A SIMULTANEOUS SAMPLE PREPARATION PROCEDURE FOR MEASUREMENT OF ^{90}Sr AND ACTINIDES IN A SPOT URINE SAMPLE

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Strontium-90 (^{90}Sr) and actinides such as americium and plutonium radioisotopes have been identified as some of the high priority radionuclides likely to be involved in a radiological/nuclear (R/N) emergency. Following an R/N accident, a large number of people may need to be screened for internal contamination. Rapid screening for internal contamination is essential because medical intervention (for example, chelation therapy), if needed, should be undertaken as early as possible. Due to significantly different chemical properties of strontium, americium and plutonium, a simultaneous sample preparation procedure for matrix removal, pre-concentration, and purification of these radionuclides is a challenge. A simultaneous sample preparation becomes more relevant for an emergency radiobioassay where a limited volume of a spot urine sample is available, the identity of the radionuclide(s) is not known, and splitting a spot sample into multiple aliquots would compromise the measurement sensitivity. To overcome the challenge, recent efforts have been focused on the use of multiple stacked extraction chromatographic cartridges, which are radionuclide selective, together with vacuum box technology for simultaneous sample preparation of ^{90}Sr and actinides in a spot urine sample.

In this presentation, a new approach will be demonstrated for simultaneous sample preparation of ^{90}Sr and actinides in a spot urine sample. It is based on an automated high performance ion chromatographic (HPIC) separation system. Compared to the radionuclide selective multiple stacked extraction chromatographic cartridges, this approach allows automated separation of Sr, Am, and Pu radionuclides on a single ion chromatographic (IC) column. Moreover, while an extraction chromatographic cartridge is typically used for a single analysis, an IC column allows analysis of multiple samples without compromising the analytical performance. As a result, sample preparation based on HPIC is an attractive alternative for long term cost saving for multiple sample analysis as well as for carrying out new research and development activity where initial method development requires multiple experimental iterations of the optimisation parameters.

The detail of the method development and performance characteristics will be discussed during the presentation.