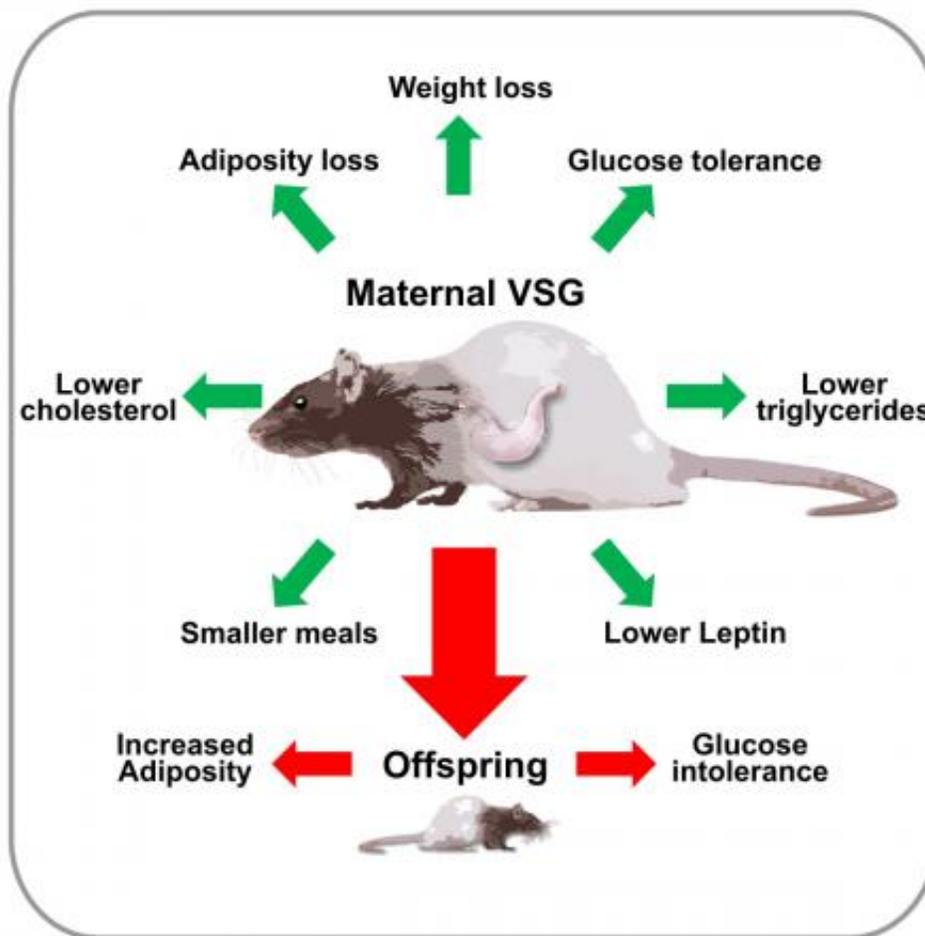


How women achieve a healthier weight may impact long-term health of offspring

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Maternal improvements following surgical weight loss do not translate into improved metabolic status for offspring. Credit: Bernadette Grayson, PhD and Glenn Doerman

New research from the University of Cincinnati (UC) suggests that the healthy weight and glucose control women achieve through weight-loss surgery don't necessarily translate into health benefits for their future children.

An [animal study](#) featured in the Aug. 21, 2013, edition of the journal *Science Translational Medicine* suggests that treatment with vertical sleeve gastrectomy (VSG) [weight loss surgery](#) of a female rat prior to conception has no positive impact on—and could even impact negatively—the metabolic health of her offspring.

The study was led by Bernadette Grayson, PhD, postdoctoral fellow in the laboratory of Randy Seeley, PhD, UC professor and Donald C. Harrison Endowed Chair in Medicine and director of the Cincinnati Diabetes and Obesity Center.

"Maternal obesity and diabetes have long-term [negative health consequences](#) for offspring in both rodents and humans," says Grayson. "Bariatric surgical procedures like vertical sleeve gastrectomy are still the most effective way to achieve sustained weight loss and improvements in [glucose levels](#)."

Knowing this, Grayson, Seeley and team set out to determine if improving maternal obesity by treating with VSG pre-pregnancy could improve the metabolic health of the offspring.

Female rats were given high-fat diets to induce obesity and then some were treated with the VSG procedure. (During VSG, a portion of the stomach is removed to leave a much smaller "sleeve"-like section.) The [female rats](#) that underwent VSG lost weight, had improved [glucose control](#) and even showed some improvements in [reproductive health](#) when compared with obese rats that did not have the same procedure. But metabolic health of the VSG rats' offspring did not improve.

"On some measures the health of these offspring, in fact, got worse," Seeley says. "Their birth weights were lower when compared to rats whose mothers didn't receive the surgery. And when they were given access to a high-fat diet following puberty, offspring of VSG rats showed a greater propensity to gain body fat and develop glucose intolerance."

There are many causes for small-for-gestational age births, Seeley says.

"In the case of VSG, the hormonal changes induced by the surgery, which aid in weight loss, may be the very same culprits for the reduced growth. This is something we will be looking at in future research," he says.

"It may not be sufficient enough just to get mom healthier before she conceives; how she gets healthier seems to matter," says Seeley, adding that the diet the mom consumed during pregnancy in these studies also played a huge role. "The interaction between diet and the maternal environments—the uterus and placenta, for example—may impact susceptibility to metabolic disease in offspring."

These findings, the authors say, could have implications for the clinical use of surgical weight loss procedures, but more work is needed before clear guidelines can be determined.

The next steps, say Grayson and Seeley, are to determine the direct cause of the effect on the offspring and find out if other types of surgical [weight loss](#) procedures have similar effects.

This work, they say, also has the potential to help in our understanding of how the maternal environment can increase or decrease the risk for obesity and diabetes in future generations.

More information: "Improved Rodent Maternal Metabolism But Reduced Intrauterine Growth After Vertical Sleeve Gastrectomy," by B.E. Grayson et al. *Science Translational Medicine*, 2013.

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