Introducing artificial intelligence for early Vancomycin Resistant Enterococci culture reads with APAS®.

M. Morales [1], B. DeYoung [1], H. Wisplinghoff [2], R. Green [1] and S. Giglio [1]
[1]LBT Innovations, Adelaide, Australia
[2]Labor Dr Wisplinghoff, Cologne, Germany

CLEVER CULTURE SYSTEMS

APAS

BACKGROUND

In clinical diagnostic laboratories, the early detection of target bacteria directly impacts early reporting of clinical results and thus patient care. APAS® technology is an advanced artificial intelligence platform used for automated culture plate interpretation. We monitored the growth of four well characterised VRE strains (*E. faecium* ATCC 700221, *E. faecalis* ATCC 51299, *E. faecium* ATCC 51858, *E. faecalis* NCTC 12201) over a period of 48 hours utilising Thermo Fisher Brilliance VRE Agar and APAS Compact. We aimed to compare how early APAS® could reliably detect VRE positive plates when compared to a routine microbiologist read.

METHOD

Four isolates were used in the study: *E. faecium* ATCC 700221, *E. faecalis* ATCC 51299, *E. faecium* ATCC 51858, and *E. faecalis* NCTC 12201. Each Thermo Fisher Brilliance VRE Agar plate was inoculated with high a concentration of VRE colonies (approximately 1000 CFU/plate) and a low concentration of VRE colonies (approximately 10 CFU/plate). Plates were contained within an APAS® Compact were incubated at 36±1°C for 48 hours and imaged every 5 minutes.

A total of 1,152 images were taken per isolate preparation. APAS® and microbiologist assessment were performed on images at every 30-minute timepoint. The images used for microbiologist assessment were scrambled prior to assessment to remove time bias. The earliest time to detection was defined as the earliest point where APAS® or the microbiologist independently determined an image as positive, and when all the other subsequent images remained positive.

RESULTS

FIGURE 1: VRE Time-lapse video

FIGURE 2: APAS® colony detection at 12 hours

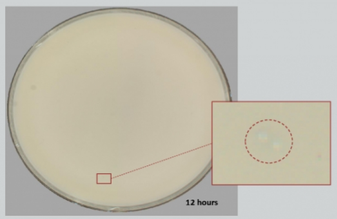
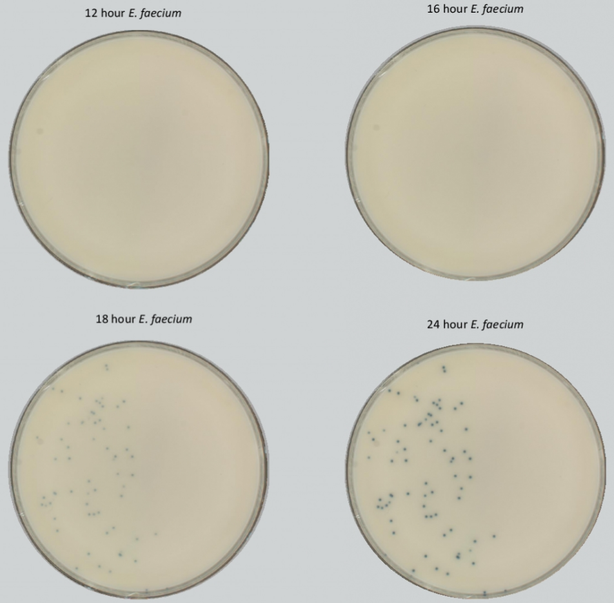
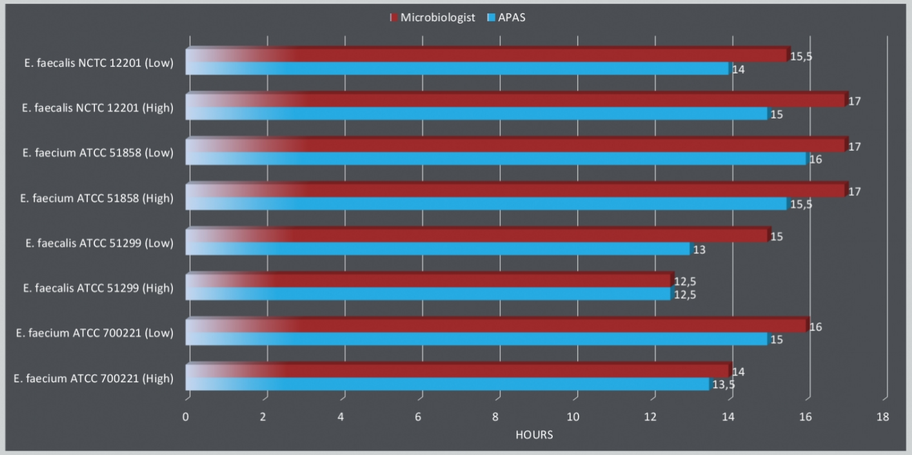


FIGURE 3 : VRE plate images at different time intervals using APAS®



RESULTS

FIGURE 4: Earliest time to detection results



Our results demonstrate that the earliest time that APAS® technology detected consistent VRE growth was approximately 13 hours after incubation and that variability existed in the way microbiologists designated positive or negative plates.

SUMMARY / CONCLUSION

In this study, we demonstrated that a significant reduction in reading time for VRE culture plates (<48 hours as recommended by manufacturer) may be possible when using APAS®.

Our results suggest that APAS® can assist in early reads of VRE culture plates and assist with infection control surveillance.

Future research should focus on demonstrating similar behaviour in wild-type isolates.

As the demand for faster turn around times for critical tests increases, efforts should be made to utilise artificial intelligence technologies for early reads where possible.

CE DISCLOSURES / ACKNOWLEDGEMENTS

The project was internally funded by LBT Innovations.

CONTACT INFORMATION

Dr Steven Giglio PhD, FASM
Scientific Director, LBT Innovations
Email: Steven.Giglio@lbtinnovations.com