

# Lead exposure changes gut microbiota, increases chance for obesity

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Exposure to lead during early development can alter the the gut microbiota, increasing the chances for obesity in adulthood, researchers from the University of Michigan School of Public Health have found.

Adult male mice exposed to [lead](#) during gestation and lactation were 11 percent larger than those not exposed, due to differences in their [gut microbiota](#), which is the ecological community of microorganisms within the body.

"Early life exposure to lead causes a long lasting impact on gut microbiome, and the change of gut microbiome may partially contribute to the increased body weight in adult life," said lead author Chuanwu Xi, associate professor of environmental health science.

Lead was added to the drinking water of female mice prior to breeding through nursing their young. Once weaned, the offspring were raised to adulthood without additional exposure, and then tested for lead effects acquired from their mothers.

"The lead levels in the mouse mothers were carefully designed to be within human population exposure levels. Our lowest dose is near the current U.S. Centers for Disease Control and Prevention's blood lead action level of 5 micrograms per deciliter, while the higher dose mirrors exposure levels during the 1960s and 70s," said Dana Dolinoy, U-M associate professor of [environmental health sciences](#) and of nutrition sciences. "Since we are investigating the effects of the developmental

origins of disease, it is important to evaluate current and historically relevant lead levels."

Lead is found throughout the environment in natural and man-made settings. For decades, researchers have found many health problems associated with exposure, even at levels lower than the threshold for safety set by the CDC. Most previous studies have dealt with ingestion and inhalation.

"We investigated more specifically the role of [gut microbiome](#) in the health impact upon lead [exposure](#) in this study," Xi said.

Research has shown that large numbers of bacteria live in animal intestines, and the range of diversity in these microbes, and the balance of various organisms, is increasingly known to be tied to health.

In this study that used deep DNA sequencing of bacterial specific genes, the guts of both males and females exposed to lead had all of the similar complexity in microbiota as those not exposed. The differences were in the balance of the different groups of microorganisms.

For example, both adult males and females exposed to lead during [early development](#) had fewer aerobes and significantly more anaerobes, suggesting a changing microenvironment of the gut.

"In both males and females developmental lead impacted the adult microbiome. We only observed adult onset obesity in the males, but females may have shown effects on obesity if we had followed them longer," Dolinoy said.

Provided by University of Michigan

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