

BOOK OF ABSTRACTS

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Good things come in small packages – delivery of vitamin K2 to human cells by extracellular vesicles from *Lactococcus cremoris*

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Themes

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Host Microbe Interactions

Abstract

Vitamin K2 is a lipophilic/hydrophobic vitamin accumulated in the membrane of certain bacteria species, and plays essential roles in human health as a carboxylation co-factor. However, the hydrophobicity of vitamin K2 forms poses challenges to their uptake by target cells of the human host to achieve desired biological function. In this study, lactic acid bacterium *Lactococcus cremoris* has been shown to secrete bacterial extracellular membrane vesicles (EVs) that contain vitamin K2. When these EVs were applied to *in vitro* grown osteosarcoma cells, the carboxylation status of an important calcium-binding bone protein named osteocalcin, increased, indicating functional delivery of bioactive vitamin K2 by bacterial EVs. Notably, the efficiency of vitamin K2 delivery by EVs appeared higher than adding solvent-dissolved pure compounds at similar concentrations. Tests with pharmaceutical inhibitors also revealed that membrane fusion between *L. cremoris* EVs and human cells seemed to be the functional delivery route for EV-associated vitamin K2.

This study provides proof of principle that bacterial EVs are ideal vehicles to deliver lipophilic compounds like vitamin K2 to human cells. Research on EVs produced by bacteria that are key players in dairy/food fermentations, will promote the applications of bacterial EVs in efficient delivery of bioactive, nutritional compounds from the microbial origins to the human host, contributing to improved nutrition and conceivable health benefits.

Keywords

EVs, lipophilic vitamins, delivery vehicles, starter, health