

Misinterpretation of Results from Rapid Blood Culture Identification Panel

The microbiology laboratory recently implemented a PCR-based blood culture identification (BCID) system that identifies 90% of the most common agents of bloodstream infection in approximately one hour once a blood culture is positive. This test will identify 19 pathogens to the species-level (5 gram-positive bacteria, 9 gram-negative bacteria and 5 yeast) and 3 markers of antimicrobial resistance (*mecA*, *vanA/B* and *kpc*). Additionally, this test will identify pathogens to the genus (*Staphylococcus*, *Streptococcus*, *Enterococcus*) and family-level (*Enterobacteriaceae*). Some confusion has been reported particularly with interpretation of genus-level analytes and markers of antimicrobial resistance. A genus includes numerous bacterial species. For example the *Staphylococcus* genus PCR detects 13 species of staphylococci including *S. aureus*, *S. epidermidis*, *S. hominis* and others. When *S. aureus* is present, the *Staphylococcus* genus and *S. aureus* analytes will both be detected, but when a coagulase-negative staphylococcus such as *S. epidermidis* is present, only the *Staphylococcus* genus analyte will be detected. The presence of *mecA* determines if staphylococci are resistant to oxacillin and therapy should be adjusted to account for these results.

Another area of confusion is with the *Enterobacteriaceae* family. This family encompasses a large number of gram-negative organisms including *E. coli*, *Klebsiella* species, *Enterobacter* species, *Proteus* species and *Citrobacter* species, among others. Thus when *E. coli* is present in the blood culture, both the *Enterobacteriaceae* and *E. coli* analytes will be positive. If an *Enterobacteriaceae* family member that does not have a species specific PCR target is present (e.g. *Citrobacter*), only the *Enterobacteriaceae* analyte will be positive. It should be noted that unusual results can occur with polymicrobial cultures. Please refer to **Table 1** below for specific interpretation of these tests. More detailed guidelines for BCID result interpretation and antimicrobial therapy recommendations are available on the antimicrobial stewardship website (http://www.nebraskamed.com/App_Files/pdf/careers/education-programs/asp/Biofire-Recs.pdf).

Please contact Drs. Paul Fey (clinical microbiology) at 559-2122 or Trevor Van Schooneveld (antimicrobial stewardship) at 559-8376 if you have any questions of concerns regarding the BCID system.

Table 1: Interpretation of *Staphylococcus* and *Enterobacteriaceae* BCID Results

PCR Target	Result	Interpretation	Interpretation
<i>Staphylococcus</i> <i>S. aureus</i> <i>mecA</i>	Detected Not detected Detected	Methicillin-resistant Coagulase- negative <i>Staphylococcus</i>	Consider withholding treatment unless severely ill or more than one blood culture positive
<i>Staphylococcus</i> <i>S. aureus</i> <i>mecA</i>	Detected Detected Detected	Methicillin-resistant <i>S. aureus</i> (MRSA)	Treat with vancomycin
<i>Staphylococcus</i> <i>S. aureus</i> <i>mecA</i>	Detected Not detected Not detected	Methicillin-susceptible Coagulase-negative <i>Staphylococcus</i>	Consider withholding treatment unless severely ill or more than one blood culture positive
<i>Staphylococcus</i> <i>S. aureus</i> <i>mecA</i>	Detected Detected Not Detected	Methicillin-susceptible <i>S. aureus</i> (MSSA)	Treat with oxacillin or cefazolin
<i>Enterobacteriaceae</i> <i>E. coli</i>	Detected Detected	<i>E. coli</i> *	Treat with ceftriaxone or ertapenem
<i>Enterobacteriaceae</i> <i>Klebsiella</i> <i>pneumoniae</i>	Detected Detected	<i>Klebsiella pneumoniae</i> *	Treat with ceftriaxone
<i>Enterobacteriaceae</i> <i>Enterobacter</i> <i>cloacae</i>	Detected Detected	<i>Enterobacter cloacae</i> *	Treat with cefepime of ertapenem
<i>Enterobacteriaceae</i> No other species detected	Detected	<i>Enterobacteriaceae</i> species not included in the BCID panel	Treat with zosyn of cefepime and await further culture data

* There is small chance that both the specific pathogen and another *Enterobacteriaceae* which cannot be not detected specifically by the BCID is present, but the therapies recommended should generally cover these pathogens as well