

In mice, obese dads produce heavier daughters with epigenetically altered breast tissue

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Obese male mice and normal weight female mice produce female pups that are overweight at birth and in childhood, and have increased number of "terminal end buds" in their breast tissue—the site where cancer often develops in rodents.

The findings, presented by a Georgetown Lombardi Comprehensive Cancer Center researcher at the AACR Annual Meeting 2014, come from one of the first animal studies to examine the impact of paternal obesity on future generations' cancer risk.

In addition, the researchers say they've found evidence that obesity could change the microRNA (miRNA) signature—epigenetic regulators of gene expression—in both the dad's sperm and the daughter's [breast tissue](#), suggesting that miRNAs may carry the epigenetic information from obese dads to their daughters.

The miRNAs identified are known to regulate insulin receptor signaling, which is linked to alterations in [body weight](#), and others molecular pathways that are associated with [breast cancer](#) development such as estrogen receptor signaling.

Obesity seems to sometimes run in families, as does some breast cancers. Maternal obesity is believed to influence both conditions in humans—a woman who is heavy in pregnancy can produce larger babies, who may have increased risk of breast cancer later in life. But few if any studies have looked at the influence of dad's obesity on his offspring's cancer risk.

"This study provides evidence that, in animals, a fathers' body weight at the time of conception affects both their daughters' body weight both at birth and in childhood and likely their risk of breast cancer later in life," says the study's lead

investigator, Sonia de Assis, PhD, an assistant professor in the Department of Oncology at Georgetown Lombardi. "Of course our study was done in mice, but it would be very interesting to know if the same associations hold for daughters of human fathers who were obese at the time of conception," she says.

De Assis and colleagues have previously found that pregnant rats that ate a [high fat diet](#) increased [breast cancer risk](#) in their female daughters and "granddaughters." That same risk was passed down from the son of the high-fat fed mother to the son's daughter.

"Researchers traditionally study the maternal link to weight and [cancer risk](#). This unusual study demonstrates a potential paternal link as well," de Assis says. "Until we know about this association in men, we should stick to what we all know is good advice: women—and men—should eat a balanced diet not only for their own benefit but also to give their offspring's the best chances of being healthy."

Provided by Georgetown University Medical Center

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