Español

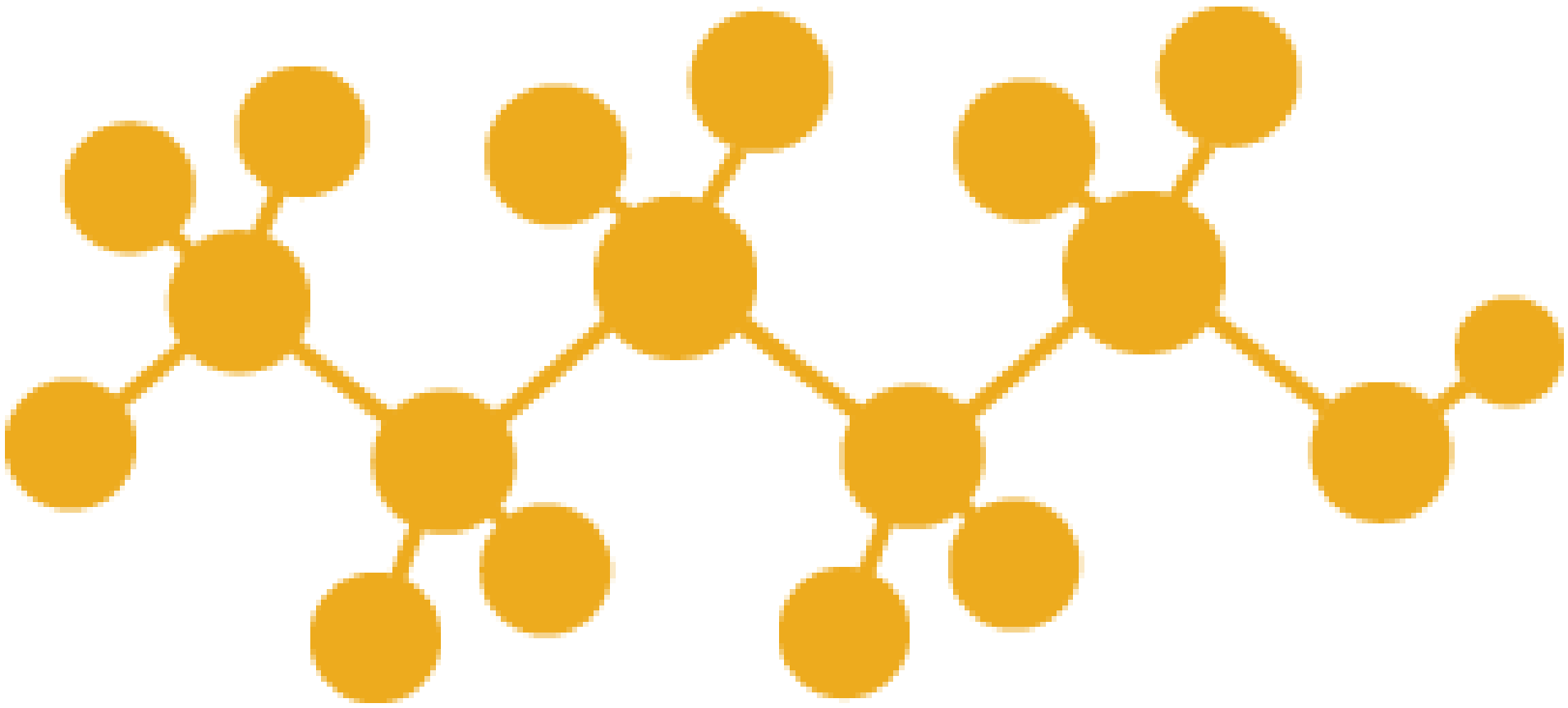
ATSDR Agency for Toxic Substances and Disease Registry

Per- and Polyfluoroalkyl Substances (PFAS) and Your Health

Per- and Polyfluoroalkyl Substances (PFAS) and Your Health Home

PFAS Information for Clinicians Factsheet

Properties



- Per- and polyfluoroalkyl substances (PFAS) are a family of thousands of synthetic chemicals; relatively few have been studied for their effect on health
- Used widely to reduce friction or resist oil, water, and stains

- Widespread and persistent in the environment
- Among studied PFAS: absorbed in intestines and lungs; bind to serum and tissue proteins; most not metabolized; half-lives range from a few days to 8+ years

Human Exposure

- Nearly all people in the U.S. have had exposure to PFAS
- PFOS, PFOA, and PFHxS exposure is decreasing in the U.S. population, in part because of production phase-outs
- Population exposures to substitute PFAS (e.g., GenX) are not well studied
- Communities with PFAS contamination of water or food are often near facilities that have manufactured, used, or handled PFAS
- Ingestion of PFAS in water and food is a main route of exposure; ingestion of dust and residue from PFAS-containing products can also result in exposure

- Inhalation is not a typical route of exposure for the general population but can occur with PFAS-containing dust, aerosols, or fumes
- Children can be exposed by drinking formula mixed with PFAS-containing water, drinking breastmilk from persons exposed to PFAS, ingesting dust or dirt, and through hand to mouth behaviors with textiles treated with stain protectants
- Some PFAS cross the placenta and enter umbilical cord blood

Health Effects

- Research is ongoing to understand the mechanisms of PFAS toxicity
- The epidemiological evidence suggests associations between increases in exposure to (specific) PFAS and certain health effects
  - Increases in cholesterol levels (PFOA, PFOS, PFNA, PFDA)
  - Small decreases in birth weight (PFOA, PFOS)
  - Lower antibody response to some vaccines (PFOA, PFOS, PFHxS, PFDA)

  - Kidney and testicular cancer (PFOA)
  - Pregnancy-induced hypertension or preeclampsia (PFOA, PFOS)
  - Changes in liver enzymes (PFOA, PFOS, PFHxS)
- The risk of health effects associated with PFAS depends on
  - Exposure factors (e.g., dose, frequency, route, and duration)
  - Individual factors (e.g., sensitivity and chronic disease burden)
  - Other determinants of health (e.g., access to safer water and quality healthcare)

Clinical Evaluation and Management

- Main goals are to
  - Identify and reduce PFAS exposures
  - Promote standard age-appropriate preventive care measures for physical health, mental health, and wellness
- Clinical presentation: PFAS toxicity is not associated with characteristic signs or symptoms

- Taking an exposure history can help identify PFAS exposures and determine actions to reduce exposures; ask about possible current and past PFAS exposure sources, durations, frequency, and magnitude
- Exposure reduction strategies follow from the exposure history; examples include
    - Installing water filtration system or using an alternative water source
    - Limiting or avoiding consumption of contaminated fish, meat, eggs, or dairy
    - Choosing products without PFAS when possible
- Breastfeeding is optimal due to its many benefits; clinicians can assist patients in their decision to breastfeed based on factors specific to the patient and child
- Clinicians can counsel patients on whether to pursue blood testing with an understanding of the benefits and limitations of PFAS testing:
    - Results (current levels of PFAS in the blood) could reflect recent exposures or past exposures in the case of PFAS with long half-lives
    - PFAS blood test results do not identify sources of exposure
    - Results do not indicate whether a current illness can be attributed to PFAS exposure or predict future health problems
    - Comparing PFAS results across laboratories can be difficult
    - Potential relief from psychological distress if PFAS levels are normal
    - Having information that could guide exposure reduction decisions
    - Potential for false positives from screening based on PFAS blood test results and iatrogenic complications from additional evaluation and treatment
- ATSDR has not developed health-based screening blood levels for PFAS
- No approved medical treatments are available to remove PFAS from the body

Additional Expertise

- Other professionals can help with exposure histories and reduction methods, and patient evaluation and monitoring/treatment plans:
  - Board-certified clinicians specializing in occupational and environmental medicine, medical toxicology, and pediatric environmental health
  - Occupational health clinicians
  - State or local health/environmental departments

More Resources

- ATSDR PFAS Information for Clinicians (full document)
- American College of Medical Toxicology
- American College of Occupational and Environmental Medicine
- ATSDR Toxicological Profile for PFAS
- ATSDR PFAS and Your Health
- ATSDR PFAS Blood Level Estimation Tool
- ATSDR Minimal Risk Levels for PFAS
- CDC's Breastfeeding: Why it Matters
- CDC National Report on Human Exposure to Environmental Chemicals
- EPA's Meaningful and Achievable Steps You Can Take to Reduce Your Risk
- NASEM Guidance on PFAS Testing and Health Outcomes
- National Institute for Occupational Safety and Health PFAS webpage
- Pediatric Environmental Health Specialty Units

Acronyms:

PFAS:

Per- and polyfluoroalkyl substances

PFDA:

Perfluorodecanoic acid

PFHxS:

Perfluorohexane sulfonic acid

PFNA:

Perfluorononanoic acid

PFOA:

Perfluorooctanoic acid

PFOS:

Perfluorooctane sulfonic acid

Last Reviewed: January 18, 2024