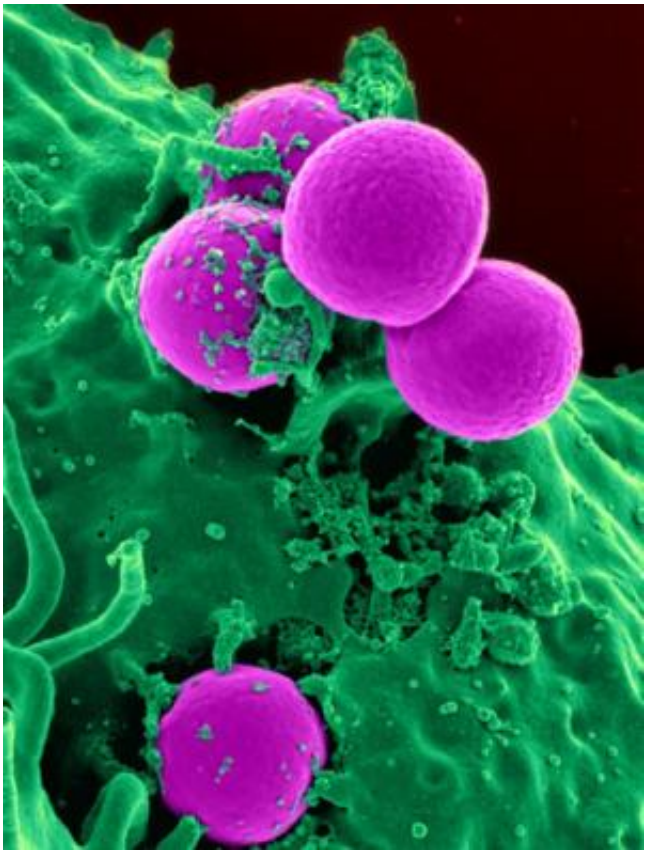
How Staph infections elude the immune system

October 27 2014



By tricking the immune system into generating antibodies specific for only one bacterial protein, Staphylococcus aureus (pictured) dodges the production of antibodies that might otherwise protect against infection. Credit: National Institute of Allergy and Infectious Diseases (NIAID)

A potentially lethal bacterium protects itself by causing immune tunnel

vision, according to a study from scientists at The University of Chicago published in The *Journal of Experimental Medicine*. By tricking the immune system into focusing on one bug-associated factor, the bacterium Staphylococcus aureus dodges the production of antibodies that would otherwise protect against infection.

Staphylococcus aureus accounts for roughly 20% of hospital-acquired blood infections, and antibiotic-resistant strains of the bug (MRSA) are on the rise. Unfortunately, efforts to protect people against Staph infections using vaccines have been largely unsuccessful. Studies in mice have shown that protection against Staph infection depends on the production of antibodies. Although several bacterial proteins can be recognized by human antibodies, these antibodies are often not enough to fight off infection or prevent re-infection.

Patrick Wilson and colleagues now find that although circulating antibodies in people infected with Staph aureus are capable of recognizing a broad range of bacterial proteins, the active immune response is focused on only one—protein A (SpA).

Antibody producing B cells express highly variable receptors on their surface, and normally only a few B cells are capable of recognizing a given molecule ("antigen"), often part of an invading pathogen. When a B cell encounters its specific antigen, it fine-tunes its surface receptor for better, faster recognition the second time around. But SpA acts as a "superantigen," meaning that it binds to and activates many B cells regardless of their receptor specificity. Once activated, some of the B cells in Staph-infected people appeared to tune their receptors to recognize SpA rather than their intended antigens. This may allow the bug to overpower B cells that might otherwise generate protective antibodies specific for other bacterial components.

It's not clear why antibodies against SpA are not protective, but these

data suggest that future vaccine approaches must be designed to side-step this bacterial subterfuge.

More information: Pauli, N.T., et al. 2014. *J. Exp. Med*. DOI: 10.1084/jem.20141404 . jem.rupress.org/content/early/ … 4/10/21/jem.20141404

Provided by Rockefeller University