Evaluation of the Vitek 2 AST-N055 Card for the Susceptibility Testing of *Acinetobacter baumannii* Isolates to Amikacin

Dong-Jin Park[1], Wonkeun Song[1], Taek-Kyung Kim[2], Jae-Seok Kim[1], Han-Sung Kim[1], Kyu Man Lee[1]

Department of Laboratory Medicine, [1]Hallym University College of Medicine, [2]Kangnam Sacred Heart Hospital, Seoul, Korea

We collected 76 clinical isolates of *Acinetobacter baumannii* (amikacin MIC by Vitek 2 AST-N055 card: ≤2 μg/mL, 11 isolates; 4 μg/mL, 19 isolates; 8 μg/mL, 17 isolates; 16 μg/mL, 27 isolates; and ≥64 μg/mL, 2 isolates) from a university hospital and evaluated the Vitek 2 AST-N055 card vs the broth microdilution as a reference method for testing susceptibility to amikacin. Vitek 2 AST-N055 card yielded very major errors in 15 isolates (19.7%) and minor errors in 26 isolates (34.2%). Of the 15 isolates shown very major errors, 14 had Vitek 2 MICs ranging from 8 to 16 μg/mL. The results of our study suggest strongly that it is unreliable to test the amikacin susceptibility by Vitek 2 AST-N055 card of *A. baumannii* with the Vitek 2 MICs ranging from 8 to 16 μg/mL. In those cases, another susceptibility test, such as broth microdilution (BMD), should be performed to confirm the results. **(Korean J Clin Microbiol 2009;12: 144-145)**

Key Words: Amikacin, *Acinetobacter baumannii*, Vitek 2

Acinetobacter baumannii is an important pathogen that causes various hospital-acquired infections[1]. Multidrug-resistance in *A. baumannii* has been increasing rapidly worldwide[2-4].

The clinical microbiology laboratory of our hospital uses Vitek 2 system for the routine antimicrobial susceptibility testing of *A. baumannii* isolates. According to the manufacturer's guideline of Vitek 2 AST-N055 card, amikacin susceptibility to *A. baumannii* may be performed as an alternative method prior to reporting the results. Thus, we evaluated the AST-N055 card of the Vitek 2 system for amikacin susceptibility testing of *A. baumannii* isolates.

From August 2007 to December 2008, we collected 76 non-duplicate clinical isolates of *A. baumannii* (amikacin MIC by Vitek 2 AST-N055 card: ≤2 μg/mL, 11 isolates; 4 μg/mL, 19 isolates; 8 μg/mL, 17 isolates; 16 μg/mL, 27 isolates; and ≥64 μg/mL, 2 isolates) from a hospital. The turbidity of bacterial suspension was adjusted to a 0.6 McFarland standard. The amikacin susceptibility testing of the 76 *A. baumannii* strains was performed with broth microdilution (BMD) method. The reference MIC was determined by the BMD with cation-adjusted Mueller-Hinton broth according to the Clinical and Laboratory Standards Institute (CLSI) guidelines[5]. *Pseudomonas aeruginosa* ATCC 27853 and *Escherichia coli* ATCC 25922 were used as the quality control strains.

Received 12 May, 2009, Revised 17 August, 2009
Accepted 25 August, 2009
Correspondence: Wonkeun Song, Department of Laboratory Medicine, Hallym University College of Medicine, 948-1, Daerim 1-dong, Youngdeungpo-gu, Seoul 150-950, Korea. (Tel) 82-2-829-5259, (Fax) 82-2-847-2403, (E-mail) swonkeun@hallym.or.kr

Using the BMD as the reference method, Vitek 2 AST-N055 cards showed very major errors in 15 isolates (19.7%) and minor errors in 26 isolates (34.2%). Of the 15 isolates shown very major errors, 14 isolates had the Vitek 2 MICs ranging from 8 to 16 μg/mL. Of the 44 isolates with Vitek 2 MICs of 8～16 μg/mL, 33 isolates (75%) were intermediate (19 isolates) or resistant (14 isolates) (Table 1). The two previous studies that compared between amikacin Vitek 2 system and BMD for 31 and 20 *A. baumannii*

Table 1. Comparison of broth microdilution method and Vitek 2 AST-N055 card for amikacin susceptibility testing of 76 *A. baumannii* isolates

Category (MIC, μg/mL)		No. of isolates
Broth microdilution	Vitek 2	
R (≥512)	S (16)	1
R (128)	R (≥64)	2
R (128)	S (16)	1
R (64)	S (16)	7
R (64)	S (8)	5
R (64)	S (4)	1
I (32)	S (16)	12
I (32)	S (8)	7
I (32)	S (4)	7
S (16)	S (16)	6
S (16)	S (8)	3
S (16)	S (4)	10
S (8)	S (8)	2
S (8)	S (4)	1
S (8)	S (≤2)	5
S (4)	S (≤2)	6

isolates, respectively, showed a satisfactory agreement[6,7]. However, our investigation differed from those of the other researchers in that we used a well-selected collection of challenge strains with known amikacin MIC by Vitek 2 AST-N055 cards instead of using a collection of consecutive isolates from routine clinical specimens. Forty-four of the 76 *A. baumannii* isolates showed the Vitek 2 MIC ranging from 8 to 16 μg/mL. In our hospital, most of the amikacin-susceptible *A. baumannii* isolates showed MICs of 2 to 4 μg/mL, but the isolates with the MICs of 8 to 16 μg/mL were rare (data not shown).

To evaluate inoculum size as a determinant in the difference of the MIC results obtained with the Vitek 2 system, 48 of the 76 *A. baumannii* isolates were also tested by using a 1.5 McFarland standard inoculum for Vitek 2 system. The categorical results of the amikacin susceptibility were the same as a 0.6 McFarland standard inoculum was used (data not shown).

In conclusions, the results of our study are strongly suggestive of the Vitek 2 AST-N055 card being unreliable in the amikacin susceptibility testing of *A. baumannii* with Vitek 2 MICs ranging from 8 to 16 μg/mL. So, in those cases, we recommend an additional susceptibility test such as BMD should be performed to confirm the results.

REFERENCES

1. Centers for Disease Control and Prevention. *Acinetobacter baumannii* infections among patients at military medical facilities treating injured U. S. service members, 2002-2004. MMWR Morb Mortal Wkly Rep 2004;53:1063-6.
2. Jeon BC, Jeong SH, Bae IK, Kwon SB, Lee K, Yong D, et al. Investigation of a nosocomial outbreak of imipenem-resistant *Acinetobacter baumannii* producing the OXA-23 β-lactamase in Korea. J Clin Microbiol 2005;43:2241-5.
3. Sunenshine RH, Wright MO, Maragakis LL, Harris AD, Song X, Hebden J, et al. Multidrug-resistant *Acinetobacter* infection mortality rate and length of hospitalization. Emerg Infect Dis 2007;13:97-103.
4. Wareham DW, Bean DC, Khanna P, Hennessy EM, Krahe D, Ely A, et al. Bloodstream infection due to *Acinetobacter* spp: epidemiology, risk factors and impact of multi-drug resistance. Eur J Clin Microbiol Infect Dis 2008;27:607-12.
5. Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing; eighteenth informational supplement. Document M100-S18. Wayne, PA; CLSI, 2008.
6. Ling TK, Tom PC, Liu ZK, Cheng AF. Evaluation of VITEK 2 rapid identification and susceptibility testing system against gram-negative clinical isolates. J Clin Microbiol 2001;39:2964-6.
7. Hsieh WS, Sung LL, Tsai KC, Ho HT. Evaluation of the Vitek 2 cards for identification and antimicrobial susceptibility testing of non-glucose-fermenting Gram-negative bacilli. APMIS 2009;11:241-7.

=국문초록=

Vitek 2 AST-N055 카드를 이용한 *Acinetobacter baumannii*의 Amikacin에 대한 감수성시험의 평가

[1]한림대학교 의과대학 진단검사의학교실, [2]강남성심병원 진단검사의학과
박동진[1], 송원근[1], 김택경[2], 김재석[1], 김한성[1], 이규만[1]

76주의 *Acinetobacter baumannii* (Vitek 2 AST-N055 card의 amikacin MIC: ≤2 μg/mL, 11 isolates; 4 μg/mL, 19 isolates; 8 μg/mL, 17 isolates; 16 μg/mL, 27 isolates; ≥64 μg/mL, 2 isolates)를 대상으로 액체배지 미량희석법을 표준방법으로 하여 Vitek 2 AST-N055 카드의 amikacin 감수성시험의 정확성을 평가하고자 하였다. Vitek 2 AST-N055 카드는 19.7% (15주)가 very major error이었고 34.2% (26주)가 minor error이었다. Very major error를 보인 15주의 *A. baumannii* 중 14주의 Vitek 2 MIC는 8～16 μg/mL이었다. 결과적으로 Vitek 2 AST-N055 card의 *A. baumannii*에 대한 amikacin MIC가 8～16 μg/mL를 보이는 결과는 부정확하여 미량액체배지희석법과 같은 확인검사가 필요하다. **[대한임상미생물학회지 2009;12:144-145]**

교신저자 : 송원근, 150-950, 서울시 영등포구 대림 1동 948-1
한림대학교 의과대학 진단검사의학교실
Tel: 02-829-5259, Fax: 02-847-2403
E-mail: swonkeun@hallym.or.kr