Exposure to flame retardants early in pregnancy linked to premature birth

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Expectant women are more likely to give birth early if they have high blood levels of a chemical used in flame retardants compared with those who have limited exposure, a new study finds.

These polybrominated diphenyl ethers (PBDEs) are used in the manufacture of furniture, carpeting, and other products to reduce flammability. Previous studies have found that the substances can leach into household dust and build up in the body where they may interfere with the thyroid, an organ that secretes brain-developing hormones. Childhood exposure to PBDEs has been linked to learning disabilities, autistic symptoms, and behavioral issues, among other developmental problems.

In an investigation led by an NYU Long Island School of Medicine researcher, nearly all pregnant women enrolled in the study had detectable levels of PBDEs in their blood. The findings revealed that women with concentrations above 4 nanograms per milliliter of blood were roughly twice as likely to deliver their children early via cesarean section or intentionally induced labor due to safety concerns for the mother or infant. By contrast, there was no elevated risk for preterm birth among women with PBDE levels below that threshold.

"Our findings illustrate that flame retardants may have a tremendous impact on childbirth even if exposure occurred early on in the pregnancy," says study lead author Morgan Peltier, Ph.D. "Although PBDE chemicals are used with good intentions, they may pose a serious health concern that may have lasting consequences for children." Peltier is an associate professor in the departments of Clinical Obstetrics, Gynecology, and Reproductive Medicine at NYU Long Island School of Medicine, part of NYU Langone Health.

According to Peltier, preterm birth is a leading cause of newborn death and occurs annually in about 15 million pregnancies worldwide. Experts have linked the phenomenon to long-term neurological disorders including cerebral palsy, schizophrenia, and learning problems that can extend into adulthood. Earlier research has pointed to PBDE exposure as a possible culprit behind preterm birth. However, these investigations

only looked at exposure to the chemicals late in pregnancy and only examined white and African-American mothers.

The new study, published online Dec. 1 in the *Journal of Perinatal Medicine*, is the first to explore the link between PBDE exposure in the first trimester of pregnancy, says Peltier. He notes that the investigation looked at a wider demographic group as well, adding Asian and Hispanic women to the analysis.

For the study, the research team analyzed blood samples from 3,529 California women, 184 of whom delivered their infants early. They measured the samples for levels of PBDE-47, a form of the chemical that commonly builds up in the household. The investigators then divided the mothers into four groups based on their amount of exposure.

The study also accounted for other risk factors linked to preterm birth, such as the mother's ethnicity, age, and whether she smoked during pregnancy.

Among the study findings, the group with the highest PBDE levels had a 75 percent increased risk for a spontaneous preterm birth compared with women who had the lowest exposure. Such births occur when women suddenly go into early labor after an otherwise normal pregnancy.

According to Peltier, the study findings also challenged previous beliefs about the role of thyroid hormones in the association between PBDEs and preterm birth. As part of the investigation, the researchers measured blood levels of thyroid stimulating hormone (TSH), a substance used to assess thyroid activity. If flame retardants indeed prevent the organ from working properly, thereby disrupting hormone function, then TSH levels should rise, says Peltier.

However, the study revealed that TSH levels remained normal,

suggesting that another mechanism must be at work. Peltier says a possible explanation is that PBDEs may interfere with hormones in the placenta instead of the thyroid.

Peltier adds that the research team next plans to follow the children born to mothers in the study over time to explore how preterm birth linked to flame retardants may affect their long-term brain development.

He cautions that the findings do not prove a direct cause and effect, but strengthen the association between so-called endocrine disrupting chemicals and spontaneous premature birth.

More information: Morgan R. Peltier et al, Women with high plasma levels of PBDE-47 are at increased risk of preterm birth, *Journal of Perinatal Medicine* (2021). DOI: 10.1515/jpm-2020-0349

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