

# ANALYSIS OF PROBIOTIC BACTERIA *LACTICASEIBACILLUS PARACASEI* SMALL RNAs INVOLVED IN STRESS RESPONSE

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One of lactic acid bacteria that can be found in human body is *Lacticaseibacillus paracasei*, which is also present in fermented foods such as cheese or pickles. It is a probiotic bacterium that balances the microbial flora to improve digestion and fortify the immune system. Notably, *L. paracasei* is resistant to a variety of stressors, including acidic conditions and bile salts, which is essential for survival in the gastrointestinal tract [1]. These bacteria adapt to various unfavourable situations by using elaborated mechanisms. One of these is the interaction of small regulatory RNAs (sRNAs) with messenger RNAs of bacterial proteins that are important for antimicrobial resistance.

sRNAs are RNA molecules that control gene expression in bacteria mainly at a post-transcriptional level. These RNAs are typically 50 to 500 nucleotides long and act by base-pairing with target mRNAs, thereby altering their translation and stability [2]. There are different sRNAs that can collectively regulate the expression of many different genes, but for the purpose of this work, it is important to study those sRNAs that modulate the expression of genes contributing to resistance in bacteria.

Therefore, scientists from the Department of Biological DNA Modification performed RNA sequencing of *L. paracasei* RNA and identified the sRNAs whose expression was altered by the tested stress factors (NaCl, bile salt, H<sub>2</sub>O<sub>2</sub>, lactic acid, penicillin G). Eight sRNAs (sLCB2601+, sLCB649-, sLCB1691-, sLCB2636-, sLCB3045+, sLCB250-, sLCB457-, sLCB652-) were selected from the list to be further analysed in this study. Plasmids enhancing their expression were inserted into *L. paracasei*, the serial dilutions of which were spotted on stressor-supplemented agarose medium. The grown colonies were compared with control *L. paracasei* bacteria in which the sRNA-free plasmid was inserted.

In conclusion, this study focused on the effect of increased expression of sRNAs on bacterial resistance to various stressors. The results obtained may contribute to the understanding of the adaptation of *L. paracasei* to environmental conditions, which is important for the improvement of probiotic products.

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[1] Hill, D., Sugrue, I., Tobin, C., Hill, C., Stanton, C., Ross, R. P. (2018). The Lactobacillus casei Group: History and Health Related Applications. *Frontiers in Microbiology*, 9, 2107. <https://doi.org/10.3389/fmicb.2018.02107>

[2] Gottesman, S., Storz, G. (2011). Bacterial Small RNA Regulators: Versatile Roles and Rapidly Evolving Variations. *Cold Spring Harbor Perspectives in Biology*, 3(12), a003798. <https://doi.org/10.1101/cshperspect.a003798>