



become ineffective against MRSA.

In research published in the July issue of *Antimicrobial Agents and Chemotherapy*, Rutgers scientists say that the combination of their newly developed antibiotic, TXA709, with cefdinir, an antibiotic that has been on the market for almost two decades, successfully treated the MRSA infection in animals.

"This is important because even though TXA709 is effective on its own in treating MRSA, combining it with cefdinir - used to treat a wide range of bacterial infections like strep throat, pneumonia, bronchitis and middle ear and sinus infections - makes it even more efficacious, while also significantly reducing the potential for the MRSA bacteria to become resistant in the future," said Daniel Pilch, associate professor in the Department of Pharmacology at Robert Wood Johnson Medical School.

Pilch and fellow scientists are racing to develop a new class of [antibiotics](#) to treat methicillin-resistant *Staphylococcus aureus* (MRSA) infections, which are responsible for 19,000 deaths annually and represent \$3 billion in annual health care costs.

The threat of MRSA and other antibiotic-resistant infections has become so severe that the World Health Organization predicts that common infections and minor injuries could become life-threatening because of a lack of drug treatments available to destroy these bacterial infections. Last month the first case in the United States of a patient with an infection resistant to all known antibiotics was reported by the U.S. Centers for Disease Control and Prevention.

"Current standard-of-care drugs for the treatment of MRSA infections are limited," said Pilch. "Furthermore, resistance to these drugs is on the rise, and their clinical effectiveness is likely to diminish in the future."

Pilch said that TXA709 kills MRSA bacteria in a unique manner unlike any other antibiotic in current clinical use, inhibiting the function of a protein, FtsZ, essential for the bacteria to divide and survive. By combining TXA709 with cefdinir, a cephalosporin antibiotic that acts much like penicillin, scientists were able to lower the dosage of the new antibiotic required to eradicate the MRSA [infection](#).

This is significant, Rutgers scientists say, because it decreases the potential for any drug-induced toxicity and side effects that might occur from a higher dosage.

"What is also good about this experimental treatment is that both drugs can be taken orally, which means they can be administered on an outpatient basis," said Pilch, who collaborated with Edmond LaVoie, professor and chair of the Department of Medicinal Chemistry at the Ernest Mario School of Pharmacy at Rutgers. "All but two of the current antibiotics being used clinically to treat MRSA need to be administered intravenously," he said.

Researchers say Phase I clinical trials on the new antibiotic, which will assess and evaluate its safety and effectiveness in humans, are expected to begin next spring.

**More information:** Malvika Kaul et al. TXA709, an FtsZ-Targeting Benzamide Prodrug with Improved Pharmacokinetics and Enhanced Efficacy against Methicillin-Resistant *Staphylococcus aureus*, *Antimicrobial Agents and Chemotherapy* (2015). [DOI: 10.1128/AAC.00708-15](https://doi.org/10.1128/AAC.00708-15)

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