Detection of MRSA encoding mecA\textsubscript{LGA251} : Problems and solutions?
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The recent identification of MRSA encoding a newly described mecA homologue (mecA\textsubscript{LGA251}) highlighted the fact that accurate detection and identification of these organisms could pose a challenge for clinical diagnostic laboratories using standard protocols.

The United Kingdom National External Quality Assessment Service (UK NEQAS) distributes clinically relevant and educational specimens for external quality assessment (EQAs). The MRSA screening scheme enables participants to assess the quality of the culture and molecular screening techniques employed for the detection of MRSA.

To improve awareness and increase case ascertainment, we sought to (i) include a representative isolate in the UK NEQAS MRSA screening scheme and (ii) assess the performance of phenotypic methods for their detection.

**Introduction and Purpose**

\textbf{i) Analysis of UK NEQAS EQA results}

301 of 311 UK NEQAS participants returned results for the mecA\textsubscript{LGA251}-positive MRSA.

\textbf{Molecular methods}

Of 68 participants that reported on the detection of MRSA using molecular methods (Figure 2):

- 16 (24%) reported positive results
  - 3 were true positives from in-house PCRs that could detect mecA\textsubscript{LGA251}
  - those using commercial molecular-based kits were presumed to have based this conclusion on test results from conventional culture run in parallel (mecA\textsubscript{LGA251} and SCCmec type 4A are sufficiently divergent not to be detected by currently available commercial molecular-based techniques)
  - 49 (72%) reported a negative result
    - 11 of these stated that based on reduced susceptibilities to oxacillin or cefoxitin they would refer the isolate for further investigation querying borderline oxacillin and cefoxitin (typical MICs 4-16 mg/L)
- 74 (29%) reported MRSA not detected (Figure 3)

\textbf{Culture-based methods}

Of the 296 participants that reported on the detection of MRSA using culture methods:

- 226 (76%) detected MRSA (Figure 3)
- 74 (25%) reported MRSA not detected (Figure 3)

The high failure rate by conventional culture with mecA\textsubscript{LGA251} isolates may be due to their low level resistance to oxacillin and cefoxitin (typical MICs 4-16 mg/L).

\textbf{ii) Analysis of results of phenotypic methods}

\textbf{MASTALEX\textsuperscript{TM} MRSA}

- None of the mecA\textsubscript{LGA251}-positive MRSA gave a positive result whether cultured on non-selective or selective media

\textbf{Clearview\textsuperscript{®} Exact PBP2a}

- When cultured on nutrient agar, all test isolates gave a negative result with the Clearview\textsuperscript{®} Exact assay
- When cultured on chromID \textsuperscript{TM} MRSA agar (bioMérieux), all test isolates gave a positive result with the Clearview\textsuperscript{®} Exact assay

\textbf{Table 2. Phenotypic and genotypic characteristics of study isolates}

\begin{tabular}{|l|c|c|c|c|c|c|c|c|c|c|c|}
\hline
\textbf{Isolate} & \textbf{NR} & \textbf{CL} & \textbf{HU} & \textbf{TR} & \textbf{AP} & \textbf{IC} & \textbf{MD} & \textbf{BR} & \textbf{EX} & \textbf{EL} & \textbf{H} & \textbf{L} \\
\hline
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\end{tabular}

- \textsuperscript{a} Pichon et al, submitted for publication; \textsuperscript{b} Isolates grown on non-selective medium (nutrient agar); \textsuperscript{c} Isolates grown on selective medium

**Results**

- Results from laboratories participating in the EQA distribution have highlighted problems in identifying mecA\textsubscript{LGA251}-positive MRSA with the commercial molecular kits used
- Where phenotypic and/or genotypic data for oxacillin/cefotaxime resistance in S. aureus are discrepant, the possibility of mecA\textsubscript{LGA251}-positive MRSA should be considered

MRSA harbouring either mecA or mecA\textsubscript{LGA251} can be detected successfully using Clearview\textsuperscript{®} Exact following cefoxitin induction, but differentiation between these two gene homologues requires the use of specific PCR-based methods

**Conclusions**

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- Where phenotypic and/or genotypic data for oxacillin/cefotaxime resistance in S. aureus are discrepant, the possibility of mecA\textsubscript{LGA251}-positive MRSA should be considered

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**Acknowledgements:** We would like to thank all participants of the UK NEQAS MRSA screening scheme for their support and the staff at UK NEQAS for their dedication and support. We would also like to thank our colleague, Abigail Shadwell, for her assistance in generating the microbiology laboratory.