



## Hemoglobin-Based Nanoparticles

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### The Invention

UW-Madison researchers have developed a multi-functional antibiotic nanoparticle that incorporates hemoglobin and the clinically approved antifungal agent naftifine in the core which is coated with red blood cell membranes. The antifungal agent inhibits release of a small molecule that absorbs reactive oxygen species while the iron molecules in the hemoglobin inhibit release and accumulation of hydrogen sulfide by the bacteria. As neutrophil activity against the bacteria depends on reactive oxygen species, blocking two pathways the bacteria use to absorb reactive oxygen species should result in neutrophil-mediated destruction of the bacteria. Coating the particle in red blood cell membranes yields a large number of polyunsaturated fatty acids which modify the bacterial cell membrane making it more susceptible to oxidative damage. The researchers have shown the particle is effective in killing antimicrobial-resistant *S. aureus* in a pneumonia model, a peritonitis model, and a bacteremia model. The particle is also efficient in killing *S. aureus* biofilms.

The inventors have an extensive data package showing the particle has multi-functional antibacterial activity as they envisioned. They have some safety data and have some preliminary data showing efficacy *in vivo*.

### Additional Information

#### For More Information About the Inventors

- [Shaoqin Gong](#)

#### Tech Fields

- [Therapeutics & Vaccines : Anti-infectives \(antibacterials, antifungals, antivirals\)](#)

For current licensing status, please contact Rafael Diaz at [rdiaz@warf.org](mailto:rdiaz@warf.org) or 608-960-9847