

Scientists discover new properties of microbes that cause common eye infection

November 12 2014



Streptococcus bacteria (red spheres in chains) adhering to collagen fibres. Credit: A. Nobbs

Scientists from Massachusetts Eye and Ear/Harvard Medical School Department of Ophthalmology have used the power of new genomic technology to discover that microbes that commonly infect the eye have special, previously unknown properties. These properties are predicted to allow the bacterium—*Streptococcus pneumoniae*—to specifically stick to the surface of the eye, grow, and cause damage and inflammation.

Researchers are now using this information to develop new ways to treat and prevent this bacterium, which is becoming increasingly resistant to antibiotics. Their findings are in the current issue of *Nature*



Communications.

S. pneumoniae is a leading cause of <u>infection</u> and is responsible for diseases ranging from infection of the lungs, pneumonia, to infection of the brain, to infection of the surface of the <u>eye</u> known as conjunctivitis. Although infection of the eye can usually be safely treated, *S. pneumoniae* infection is a leading cause of illness and death worldwide.

According to Mass. Eye and Ear researcher Michael S. Gilmore, Sir William Osler Professor of Ophthalmology, Harvard Medical School, an effective vaccine is available that helps prevent many of the most severe types of infection. "I believe it is especially important for children and the elderly to be vaccinated. The vaccine causes the body to react to a slimy coating on the bacterial surface called a "capsule." The capsule allows *S. pneumoniae* to escape from white blood cells that try to eliminate it, and *S. pneumoniae* goes on to cause lung and other infections."

However, the strains of *S. pneumoniae* that cause <u>eye infection</u> have been known to lack this capsule, yet they still cause infection. "Because they lack the capsule, they are not affected by the vaccine either," he continued.

To design a better vaccine, and to understand how these "unencapsulated" strains of *S. pneumoniae* are still able to cause infection of the ocular surface, the research team, spearheaded by postdoctoral researcher Michael Valentino and including Mass. Eye and Ear scientists Wolfgang Haas and Paulo Bispo, as well as a collaborative team from the Broad Institute of Harvard University and Massachusetts Institute of Technology, the U.S. Centers for Disease Control and Prevention, and elsewhere, examined the genomes of a large collection of *S. pneumoniae* strains collected from across the United States.



"We found that about 90 percent of the conjunctivitis strains were very closely related and formed a new group of *S. pneumoniae* with infectious properties that were different from any other known strains," Dr. Gilmore said. "These new properties are believed to allow *S. pneumoniae* to resist the normal clearance mechanisms of the surface of the eye, including blinking and tears, stick to the eye surface, grow there and cause damage."

Dr. Gilmore believes that including some of the *S. pneumoniae* proteins that allow the bacterium to do this in a new type of vaccine, might lead to the prevention of nearly 90 percent of the cases of conjunctivitis caused by this microbe and save the use of antibiotics for more severe infections.

More information: The paper, entitled "Unencapsulated Streptococcus pneumoniae from conjunctivitis encode variant traits and belong to a distinct phylogenetic cluster," appears in the Nov. 13 issue of issue of the prestigious international science journal, *Nature Communications*.

Provided by Massachusetts Eye and Ear Infirmary

Citation: Scientists discover new properties of microbes that cause common eye infection (2014, November 12) retrieved 8 May 2024 from <u>https://medicalxpress.com/news/2014-11-scientists-properties-microbes-common-eye.html</u>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.