Skin microbiome influences common sexually transmitted disease

September 15 2015

Human skin structure. Credit: Wikipedia

For years, researchers have known that the human skin is home to a diverse community of microorganisms, collectively known as the skin microbiome. Now a new study has shown that individuals with a particular skin microbiome can effectively clear bacteria that cause chancroid, a sexually transmitted disease common in the developing

world that has been linked to enhanced HIV transmission. The study, published in the September 15th issue of *mBio*, is the first prospective study to show that the skin microbiome can influence the outcomes of a bacterial infection.

"What we found from this study is that people who resolve infections start off with microbiomes that resemble each other. People who form abscesses in response to infection have different microbiomes that don't resemble each other preinfection, but during an infection, they get driven to one composition," said lead study author Stanley Spinola, MD, professor and chair, Department of Microbiology and Immunology, Indiana University School of Medicine, Indianapolis. "If the bacteria in the resolvers are actually contributing to the host defense, you could think about using bacteria as a probiotic to help prevent infection or you could use the microbiome to identify people at risk for certain infections. This, however, is speculative. You would have to test it."

Researchers have hypothesized that some resident bacteria can protect the skin from infection by outcompeting pathogens for resources or by priming the immune system's response to invaders. Until now, however, no prospective study has evaluated the influence of the skin microbiome on the susceptibility to or protection from infection.

In the new study, researchers evaluated the skin microbiome of eight individuals before, during, and after inoculation with *Haemophilus ducreyi* on the arm. In addition to chancroid, this bacteria has emerged as a major cause of skin ulcers in children in equatorial Africa and the South Pacific, so infection of the arm is relevant to its biology. Infected individuals can either clear the infection or develop pustules that eventually form abscesses. The investigators compared the skin microbiome in patients who resolved their *H. ducreyi* infection to those who didn't. The researchers discovered that preinfection skin microbiomes of pustule formers and resolvers have distinct community

structures that change in response to the progression of *H. ducreyi* infection.

"The number one question is whether the microbiome that is present in patients who resolve the infection is merely a signature of an innate immune system that is good at clearing the skin of infections or are there specific bacteria in that composition that are helping the immune system clear the pathogen," said Dr. Spinola. Ongoing research hopes to elucidate an answer to this question.

Investigators from Loyola University in Chicago and Indiana University, Indianapolis were also involved in the research.

Provided by American Society for Microbiology