



BD Phoenix™ M50 automated identification and susceptibility testing

The most reliable system for antimicrobial resistance detection



Some things are meant to go together. Like smarter software, smoother workflow, higher reliability, increased productivity and better healthcare delivery.

Effective infection control efforts depend on the performance of the laboratory to **accurately detect antimicrobial resistance (AMR)** and on the ability to provide clinicians with reliable, actionable, more comprehensive information sooner, resulting in improved patient outcomes.

And this is what you get with the BD Phoenix M50 automated identification and susceptibility testing.

BD Phoenix M50 gives the microbiology laboratory the capacity to simultaneously perform identification (ID) and antibiotic susceptibility testing (AST) determinations and much more:

- the broadest ID taxa database
- the best ID performance for clinically relevant bacteria
- the most accurate system for detecting AMR
- the best-in-class expert system
- the most efficient communication to clinicians
- the broadest flexibility to integrate newer technologies
- the most efficient workflow
- the most robust system

Let BD Phoenix help you concentrate on what is important—helping your institution deliver significantly better healthcare.

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Performance

Identification

One of the basic requirements for optimized patient treatment and control of infections and emerging resistance is a highly accurate microbial identification (ID) in the fastest possible time.

- ID is based on 45 chromogenic and fluorogenic substrates
- No reagent additions or off-line tests, saving time and money
- Five-time dependent databases provide highly accurate identification
- Broadest ID database for clinical significant organisms



“Of the 142 clinical isolates that were identified at the species level, Vitek 2, MicroScan, and Phoenix correctly identified 93.7%, 82.4%, and 93.0%, and incorrectly identified 2.1%, 7.0%, and 0%, respectively. In the reference strain tests, VITEK 2, MicroScan, and Phoenix correctly identified 55.3%, 54.4%, and 78.0%, respectively.”

Won-Young Jin, et al.
Diagnostic Micro and Inf Dis
70 (2011) 442–447

“Phoenix Yeast ID panel results are available in 4-12 hours and Vitek 2 Yeast ID Card results are available in 18 hours.”

—
“The Phoenix Yeast ID panel identified 97.0% of the clinical strains with >90% probability. The Vitek 2 ID card identified 82.3% of the clinical strains with >90% probability and an additional 16.6% with low discrimination results requiring the user to perform further testing or decision making.”

M. Morgan, et al.
Presented at the 112th ASM, 2012

“Three automated identification and AST systems were compared using organisms from clinical patient samples along with a subset of challenge organisms. Phoenix had the highest number of correct identifications.”

P. Sellenriek, et al.
Presented at
the 105th ASM, 2005

	ID database	Average TTR*	Time dependent database
Gram negative	> 160 taxa	3 h	Yes
Gram positive	> 140 taxa	3 h	Yes
Yeast	64	4 h (60%) 8 h (80%)	Yes

*TTR: time to result



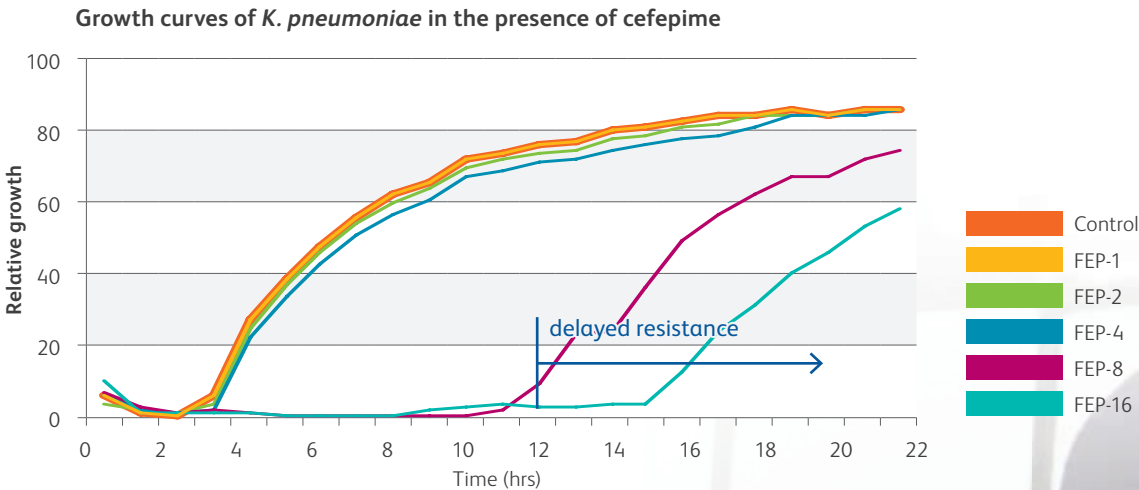
BD Phoenix, with its unique technology for ID determination, is the only system to provide such a broad database combined with the shortest time to result and most accurate ID.

Performance

Resistance detection

One of the major goals of the microbiologist is to obtain a highly accurate AST result and to provide the best possible results to the clinician.

- 84 wells dedicated to AST (19 to 23 drugs) in each combo ID / AST panel
- Dual technology: every 20 minutes, wells are monitored for redox and turbidity
- True minimum inhibitory concentration (MIC) testing: serial double dilutions for each antimicrobial
- All reported antimicrobial concentrations are included in the panel, without skipping any dilution
- Results are enhanced by specific delayed resistance algorithms
- EMERGE panel: 132 wells dedicated to AST (30 drugs)



Foundation for detection of emerging resistance is not available in other automated systems: Panel design and dual technology ensure broadest antimicrobial testing, with a minimum of 3 doubling dilutions enabling detection of delayed resistance.

Performance

BDXpert system for interpreting AST results

BDXpert offers expert advice on specific test results, MICs, overall phenotypes or a combination of these. The rule base comprises data from current scientific literature, standard guidelines (CLSI, EUCAST and SFM) as well as rules to enhance the detection of resistance mechanisms and unusual phenotypes.

- Updated annually according to the standard guidelines (CLSI, EUCAST).
- Rules can be easily disabled or enabled by the user to act manually or automatically according to every hospital's policies.
- Provides expert advice based on the full doubling-dilution MIC (never alters the MIC results).
- Is an excellent educational tool for learning and understanding the use of hierarchical rules applied to microorganisms and antibiotics.
- To complement the BDXpert system, the optional BD EpiCenter Clinical Application Rule Editor BD EpiCARE™ allows users to define specific rules and actions to ensure policy compliance for the reporting of microbiology data.


The BDXpert system is a "best-practice" rule set that expertizes the full doubling-dilution MIC results produced by the Phoenix AST system.

BDXpert may alter certain interpretations according to the selected standard, but MIC results are never altered.

Courvalin, et al.
Clinical Microbiology Reviews,
Vol 24(3) 2011, p. 515–556

The Phoenix system showed accuracy assessment in accordance with the ISO standards when using EUCAST breakpoints. Inclusion of EUCAST criteria in automatic antimicrobial susceptibility testing systems will facilitate the implementation of EUCAST breakpoints in clinical microbiology laboratories.

T. Giani, et al.
Clin Microbiol Infect Vol 18(9) 2012: 1469 0691.2012.03980



The BDXpert system allows continuous quality assurance, ensures consistency, improves interpretation of results, improves antibiotic use and stabilizes the emergence of antibiotic-resistant pathogens.

Performance

Emerging resistance

Several emerging resistance markers are linked to hospital-acquired infections. Therefore the performance of the laboratory's ID and AST system to detect these two mechanisms is critical. Upon detection of resistance mechanisms, the clinician needs to be informed as quickly as possible so that patient treatment can be modified accordingly.

- **BD Phoenix is the only automated system that provides ESBL (extended spectrum b-lactamase) confirmation in all GN panels**
- **Five wells dedicated to ESBL detection**
- **Differential responses of third-generation cephalosporins in the presence and absence of the b-lactamase inhibitor clavulanic acid**
- **Detection for *E. coli*, *K. pneumoniae* and *K. oxytoca***
- **ESBL result determined within 4 to 8 hours**

The system with the highest sensitivity for the detection of ESBLs was the Phoenix (99%), followed by the VITEK 2 (86%) and the MicroScan (84%). Integration of an ESBL confirmation test into the routine test panels of the semiautomated systems would considerably reduce the time to accurate ESBL detection in the laboratory and might contribute to earlier institution of optimal antibiotic therapy and adequate infection control procedures.

Irith Wiegand, et al.

JCM Vol. 45, No. 4, 2007, p. 1167–1174

- **BD Phoenix was the first automated system to include MRSA detection for both cefoxitin and oxacillin**
- **BD Phoenix has excellent performance for detecting KPC (*Klebsiella pneumoniae carbapenemase*) producers in Enterobacteriaceae**

The excellent sensitivity shown by cefoxitin tests suggests, according to the Authors, the replacement of oxacillin methods, eliminating the risk of finding non-mecA-mediated resistance. In that case, non-mecA-mediated resistance to penicillinase-stable penicillins would not be detected, hence additional testing should be required in case patient is not responding to beta-lactam therapy.

Jana M Swenson, et al.

Diagnostic Microbiology and Infectious Disease 58 (2007) 33–39

The systems differed, however, in their abilities to infer carbapenemase production accurately and in the degrees to which they even attempted to do so. By this criterion, the rank order was Phoenix > MicroScan NM36 > MicroScan NBC39 > Vitek 2.

Neil Woodford, et al.

Journal of Clinical Microbiology Vol 48(8) 2010: 2999–3002



Performance

- BD Phoenix shows the best performance for detecting iMLSb (inducible macrolide–lincosamide–streptogramin B) in *Streptococci* and *Staphylococci*
- The 3 groups of drugs are included in all Gram positive panels

Two automated systems, BD Phoenix and bioMérieux Vitek 2, were compared to a double-disk diffusion method for the detection of inducible resistance to clindamycin in *Staphylococcus* spp. Analysis of 524 clinical isolates revealed sensitivity and specificity of 100% and 99.6%, respectively, for Phoenix and 91.1% and 99.8%, respectively, for Vitek 2.

Blake W. Buchana, et al.
Diagnostic Microbiology and Infectious Disease 72
(2012) 291–294

Phoenix was able to detect clindamycin resistance for a large number of the clindamycin inducible *S. agalactiae* isolates. This would greatly reduce the amount of D Zone testing required to correctly interpret and report clindamycin results. Both Vitek and MicroScan would require D Zone testing for all clindamycin inducible isolates.

C. M. Gosnell, et al.
Poster presented at ASM 2005

Other resistance markers detected by BD Phoenix:

- Dual b-lactamase test (nitrocefin-based and penicillinase production) for *Staphylococcus* spp.
- VRSA: vancomycin-resistant *Staphylococcus aureus*
- VISA: vancomycin-intermediate *Staphylococcus aureus*
- TISA: teicoplanin-intermediate *Staphylococcus aureus*
- TRSA: teicoplanin-resistant *Staphylococcus aureus*
- VRE: vancomycin-resistant *Enterococcus* spp
- HLAR: high-level aminoglycoside resistance (gentamicin HLGR or streptomycin HLSR)
- TRE: teicoplanin-resistant *Enterococcus* spp
- High-level mupirocin resistance in *S. aureus*
- Carbapenemase

All resistance markers can be associated with customizable alarms, allowing that critical results are communicated immediately.



All resistance markers are tested on every panel of the appropriate type so there is no need for additional tests or added incubation.

This results in faster reporting and less additional or repeat testing.

Flexibility

Direct identification from positive BD BACTEC blood culture bottles

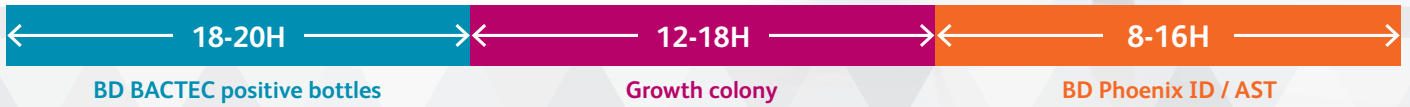
By only a small change in daily laboratory routine, ID and AST results of positive blood culture isolates can be obtained up to one day earlier than with the classical method, thereby leading to earlier targeting of antibiotic therapy in patients with bloodstream infections.



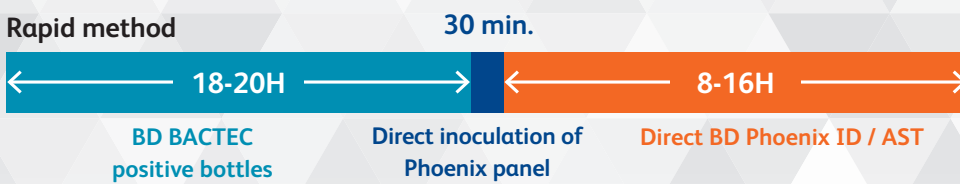
...we conclude that AST by inoculating Phoenix panels with bacteria harvested directly from positive blood culture bottles is as reliable as using bacteria from a subculture on agar...

Beuving, et al.
BMC Microbiology 2011, 11:156.

Classical method



Rapid method



Integration of identification results from Bruker MALDI Biotyper System

BD EpiCenter integrates organism ID from Bruker MALDI Biotyper with Phoenix antimicrobial susceptibility results and enhances result review and reporting.



Workflow

Ease of use

BD Phoenix workflow is based on advanced panel and instrument designs that ensure:

- All panels and broths are stored at room temperature
- Flexible inoculum density (0.25 or 0.5 McFarland) that reduces subculture incubation time
- No reagent addition to panel, allowing an effortless workflow and simplified logistics
- No off-line tests, ensuring optimized workflow
- Panels are sealed after inoculation, ensuring safe handling
- ID-only, combo or AST-only panels available to suit your laboratory needs



Robustness

The BD Phoenix M50 has been designed with a new touch screen interface available in several languages and embedded with the BDxpert system. Up to two units can be stacked to best fit different testing needs while minimal maintenance is required (no reagents, pumps or waste to maintain).

Modularity



*up to 50 ID / AST
per day*

*up to 100 ID / AST
per day*

Maintenance

Daily	Temperature check
Weekly	LED check
Every 6 months	Air filters check / clean

Technical specifications

	Single BD Phoenix M50 including PC	Two-stacked BD Phoenix M50 including PC
Height	53.5 cm	107 cm
Width	136 cm	136 cm
Depth	76.5 cm	76.5 cm
Clearance (left)	7.62 cm	7.62 cm
Clearance (front)	45.72 cm	45.72 cm
Weight	54.5 kgs	109 kgs
Power requirements	90-264VAC; 47-63Hz 15 amp circuit	90-264VAC; 47-63Hz 15 amp circuit



BD EpiCenter

Using BD EpiCenter Multi-User™ software opens up avenues for improved laboratory productivity and communication between the laboratory and other departments. The laboratory can add workstations to improve workflow between different areas within the lab. BD EpiCenter can be directly interfaced to the Laboratory Information System (LIS), allowing real time communication and customized uploads and downloads of data fitting to your own laboratory configuration and needs.

In addition, physicians, infection control professionals and pharmacists can gain real-time access to information and BD EpiCenter data analysis tools from the convenience of their own computers.

Performing time-sensitive epidemiology studies as well as quality and workload management analysis is simplified and intuitive using the software's powerful data mining tools, graphical interface and Microsoft XP™ and SQL Server™ architecture.

Compiling, analyzing and communicating information has never been easier because the software is easily networked so that everyone can have secure access to this time-sensitive patient data.



Whether it is monitoring organism phenotypic trends to resistance marker alerts and organism surveillance, BD EpiCenter provides real-time information to those clinicians that can affect patient care.

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