Sublethal Concentrations Of Antibiotics Cause Shift To Anaerobic Metabolism In Listeria Monocytogenes And Induce Phenotypes Linked To Antibiotic Tolerance - DTU Orbit (07/03/2019)

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Introduction: The foodborne pathogen *Listeria monocytogenes* can cause the severe infection listeriosis, which have up to 20-30% mortality, but if discovered in time, it can be treated with antibiotics. Most antibiotics are bacteriostatic against *L. monocytogenes*. This could be due to the coexistence with antibiotic-producing organisms during its saprophytic lifestyle. To determine if tolerance could be induced or potentially alter virulence, we investigated the transcriptome after exposure to sublethal antibiotic concentrations. Results: Four antibiotics caused induction of the alcohol dehydrogenase gene *lmo1634* and repression of *alsA* and *lmo1992*, which are involved in acetoin production leading to more ethanol and less acetoin production. This shift in central metabolism indicates a shift from aerobic to anaerobic metabolism, that could reduce oxidative stress and be a survival strategy in response to antibiotics. We investigated the antibiotic tolerance of a Δ*lmo1634* mutant, however; it was comparable with the wild-type in a killing assay. *L. monocytogenes* encodes a second alcohol dehydrogenase *lmo1179*, which potentially could cause a redundant pathway and this is under further investigation. The concentration of acetoin and ethanol are also currently under investigation. Conclusions: Consistent with other studies, we hypothesize that *L. monocytogenes* when exposed to antibiotics alters its metabolism from aerobic to anaerobic metabolism, and this could prepare the organism to withstand lethal concentrations of antibiotics.

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