

Effect of increasing gentamicin concentrations on *Listeria monocytogenes* cells viability


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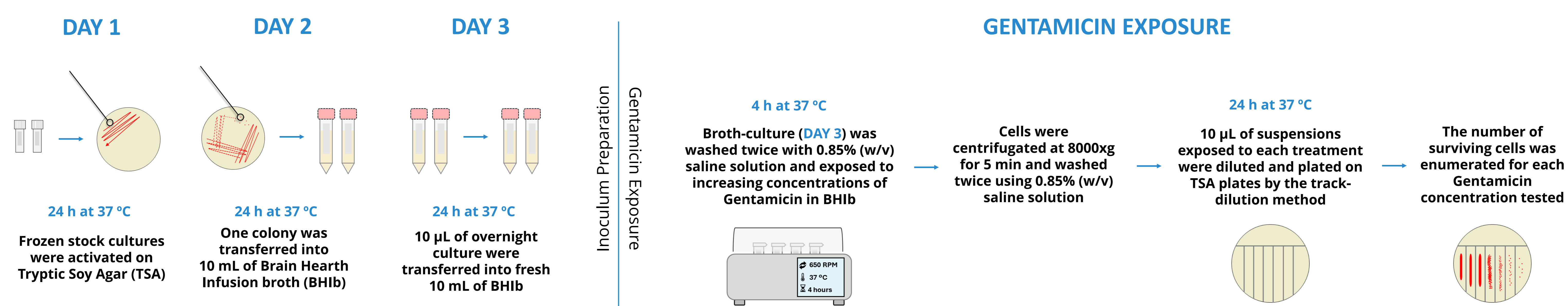
Introduction

Listeria monocytogenes is a notorious foodborne pathogen responsible for listeriosis, a severe bacterial infection primarily affecting individuals with weakened immune systems, including pregnant women, elderly and other immunocompromised persons. Because of its ability to survive harsh environmental conditions, such as refrigeration temperatures and disinfection processes, it can persist in food processing environments, posing a major challenge to the food industry. One possible mechanisms used by *L. monocytogenes* to endure such hostile conditions is formation of persister cells, a subpopulation of cells capable of transiently tolerating bactericidal levels of antimicrobial agents. This tolerant state can be induced by exposing to elevated concentrations of stress-inducing compounds (e.g., antibiotics). When favorable conditions are restored, these cells restore normal metabolic activity.


Objectives

 This study aimed to investigate the impact of gentamicin on the viability of four *L. monocytogenes* strains: Lm 462, Lm 1108, and Lm 1117 (isolated from food products), and Lm 2542 (of clinical origin). All strains used for this work were supplied by the *GenoPhenoTraits4Persistence* project culture collection.

Methods



Results

 **Listeria monocytogenes**
GenoPhenoTraits4Persistence Project

Strain	Lm 462	Lm 1108	Lm 1117	Lm 2542
Origin	Food	Food	Food	Clinical
Sample	Frozen Bread	Dairy (Ready-to-eat)	Dairy (Raw Milk)	Placenta
Characteristics	An isolate with previously detected efflux pumps	An isolate previously identified as a Persistent strain	An isolate previously identified as a Non-Persistent strain	An isolate associated with an outbreak in Portugal

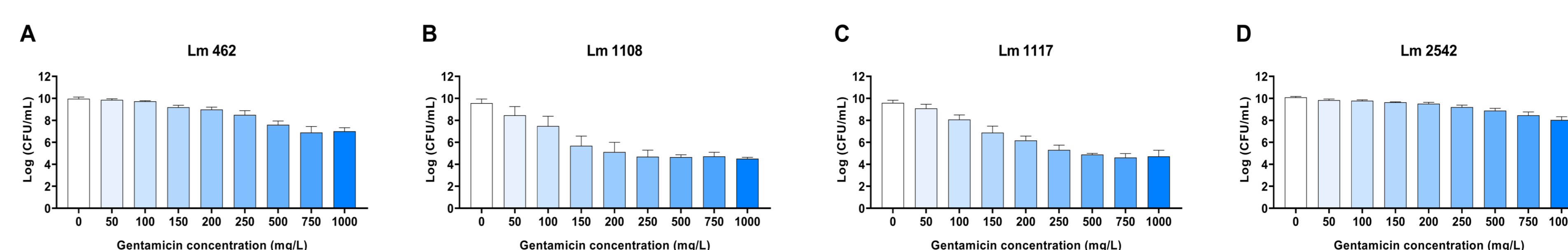


Figure 1 – Effect of gentamicin (0–1000 mg/L, 4 h at 37 °C, 650 rpm) on viability of four *Listeria monocytogenes* strains. results are expressed as mean log(CFU/mL) ± SD (n = 3)

Conclusions

- Among the strains tested, Lm 2542 and Lm 462 showed the greatest tolerance to gentamicin, maintaining counts of 8.03 ± 0.30 and 7.01 ± 0.32 Log (CFU/mL), respectively, at the highest concentration.
- Interestingly, Lm 2542 was linked to a cheese-associated outbreak in Portugal [1] and Lm 462 is known to carry an efflux-pump system [2]; these characteristics might be related to the strains' apparent tolerance.
- In contrast, gentamicin markedly reduced viability of Lm 1108 and Lm 1117, which fell to 4.52 ± 0.12 and 4.71 ± 0.57 Log (CFU/mL) at the same concentration, respectively.
- A biphasic killing curve, a typical pattern of *L. monocytogenes* persister cells selection [3], was observed in both tolerant and susceptible strains following antibiotic exposure.
- To confirm the formation of this persister sub-population, these strains should be exposed and re-exposed to the highest gentamicin concentration used in this study for prolonged periods.
- Future studies should include a larger, more diverse panel of *L. monocytogenes* strains to determine whether the observed resilience reflects strain-specific phenotypic traits or is influenced by the strains' isolation environment.

Acknowledgements

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