

MEASUREMENT OF CREATININE AND UREA ON FELINE SAMPLES: RESULTS OF AN IN-HOUSE ANALYSER vs AN EXTERNAL COMMERCIAL LABORATORY

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ABSTRACT: Creatinine and urea are commonly measured in cats. These analytes can be measured via in-house analysers or at an external commercial laboratory. The aim of our study was to compare the results obtained by an in-house analyser with the results of an external laboratory when these analytes were assessed on feline samples. Equivalence between the two methods was tested using paired equivalence tests. Limits of equivalence were set at $\pm 20\%$ for creatinine and $\pm 12\%$ for urea. Two-hundred and nine cats were included in the study for a total of 207 paired creatinine results and 149 paired urea results. While the two methods can be considered equivalent for the measurement of creatinine (mean $\text{Crea}_{\text{EPOC}}/\text{Crea}_{\text{LAB}}$ ratio 0.97; 95% CI 0.95 – 1.00), using these criteria, this was not true for urea (mean $\text{Urea}_{\text{EPOC}}/\text{Urea}_{\text{LAB}}$ ratio 0.88; 95% CI 0.85 – 0.99).

INTRODUCTION: Creatinine and urea are commonly evaluated in cats presented to veterinary attention as part of the diagnostic work up of an unwell cat or cats with urinary tract disease. They are also included in the recommended wellness evaluation of senior cats (1). Studies have compared the results of some in-house analysers with the ones obtained by reference laboratories (2–5), highlighting that they can't always be used interchangeably. The aim of our study was to assess the agreement between the EPOC analyser (Enterprise Point Of Care blood analysis system, Epocal Inc.) and a commercial laboratory analyser (Beckman AU480 analyser) when measuring urea and creatinine in feline patients.

MATERIAL AND METHODS: The patient database of our hospital was searched for cats who had blood creatinine and/or urea assessed with both methods between January 2018 and March 2021. Creatinine and urea obtained by the two analysers were compared using paired equivalence tests. Upper and lower limits of equivalence were set at $\pm 12\%$ for urea and $\pm 20\%$ for creatinine. These reflect the total error for these two analytes allowed by the Guidelines of the American Society of Veterinary Clinical Pathology (6).

RESULTS: Two hundred and nine cats had blood creatinine and/or urea measured both on the in-house analyser and at an external commercial laboratory. Two hundred and seven paired creatinine measurements and 149 paired urea measurements were included in the statistical analysis (Table 1 and Figure 1). The paired equivalence test was done after log transformation of the data as the differences of the paired measures were not normally distributed. The results are presented in Figure 2. Our data showed equivalence of EPOC analyser and Beckman AU480 analyser for the measurement of blood creatinine with limits of equivalence set at $\pm 20\%$. The two methods were not equivalent when urea was measured with limits of equivalence set at $\pm 12\%$.

Analyte	EPOC analyser	Laboratory
Creatinine ($\mu\text{mol/L}$)	129 (89 – 169)	127 (96 – 162)
Urea (mmol/L)	8.2 (6.4 – 11.1)	9.3 (7.1 – 13.1)

Table 1 Median and interquartile range for urea and creatinine measured with the EPOC analyser and at the external laboratory

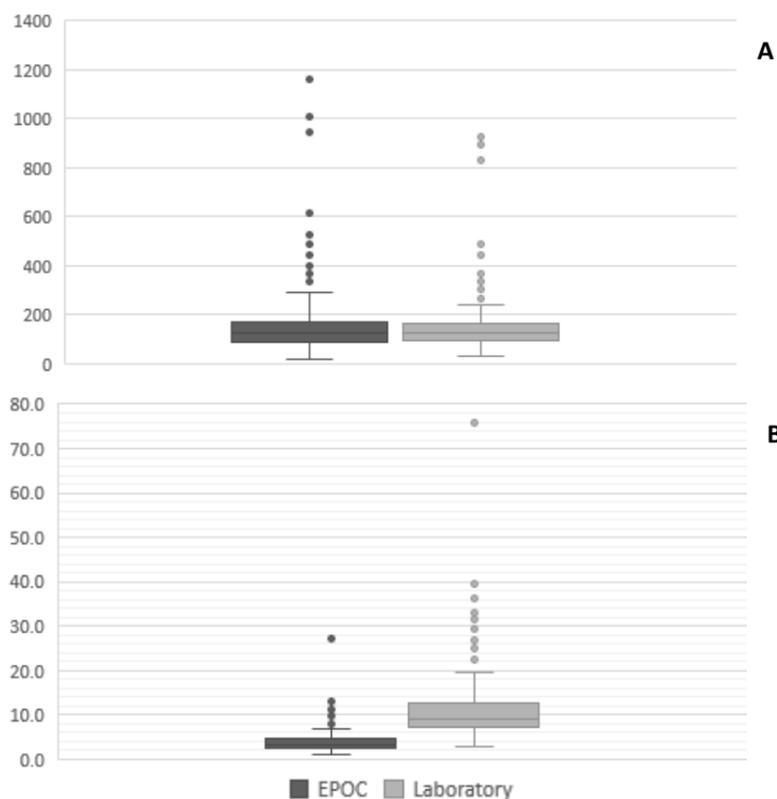


Figure 1 Box plots of A) creatinine ($\mu\text{mol/L}$) and B) urea (mmol/L) concentrations measured on both in-house EPOC analyser and at an external laboratory.

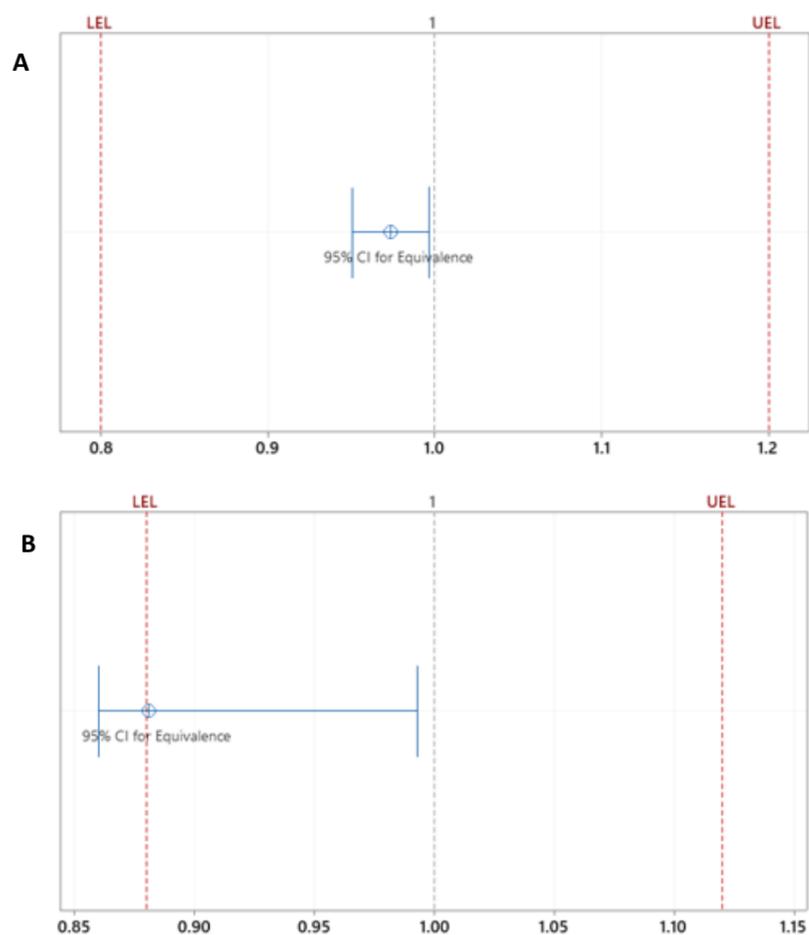


Figure 2 Limits of equivalence and confidence interval for A) $\text{Crea}_{\text{EPOC}}/\text{Crea}_{\text{LAB}}$ ratio and B) $\text{Urea}_{\text{EPOC}}/\text{Urea}_{\text{LAB}}$. LEL: lower equivalence limit; UEL: upper equivalence limit; CI: confidence interval

DISCUSSION

- The two methods assessed in this study could be used interchangeably for the measurement of creatinine in cats based on the criteria set in this study (maximum tolerated discrepancy between the two analysers = 20%)
- The two methods are not equivalent for the measurement of urea (maximum tolerated discrepancy between the two analysers = 12%) and this should be considered when this analyte is monitored in the same animal over time

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