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Large human study links phthalates, BPA and thyroid hormone levels

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A link between chemicals called phthalates and thyroid hormone levels was confirmed by the University of Michigan in the first large-scale and nationally representative study of phthalates and BPA in relation to thyroid function in humans.

The U-M School of Public Health study also reported suggestive findings consistent with a previously reported link between a chemical called bisphenol-A and thyroid hormone levels. BPA is best known for its use in certain plastic water bottles and in the linings of canned foods.

Researchers used publicly available data from the U.S. National Health and Nutrition Examination Survey to compare urine metabolites and serum thyroid measures from 1,346 adults and 329 adolescents. Generally speaking, greater concentrations of urinary phthalate metabolites and BPA were associated with greater impacts on serum thyroid measures, said John Meeker, assistant professor at U-M SPH and lead study author.

Specifically, researchers found an inverse relationship between urinary markers of exposure and thyroid hormone levels, meaning as urinary metabolite concentrations increased, serum levels of certain thyroid hormone levels decreased.

Phthalates and BPA are chemical compounds that appear in solvents, plasticizers and common household products. These latest results were consistent with findings from previous smaller studies by Meeker and

others that suggested the relationship.

The current study showed the strongest relationship between thyroid disruption and DEHP, a phthalate commonly used as a plasticizer. Research has shown that the primary exposure to DEHP is through diet. Urine samples in the highest 20 percent of exposure to DEHP were associated with as much as a 10 percent decrease in certain thyroid hormones compared to urine samples at the lowest 20 percent of exposure.

"This seems like a subtle difference," Meeker said, "but if you think about the entire population being exposed at this level you'd see many more thyroid related effects in people."

Researchers looked at another phthalate called DBP but overall, didn't find a significant relationship between exposure and thyroid measures. DBP is also a plasticizer, and is also used in solvents and personal care products.

Thyroid hormones play an important role in many body functions, from reproduction to metabolism and energy balance.

While the study focused primarily on adults, these findings underscore the need for more research on adults, pregnant women, and children, Meeker said, because fetal and child development may be particularly vulnerable to disruptions in thyroid hormone levels associated with exposure to environmental chemicals.

Meeker pointed out that the study had limitations. Since urine and serum samples were collected at a single point in time, researchers couldn't conclude a cause-and-effect relationship; it would be better to follow people over time and collect several samples, especially since these chemicals metabolize quickly and one snapshot may not represent the

true chemical exposure.

The group has several ongoing studies on the potential impacts of phthalate and BPA exposure on pregnancy outcomes and child development.

Provided by University of Michigan