

Evaluation of the Total MBL Confirm Kit (ROSCO) for detection of metallo- β -lactamases in *Pseudomonas aeruginosa* and *Acinetobacter baumannii*

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Objectives:

In general, phenotypic tests for carbapenemase production in *Pseudomonas aeruginosa* and *Acinetobacter baumannii*, lacks predictive value due to unspecific metallo- β -lactamase (MBL) inhibitor activity in synergy tests. The aim of this study was to test a collection of characterized *P. aeruginosa* and *A. baumannii* isolates using a new inhibitor-based test kit – the Total MBL Confirm Kit – for detection of MBLs.

Methods:

The strain collection consisted of 28 carbapenemase-producing *P. aeruginosa* isolates, including VIM- (n=23), GIM- (n=1), IMP- (n=3) and AIM- (n=1) producers, and 44 carbapenemase-producing *A. baumannii* isolates, including NDM- (n=2), SIM- (n=2), IMP- (n=1), OXA-23- (n=33), OXA-58- (n=3), and OXA-24- (n=3) producers. Further, carbapenem non-susceptible, carbapenemase negative isolates (43 *P. aeruginosa* and 9 *A. baumannii*) were included. All isolates were tested using the Total MBL Confirm Kit (ROSCO) containing meropenem (MEM)+/- dipicolinic acid (DPA), imipenem (IMI)+/-DPA, and IMI+/-EDTA according to the manufacturer's instructions.

Results:

MEM+/-DPA <i>P. aeruginosa</i>	MBL-positive (n=28)	MBL-negative (n=43)
Test-positive	25	37
Test-negative	3	6
Sensitivity	89%	
Specificity	14%	
Positive predictive value	40%	

IMI+/-EDTA <i>P. aeruginosa</i>	MBL-positive (n=28)	MBL-negative (n=43)
Test-positive	28	41
Test-negative	0	2
Sensitivity	100%	
Specificity	5%	
Positive predictive value	41%	

IMI+/-DPA <i>P. aeruginosa</i>	MBL-positive (n=28)	MBL-negative (n=43)
Test-positive	24	14
Test-negative	4	29
Sensitivity	86%	
Specificity	67%	
Positive predictive value	63%	

MEM+/-DPA <i>A. baumannii</i>	MBL-positive (n=5)	MBL-negative (n=48)
Test-positive	5	16
Test-negative	0	32
Sensitivity	100%	
Specificity	67%	
Positive predictive value	24%	

IMI+/-EDTA <i>A. baumannii</i>	MBL-positive (n=5)	MBL-negative (n=48)
Test-positive	a=4	b=28
Test-negative	c=1	d=20
Sensitivity	80%	
Specificity	42%	
Positive predictive value	13%	

IMI+/-DPA <i>A. baumannii</i>	MBL-positive (n=5)	MBL-negative (n=48)
Test-positive	4	0
Test-negative	1	48
Sensitivity	80%	
Specificity	100%	
Positive predictive value	100%	

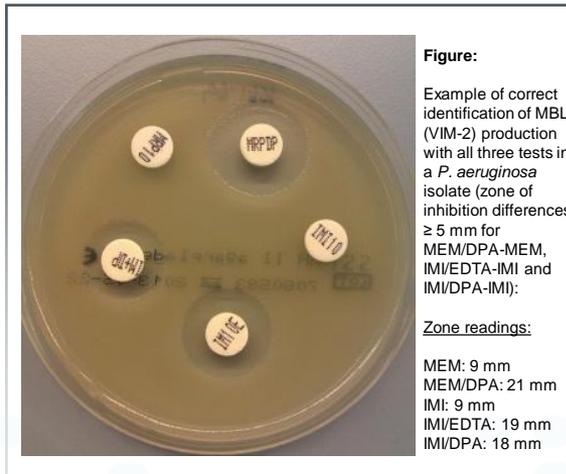


Figure:

Example of correct identification of MBL (VIM-2) production with all three tests in a *P. aeruginosa* isolate (zone of inhibition differences ≥ 5 mm for MEM/DPA-MEM, IMI/EDTA-IMI and IMI/DPA-IMI):

Zone readings:

MEM: 9 mm
MEM/DPA: 21 mm
IMI: 9 mm
IMI/EDTA: 19 mm
IMI/DPA: 18 mm

Conclusion:

Although all tests showed a sensitivity of $>80\%$, the specificity and positive predictive value were low with the exception of the combination of IPM+/-DPA for *A. baumannii*. Further modifications of inhibitor-based tests are required for the detection of MBL-production in non-fermentative Gram-negative bacteria.

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