Turning to parasites as potential disease fighters

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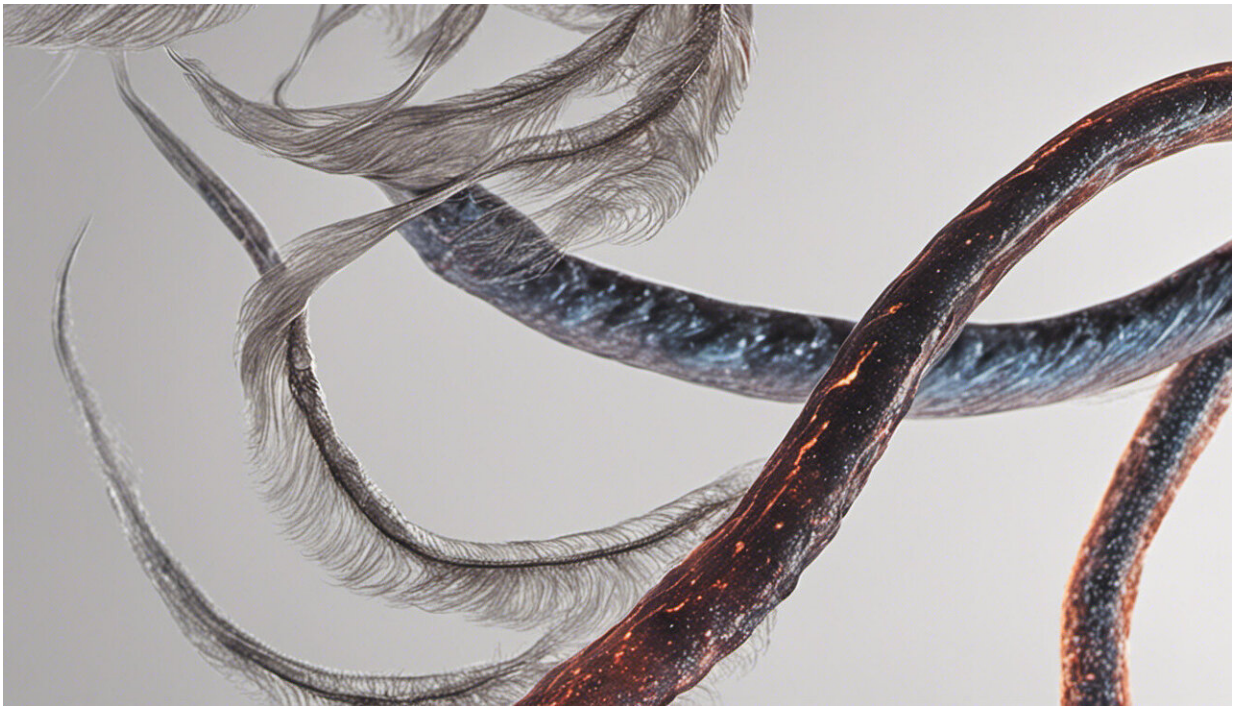

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(Medical Xpress)—There is a new weapon in the fight against autoimmune diseases such as Type 1 diabetes, rheumatoid arthritis, Crohn's disease and lupus, the common trait of which is an immune system that attacks its own organs and tissues.

William Gause, an immunologist at Rutgers New Jersey Medical School, is among those leading the charge against these diseases by studying how the human body reacts to worms. The worms Gause studies, or helminths as biologists call them, are small parasites that live in human intestines, especially in the developing world.

According to an article in *Nature Reviews Immunology* by Gause and colleagues from the National Institutes of Health and the University of Edinburgh, the worms' presence through millennia of human evolution likely has led to an immune response called type 2 immunity. This includes immune regulatory pathways that help control the inflammation that can contribute to autoimmune diseases.

The immune reaction, the researchers say, appears to have developed as a way to rapidly repair wounds caused by these invaders as they move through the body. In fact, components of the type 2 immune response may someday be used to enhance the wound healing process. Additionally, this response triggers regulatory networks that block harmful immune responses, or inflammation, that otherwise would exacerbate the tissue injury.

"What we would like to do now is harness components of the type 2 immune response to target the control of harmful inflammation that can lead to autoimmune diseases like diabetes and inflammatory bowel disease," Gause says. He adds that inflammatory responses also have been linked to other diseases, including cardiovascular disease and metabolic disorders, and even to allergic reactions and fibrosis that may result when titanium shavings that flake away from artificial joints settle in the body. "Finding new ways to stimulate these regulatory components of the type 2 immune response may provide us with a new set of tools to target the control of harmful inflammatory responses now associated with this wide array of different diseases."

For now, live helminths or helminth byproducts may be introduced into the body on a short-term basis to train compromised immune systems. A 2012 study by a Gause-led team found that the introduction of helminths for two weeks caused the immune systems of mice to produce cytokines, or signaling molecules, which gave them lasting protection against Type 1 diabetes.

That finding mirrors human experience in the developing world where helminth infection is endemic, but the incidence of autoimmune diseases such as Type 1 diabetes is extremely low.

"There is a growing body of evidence to support the hygiene hypothesis, which suggests that decreased exposure to microbes and helminths in industrialized countries may impair the development of immune regulatory networks that would otherwise control harmful inflammatory responses," Gause says.

The end result of that process, according to Gause, is increased incidence of a variety of diseases linked to harmful inflammation. "If we find a controlled way to apply the benefit that helminths appear to provide to the workings of the immune system, it is conceivable that we as a society would no longer need to endure the apparent tradeoff between clean living conditions and inflammatory diseases."

Provided by Rutgers University