

New discovery in battle against plague and bacterial pneumonias

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Researchers from the Smiley lab at the Trudeau Institute have now identified a single component of the plague causing bacterium that can be used as a vaccine. This single "subunit" could potentially be used to create a safer form of a T cell-stimulating plague vaccine. The new data is featured in the July issue of *The Journal of Immunology*.

"To date, there has been little progress in the development of safe and effective vaccines for plague or similar bioweapons," said Dr. Stephen Smiley, a leading plague researcher and Trudeau Institute faculty member. "Our data identifies a single component of the plague causing bacterium seen by [T cells](#). This could be a key discovery as we seek to develop a plague vaccine."

The lab envisions that this subunit might be added to others already being studied for their ability to induce [antibody responses](#). Together, these multiple subunits might safely induce both antibody and T [cell responses](#), thereby better combating plague.

According to Dr. Smiley, there is no licensed plague vaccine in the United States. Together with postdoctoral associate Jr-Shiuan Lin, he is working to develop a vaccine that will protect members of the armed services and public from a "plague bomb."

Plague is caused by *Yersinia pestis*, arguably the most [deadly bacteria](#) known to man. *Yersinia pestis* infections of the lung, known as pneumonic plague, are extremely lethal and usually lead to death within

a week of infection.

This could be a major discovery in the ongoing battle between scientists working to develop a vaccine to protect against plague and the terrorists who seek to use plague as a weapon. Many of the highest priority bio-terror concerns are caused by bacteria that acutely infect the lung. These include anthrax, [tularemia](#) and plague.

Most of the plague [vaccine candidates](#) that have been studied aim to stimulate [B cells](#) to produce plague-fighting antibodies. However, animal studies suggest that antibodies may not be enough to protect humans from pneumonic plague. The Smiley laboratory has shown that T cells can also fight plague. The lab previously demonstrated that an immunization with an experimental vaccine stimulates the production of T cells that provide partial protection against pneumonic plague. This vaccine consisted of a live but weakened version of the plague causing bacterium.

Live vaccines are often effective, but they can be difficult to license because they have the potential to grow within immunocompromised recipients and inadvertently cause disease.

Additionally, Dr. Smiley believes these studies may help us learn to combat other kinds of pneumonia: "Bacterial pneumonia is one of the most common causes of death in hospitals and, like plague, many of these pneumonias are caused by bacteria that we may need to combat with both antibodies and T cells."

Provided by Trudeau Institute

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