vanC Gene-Related Intrinsic Teicoplanin Resistance Detected in Enterococcus casseliflavus and E. gallinarum Strains by the BD Phoenix Automated Microbiology System

Enterococcus members are becoming increasingly important agents of human disease, largely because of their resistance to antimicrobial agents. Because of their resistance to penicillins and cephalosporins of several activity ranges, the acquisition of high-level resistance to aminoglycosides, and now the emergence of vancomycin resistance, these bacteria are often involved in serious superinfections among patients receiving broad-spectrum antimicrobial chemotherapy (2).

Acquired glycopeptide resistance in Enterococcus species corresponds to five different phenotypes, with VanA and VanB phenotypes being the most prevalent and important clinically. Strains with the vanA genotype characteristically display inducible, transposon-mediated, high-level resistance to both vancomycin (MIC, 64 to 1,000 μg/ml) and teicoplanin (MIC, 16 to 512 μg/ml). Strains with the vanB genotype have acquired inducible resistance to various concentrations of vancomycin (MIC, 4 to 1,000 μg/ml) but remain susceptible to teicoplanin (MIC, 0.5 to 1 μg/ml), although rare vanB strains may also be resistant to the latter antibiotic. Isolates that have the vanC genotype display intrinsic, constitutive, low-level resistance to vancomycin (MIC, 2 to 32 μg/ml) and are susceptible to teicoplanin (MIC, 0.5 to 1 μg/ml). The vanC genotype corresponds to the intrinsic glycopeptide resistance seen in Enterococcus gallinarum, E. casseliflavus, and E. flavescens (2).

The antibacterial activities of teicoplanin against gram-positive bacteria, including those expressing resistance to unrelated compounds, are similar to that of vancomycin, but with increased potency, particularly against Streptococcus spp. and Enterococcus spp. Teicoplanin is active against vancomycin resistance caused by VanB and VanC but is not active against VanA resistant strains. Despite the increasing importance of glycopeptide resistance, teicoplanin has proved its clinical worth and continues to have important potential in the treatment of life-threatening gram-positive sepsis (1a).

Automated microbiology systems are routinely used for identification and antimicrobial susceptibility testing of a wide spectrum bacteria, including those of the Enterococcus genus. The Phoenix Automated Microbiology System (Becton Dickinson) is one of these systems used in our microbiology laboratory at Yuzuncu Yil University Medical Faculty Hospital.

Recently, E. casseliflavus and E. gallinarum strains were isolated from two different urine samples from a patient, and teicoplanin was reported as resistant, although the MIC was ≤1. Upon examination of the preliminary reports, a change from sensitive to resistant for teicoplanin by the automated BDXpert system in accordance with rule 1099 of that system was observed (1). Rule 1099 under the expert trigger rules states that “E. casseliflavus or E. gallinarum is intrinsically low-level resistant to vancomycin and teicoplanin (VanC),” and because of the identified bacteria, the exchange for teicoplanin from sensitive to resistant was made following this rule.

Resistance to teicoplanin in Enterococcus species is often seen in E. faecalis and E. faecium strains due to the vanA gene. Identification and antibiotic susceptibility tests for both of the two isolated strains were repeated in order to prevent any misidentifications, but there was not any change in the results. Antimicrobial testing of teicoplanin by use of the Kirby-Bauer disc diffusion method was performed on both of the isolated strains, and they were both detected as sensitive to teicoplanin.

E. casseliflavus and E. gallinarum strains have the chromosomal nontransferable vanC gene, and they are intrinsically low-level resistant to vancomycin; however, they are sensitive to teicoplanin. Researchers in clinical microbiology laboratories using automated systems for antimicrobial susceptibility tests should be aware of this situation, and the result needs to be verified using a reference method before reporting the isolate as resistant to teicoplanin.

REFERENCES