

How Bacteria Boost the Immune System

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(PhysOrg.com) -- Scientists have long known that certain types of bacteria boost the immune system. Now, Loyola University Health System researchers have discovered how bacteria perform this essential task.

Senior author Katherine L. Knight, PhD. and colleagues report their discovery in a featured article in the June 15, 2010, issue of the *Journal of Immunology*, now available online. Knight is professor and chair of the Department of Microbiology and Immunology at Loyola University Chicago Stritch School of Medicine.

The human body is teeming with bacteria. In each person, there are about 10 times as many [bacterial cells](#) as human [cells](#). Bacteria live on skin, in the respiratory tract and throughout the digestive tract. The digestive tract alone is home to between 500 and 1,000 bacterial species.

While some bacteria cause infections, most species are harmless or perform beneficial functions, such as aiding digestion. These beneficial bugs are called commensal bacteria. One of the most important functions of commensal bacteria is boosting the immune system. Studies by other researchers have found that mice raised in sterile, germ-free environments have poorly developed immune systems. But until now, scientists have not known the mechanism by which bacteria help the immune system.

Knight's lab studied the spores from rod-shaped bacteria called *Bacillus*, found in the digestive tract. (A spore consists of the DNA of a

bacterium, encased in a shell. Bacteria form spores during times of stress, and re-emerge when conditions improve.) Researchers found that when they exposed [immune system cells](#) called B lymphocytes to bacterial spores, the [B cells](#) began dividing and reproducing.

Researchers further found that molecules on the surfaces of the spores bound to molecules on the surfaces of B cells. This binding is what activated the B cells to divide and multiply. B cells are one of the key components of the immune system. They produce antibodies that fight harmful viruses and [bacteria](#).

The findings suggest the possibility that some day, bacterial spores could be used to treat people with weakened or undeveloped immune systems, such as newborns, the elderly and patients undergoing bone marrow transplants. In cancer patients, [bacterial spores](#) perhaps could boost the [immune system](#) to fight tumors. However, Knight cautioned that it would take years of research and clinical trials to prove whether such treatments were safe and effective.

Provided by Loyola University Health System

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