



# Evaluation of a PCR-Based Electrochemical Detection System for the Rapid Detection of Microorganisms and Resistance Genes from Positive Blood Cultures

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## Introduction

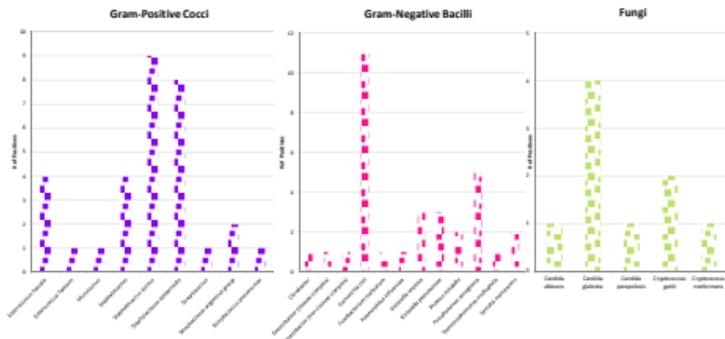
Bloodstream infections continue to be a major cause of morbidity and mortality, with the proportion due to multidrug resistant organisms increasing in recent decades. Methods for rapid identification and resistance marker detection from positive blood cultures are commonly used to inform appropriate patient treatment and management. We evaluated the performance of the PCR-based ePlex Research Use Only Blood Culture Identification (BCID) Gram-positive (GP), Gram-negative (GN), and fungal (FP) panels (GenMark Diagnostics).

## Methods

- Positive blood cultures bottles from clinical samples demonstrating gram-positive cocci, gram-negative bacilli, or yeast on initial Gram stain were tested on the corresponding ePlex BCID-GP, GN, or FP assay.
- Specimens were tested within 7 days if stored at room temperature otherwise kept at -70°C prior to testing.
- Results were compared to MALDI-TOF and phenotypic susceptibility results, as well as to Verigene BC-GN or BC-GP results if available.

## Results

- A total of 78 specimens were tested (32 GP, 37 GN, and 9 FP).
- The ePlex BCID sensitivity for organisms included on the panels was 74/74 (100%), 6 of which were not Verigene BC-GN or GP targets (2 *Serratia* sp., 1 *Haemophilus influenzae*, 1 *Stenotrophomonas maltophilia*, 1 *Fusobacterium nucleatum*, and 1 *Micrococcus* sp.).
- One sample was inhibited and could not be determined by repeat testing.
- The ePlex BCID panels correctly resulted 3 specimens containing only non-panel targets as no target detected, and detected all targets in 3 of 3 polymicrobial specimens (Table 1).
- BCID-GP detection of *mecA*, *vanA*, and *vanB* targets correlated 100% (13/13) with susceptibility and/or Verigene testing for 12 methicillin-resistant *Staphylococcus* spp and 1 vancomycin-resistant *E. faecium*.
- BCID-GN accurately detected *E. coli* and *bla*<sub>CTX-M</sub> in 5/5 cultures with extended-spectrum beta-lactamase producing *E. coli* as confirmed by Verigene BC-GN and susceptibility testing.



| BCID Panel No. | BCID Results  | Blood Culture Organisms Isolated  |
|----------------|---|---|
| 1              | GP<br><i>Enterococcus faecalis</i><br>Pan Gram-Negative                                   | <i>Enterococcus faecalis</i><br><i>Klebsiella oxytoca</i>   |
|                | GN<br><i>Klebsiella oxytoca</i><br>Pan Gram-Positive                                      |   |
| 2              | GP<br><i>Enterococcus faecalis</i><br><i>Streptococcus anginosus</i><br>Pan Gram-Negative | <i>Enterococcus faecalis</i><br><i>Streptococcus anginosus</i><br><i>Escherichia coli</i><br><i>Morganella morganii</i> |
|                | GN<br><i>Citrobacter</i><br>Pan Candida   |   |
| 3              | GN<br><i>Citrobacter</i><br>Pan Candida   | <i>Citrobacter koseri</i>   |
|                | FP<br><i>Candida glabrata</i>   |   |

Table 1. The ePlex results of polymicrobial blood cultures. All 3 polymicrobial specimens were correctly called by the ePlex panel "Pan-" detection feature.

## Results

- Two specimens had a false positive result (*P. mirabilis*, Pan Gram-negative). PCR analysis confirmed presence of *P. mirabilis* DNA in the first specimen but the Pan-Gram-negative results could not be further tested.

## Conclusion

- The ePlex BCID assay is a rapid and accurate alternative to conventional methods for the identification of microorganisms and resistance markers, including polymicrobial blood cultures.
- The broad panel targets allow identification of clinically important pathogens that are not currently on other FDA-cleared panels.

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