Fluorinated compounds are common in U.S. fast food packaging and potentially contribute to population-wide PFAS exposure

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Abstract: Per- and polyfluoroalkyl substances (PFASs) are highly persistent synthetic chemicals, some of which have been associated with cancer, developmental and immune toxicity, and other health effects. PFASs are used in some grease-resistant food packaging; prior studies found PFASs in packaging can leach into food. To evaluate potential contributions of fast food packaging to PFAS exposure, we screened food packaging samples for fluorinated chemicals and evaluated associations between reported fast food consumption and PFAS blood levels. In 2014-2015, we tested >400 samples of food contact papers, paperboard, and cups from fast food restaurants across the U.S. for total fluorine using particle-induced gamma-ray emission (PIGE) spectroscopy. PIGE can rapidly measure total fluorine in paper, a marker for PFASs. We detected fluorine (>16 nmol/cm²) in 46% of food contact papers and 20% of paperboard samples. Liquid chromatography/high-resolution mass spectrometry analysis of a subset of 20 samples found 27 known PFASs and unidentified polyfluorinated compounds based on nontargeted analysis. Six of the 20 samples contained detectable levels of PFOA (C8), even though in 2011 U.S. food packaging manufacturers phased out C8 compounds. While production of long-chain PFASs has been phased out in the U.S., newer short-chain and polyether PFASs are similarly persistent and also raise health concerns. We explored associations between fast food consumption and PFAS blood serum levels in the general U.S. population using U.S. CDC’s NHANES biomonitoring and health survey data. Number of fast food meals consumed in the prior week and consumption of fast food in the prior day were associated with higher levels of PFOS, PFOA, and several related PFASs after controlling for demographic variables, BMI, and NHANES cycle, with stronger associations in 2007-2010 data compared to 2011-2014 data. Our results suggest potentially significant contributions of fast food packaging to PFAS exposure.

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