

Scientists reveal important clues to how bacteria and viruses are identified as enemies

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A new research report in the October 2010 print issue of the *Journal of Leukocyte Biology* sheds important light on how our immune systems detect invading organisms to be destroyed and removed from our bodies. The information from this research should ultimately help lead to the development of new drugs and treatments that allow health care providers to prevent runaway immune reactions that can have devastating consequences for people.

"Our study helps us to understand exactly how the [immune system](#) is activated when it comes across infection from bacteria or viruses," said Melanie J. Scott, M.D., Ph.D., an author of the research report from the Department of Surgery at the University of Pittsburgh, Pennsylvania. "The more information we have about how this process works, the more likely we are to be able to help our immune systems fight off attacks from infections."

To make this discovery, scientists examined the production of a specific part of the complement system (called "factor B") in macrophages, an immune cell that both attacks foreign invaders and marks them for death by other types of [immune cells](#). The researchers wanted to know if a molecule found on the outside of bacteria (lipopolysaccharide) or a synthetic version of a molecule found in some viruses (polyI:C) would stimulate factor B production by macrophages. The levels of factor B produced inside the cell were measured, as was the amount released from the cell. Results showed that lipopolysaccharide used a specific receptor on the outside of cells (TLR4) to produce factor B. polyI:C also

stimulated factor B production in macrophages, not through its specific cell surface receptor (TLR3) but through another receptor that is located within cells. This shows that [bacteria](#) and viruses can produce similar end results in activating the body's defense systems, but they use different pathways to do the activation.

"As this research shows, the immune system is incredibly complex. It also highlights the redundancy which is vital to our survival," said John Wherry, Ph.D., Deputy Editor of the [Journal of Leukocyte Biology](#). "Viruses and bacterial have evolved many strategies to avoid immune responses, but the immune system counters with additional tricks and alternative pathways. This research helps us better understand one very important set of redundant pathways that regulates a key defense mechanism and identifies therapeutic targets for controlling that response."

More information: David J. Kaczorowski, et al. The pattern recognition receptor ligands lipopolysaccharide and polyinosine-polycytidylic acid stimulate factor B synthesis by the macrophage through distinct but overlapping mechanisms. *J Leukoc Biol* 2010 88: 609. [DOI: 10.1189/jlb.0809588](https://doi.org/10.1189/jlb.0809588)

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