Scientists illuminate role of staph toxins in bacterial sepsis

2 February 2017

Staphylococcus epidermidis bacteria are a significant health concern for hospitalized infants, children and anyone with implanted medical devices. The bacteria—typically skin dwellers—can infect the bloodstream and cause a life-threatening condition known as sepsis. Between 1 and 3 million people a year in the United States are diagnosed with sepsis, and between 15 and 30 percent of them die. Severe bacterial sepsis is characterized by an extreme immune response, inflammation, reduced blood flow, clotting, and organ failure. Methicillin-resistant strains of *S. epidermidis* (MRSE) cause most sepsis cases. Notably, methicillin resistance rates in *S. epidermidis* exceed those in the more-familiar *S. aureus* (MRSA), and methicillin resistance makes MRSE infections difficult to treat.

For decades scientists have thought that *S. epidermidis* sepsis resulted from an overwhelming immune response to unchanging surface structures on the invading bacteria. Now, National Institutes of Health (NIH) scientists have identified an *S. epidermidis* toxin (PSM-mec) that is released into the bloodstream and contributes to sepsis. The investigators say this is the first time a toxin from *S. epidermidis* or closely related bacteria has been linked to sepsis.

In tissue studies using *S. epidermidis* strains, the group found that the PSM-mec toxin helped the bacteria survive in human blood and resist attack by neutrophils, important immune system fighters. In a mouse model, the toxin significantly increased disease and stimulated the immune response, which worsened the septic infection.

The researchers say clinical studies are needed to assess whether PSM-mec affects sepsis in people and thus can be a target for therapeutics. They also are investigating whether related toxins found in methicillin-susceptible *S. epidermidis* and *S. aureus* have a similar function.

More information: Li Qin et al, Toxin Mediates Sepsis Caused by Methicillin-Resistant Staphylococcus epidermidis, *PLOS Pathogens* (2017). DOI: 10.1371/journal.ppat.1006153

Provided by NIH/National Institute of Allergy and Infectious Diseases