

# Female mice exposed to environmental chemicals may show decreased physical activity in their offspring

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Endocrine disruptors are contaminants that interfere with endocrine or hormone systems and can cause tumors, birth defects and developmental disorders in mammals. Often, these contaminants are used in a variety of consumer products, such as water bottles, dental composites and resins used to line metal food and beverage containers. Now, a University of Missouri study suggests that female mice exposed to these environmental chemicals may cause decreases in their daughter's metabolism and the amount of exercise and voluntary physical activity they engage in later in life. These disruptors when introduced in developmental stages, are essentially creating "couch potatoes" among female mice and could predict future metabolic complications, researchers say.

"We found that if we exposed mice to one of two common endocrine disruptors- bisphenol A (BPA) or ethinyl estradiol (EE), which is the estrogen present in [birth control pills](#), during development, it caused later disruptions in voluntary physical activity once the mice became adults," said Cheryl Rosenfeld, associate professor of biomedical sciences in the College of Veterinary Medicine and a researcher in the Bond Life Sciences Center at MU. "Mice exposed to [endocrine disruptors](#) move around less, are more likely to sleep and engage in less voluntary physical activity."

To test the chemicals' impact on metabolism and activity, Rosenfeld's lab exposed mice to BPA and EE in the womb and during weaning

through the mother's diet. A third group of mice whose mothers were placed on a control diet and were thus not exposed to either chemical. At weaning, the scientists then placed all the mice on the same [control diet](#) and measured their energy expenditure, body composition and level of voluntary physical activity as adults.

To further test the effects of voluntary exercise, the lab rigged bicycle computers to "hamster wheels" to track how far, fast and for how long the mice ran. Researchers monitored the mice's [energy expenditure](#) by measuring oxygen consumption and carbon dioxide production, and tracked the rodents' movements during the day and at night.

"Female mice exposed to BPA and EE were less active than the control mice," Rosenfeld said. "They moved around less at night—when these mice are typically most active—and moved more slowly, drank less water, and spent more time sleeping. In addition, BPA-exposed females burned more carbohydrates relative to fats, as compared to [control mice](#). This is similar to the difference between obese and slender humans, and many researchers believe that burning more carbohydrates relative to fats can lead to fats gradually accumulating in the body."

The researchers currently are conducting follow-up studies to determine if the changes caused by exposure to BPA and EE predispose [mice](#) to obesity and other metabolic disorders.

"Our findings are significant because decreased voluntary physical activity, or lack of exercise, can predispose animals or humans to cardiovascular diseases, metabolic disorders and even cancer," Rosenfeld said.

**More information:** "Sex-dependent effects of developmental exposure to bisphenol A and ethinyl estradiol on metabolic parameters and voluntary physical activity." *J Dev Orig Health Dis*. 2015 Sep

18:1-14. [Epub ahead of print].

[www.ncbi.nlm.nih.gov/pubmed/26378919](http://www.ncbi.nlm.nih.gov/pubmed/26378919)

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