Combined Procedure of Determination of Key Radionuclides in Food for the Ingestion Dose Assessment

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Public's concerns in safe food have increased greatly due to nuclear accidents. Radionuclides of both natural and human-made origin are present at various concentrations in food, resulting in exposure to ionizing radiation and an internal radiation dose. Exposure due to radionuclides in food amounts to 0.29 mSv [1]. The natural radionuclides ^{210}Po, ^{210}Pb, ^{226}Ra, ^{228}Ra and the artificial radionuclides ^{90}Sr, ^{137}Cs and ^{14}C have been identified as the main contribution to the dose of internal exposure [2]. Better methods of detection and identification of radionuclides in food play an important role for the assessment of ingestion dose. Normally the measurement categorized into two groups: gamma-ray spectrometry and radiochemical methods. We select the first direct γ spectrometry measurement for ^{137}Cs, ^{226}Ra, ^{228}Ra and ^{210}Pb using dried food samples in 2 marinelli beakers. If the level is lower than the detection limit (0.1-0.5Bq/kg), such as ^{228}Ra and ^{210}Pb, follow the radiochemical analytical procedure, together with ^{210}Po (alpha emitting) and ^{90}Sr (beta emitting). In comparison with the radiochemical separation procedure for single radionuclide, we developed a cost-effective procedure for simultaneously separating and measuring radionuclides [3, 4]. All the detection limits meet equivalent or lower to 10% of the IAEA guidance levels [5] The recovery or overall efficiencies, the minimum detectable activities of radionuclides, and the uncertainty assessment are presented and discussed. (This work was funded by the National Key Research and Development Project, China, No. 2019YFC1604804)

Reference

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