

Intestinal helminths boost fat burning: Japanese investigators show how

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Intestinal infection with helminths—a class of worm-like parasites—prevented weight gain in laboratory mice on a high-fat diet. The helminths did so by boosting populations of bacteria that produce compounds that trigger increased energy consumption in the mice. The research is published in *Infection and Immunity*, a journal of the American Society for Microbiology.

Humans have occasionally swallowed [intestinal worms](#) in order to lose weight. The goal of the investigators, led by Hajime Hisaeda, MD, Ph.D., was to discover the mechanisms by which the worms caused the weight loss, in order to develop ways to help humans lose weight without helminths. Dr. Hisaeda is Director, Department of Parasitology, National Institute of Infectious Diseases, Tokyo, Japan.

In earlier work, other researchers had reported that infection by *H. polygyrus* prevented obesity via mechanisms mostly different from those found in the current study.

Dr. Hisaeda and his collaborators put the [laboratory mice](#) on a [high-fat diet](#). They then infected some of the mice with the intestinal nematode, *Heligmosomoides polygyrus*, using the rest as controls. They monitored body weight, the composition of species in the intestinal microbiota, and several other parameters.

As expected, the presence of *H. polygyrus* prevented further [weight gain](#), which was seen in the control mice. The investigators found that the presence of the helminths boosted populations of certain bacteria that produce the neurotransmitter, norepinephrine, notably certain species of *Bacillus* and *Escherichia*. Norepinephrine, in turn, induces expression of "uncoupled protein-1" (UCP-1) on the inner membranes of mitochondria—the cellular engines—in fat cells called adipocytes. That, in turn, causes increased energy consumption within adipocytes. Put simply, the fat cells burn more fat.

Intestinal worms are well adapted to life in the human intestine. They seldom cause [severe symptoms](#), and have inhabited human intestines probably since our species evolved. In fact, it is only recently that humans have been able to eradicate worms from the intestines—something that is probably a factor in the rise of allergies and [inflammatory diseases](#), said Dr. Hisaeda. "We think worms are symbionts and possible built-in-regulators preventing autoimmunity and obesity," said Dr. Hisaeda.

But modern western culture is not adapted to worm infections, as beneficial as they may be. The investigators hope to develop methods of duplicating the chain reaction of steps that is initiated by the helminths in order to boost fat burning.

Provided by American Society for Microbiology

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