

Biofire® FilmArray® Blood Culture Identification Panel Clinician Guidance for Empiric Therapy

Northwestern Medicine Antimicrobial and Diagnostic Stewardship

The BioFire® FilmArray® Blood Culture Identification 2 (BCID2) Panel is an FDA-approved multiplex PCR assay that rapidly detects a limited number of commonly-identified bloodstream pathogens. While detection of organisms and resistance markers can serve as a guide for empiric antimicrobial selection, culture-based identification and susceptibility testing is required for directed antimicrobial therapy.

Note: All management decisions should be made with consideration of the patient's clinical status, medication allergies, and prior recent culture/susceptibility results.

- If patient is critically ill and/or has a recent history of multi-drug resistant organisms, empiric antibiotic choice may need to be modified regardless of BCID2 result
- Consider potential sources of infection and determine if broader coverage is needed in addition to the coverage prompted by the BCID2 and/or blood culture result (e.g., a patient with an intra-abdominal abscess and a positive blood culture for *Enterococcus* spp. may warrant continuation of broad Gram-negative and anaerobic coverage as well as appropriate enterococcal coverage)
- If the BCID2 and Gram stain results are discrepant (e.g., BCID2 detects *P. aeruginosa* and the Gram stain shows Gram-positive cocci) consider continuing broad empiric therapy until final culture and susceptibility results are available and/or consulting an ID pharmacist or physician to help guide management
- If a bloodstream infection is suspected but the BCID2 is negative, consider continuing empiric therapy based on clinical presentation and epidemiologic risk until blood cultures are finalized
- For further questions on interpretation and management, page the ASP/ID pharmacist or consult ID

Table 1. Gram-positive Bacteria

Organism	Resistance Gene	Antibiotic Recommendation	Comments
<i>Enterococcus faecalis</i>	---	Ampicillin	<u>Severe PCN allergy:</u> Vancomycin
<i>Enterococcus faecium</i>	---	Vancomycin	
	<i>vanA/B</i>	Linezolid or Daptomycin	Daptomycin 10-12mg/kg IV q24h
<i>Listeria monocytogenes</i>	---	Ampicillin	<u>Severe PCN allergy:</u> TMP/SMX. If dual allergy of PCN and TMP/SMX, consult ID or ASP/ID pharmacist.
<i>Staphylococcus aureus</i>	---	Cefazolin	<i>ID consult recommended</i>
	<i>mecA/C</i> and MREJ or <i>mecA/C</i>	Vancomycin	
<i>Staphylococcus epidermidis</i>	---	Vancomycin*	*Consider discontinuing antibiotics if only 1 out of 2 cultures are positive and patient lacks systemic signs/symptoms of infection (fever, hypotension, leukocytosis) due to likely contaminant
<i>Staphylococcus lugdunensis</i>	---	Cefazolin	
	<i>mecA/C</i>	Vancomycin	
<i>Staphylococcus species</i>	---	Vancomycin	
<i>Streptococcus agalactiae</i>	---	Ceftriaxone	
<i>Streptococcus pneumoniae</i>	---	Ceftriaxone	Consider addition of Azithromycin or Levofloxacin <u>CNS infection:</u> add Vancomycin and increase Ceftriaxone dosing to 2g IV q12h
<i>Streptococcus pyogenes</i>	---	Ceftriaxone	<u>Toxic shock syndrome:</u> add Clindamycin 900mg IV q8h or Linezolid for anti-toxin effects
<i>Streptococcus species</i>	---	Ceftriaxone	

Table 2. Gram-negative Bacteria

Organism	Resistance Gene	Antibiotic Recommendation	Comments
<i>Acinetobacter calcoaceticus-baumannii</i> complex	---	Ampicillin/sulbactam + Minocycline	Ampicillin/sulbactam 9g IV q8h Minocycline 200mg IV BID <u>Severe PCN allergy:</u> Meropenem 2g IV q8h + Minocycline 200mg IV BID <u>If critically ill: <i>ID or ASP/ID pharmacist consultation is strongly recommended at time of BCID2 result.</i></u> Consider adding Meropenem and Cefiderocol or Polymyxin B
<i>Bacteroides fragilis</i>	---	Piperacillin/tazobactam	<u>Alternative for low-risk, hemodynamically-stable patients:</u> Ceftriaxone + Metronidazole
Enterobacterales species	---*	Cefepime (Please read comments)	This is a broad target for all bacteria within the Enterobacterales (formerly Enterobacteriaceae) group. If another target within the group is also positive (<i>E. cloacae</i>, <i>E. coli</i>, <i>Klebsiella</i> spp., <i>Proteus</i> spp., or <i>Salmonella</i>), follow the antibiotic recommendation for that specific organism instead as this likely represents a monomicrobial bacteremia. If only Enterobacterales is positive, this may indicate a less common Gram-negative pathogen and cefepime is recommended empirically pending final culture results. *See below if resistance genes detected
<i>Enterobacter cloacae</i> complex	---*	Cefepime	*See below if resistance genes detected

<i>Escherichia coli</i>	---*	Piperacillin/tazobactam	*See below if resistance genes detected
<i>Haemophilus influenzae</i>	---	Ceftriaxone	<u>CNS infection</u> : dose Ceftriaxone 2g IV q12h
<i>Klebsiella aerogenes</i>	---*	Cefepime	*See below if resistance genes detected
<i>Klebsiella oxytoca</i>	---*	Ceftriaxone	*See below if resistance genes detected
<i>Klebsiella pneumoniae</i> group	---*	Ceftriaxone	*See below if resistance genes detected
<i>Neisseria meningitidis</i>	---	Ceftriaxone	<u>CNS infection</u> : dose Ceftriaxone 2g IV q12h
<i>Proteus</i>	---*	Piperacillin/tazobactam	*See below if resistance genes detected
<i>Pseudomonas aeruginosa</i>	---*	Cefepime	<u>Alternatives</u> : Piperacillin/tazobactam, Ceftazidime, Meropenem If concern for MDR <i>P. aeruginosa</i> based on culture history, consider Ceftolozane/tazobactam with ID consultation <u>Septic shock</u> : Add Amikacin 15-20mg/kg x 1 *See below if resistance genes detected
<i>Salmonella</i>	---*	Ceftriaxone	*See below if resistance genes detected
<i>Serratia marcescens</i>	---*	Cefepime	*See below if resistance genes detected
<i>Stenotrophomonas maltophilia</i>	---	TMP/SMX	TMP/SMX 10-15mg/kg/day <u>Allergy</u> : Levofloxacin
*Resistance Genes			
Any	CTX-M	Meropenem	
Any	IMP	Ceftazidime/avibactam + Aztreonam	<i>ID consult required</i>
Any	KPC	Ceftazidime/avibactam	
Any	OXA-48-like	Ceftazidime/avibactam	
Any	NDM	Ceftazidime/avibactam + Aztreonam	
Any	VIM	Ceftazidime/avibactam + Aztreonam	
Any	<i>mcr-1</i>	<u>Avoid</u> Colistin/Polymyxin B	Marker for Colistin resistance

Table 3. Yeast

Organism	Resistance Gene	Antifungal Recommendation	Comments
<i>Candida albicans</i>	---	Fluconazole	<i>ID consult recommended</i> Consider Micafungin if previous azole exposure or critically ill
<i>Candida auris</i>	---	Micafungin	<i>ID consult recommended</i> Micafungin 200mg IV daily
<i>Candida glabrata</i>	---	Micafungin	<i>ID consult recommended</i>
<i>Candida krusei</i>	---	Micafungin	<i>ID consult recommended</i>
<i>Candida parapsilosis</i>	---	Fluconazole	<i>ID consult recommended</i> Consider Micafungin if previous azole exposure or critically ill
<i>Candida tropicalis</i>	---	Fluconazole	<i>ID consult recommended</i> Consider Micafungin if previous azole exposure or critically ill
<i>Cryptococcus neoformans/gattii</i>	---	Liposomal Amphotericin B + Flucytosine	<i>ID consult recommended</i> Liposomal Amphotericin B IV 3-4mg/kg/day Flucytosine 25mg/kg PO q6h

Antimicrobial recommendations are based on the local 2021 NMH antibiogram data