P042

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Rapid gram-negatives identification and antimicrobial susceptibility testing directly from positive blood cultures: an experimental evaluation on purified bacterial suspension

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INTRODUCTION

Gram-negative bacteria are diffused sepsis aetiological agents, revealing frequent multi-drug resistance episodes within specific geographical areas. Although fast diagnostic improvements have been added to the laboratory routine, purified bacterial suspensions have not been sufficiently investigated for providing microbiological results. The LFIA O.K.N.V.I. RESIST-5 BC (Coris BioConcept) identifies carbapenemases from positive blood cultures. Herein, we experiment its off-label use on bacterial pellet from these samples. The final purpose was the collection of ID and AST from the pellet, aiming to compare its coherence to the conventionally reported results from grown colonies.

METHODS

We included 55 blood cultures, positive for Gram-negatives. After the culture-based workflow, bacterial suspensions have been obtained from 1 ml (20' minutes process using the Coris BioConcept Resist-BC kit). The pellet underwent the Coris BioConcept LFIA Resist-5 according to the manufacturer's instructions. Furthermore, a 0.5 McFarland endured MALDI TOF-MS identification (ID) through the Biotyper Sirius system (Bruker Daltonics) and antimicrobial susceptibility testing (AST) through the Vitek 2.0 (Biomerieux, Marcy d'Etoile, France), while the Kirby-Bauer (KB) and the Gradient test methods ensured cefiderocol and aztreonam/avibactam susceptibility testing.

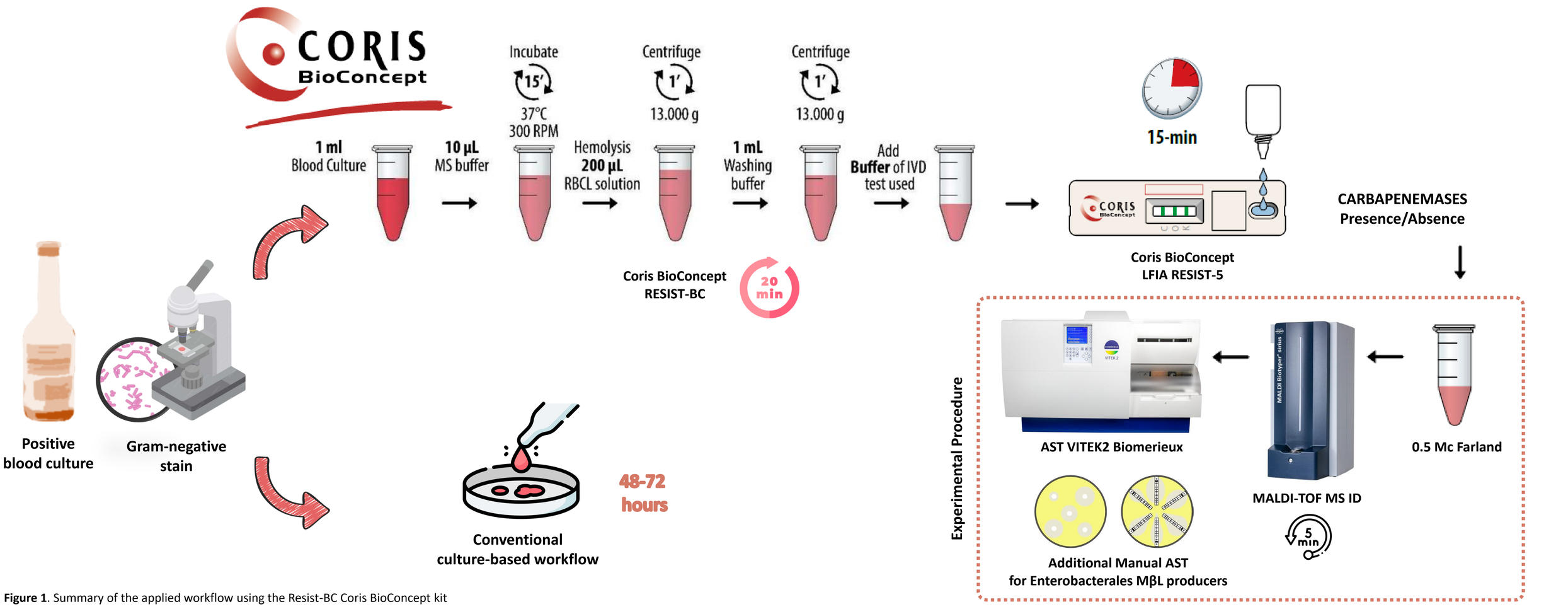

Figure 1. Summary of the applied workflow using the Resist-BC Coris BioConcept kit

RESULTS

The Coris BioConcept Resist-BC kit correctly identified 44 aetiologies (80%). Otherwise, 11 samples (20%) showed complete ID and AST only from the conventional systems (3 *K. pneumoniae*, 2 *E. coli*, 4 *A. baumannii*, 1 *S. maltophilia*, and 1 *A. ursingii*). All the carbapenemases-producing strains confirmed meropenem MIC values higher than the clinical breakpoint, demonstrating a 100% concordance between the phenotypic AST and the LFIA results from the bacterial pellet. The time-to-result (TTR) analysis documented an average time of 10.10 hours for pellet-based procedure, while the conventional protocol confirmed 48-72 hours.

ID Bacterial Pellet - Maldi	Number (%)	Carbapenemase LFIA Coris Resist-5
Acinetobacter baumannii	2 (3.6%)	
Burkholderia cepacia	1 (1.8%)	
Escherichia coli	12 (21.8%)	1 (8.3%) NDM
Enterobacter hormaechei	2 (3.6%)	
Klebsiella pneumoniae	18 (32.8%)	7 (38.8%) KPC; 4 (22.2%) NDM; 4(22.2%) NDM/OXA-48)
Morganella morganii	1 (1.8%)	
Pseudomonas aeruginosa	3 (5.5%)	1 (33.33% VIM)
Providencia stuartii	1 (1.8%)	
Proteus mirabilis	2 (3.6%)	
Serratia marcescens	1 (1.8%)	
Salmonella spp.	1 (1.8%)	
No ID	11 (20%)	

Table 1. Summary of identified species and their eventual resistance mechanisms

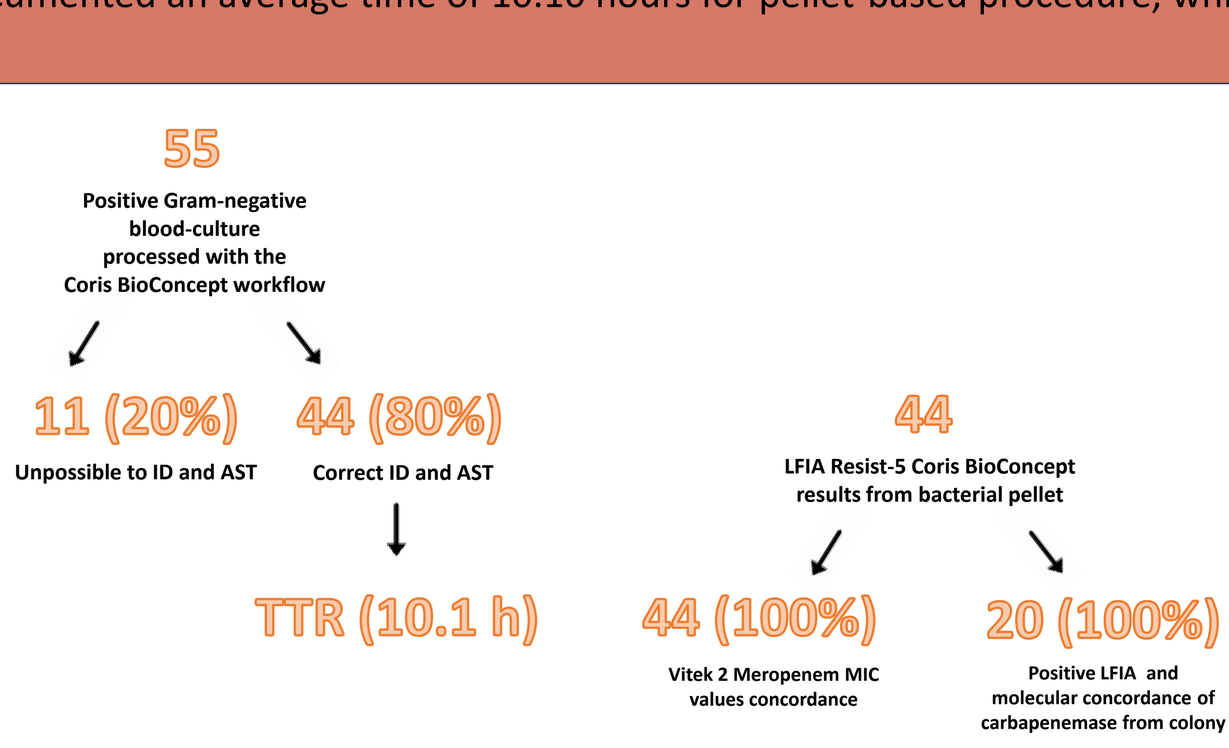

Figure 2. Comparison between Coris and conventional method TTR, along with agreement percentages about identification and resistance markers.

CONCLUSIONS

Microbiological investigations from purified bacterial suspension demonstrated vital microorganisms and possibility to significantly reduce diagnostic delays after the blood culture positivization. The pellet-based protocol achieved species identification and MIC values, preventing the time-spending cultures' comparable results. The concordance also regarded manual testing, allowing to register updated susceptibility data for metallo-β-lactamases producers. Future studies may enrich our preliminary evaluation, including a higher sample size and potential clinical or therapeutical evaluation on the included aetiological agents.