

Quaternary ammonium salt based disinfectants reduce the expression of listeriolysin O in *Listeria monocytogenes*

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INTRODUCTION

Bacterial resistance, caused among others by frequent use of disinfectants and antibiotics, has become one of the major problems in food industry. Therefore, better understanding of mechanisms of action of disinfectants is of great importance. Quaternary ammonium salts (QAC) have been extensively used as antimicrobial agents in food-processing industries and medicine. In this study, proteomic methods were used to identify changes in the proteome of foodborne pathogen *Listeria monocytogenes* after treatment with three QAC based disinfectants.

RESULTS

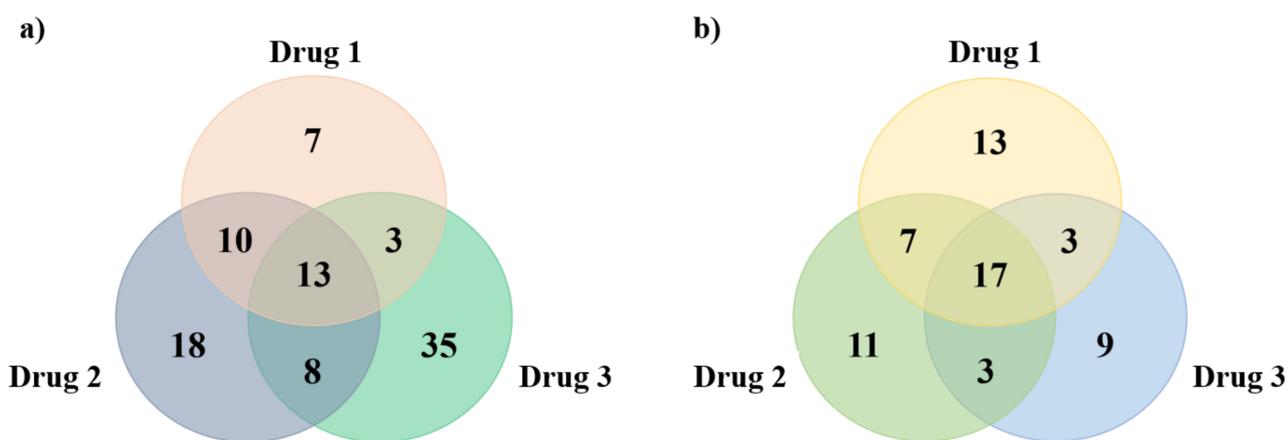


Figure 1. Number of up-regulated (A) and down-regulated (b) proteins after treatment with each of three inhibitors.

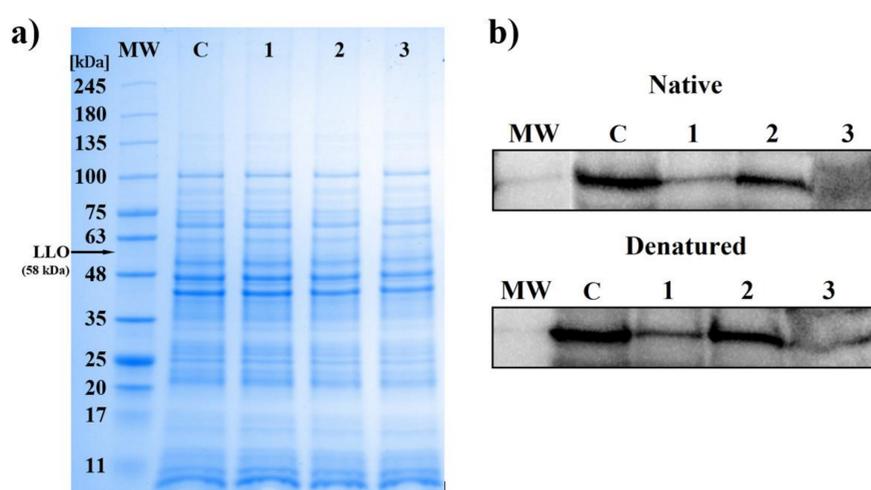
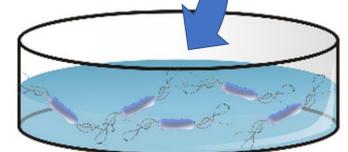


Figure 2. SDS-PAGE of extracted proteins (a) and immunoblots with anti-Listeriolysin O antibody (dilution 1:1000) after SDS-PAGE analysis performed under both non-reducing (Native) and reducing (Denatured) conditions (b). Lane description: MW – molecular weight, C – control, non-treated bacterial lysates, 1-3 – samples from *L. monocytogenes* treated with drugs 1-3.

Table 3. Student's T-test difference LFQ intensity control_LFQ intensity for LLO after treatment of *L. monocytogenes* with tested POD inhibitors

Protein	Uniprot	Drug	Student's T-test difference
Listeriolysin O (LLO)	Q724L1	Drug 1	5.205694198
		Drug 2	7.003893534
		Drug 3	5.367863973

Treatment with three disinfectants based on quaternary ammonium salts (QAC)



Listeria monocytogenes

Identification of differently expressed proteins with LC-ESI-MS/MS

Gene ontology annotations

Biomarker candidate discovery

CONCLUSIONS

LC-MS/MS analysis, followed by gene ontology searching, reveals disturbance in the synthesis of plasma membrane proteins and cell wall proteoglycans in treated samples. Down-regulation of some of key proteins important for bacterial growth, is also observed. Listeriolysin O (LLO), the major virulence factor of *L. monocytogenes*, is significantly down-regulated after treatment with each of the three investigated inhibitors. Significant inhibition of Listeriolysin O suggest that this protein can be used as potential biomarker candidate for food contamination with *L. monocytogenes*.