The effect of non-absorbent hydrophobic sand litter on urine protein-to-creatinine measurement in cats.

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Background:

- Quantification of proteinuria is often performed by measuring the urine protein-to-creatinine ratio (UPC).
- Strong correlation exists between UPCs measured in urine obtained by cystocentesis and free catch methods in cats and dogs.^{1,2}
- The effect of non-absorbent hydrophobic sand litter on the measurement of UPCs in feline urine has not been evaluated.
- Using voided urine samples may offer a more cost-efficient and stress-free means of monitoring UPCs in cats.

Aim of study:

- To investigate whether a commonly used non-absorbent litter³ affects UPC measurements in feline urine.

Methods:

- Duplicate UPCs were measured in 40 urine samples obtained by cystocentesis from 39 cats.
- Up to 3ml of urine were placed in contact with the hydrophobic sand litter for 24 hours and covered.
- Urine was recovered using a pipette and repeat UPCs measured in duplicate.

Results:

- A Wilcoxon signed-rank test showed a statistically significant decrease of 0.01 in UPC after exposure to the litter for 24 hours, $p < 0.0005$, (range 0.06-5.59).
- Strong correlation exists between UPCs at baseline and after 24 hours exposure to litter, $r_s = 0.988$.
- Passing-Bablok regression analysis revealed minimal constant and proportional error between paired measurements, $y = -0.0038 + 0.9696x$ (Figure 1).
- Visual inspection of the Bland-Altman plot demonstrated excellent agreement between baseline UPCs and 24-hour UPCs (Figure 2).
- Agreement for IRIS classification was almost perfect with a Cohen's kappa coefficient of $k = 0.915$.

Figure 1: Passing-Bablok regression analysis of UPC measured at baseline and after 24-hour exposure to non-absorbent hydrophobic sand litter. Scatter chart with regression line (solid) and confidence bands (dashed) for regression line are shown. Regression line equation $y = -0.0038 + 0.9696x$

Figure 2: Difference versus average Bland-Altman plot of UPC measured at baseline and after 24-hour exposure to non-absorbent hydrophobic sand litter. Solid blue line represents the mean bias = -0.02. Dashed lines represent the 95% limits of agreement from -0.19 to 0.15.

Conclusion:

- The agreement measures of Bland-Altman analysis and Cohen's kappa for IRIS proteinuria classification both suggest that the use of non-absorbent hydrophobic sand litter has minimal effect on UPC measurement in feline urine.
- Feline urine exposed to this litter substrate appears acceptable for UPC measurement.

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