JOURNAL OF CLINICAL MICROBIOLOGY, May 2006, p. 1922–1923 Vol. 44, No. 5
0095-1137/06/$08.00+0 doi:10.1128/JCM.44.5.1922–1923.2006

Letter to the Editor

High Prevalence of Teicoplanin Resistance among *Staphylococcus epidermidis* Strains in a 5-Year Retrospective Study

Coagulase-negative staphylococci (CoNS), and especially *Staphylococcus epidermidis*, are now considered to be important nosocomial pathogens (7, 10). They usually belong to the human commensal flora and are resistant to multiple antimicrobial agents, including methicillin and other drugs commonly used for the treatment of staphylococcal infections. Given the high frequency of methicillin-resistant isolates, glycopeptide antibiotics have been largely recommended for the empirical treatment of CoNS infections (4).

From January 2000 to December 2004, all nonrepetitive staphylococci isolated and identified in our laboratory were collected and screened for teicoplanin resistance as recommended by the National Breakpoint Committee of the French Society for Microbiology (3). The test consisted of spotting 10 μl of 6×10^8 CFU/ml bacterial suspension (McFarland 2) on Mueller-Hinton agar plates containing 5 μg/ml teicoplanin. Readings were made after 24 h at 37°C. *Staphylococcus aureus* ATCC 25923 and *Staphylococcus haemolyticus* CIP 107204 were used as negative and positive controls, respectively. MICs of vancomycin and teicoplanin were determined by the agar dilution method for all strains detected positive with the screen test (8). Classification of strains as susceptible or resistant was performed according to the European consensus (see the EUCAST website [http://www.escmid.org]). A total of 2,476 staphylococci were included in the study, 1,437 *S. aureus* bacteria and 1,039 CoNS. By using the ID32 Staph gallery (bioMérieux, Marcy l'Etoile, France), the 1,039 CoNS were categorized as 632 (60.8%) *S. epidermidis* strains, 103 (9.9%) *S. haemolyticus*, 137 (13.2%) *S. hominis*, and 167 (16.1%) other CoNS. Within *S. epidermidis*, 142 (22.5%) strains were isolated from urinary tract infections and 17 (2.7%) were from other nosocomial infections, while 473 (74.8%) were either contaminants of blood cultures or noninvasive colonizers of bladder and peripherically inserted catheters. The vast majority of *S. haemolyticus* and *S. hominis* strains (91%) had no clinical significance.

Among 300 *S. epidermidis* strains resistant to methicillin, 165 (55%) were also resistant to teicoplanin (MIC > 8 μg/ml) (Table 1). Among these, only one strain isolated in 2002 showed a decreased susceptibility to vancomycin (MIC = 8 μg/ml). As observed in other French hospitals (1), there was a very low prevalence of teicoplanin resistance in *S. aureus* during the time of the study (Table 1). By contrast, the prevalence of teicoplanin resistance among *S. epidermidis* strains increased from 7.2% in 2000 to 46.1% in 2003 and then subsequently decreased (30.4%) in 2004. Susceptibilities to erythromycin, ciprofloxacin, and gentamicin for *S. epidermidis* did not vary in the same time period. The pulsed-field gel electrophoresis analysis of 20 *S. epidermidis* teicoplanin-resistant strains yielded 20 distinct SmaI pulsotypes. The rise of teicoplanin resistance in *S. epidermidis* was therefore not related to the spread of predominant clones, and this emergence cannot be explained by extensive use of glycopeptides in our hospital. Teicoplanin consumption decreased from 2000 to 2004, whereas vancomycin consumption remained constant (Fig. 1). The trait of teicoplanin resistance mainly occurs among *S. epidermidis* methicillin-resistant strains (Table 1), and coresistance to ciprofloxacin occurs in 60% of these strains. It is likely that such strains are disseminated to the hospital environment. The extensive use of fluoroquinolones in our hospital could bring local antibiotic pressure, since their consumption was significant during this period

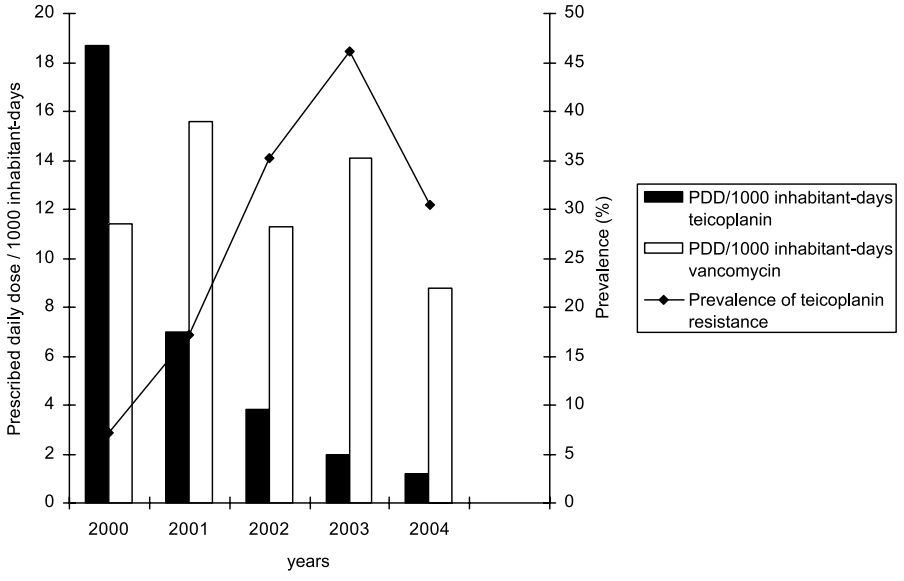

FIG. 1. Relationship between the incidence of teicoplanin resistance in *S. epidermidis* and glycopeptide use in prescribed daily doses (PDD)/1,000 inhabitant days.

TABLE 1. Frequency (%) of teicoplanin resistance (MIC > 8 μg/ml) according to staphylococcal species and to methicillin resistance from January 2000 to December 2004

Species[a]	Frequency (%) of strains with teicoplanin MICs > 8 μg/ml by year				
	2000	2001	2002	2003	2004
S. epidermidis	7.2	17.2	35.2	46.1	30.4
TR/MRI	20	33.9	71.7	84.4	60.9
S. haemolyticus	17.9	25	55.5	31.2	35.7
TR/MRI	31.8	40	76.9	55.5	55.5
S. hominis	9.5	7.4	21	20.9	14.8
TR/MRI	25	16.7	80	33.3	44.4
Other CoNS	4	10.3	14.6	5.9	8.7
TR/MRI	15.4	37.5	62.5	25	100
S. aureus	2.8	1.3	0.9	0.9	1.2
TR/MRI	2.8	3.6	6.7	2.7	4.2

[a] TR/MRI, teicoplanin resistance among methicillin-resistant isolates.

(100 prescribed daily doses/1,000 inhabitant days in 2001 and 97 prescribed daily doses/1,000 inhabitant days in 2004). Other recent reports have also pointed out reduced susceptibility to glycopeptides within *S. haemolyticus* and *S. epidermidis* in various European countries (2, 5, 6, 9). These alarming data suggest that such strains might be highly disseminated in the community and in hospitals. Large prospective studies are needed to generate a list of risk factors for the emergence of teicoplanin resistance in CoNS isolates.

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François Trueba*
Eliane Garrabe
Rachid Hadef
Roland Fabre
Jean-Didier Cavallo
Laboratoire de Microbiologie Clinique
Hôpital d'Instruction des Armées Bégin
69 avenue de Paris
94163 Saint-Mandé Cedex, France

Krassimira Tsvetkova
Olivier Chesneau
Unité des Agents Antibactériens
Institut Pasteur
28 rue du Dr. Roux
75724 Paris Cedex 15, France

*Phone: 33-140514633
Fax: 33-140514298
E-mail: f.trueba@wanadoo.fr