A targeted gene expression analysis during biofilm formation by *Salmonella enterica* on stainless steel surfaces

Agapi I Doulgeraki[1], Henri Ntoulati[2], Efstathios Giaouris[2], George-John E. Nychas[1]

[1]Department of Food Science and Human Nutrition, Laboratory of Microbiology and Biotechnology of Foods, Agricultural University of Athens (AUA), Iera Odos 75, Athens, 11855, Greece
[2]Department of Food Science and Nutrition, University of the Aegean, Mitropoliti Ioakeim 2, Myrina, 81400, Lemnos Island, Greece

Salmonella enterica is one of the most important foodborne pathogens. It is able to colonize various niches in diverse habitats, while numerous studies have shown that it can easily attach to a variety of food contact surfaces and create biofilms. Compared to their suspended counterparts, sessile cells normally exhibit an altered phenotype with respect to growth rate, antimicrobial resistance and gene transcription. However, the exact molecular mechanisms behind *Salmonella* surface-associate lifestyle are not fully elucidated. To this direction, in the present study, the expression of 14 genes was comparatively evaluated between planktonic and biofilm cells of *S.* Enteritidis. These genes were selected based on previous knowledge on their putative involvement in stress related mechanisms and other colonization implications. Biofilms were left to be formed on stainless steel coupons incubated under static conditions in brain heart growth medium at either 10 or 20°C for 6 days (144 h). Results revealed significant differential expression for the genes studied between the two growth modes (planktonic, sessile). Surprisingly, the effect of growth temperature on gene expression of biofilm cells was not as evident, despite the fact that 1 log cfu/cm^2 difference in sessile population density was observed between 10 and 20°C. Further work combined with translation studies will help us to unravel the contribution of these genes in biofilm formation by this pathogen. Such knowledge could be useful in designing food safety intervention techniques to reduce public health hazards.

Acknowledgments
This work was found by the action THALIS: "*Biological Investigation Of the Forces that Influence the Life of pathogens having as Mission to Survive in various Lifestyles; BIOFILMS*", falls under the Operational Programme (OP) "Education and Lifelong Learning (EdLL)" and is co-financed by the European Social Fund (ESF) and National Resources

Keywords: *Salmonella*, biofilm formation, gene expression, stress response, energy metabolism