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INTRODUCTION

Fast and reliable microbiological diagnostic is crucial for targeted anti-microbial therapy. APAS® technology is an advanced artificial intelligence platform used for culture plate reading, analysis, and interpretation.

Using this technology, we analysed 478 clinical samples send for VRE detection under normal laboratory testing conditions and compared APAS reading of two different selective agar types with conventional plate reading (i.e. microbiologist).

AIM

This study was conducted to evaluate AI-based VRE-detection algorithms in combination with different selective chromogenic culture media.

METHOD

- 3 month period
- Evaluation of 478 clinical swabs for VRE detection
- Inoculation on BrillianceVRE® (ThermoFisher) and ChromID® VRE (BioMerieux) plates
- Growth classified after 24 and 48 hours
- Identification of blue colonies by APAS Independence (CCS) AI-Algorithms vs. Microbiologist experience
- All blue colonies were further characterized with MALDI-TOF and MicroScan WalkAway System to confirm VRE.
- In case of discrepancies VRE-PCR (Cepheid) to detect Van A/B) was used.

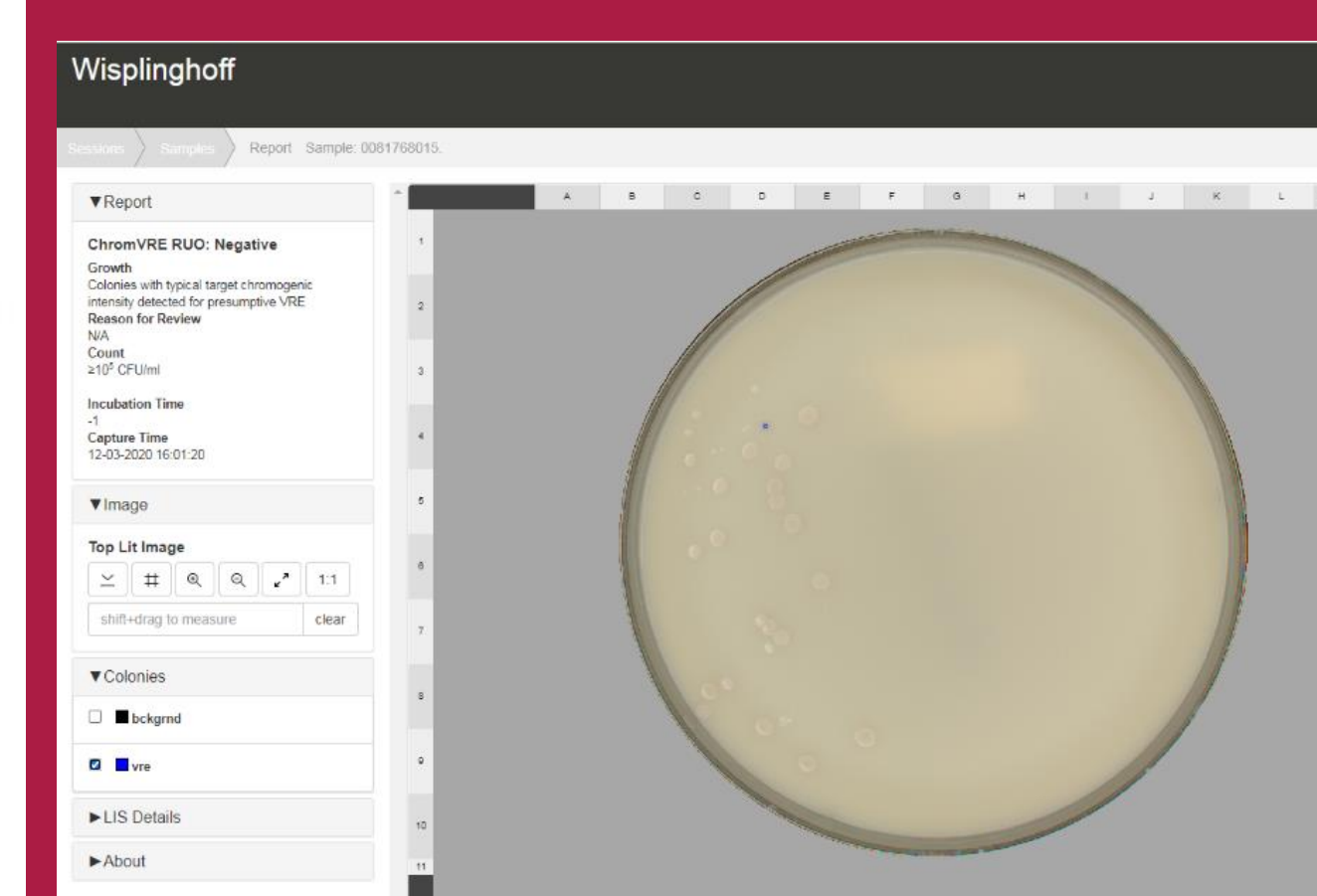


Figure 1: APAS® Independence

Figure 2: APAS software

RESULTS

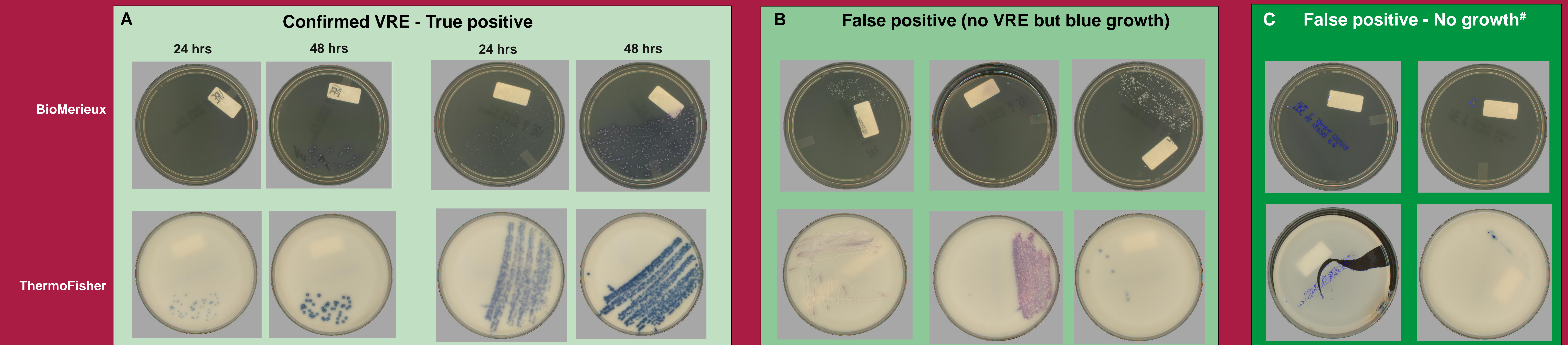
Among 478 samples, a total of 27 (5.6 %) were positive for VRE. BrillianceVRE® (ThermoFisher) and ChromID® VRE (BioMerieux) each missed one VRE.

Table 1: Detection of VRE by APAS vs. conventional plate reading by microbiologist after 24 and 48 hrs of incubation of BioMerieux and ThermoFisher selective VRE agar. Sensitivity did not reach 100% as each selective agar missed one VRE.

	BioMerieux 24h		Thermo 24h		BioMerieux 48h		Thermo 48h	
	APAS	plate reading	APAS	plate reading	APAS	plate reading	APAS	plate reading
Sensitivity	81.48%	74.07%	88.89%	85.19%	96.30%	96.30%	96.30%	96.30%
Specificity	81.60%	98.89%	83.15%	92.02%	84.92%	96.23%	61.20%	82.93%
Positive Predictive Value (*)	20.95%	80%	24.00%	38.98%	27.66%	60.47%	12.94%	25.24%
Negative Predictive Value (*)	98.66%	98.45%	99.21%	99.05%	99.74%	99.7%	99.64%	99.73%
Accuracy (**)	81.59%	97.49%	83.47%	91.63%	85.56%	96.23%	63.18%	83.68%

(*) These values are dependent on disease prevalence (5.65% (3.76% to 8.11%); **Accuracy: overall probability that a plate is correctly classified = Sensitivity × Prevalence + Specificity × (1 – Prevalence)

Figure 4: Examples of agar plates assigned as “presumptive positive” by APAS categorized in true positive (A), false positive but blue growth on agar plate (B) and false positive and no growth (C).
A Confirmed VRE positive samples after 24 and 48 hrs incubation (BioMerieux plates (top) and ThermoFisher plates (below)). B VRE negative samples but growth of blue colonies on the agar plate. C No growth on the agar plate but assigned as “presumptive positive” by APAS due to artefacts (agar split, label, reflection). # bordered in blue what APAS detected as VRE



CONCLUSIONS

While AI-based classification for VRE-detection using the APAS Independence was comparable to conventional plate reading at a 48 hours read, this study showed a higher sensitivity for AI-based classification at 24 hour read.

Low specificity of APAS is expected to increase due to continuous training of APAS AI-technic.

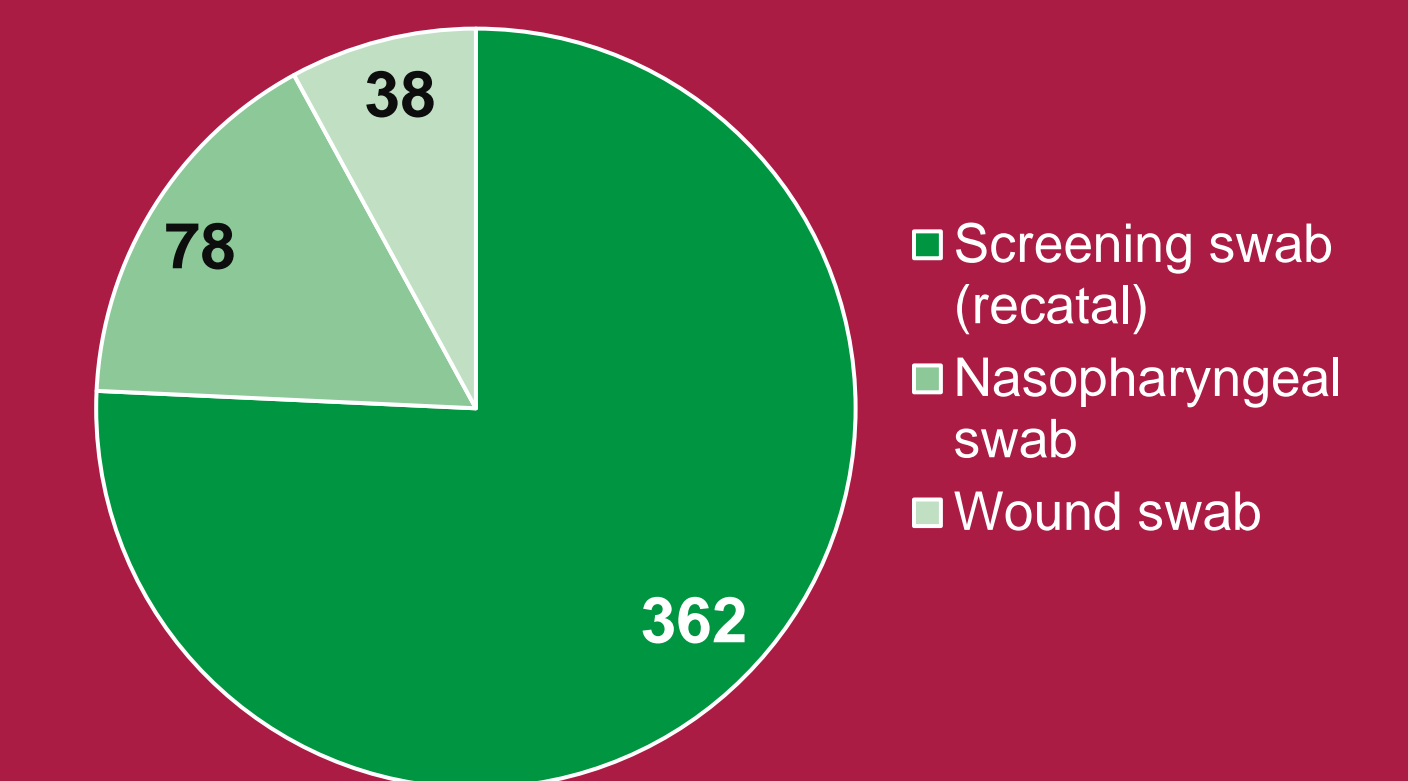


Figure 3: Sample types used (n = 478)

CONTACT INFORMATION

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