tions caused by panresistant non-fermenting bacilli. Our isolates appeared susceptible to colistin by disc diffusion. However, we also determined the activity of aztreonam in the presence of clavulanic acid (2 mg/L) and tazobactam (4 mg/L), and found that both inhibitors partly restored activity of the antibiotic, lowering the MICs to 1–2 mg/L. This approach could therefore also be of clinical relevance.

References


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Emergence of Staphylococcus hominis strains expressing low-level resistance to quinupristin/dalfopristin in Greece

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Sir,

Quinupristin/dalfopristin, a semi-synthetic derivative of pristinamycin IA (streptogramin B) and pristinamycin IIA (streptogramin A), respectively, was introduced in Greek hospitals in 2002, for the treatment of infections caused by multiresistant Gram-positive bacteria such as vancomycin-resistant enterococci and teicoplanin-resistant staphylococci. In Greece, where natural mixtures (pristinamycin, synergistin, etc.) have not been used orally and topically, and virginiamycin has been never used as a growth promoter in animal feed, staphylococci resistant to streptogramins were not isolated until 2002. This is the first report of the emergence of staphylococci resistant to quinupristin/dalfopristin in Greece.

A total of 850 staphylococci [350 Staphylococcus aureus and 500 coagulase-negative staphylococci (CoNS)] were tested for their susceptibility to quinupristin/dalfopristin. The isolates were recovered during 2002–2004 from clinical specimens (blood, pus, etc.) from individual patients in two tertiary care hospitals, University Hospital of Patras and University Hospital of Larissa, located in south–western and in central Greece, respectively. These institutions are hospitals with 750 and 600 beds, respectively, about 229,667 ambulatory visits and 107,000 admissions per year and they cover an area of 2,500,000 inhabitants, roughly 25% of the total population of Greece. The identification of isolates was carried out by Gram-stain, catalase and coagulase production, and the API Staph System (bioMérieux SA, Lyon, France). The susceptibility of isolates to antimicrobial agents (ampicillin, oxacillin, trimethoprim/sulfamethoxazole, ofloxacin, clindamycin, erythromycin, gentamicin, tobramycin, rifampicin, tetracycline, fusidic acid, vancomycin, linezolid and quinupristin/dalfopristin) was determined by the disc diffusion method.2 MIC determination of quinupristin/dalfopristin was assessed by Etest, according to the procedures of the manufacturer, and by the reference agar dilution method.3 The classification of isolates as susceptible or resistant was carried out according to the NCCLS criteria (susceptible $\leq 1\, \text{mg/L}$, resistant $\geq 4\, \text{mg/L}$). Isolates with MICs $\leq 1\, \text{mg/L}$ were tested for the presence of genes encoding resistance to streptogramin A [vga(A), vgb(A), vga(B), vgb(B), vga(AV)] and streptogramin B [erm(A), erm(C), msr, vgb(A), vgb(B)] by PCR.5 The presence of the mecA gene was also detected by PCR.7 The clonality of the isolates was determined by pulsed-field gel electrophoresis (PFGE) of SmaI DNA digests.8

Among S. aureus isolates, none was found to express resistance to quinupristin/dalfopristin. Their MICs ranged from 0.19 to 0.75 mg/L (mean value 0.35 mg/L). The majority of CoNS, showed MICs within a range of 0.19–0.75 mg/L (mean value 0.45 mg/L), except 10 Staphylococcus hominis isolates with MICs of 1–3 mg/L. These isolates were recovered from blood cultures during 2004, 2 years after the introduction of the agent into the hospital environment. Before isolation, none of the 10 patients was treated with quinupristin/dalfopristin. Discrepancies between the determination of MICs by Etest and by the reference agar dilution method were not observed. However, the disc diffusion method failed to detect these low-level resistant isolates, characterizing them as susceptible.

The detection of genes involved in the expression of quinupristin/dalfopristin resistance revealed that all isolates carried the vga(A) gene, encoding an efflux mechanism. All isolates were erm(A)-positive, expressing a MLSB constitutive phenotype. The presence of the mecA gene was detected in all except one isolate. PFGE analysis showed that the majority of isolates (eight out of 10) belonged to the same clone (t’), and the remaining two isolates to two different types (t, v), not related to previously identified clones (Figure 1).5 The strains of clone t’ expressed resistance to oxacillin, erythromycin, clindamycin, rifampicin, fusidic acid, trimethoprim/sulfamethoxazole and gentamicin, but remained susceptible to linezolid and glycopeptides. In contrast, the strains of clones t and v were significantly less resistant:

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resistance to oxacillin, erythromycin and clindamycin (u), and resistance to ampicillin, erythromycin and clindamycin (v). The rates of resistance to quinupristin/dalfopristin were quite similar between the two hospitals (1.5% in Patras and 2.3% in Larissa).

In Greece, 2 years after the introduction of quinupristin/dalfopristin into clinical practice, an emergence of staphylococci resistant to the agent was observed. The rate of resistance was 2%, due mainly to the spread of the same clone in hospitals and they were carried with low-level resistance to quinupristin/dalfopristin (MIC 1–3 mg/L). We propose the use of the Etest as a reliable and applicable method in clinical laboratories, for the detection of low-level resistance to quinupristin/dalfopristin, since the disc diffusion method fails to detect such strains. Treatment of infections caused by strains that are misidentified phenotypically as susceptible to quinupristin/dalfopristin may contribute to the in vivo selection of clones that exhibit higher levels of resistance.

References


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Successful treatment with linezolid of septic shock secondary to methicillin-resistant Staphylococcus aureus arthritis

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Sir,

Bacterial sepsis is a major cause of death in the intensive care unit. The growing prevalence of multiresistant strains amongst the involved pathogens is a matter for serious concern, as it drastically limits the number of potentially useful antibiotics. Until recently, the glycopeptides were the sole antibiotics with consistent activity to manage methicillin-resistant Staphylococcus aureus (MRSA) infections, leaving few or no alternatives in case of treatment failure. New antimicrobials have been developed, which now offer an alternative. One of these is linezolid, the first in the new class of oxazolidinone antibiotics. Linezolid...