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Tracing the Roots of Obesity Back to the Womb

By Catherine Elton

As doctors and researchers grapple with the U.S.'s runaway rates of obesity, they have begun to look for causes of it in a critical if little understood period of life: the nine months before birth. Research has found that women who gain too much weight in pregnancy have heavier babies — and that heavier babies are more prone to obesity later on.

Until now, researchers had not been able to rule out the role of genes. If heavier mothers give birth to heavier babies, it was presumed, it could be the woman's genes that cause her to gain excessive weight during pregnancy and that those genes, passed on to her child, contribute to his or her obesity.

A new study helps eliminate that possibility. By looking at a large group of women who gave birth at least twice from 1989 to 2003, researchers were able to compare different pregnancies in the same women. Based on the data, the authors conclude that maternal weight gain during pregnancy leads to higher infant birth weight, independent of genetics. "What this study adds to the literature is the family approach, which reduces the influence of genetic factors. These kids all have the same mothers. The high birth weight isn't because of genes. It has something to do with the weight gain itself," says Matthew Gillman, director of an obesity-prevention program at Harvard Medical School. Gillman was not involved in the study. The authors of the study, published Wednesday, Aug. 4, in the journal *Lancet*, analyzed natal records of 513,501 women and their 1,164,750 offspring born over a 15-year period in New Jersey and Michigan. The researchers excluded mothers with gestational diabetes and babies born before 37 or after 41 weeks. They also ruled out babies with very low and very high birth weights.

What they found was that mothers who gained more than 53 lb. (24 kg) during pregnancy were more than twice as likely to have a high-birth-weight baby — more than 8.8 lb. (4 kg) — as women who put on 18 to 22 lb. (8 to 10 kg). "The reason this is important is because high birth weight is known to increase the risk for obesity later in life," says lead author David Ludwig of Children's Hospital Boston. "An ideal time to begin obesity-prevention efforts for the next generation actually begins before birth."

Traditionally, the public-health focus has been on making sure that women gain enough weight during pregnancy to lower the risk of having babies with low birth weights — which can result in many health problems in the near and long term. (Perhaps unexpectedly, one of the risks of low birth weight is also obesity later in life, particularly excessive weight in the center of the body.) Now, however, with more than half of the U.S. population being either overweight or obese, the focus has largely shifted to the other end of the spectrum, women who gain too much weight. "Many obstetricians aren't telling women how much weight they should gain, and many women's friends tell them, 'You can have an extra ice cream because now you can eat for two.' That's not the case," says Dr. Emily Oken, an assistant professor of population medicine at Harvard Medical School and an expert on obesity.

The latest guidelines issued by the Institute of Medicine recommend that women of healthy weight gain 25 to 35 lb. (11 to 16 kg) during pregnancy. Overweight women should gain less — 15 to 25 lb. (7 to 11 kg) — and obese women, who account for some 27% of women of childbearing age, should limit pregnancy gains to 11 to 20 lb. (5 to 9 kg). But experts note some limitations to the new study and urge caution regarding its conclusions. One problem is that the study looked only at birth weight, which is at best a proxy for potential obesity. A heavy child might be heavy at birth only because he is very long, for instance. And birth weight does not take into account body composition — lean mass vs. fat.

Although some new studies are now looking at body composition in relation to birth weight as a risk factor for obesity, the research is complicated by the variety of methods of assessing body composition, none of them ideal. Measurements like those based on skin folds are sometimes hard to take accurately, while those that involve scanning may expose children to radiation. Still others, like magnetic resonance imaging, don't work well with squirming children.

The *Lancet* study was also not designed to follow children after birth to see whether their high birth weight actually resulted in obesity. Further, it did not take into account women's pre-pregnancy weight but rather just evaluated weight gain during gestation. Research on whether maternal weight gain increases risk for offspring obesity in all weight classes, or just among obese women, has produced conflicting results. "Ludwig makes a strong connection from excessive maternal weight gain to childhood obesity, but that strong connection hasn't been met with the findings. You can't just make that jump," says Anna Maria Sieg-Riz, a professor of epidemiology and nutrition at the University of North Carolina. "What this study says is that high maternal weight gain leads to high birth weight. And that's where this study's conclusions need to stop."

Of course, that doesn't mean that high birth weight itself is of no concern. Quite the contrary. It can make for difficult labor and delivery, even one that requires a cesarean section. And high birth weight is associated with other health problems later in life, including increased risk for cancer.

It's easy to see this study as just another daunting example of all the things women can do to screw up their children before they are born. But looked at another way, it tells us that with a little more information and some discipline, a child's birth weight is something we can help control. Genes, for better or worse, are not.

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