Pregnant Women’s Health Consequences Following Exposure to PBDEs

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BACKGROUND
PBDEs (Polybrominated diphenyl ethers) are chemicals introduced by industry in the 1970s to serve as flame retardants on common consumer products like electronics, plastics, and foam in furniture. They are also suspected to disrupt thyroid activity during a woman’s pregnancy, which is a time of increased demand on the thyroid gland. Maternal thyroid fluctuations and disease as a result of exposure to PBDEs are therefore a concern. This systematic review aims to capture all of the relevant literature that studied the association between PBDEs and maternal thyroid activity.

ABSTRACT
Objectives: I conducted a systematic review of literature that provided epidemiological evidence on the association between PBDE exposure during pregnancy and maternal thyroid function.

Methods: I searched electronic literature databases (October 9, 2015) for studies that assessed the association between PBDE exposure (measured as house dust, maternal blood serum, cord blood, breast milk, or house dust), and thyroid hormone function during pregnancy (measured via maternal or cord blood). I assessed each study for bias and confounding.

Results: Of the twelve studies I found, nine of them reported significant associations between PBDEs and thyroid hormones. The nine studies differed in which congeners showed significant associations and whether those associations were positive or negative. Cross-sectional studies likely focused on confounding factors and a few of the prospective cohorts had small sample sizes and power. Also, many did or were unable to include confounders like iodine, which is known to affect the thyroid gland. Lastly, studies assessed PBDE exposure and thyroid activity at one or different times over the course of a pregnancy, which makes results difficult to compare.

Conclusions: Nine of the twelve studies I found reported significant associations between PBDE exposure during pregnancy and thyroid hormone levels; although the direction of the association varies. While many of the studies likely focused on confounding which over which PBDE congeners have negative or positive associations with thyroid activity, it is still of important note that the studies have shown PBDEs to have a statistically significant association with pregnant women’s thyroid activity, particularly congeners 47 and 99.

METHODS

RESULTS

Eight studies did not find statistically significant results for PBDEs and TSH association. Mazadzori et al. 2003 did not measure TSH while studies Chevrier et al. 2010 and Zota et al. 2011 found different directions of associations between PBDEs and TSH. Of the studies that measured Free and Total T3, results varied, but there were more negative than positive associations between them and the PBDEs measured. Measuring Free and Total T4, studies were almost split on negative and positive associations. However, it is important to note that when looking across these studies, different congeners were presented the statistically significant associations. Although there is not a clear consensus on which congeners have either a positive or a negative association with thyroid function, these results are still relevant for healthcare providers, users and policy makers. Namely, a number of the congeners do present a statistically significant association with thyroid activity, particularly 47 and 99. Research has shown repeated associations especially with these two congeners and so caution is warranted.

DISCUSSION
There is not a clear consensus in the literature as to which PBDE congeners have a statistically significant association with pregnant women’s thyroid activity and whether that activity is defined negative or positive. These results need to be replicated through further research before coming to final conclusions. Studies varied in their methods of measuring PBDEs and hormones. Some methods were more robust than others, and funding or time restraints may have played a role here. Future studies should present their results in the context of their measurement methods. Additionally, as discussed earlier, studies varied in their choice of PBDE congeners and hormones to measure. Abdelouahab et al. 2013 chose to include thyroid peroxidase antibodies, for example, which are different indicators of thyroid function. Including more congeners and hormones can give a bigger picture and provide unexpected associations, but may make it more difficult to elucidate individual associations between particular congeners and hormones.

Many studies look at PBDEs alongside other chemicals, like PCBs or pesticides. It is possible that PBDEs interact with these factors or other chemicals, so it is important to control for these covariates. We need to differentiate and understand the effect of PBDEs alone, especially as industry may introduce new chemicals to the market that mimic or replace PBDEs.

REFERENCES

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