

Female mice exposed to BPA by mothers show unexpected characteristics

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Female mice exposed to Bisphenol A through their mother's diet during gestation and lactation were found to be hyperactive, exhibit spontaneous activity and had leaner body mass than those not exposed to the chemical, researchers at the University of Michigan School of Public Health have discovered.

BPA is a chemical most commonly found in the lining of food cans and cash register receipts. It once was in many hard [plastic bottles](#), including [baby bottles](#), but many companies have removed it as concerns about exposure have come to light in recent years.

These latest findings from U-M researchers seem to contradict previous studies on BPA that found the chemical to be a factor in obesity. But Dana Dolinoy, the John G. Searle Assistant Professor of Environmental Health Sciences and senior/corresponding author of the study, says research shows that many factors impact how the body reacts to the chemical.

"Our hypothesis going into this study was that BPA would act as an obesogenic agent. And there is some preliminary evidence that it does," Dolinoy said. "But there are differences in exposure, duration and when you actually measure the individual.

"Recent evidence in humans only looks at one time point. What we're really interested in is BPA exposure during early development, and how that affects health throughout life. So those are two very different

questions."

The researchers exposed mothers to three different levels of BPA in the diet then followed the offspring through adulthood at three, six and nine months of age. The [average lifespan](#) of a mouse is two years, so by three months they are [young adults](#).

"We looked at several different metabolic [phenotypes](#), including spontaneous activity, [food intake](#), [energy expenditure](#) and [body composition](#). I think the most striking result we saw was the increased activity in these animals," said Olivia Anderson, doctoral student in environmental health sciences and lead author on the paper published online in the *Journal of the Federation of American Societies for Experimental Biology*.

"There are several things we need to look at in evaluating studies investigating BPA as an obesogen, such as composition of the diet. Not all these diets are similar throughout these studies. Some may have high-fat diets. Some may have diets with different protein levels. Then there is the difference in exposure timing and doses of exposure of BPA. It's important to dig a little deeper and actually look at the mechanism that BPA is acting upon."

As to why only females exhibited the excessive activity and lean bodies, Dolinoy says it bears more study, but because BPA is known to impact estrogen and thyroid hormone, most likely it is affecting these natural hormones in the females.

Dolinoy's lab is dedicated to the study of environmental epigenetics and nutrition—learning about how exposure to chemical, nutritional and behavioral factors alters gene expression and impacts health and disease.

In December, she and colleagues released a study that found BPA in

human fetal liver tissue, demonstrating that there is considerable exposure to the chemical during pregnancy. That research also found that the BPA in fetuses was in a form not eliminated from the body, unlike previous studies that showed adult humans metabolize and rid their bodies of the chemical.

Her work is supported by the U-M Formative Children's [Environmental Health](#) and Disease Prevention Center (UM-CEHC) and the U-M Michigan Nutrition and Obesity Research Center (MNORC). MNORC receives funding from the National Institutes of Health, and UM-CEHC from the NIH and the Environmental Protection Agency.

"The work that Olivia Anderson carried out in Dr. Dolinoy's lab is really at the heart of some of the most pressing questions we're trying to solve right now, and their work was a great fit for both centers because it asks and answers questions that are right at the intersection of how toxicants effect health, particularly related to obesity," said Karen Peterson, professor of [environmental health sciences](#) at the U-M School of Public Health, director of the CEHC and associate director of MNORC.

More information: "Perinatal Bisphenol A Exposure Promotes Hyperactivity, Lean Body Composition, and Hormonal Responses Across the Murine Life-Course": www.fasebj.org/content/early/recent

Provided by University of Michigan

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