

How belly fat differs from thigh fat—and why it matters

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Men tend to store fat in the abdominal area, but don't usually have much in the way of hips or thighs. Women, on the other hand, are more often pear-shaped—storing more fat on their hips and thighs than in the belly. Why are women and men shaped differently? The answer still isn't clear, but it's an issue worth investigating, says Steven R. Smith, M.D., director of the Florida Hospital – Sanford-Burnham Translational Research Institute for Metabolism and Diabetes. That's because belly fat is associated with higher risks of heart disease and diabetes. On the other hand, hip and thigh fat don't seem to play a special role in these conditions.

In a study published in the *Journal of Clinical [Endocrinology and Metabolism](#)*, Smith and colleagues help explain this discrepancy by determining how belly and thigh fat differ genetically. This research might shift common thinking about fat—rather than focusing on how to banish [belly fat](#), perhaps we need tip the balance in favor of heart-friendly fat in the lower body. In that case, the study also provides a first step toward aiming treatments at specific regions of the body, especially those that contribute most to the complications of obesity.

Belly fat genes vs. thigh fat genes

Smith and colleagues first took fat samples from men and women. Then they compared the genes most active in belly fat to those most active in thigh fat.

Here's what they found: The genes operating in a person's thigh fat are hugely different from those in his or her belly fat. For men, 125 genes are expressed differently in the belly than in the thighs. For women, it's 218 genes (most are unique to women, but 59 genes are the same as those that varied in male fat).

The most notable genes that differed are known as homeobox genes. These genes are known for their role in helping shape a developing embryo—determining which cells and organs go where. Many homeobox genes are influenced by hormones such as [estrogen](#).

Why are these homeobox genes important for fat? "We believe these [genes](#) actually program those fat cells to respond differently to different hormones and other signals," Smith says.

Stem cells show fat is preprogrammed for its location

In the course of their work, Smith and his team also isolated stem cells from belly and thigh fat and grew them in laboratory dishes. This was a nice control because fat cells in a dish aren't influenced by nerves, hormones, or other outside signals.

Yet the researchers still saw the same location-specific differences in gene activity in the fat that developed from these stem cells. That result told them that the cells are preprogrammed. In other words, belly fat and thigh fat are genetically destined for their final location during development. It's not a difference that's acquired over time, as a result of diet or environmental exposure.

A new way of thinking about fat

Medically speaking, says Smith, it's important to understand these

differences and how they arise. "Even though many women hate having large hips and thighs, that pear shape actually reduces their risk of [heart disease](#) and diabetes. In fact, women who have heart attacks tend to have more belly fat than thigh fat."

This research marks a new way of thinking. "Most people want to stop belly fat. But the problem is not just the fat—it's the location. Belly fat is just a marker of the problem. The real issue is in inability to store that fat on the hips and thighs," he continues.

Smith hopes that future studies aimed at understanding the fundamental differences in these fat depots could lead to specific treatments aimed at the regions that contribute most to the [complications of obesity](#).

Provided by Sanford-Burnham Medical Research Institute

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