Investigation of the gene expression in *Listeria monocytogenes* after pulsed electric field processing

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Background:
To meet the consumers demand for safe food with fresh-like properties, non thermal preservation techniques such as Pulsed Electric Field (PEF) is a promising alternative method. During PEF, the bacteria are exposed to an electric field greater than 20 kV/cm under short time (µs) resulting in membrane disruption and leakage of intracellular components. Dependent on PEF treatment the bacteria are killed or just injured; in the later case the induced pores in the cell membrane will reseal. In order to develop new processes for safe food it is important to assess cellular mechanisms in the bacteria that are associated with stress, survival and growth. In this study quantitative PCR have been used to study changes in the gene activity in *L. monocytogenes* after PEF treatment. The project HighQ RTE (www.highqrte.eu) is funded by the EU´s 6th Framework Programme´s "Food Quality and Safety" activity.

Objectives:
To investigate the gene expression of *rpoB* and *opuCA* in *L. monocytogenes* after different PEF treatments in phosphate buffer.

Methods:
Gene expression of *L. monocytogenes* Scott A was investigated after three different PEF treatments; 35 kV, 6µs, 3 pulses; 35 kV, 6µs, 5 pulses and 32 kV, 10µs, 5 pulses. Samples for RNA were collected after 6, 15 and 20 min after PEF. Developed quantitative reverse transcription PCR methods specific for *rpoB* (protein synthesis) and *opuCA* (osmoregulation) was used to investigate the gene expressions.

Results:
The highest reduction (1.5 log CFU/ml) of *L. monocytogenes* was achieved when applying PEF treatment of 32kV/cm, 10µs, 5 pulses. After this treatment the *rpoB* expression was slightly down regulated during 20 min after PEF. The opposite effect was however observed after the other two PEF treatments, 35 kV, 6µs, 3 pulses and 35 kV, 6µs, 5 pulses. Here the *rpoB* expression was up regulated, with the highest expression observed after 15 min. At this time the expression had increased 6-fold compared to untreated cells. Also after 20 min the *rpoB* expression was still high; between 4-6 times higher than for untreated cells. Work is in progress to analyse the *opuCA* expression.

Conclusions:
Different PEF treatments affect the *rpoB* expression and subsequently the protein synthesis in *L. monocytogenes* differently.