

Declaring a truce with our microbiological frienemies

March 27 2013, by Matthew Swayne

Managing bacteria and other microorganisms in the body, rather than just fighting them, may lead to better health and a stronger immune system, according to a Penn State biologist.

Researchers have historically focused on microbes in the body as primarily [pathogens](#) that must be fought, said Eric Harvill, professor of microbiology and infectious disease. However, he said that recent evidence of the complex interaction of the body with microbes suggests a new interpretation of the relationship.

"Now we are beginning to understand that the immune system interacts with far more [beneficial bacteria](#) than pathogens," said Harvill. "We need to re-envision what the true immune system really is."

Harvill said that this reinterpretation leads to a more [flexible approach](#) to understanding how the immune system interacts with microbes. This approach should balance between defending against pathogens and enlisting the help of [beneficial microbes](#).

While the role that some bacteria play in aiding digestion is better known, microbes assist in improving body functions, including strengthening the immune system and responding to injuries.

In some cases, attacking pathogens can harm the [beneficial effects](#) microbes have on immune system, according to Harvill. For example, patients on antibiotics have an increased risk of contracting [yeast](#)

[infections](#) and MRSA.

"Viewing everything currently considered immunity, including both resistance and tolerance, as aspects of a complex microbiome management system that mediates interactions with the sea of microbes that surround us, many of which are beneficial, can provide a much more [positive outlook](#) and different valuable perspectives," Harvill said.

The system that includes bacteria and other microbes in the human body, or the microbiome, is much larger and more integrated into human health than most people suspect, according to Harvill.

"The human body has ten times more [bacterial cells](#) than [human cells](#)," said Harvill.

Adding to the complexity is the adaptive capacity of the human immune system. The immune system can develop antibodies against certain pathogens, which it can reuse when threatened by future attacks from the same pathogen.

Harvill, who described his alternative viewpoint in the latest issue of mBio, said that some researchers have not yet accepted this broader approach to the immune system.

"Among immunologists or microbiologists this is an alien concept," said Harvill. "It's not part of how we have historically looked at the immune system, but it's a useful viewpoint."

Other researchers who study plant and nonhuman biology are already starting to embrace the concept. For example, plant biologists are beginning to recognize that viruses can help plants resist drought and heat.

"Within nonhuman immunology, this is not an alien concept because they have seen many examples of beneficial relationships between the host and its microbial commensals," Harvill said.

Harvill said adopting this new perspective could be the first step toward new medical treatments.

"This new viewpoint suggests new experiments and results will be published," said Harvill. "And, hopefully, the concept becomes more and more mainstream as supporting evidence accumulates."

Provided by Pennsylvania State University

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