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MRSA strain gained dominance with help from skin bacteria

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Scientists believe they have an explanation for how the most common strain of methicillin-resistant *Staphylococcus aureus* (MRSA) rapidly rose to prominence. Research published in *mBio*, the online open-access journal of the American Society for Microbiology, suggests that the strain recently acquired a number of genes from common skin bacteria that allow it to grow and thrive on the skin where other strains of MRSA cannot.

"Over the past 15 years, methicillin-resistant *Staphylococcus aureus* has become a major public health problem. It is likely that adaptations in specific MRSA lineages drove the spread of MRSA across the United States and allowed it to replace other, less-virulent *S. aureus* strains," says Paul Planet of Columbia University, the lead author on the study.

Since it was first identified in the late 1990s the USA300 strain of MRSA has undergone an extremely rapid expansion across the United States. It is now the predominant cause of community-acquired MRSA skin and soft tissue infections and has been implicated in MRSA outbreaks among professional football teams. The strain is genetically distinguished from other strains by a cluster of genes known as the arginine catabolic mobile element (ACME.)

"Using phylogenetic analysis, we showed that the modular segments of ACME were assembled into a single genetic locus in *Staphylococcus epidermidis* (a relatively harmless bacterium typically found on human skin) and then horizontally transferred to the common ancestor of

USA300 strains in an extremely recent event that coincided with the emergence and spread of this strain" says Planet.

The researchers identified one ACME gene in particular, called speG, that conferred on USA300 strains the ability to withstand high levels of polyamines, compounds produced by the skin that are toxic to other strains of MRSA. Polyamine tolerance also gave MRSA multiple advantages including enhanced biofilm formation, adherence to host tissues and resistance to certain antibiotics, according to the study.

"We suggest that these properties gave USA 300 a major selective advantage during skin infection and colonization, contributing to the extraordinary evolutionary success of this clone," says Planet.

Provided by American Society for Microbiology

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