

As a library, NLM provides access to scientific literature. Inclusion in an NLM database does not imply endorsement of, or agreement with, the contents by NLM or the National Institutes of Health.

Learn more: [PMC Disclaimer](#) | [PMC Copyright Notice](#)



[Front Microbiol.](#) 2022; 13: 903298.

PMCID: PMC9204182

Published online 2022 Jun 3. doi: [10.3389/fmicb.2022.903298](https://doi.org/10.3389/fmicb.2022.903298)

PMID: [35722329](https://pubmed.ncbi.nlm.nih.gov/35722329/)

Rapid and Ultrasensitive Detection of Methicillin-Resistant *Staphylococcus aureus* Based on CRISPR-Cas12a Combined With Recombinase-Aided Amplification

[Ying Wang](#), ¹ [Xuan Liang](#), ¹ [Jie Xu](#), ¹ [Lan Nan](#), ² [Fang Liu](#), ¹ [Guangcai Duan](#), ¹ and [Haiyan Yang](#)^{✉1,*}

[Copyright](#) © 2022 Wang, Liang, Xu, Nan, Liu, Duan and Yang.

This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Abstract

Staphylococcus aureus is one of the main pathogens causing hospital and community-acquired infections, in particular, infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA) cause a higher mortality rate than those caused by methicillin-sensitive strains, which poses a serious global public health problem. Therefore, rapid and ultrasensitive detection of patients with clinical MRSA infection and timely control of infection are essential. Clustered regularly interspaced short palindromic repeats (CRISPR) and CRISPR-associated proteins (Cas) based on nucleic acid detection methods are well-known for its high specificity and sensitivity and programmability. Here, we successfully proposed a method based on CRISPR-Cas12a combined with recombinase-aided amplification (RAA) through fluorescent readout to achieve accurate identification and highly sensitive detection of MRSA in clinical samples. Results showed that the limit of detection (LoD) of the RAA-Cas12a method could reach 10 copies/μl at 60 min of reaction. Specificity tests showed that the method could distinguish MRSA from clinically common bacteria. The results of RAA-Cas12a were consistent with that of antimicrobial susceptibility tests (AST) and polymerase chain reaction (PCR) in 83 clinical samples. These results indicated that the detection method based on RAA-Cas12a has high sensitivity and specificity, and provides important value for rapid detection of MRSA.

Keywords: *Staphylococcus aureus*, MRSA, CRISPR-Cas12a, RAA, detection



[Back to Top](#)