THE EFFECT OF TEMPERATURE AND SODIUM CHLORIDE ON THE GROWTH OF *LISTERIA MONOCYTOGENES*

Sabrine Labidi

Dr. Gabriella Kiskó ; Dr. Csilla Mohácsi-Farkas

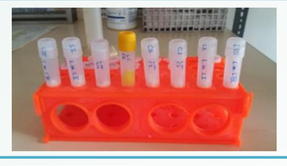
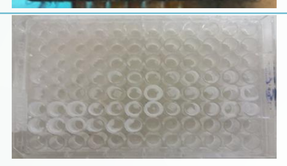
Hungarian University of Agriculture and Life Sciences (MATE), Institute of Food Science and Technology,
Department of Food Microbiology, Hygiene and Safety, Somlói st 14–16,
HU-1118 Budapest, Hungary

Introduction

Listeria species are widespread in the environment, including soil, raw foods, stream water, plants, animals, and it also commonly colonize the food processing environment and ready-to-eat products, and contaminate deli meats, seafood, and dairy products. In 2016, the European Food Safety Authority described more than 2500 cases of listeriosis, with 247 deaths (EFSA, 2017). Biofilm formation allows bacteria to survive in unfavourable conditions and be persistent in food processing environments. In case when biofilms contain pathogenic bacteria it could cause contamination of food products and food-borne outbreaks. To control the biofilm formation several methods are used such as low temperature and high concentration of sodium chloride.

Therefore, our aim is to study the effect of temperature and sodium chloride on *Listeria monocytogenes* strains and their associated biofilms.

Materials and method

Two *Listeria monocytogenes* isolates were selected for this study.	
Fresh cultures were prepared in Trypto-Casein Soy Broth (TSB) cultivated at 37 °C for 24 hours.	
Laboratory-generated biofilms were grown in an ELISA titer plate with a final volume of 200 µL of M9 minimal media.	

In order to study the response of *L. monocytognes* strains towards NaCl and temperature :

- 15% of Sodium Chloride in the composition of M9 Minimal medium was used.
- The plates were incubated for 7 days at 1°C.

Results and Discussion

❑ Biofilm formation of two *Listeria monocytogenes* strains was analyzed in M9 Minimal Medium with 15% of Sodium Chloride , which results are shown in Figure 1.

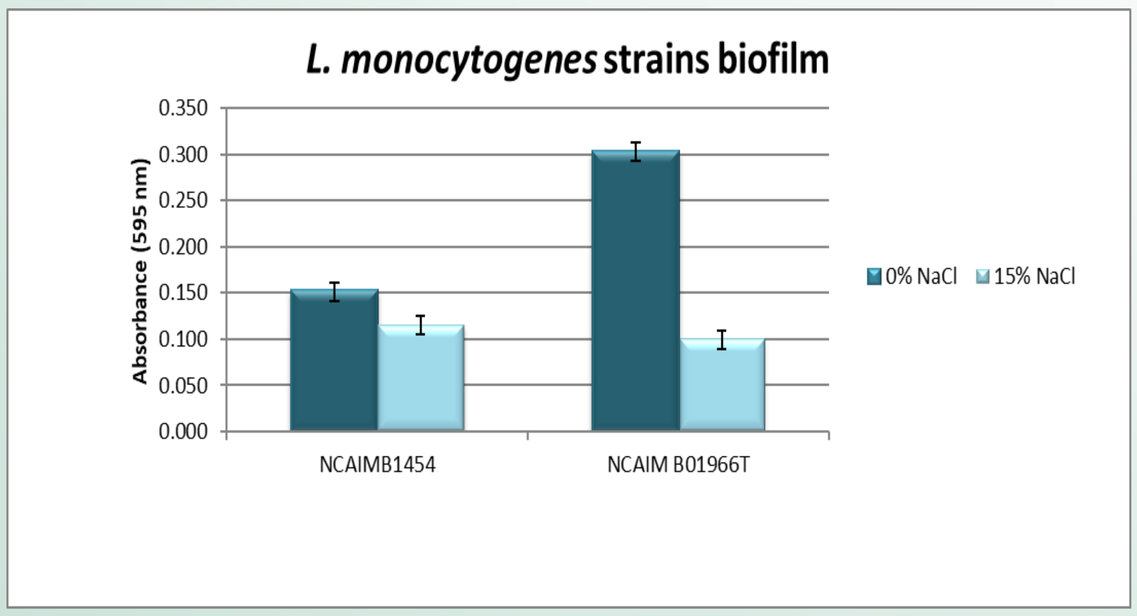


Figure 1. Biofilm formation of *L. monocytogenes* strains under 0% and 15% of Sodium Chloride

Without NaCl, *L. monocytogenes* NCAIM B01966T formed the highest amounts of biofilm (OD595 > 0.250), while the weakest biofilm-forming strain found to be *L. monocytogenes* NCAIMB1454 showing an OD595< 0.200 under the same conditions.

We can notice that the two strains of *L. monocytogenes* formed biofilm in a lesser extent when 15% of NaCl is added. The biggest decrease of biofilm formation was observed at *L. monocytogenes* NCAIMB01966T, where the OD_{595} which was higher than 0.300 dropped to 0.100 at 15% NaCl concentration.

❑ Biofilm formation of two *Listeria monocytogenes* strains was analyzed in M9 Minimal Media and incubated at 1°C, which results are shown in Figure 2.

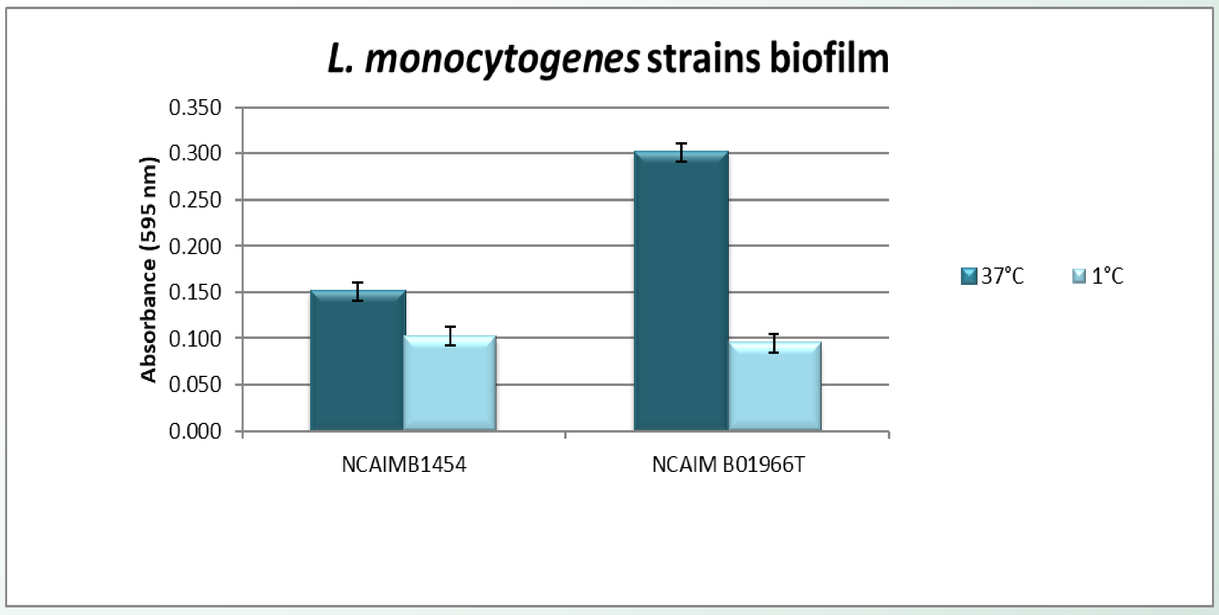


Figure 2. Biofilm formation of *L. monocytogenes* strains under 37°C and 1°C

It could be noticed that *L. monocytogenes* strains formed decreasing amounts of biofilm when treated with low temperature (1°C). In case of *L. monocytogenes* NCAIM B01966T, where the OD595 was higher than 0.250 at 37°C dropped to less than 0.100. However, the weak biofilm-forming strain NCAIMB1454 was less sensitive to the temperature than the strong biofilm-forming strain NCAIM B01966T.

Conclusion

As. our preliminary studies showed, 15% of NaCl and low temperature (1°C) accentuates the inhibition of *L. monocytogenes*, and it decreased their associated biofilms. However, the weak biofilm-forming strain was less sensitive to the temperature than the strong biofilm-forming strain.

Acknowledgement

The authors acknowledge the Hungarian University of Agriculture and Life Sciences's Doctoral School of Food Science for the support in this study. The Project was supported by the European Union and co-financed by the European Social Fund (grant agreement no. EFOP-3.6.3-VEKOP-16-2017-00005).