



## Health harms associated with long-chain and short-chain PFAS commonly detected in drinking water and used in consumer or industrial products

| Chemical        | Harm to the immune system   | Harm to development and reproduction  | Harm to the endocrine system   | Metabolic changes                                       | Changes in the liver                             | Increased risk of cancer   |
|-----------------|---|---|--|---|--|--|
|                 | Weaker immune response; lower antibody production in response to vaccination; increased allergic response; increased risk of asthma; changes in spleen and thymus | Reduced birth weight; pregnancy-induced hypertension; preeclampsia; reduced fertility; reduced duration of breastfeeding; altered mammary gland development; harm to the male reproductive system | Changes in hormone levels, including thyroid and reproductive hormones; thyroid disease; hormone receptor activation | Increased cholesterol and lipids; weight gain; diabetes | Increased liver weight; changes in liver enzymes | Increased risk of testicular, kidney or breast cancer; increased tumors in laboratory animals; evidence of one or more of the key characteristics of carcinogens |
| Long-chain PFAS |   |   |  |   |  |  |
| PFOA**          | ■   | ■   | ■  | ■   | ■  | ■  |
| PFOS**          | ■   | ■   | ■  | ■   | ■  | ■  |
| PFNA**          | ■   | ■   | ■  | ■   | ■  | ●  |
| PFHxS*#         | ■   | ■   | ■  | ●   | ■  | ●  |
| PFDA**          | ■   | ■   | ■  | ■   | ■  | ●  |
| PFDoA#          | ●   | ●   | ●  | ▲   | ■  | ●  |
| PFUA#           | ●   | ■   | ●  | ▲   | ■  | ●  |



| Chemical                | Harm to the immune system | Harm to development and reproduction | Harm to the endocrine system | Metabolic changes | Changes in the liver | Increased risk of cancer |
|-------------------------|---------------------------|--------------------------------------|------------------------------|-------------------|----------------------|--------------------------|
| <b>Short-chain PFAS</b> |                           |                                      |                              |                   |                      |                          |
| GenX*                   | ■                         | ■                                    | ■                            | ▲                 | ■                    | ■                        |
| PFHxA**                 | ■                         | ■                                    | ■                            | ▲                 | ■                    | ●                        |
| PFBS**                  | ●                         | ■                                    | ■                            | ●                 | ■                    | ●                        |
| PFBA**                  | ●                         | ■                                    | ●                            | ▲                 | ■                    | ●                        |
| PFHpA**                 | ▲                         | ▲                                    | ●                            | ▲                 | ■                    | ●                        |
| 6:2 FTOH                | ■                         | ●                                    | ●                            | ▲                 | ▲                    | ●                        |
| 6:2 FTSA*               | ▲                         | ▲                                    | ▲                            | ●                 | ■                    | ▲                        |
| PFPeA**                 | ▲                         | ▲                                    | ▲                            | ▲                 | ▲                    | ●                        |
| PFPeS*                  | ▲                         | ▲                                    | ▲                            | ▲                 | ▲                    | ●                        |

Sources: The Agency for Toxic Substances and Disease Registry; the National Toxicology Program; Environmental Protection Toxicity Assessments for PFBS and GenX; and other sources from the peer-reviewed scientific literature.

\* PFAS chemicals **detected by EWG** in U.S. public drinking water supplies.

# PFAS included in ATSDR toxicological profile.

**KEY**

- Strong evidence of health effects documented in people or in laboratory animal studies.
- Moderate evidence of health effects documented in people or in laboratory animal studies.
- ▲ Not studied or no reported association in available studies.