

## Bacteria build walls to withstand antibiotics

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Antibiotic resistant bacteria, which are proliferating in hospitals and causing major headaches for physicians, cheat death by finding ways to fortify their cell walls against the deadly drugs. The question is: how? New research from the laboratory of Alexander Tomasz shows that one gene, called mecA, enables some bacteria to withstand penicillin and other drugs in its class.

Part of a larger group called beta-lactam antibiotics, these drugs work by inhibiting proteins the bacteria need to construct their cell wall. If a Staphylococcus aureus bacterium has the mecA gene, however, it can still build a cell wall even in the presence of the antibiotics. But mecA is an acquired gene in S. aureus, and Tomasz and colleagues show that these bacteria probably picked mecA up from another bacteria called S. sciuri.

S. sciuri, which is only very remotely related to S. aureus, lives on the skin of domestic and wild animals, including mice, rats and squirrels. While all S. sciuri carry a gene closely related to mecA, they are virtually all fully sensitive to beta-lactam antibiotics. On rare occasions, a mutation occurs in mecA that renders them resistant. Tomasz's group introduced this mutated gene into S. aureaus and showed that they then also became resistant to beta-lactam antibiotics.

"This suggests that the mecA gene originated in S. scuiri and then found its way into S. aureus," says Tomasz, head of the Laboratory of Microbial Cell Biology and the Dr. Plutarch Papamarkou Professor. "Even though the two bacteria use different molecules to make their cell



walls, we found that the mecA protein can use what is available to build the cell wall.

The findings on how antibiotic resistance is conferred may eventually help scientists and doctors prevent its spread.

Source: The Rockefeller University

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