PFAS and Developmental and Reproductive Toxicity:

AN EWG FACT SHEET

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The toxic fluorinated chemicals known as PFAS are a class of environmentally persistent manmade chemicals that are used as water, grease and stain repellents in clothing and furniture, in industrial firefighting foam, and in the production of nonstick cookware.

PFAS, which are detected in the blood of nearly every American, are associated with multiple adverse health effects, including immunotoxicity, cancer and increased cholesterol, as well as developmental and reproductive toxicity.

Exposure can occur through food, water, indoor air and consumer products. PFAS chemicals readily cross through the placenta and have been detected in cord blood, indicating direct exposure to the developing fetus. PFAS are also detected in breast milk, which provides another exposure route for infants.

Such exposures can lead to developmental and reproductive toxicity from PFAS, including low birth weight, thyroid disruption, harm to the male reproductive system, pregnancy-induced hypertension, and some evidence of shorter duration of breastfeeding and infertility. The Environmental Protection Agency's health advisory values for the two best-known PFAS chemicals—PFOA, formerly used to make DuPont's Teflon, and PFOS, formerly an ingredient in 3M's Scotchgard—set in 2016, are based on developmental toxicity.

DEVELOPMENTAL AND REPRODUCTIVE HEALTH EFFECTS ASSOCIATED WITH EXPOSURE TO PFAS

ADVERSE HEALTH EFFECTS RELEVANT FOR HUMANS	EVIDENCE FROM HUMAN AND ANIMAL STUDIES
Low birth weight	• PFOA levels in maternal serum during pregnancy are associated with lower birth weight.[1] • Evidence of reduced fetal weight has also been observed in animal studies.[2]
Thyroid disruption	• Studies in humans find associations among PFAS, PFHxS and PFOS; exposure during pregnancy; and increases in maternal thyroid stimulating hormone, or TSH.[3] • Animal studies on PFOA, PFOS, PFBA, PFBS, PFHxA, PFHxS, PFNA, and PFDA cause changes in thyroid hormone levels, TSH and thyroxine, or T4, in adult animals. [4,5]
Harm to sperm and the male reproductive system	• In humans, maternal exposure to PFOA was associated with reduced sperm concentrations and count in male offspring.[6] • Men living in a region of Italy highly contaminated by PFOA had reduced semen quality, testicular volume and penile length compared to controls.[7] • Animals studies find decreases in serum testosterone and sperm count from developmental and adult exposure to PFOA.[8,9]
Pregnancy induced hypertension (preeclampsia)	• Evidence from the C8 Health Study of 70,000 residents near a DuPont Teflon plant in West Virginia suggests a probable link between PFOA and PFOS and pregnancy-induced hypertension.[10,11,12] • Other studies have found no association.[13,14]

ADVERSE HEALTH EFFECTS RELEVANT FOR HUMANS	EVIDENCE FROM HUMAN AND ANIMAL STUDIES
Reduced time of breastfeeding and impacts on mammary gland development	• Some human studies have reported PFOA and PFOS exposure to be associated with shorter durations of breastfeeding.[15,16] • Animal studies find PFOA causes reduced mammary gland development in females and offspring, although impacts on lactation and/or nursing behavior have not been well assessed.[17,18,19]
Increased time to pregnancy	• In human studies, PFOA and PFOS exposure has been associated with longer time to pregnancy, an indicator of infertility or subfecundity.[20,21] • Other studies find no association. [22,23,24,25]

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