Fighting bacteria with a new genre of antibodies

April 24 2013

Credit: AI-generated image (disclaimer)

In an advance toward coping with bacteria that shrug off existing antibiotics and sterilization methods, scientists are reporting development of a new family of selective antimicrobial agents that do not rely on traditional antibiotics. Their report on these synthetic colloid particles, which can be custom-designed to recognize the shape of

specific kinds of bacteria and inactivate them, appears in the *Journal of the American Chemical Society*.

Vesselin Paunov and colleagues point out that many bacteria have developed resistance to existing antibiotics. They sought a new approach—one that bacteria would be unable to elude by mutating into drug-resistant forms. Their inspiration was the antibodies that the immune system produces when microbes invade the body. Those antibodies patrol the body for microbes and bind to their surfaces, triggering a chain of events in which the body's immune system attacks and destroys the microbes.

Paunov's team describes development and successful tests of synthetic colloid particles, called "colloid antibodies." Colloids are materials in which tiny particles of one material are dispersed in another material. Milk is a colloid in which globules of fat are spread throughout water and other materials. The colloid antibody particles are shells packed with a killing agent. They are designed to recognize and bind to specific bacteria.

Laboratory experiments showed that the colloid antibodies attached to and inactivated only their intended targets without harming other cells. "We anticipate that similar shape selective colloid antibodies can potentially become a powerful weapon in the fight against antibiotic-resistant bacteria," say the researchers. "They can also find applications as non-toxic antibacterial agents, preventing growth of harmful bacteria in various formulations."

The article is titled "Photothermal Colloid Antibodies for Shape-Selective Recognition and Killing of Microorganisms."

More information: Photothermal Colloid Antibodies for Shape-Selective Recognition and Killing of Microorganisms, J. Am. Chem.

Soc., 2013, 135 (14), pp 5282–5285 DOI: 10.1021/ja400781f