

Heavy metal and disinfectant resistance genes among livestock-associated methicillin-resistant *Staphylococcus aureus* isolates - DTU Orbit (09/11/2017)

Heavy metal and disinfectant resistance genes among livestock-associated methicillin-resistant *Staphylococcus aureus* isolates

Livestock associated methicillin-resistant *Staphylococcus aureus* (LA-MRSA) has emerged in animal production worldwide. Most LA-MRSA in Europe belong to the clonal complex (CC)398. The reason for the LA-MRSA emergence is not fully understood. Besides antimicrobial agents used for therapy, other substances with antimicrobial activity applied in animal feed, including metal-containing compounds might contribute to their selection. Some of these genes have been found in various novel SCCmec cassettes. The aim of this study was to assess the occurrence of metal-resistance genes among a LA-*S. aureus* collection [n = 554, including 542 MRSA and 12 methicillin-susceptible *S. aureus* (MSSA)] isolated from livestock and food thereof. Most LA-MRSA isolates (76%) carried at least one metal-resistance gene. Among the LA-MRSA CC398 isolates (n = 456), 4.8%, 0.2%, 24.3% and 71.5% were positive for *arsA* (arsenic compounds), *cadD* (cadmium), *copB* (copper) and *czrC* (zinc/cadmium) resistance genes, respectively. In contrast, among the LA-MRSA non-CC398 isolates (n = 86), 1.2%, 18.6% and 16.3% were positive for the *cadD*, *copB* and *czrC* genes, respectively, and none were positive for *arsA*. Of the LA-MRSA CC398 isolates, 72% carried one metal-resistance gene, and the remaining harboured two or more in different combinations. Differences between LA-MRSA CC398 and non-CC398 were statistically significant for *arsA* and *czrC*. The *czrC* gene was almost exclusively found (98%) in the presence of SCCmec V in both CC398 and non-CC398 LA-MRSA isolates from different sources. Regarding the LA-MSSA isolates (n = 12), some (n = 4) were also positive for metal-resistance genes. This study shows that genes potentially conferring metal-resistance are frequently present in LA-MRSA.

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