

Per- and Polyfluoroalkyl Substances Exposure during Pregnancy

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Per- and polyfluoroalkyl substances (PFAS) are synthetic chemicals that have been in use in industries around the globe since the 1940's. Although the manufacturing of some PFAS in the United States was halted a while ago, exposure in the U.S. is still widespread. Experimental and human data suggest that PFAS are endocrine disrupting chemicals. Endocrine disruptors can interfere with hormone systems in human. During pregnancy, a woman's hormone levels are particularly important as it can affect the child's development interfering with proper fetal growth and development.

Objectives: 1) to review the literature on the associations between prenatal PFAS exposure and birthweight and infant growth, 2) to examine associations between PFAS concentrations and maternal hormone levels.

Method: We conducted a literature review using PubMed including the terms of four PFAS [perfluorooctane sulfate (PFOS), perfluorooctanoic acid (PFOA), perfluorohexane (PFHXS), perfluorononanoate (PFNA)], birthweight and infant growth. We studied association between these four PFAS and maternal hormones in the UPSIDE (Understanding Pregnancy Signals and Infant Development) cohort. UPSIDE includes 286 pregnant women with PFAS and maternal hormones (testosterone, free testosterone, estrone, estradiol, and estriol) measures.

Results: Epidemiological and toxicological literature shows that PFAS are associated to smaller size at birth. Furthermore, when looking at birthweight, studies shown that girls born to mothers with higher serum concentrations were smaller at birth but higher at 20 months (about 1 and a half years) old. Examining UPSIDE data, we detected a positive association between PFHXS and estradiol at both second and third trimesters ($p < 0.05$). These associations were stronger for baby boys ($p = 0.31$, $p < 0.12$).

Conclusion: PFAS are endocrine disruptors that may affect birthweight and child growth. This impact maybe different in baby boy's vs baby girls. A potential mechanism for this effect is through alteration in maternal hormones during pregnancy. Supported by P30ES005022 and R25ES020721 and the Rutgers Office of Research and Economic Development.

