kidneys with nephroureterolithiasis and variable degrees of renal pelvis/ureteral dilation. Six kidneys showed a non-obstructive scintigraphic pattern, with a downward slope of time-activity curves (TAC) and a median excretion half-time of radiopharmaceutical ($T_{(1/2)}$) of 6.09 (5.08-8.43) min. Eight kidneys showed an obstructive pattern, with a continuous rise of TAC and median $T_{(1/2)}$ of 43.13-0.00) min. In one kidney with presumptive partial obstruction scintigraphic results were equivocal. Seventeen kidneys, most of which had an individual kidney glomerular filtration rate below 0.5ml/min/kg, had non-diagnostic studies. Diuretic renal scintigraphy may be a useful adjunct modality in the diagnosis of ureteral obstruction in some cats if renal function is maintained. However, the large number of non-diagnostic studies in animals with decreased renal function represents a clear limitation of the technique.

[J Feline Med Surg](#). 2010 Apr;12(4):330-3. Epub 2010 Mar 15.

Feline renal allograft rupture.

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Abstract

A 5-year-old domestic shorthair cat, that had undergone renal transplantation 3 months earlier, was evaluated after an acute episode of abdominal discomfort. Abdominal ultrasound revealed an enlarged renal allograft (5.5 cm; reference range, 3.2-4.2 cm) with pyelectasia (renal pelvis=3.7 mm; reference range, 1-2mm). Based on the ultrasonographic appearance of the allograft, primary rule-outs for the renomegaly included hypertrophy and allograft rejection. The ureter and urethra were dilated and a mild amount of abdominal effusion was noted. Thirty-six hours after admission, the cat became acutely hemodynamically unstable and was diagnosed with a hemoabdomen. Review of the original ultrasound revealed a peri-renal hematoma. During emergency laparotomy, ruptures in the cortex of the transplanted kidney were found to be the source of hemorrhage. Immediately following surgery, the cat experienced cardiorespiratory arrest, and resuscitation was not successful. Necropsy and histopathology revealed rupture of the renal allograft. This is the first reported case of renal allograft rupture in a cat, whereas allograft rupture has been reported in human renal transplant patients.

[J Feline Med Surg.](#)

Effect of water source on intake and urine concentration in healthy cats.

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Abstract

Increasing water intake and decreasing urine concentration are recommended for cats with urolithiasis and with idiopathic cystitis. Fountains are advocated to encourage drinking; however, effects on drinking of fountains have not been reported in cats living in pet owners homes. Thirteen healthy cats were assigned to have 24-h water intake and urine osmolality and specific gravity measured when water was offered from a bowl or fountain. One cat developed excessive barbering, vomiting, and refusal to drink water offered from the fountain. For the remaining 12 cats, intake was slightly greater from the fountain. However, urine osmolality was not significantly different. In this study, a fountain failed to substantially increase water intake and dilute urine in cats. A similar study including a greater period of time and additional cats may clarify the results of this study.

[J Feline Med Surg.](#) 2009 Nov;11(11):913-24.

Treatment options for hyperphosphatemia in feline CKD: what's out there?

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Abstract

PRACTICAL RELEVANCE: Phosphorus is retained in chronic kidney disease (CKD), promoting renal secondary hyperparathyroidism and eventually resulting in hyperphosphatemia. Most agree that phosphate retention is a major contributor to the progression of CKD in many species and it is well known that hyperphosphatemia is associated with a significant mortality risk in humans with end-stage renal disease. **PATIENT GROUP:** Chronic kidney disease is a common ailment of geriatric cats. **EVIDENCE BASE:** There is evidence in cats suggesting that the use of a phosphate-restricted diet in IRIS stage 2-3 disease has a beneficial effect on clinical outcome. However, despite the fact that intestinal phosphate binders are commonly used in veterinary practice for patients with CKD, there have been few published reports focusing on the safety and efficacy of these products in veterinary medicine. No phosphorus binders are licensed as medications for dogs or cats. This article draws on data from clinical trials in humans and studies in cats to discuss treatment goals and options for phosphate retention and hyperphosphatemia in feline CKD. **CLINICAL SIGNIFICANCE:** With careful monitoring of serum phosphate and parathyroid hormone, and implementation of phosphate-restricted dietary management and intestinal phosphate binders, progression of CKD and the degree of hyperparathyroidism in cats may be reduced. **AUDIENCE:** Companion animal and feline practitioners are at the forefront in the management of CKD in cats.

[J Feline Med Surg.](#) 2010 Feb;12(2):138-40. Epub 2009 Aug 28.

Polycystic kidney disease in a Chartreux cat.

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Abstract

Polycystic kidney disease (PKD) is one of the most common genetic diseases in cats. It has been widely described in Persians and Persian-related cats and sporadically in other breeds. The purpose of the present paper is to describe the first reported case of PKD in a 12-year-old female Chartreux cat. The cat was referred with polyuria and polydipsia and enlarged and irregular kidneys at palpation. Multiple renal cysts and a

single liver cyst were identified by ultrasound and the inherited pattern was confirmed by genetic test (polymerase chain reaction/restriction fragment length polymorphism (PCR/RFLP) assay). Chartreux cats should be included in the screening programme of PKD, and PKD should be always considered as a possible cause of chronic renal failure in this breed.

[J Feline Med Surg.](#) 2009 Dec;11(12):1028-30. Epub 2009 Aug 12.

Comparison of plasma clearance of exogenous creatinine, exo-iohexol, and endo-iohexol over a range of glomerular filtration rates expected in cats.

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Abstract

The study investigated plasma clearance of exogenous creatinine (PECCT), exo-iohexol (PexICT) and endo-iohexol (PenICT) in six healthy cats, four cats with chronic kidney disease (CKD) and six hyperthyroid (HT) cats to assess potential differences in glomerular filtration rate (GFR) measurement over a wide range of GFR values. The PECCT, PexICT and PenICT were performed in a combined protocol. There was a significant difference between PexICT and PenICT and PECCT in healthy cats. Differences between clearance techniques are suggested to be correlated to range in GFRs and should be taken into account when GFR is measured.

[J Feline Med Surg.](#) 2009 Dec;11(12):993-6. Epub 2009 Aug 5.

Evaluation of the repeatability of ultrasound scanning for detection of feline polycystic kidney disease.

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Abstract

Polycystic kidney disease (PKD) is the most prevalent inherited genetic disease in cats with Persian and Persian-related breeds predominantly affected. Diagnosis of PKD relied on ultrasound scanning until the recent development of the PKD gene test. However, gene testing has limitations as it will only identify the autosomal dominant form of PKD and not other forms of cystic kidney disease. Ultrasound scanning also has the advantage of being able to assess the severity and progression of disease in PKD affected cats. The aim of this study was to demonstrate the repeatability of ultrasound scanning in the detection of PKD and to assess

progression of the disease over time. This study demonstrated 100% repeatability of ultrasound scanning in the detection of PKD and has also demonstrated progression of disease in 75% of PKD positive cats assessed over a 1-year period.

[J Feline Med Surg.](#) 2009 Oct;11(10):869-72. Epub 2009 May 21.

Peripheral neuropathy in a cat with renal lymphoma.

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Section of Clinical Science, Department of Animal Pathology, Faculty of Veterinary Medicine, University of Turin, Grugliasco, Italy.

Abstract

A 12-year-old male cat was referred for progressive limb weakness lasting 2 weeks. Physical examination detected muscle atrophy and bilateral renomegaly with distortion of the renal contours. The cat was ambulatory but tetraparetic. It showed a peculiar posture on forelimbs with bilateral flexion of the carpi and extrarotation of forearms. The cat was unable to go upstairs or jump. Neurological examination showed findings compatible with peripheral nervous system involvement. Histopathological findings revealed a high grade non-B, non-T cell renal lymphoma and peripheral neuropathy characterised by demyelination, axonal degeneration and muscle denervation. In the absence of congenital, metabolic and infectious diseases or exposure to toxins, a paraneoplastic peripheral neuropathy was hypothesised. In humans and dogs, paraneoplastic peripheral neuropathies have been documented with different neoplastic processes including lymphoproliferative disorders. To the authors' knowledge, this is the first report of suspected paraneoplastic polyneuropathy in a cat with malignant tumour.

Journal of Comparative Pathology (May 09 to May 2010)

[J Comp Pathol.](#) 2010 Feb 12. [Epub ahead of print]

Severe Renal Failure in a Dog Resembling Human Focal Segmental Glomerulosclerosis.

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Abstract

A case of renal disease in a dog resembling human focal segmental glomerulosclerosis is presented. A kidney biopsy from this animal showed focal glomerular sclerosis, with variable distribution, affecting the perihilar and peripheral segments of the glomerular tuft. Non-sclerotic glomeruli were markedly enlarged. Interstitial fibrosis in association with tubular atrophy affected approximately 20% of the area of the biopsy. Immunofluorescence labelling showed immunoglobulin M deposits entrapped in segmental sclerotic areas and ultrastructural examination revealed segmental sclerosis and obliteration of capillaries, vacuolation of podocytes and diffuse effacement of foot processes. The dog was humanely destroyed 1 month later. At necropsy examination there was severe end-stage kidney disease with interstitial fibrosis involving more than 60% of the renal tissue. The clinical course and the microscopical, immunofluorescence and ultrastructural findings in this case have similarity to focal segmental glomerulosclerosis in man.

Journal of Small Animal Practice (May 09 to May 2010)

[Small Anim Pract.](#) 2010 Apr 6. [Epub ahead of print]

An evidence-based review of therapies for canine chronic kidney disease.

Roudebush P, Polzin DJ, Adams LG, Towell TL, Forrester SD.

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Abstract

Successful treatment and prevention of kidney disease in dogs requires a multi-dimensional approach to identify and eliminate causes or exacerbating factors, provide professional evaluation on a regular basis and implement a comprehensive treatment programme when necessary. Over the years, many therapeutic and preventive interventions have been developed or advocated for chronic kidney disease in dogs, but evidence of efficacy or effectiveness is often lacking or highly variable. Accordingly, the main objective of this systematic review was to identify and critically appraise the evidence supporting various aspects of managing canine chronic kidney disease.

[J Small Anim Pract.](#) 2010 Apr;51(4):224-6. Epub 2010 Mar 1.

Delayed-onset urinary incontinence in five female dogs with ectopic ureters.

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Abstract

This case series describes five female dogs with congenital ectopic ureter presenting with delayed-onset urinary incontinence out of 22 female dogs diagnosed with ectopic ureter over a 102-month period at a veterinary teaching hospital. All five dogs improved following surgical treatment of ectopic ureter, but only three remained continent long-term without further intervention. Delayed-onset urinary incontinence in female dogs with ectopic ureters may be more common than the current literature suggests. Congenital ectopic ureter should be considered and investigated as a possible contributing factor in female dogs presenting with delayed-onset urinary incontinence.

[J Small Anim Pract.](#) 2010 Jan;51(1):53; author reply 53; discussion 53.

Effect of storage time on dog urine.

Wiwanitkit V.

[Small Anim Pract.](#) 2009 Oct;50(10):536-9.

The effect of substrate composition and storage time on urine specific gravity in dogs.

Steinberg E, Drobatz K, Aronson L.

Department of Surgery, University of Pennsylvania, Philadelphia, PA 19104, USA.
Comment in: [J Small Anim Pract. 2010 Jan;51\(1\):53; author reply 53; discussion 53.](#)

Abstract

OBJECTIVES: The purpose of this study is to evaluate the effects of substrate composition and storage time on urine specific gravity in dogs. **METHODS:** A descriptive cohort study of 15 dogs. The urine specific gravity of free catch urine samples was analysed during a 5-hour time period using three separate storage methods; a closed syringe, a diaper pad and non-absorbable cat litter. **RESULTS:** The urine specific gravity increased over time in all three substrates. The syringe sample had the least change from baseline and the diaper sample had the greatest change from baseline. The urine specific gravity for the litter and diaper samples had a statistically significant increase from the 1-hour to the 5-hour time point. **CLINICAL SIGNIFICANCE:** The urine specific gravity from canine urine stored either on a diaper or in a non-absorbable litter increased over time. Although the change was found to be statistically significant over the 5-hour study period it is unlikely to be clinically significant.

[J Small Anim Pract.](#) 2009 Nov;50(11):593-6. Epub 2009 Oct 8.

Predicting recovery of urination control in cats after sacrocaudal injury: a prospective study.

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Comment in: [J Small Anim Pract. 2010 Mar;51\(3\):187; author reply 187.](#)

Abstract

OBJECTIVES: To determine whether intact tail base pain sensation predicts control of urination after sacrocaudal fracture-subluxation in cats. **METHODS:** Twenty-one cats affected by sacrocaudal fracture-subluxation were diagnosed routinely by radiography. The ability of each cat to detect a painful stimulus applied to the tail base was tested by application of pressure using a standard surgical instrument. Cats were then hospitalised for up to 30 days and categorised according to whether they showed control of urination. A value of $P < 0.05$ was regarded as significant. The results were analysed to produce data regarding sensitivity, specificity and the positive and negative predictive value of the test. **RESULTS:** All 11 cats that had intact tail base sensation showed control of urination within three days. Four of the 10 cats without tail base pain sensation did not recover control of urination by day 30. **CLINICAL SIGNIFICANCE:** Intact tail base sensation predicts control of urination and is therefore a useful screening test.

[J Small Anim Pract.](#) 2009 Jun;50(6):298-300. Epub 2009 Mar 13.

Preputial urinary diversion to treat urine soaking during urination in a dog.

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Abstract

A young dog was presented with a history of adopting an unusual posture to urinate, resulting in urine soaking of the ventral abdomen and caudal forelimbs. The dog was initially treated surgically with cranial advancement of the prepuce, which did not resolve the problem. Further surgery was then successfully carried out to create a more caudal preputial orifice, which angled the penis ventrally when extruded, directing urine away from the body. At follow-up clinical examination, the dog was clinically normal.

[J Vet Intern Med.](#) 2010 Apr 2. [Epub ahead of print]

Oxidative Stress and Neutrophil Function in Cats with Chronic Renal Failure.

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Abstract

Background: Oxidative stress is an important component in the progression of chronic renal failure (CRF) and neutrophil function may be impaired by oxidative stress. Hypothesis: Cats with CRF have increased oxidative stress and decreased neutrophil function compared with control cats. Animals: Twenty cats with previously diagnosed renal failure were compared with 10 age-matched control cats. Methods: A biochemical profile, CBC, urinalysis, antioxidant capacity, superoxide dismutase (SOD) enzyme activity, reduced to oxidized glutathione ratio (GSH : GSSG), and neutrophil phagocytosis and oxidative burst were measured. Statistical comparisons (2-tailed t-test) were reported as mean +/- standard deviation. Results: The CRF cats had significantly higher serum blood urea nitrogen, creatinine, and phosphorus concentrations than control cats, and significantly lower PCV and urine specific gravity than control cats. The GSH : GSSG ratio was significantly higher in the CRF group (177.6 +/- 197, 61.7 +/- 33; P < .02) whereas the antioxidant capacity was significantly less in the CRF group (0.56 +/- 0.21, 0.81 +/- 0.13 Trolox units; P < .005). SOD activity was the same in control and CRF cats. Neutrophil oxidative burst after *Escherichia coli* phagocytosis, measured as an increase in mean fluorescence intensity, was significantly higher in CRF cats than controls (732 +/- 253, 524 +/- 54; P < .05). Conclusions: The higher GSH : GSSG ratio and lower antioxidant capacity in CRF cats is consistent with activation of antioxidant defense mechanisms. It remains to be determined if supplementation with antioxidants such as SOD beyond the level of control cats would be of benefit in cats with CRF.

[J Vet Intern Med.](#) 2010 Mar 19. [Epub ahead of print]

Correction of Hyperkalemia in Dogs with Chronic Kidney Disease Consuming Commercial Renal Therapeutic Diets by a Potassium-Reduced Home-Prepared Diet.

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Abstract

Background: Hyperkalemia occurs in dogs with chronic kidney disease (CKD). Objectives: (1) To determine the incidence of hyperkalemia in dogs with CKD, (2) to determine the proportion of hyperkalemic dogs that required modification of dietary potassium intake, (3) to evaluate the response to dietary modification. Methods: The

hospital database was reviewed retrospectively to identify dogs with CKD and persistent (>5.3 mmol/L on at least 3 occasions) or severe ($K \geq 6.5$ mmol/L) hyperkalemia while consuming a therapeutic renal diet. Records of dogs with hyperkalemia that were prescribed a home-prepared, potassium-reduced diet were evaluated further. Response was evaluated by changes in body weight, BCS, and serum potassium concentration. Results: One hundred and fifty-two dogs were diagnosed with CKD, of which 47% had ≥ 1 documented episode of hyperkalemia, 25% had ≥ 3 episodes of hyperkalemia, and 16% had ≥ 1 episodes of severe hyperkalemia ($K > 6.5$ mmol/L). Twenty-six dogs (17.2%) with CKD and hyperkalemia were prescribed a potassium-reduced, home-prepared diet. The potassium concentration of all hyperkalemic dogs on therapeutic diets (potassium content, 1.6 ± 0.23 g/1,000 kcal of metabolizable energy [ME]) was 6.5 ± 0.5 mmol/L but decreased significantly to 5.1 ± 0.5 mmol/L in 18 dogs available for follow-up in response to the dietary modification (0.91 ± 0.14 g/1,000 kcal of ME, $P < .001$). Potassium concentration normalized in all but 1 dog. Conclusions and Clinical Importance: Hyperkalemia is a potential complication of CKD. In a subset of CKD dogs, hyperkalemia can be associated with commercial renal diets and could restrict use of these diets. Appropriately formulated, potassium-reduced, diets are an effective alternative to correct hyperkalemia.

[J Vet Intern Med.](#) 2010 Mar-Apr;24(2):431-5.

Drug-induced minimal change nephropathy in a dog.

Sum SO, Hensel P, Rios L, Brown S, Howerth EW, Driskell EA, Moussy A, Hermine O, Brown CA.

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[J Vet Intern Med.](#) 2010 Mar-Apr;24(2):314-22.

Progressive juvenile glomerulonephropathy in 16 related French Mastiff (Bordeaux) dogs.

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Abstract

BACKGROUND: Familial juvenile glomerulonephropathy (JGN) is reported in several breeds of dogs. The mode of inheritance and spectrum of pathological lesions vary

among breeds. A progressive JGN was detected in a pedigree of French Mastiff (FM) dogs. OBJECTIVES: To describe clinical, laboratory, and histopathologic findings in related FM dogs suffering from progressive JGN and to determine the mode of inheritance of this condition. ANIMALS: Sixteen affected and 35 healthy related FM dogs METHODS: FM dogs < 24 months of age and diagnosed with chronic kidney disease with evidence of proteinuria entered the study. Clinical, laboratory, histopathologic findings, and pedigree data were recorded. RESULTS: Clinical signs were typical of progressive glomerulopathy with resultant renal failure. Increased blood urea nitrogen, creatinine and total cholesterol concentrations, and proteinuria were found in all patients. Affected dogs had abnormal kidney structure on abdominal ultrasound examination. Histopathologic examination revealed extensive cystic glomerular atrophy, glomerular hypercellularity, and capillary wall thickening without immune complex deposition when tested with immunohistochemistry or immunofluorescence. Electron microscopy did not disclose specific primary glomerular lesions. Mean age at death was 20 months and mean length of survival after diagnosis was 6 months. Both males and females from healthy parents were affected. An autosomal recessive mode of transmission is suspected, but a more complex mode of inheritance cannot be excluded. CONCLUSIONS AND CLINICAL IMPORTANCE: Progressive familial JGN occurs in FM dogs. Characterization of the pathogenesis and mode of inheritance of this disease warrants additional study.

[J Vet Intern Med.](#) 2010 Jan-Feb;24(1):65-72.

Urinary markers in healthy young and aged dogs and dogs with chronic kidney disease.

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Abstract

BACKGROUND: Blood urea nitrogen and serum creatinine concentrations only detect a decrease of > 75% of renal functional mass. Therefore, there is a need for markers that allow early detection and localization of renal damage. HYPOTHESIS: Urinary albumin (uALB), C-reactive protein (uCRP), retinol binding protein (uRBP), and N-acetyl-beta-D-glucosaminidase (uNAG) concentrations are increased in dogs with chronic kidney disease (CKD) compared with healthy controls and in healthy older dogs compared with young dogs. ANIMALS: Ten dogs with CKD, 10 healthy young dogs (age 1-3 years), and 10 healthy older dogs (age > 7 years) without clinically relevant abnormalities on physical examination, hematology, biochemistry, and urinalysis. METHODS: Urinary markers were determined using an ELISA (uALB, uCRP, and uRBP) or a colorimetric test (uNAG). Results were related to urinary creatinine (c). The fixed effects model or the Wilcoxon rank sum test were used to compare the different groups of dogs. RESULTS: uALB/c, uRBP/c, and uNAG/c were significantly

higher in CKD dogs than in healthy dogs. No significant difference was found for uCRP, which was not detectable in the healthy dogs and only in 3 of the CKD dogs. Between the healthy young and older dogs, no significant difference was detected for any of the markers. CONCLUSION: The urinary markers uALB/c, uRBP/c, and uNAG/c were significantly increased in dogs with CKD compared with healthy controls. Additional studies are needed to evaluate the ability of these markers to detect renal disease before the onset of azotemia.

[J Vet Intern Med.](#) 2010 Jan-Feb;24(1):73-9.

Calcium and phosphorus homeostasis in dogs with spontaneous chronic kidney disease at different stages of severity.

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Abstract

BACKGROUND: Studies in dogs with experimental chronic kidney disease (CKD) have demonstrated that abnormalities of calcium-phosphorus (Ca-P) homeostasis occur frequently and have a negative effect on kidney function and survival. However, the prevalence of these alterations in dogs with naturally occurring CKD at different stages of severity has not yet been investigated. **HYPOTHESIS:** Abnormalities of Ca-P metabolism occur early in the course of CKD with an increased prevalence in more severe stages. **ANIMALS:** Fifty-four dogs with CKD and 22 healthy dogs. **METHODS:** Blood and urine samples were obtained for a CBC, biochemistry, determination of parathyroid hormone (PTH), calcitriol, and ionized calcium concentrations and urinalysis. Based on urine protein/creatinine ratio and serum creatinine concentration, dogs were grouped according to the IRIS classification for CKD. **RESULTS:** Hyperparathyroidism (HPTH) (PTH > or = 48 pg/mL) was diagnosed in 41 (75.9%) dogs with CKD. Its prevalence increased from 36.4% (stage 1) to 100% (stage 4). Hyperphosphatemia (P > 5.5 mg/dL) was present in 37 (68.5%) dogs; increasing in prevalence from 18% (stage 1) to 100% (stage 4). Receiver-operating characteristic curve analysis showed that serum phosphorus concentration in the 4.5-5.5 mg/dL range correctly identified the presence of HPTH in most dogs. Calcitriol concentration progressively decreased in dogs with CKD and differences became statistically significant by stage 3. **CONCLUSION AND CLINICAL RELEVANCE:** HPTH and hyperphosphatemia occur frequently in dogs with naturally occurring CKD, even at early stages of CKD in some dogs. These findings highlight the importance of monitoring these parameters early in the course of CKD.

[J Vet Intern Med.](#) 2009 Nov-Dec;23(6):1284-8.

Distal renal tubular acidosis and immune-mediated hemolytic anemia in 3 dogs.

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Guelph, ON, Canada.

[J Vet Intern Med.](#) 2009 Sep-Oct;23(5):1003-6.

Acute effect of pimobendan and furosemide on the circulating renin-angiotensin-aldosterone system in healthy dogs.

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Abstract

BACKGROUND: The renin-angiotensin-aldosterone system (RAAS) is activated in states of decreased cardiac output and by certain cardiovascular therapeutic agents, such as loop diuretics and vasodilators. **HYPOTHESIS:** Short-term treatment with the inodilator, pimobendan, will not activate the circulating RAAS because its vasodilatory action will be offset by its positive inotropic property, thereby ameliorating RAAS stimulation at the juxtaglomerular apparatus. Furthermore, pimobendan will suppress RAAS activation produced by furosemide. **ANIMALS:** Nine healthy laboratory dogs were used in this study. **METHODS:** Experimental, cross-over study. Dogs were administered pimobendan (0.5 mg/kg q12h) for 4 days followed by furosemide (2 mg/kg q12h) and then, after a wash-out period, a combination of the drugs. Aldosterone : creatinine (A : Cr) was measured at the end of each treatment cycle. **RESULTS:** There was no significant increase in the average urinary A : Cr with the administration of pimobendan (control urinary A : Cr = 0.46, standard deviation (SD) 0.33; pimobendan A : Cr = 0.48, SD 0.28). There was a significant increase in the average urinary A : Cr after administration of furosemide (urinary A : Cr = 1.3, SD 0.70) and with the combination of furosemide and pimobendan (urinary A : Cr = 2.9, SD 1.6). **CONCLUSIONS AND CLINICAL RELEVANCE:** Short-term administration of high-dose pimobendan, does not activate the RAAS in healthy dogs. Pimobendan did not prevent RAAS activation associated with furosemide therapy. These results in healthy dogs suggest that furosemide therapy, with or without pimobendan, should be accompanied by RAAS suppressive therapy.

[J Vet Intern Med.](#) 2009 Nov-Dec;23(6):1184-9. Epub 2009 Aug 26.

The cardiac biomarker NT-proBNP is increased in dogs with azotemia.

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Abstract

BACKGROUND: Amino-terminal probrain natriuretic peptide (NT-proBNP) has been proposed as a useful biomarker for heart disease in dogs. In humans, decreased glomerular filtration rate (GFR) increases NT-proBNP. **OBJECTIVE:** To investigate whether decreased GFR as indicated by plasma creatinine concentration is associated with increased NT-proBNP in dogs without heart disease. **ANIMALS:** Four groups of dogs: healthy (n= 39), azotemic (n= 36), heart disease (n= 37), and congestive heart failure (CHF) (n= 7) presented to 2 teaching hospitals. **METHODS:** Prospective observational cohort study. Plasma creatinine concentration and NT-proBNP were measured in every dog. Nonparametric tests were used to compare the differences among groups. The median and actual results for each group were compared with the manufacturer's recommended and previously published suggestions for cut-off values for diagnosis of heart disease. **RESULTS:** Median (range) plasma creatinine concentration was 1.47 (1.06-1.70), 4.36 (1.74-15.6), 1.22 (0.69-1.91), and 1.45 (0.63-1.64) mg/dL and median (range) NT-proBNP was 118 (2-673), 556 (37-1,819), 929 (212-5,658), and 3,144 (432-5,500) pmol/L for the healthy, azotemic, heart disease, and CHF groups, respectively. Pair-wise comparison indicated a significant difference among all groups for NT-proBNP ($P < \text{or} = .049$). Plasma creatinine concentration was significantly higher in the azotemic group compared with other groups ($P < .001$) but there was no significant among other groups. Application of 3 recommended cut-off values led to misclassification of dogs with azotemia as having heart disease. **CONCLUSIONS:** Azotemia results in NT-proBNP being increased to concentrations reported as diagnostic of heart disease or heart failure in dogs. Care should be employed when interpreting the results of NT-proBNP in patients with known or possible increased plasma creatinine concentration.

[J Vet Intern Med.](#) 2009 Sep-Oct;23(5):1031-7. Epub 2009 Aug 11.

Retinol-binding protein in serum and urine of hyperthyroid cats before and after treatment with radioiodine.

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Abstract

BACKGROUND: Retinol-binding protein (RBP) is suggested as a clinically useful marker of renal function in cats. **HYPOTHESIS:** Serum and urinary RBP concentrations in hyperthyroid (HT) cats differ from those in healthy (H) cats; radioiodine (^{131}I) treatment influences serum and urinary RBP concentrations in HT cats. **ANIMALS:**

Ten HT and 8 H cats. METHODS: RBP concentration was evaluated in feline serum and urine samples from a prospective study. RESULTS: There was a significant ($P = .003$) difference in the urinary RBP/creatinine (uRBP/c) ratios of H (-) and untreated HT ($1.4 \pm 1.5 \times 10^{-2}$ microg/mg) cats. Serum total thyroxine concentration (1.8 ± 1.9 microg/dL, 24 weeks) and uRBP/c ($0.6 \pm 1.0 \times 10^{-2}$ microg/mg, 24 weeks) decreased significantly ($P < .001$) in HT cats at all time points after treatment with (^{131}I) , and these variables were significantly correlated with one another ($r = 0.42$, $P = .007$). Serum RBP concentrations from HT cats (199 ± 86 microg/L) did not differ significantly ($P = .98$) from those of H cats (174 ± 60) and did not change after treatment with (^{131}I) (182 ± 124 microg/L, $P = .80$). CONCLUSION AND CLINICAL IMPORTANCE: The presence of urinary RBP in HT cats is a potential marker of tubular dysfunction that is correlated to thyroid status, although it is independent of circulating RBP concentrations. The decreased uRBP/c combined with the absence of changes in serum RBP after treatment suggests that the suspected tubular dysfunction was partly reversible with treatment of (^{131}I) .

[J Vet Intern Med.](#) 2009 Sep-Oct;23(5):1045-50. Epub 2009 Aug 11.

Effect of experimental hypothyroidism on glomerular filtration rate and plasma creatinine concentration in dogs.

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Abstract

BACKGROUND: Hypothyroidism affects renal function in a manner opposite the effects of hyperthyroidism. OBJECTIVE: To evaluate the effects of experimentally induced hypothyroidism on glomerular filtration rate (GFR) and basal plasma creatinine concentration in dogs. ANIMALS: Sixteen anestrous, female dogs. METHODS: Hypothyroidism was induced by administration of (^{131}I) in 8 dogs, and 8 healthy euthyroid dogs acted as controls. Exogenous plasma creatinine clearance (an estimate of GFR) was measured in all dogs before (control period) and 43-50 weeks after induction of hypothyroidism (posttreatment period). Other pharmacokinetic parameters of creatinine were also determined. RESULTS: No significant difference was observed for basal plasma creatinine concentration and creatinine clearance between control and hypothyroid dogs in the control period. In the posttreatment period, mean \pm SD creatinine clearance in the hypothyroid group (2.13 ± 0.48 mL/min/kg) was lower ($P < .001$) than that of the control group (3.20 ± 0.42 mL/kg/min). Nevertheless, basal plasma creatinine concentrations were not significantly different between the hypothyroid and control groups (0.74 ± 0.18 versus 0.70 ± 0.08 mg/dL, respectively) because endogenous production of creatinine was decreased in hypothyroid dogs (22 ± 3 versus 32 ± 5 mg/kg/d, $P = .001$). CONCLUSION AND CLINICAL IMPORTANCE: Hypothyroidism causes a substantial decrease in GFR without altering plasma creatinine concentrations,

indicating that GFR evaluation is needed to identify renal dysfunction in such patients.

[J Vet Intern Med.](#) 2009 May-Jun;23(3):514-9.

Ionized hypercalcemia in dogs: a retrospective study of 109 cases (1998-2003).

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Abstract

BACKGROUND: Serum hypercalcemia in dogs has been reported in association with a variety of diseases. Serum-ionized calcium (iCa) concentration is a more accurate measure of hypercalcemia than total serum calcium or corrected serum calcium concentrations. The severity of hypercalcemia has been utilized to suggest the most likely differential diagnosis for the hypercalcemia. **HYPOTHESIS:** Diseases causing ionized hypercalcemia may be different than those that cause increases in total or corrected serum calcium concentrations. The severity of ionized hypercalcemia in specific diseases cannot be used to determine the most likely differential diagnosis for ionized hypercalcemia. **ANIMALS:** One-hundred and nine client-owned dogs with a definitive cause for their ionized hypercalcemia evaluated between 1998 and 2003 were included in this study. **METHODS:** Retrospective, medical records review. **RESULTS:** Neoplasia, specifically lymphosarcoma, followed by renal failure, hyperparathyroidism, and hypoadrenocorticism were the most common causes of ionized hypercalcemia. Dogs with lymphoma and anal sac adenocarcinoma have higher serum iCa concentrations than those with renal failure, hypoadrenocorticism, and other types of neoplasia. The magnitude of serum-ionized hypercalcemia did not predict specific disease states. **CONCLUSIONS AND CLINICAL IMPORTANCE:** Serum-ionized hypercalcemia was most commonly associated with neoplasia, specifically lymphosarcoma. Although dogs with lymphosarcoma and anal sac adenocarcinoma had higher serum iCa concentrations than dogs with other diseases, the magnitude of the serum iCa concentration could not be used to predict the cause of hypercalcemia. Total serum calcium and corrected calcium concentrations did not accurately reflect the calcium status of the dogs in this study.

[J Vet Intern Med.](#) 2009 Jul-Aug;23(4):806-13.

Evaluation of predictors of the development of azotemia in cats.

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Abstract

BACKGROUND: Chronic kidney disease (CKD) is a common condition in geriatric cats. Diagnosis is based on the development of persistent azotemia with inadequate urine concentrating ability. Biomarkers are sought for early identification. **HYPOTHESIS:** Clinical variables, urine concentrating ability, proteinuria, and N-acetyl-beta-D-glucosaminidase (NAG) index will be predictive of cats at risk of developing azotemia within 12 months. **ANIMALS:** Client-owned nonazotemic geriatric (≥ 9 years) cats. **METHODS:** Prospective longitudinal cohort study monitoring a population of healthy nonazotemic geriatric cats every 6 months until development of azotemia, death, or the study end point (September 30, 2007). Multivariable logistic regression analysis was used to assess baseline clinical, biochemical, and urinalysis variables, urine protein to creatinine ratio (UP/C), urine albumin to creatinine (UA/C) ratio, and urinary NAG index as predictors of development of azotemia. **RESULTS:** One hundred and eighteen cats were recruited with a median age of 13 years. Ninety-five cats (80.5%) had been followed or reached the study end point by 12 months of which 30.5% (29/95) developed azotemia. Age, systolic blood pressure, plasma creatinine concentration, urine specific gravity, UP/C, UA/C, and NAG index were significantly associated with development of azotemia in the univariable analysis ($P \leq .05$). However, in the multivariable analysis, only plasma creatinine concentration with either UP/C (Model 1) or UA/C (Model 2) remained significant. **CONCLUSIONS AND CLINICAL IMPORTANCE:** This study demonstrates a high incidence of azotemia in a population of previously healthy geriatric cats. Proteinuria at presentation was significantly associated with development of azotemia although causal association cannot be inferred. Evaluation of NAG index offered no additional benefit.

[J Vet Intern Med.](#) 2009 Jul-Aug;23(4):844-9. Epub 2009 Jun 1.

Effect of thyroxine supplementation on glomerular filtration rate in hypothyroid dogs.

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Abstract

BACKGROUND: Glomerular filtration rate (GFR) is decreased in humans with hypothyroidism, but information about kidney function in dogs with hypothyroidism is lacking. **HYPOTHESIS:** Hypothyroidism influences GFR in dogs. The objective of this study was to assess GFR in hypothyroid dogs before implementation of thyroxine supplementation and after re-establishing euthyroidism. **ANIMALS:** Fourteen hypothyroid dogs without abnormalities on renal ultrasound examination or urinalysis. **METHODS:** Blood pressure and GFR (measured by exogenous creatinine clearance) were measured before treatment (T0, n=14) and at 1 month (T1, n=14) and at 6 months (T6, n=11) after beginning levothyroxine supplementation therapy (20 microg/kg/d, PO). The response to therapy was monitored at T1 by measuring

serum total thyroxine and thyroid stimulating hormone concentrations. If needed, levothyroxine dosage was adjusted and reassessed after 1 month. Statistical analysis was performed using a general linear model. Results are expressed as mean \pm standard deviation. RESULTS: At T0, the average age of dogs in the study group was 6.3 \pm 1.4 years. Their average body weight decreased from 35 \pm 18 kg at T0 to 27 \pm 14 kg at T6 (P<.05). All dogs remained normotensive throughout the study. GFR increased significantly with levothyroxine supplementation; the corresponding results were 1.6 \pm 0.4 mL/min/kg at T0, 2.1 \pm 0.4 at T1, and 2.0 \pm 0.4 at T6 (P<.01). CONCLUSION: GFR was <2 mL/min/kg in untreated hypothyroid dogs. Re-establishment of a euthyroid state increased GFR significantly.

[J Vet Intern Med.](#) 2009 May-Jun;23(3):592-7. Epub 2009 Apr 21.

Sequencing of the von Hippel-Lindau gene in canine renal carcinoma.

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Abstract

BACKGROUND: Similarities in human and canine renal cell carcinoma (RCC) epidemiology and biologic behavior suggest that molecular mechanisms of tumorigenesis may be similar in both species. Approximately 75% of RCC in people are of the clear cell subtype, up to 85% of which are associated with mutation of the von Hippel-Lindau (VHL) gene. The canine VHL coding deoxyribonucleic acid (DNA) shares 90% identity with the human VHL gene. **OBJECTIVE:** To determine whether or not RCC in dogs are associated with VHL mutations, and if so determine the prevalence, type, and location of these mutations. **ANIMALS:** Thirteen dogs with RCC, 2 dogs with primary renal sarcomas, and 10 dogs without neoplastic kidney disease. **Methods:** DNA was extracted from paraffin-embedded RCC tissue; DNA extracts from paraffin-embedded and snap-frozen nonneoplastic canine kidneys and canine whole blood were used as negative controls. Polymerase chain reaction and sequencing of the 3 VHL exons was performed, and results compared with the accessioned canine sequence. **RESULTS:** All VHL exons were amplified from 9 of 13 canine RCC samples, both renal sarcomas, 8 of 10 nonneoplastic kidney samples, and canine whole blood; only exon 2 could be amplified from 2 RCC samples. Mutations were not identified in any exons. A maximal prevalence of 33.6% for VHL mutations in canine RCC was determined. **CONCLUSION AND CLINICAL IMPORTANCE:** Although similarities between canine and human RCC merit further investigation of the dog as a model for some subtypes of renal tumors, the lower prevalence of VHL mutations suggests that oncogenesis in these 2 species differs.

[J Vet Med Sci](#). 2010 Apr 13. [Epub ahead of print]

The Assessments of Factors that Affect Glomerular Filtration Rate and Indirect Markers of Renal Function in Dogs and Cats.

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Abstract

Chronic kidney disease is one of the most common disorders in dogs and cats. Plasma urea nitrogen (P-UN) and creatinine (P-Cre) concentrations are not sufficiently sensitive for the early diagnosis of renal dysfunction. Although urine and plasma clearance methods allow earlier detection of reductions in the GFR, it is difficult to estimate mildly reduced GFR from the values obtained by these methods, as they are also affected by physiological factors, such as body weight (BW) and age. The present study is a retrospective survey designed to assess the factors that affect markers of kidney function and to reevaluate the clinical utility of these markers including P-UN, P-Cre, and GFR determined by plasma iohexol clearance (PCio) in dogs and cats. P-UN, P-Cre, and PCio values in dogs, and P-Cre and PCio in cats were significantly correlated with BW ($P < 0.001$). PCio in smaller dogs (≤ 15.0 kg) was significantly and inversely correlated with age. In smaller dogs, the increase of P-UN alone might warrant a suspicion of decreased GFR, but in contrast, P-Cre may be inefficient for detecting renal dysfunction or determining the severity of CKD compared with that in larger dogs (≥ 15.1 kg). P-Cre in larger dogs correlated better with PCio than that in smaller dogs, suggesting that P-Cre in larger dogs was a more sensitive marker of reduced GFR.

[J Vet Med Sci](#). 2010 May;72(4):493-7. Epub 2009 Dec 10.

Evaluation of the hemodynamic impact of continuous renal replacement therapy in healthy dogs.

Shimokawa Miyama T, Itamoto K, Yoshioka C, Minami K, Okawa T, Fujisaki Y, Hiraoka H, Mizuno T, Okuda M.

Laboratory of Veterinary Internal Medicine, Faculty of Agriculture, Yamaguchi University.

Abstract

We performed continuous renal replacement therapy (CRRT) on clinically healthy dogs to evaluate the effects of CRRT on hemodynamics. Heart rate, arterial blood

pressure, and central venous pressure of the dogs (n=6) were recorded during the procedure, which was performed under general anesthesia. Throughout the CRRT, heart rate and arterial blood pressure were stable. Central venous pressure increased after CRRT termination but returned to the basal level within 30 min. In this study, hemodynamic alterations, including hypotension, hypertension, and arrhythmias, were not observed during CRRT. These observations suggest that the CRRT protocol used in the present study can be safely applied to clinical cases with acute renal failure.

[J Vet Med Sci](#). 2010 Mar;72(3):363-7. Epub 2009 Dec 4.

Nafamostat mesilate is not appropriate as an anticoagulant during continuous renal replacement therapy in dogs.

Shimokawa Miyama T, Yoshioka C, Minami K, Okawa T, Hiraoka H, Itamoto K, Mizuno T, Okuda M.

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Abstract

We performed continuous renal replacement therapy (CRRT) in clinically healthy dogs (n=7) to evaluate the utility of nafamostat mesilate (NM) as an anticoagulant. In 3 of the 7 dogs, CRRT had to be discontinued before the target duration due to coagulation in the extracorporeal circuit, into which NM was administered constantly at the rate of 2.0-6.0 mg/kg per hour. The rate of administration of NM was greater than the recommended dose of NM in humans. Further, all the dogs suffered vomiting during CRRT with NM infusion. We therefore recommend that NM is not used as an anticoagulant during CRRT in dogs.

[J Vet Med Sci](#). 2010 Mar;72(3):271-8. Epub 2009 Dec 1.

Evaluation of a single sampling method for estimation of plasma iohexol clearance in dogs and cats with various kidney functions.

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Abstract

Plasma iohexol clearance (PCio) is a practical method for measuring the glomerular filtration rate (GFR) in clinical settings. However, it is too time-consuming for routine application and requires hospitalization for at least half a day. Therefore, the

development of a simpler procedure for plasma clearance is necessary to allow the frequent measurement of GFR in clinical settings. The purpose of the present study was to evaluate a single sampling method for estimation of PCio in dogs and cats with various kidney functions. The PCio determined by the 1-compartment model using 3 samples (PCio (3samples)) was used as a reference for the evaluation of the single sampling method (PCio (single)). Plasma iohexol concentration was determined by a cerium arsenite colorimetric method. PCio single was calculated using the equation obtained by nonlinear regression analysis. PCio (single) was significantly correlated with PCio (3samples) in both dogs and cats (dogs: $R(2)=0.985$, $P<0.001$, cats: $R(2)=0.986$, $P<0.001$). In a receiver operating characteristics analysis, the area under the curve, sensitivity, and specificity for detecting decreased GFR were 0.995 [SE, 0.003], 98%, and 93% for dogs and 0.993 [SE, 0.003], 98%, and 93% for cats, respectively. These results demonstrate that PCio (single) may be very useful for the detection of decreasing GFR in dogs and cats.

[J Vet Med Sci](#). 2010 Jan;72(1):103-7. Epub 2009 Nov 13.

Canine nephrotoxicosis induced by melamine-contaminated pet food in Italy.

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Abstract

Two young dogs belonging to the same kennel placed nearby Treviso (north-eastern Italy) died at the end of 2008 with clinical signs of renal failure. They were subjected to necropsy and were evaluated for histopathological and toxicological changes. Both the animals had same clinical signs and laboratory evidence of uremia. Post mortem investigations revealed severe nephrotoxicosis, associated with uroliths deposition within renal tubules and pelvis. The predominant crystal type was identical to those observed in the kidneys of animals involved in the 2004 and 2007 melamine-associated renal failure epidemic in Asia and US, providing evidence that they share the same causative agent. High doses of melamine were detected in the pet food administered to the dogs, likewise melamine was identified in renal tissue from one dead dog and in urine samples from both the animals. Therefore, a diagnosis of melamine-related nephrotoxicosis was made. To the author's knowledge this is the first report about melamine contamination of pet food from EU.

[J Vet Med Sci](#). 2010 Jan;72(1):13-8. Epub 2009 Nov 5.

Differences in the duration of diuretic effects and impact on the renin-angiotensin-aldosterone system of furosemide in healthy dogs.

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Abstract

Our aim was to investigate the differences in the duration of diuretic effects and impact on the renin-angiotensin-aldosterone (RAA) system of furosemide as a model of short- and long-acting loop diuretics. Anesthetized dogs (n=6) were randomized into placebo, intravenous bolus administration (IB) and chronic rate infusion (CRI) groups. This study was conducted with a crossover study. Furosemide (4 mg/kg) was diluted to 18 mL in sterile saline. Furosemide was infused at 0.5 mg/kg/hr for 8 hr in the CRI group or was injected at 0 and 4 hr (both 2 mg/kg) in the IB group. Blood and urine samples were collected at baseline and at 1, 2, 4, 5, 6 and 8 hr. Compared with the baseline, the IB group had a significantly increased urine output at 1 and 5 hr. The CRI group had a significantly increased urine output persisting for 4 hr compared with the baseline. Compared with the placebo group, 8-hr urine output and 8-hr sodium excretion were significantly increased in the IB and CRI groups; the values in the CRI group were significantly higher than those in the IB group. Eight-hour potassium excretion was significantly increased in the IB and CRI groups. The plasma aldosterone concentration was significantly elevated in the IB group at 8 hr. Duration of action may be a predominant cause of loop diuretic-related differences

[J Vet Med Sci.](#) 2009 Sep;71(9):1255-9.

Urethral stenting in a cat with refractory obstructive feline lower urinary tract disease.

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Abstract

A 10-year-old male Korean domestic short-haired cat was presented with refractory lower urinary tract obstruction. The cat was treated by urethral stent placement using a self-expanding nitinol intraluminal stent (Zilver 535 biliary stents, COOK, U.S.A.) subsequent with balloon expansion. Although the cat showed 2 days of transient hematuria after the stent placement, no further obstruction was occurred after the stent placement. Follow-up studies performed at monthly intervals have found no re-stenosis or particular complications, to date.

[J Vet Med Sci.](#) 2009 Sep;71(9):1169-76.

Evaluation of the measurement of serum cystatin C by an enzyme-linked immunosorbent assay for humans as a marker of the glomerular filtration rate in dogs.

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Abstract

The serum cystatin C (Cys-C) concentration is a better filtration marker than plasma creatinine (Cre) concentration in humans. In veterinary medicine, a few studies have shown that the serum Cys-C concentration in dogs is also a better marker than the plasma Cre concentration. The purpose of this study is to evaluate the applicability of measuring the serum Cys-C concentration by an enzyme-linked immunosorbent assay (ELISA) as a marker of the glomerular filtration rate in dogs with various renal dysfunctions. The serum Cys-C concentration in dogs with chronic kidney disease (CKD) was significantly higher (1.23 +/- 0.21 mg/L) than that in 76 control dogs (0.85 +/- 0.15) (P<0.001). The reference range of the serum Cys-C concentrations in samples from the 76 control dogs was 0.55-1.15 mg/l. Serum Cys-C concentration was more strongly correlated with plasma iohexol clearance (r=-0.704, P<0.001) than plasma Cre concentration in dogs (r=-0.598, P<0.001). In a receiver operating characteristics analysis, significant differences between the serum Cys-C and plasma Cre concentrations were found with regard to their AUC (0.949, [SE, 0.019] and 0.849 [SE, 0.029]) and diagnostic sensitivity (90.3% and 73.6%) for detecting decreased PCio (P<0.05). Therefore, the measurement of serum Cys-C concentration by ELISA is more useful for the detection of early CKD than measuring the plasma Cre concentration.

[J Vet Med Sci.](#) 2009 May;71(5):539-48.

Antagonistic effects of atipamezole and yohimbine on xylazine-induced diuresis in healthy dogs.

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Abstract

The aim of this study was to investigate and compare the antagonistic effects of atipamezole and yohimbine on xylazine-induced diuresis in healthy dogs. Five healthy male beagles were assigned to each of the 8 treatment groups in a randomized design at 1-week intervals in the same dog. One group was not medicated. The dogs in the other groups received 2 mg/kg xylazine intramuscularly (IM) and a treatment of saline (control), 50, 100 or 300 microg/kg of each

atipamezole or yohimbine IM 0.5 hr later. Urine and blood samples were collected 11 times over the course of 24 hr. Urine volume, pH, specific gravity and creatinine values; osmolality, electrolyte and arginine vasopressin (AVP) values in both urine and plasma; and plasma atrial natriuretic peptide (ANP) concentration were measured. Both atipamezole and yohimbine antagonized xylazine-induced diuresis. The reversal effect of yohimbine was more potent, but not dose-dependent at the tested doses, in contrast with atipamezole. Both atipamezole and yohimbine exhibited similar potency in reversing the decreases in urine specific gravity, osmolality, creatinine, sodium and chloride concentrations and the increase in the plasma potassium concentration induced by xylazine. Both also inhibited xylazine-induced diuresis without significantly altering the hormonal profile in the dogs. A higher dose of atipamezole tended to increase the plasma ANP concentration. This may not be due only to actions mediated by alpha(2)-adrenoceptors. Both drugs can be used as antagonistic agents against xylazine-induced diuresis in healthy dogs.

Research in Veterinary Science (May 08 – May 09)

[Res Vet Sci.](#) 2010 Aug;89(1):124-5.

Fluconazole decreases cyclosporine dosage in renal transplanted dogs.

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Abstract

The effect of fluconazole (Fcz) on the cyclosporine (CsA) dosage was investigated in renal transplanted dogs receiving CsA-based immunosuppressive therapy. Initially, CsA was administered orally twice daily to raise the blood trough level between 400 and 600 ng/ml. After the addition of Fcz, the CsA dosage was adjusted to maintain its therapeutic blood concentration. Fcz significantly decreased CsA dosage in both normal and renal transplanted dogs, but a higher dosage of CsA was needed in renal transplanted dogs. In conclusion, Fcz decreases required CsA dosage and thereby reduces the cost of immunosuppressive therapy in canine renal transplantation.

[Res Vet Sci.](#) 2010 Apr;88(2):294-9. Epub 2009 Oct 12.

Comparative study of chronic kidney disease in dogs and cats: induction of myofibroblasts.

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Abstract

We investigated the kidneys of dogs and cats to clarify whether renal myofibroblasts induction is associated with the severity of chronic kidney disease (CKD). Immunohistochemical expression of myofibroblast markers, alpha-smooth muscle actin (SMA) and vimentin, were evaluated quantitatively. The degrees of glomerulosclerosis, glomerular hypertrophy, interstitial cell infiltration, and interstitial fibrosis were also evaluated quantitatively. The plasma creatinine (pCre) concentrations correlated with glomerulosclerosis, cell infiltration, and fibrosis in dogs, and only with fibrosis in cats. The alpha-SMA expression correlated with pCre, glomerulosclerosis, cell infiltration, and fibrosis in dogs, and with pCre and fibrosis in cats. Tubular vimentin expression correlated with fibrosis in cats, but not in dogs. Interstitial vimentin expression correlated with pCre, glomerulosclerosis, cell infiltration, and fibrosis in dogs, but only with pCre in cats. In conclusion, it was suggested that the severity of CKD in dogs and cats was mediated by different pathways associated with myofibroblasts expression.

[Res Vet Sci.](#) 2009 Aug;87(1):76-8.

Evidence for a relationship between Leishmania load and clinical manifestations.

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Abstract

Visceral leishmaniasis (VL) is a life-threatening disease of medical, social and economic importance in endemic areas. Dogs are the main reservoir of *Leishmania infantum*. In this study, the authors investigated a group of 56 natural infected dogs to establish the relationship between parasite load and various clinical forms of leishmaniasis. The sick dogs were monitored at the beginning from clinical and physiological point of view. *Leishmania* load was measured by real-time PCR assay on whole blood samples and lymph node aspirates, collected at the time of diagnosis. Our results indicate that a higher quantity of *Leishmania* DNA was found in the lymph nodes of dogs characterized by maximum clinical score. This interesting finding indicates the presence of a positive relationship between *Leishmania* load and clinical manifestations in dogs showing a severe clinical form of leishmaniasis.

Veterinary Clinical Pathology (May 09 to May 2010)

[Vet Clin Pathol.](#) 2010 Jan 4.

Evaluation of albuminuria and its relationship with blood pressure in dogs with chronic kidney disease.

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Abstract

Background: Microalbuminuria and hypertension have long been associated with a guarded prognosis in human patients with a variety of diseases. In veterinary medicine, tests for microalbuminuria have been used for detecting early kidney damage, but there is little information regarding its association with high blood pressure in dogs with chronic kidney disease (CKD). Objective: The objective of this study was to evaluate albuminuria and its association with arterial hypertension in dogs with CKD. Methods: Urinary albumin:creatinine (UAC) ratio, urinary protein:creatinine (UPC) ratio, and systolic blood pressure were determined in 39 clinically healthy dogs and 40 dogs with CKD. Results: UAC in dogs with CKD (range, 0.002-7.99; median, 0.38) was statistically different from that of control dogs (range, 0.0005-0.01; median, 0.002). Microalbuminuria (UAC 0.03-0.3) and macroalbuminuria (UAC>0.3) were detected in 32.5% and 50% of dogs with CKD, respectively. Sixty percent (24/40) of dogs with CKD had systolic pressure \geq 180 mmHg; in these dogs, UAC ratio (range, 0.006-7.99; median, 1.72) was significantly higher than in dogs with CKD and systolic pressure<180 mmHg (range, 0.002-4.83; median, 0.10). Of hypertensive dogs with CKD, those with UPC>1.0 usually had macroalbuminuria, those with UPC 0.5-1.0 usually had microalbuminuria, and those with UPC<0.5 usually lacked albuminuria. Conclusions: UAC ratio was higher in hypertensive than in normotensive dogs with CKD. Tests designed to detect microalbuminuria may be useful for hypertensive dogs with CKD and a UPC \leq 1.0 to detect the onset and magnitude of albuminuria. Once macroalbuminuria is overt, the UPC ratio itself can be used for the same purpose.

[Vet Clin Pathol.](#) [Epub ahead of print]

Complement C3 in Bernese Mountain dogs.

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Abstract

Background: Previous research suggests that low serum concentrations of the third component of complement (C3) are associated with both the susceptibility to infectious agents such as *Borrelia burgdorferi* and the development of glomerular

disease. We hypothesized that low levels of C3 are associated with the coincident occurrence of *B. burgdorferi* infection and glomerulonephritis in Bernese Mountain dogs. Objectives: The aims of this study were to evaluate the serum concentration of C3 in Bernese Mountain dogs with and without antibodies against *B. burgdorferi* and to compare this concentration with that of healthy control dogs. Methods: Eighty-three clinically healthy Bernese Mountain dogs and 46 control dogs were included. Antibodies against *B. burgdorferi* were determined using an ELISA with a whole cell sonicate as antigen. Results were confirmed using Western blot. C3 was measured using a single radial immunodiffusion test. Results were reported as the percentage concentration of C3 compared with that in pooled preserved canine serum (100% C3 concentration). Results: Median C3 concentration was 128.5% in Bernese Mountain dogs with antibodies against *B. burgdorferi*, 133.5% in *B. burgdorferi*-negative Bernese Mountain dogs, 87.8% in positive control dogs, and 102.2% in negative control dogs. Within Bernese Mountain and control groups, C3 was lower in dogs with antibodies against *B. burgdorferi* compared with those without. Percentage concentration of C3 was higher in healthy Bernese Mountain dogs compared with control dogs. Conclusion: Low C3 concentration is not an explanation for the high prevalence of *B. burgdorferi* infections and glomerular disease in Bernese Mountain dogs.

[Vet Clin Pathol.](#) 2009 Dec;38(4):485-92.

Comparison of semiquantitative test strips, urine protein electrophoresis, and an immunoturbidimetric assay for measuring microalbuminuria in dogs.

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Abstract

BACKGROUND: The presence of albumin in urine, even in small amounts, is always abnormal and usually reflects kidney dysfunction. Different techniques are commercially available for the measurement of microalbuminuria in dogs. **Objectives:** The purpose of this study was to compare the accuracy of semiquantitative test strips, urine protein electrophoresis, and a validated immunoturbidimetric assay in the measurement of microalbuminuria in dogs. **METHODS:** Urine samples were collected from 307 dogs presented to The Queen's Veterinary School Hospital, University of Cambridge, for a variety of clinical conditions. Urine was collected by midstream free catch (193/307, 63%), cystocentesis (89/307, 29%), or catheterization (25/307, 8%). Routine urinalysis was performed on all samples. Albumin was measured by using semiquantitative test strips, by agarose gel electrophoresis, and by an automated immunoturbidimetric assay designed for human samples (considered as the gold standard). The latter was validated using a purified canine albumin standard. **RESULTS:** The immunoturbidimetric assay had within-assay and between-assay coefficients of variation (CV) of 1.3% and 5.0%, respectively, overall recovery of 97.1%, and high

linearity ($r=.985$). Of the samples with measurable albumin (>1.4 mg/L) by the immunoturbidimetric assay, 57/195 (29%) were negative for albumin using the semiquantitative test strips and 138/195 (71%) were positive. Urine protein electrophoresis (UPE) and immunoturbidimetric results had a concordance CV of 86%. CONCLUSIONS: UPE and semiquantitative test strips are less accurate than the automated immunoturbidimetric method for the measurement of albumin in canine urine.

[Vet Clin Pathol.](#) 2010 Mar;39(1):53-6. Epub 2009 Jul 1.

The use of pooled vs serial urine samples to measure urine protein:creatinine ratios.

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Abstract

BACKGROUND: Evaluation of serial urine protein:creatinine (UPC) ratios is important in prognosticating chronic kidney disease and monitoring response to therapeutic interventions. Owing to random biologic variation in dogs with stable glomerular proteinuria, multiple determinations of UPC ratios often are recommended to reliably assess urine protein loss. This can be cost-prohibitive. **OBJECTIVE:** The purpose of this study was to evaluate agreement between the mean of 3 UPC ratios obtained on 3 separate urine samples per dog and a single UPC ratio obtained when aliquots of the separate samples were pooled and analyzed as 1 sample. **METHODS:** Three separate urine samples were collected from each of 25 dogs, both client-owned and members of a research colony. Protein and creatinine concentrations were measured in the supernatant of each sample using a biochemical analyzer, and the mean of the 3 UPC ratios was calculated. A 1.0 mL aliquot of each of the 3 samples from each dog was pooled to create a fourth sample for that dog, and the UPC ratio of the pooled sample was similarly determined. Agreement and correlation between the mean and pooled UPC ratios were assessed using Bland-Altman difference plots and regression analysis, respectively. **RESULTS:** The UPC ratio in the pooled samples was highly correlated ($r=.9998$, $P<.0001$) with the mean UPC ratio of the 3 separate samples. Strong agreement between results was demonstrated; a UPC ratio from a pooled sample was at most $\pm 20\%$ different than the mean UPC ratio obtained from 3 separate samples. **CONCLUSIONS:** Measuring the UPC ratio in a pooled sample containing equal volumes of several different urine specimens from the same dog provides a reliable and cost-effective alternative to assessing multiple UPC ratios on several specimens from the same dog.

[Vet Clin Pathol.](#) 2009 Sep;38(3):337-42. Epub 2009 May 11.

Diagnostic utility and cost-effectiveness of reflex bacterial culture for the detection of urinary tract infection in dogs with low urine specific gravity.

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University of Zimbabwe, Harare, Zimbabwe.

Abstract

BACKGROUND: Urinary tract infections (UTIs) may be subclinical or difficult to detect in dilute urine as sediment abnormalities may not be observed. In our laboratory, bacterial culture is automatically performed (reflex culture) on samples with urine specific gravity (USG) < or = 1.013 to increase the likelihood of detecting infection. The value of routine culture of dilute urine, however, has not been fully assessed.

OBJECTIVE: The purpose of this retrospective study was to evaluate the frequency of positive bacterial cultures and analyze the diagnostic utility and cost-effectiveness of culture compared with routine sediment examination for detecting UTI in dilute urine specimens from dogs. **METHODS:** Urinalysis and concurrent aerobic bacterial culture results were obtained from the electronic medical record system at the University of California-Davis Veterinary Medical Teaching Hospital for samples with USG < or = 1.013 analyzed from July 1998 through January 2005. Urine collection method, presence of leukocytes and bacteria, bacterial culture results, and clinical diagnosis were recorded. Cost-effectiveness of reflex culture, based on low USG as the sole criterion, was evaluated. **Results:** Of 1264 urine specimens, 106 (8.4%) had positive bacterial cultures. Using culture as the gold standard, sediment evaluation had a diagnostic sensitivity of 58.5% and specificity of 98.3% (diagnostic accuracy 94.9%). An additional cost of \$60 per patient was incurred, leading to average annual costs of \$11,668 for reflex bacterial cultures of all samples with low USG, regardless of collection method. Within our study population, 10 urine samples needed to be cultured for each true positive result. **CONCLUSIONS:** The sensitivity of urine sediment evaluation is low for UTI in dilute urine samples; however, reflex bacterial culture does not appear to be cost-effective in dogs with USG < or = 1.013 in the absence of active urine sediment or high clinical suspicion for UTI.

Veterinary Record (May 09 to May 2010)

[Vet Rec.](#) 2010 May 15;166(20):618-23.

Assessment of renal vascular resistance and blood pressure in dogs and cats with renal disease.

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Abstract

This study investigated the possible relationships between renal resistive index (RI) or pulsatility index (PI) and systolic blood pressure and biochemical and haematological parameters in dogs and cats with renal disease. The study included 50 dogs and 20 cats with renal disease. RI and PI were significantly higher in both dogs and cats with renal disease than in 27 healthy dogs and 10 healthy cats. In dogs, a significant negative correlation was found between RI and red blood cell count, and a positive correlation was found between PI and serum creatinine. In cats, a positive correlation was found between RI and serum urea, between PI and serum creatinine, and between PI and serum urea. No relationship could be found between either RI or PI and systolic blood pressure.

[Vet Rec.](#) 2010 Apr 10;166(15):459-62.

Glucosuria in Norwegian elkhounds and other breeds during dog shows.

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Abstract

Clinically healthy Norwegian elkhounds were tested for glucosuria by urine dipstick analysis and the results were compared with a group of dogs of other breeds during 15 dog shows. Fifty-two of 187 Norwegian elkhounds (27.3 per cent) and 15 of 202 dogs of other breeds (7.4 per cent) were glucosuric during the dog shows; the difference was statistically significant. Two of the glucosuric elkhounds and one non-glucosuric elkhound developed signs of kidney disease during the year of the study.

[Vet Rec.](#) 2010 Feb 13;166(7):199-202.

Malignant histiocytosis and other causes of death in Bernese mountain dogs in Denmark.

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Abstract

To determine the causes of death in Bernese mountain dogs, to assess the prevalence of malignant histiocytosis in the Danish Bernese mountain dog population, and to assess whether a hereditary pattern for this disease exists, 756 questionnaires were sent to members of the Danish Bernese Mountain Dog Club requesting information regarding the life span and causes of death of their dogs. A response rate of 57.7 per cent was achieved, giving information for 812 dogs, of

which 290 had died. The average life span was 7.1 years. The most prevalent causes of death were neoplasia (42.1 per cent), old age (10.3 per cent), kidney disease (6.9 per cent), infection (5.9 per cent), skeletal problems (5.2 per cent), heart disease (3.8 per cent) and behavioural causes (3.5 per cent). Thirteen dogs were diagnosed with malignant histiocytosis, 11 of which were genealogically related.

[Vet Rec.](#) 2010 Feb 6;166(6):169-74.

Urinary catecholamine and metadrenaline to creatinine ratios in dogs with a phaeochromocytoma.

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Abstract

Urinary adrenaline (epinephrine), noradrenaline, dopamine, metadrenaline (metanephrine) and normetadrenaline to creatinine ratios were measured from spot samples of seven client-owned dogs with a histologically confirmed phaeochromocytoma. Urine was collected on day 0 in the hospital in six dogs, and additionally on days 2, 6 and 7 after discharge in two of these dogs. In one dog, urine was sampled on day 7 only. Samples were also collected from 10 healthy control dogs on days 0, 1 and 7. In dogs with phaeochromocytomas, normetadrenaline:creatinine ratios at all time points ranged from 103 to 6430 nmol/mmol. From day 0, ratios of samples taken at the hospital (range 157 to 925 nmol/mmol) were significantly higher ($P < 0.0012$) compared with control samples (range 14 to 91 nmol/mmol). The highest normetadrenaline:creatinine ratios were found in two dogs with bilateral phaeochromocytomas. Adrenaline:creatinine and noradrenaline:creatinine ratios were also significantly increased ($P < 0.016$) in dogs with a phaeochromocytoma at day 0 compared with controls, although the difference was less pronounced than that between controls and dogs with a phaeochromocytoma for the normetadrenaline:creatinine ratio. Urine normetadrenaline:creatinine ratios may be useful in the diagnosis of canine phaeochromocytomas.

[Vet Rec.](#) 2009 Nov 14;165(20):594-7.

Comparison of a rapid immunoassay for antibodies to the C6 antigen with conventional tests for antibodies to *Borrelia burgdorferi* in dogs in Europe.

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Abstract

A commercial immunoassay for antibodies to the C6 antigen of *Borrelia burgdorferi* was evaluated against an IgG in-house ELISA in combination with a Western blot assay to examine 104 samples of serum from 53 healthy Bernese mountain dogs, which were suspected to have a breed predisposition to Lyme borreliosis, and 55 samples from 30 healthy large-breed longhair dogs. The two test methods correlated in 125 (79 per cent) of the samples with an agreement of kappa=0.571 ($P < 0.001$). In comparison with the in-house ELISA in combination with a Western blot, the sensitivity and specificity of the C6 test were 81 per cent and 77 per cent respectively. The agreement between the tests was better with the samples from the Bernese mountain dogs ($k=0.681$) than with the samples from the control dogs ($k=0.347$).

Veterinary Radiology and Ultrasound (May 09 to May 2010)

[Vet Radiol Ultrasound](#). 2010 May-Jun;51(3):335-7.

Relationship between age, plasma renin activity, and renal resistive index in dogs.

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Abstract

The renal resistive index (RI) value of 0.73 has been proposed as the upper limit in normal adult dogs. In humans, changes in RI with age are associated with plasma renin activity. There are relatively few equivalent reference data for dogs. We obtained reference RI data from 22 clinically healthy dogs <4 months of age and 33 healthy dogs between 4 months and 7 years of age. An association between the RI and plasma renin activity was investigated. The mean RI in the older dogs was 0.65 ± 0.05 vs. 0.75 ± 0.05 in dogs <4 months of age. The mean plasma renin activity in the older dogs was 1.18 ± 1.03 vs. 4.23 ± 3.09 ng/ml/h in dogs <4 months of age. There was a weak linear relationship between the RI and plasma renin activity ($r^2 = 0.280$, $P < 0.01$) in dogs <4 months of age. Also in these younger dogs, RI was negatively correlated with age ($r^2 = 0.682$, $P < 0.01$). The RI was higher in dogs <4 months of age than in older dogs. Therefore, the mean renal RI is slightly higher in young dogs than reported for an older population and interpretation of the RI must include an assessment of patient age.

[Vet Radiol Ultrasound](#). 2010 Mar-Apr;51(2):168-72.

Contrast-enhanced ultrasound of the feline kidney.

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Abstract

Contrast-enhanced ultrasound offers a noninvasive means of subjectively and quantitatively evaluating renal perfusion in cats with renal disease, or in renal transplant patients. In this study, we characterized the pattern of ultrasonographic contrast enhancement in 16 normal feline kidneys in eight cats using contrast-enhanced power Doppler and contrast-enhanced harmonic ultrasound techniques. Mean time to peak contrast enhancement for the whole kidney was longer using contrast-enhanced harmonic ultrasound (16.8s, SD 4.7s) than contrast-enhanced power Doppler ultrasound (12.2s, SD 1.8s). The time to peak enhancement for the cortex alone in contrast-enhanced harmonic ultrasound was 13s (SD 3.2s), and for the renal medulla was 25.5s (SD 8.7s). The half time for washout of contrast agent was 39s (SD 14.5s) for contrast-enhanced harmonic ultrasound. The pattern of contrast enhancement in these normal feline kidneys can be used as normal reference values for the evaluation of clinical patients. Contrast-enhanced harmonic ultrasound may allow the differentiation between cortical and medullary perfusion patterns.