

Anthrax cellular entry point uncovered

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The long-sought-after biological “gateway” that anthrax uses to enter healthy cells has been uncovered by microbiologists at the University of Alabama at Birmingham (UAB).

Anthrax spores enter the cell through something called Mac-1, a receptor that sits on the surface of certain cells.

This is the first study to uncover exactly how the bacteria get inside cells to begin with, the UAB researchers said. Previous studies have shown what happens after anthrax spores enter the body and wreak havoc.

Unraveling the anthrax-Mac-1 gateway is a milestone in the ongoing efforts to protect humans from bioterrorism and biological warfare, the UAB microbiologists said. Such a discovery will speed the development of new drugs and vaccines to fight or prevent anthrax infection, and advance the understanding of bacterial infection.

The findings are published in the online version of the journal *Proceedings of the National Academy of Sciences* and will soon appear in a print edition.

“We know anthrax infection can occur in wild and domestic animals, but in humans this disease is extremely rare and very dangerous. It is a bioweapon,” said John Kearney, Ph.D., a professor in the UAB Department of Microbiology and co-author on the study. “This study reveals the biological paradigm that makes the anthrax spore clever enough to target the Mac-1 receptor, and use this entry point to boost its

lethality.”

Bacillus anthracis infection occurs in three forms: cutaneous (skin), inhalation and through swallowing spores. The skin infection is the most common type and can be treated with antibiotics if diagnosed rapidly.

The more serious form is inhalation anthrax, which was diagnosed in a few adults during the anthrax scare after the Sept. 11, 2001, terror attacks against the United States.

In the UAB study, researchers worked under strict bio-safe conditions to infect cultures of cells and laboratory-bred mice with a strain of anthrax often used in research.

Infection rates and other observations were significant enough to convince the microbiologists anthrax relies on Mac-1 to do its damage inside healthy cells.

“By showing how anthrax spores recognize Mac-1 receptors, this discovery points toward a precise entry point which *B. anthracis* uses to proliferate and trigger lethal consequences,” said Claudia Oliva, Ph.D., and Melissa Swiecki, Ph.D., both researchers in the UAB Department of Microbiology and co-lead authors on the study.

Source: University of Alabama at Birmingham

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