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Screening and Quantification Workflows for PFAS in Food Packing

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Perfluoroalkyl substances (PFAS) are globally used in a variety of consumer goods due to their unique functional properties. There are many routes of potential exposure to PFAS from non-stick cookware, grease-resistant paper, fast food wrappers, microwave popcorn bags, and retail and convenience packaging. Long-chain PFAS were voluntarily discontinued by manufacturers in the USA and are not intentionally added to food packaging, consistent with FDA guidelines. Short-chain PFAS and fluorinated acrylate polymers remain authorized for use in packaging and industrial applications. A comprehensive, rapid, and cost-effective quantification of all 4000+ PFAS compounds is not currently practical given today's technology, methods, and workflows. Recent publications and work by our team have established methods for detection of total fluorine as an indicator of PFAS. Variability in screening and quantification for PFAS such as sample preparation and residual concentrations in cellulose-based products can have a significant impact on reported values to assess consumer exposure in food packaging. This presentation discusses PFAS in food packaging from screening through quantification.

Method development and investigation into perfluoroalkyl and polyfluoroalkyl substances (PFAS) in the US food supply

Susan Genualdi, Wendy Young, Lowri deJager, & Timothy Begley, U.S. Food and Drug Administration

The dietary exposure to perfluoroalkyl and polyfluoroalkyl substances (PFAS) through foods consumed in the US has not been well characterized. Potential sources of PFAS contamination of foods in the human diet include contaminated water affecting agricultural products, livestock, and seafood, and migration from food contact materials. The FDA's Total Diet Study (TDS) routinely collects and monitors composite samples of table-ready highly consumed foods each year. Samples collected through this program in 2018 were used to develop a Quick, Easy, Cheap, Effective, Rugged, Safe (QuEChERS) extraction method for PFAS with analysis by liquid chromatography mass spectrometry. A total of 16 PFAS were analyzed in a variety of commodities including fruits, vegetables, milk, cheese, grains, meats and seafood. This method was used to analyze 179 TDS composite food samples collected in different regions of the country and representing foods available in those regions.

During method development, challenges arose with matrix suppression, interferences, false positives and method blanks. Investigations were also made into improving chromatography and additional clean-up steps. Results from the TDS samples will be presented along with method development and optimizations. This method will allow the FDA to continue monitoring PFAS compounds in the US food supply.

Challenges Associated with the Analysis of PFAS in Food and Food Contact Materials

Charles Neslund

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Per- and polyfluoroalkyl substances (PFAS) are considered persistent organic pollutants (POPs). As such our expectation is that they remain in the environment for years and in many cases are not biodegradable. As the analysis and investigation of sites contaminated with PFAS and the impact to drinking water continues to mature there is a growing interest in the contribution of PFAS from ingestion of foods. To date, the only commonly acceptable methodology for the analysis of PFAS was a drinking water method, EPA 537.1. This method covers a somewhat limited list of PFAS and is designed for drinking water. In December of 2019, EPA published Method 533, which has a broader list of compounds and uses a different extraction chemistry but is still designed for drinking water. So, what does a commercial laboratory do when customers want to evaluate vegetables grown if fields treated with biosolids, or milk from a dairy whose cows ingested PFAS contaminated water? What about evaluation of the potential for PFAS migration from food contact materials (FCM)? This presentation will discuss these challenges and experiences in the presence of development of in-house laboratory techniques and recently published approaches from the FDA.

Developing International Consensus Performance Standards and Official Methods of Analysis for PFAS: Benefits and Challenges

Palmer Orlandi, PhD Association of Official Analytical Collaboration

PFAS is a class of per- and poly-fluoroalkyl compounds recognized as persistent bioaccumulative and toxic contaminants present throughout the environment. Their ubiquity presents a significant concern to global human health. Whereas most of the surveillance and testing thus far for PFAS has focused on soil, sediment and water using validated and uniformly accepted methodologies, their pervasive presence in the environment and

their use in food contact paper and packaging has created a need to expand testing capabilities to foods and other food-related matrices as well. Currently, validated analytical methods to compile exposure data on PFAS in foods are limited to a single-laboratory validated method developed by the US Food & Drug Administration in 2019. Though limited in scope, their method has laid the groundwork for future method (matrix) extension. However, the high level of global concern and the disparate regulatory trends worldwide requires that a consensus and harmonization of method performance standards be achieved for future method development and testing needs. This presentation will highlight the benefits for the global adoption of consensus standards, describe the process, and provide evidence on how such a process fosters the implementation of official methods of analysis.