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Screening for colorectal cancer risk biomarkers related to diet

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Background: Red and processed meat are associated with high risks of colorectal cancer due to the endogenous formation of O⁶-carboxymethyl guanine (O⁶CMG), a potent carcinogen. The aim of our research is to develop liquid chromatography tandem mass spectrometry (LC-MS/MS) analytical methods for the measurement of the DNA adducts, such as O⁶CMG and its nucleoside O⁶-carboxymethyl deoxyguanosine (O⁶CMdG), in urine samples and correlate it to different diets.

Methods: Urine samples were collected from volunteers on three different diets (vegetarian as the control, with red and processed meat as the experimental group) over a period of 15 days at the Medical Research Council, Cambridge. Samples were analysed by LC-MS/MS either by direct injection or using a column-switching system with an on-line solid phase extraction (SPE) column.

Results: An LC-MS/MS method was developed and used initially to monitor and quantify O⁶CMdG and O⁶CMG using standards in synthetic urine. O⁶CMG elutes at 4.7 min and have a limit of detection (LOD) of 0.3ng/mL, and O⁶CMdG elutes at 14.1 min and have a LOD of 0.03ng/mL. The LC-MS/MS direct injection analysis of the clinical samples showed low sensitivity and the need for sample clean-up.

Conclusions: An efficient method for the separation and quantification of O⁶CMdG and O⁶CMG was developed. An on-line SPE column system is under development to allow an efficient and rapid processing of a large number of clinical urine samples.

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None Disclosed

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