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Analysis of Radioactive Strontium in Food by Cerenkov Liquid Scintillation Counting

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Content

Hundreds of food samples are analyzed annually for radioactive strontium-90 (90Sr) at FDA's Winchester Engineering and Analytical Center (WEAC). Carried out under the FDA's food safety compliance programs, these laboratory analyses enable the FDA to assess the prevailing level of 90Sr in our nation's food supply and prepare to monitor any adverse changes of 90Sr concentration in the food supply as a result of a nuclear or radiological incident.

The current radiochemical method used for the detection of 90Sr is laborious, time-consuming, and potentially hazardous if not performed properly. It generates a high volume of mixed wastes containing organic solvent, strong nitric acid, and radioactive materials. These wastes are difficult to manage and expensive to dispose of. Besides these drawbacks, the method lacks the ability to detect another radioactive strontium isotope, i.e., 89Sr, a curial radionuclide necessary for radiological risk assessment in the event of a radiological emergency involving 89Sr.

In order to comply with green government mandates, improve operation safety, and expand the agency's radioanalytical capability, a novel, safer, quicker, and greener method was developed. This new method is based on solid-extraction liquid scintillation counting and was developed for the detection of 89Sr and 90Sr in a broad range of food. The new method differentiates between 89Sr and 90Sr in food and eliminates most of the hazardous wastes.

Two types of Eichrom's extraction chromatography resins, i.e., Sr resin and DGA resin, with high affinity toward Sr and Y, respectively, were used for food analysis. The 89Sr and 90Sr (determined via its progeny isotope 90Y) were analyzed via Cerenkov liquid scintillation counting. The extraction yields for Sr and Y are determined by ICPMS and XRF, respectively. A preliminary study indicated that the new method provides not only a lower detection limit of 90Sr in food but also radioanalytical capability that is critically needed for responding to a radiological event that involves radioactive 89Sr.

About the Presenter

Stephanie Healey serves as a supervisory chemist in the Radiochemistry and Microbiology Section, Analytical Branch, Winchester Engineering and Analytical Center, FDA. She specialized in analysis of radionuclides in FDA-regulated products and has experience in various radiometric techniques including gamma ray spectrometry, gas-flow proportional counting, and liquid scintillation counting. She is also skilled in various radiochemical separation techniques. Currently, she is supervising a number of radiochemical method development and validation per ISO standards.

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