Nanosponges lessen severity of streptococcal infections

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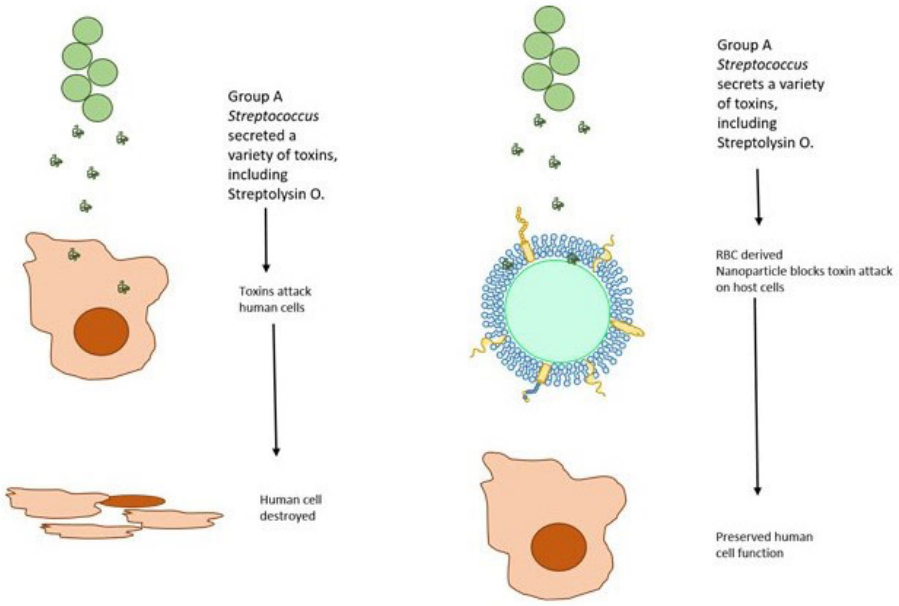

Researchers created engineered nanosponges (right) from red blood cells (RBC). The nanosponges capture and inactivate toxins produced by bacteria, thus reducing damage to cells. Credit: Tamara Escajadillo, University of California, San Diego

In a new study, researchers show that engineered nanosponges that are encapsulated in the membranes of red blood cells can reduce the severity of infections caused by group A *Streptococcus*, the bacteria responsible

for strep throat and life-threatening infections such as necrotizing fasciitis, or flesh-eating disease. The new treatment approach could be particularly useful for severe or antibiotic-resistant bacterial infections.

Tamara Escajadillo, graduate student researcher at the University of California in San Diego, will present the new study at the American Society for Pharmacology and Experimental Therapeutics annual meeting during the Experimental Biology 2017 meeting, to be held April 22-26 in Chicago.

One reason group A *Streptococcus* and other invasive pathogens are so dangerous is they release pore-forming toxins that can poke holes in the membranes of cells within a person's body, leading to cellular dysfunction or cell death.

"Our engineered nanosponges capture and inactivate the toxins produced by bacteria, thus reducing damage to cells," said Escajadillo. "By demonstrating their effectiveness with live Streptococcal infections, we provide compelling evidence for the potential functionality of the nanosponges in a clinical setting."

The researchers created the nanosponges by separating the membranes of human red blood cells from their internal contents and stabilizing the membranes with an engineered core designed to absorb the toxins produced by pathogenic bacteria. Experiments with cultured cells showed that in the presence of group A *Streptococcus*, the nanosponges successfully acted as decoys, preventing toxins from reaching cells important for defense against infection, such as white blood cells and skin cells. The nanosponges also reduced disease severity in a live mouse model of necrotizing fasciitis.

"The use of human cellular membranes as a decoy has the potential to block a large family of related microbial toxins and reduce the severity

of invasive bacterial infections in vulnerable patients," said Escajadillo.

The researchers are now testing their nanosponges with a variety of important bacterial toxins and live infections. They also want to develop a version that could counteract the dangerous inflammatory cascade that occurs in bacterial sepsis, a life-threatening condition that arises when the body is overwhelmed with an infection.

More information: Alternative Therapeutic Nanoparticle Approach For Treatment Of Invasive Streptococcal Infections, app.core-apps.com/eb2017/abstr … 4f98d1c4301c53f60e43

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