The adaptable anthrax bacterium

May 15 2020, by Leigh MacMillan

A photomicrograph of Bacillus anthracis bacteria using Gram-stain technique. Anthrax is diagnosed by isolating B. anthracis from the blood, skin lesions, or respiratory secretions, or by measuring specific antibodies in the blood of persons with suspected cases. Photo Credit: Content Providers(s): CDC

The bacterium Bacillus anthracis—the cause of the serious infectious disease anthrax—has been used as a bioterror agent. Understanding how

B. anthracis adapts to hostile environments to cause infection may identify new targets for treatment.

Eric Skaar, Ph.D., and colleagues studied the response of B. anthracis to targocil, an antimicrobial compound that damages the cell envelope.

They demonstrated that targocil treatment activates a "two-component system" called EdsRS, which increases the production of a membrane phospholipid (cardiolipin) through a previously uncharacterized cardiolipin synthase enzyme. Cardiolipin is then used to repair the envelope and maintain B. anthracis viability and fitness.

The findings, reported in the journal *mBio*, highlight the adaptability of B. anthracis and reveal a mechanism the pathogen uses to defend against structural damage and resist antimicrobial toxicity. The work underscores the importance of studying two-component systems like EdsRS that B. anthracis uses to adapt to its environment and cause disease.

More information: Clare L. Laut et al. Bacillus anthracis Responds to Targocil-Induced Envelope Damage through EdsRS Activation of Cardiolipin Synthesis, *mBio* (2020). DOI: 10.1128/mBio.03375-19

Provided by Vanderbilt University