PFAS in the Environment & Implications for Human Exposure

Elsie M. Sunderland
ems@seas.harvard.edu
https://bgc.seas.harvard.edu
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PFAS are detectable in virtually all Americans

Detected in 98% of Americans

Impacts on communities

Exposure linked to health risks:
Cancer, elevated cholesterol, obesity, immune suppression, and endocrine disruption

(Lewis et al., 2015; Grandjean et al., 2012; Braun et al., 2016; Barry et al., 2013)
Human exposures to PFAS are diverse: Some can be addressed/mitigated faster than others

Sunderland et al., 2019, JESEE
2016 US EPA provisional lifetime health advisory for drinking water of 70 ng/L (PFOS + PFOS or sum)

Estimated **18-80 Million** U.S. Residents have **>10 ng/L PFAS** in their tap water

Andrews and Naidenko, 2020, EST Letters
There are thousands of PFAS. Large amounts of unidentified organofluorine in surface & drinking waters

AFFF impacted watersheds in Cape Cod MA

Drinking Water in MA

Ruyle et al. (2021), ES&T

% unknown EOF: 8% - 89% in 1989/1990; 60% - 94% in 2016

Hu et al. (2019), Environmental Health Perspectives
Some PFAS accumulate in food webs & seafood: an important human exposure source

NHANES 2005-2006

Hu et al. 2018, Environmental Health
Agronomic exposure pathway for PFAS

The curious case of tainted milk from a Maine dairy farm

Richard Valdmanis, Joshua Schneyer

ARUNDEL, Maine (Reuters) - For Maine dairy farmer Fred Stone, the discovery in 2016 that his cows were producing tainted milk has since brought financial ruin and threatened to shut down a century-old family business.
PFAS in food packaging can contaminate food

Schaider et al., 2017, ES&T Letters

Tokranov et al., 2019
ES&T Letters
Personal Care Products

High concentrations detected of precursors to PFAS with known health effects; Gap in US and Canadian labeling laws

Whitehead et al., 2021; ES&T Letters
PFAS in many consumer products: Indoor environment and dust

Example: 15 Fire Stations in MA

Young et al., 2020, JESEE
PFAS are globally distributed contaminants: The atmosphere is an important transport mechanism
Regulatory action is effective: Rapid declines in seawater, wildlife and humans after PFOS phase-out

Zhang et al., 2017
Dassuncao et al., 2017
Dassuncao et al., 2018