



Rapid detection of NDM and VIM carbapenemases by recombinase polymerase amplification and lateral flow-based detection

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Background

- Antibiotic resistance is posing a serious clinical and public health threat.
- The WHO, and CDC recognize carbapenem-resistant bacteria as a critical and urgent threats, respectively.^(1,2)
- Rapid and simple point-of-care (POC) tests are essential elements to diagnose, and aid in infection control and management.

Objectives

- To develop instrument-free prototype tests, to detect NDM and VIM carbapenemase encoding genes, suitable for POC testing in poor resource settings.

Methods & Results

- We have used recombinase polymerase amplification (RPA), iso-thermal method, coupled with a lateral-flow detection systems.

- We optimized the RPA-based assays and tested the limit of detection (LOD) by running 10-fold dilutions using characterized positive controls in replicates (over three different days). The reliable LOD (3/3) of the NDM assay is down to 9.2 copies (see figure 1a) while 7.5 copies for the VIM assay (see figure 1b).
- The assays were further validated using a panel of DNA extracts (n=57) from carbapenemase and non-carbapenemase producing organisms. Assay sensitivities and specificities compared to reference PCR methods were both 100%.
- Both assays can provide results in 15 minutes.

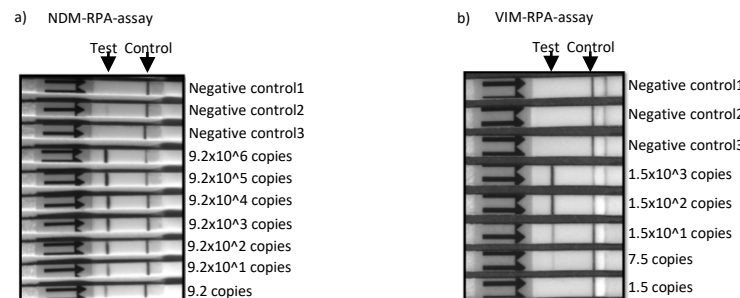


Figure 1 example of LOD visual results of lateral flow strips for a) NDM-RPA-assay, b) VIM-RPA-assay.

Conclusion

- Our prototype tests offer simplicity, speed, sensitivity and specificity for detection of resistance genes and may have value for POC testing, especially in low-income settings.

Acknowledgments

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More info

- Kindly note, to avoid any repetition of data, all associated figures and tables will be presented in the oral presentation on Thursday 9 September at 10:05am.
- Published article's link
<https://pubmed.ncbi.nlm.nih.gov/33974185/>

References

¹WHO publishes list of bacteria for which antibiotic urgently needed, ² 2019 AR Threats Report.