A single exposure to a sublethal pediocin concentration initiates a resistance-associated temporal cell envelope and general stress response in Listeria monocytogenes

Listeria monocytogenes can cause the potentially fatal food-borne disease listeriosis, and the use of bacteriocin-producing lactic acid bacteria to control L. monocytogenes holds great promise. However, development of bacteriocin resistance is a potential challenge and the purpose of this study was to determine if exposure to sublethal concentrations of pediocin-containing Lactobacillus plantarum WHE 92 supernatant could prime L. monocytogenes for resistance. By transcriptomic analysis, we found two, 55 and 539 genes differentially expressed after 10, 60 and 180 min of exposure to L. plantarum WHE 92 supernatant as compared to control exposures. We observed temporal expression changes in genes regulated by the two component system LisRK and the alternative sigma factors SigB and SigL. Additionally, several genes involved in bacteriocin resistance were induced. ΔlisR, ΔsigB and ΔsigL mutants were all more resistant than wild types to L. plantarum WHE 92 supernatant. LisRK, SigB and SigL regulation and genes associated with resistance are involved in the temporal adaptive response to pediocin and all three regulatory systems affect pediocin resistance. Thus, a single exposure to a sublethal pediocin concentration initiates a response pointing to resistance and indicates that further research exploring the link between adaptive responses and resistance is needed.