

Side by Side by Side Evaluation of Dade Microscan Walkaway 96, BD Phoenix and BioMérieux Vitek2 for Identification Testing of a Challenge and Routine Set of Nonfermentative and Miscellaneous Gram Negative Clinical Isolates

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ABSTRACT (REVISED)

■ **OBJECTIVES:** To simultaneously evaluate three automated identification (ID) instruments: Dade Microscan Walkaway 96, BD Phoenix and BioMérieux Vitek2 against a challenge and routine set of nonfermentative and miscellaneous gram-negative bacilli strains collected from routine, referred and stock reference cultures.

METHODS: Simultaneous testing of 187 strains was performed on 3 automated identification instruments using colonies from a single inoculum plate and each manufacturer's directions for inoculation and reading. A scoring system for identification was used. Organisms not included in each manufacturer's databases were not scored.

RESULTS: Each instrument produced the correct result at the species level for 48 - 70% of strains scored. Microscan produced the correct result at the species level for 57% of challenge isolates and 75% of routine isolates. Phoenix produced the correct result at the species level for 67% of challenge isolates and 75% of routine isolates. Vitek2 produced the correct result at the species level for 42% of challenge isolates and 61% of routine isolates. Thirteen percent of challenge isolates tested on the Vitek2 were not included in their database and were not scored. Vitek2 grouped 20% of isolates tested as Various Nonfermenting Gram-Negative Bacilli (VNFGN).

CONCLUSIONS: The BD Phoenix instrument had the largest number of correct identifications to the species level for the nonfermentative and miscellaneous gram-negative bacilli tested. The Phoenix and Microscan databases were the most extensive and contained all but one of the genus and species tested. The Microscan performed equally as well as the Phoenix for routine isolates, however additional testing would be necessary for more challenging isolates. The Vitek2 groups many of the nonfermentative gram-negative bacilli into Various Nonfermentative Gram-Negative (VNFGN) and their database is limited for more challenging isolates. Each laboratory must evaluate the disadvantages and advantages of each of these three systems according to their specific lab requirements.

INTRODUCTION

Infections caused by nonfermentative gram-negative organisms cause considerable morbidity and mortality in compromised hosts such as burn and cystic fibrosis patients. Over the last few decades, automated identification and susceptibility testing methods have become the mainstay of clinical microbiological laboratories. These automated identification systems have not produced reliable identification results for these organisms and has necessitated the need for alternative identification methods for these strains. Newly developed ID and AST systems may permit these species to be more accurately identified. We compared three systems' ability to identify nonfermenting and miscellaneous gram-negative bacilli in a side by side by side evaluation.

OBJECTIVE

The objective of this study was to assess the reliability of nonfermentative and miscellaneous gram-negative bacilli identification results of the Dade Microscan Walkaway 96, the BD Phoenix and the BioMérieux Vitek2 by performing a side by side by side evaluation. One hundred and eighty seven clinical isolates were tested using the same inoculum and tested simultaneously on each instrument.

MATERIALS & METHODS

Strains, culture conditions and inoculum preparation: One hundred and eighty seven routine strains from a clinical laboratory were tested: 65 routine and 122 challenge nonfermentative and miscellaneous gram-negative bacilli. Each isolate was subcultured onto Trypticase Soy Agar with 5% defibrinated sheep blood and incubated at 35°C for 18-20 h in ambient air. Isolates were set up to the Rapid ID Neg Panel Type 3 for the Microscan, NMIC/ID-5 or NID for the Phoenix and ID-GNB for the Vitek2. All panels and cards were set up and processed according to the manufacturers' recommendations.

Any gram-negative ID discrepancies on the Microscan were repeated from an isolate subbed onto Maconkey agar (recommended media for the rapid ID Neg panel).

Quality Control: 30 day QC and then weekly QC was performed according to each manufacturer's recommendations.

Reporting Identification: A score was given to each identification result based on genus and species. There were 6 categories of results: (i) correct genus and species was given a score of 4, (ii) correct genus and species after additional rapid tests was given a score of 3, (iii) correct genus and incorrect species was given a score of 2, (iv) a result of 'low probability', 'low discrimination' (with the correct identification being the first choice given) or a correct result with extra overnight tests was given a score of 2, (v) incorrect genus i.e. an incorrectly identified strain was given a score of 0 (vi) No ID (no identification was given) was given a score of 0. Only organisms included in each manufacturer's database were scored.

Any discrepancies in identification results were resolved by performing reference fermentative identification tests and other reference tests.

RESULTS

Table 1
Identification Results of 65 Nonfermentative and Miscellaneous Gram-Neg Bacilli Routine Isolates tested on the Microscan Walkaway, Phoenix (BD) and Vitek2 (BioMérieux)

RESULT	MICROSCAN		PHOENIX		VITEK2	
Correct ID	48	75%	48	75%	39	61%
Incorrect species	11	17%	9	14%	1	2%
Incorrect Genus	5	8%	4	6%	1	2%
No ID	0	0%	0	0%	2	3%
Not in database	0	0%	2	3%	2	3%
Grouped	0	0%	0	0%	10	16%
No growth/Aborted	0	0%	2	3%	0	0%
Low probability or discrimination	1	2%	0	0%	10	16%

Table 2
Identification Results of 122 Nonfermentative and Miscellaneous Gram-Neg Bacilli Challenge Isolates tested on the Microscan Walkaway, Phoenix (BD) and Vitek2 (BioMérieux)

RESULT	MICROSCAN		PHOENIX		VITEK2	
Correct ID	70	57%	82	67%	51	42%
Incorrect species	8	7%	11	9%	13	11%
Incorrect Genus	29	24%	25	20%	6	5%
No ID	1	0.1%	4	3%	5	4%
Not in database	7	6%	0	0%	16	13%
Grouped	0	0%	0	0%	24	20%
Low probability or discrimination	7	6%	0	0%	7	6%

MISIDENTIFIED STRAINS

***Acinetobacter baumannii*:** BD misidentified 5 isolates as *Acinetobacter* sp (3), CDC Group EF-4a (1) and *Moraxella* sp (1)

***Acinetobacter lwoffii*:** Microscan misidentified 7 isolates as *Moraxella* sp (2), Alsp/xyl/CDC IV (1), *Oligella urethralis* (3) and *A. lwoffii*, low probability (1)

***Alcaligenes xylosoxidans/faecalis*:**

- Microscan misidentified 3 isolates as *A. lwoffii* (1), *Alcaligenes* sp (1) and *Acinetobacter baumannii* (1)
- BD misidentified 5 isolates as *Achromobacter* sp (1), *Moraxella* sp (1), *Bordetella* sp (1), *Pantoea* sp (1) and *Pasteurella* sp (1)

***B. cepacia*:**

- Microscan misidentified 10 isolates as *C.violaceum* (8) and Alsp/xyl/CDC IV (2)
- Phoenix misidentified 8 isolates as CDC IV (3), *Achromobacter* sp (2), *B. gladioli* (1), *A. faecalis* (2) and no ID (1)

- Vitek2 misidentified 5 isolates as *B. cepacia* (low discrim) (3), *B. pseudomallei* (low discrim) (1) and *R. picketti* (1)

***Eikenella corrodens*:**

- Microscan misidentified 9 isolates as M6/EF-4B/Nweav (4), *E. corrodens* with extra tests (3) and Alsp/xyl/CDC IV (2)
- Phoenix misidentified 2 isolates as *Pasteurella aerogenes* (1) and *Vibrio* sp (1)

***Pasteurella multocida*:**

- Microscan misidentified 3 isolates as *Pasteurella hae/pne/ur* (low probability) (2) and CDC EO-2 (1)
- Phoenix misidentified 1 isolate as *Moerellella wisconsin* (1)
- Vitek2 misidentified 5 isolates as *P. multocida* (low discrim) (4) and *P. pneumotropica* (1)

Table 3
Correct Identification Results of 187 Non-Fermentative and Miscellaneous Gram Negative Bacilli Challenge and Routine Strains tested on the Microscan Walkaway 96 (Dade), Phoenix (BD) and Vitek2 (BioMérieux)

ORGANISM	NO. TESTED	MICROSCAN	PHOENIX	VITEK2
<i>Acinetobacter baumannii</i>	10	9	5	9
<i>Acinetobacter Iwoffii</i>	9	2	6	Not in Database(NID)
<i>Acinetobacter</i> species	7	4	5	1 + 6 Grouped as VNFGN
<i>Alcaligenes xylosoxidans/faecalis</i>	6	3	1	6 (Grouped as VNFGN)
<i>Brevundimonas vesicularis</i>	2	2	1	2
<i>Burkholderia cepacia</i>	11	1	3	6
<i>Chryseobacterium indologenes</i>	2	2	1	1
<i>Comomonas acidovorans</i>	3	3	3	3 (Grouped as VNFGN)
<i>Eikenella corrodens</i>	11	2	9	NID
<i>Flavimonas oryzihabitans</i>	2	0	NID	NID
<i>Kingella kingae</i>	6	NID	5	NID
<i>Moraxella phenylpyruvica</i>	1	0	0	1 Grouped as VNFGN
<i>Ochromobacter anthropi</i>	7	4	5	3
<i>Oligella urethralis/ureolytica</i>	4	2	3	4 (Grouped as VNFGN)
<i>Pasteurella multocida</i>	10	7	8	5
<i>Pasteurella</i> species	1	1	1	0
<i>Pseudomonas aeruginosa</i>	75	62	66	60
<i>Pseudomonas</i> species	18	12	6	1+ 5 Grouped as VNFGN
<i>Sphingomonas paucimobilis</i>	2	2	2	2
Total Correct	187	118 (63%) + 6 (3%) NID	130 (70%) + 2 (1%) NID	90 (48%) + 28 (15%) NID 25 (13%) VNFGN

Table 4
Overall Total Number of Correct Identification Results for 187 Non-Fermentative and Miscellaneous Gram-Negative Bacilli, Challenge and Routine Strains on the Microscan Walkaway (Dade), Phoenix (BD) and Vitek2 (BioMérieux)

SCORE	MICROSCAN	PHOENIX	VITEK2
Correct ID of Challenge Isolates	70 57%	82 67%	51 42%
Correct ID of Routine Isolates	48 74%	48 74%	39 62%
Total	118 63%	130 70%	90 48%

DISCUSSION AND CONCLUSIONS

- The Microscan Walkaway 96, Phoenix and Vitek2 produced reliable and accurate identification results for routine nonfermentative and miscellaneous gram-negative clinical isolates by identifying 61-75% of strains.
- All 3 instruments identified a lower percentage of the challenge nonfermentative gram-negative bacilli to the species level and would require additional testing in the routine clinical laboratory.
- Vitek2 has a smaller database for nonfermenting and miscellaneous gram-negative bacilli and groups many strains as 'various nonfermenting gram-negative bacilli.'
- Phoenix identified the largest number of nonfermenting and miscellaneous gram-negative bacilli (70%).
- Microscan and Phoenix's databases were equally as extensive and included all but 1 genus tested.