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The substitute chemical BPF can be linked to children's cognitive development

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Researchers at Karlstad University, Uppsala University and the Icahn School of Medicine at Mount Sinai in New York have found that exposure to bisphenol F (BPF) during early pregnancy can be linked to

poorer cognitive function in children at seven years of age. BPF has replaced bisphenol A (BPA) in a wide range of products as the EU has banned BPA in products for children. This study is the first to show that prenatal exposure for the substitute chemical BPF is associated with impaired cognitive development in children.

It has long been known that BPA is a hormone-disrupting chemical, affecting e.g., children's neurological development, contribute to infertility, and increase the risk of hormone-related cancer. Therefore, since 2011 there has been a ban within the EU against using BPA in e.g., baby bottles and children's toys. In addition, the switch to BPA-free materials has begun in various parts of the food industry (baby food jars, drink bottles and other household utensils) and a switch to BPA-free cash receipts. Taken together, these changes mean that exposure to BPA has decreased. But as BPA has been phased out, a number of other bisphenols have been introduced in consumer products, such as BPF and bisphenol S (BPS).

However, experimental studies in animals and cell models have shown that the replacement chemicals BPF and BPS have similar endocrine disrupting effects as BPA, and can therefore probably also be important for e.g., neurological development. Unfortunately, studies that have examined the effect of the substitute chemicals in humans are very limited and BPF have not been studied. The purpose of the present study was therefore to investigate whether exposure to these three chemicals during early pregnancy could be linked to children's cognitive development at school age.

Three bisphenols (BPA, BPF, BPS) were measured in 803 women in week 10 of the pregnancy in the Swedish SELMA study and the children's cognitive ability was examined with a so-called WISC test (IQ) at seven years of age. The results were controlled for important background variables such as the mothers smoking, education, IQ, etc.

and the children's sex, birth weight, prematurity etc.

The results showed that prenatal exposure to BPF was associated with cognitive function in children at seven years of age. An increased exposure corresponding to the difference between the 25% lowest exposed and the 25% highest exposed mothers was linked to approximately two units lower IQ in the children. This is an effect that is not visible in an individual child but which is a significant effect at group level.

"We are not really surprised by these results," says Carl-Gustaf Bornehag, professor and project manager for the SELMA study, at Karlstad University and the Icahn School of Medicine at Mount Sinai. "Experimental studies have shown that both BPF and BPS can have similar properties to BPA. Results again show that one must be careful before introducing new chemicals."

"The study raises concerns," says Elin Engdahl, researcher at Uppsala University and co-author of the study. "Exposure to BPF increases because the chemical now replaces, for example, BPA in a wide range of common products and materials. I think that more responsibility should lie in proving that chemicals are safe before they are released on the market."

More information: Carl-Gustaf Bornehag et al. Prenatal exposure to bisphenols and cognitive function in children at 7 years of age in the Swedish SELMA study, *Environment International* (2021). DOI: 10.1016/j.envint.2021.106433

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