Immune system may play role in obesity

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Certain cells less common in belly fat of overweight compared to thinner people: study.

(HealthDay)—Certain immune system cells may play an important role in weight control, an early study suggests.

Scientists had known that the immune cells may help ward off obesity in mice. The new findings are the first to suggest the same is true in humans, researchers report in the Dec. 22 online edition of *Nature*.

The investigators found that the cells, known as ILC2s, were less common in belly fat from obese adults, versus thinner people. What's more, in experiments with mice, they found that ILC2s seem to spur the development of "beige" fat cells, which boost the body's calorie burning.

It appears that these (ILC2) cells don't work properly in obesity, according to senior researcher David Artis, a professor of immunology at Weill Cornell Medical College in New York City.

Exactly why or how that happens is not clear, Artis said, but those are key questions for future research. The ultimate hope, he added, is to develop new approaches to tackling obesity.

It's only in the past few years that researchers have been gaining an understanding of how the immune system affects metabolism and weight control, according to Artis.

That might sound surprising, since the immune system is best known as the body's defense against infections. But it makes sense in evolutionary terms, Artis said.

He explained that while the immune system's immediate job is to fight infection, it's conceivable that some of its components evolved to have the ability to "communicate" with fat tissue during times of adversity, in order to alter the body's metabolism.

"You can imagine it basically telling the fat tissue, 'We're going to be malnourished for a while. Let's adapt,'" Artis said.

An obesity researcher who was not involved in the study said the new research adds to evidence that the immune system is a player in weight control.

"It's really quite intriguing," said Dr. Charles Billington, an endocrinologist at the University of Minnesota in Minneapolis.

The general idea that immune function and metabolism are connected is not new, according to Billington, who is also a spokesman for the Obesity Society. He noted that when people are injured or have an allergic reaction, the body often goes into "hypermetabolism," or revved-up calorie burning.

But, Billington said, this study and some other recent work show how the immune system influences metabolism, and possibly longer-term weight control.

He also stressed, however, that there are plenty of unknowns.

"There is some kind of overlap between the immune system and metabolism," he said, "but we don't really understand it yet."

ILC2s are one group of immune cells believed to help fight infections and play a role in allergies. Artis and colleagues wanted to know if these cells might have other jobs, too.

The researchers started with samples of belly fat taken from both obese and normal-weight adults. It turned out that fat from obese people had fewer ILC2s—just like obese lab mice.

Then the researchers tested the effects of injecting lab mice with interleukin-33—an immune system protein that acts like a "chemical messenger" among cells.

The study authors found that the treatment boosted ILC2s in the animals' white fat, which in turn increased calorie burning.

White fat, Billington explained, is the kind that stores extra calories and shows up as a beer belly or love handles. But there is another fat, called brown fat, which actually takes up little space in the body and burns calories to generate heat.

Scientists have long been interested in finding a way to turn up the dial on brown fat, according to Artis. But in addition to the white and brown varieties, he said, there's a third type of body fat—so-called beige fat.

Like brown fat, it burns calories and creates heat. What's more, Artis said, it may play an important role in preventing obesity.

In his team's experiments, ILC2 cells seemed to boost calorie burning by enhancing the animals' stores of beige fat.

And what does that mean for humans?

"Obviously, we're in the infancy of this research, and there's a lot more work to do," Artis stressed. But the goal, he said, is to develop new approaches to treating obesity, by better understanding the communication between the immune system and body fat.

That will be a long road, according to Billington. He pointed to one big question: Since immune system cells have multiple jobs, how do you get them to only boost beige fat, without doing things you don't want—like spur allergic reactions?

And in the bigger picture, obesity research has made one thing clear: Metabolism and weight control are complex. "There's unlikely to be any 'magic bullet' against obesity," Billington said.

More information: *Nature* paper: nature.com/articles/doi:10.1038/nature14115

The U.S. National Institutes of Health has more on causes of obesity.