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Isolation and molecular characterization of vancomycin-resistant *Enterococcus faecium* in Malaysia

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R. SON, F. NIMITA, G. RUSUL, E. NASRELDIN, L. SAMUEL AND M. NISHIBUCHI. 1999. Nineteen strains of vancomycin-resistant *Enterococcus faecium* isolated from 10 of 75 (13·3%) tenderloin beef samples were examined for resistance to selected antibiotics, presence of plasmids, and genetic diversity by random amplification of polymorphic DNA analysis. All strains showed multiple resistant to the antibiotics tested. Multiple antibiotic indexing of the vancomycin-resistant *E. faecium* strains showed that all (100%) originated from high risk contamination environments where antibiotics were often used. Plasmids ranging in size from 1·5 to 36 megadalton were detected in 15 of 19 (79%) strains. Thus, three plasmid profiles and eight antibiotypes were observed among the *E. faecium* strains. A high degree of polymorphism was obtained by combining the results of the two primers used; with the 19 *E. faecium* strains being differentiated into 19 RAPD-types. These preliminary results suggest that RAPD-PCR has application for epidemiologic studies and that resistance patterns and plasmid profiling could be used as an adjunct to RAPD for the typing of *E. faecium* in the study area.

INTRODUCTION

In the last decade, enterococci have become increasingly important cause of nosocomial infections Murray 1990; Korten and Murray 1993). Ampicillin and aminoglycosides have been considered the drugs of choice for treatment of serious enterococcal infections (Calia 1996). However, the number of enterococci that are resistant to ampicillin and aminoglycosides has increased (Herman and Gerding 1991). The glycopeptide antibiotics vancomycin and teicoplanin are important substances for treatment of severe hospital infections. Diseases caused by enterococci which are resistant to the β–lactam antimicrobial agent ampicillin and aminoglycoside antibiotics can be treated only with glycopeptides (Lerner 1996). Unfortunately, resistance to vancomycin and teicoplanin has also been reported. In the United States, the Center for Disease Control and Prevention reported that there was a 20-fold increase (1989–90) in the occurrence of vancomycin-resistant enterococci associated with nosocomial infections from animals to humans. The source of glycopeptide-resistant enterococci is not known. One possibility is that these organisms are spread via the food chain. Some data have indicated that raw poultry and raw minced meat may harbour VRE (Bates *et al.* 1994). In this context, adding the glycopeptide avoparcin, a mycelial product of *Streptomyces candidus*, to animal feed was thought to be responsible for the development of glycopeptide resistance in enterococci in animals. This paper describes the characterization of *E. faecium* strains isolated from tenderloin beef retailed in Malaysia with respect to plasmid profiles, antimicrobial resistances and their random amplified polymorphic DNA profiles.

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MATERIALS AND METHODS

Samples, isolation and identification of vancomycin-resistant Enterococci

Between July 1997 and March 1998, a total of 75 samples of tenderloin beef were purchased from supermarkets at various