Investigation of Per- and Polyfluoroalkyl Substances (PFAS) in US food products

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Background

- **DuPont phased out PFOA completely in 2015.**
- **Gen-X (HFPO-DA) - new technology used to make high performance fluoropolymers without PFOA.**
- Production has shifted towards shorter chain length perfluorinated substances (6 carbons or less) and other classes of polyfluorinated substances.

Potential sources of PFAS to humans

- **Household exposure**
- **Environmental exposure**

Dietary Intake exposure from agriculture, seafood, and livestock

Objectives:

- To develop methods to determine the concentrations of Per- and Polyfluoroalkyl substances (PFAS) in a variety of food items utilizing samples from FDA Total Diet Study program.
- To assess the impact of food sources in close proximity to environmental inputs of PFAS chemicals – Investigate location in close proximity to PFAS production facility and location close to Air Force Base where groundwater has been contaminated with Aqueous Film Fighting Foam (AFFF).

Method

1. Add water and extraction solvent (Automix)...
2. Add QuECHERS solid (800 mg MgSO4, and 1000 mg NaCl)...
3. Transfer supernatant to SPE tube (400 mg PSA, 400 mg C18 and 1200 mg MgO...)
4. Filter extract with a 0.2 µm nylon filter...
5. Analysis using SCIEX 6500 plus

Total Diet Study Samples (TDS)

- TDS samples were used because of the diverse food categories (produce, meat, dairy, and grain products) and they were already prepared for analysis.
- Samples were collected in October 2017 from the Mid-Atlantic Region (see map).
- Analytical sample is a composite of 3 flies per collection in that region of each food item.
- 91 samples were analyzed. Including produce, meat, dairy, and grain products. Non-detects (16 analytes) were reported in 81 of the 91 samples analyzed.
- Using our current safety assessment methods, the samples with PFOA are not likely to be a health concern.

Dairy Farm near Air Force Base in New Mexico

- A dairy farm in New Mexico was found to have contaminated groundwater due to its close proximity to an Air Force Base where AFFF has been historically and currently used.
- The water sample had a PFOA concentration around 2500 ng/L, which is 33 times greater than the EPA health advisory level of 70 ng/L.
- The impact of the water contamination also resulted in PFAS contaminated silage produced in the area.
- As a result, dairy cows were exposed to contaminated water and silage, resulting in milk contamination.
- PFOA has a slow elimination rate from milk even after exposure is stopped. With a half-life of 56 days, it would take 1.5 years to eliminate PFOA from the milk.
- The profiles of PFAS in milk are similar to profiles of AFFF foams reflecting the long-term exposure of these chemicals to the cows and the persistence of the long chain compounds in these animals.

Produce collected near a PFAS Production Plant in Eastern US

- Produce (mainly lettuce, cabbage, kale, collard greens) were collected at local farmer's markets along the river from above and below the PFAS production plant in June 2018.
- Based on previous studies, longer chain PFAS compounds can uptake into the leafy portion of the plant. Without the plant being exposed to AFFF foam, it is unlikely to be contaminated.
- **Wells near the PFAS production plant are known to be contaminated with Gen-X (HFPO-DA) and samples collected from a produce stand within 10 miles of the plant had HFPO-DA concentrations—200 ng/kg.

Conclusions:

- The FDA has reviewed results for PFOA/PFOA in top commodities using a safety assessment based on food consumption data and the EPA reference doses. Use of the developed method and a robust sampling plan will provide a better understanding of potential dietary exposure to consumers that might include TDS and other sampling assignments.
- Safety assessment was used to advise the New Mexico dairy farm that their milk was unfit for human consumption, the product was discarded.
- PFAS concentrations measured in lettuce and other produce grown near a PFAS production plant were not likely a human health concern from consumption.
- Results indicate PFAS concentrations measured in produce samples and TDS samples were not likely a human health concern from consumption.
- Water sources and foods grown near potentially contaminated sites will be monitored to ensure the safety of foods being introduced into commerce in the US.