

'Safer' replacements for harmful chemical in plastics may be as risky to human health, studies suggest

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According to a new series of studies out of NYU Langone Medical Center, two chemicals increasingly used during manufacturing to strengthen plastic wrap, soap, cosmetics, and processed food containers have been linked to a rise in risk of high blood pressure and diabetes in children and adolescents.

The compounds, di-isononyl phthalate (DINP) and di-isodecyl phthalate (DIDP), are both in a class of chemicals known as phthalates. Ironically, the two chemicals were used as replacements for another chemical, di-2-ethylhexylphthalate, or DEHP, which the same researchers proved in previous research to have similar adverse effects.

"Our research adds to growing concerns that environmental chemicals might be independent contributors to [insulin resistance](#), elevated [blood pressure](#) and other metabolic disorders," says study lead investigator Leonardo Trasande, MD, MPP, a professor at NYU Langone.

Trasande says the series of studies are believed to be the first to examine [potential health risks](#) from DEHP replacements. In the most recent one, described in the journal *Hypertension* online July 9, the investigators report a "significant association" between [high blood pressure](#) and the presence of DINP and DIDP levels in study subjects.

Specifically, they say, for every tenfold increase in the amount of phthalates consumed, there was a 1.1 millimeters of mercury increase in blood pressure.

In the earlier study, published in May in the *Journal of Clinical Endocrinology and Metabolism*, the same NYU investigators found an association between DINP and DIDP concentrations and increased insulin resistance, a precursor to diabetes. One in three adolescents with the

highest DINP levels had the highest insulin resistance, while for those with the lowest concentrations of the chemicals, only one in four had insulin resistance.

DEHP, the original [chemical](#) used as a plasticizer, was banned in 2004 in Europe after researchers elsewhere found a link between exposure to the plasticizer and detrimental effects on human health. In the United States, manufacturers voluntarily began to replace DEHP with DINP and DIDP over the last decade.

Trasande's own research in 2013 confirmed the link between DEHP exposure and hypertension in Americans.

For the new study research, the NYU team reviewed blood sample and urine analyses from participants in the National Health and Nutrition Examination Survey. Since 1999, NHANES, as it is known, gathers information about the prevalence and risk factors of major diseases by annually surveying 5,000 volunteers. As part of the NYU Langone investigation, blood samples of a diverse group of 356 children and adolescents ages 12 to 19 were measured and evaluated for phthalates and glucose based on their urinary levels of the substances.

Blood and urine samples were collected once between 2008 and 2012, and the study volunteers' blood pressure was similarly measured. Diet, physical activity, gender, race/ethnicity, income, and other factors independently associated with insulin resistance and hypertension were also factored into the researchers' analysis.

"Alternatives to DIDP and DINP include wax paper and aluminum wrap; indeed, a dietary intervention that introduced fresh foods that were not canned or

packaged in plastic reduced phthalate metabolites substantially," says Trasande. "Our study adds further concern for the need to test chemicals for toxicity prior to their broad and widespread use, which is not required under current federal law (the 1976 Toxic Substances Control Act)," he says.

Trasande says there are "safe and simple" steps families can take to limit exposure to phthalates. These include not microwaving food in plastic containers or covered by plastic wrap, and washing plastic [food containers](#) by hand instead of putting them in the dishwasher, where harsh chemicals can lead to increased leaching of plasticizers into food. He says people can also avoid using plastic containers labeled on the bottom with the numbers 3, 6 or 7 (inside the recycle symbol), in which chemicals such as phthalates are used.

Trasande says his team now plans to study the long-term effects of exposure to these chemicals, in particular during pregnancy and early childhood, which might reveal different and/or more persistent effects on health.

Provided by New York University School of Medicine

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