

GFR measurements in feline subjects using high performance capillary electrophoresis.

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INTRODUCTION

This abstract describes a Label-Free High Performance Capillary Electrophoresis (HPCE) method for the determination of Glomerular Filtration Rate (GFR) values in feline subjects administered with the contrast agent Iohexol (Omnipaque™). It was hypothesised that this capillary electrophoresis technique would give quicker results, with minimal sample preparation and lower costs compared to traditional HPLC techniques.

MATERIALS AND METHODS

Residual serum samples from 14 healthy adult cats, which had been administered Iohexol for GFR assessment by a traditional High Performance Liquid Chromatography technique with ultraviolet detection (HPLC-UV), were obtained. Each of the 14 cats had had blood samples taken at 120, 180 and 240 min time-points following intravenous administration of a bolus dose of 647 mg kg⁻¹ of Iohexol. Serum was separated from whole blood and stored at -80°C. Iohexol concentrations in each of the serum samples were measured using deltaDOT's Label-Free HPCE system. An Iohexol standard calibration curve was prepared in feline plasma and used to determine the concentration of Iohexol remaining in each of the feline plasma samples at each of the three time-points. GFR was calculated using the method described by Finch et al. (2011). A Bland-Altman plot was used to assess

differences between GFR values obtained using the current capillary electrophoresis method and traditional HPLC-UV.

RESULTS

A calibration curve for Iohexol, ranging between 7.8 and 500 lg ml⁻¹, was generated in feline serum; excellent linearity was achieved with an R² value of 0.9954 with a total sample preparation and analysis time < 30 min. No difference in linearity was observed between serum stored in EDTA tubes and serum stored in heparin tubes. Relative standard deviation (RSD) was used as a measure of repeatability. Percent RSD values of 1.4% in terms of Iohexol concentration were obtained following six repeat injections of sample at a concentration of 1 mg ml⁻¹. Accuracy was measured as a recovery of 104% when tested with a 125 lg ml⁻¹ standard. The average bias for GFR between the two methods was -0.12 ± 15%.

CONCLUSIONS

High performance capillary electrophoresis is a rapid and cost-effective method for measuring Iohexol in feline GFR estimation. Minimal sample preparation is required prior to analysis and excellent repeatabilities are achieved. Good correlation between GFR values obtained using capillary electrophoresis and those obtained using HPLC-UV was achieved.

REFERENCES

1. Finch, N.C., Syme, H.M., Elliott, J., Peters, A.M., Gerritsen, R., Croubels, S. & Heiene, R. (2011) Glomerular filtration rate estimation by use of a correction formula for slope-intercept plasma iohexol clearance in cats. *American Journal Veterinary Research*, 72, 1652–1659.