

Endocrine-disrupting chemicals alter thyroid hormone activity during pregnancy

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A new study in human placenta provides the strongest evidence to date that Endocrine Disrupting Chemicals (EDCs) can interfere with thyroid hormone action in pregnant women. The implication is that flame retardant chemicals called polychlorinated biphenyls (PCBs) can infiltrate the placenta during pregnancy and affect thyroid hormone activity at the cellular level, according to a new study published in the Endocrine Society's *Journal of Clinical Endocrinology & Metabolism* (*JCEM*).

PCBs were used in transformers and other electrical equipment, paints, adhesives and tape. Although the endocrine-disrupting chemicals were banned in the United States in 1979, PCBs still are released into the environment from disposal sites or products manufactured prior to the ban. Most people have been exposed to low levels of PCBs.

Scientific findings suggest these endocrine-disrupting chemicals interfere with the [thyroid hormone](#). The hormone is essential for brain development in fetuses and newborns.

"As endocrine-disrupting chemicals, PCBs interfere with the way the thyroid hormone functions, but they don't actually change the amount of the hormone found in the body," said one of the study's authors, R. Thomas Zoeller, PhD, of the University of Massachusetts in Amherst, MA. "Although these effects are largely invisible in scientific studies that only judge thyroid activity by measuring hormone levels, they may be having a real impact on infants' brain development."

The prospective birth cohort study examined the effects of low-dose [chemical](#) exposure in 164 pregnant women. Tissue from the placenta – the structure that develops in the uterus to provide oxygen and nutrients to the fetus during pregnancy – was analyzed for the enzyme CYP1A1.

This enzyme changes endocrine-disrupting chemicals into a form that can interfere directly with the body's thyroid hormone receptors.

Researchers found that in pregnancies where the placenta contained higher amounts of the enzyme, the tissue also exhibited signs of thyroid disruption. Levels of two thyroid-regulated genes tended to be higher in these pregnancies, although the mother's overall thyroid hormone levels did not change.

"Whatever is happening in the placenta likely reflects what is happening in the fetus," Zoeller said. "To truly understand how endocrine-disrupting chemicals may be affecting pregnancies, the findings show we need to study not only [hormone levels](#), but hormone activity at the [cellular level](#)."

The effects of [endocrine-disrupting chemicals](#) may be particularly insidious in people who smoke, Zoeller said. The enzyme CYP1A1 is supposed to clean the blood, and the body produces more of this enzyme when it is exposed to cigarette smoke. The researchers found [pregnant women](#) who smoked tended to have higher levels of the enzyme in the placental tissue.

Other authors of the study include: Thomas Luke Wadzinski, Katherine Geromini, Judy McKinley Brewer and Ruby Bansal of the University of Massachusetts; and Nadia Abdelouahab, Marie-France Langlois and Larissa Takser of the University of Sherbrooke in Sherbrooke, Quebec.

More information: The study, "Endocrine Disruption in Human

Placenta: Expression of the Dioxin-Inducible Enzyme, Cyp1a1, is Correlated with that of Thyroid Hormone Regulated Genes," was published online, ahead of print.

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