

Why do some people gain weight when others don't?

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Do you have that friend—the one who can eat endless hot fudge sundaes and never gain weight? Or do you sometimes feel that even if you worked out three hours a day and ate nothing but celery sticks, you couldn't lose weight?

Jeff Horowitz, assistant professor of kinesiology, recently received a five-year, \$2.1 million grant from the National Institutes of Health to look at what may be causing different people to gain or lose weight when they appear to eat and exercise the same amount.

"When you gain or lose weight, it has to be due to an energy imbalance," Horowitz said. Although losing weight for most people is far from simple, the regulation of body weight boils down to simple math: calories eaten minus calories burned equals weight gained. If people gain

weight at different rates despite eating the same number of calories, there must be a difference in how much energy is expended.

For Horowitz's new study, participants will spend two weeks in the hospital with their diet and physical activity closely monitored. Volunteers will get 2,000 calories more than they need each day while Horowitz's team studies how quickly they gain weight and body fat.

After two weeks, volunteers will go on a calorie-restricted diet, and the researchers will look at how quickly the extra weight and body fat come off.

The primary aim of their study is to uncover what about the person's biology and metabolism differs to make some prone to gain a lot of weight and others more resistant.

The inspiration for this project came when Horowitz was conducting a study on low-carb diets. It was important to that specific research project that volunteers maintain a steady weight. This worked for most participants, but there were a few people who seemed to lose weight no matter how many additional calories were added to their diets.

One of Horowitz's collaborators, Ariel Barkan, a professor of internal medicine and of neurosurgery at the U-M Medical School, noted that he'd seen a similar reaction in a rodent study, with the same diet causing some to gain much more weight than others, despite similar activity levels. It turned out that animals with high levels of growth hormone were resistant to gaining weight.

Horowitz returned to his study data, which included growth hormone samples from his volunteers, and found that there was a strong connection between those who had high growth hormone levels and those who had lost weight.

Growth hormone spikes and falls a few times throughout the day. Those who lost some weight on the diet that should have kept their weight stable had higher spikes, not just consistently high hormone levels.

To test the connection, Horowitz will use volunteers with growth hormone levels on the low side of normal. Some of these participants will receive a constant level boost of growth hormone during their two weeks of indulgence, while others will get additional growth hormone following the body's usual pattern of daily spikes.

As part of the study, Horowitz will take muscle biopsy samples to measure muscle protein synthesis, which burns a lot of energy. Horowitz hypothesizes that one way growth hormone may help make people more resistant to gaining weight is by increasing the activity of bodily processes like this that expend a lot of energy throughout the day.

If the researchers see that giving additional growth hormone alters weight gain, that could mean that it is an effective treatment for people who struggle with obesity.

The bad news is, there's a linear decline in growth hormone as we age, so if Horowitz's theory is right, this could be one reason we gain weight as we get older—it's part of our body chemistry. Gaining weight reduces growth hormone, too, so you can get caught in a vicious cycle.

The good news is, exercise boosts growth hormone, so those with milder weight control issues might simply find that enough physical activity to generate more growth hormone could help manage weight—separate from the calories the exercise burns.

Horowitz plans to begin screening volunteers this month.

Source: University of Michigan

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