

Coagulase**Glycopeptide****Incidence of Coagulase-Negative Staphylococci with Reduced Susceptibilities to Glycopeptides and Comparison of Test Methods**

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Background : We tried to evaluate the incidence and clinical significance of coagulase-negative staphylococci (CoNS) with reduced susceptibilities to glycopeptides. In addition, the ability of disk diffusion and Vitek system to detect CoNS with reduced susceptibilities to glycopeptides were compared with the standard agar dilution method.

Methods : One hundred and nineteen clinical isolates of CoNS were recovered at Samsung Medical Center from June to July 1998 and were examined for their susceptibilities to vancomycin and teicoplanin by disk diffusion method (30- μ g disk), Vitek system with GPS-AA card, and agar dilution for the determination of MICs. The records of all patients, from whom CoNS with decreased susceptibility to glycopeptide was isolated, were reviewed.

Results : All CoNS showed uniform susceptibility to vancomycin by all three methods but 11 strains (9.2%) exhibited reduced susceptibilities to teicoplanin (MICs, 16 to 32 μ g/mL). All but suspected colonized strains were nosocomially acquired and were isolated from 7 different wards. None were previously treated with teicoplanin. The concordance rates of disk diffusion method and Vitek system with agar dilution method were 94.1% and 84%, respectively. However, the sensitivity of disk diffusion method and Vitek system were only 50.0% and 62.5%, respectively.

Conclusions : This study demonstrates that CoNS with reduced susceptibilities to glycopeptides is not uncommon and may cause true infections in clinical settings. However, neither disk diffusion method nor Vitek system could differentiate these strains from more susceptible isolates.

Key words : Coagulase-negative staphylococci, Glycopeptide, Antimicrobial resistance, Antimicrobial susceptibility test

Glycopeptide, vancomycin, teicoplanin, methicillin, glycopeptide, CoNS, 1996, 1997, Vitek system (bioMerieux Vitek, Inc., USA), teicoplanin, CoNS 16, 135, 2. coagulase, (coagulase-negative), catalase, Staphaurex Plus (Murex Biotech Ltd., UK), coagulase, CoNS, Vitek-GPI card (bioMerieux Vitek, Inc., USA), 3. glycopeptide, 가, CoNS가, 가, CoNS, National Committee for Clinical Laboratory Standards (NCCLS), [4,5], Vitek system (minimum inhibitory concentration: MIC), GPS-AA card (bioMerieux Vitek, Inc., USA), ciprofloxacin (5 µg), clindamycin (2 µg), erythromycin (15 µg), oxacillin (1 µg), penicillin (10 IU), teicoplanin (30 µg), trimethoprim/sulfamethoxazole (1.25 µg /23.75 µg), vancomycin (30 µg) (BBL Sensi-Disc, Becton Dickinson Microbiology Systems, USA), Vitek system, cephalothin, ciprofloxacin, erythromycin, gentamicin, imipenem, oxacillin, penicillin, teicoplanin, vancomycin, S. epidermidis ATCC 12228, S. aureus ATCC 29213, CDC Dr. Clark가 E. faecalis A256 (vanA) E. faecalis V583 (vanB), 4. Glycopeptide, CoNS가, 2, 가, 1. Glycopeptide, CoNS, 1998, 6, 7, 113, 가, tip, 15, 가, 119, CoNS, 가, 가

Table 1. Distribution of vancomycin and teicoplanin MICs for clinical isolates of coagulase-negative staphylococci at Samsung Medical Center from June to July, 1998 (n=119)

MIC ($\mu\text{g/mL}$)	Vancomycin		Teicoplanin				
	2 (S)	4 (S)	2 (S)	4 (S)	8 (S)	16 (I)	32 (R)
No. of isolates	116	3	60	30	18	8	3

Characters in parenthesis are NCCLS interpretive categories (S, susceptible; I, intermediate; and R, resistant).

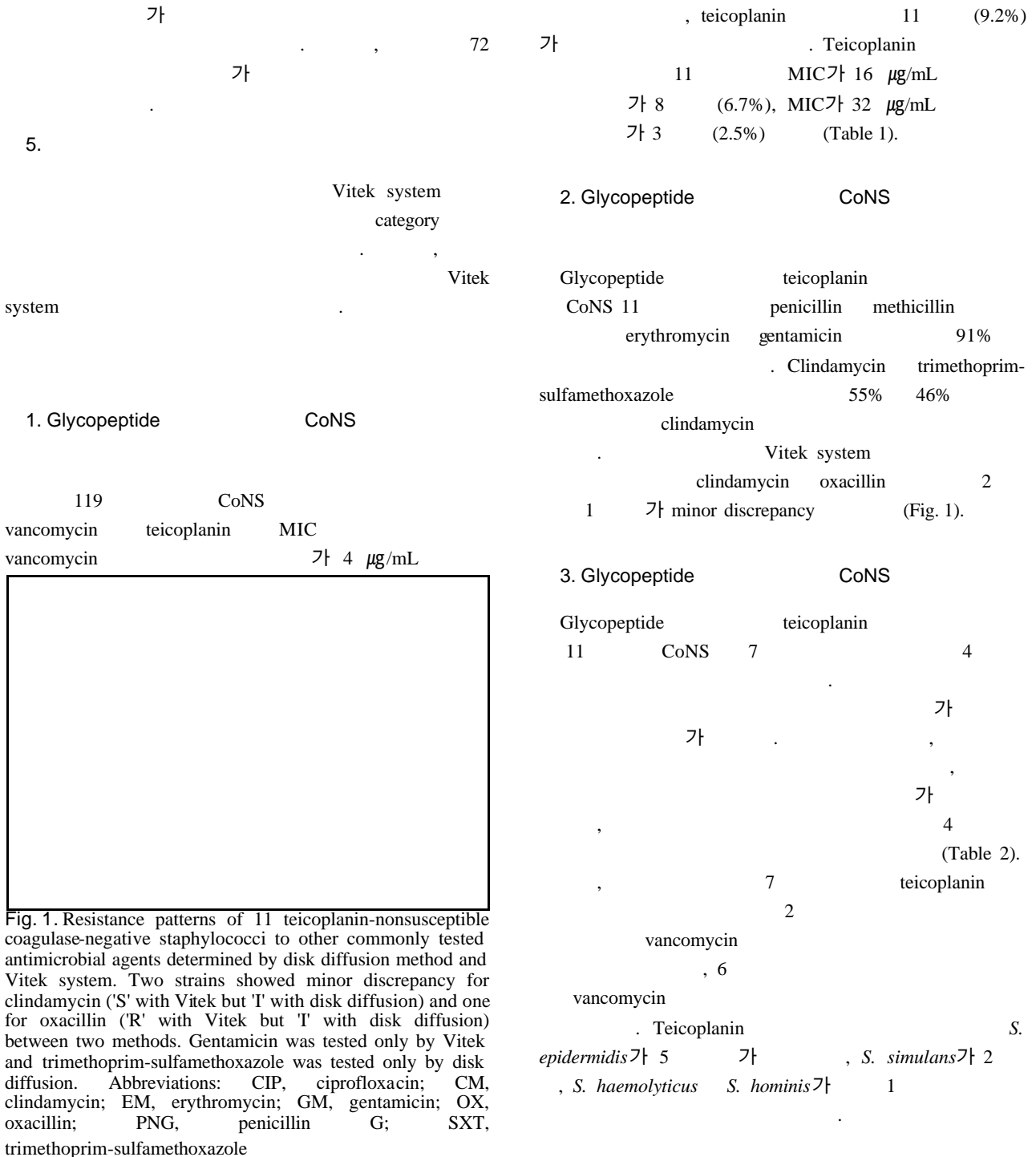


Fig. 1. Resistance patterns of 11 teicoplanin-nonsusceptible coagulase-negative staphylococci to other commonly tested antimicrobial agents determined by disk diffusion method and Vitek system. Two strains showed minor discrepancy for clindamycin ('S' with Vitek but 'T' with disk diffusion) and one for oxacillin ('R' with Vitek but 'T' with disk diffusion) between two methods. Gentamicin was tested only by Vitek and trimethoprim-sulfamethoxazole was tested only by disk diffusion. Abbreviations: CIP, ciprofloxacin; CM, clindamycin; EM, erythromycin; GM, gentamicin; OX, oxacillin; PNG, penicillin G; SXT, trimethoprim-sulfamethoxazole

Table 2. Clinical characteristics of the patients infected with coagulase-negative staphylococci with decreased susceptibility to teicoplanin

No. of isolates	Age	Sex	Medical problem or procedure	Source	Previous antimicrobial agent(s)	CoNS species
18	41 yr	F	Multiple fracture	Blood	Tobramycin and vancomycin	<i>S. epidermidis</i>
19	37 yr	M	SAH	Blood	Ceftazidime and gentamicin	<i>S. epidermidis</i>
22*	7 days	M	Prematurity, RDS	IVD	Cefazolin and gentamicin	<i>S. epidermidis</i>
40*	46 days	M	Prematurity, SEH	Blood	Imipenem	<i>S. epidermidis</i>
42	4 days	M	Prematurity, SEH	Blood	Cefazolin and gentamicin	<i>S. simulans</i>
61	35 yr	M	LT	Wound	Ampicillin, gentamicin and erythromycin	<i>Other CoNS</i>
63	32 yr	M	AML	IVD	Ceftazidime, tobramycin and vancomycin	<i>S. hominis</i>
70*	3 mo	M	AGE	Blood	None	<i>Other CoNS</i>
80	9 days	M	ICH	IVD	Cefazolin, gentamicin and piperacillin	<i>S. haemolyticus</i>
92	1 day	M	Prematurity, RDS, sepsis	Blood	Cefazolin, gentamicin, piperacillin and amikacin	<i>S. simulans</i>
118*	19 yr	M	Viral meningitis	CSF	None	<i>S. epidermidis</i>

* Suspected colonization

Abbreviations: AGE, acute gastroenteritis; AML, acute myeloid leukemia; F, female; ICH, intracranial hemorrhage; IVD, intravenous device; LT, liver transplantation; M, male; RDS, respiratory distress syndrome; SAH, subarachnoid hemorrhage; SEH, subependymal hemorrhage

Table 3. Comparison of disk diffusion method and Vitek system with standard agar dilution method to detect coagulase-negative staphylococci with decreased susceptibility to teicoplanin (n=135)

Agar dilution MIC ($\mu\text{g/mL}$)	n	Disk diffusion (mm)			Vitek MIC ($\mu\text{g/mL}$)		
		S (10)	I (11-13)	R (14)	S (4)	I (16)	R (32)
4	94*	94	0	0	83	6	2
8	25 [†]	22	3	0	17	3	4
16	12	6	6	0	5	4	3
32	4	2	2	0	1	1	2

* Three isolates were not included in Vitek results because of insufficient growth

[†] One isolate was not included in Vitek results because of insufficient growth

4.

1) 135 , Teicoplanin Vitek system CoNS 50.0% 62.5% 97.5% 87.0%
vancomycin (Table 3).

teicoplanin 119 3) MIC (zone diameter)
3 가 , Vitek system MIC 16 μg
15 가 , Vitek system MIC 8 /mL MIC 가 15 mm , teicoplanin 가
Vitek system 가 4 $\mu\text{g/mL}$ 51 8 $\mu\text{g/mL}$ 19
(29.4%) 12 (63.2%)
system 가 15 mm (Fig. 2).
(Table 3).

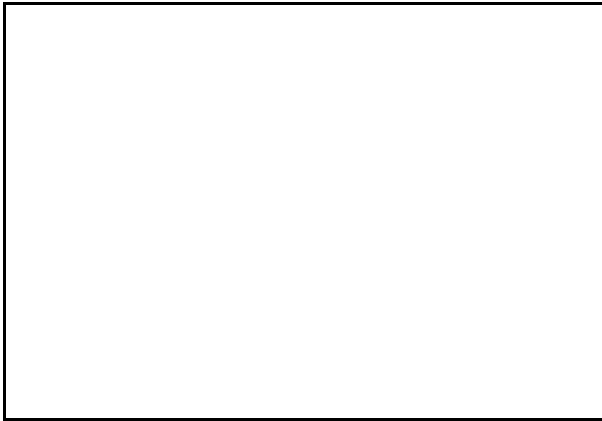


Fig. 2. Distribution of disk diffusion zone diameter of coagulase-negative staphylococci obtained with a 30-μg teicoplanin disk.

epidermidis *S. haemolyticus*
 35 kDa 39 kDa
 glycopeptide [11,13].
 , teicoplanin (penicillin
 binding protein; PBP) 2 가 CoNS
 glycopeptide [1]. , teicoplanin
 가 [14].
 Glycopeptide CoNS
 가 .

Glycopeptide CoNS
 Goldstein [6] Maugein [7] teicoplanin
 CoNS가 8.8% 26.5% ,
 Cercenado [8] 5 CoNS 0.55%가
 teicoplanin
 .
S. epidermidis 7%
S. haemolyticus 31%가 teicoplanin
 [9]. , [10] 6
 CoNS 1.44%가 teicoplanin
 glycopeptide CoNS가
 2
 116 CoNS 11 (9.2%)
 가 ,
 teicoplanin CoNS 가
 .
 CoNS glycopeptide
 enterococci 가 가
 가 가 가
 , glycopeptide
 CoNS [11,12]. ,
 teicoplanin CoNS autolysis가
 [12]. ,
 [1,11,12]. O'Hare vancomycin
 teicoplanin S.

glycopeptide
 [1,9,10,15]. NCCLS teicoplanin CoNS
 가 11-13 mm Tenover
 가 15 mm
 [15,16].
 MIC가 16 μg/mL 11
 15 mm ,
 MIC가 8 μg/mL 19 12 (63.2%) 4
 μg/mL 51 15 (29.4%) 15
 mm ,
 CoNS teicoplanin
 가 15 mm , CoNS
 .
 Vitek system glycopeptide
 CoNS 가
 , teicoplanin FDA
 NCCLS
 Vitek system
 teicoplanin
 , vancomycin
 teicoplanin GPS-AA card
 GPS-IZ card Vitek system
 glycopeptide CoNS
 . Tenover [15]
 vancomycin 4
 CoNS Vitek system vancomycin
 ,

[10]

Vitek GPI-IZ card
 teicoplanin 7
 CoNS 3 가
 135 vancomycin
 , Vitek system
 , teicoplanin MIC가 16 µg/mL
 12 5 (41.7%) 32 µg/mL
 4 1 (25%)가
 , MIC가 8 µg/mL 4 µg/mL 25
 94 7 8
 , CoNS glycopeptide
 Vitek system

: Coagulase (coagulase-negative
 staphylococci; CoNS) glycopeptide

system glycopeptide CoNS Vitek

:1998 6 7
 119 CoNS , Vitek
 system , glycopeptide
 CoNS가

: vancomycin
 , 11 teicoplanin MIC
 가 16 µg/mL
 4
 , 7
 6 vancomycin
 teicoplanin
 Vitek system
 94.1% 84% , teicoplanin
 CoNS 50.0%
 62.5%

: Glycopeptide
 CoNS
 , Vitek system glycopeptide
 CoNS
 가

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