

Obese male mice produce more disease-promoting immune cells than females

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Credit: Martha Sexton/public domain

Obesity may be tougher on male immune systems than females, a new study in mice at the University of Michigan Medical School suggests.

With the risk for obesity-associated diseases significantly higher for men than women, researchers compared how mice from each sex reacted to

high-fat diets. They found that the difference may lie in the tendency of males to produce higher levels of [white blood cells](#) that encourage inflammation, which contributes to the [negative health consequences](#) of obesity such as insulin resistance and Type 2 diabetes.

The findings appear in this month's *Journal of Biological Chemistry*.

"Men and women have very different cardiovascular risk and diabetes risk, and male mice are most often studied because their risk for developing these diseases is higher," says lead author Kanakadurga Singer, M.D., assistant professor in pediatrics at U-M's C.S. Mott Children's Hospital.

"Since female obesity has been understudied in the animal models, we wanted to understand the root causes of differences between sexes," she continues. "We found that obesity did not trigger inflammation in [female mice](#) the way it did in males. While it has long been known that male and female immune systems are different, our research helps provide the foundation for future clinical studies exploring how these differences impact diseases such as diabetes. Further research can also hopefully explain differences we see clinically between men and women when it comes to obesity and disease risk."

Obesity is known to induce a chronic low-grade inflammation that has long been associated with diabetes and [cardiovascular disease](#). The new study finds that in young reproductive-age female mice fed a high-fat diet while they became obese, the body produces only a mild inflammatory white blood cell response. In male mice, however, diet-induced [obesity](#) made more active inflammatory white blood cells and enhanced their progenitors. This in turn made the male mice more prone to higher blood glucose and insulin levels, measures of diabetes.

"It's important for us to understand differences in disease risk,

symptoms, and responses to treatments between sexes," says senior author Carey N. Lumeng, M.D., Ph.D, associate professor in pediatrics and physiology at the Medical School and a pediatric pulmonologist at U-M's C.S. Mott Children's Hospital.

"Our research highlights the need to broaden clinical investigations and animal studies to include both males and females to better guide new interventions," Singer adds.

More information: "Differences in hematopoietic stem cells contribute to sexually dimorphic inflammatory responses to high fat diet-induced obesity" (Sex differences in diet-induced hematopoiesis), www.jbc.org/cgi/doi/10.1074/jbc.M114.634568

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