

# Researchers make new discoveries on what does and doesn't affect immune system

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Scientists know that a number of factors can affect the body's immune system: poor diet, certain steroids, chronic stress. Now researchers at Michigan State University have discovered that an appetite-controlling hormone also affects the immune system, while natural versions of certain steroids do not.

Both studies are reported in this week's online edition of the *Proceedings of the National Academy of Sciences*.

"These two studies, while not directly related, show that the neuroendocrine system plays a big role in both the immune system and obesity," said Pamela Fraker, MSU professor of biochemistry and molecular biology and lead scientist for both projects. "MSU is one of the few places studying the relationship between metabolism, the immune system and the neuroendocrine system."

## A new role for leptin

One MSU research team discovered that leptin, a hormone produced by fat cells, supports white blood cell production in the body, enhancing immune function. This is the first time leptin's effect on the immune system has been demonstrated.

Scientists have long known that leptin helps control how much a person eats as well as how quickly the body burns energy.

"Many investigators have been trying to unlock the key to obesity for years," said Fraker. "The more fat a person has, the more leptin there is in the bloodstream. In obese people, it seems that the body becomes leptin-resistant -- the signals get jammed. So giving obese people leptin doesn't help them lose weight."

The MSU scientists were examining ob/ob mice (genetically programmed to have non-functional leptin) and db/db mice (genetically programmed to have non-functional leptin receptors), giving them supplemental leptin to study its effects. While causing the mice to eat less, the big surprise was leptin's effect on the immune system. The mice that were given leptin had double the number of B cells, a type of white blood cell produced in bone marrow that fights infection by making antibodies.

"This is a brand new role for leptin," said Fraker. "It appears that most obese people may be somewhat immunosuppressed. This finding shows us that the body's resistance to leptin plays a role in that, too."

To further study leptin's effect on the immune system, Fraker and her colleagues are planning a study on morbidly obese people who will be having gastric bypass surgery. While the outcome of the surgery is highly successful for most people, mortality rates can range from 2 to 10 percent, which is significant.

"Infection from poor wound healing, which is the result of reduced immune function, is one reason people die from the surgery," Fraker said. "We're going to measure people's immune function before and after surgery to see how much it improves, as well as how fast it improves."

Other members of this research team are MSU scientists Louis King, research assistant professor of biochemistry and molecular biology, and

Kate Claycombe, assistant professor of food science and human nutrition.

## **Naturally-produced steroids don't inhibit immune system**

While corticosteroids, such as prednisone, reduce inflammation, they also inhibit the body's immune system -- a person taking prescription steroids is more susceptible to infection. Another MSU research team found that corticosteroids produced naturally in the body don't have this same immunosuppressive effect.

The human body secretes corticosteroids when it's under stress, both psychological and physical, and these steroids are responsible for the "fight-or-flight response" in humans and other animals. Cortisol (also called hydrocortisone) is the most abundant corticosteroid in the body. These steroids' anti-inflammatory effects are well-known and pharmaceutical companies have been making versions of them for about 20 years. But people taking steroids are warned that cuts and bruises may be slow to heal because of steroids' effects on the immune system.

Fraker and her team's discovery that the naturally-produced versions of the steroids don't affect the immune system like the pharmacological versions is the first time this has been observed.

"With the pharmacological versions of steroids, you lose some immune function," Fraker explained. "With the natural versions, you retain neutrophil [a type of white blood cell] function. It may be worthwhile for pharmaceutical companies to investigate synthesizing natural versions of the steroids."

Source: Michigan State University

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