

# Blame the environment: Why vaccines may be ineffective for some people

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A new discovery may explain why a tuberculosis vaccine is not as effective for some people as anticipated, and potentially explains why other vaccines do not work as well for some as they do for others. In a research report presented in the December 2010 issue of the *Journal of Leukocyte Biology*, scientists from Singapore show that *Mycobacterium chelonae*, a common environmental bacterium found in soil and water, can decrease the effectiveness of the bacille Calmette-Guerin (BCG) vaccine used to prevent tuberculosis, especially in countries outside of the United States.

"Uncovering the reasons why BCG is failing will help researchers in designing new, more effective vaccines against TB," said Geok Teng Seah, Ph.D., a researcher involved in the work from the Department of Microbiology at the National University of Singapore. "This will give us more tools to fight this globally significant infectious disease."

To make this discovery, scientists studied mice with and without prior exposure to *M. chelonae*. When subsequently given BCG [vaccine](#), the mice with prior exposure to *M. chelonae* produced higher amounts of suppressive chemical signals; these chemical signals are believed to reduce the level of immunity induced by BCG vaccine in the host mice. Then the researchers extracted certain [white blood cells](#) with known suppressive functions from both exposed and unexposed mice. After transferring these cells into separate groups of unexposed mice, they found that recipients of suppressor cells from *M. chelonae* exposed mice did not respond as strongly to BCG vaccine as recipients of suppressor

cells from unexposed donor mice. This indicates that the suppressor cells from *M. chelonae* exposed mice are functionally different from those of unexposed mice. Ultimately, the data suggest that these [suppressor cells](#), induced in the host when exposed to *M. chelonae*, dampen the effectiveness of the BCG vaccine.

"This study sheds important light on why many immunological therapies and vaccines look great in the lab, but fall short in the real world," said John Wherry, Ph.D., Deputy Editor of the [Journal of Leukocyte Biology](#). "Humans are exposed to many more non-disease causing bacteria and viruses compared to relatively clean laboratory animals, and as this study shows with a TB vaccine, environmental exposure to one kind of bacteria can influence the efficacy of immunity to different, more dangerous bugs."

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