Methicillin-Resistant *Staphylococcus Aureus* – A Leading Cause Of Disease And Death In Hospitals And The Community

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Abstract

*Staphylococcus aureus* is a dangerous human pathogen and the primary source of fatal infections in hospitals. In many countries, a majority of *S. aureus* hospital isolates are resistant to methicillin (methicillin-resistant *S. aureus*, MRSA) or even a larger variety of antibiotics (multi-drug resistant *S. aureus*). This leaves only a small set of antibiotics, often with much lower efficiency, as treatment options. In addition to hospital-associated MRSA infections, there have been global outbreaks of MRSA infections in otherwise healthy individuals in the community (community-associated MRSA, CA-MRSA) since the late 1990s.

Many aspects of MRSA outbreaks are poorly understood. In particular, we do not understand on a molecular level what makes new clones rise and others disappear. Recent research has shed some new light on these key questions. MRSA appears to take up genetic material from other staphylococci, which carries genes that help the bacteria colonize in the nose. This is important, because colonization with *S. aureus* often precedes infection. Furthermore, we now have much information about the molecular determinants that are responsible for the exceptionally high virulence of CA-MRSA. For example, CA-MRSA strains produce toxins that the bacteria use as weapons against human phagocytes, thereby evading elimination by the human immune defense.

Notably, a detailed understanding of MRSA virulence strategies will facilitate efforts to develop anti-staphylococcal drugs and vaccines, which are urgently needed given the paucity of efficient antibiotics that are still available for the treatment of staphylococcal disease.

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