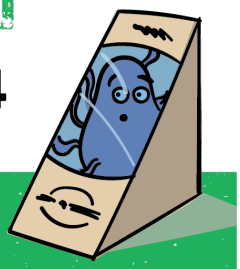
SCIENTIFIC and NETWORKING PROGRAMME

ISOPOL

THE 21st INTERNATIONAL SYMPOSIUM on PROBLEMS of LISTERIA and LISTERIOSIS

NORWICH

10-13th SEPTEMBER 2024



With thanks to our
SPONSORS

GOLD

Biotechnology and Biological Sciences Research Council

Food Standards Agency

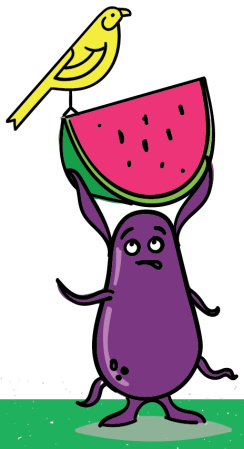
FOOD SAFETY RESEARCH NETWORK

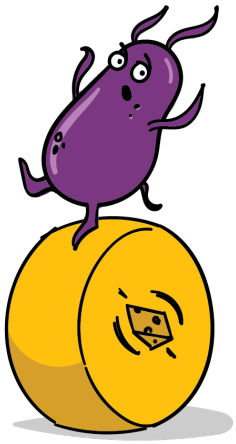
Quadram Institute
Science • Health • Food • Innovation

SILVER

AFFI AMERICAN FROZEN FOOD INSTITUTE

ThermoFisher SCIENTIFIC





BRONZE

CENTRE FOR MICROBIAL INTERACTIONS

UIC UNIVERSITY OF ILLINOIS CHICAGO

Poster 9

Influence of Growth Conditions on the Production and Composition of Extracellular Vesicles from *Listeria monocytogenes*

Yue Liu (1), Arkadiusz Nawrocki (2), Eva Maria Sternkopf Lillebæk (2), Martin Røssel Larsen (2), Tjakko Abee (1), Birgitte Haahr Kallipolitis (2)

1. Food Microbiology, Wageningen University & Research; 2. Department of Biochemistry and Molecular Biology, University of Southern Denmark

Listeria monocytogenes produces extracellular vesicles (EVs), which are nano-sized, spherical particles originated from cell membrane, containing various biomolecules such as proteins, lipids, and nucleic acids. The production and composition of EVs are not only a reflection of the physiological state of the producing bacterium, but also in return influence bacterial ecophysiology by modulating bacteria-bacteria, bacteria-environment, and bacteria-host interactions.

In this study, we explore the influence of growth conditions on the production and protein composition of *L. monocytogenes* EVs. *L. monocytogenes* EGDe was cultivated at 30 °C and 37 °C under anaerobic and aerobic conditions, and cells and EVs were harvested at late-exponential phase.

Relative quantification by membrane staining revealed that anaerobic cultivation at 30 °C resulted in the highest EV production, followed by aerobic cultivation at 30 °C, and then by aerobic and anaerobic cultivations at 37 °C. Comparative proteomic analysis revealed distinct profiles in EVs and cells from different growth conditions. Notably, autolysins are uniquely enriched in EVs at 37 °C, while prophage-related elements including phage holin and endolysin are uniquely enriched at 30 °C, which points to different mechanisms of *L. monocytogenes* EV biogenesis in the tested conditions. Proteins associated with virulence, such as internalins and listeriolysin O, are enriched in 37 °C samples. Notably, this enrichment is more distinct in EVs than in cells, indicating a role of EVs in pathogenesis. In addition, several RNA-binding proteins were uniquely enriched in EVs from anaerobic cultivation at 37 °C, including SpoVG and Zea. In line with this, initial experiments showed increased adhesion of *L. monocytogenes* to Caco-2 cells that were co-incubated with EVs obtained from cells previously grown in anaerobic conditions at 37 °C.

These insights provide promising leads in further investigations into *L. monocytogenes* EVs, including their biogenesis mechanism, RNA cargos and roles in pathogen-host interaction.