

Roundworm quells obesity and related metabolic disorders

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Researchers at the University of Maryland School of Medicine, Baltimore, have shown in a mouse model that infection with nematodes (also known as roundworms) can not only combat obesity but ameliorate related metabolic disorders. Their research is published ahead of print online in the journal *Infection and Immunity*.

Gastrointestinal nematodes infect approximately 2 billion people worldwide, and some researchers believe up until the 20th century almost everyone had worms. In developed countries there is a decreasing incidence of nematode infection but a rising prevalence of certain types of [autoimmunity](#), suggesting a relationship between the two. Nematode infection has been purported to have therapeutic effects and currently clinical trials are underway to examine worms as a treatment for diseases associated with the relevant cytokines, including [inflammatory bowel disease](#), multiple sclerosis, and allergies.

In the study researchers tested the effect of nematode infection on mice fed a high-fat diet. Infected mice of normal girth gained 15 percent less weight than those that were not infected. Mice that were already obese when infected lost roughly 13 percent of their body weight within 10 days. Infection also drastically lowered fasting [blood glucose](#), a risk factor for diabetes, and reduced [fatty liver disease](#), decreasing liver fat by ~25 percent, and the weight of the liver by 30 percent.

The levels of insulin and leptin also dropped, "indicating that the mice restored their sensitivities to both hormones," says corresponding author

Aiping Zhao of the University of Maryland School of Medicine, Baltimore. Leptin moderates appetite. As with too much insulin, too high a level of leptin results in insensitivity, thus contributing to obesity and metabolic syndrome, Zhao explains.

The mechanism of the moderation of these hormones "was associated with a parasite-induced reduction in glucose absorption in the intestine, reduced liver triglycerides, and an increase in the population of cells called "alternatively activated macrophages," which regulate glucose metabolism and inflammation," says coauthor Joe Urban of the United States Department of Agriculture. Some of these changes involved "a protein called interleukin-13 and related intracellular signaling mechanisms," he says. "This suggests that there are immune related shifts in metabolism that can alter expression of obesity and related metabolic syndrome."

The incidence of obesity has been climbing dramatically, worldwide. It is a key risk factor for many metabolic diseases, including diabetes, hypertension, and heart disease. Recent studies indicate that it is accompanied by chronic low-grade inflammation in adipose tissues, causing the release of proinflammatory cytokines and chemokines that contribute to the development of cardiovascular disease and [metabolic syndrome](#).

Parasitic nematode infection induces a marked elevation in host immune Th2-cells and related type 2 cytokines which, besides combating the infection, also have potent anti-inflammatory activity, according to the report.

More information: Z. Yang, V. Grinchuk, A. Smith, B. qin, J.A. Bohl, R. Sun, L. Notari, Z. Zhang, H. Sesaki, J.F. Urban, Jr., T. Shea-Donohue, A. Zhao, 2013. Parasitic nematode-induced modulation of body weight and associated metabolic dysfunction in mouse models of

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