Effects of short chain fatty acids on *Aliarcobacter butzleri*'s virulence

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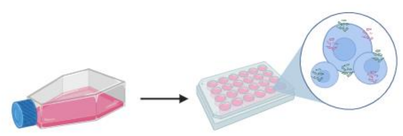
Introduction

Short chain fatty acids (SCFA) are a key factor in maintaining intestinal and metabolic health. They are formed through the microbial fermentation of indigestible carbohydrates and show an increase concentration-wise along the intestine.[1] *Aliarcobacter butzleri* is an emerging enteropathogen found in food and water and when ingested encounters SCFA in the intestine that may influence its virulence and survival [2,3]

Aim: To understand the effects of SCFA on *Aliarcobacter butzleri*'s virulence, using eight strains isolated from different sources (human, environment, food).

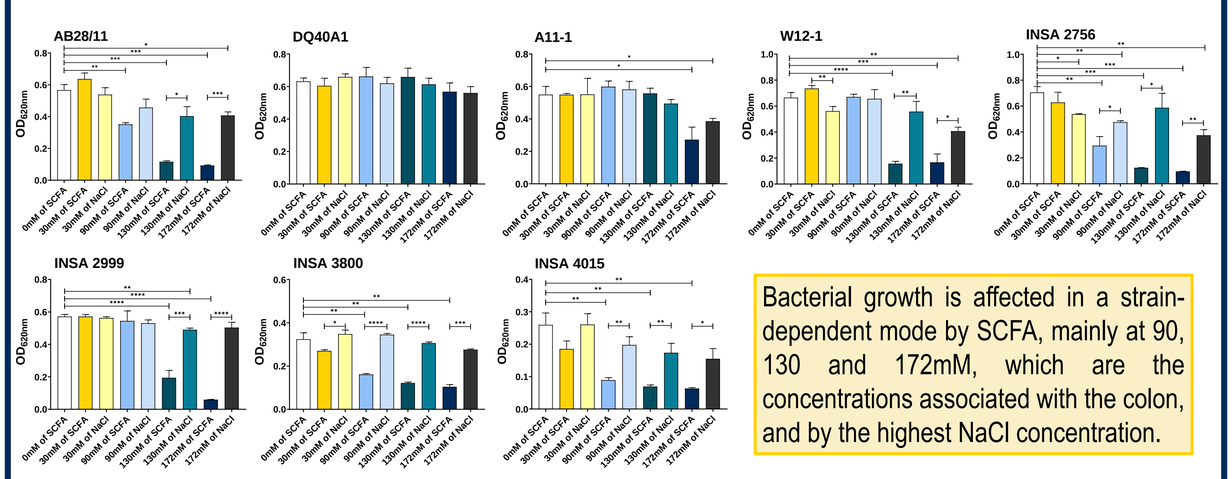
Methodology

- Bacterial Growth
- Motility Evaluation
- Biofilm formation
- Putative virulence gene expression
- Adhesion and invasion to Caco-2 cells



Results

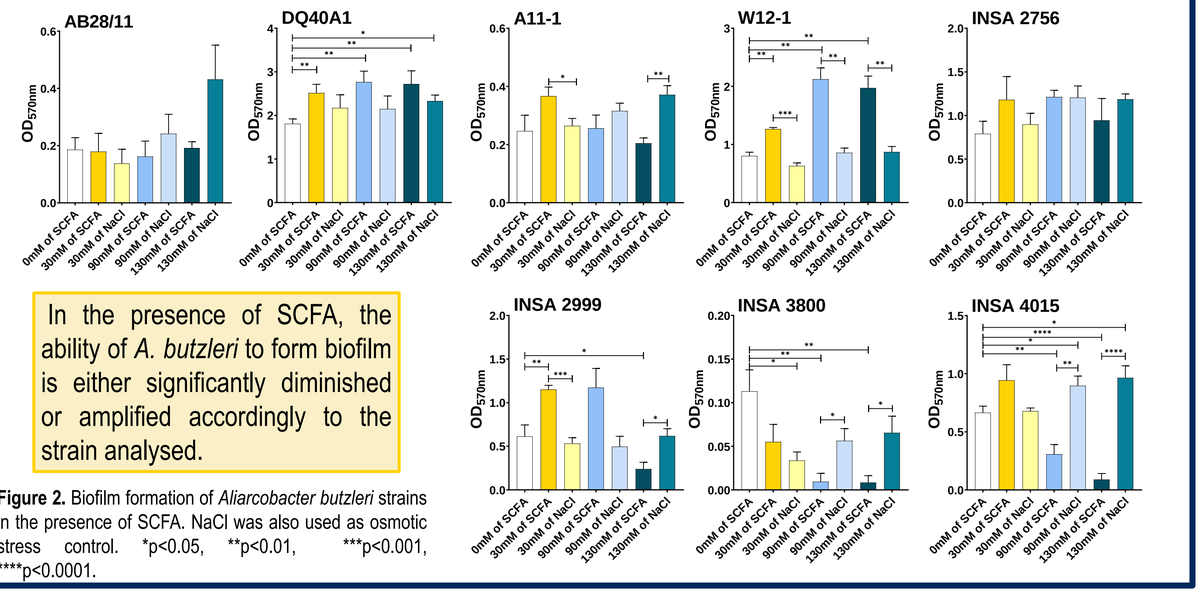
Bacterial Growth



Bacterial growth is affected in a strain-dependent mode by SCFA, mainly at 90, 130 and 172mM, which are the concentrations associated with the colon, and by the highest NaCl concentration.

Figure 1. Bacterial growth of *Aliarcobacter butzleri* strains in the presence of different concentrations of SCFA at 24 hours. NaCl was also used as osmotic stress control. *p<0.05, **p<0.01, ***p<0.001, ****p<00001.

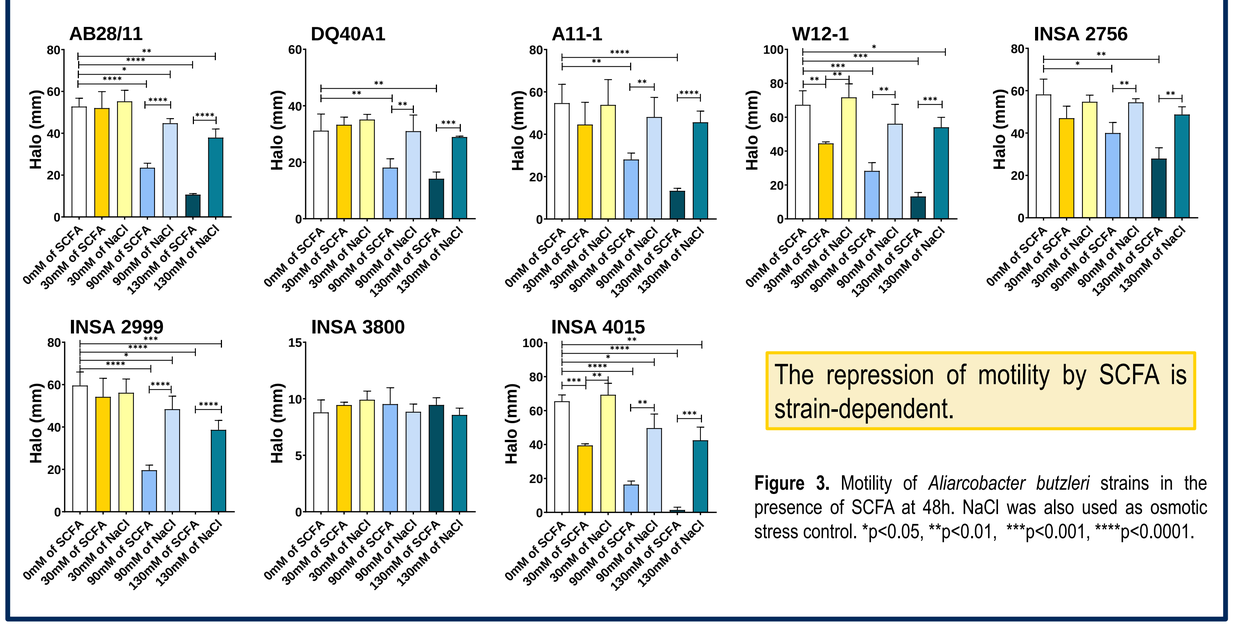
Biofilm Formation



In the presence of SCFA, the ability of *A. butzleri* to form biofilm is either significantly diminished or amplified accordingly to the strain analysed.

Figure 2. Biofilm formation of *Aliarcobacter butzleri* strains in the presence of SCFA. NaCl was also used as osmotic stress control. *p<0.05, **p<0.01, ***p<0.001, ****p<0.0001.

Motility Evaluation



The repression of motility by SCFA is strain-dependent.

Figure 3. Motility of *Aliarcobacter butzleri* strains in the presence of SCFA at 48h. NaCl was also used as osmotic stress control. *p<0.05, **p<0.01, ***p<0.001, ****p<0.0001.

Gene Expression

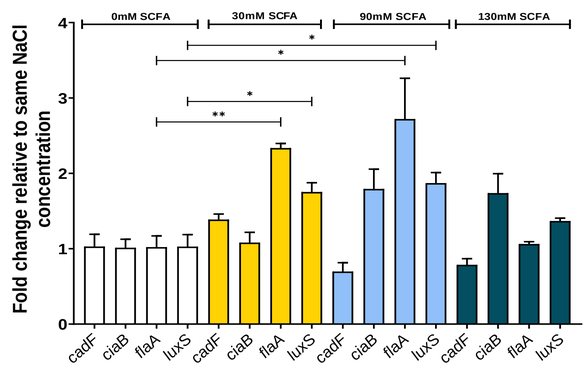


Figure 4. Expression of virulence genes in *Aliarcobacter butzleri's* DQ40A1 strain in the presence of SCFA. NaCl was also used as osmotic stress control. *p<0.05 and **p<0.01

Transcriptional analysis of *A. butzleri* in SCFA revealed an up-regulation of *flaA* and *luxS* genes, involved in motility, biofilm or celular infection and regulation of virulence factors.

Adhesion and Invasion

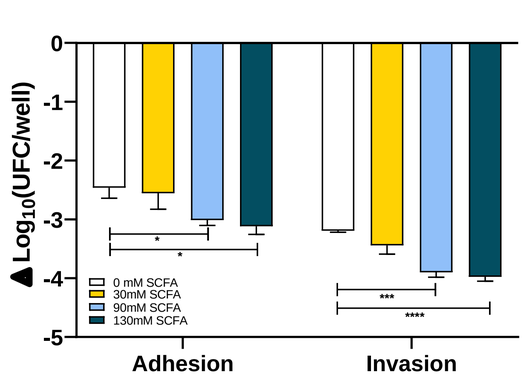


Figure 5. Adhesion and invasion of *Aliarcobacter butzleri's* DQ40A1 strain to Caco-2 cells in the presence of SCFA. *p<0.05, ***p<0.001, ****p<0.0001.

The bacterium's ability to adhere and invade Caco-2 cells seems to be reduced in the presence of SCFA.

Conclusions

✓ **The results suggest that SCFA may have a role in modulating *A. butzleri*'s survival and virulence**

Acknowledgments

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