

The mazEF toxin-antitoxin system as an attractive target in clinical isolates of *Enterococcus faecium* and *Enterococcus faecalis*

ABSTRACT

The toxin-antitoxin (TA) system is a regulatory system where two sets of genes encode the toxin and its corresponding antitoxin. In this study, the prevalence of TA systems in independently isolated clinical isolates of *Enterococcus faecium* and *Enterococcus faecalis* was determined, the dominant TA system was identified, different virulence genes in *E. faecium* and *E. faecalis* were surveyed, the level of expression of the virulence and TA genes in normal and stress conditions was determined, and finally their associations with the TA genes were defined. Remarkably, the analysis demonstrated *higBA* and *mazEF* in all clinical isolates, and their locations were on chromosomes and plasmids, respectively. On the other hand, a quantitative analysis of TA and virulence genes revealed that the expression level in both genes is different under normal and stress conditions. The results obtained by anti-*mazF* peptide nucleic acids demonstrated that the expression level of virulence genes had decreased. These findings demonstrate an association between TA systems and virulence factors. The *mazEF* on the plasmids and the *higBA* TA genes on the chromosomes of all *E. faecium* and *E. faecalis* strains were dominant. Additionally, there was a decrease in the expression of virulence genes in the presence of anti-*mazF* peptide nucleic acids. Therefore, it is suggested that *mazEF* TA systems are potent and sensitive targets in all *E. faecium* and *E. faecalis* strains.

Keyword: *Enterococcus faecium*; *Enterococcus faecalis*; Toxin–antitoxin system; Virulence genes; Peptide nucleic acids