

Assessing the persister state to benzalkonium chloride in *Listeria monocytogenes*

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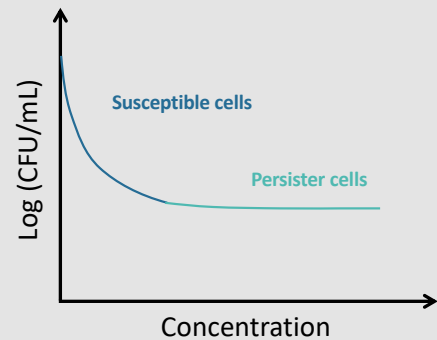
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Introduction

Listeria monocytogenes (Lm) persisters are a subpopulation of growth-arrested cells that possess non-heritable, temporary tolerance to lethal doses of antibiotics (e.g., gentamicin), which can be studied through biphasic killing curves – initial drop of **susceptible cells** followed by a **plateau of persisters** in response to continuous antibiotic exposure or to its increasing concentration.

In the context of food safety, persister cells may contribute to the persistence and survival of bacteria in relevant environments, such as in the food-producing sector. Few studies have been published on Lm persisters and most only address antibiotic exposure, while **information on other stresses that cells are exposed to in these environments (e.g. disinfectants, NaCl concentrations, pH) is lacking.**



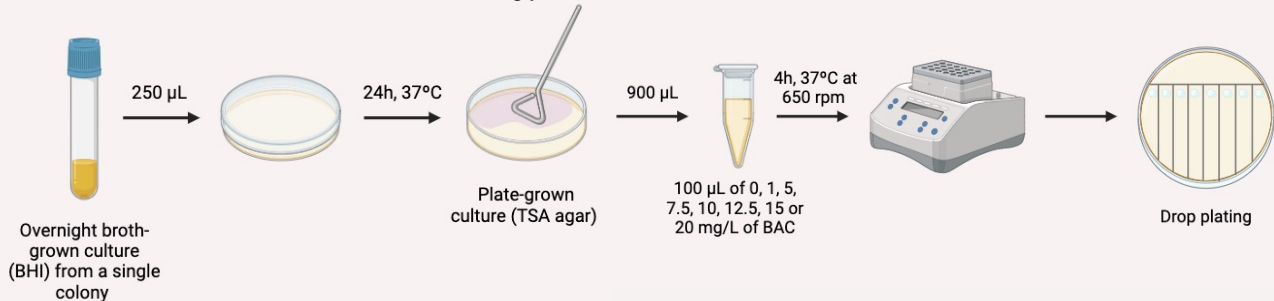
Preliminary objective:



Can persister cells be formed in response to benzalkonium chloride (BAC)?

Methodology

- Determination of BAC concentrations used for selecting persister cells



Results

The dose-dependent killing curves for BAC of four *Lm* strains isolated from a cheese factory, with known minimum inhibitory concentrations (1.25 mg/L), are represented in Figure 1.

All strains show an initial plateau in CFU counts up to 12.5 mg/L, followed by a subsequent decrease and eventual death. This does not correspond to the expected persister curves (described in introduction).

However, it is worth noting that these strains were able to survive in BAC concentrations 10-fold higher than the MIC, which may indicate (i) a tolerance equivalent to that of persister cells; (ii) that these concentrations are below the minimum bactericidal concentration; or (iii) that instead of entering a state of persisters, cells enter a viable but non-culturable state.

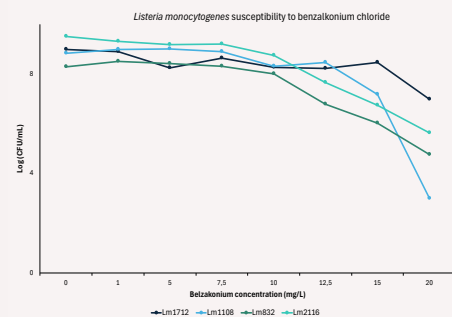


Figure 1. Dose-dependent killing curves to BAC. Two independent assays were performed for each of the four strains.

Conclusion

- **BAC by itself does not induce the persister state of these *Lm* strains.**

- Additional studies are being conducted with different stresses encountered in food processing environments.

References

- Almeida, G. et al. (2013) *Foci of contamination of Listeria monocytogenes in different cheese processing plants* 167
Li, X. et al. (2023) Formation of *Listeria monocytogenes* persister cells in the produce-processing environment, *International Journal of Food Microbiology* 390

Acknowledgements

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