Antibiotic resistant enterococci—Tales of a drug resistance gene trafficker

Enterococci have been recognized as important hospital-acquired pathogens in recent years, and isolates of E. faecalis and E. faecium are the third- to fourth-most prevalent nosocomial pathogen worldwide. Acquired resistances, especially against penicillin/ampicillin, aminoglycosides (high-level) and glycopeptides are therapeutically important and reported in increasing numbers. On the other hand, isolates of E. faecalis and E. faecium are commensals of the intestines of humans, many vertebrate and invertebrate animals and may also constitute an active part of the plant flora. Certain enterococcal isolates are used as starter cultures or supplements in food fermentation and food preservation. Due to their preferred intestinal habitat, their wide occurrence, robustness and ease of cultivation, enterococci are used as indicators for fecal pollution assessing hygiene standards for fresh- and bathing water and they serve as important key indicator bacteria for various veterinary and human resistance surveillance systems. Enterococci are widely prevalent and genetically capable of acquiring, conserving and disseminating genetic traits including resistance determinants among enterococci and related Gram-positive bacteria. In the present review we aimed at summarizing recent advances in the current understanding of the population biology of enterococci, the role mobile genetic elements including plasmids play in shaping the population structure and spreading resistance. We explain how these elements could be classified and discuss mechanisms of plasmid transfer and regulation and the role and cross-talk of enterococcal isolates from food and food animals to humans.