

Project 3

Title: Structure/function relationships of the major glucose transporter in *Lactococcus lactis*

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Host laboratory: Lactic Acid Bacteria & in vivo NMR

Short description:

Lactococcus lactis is an industrially relevant microorganism used worldwide in food fermentations, and is one of the best characterized species of the lactic acid bacteria. In view of its economical value, the genetics and physiology of *L. lactis* have been studied extensively, generating a large body of metabolic information and a battery of genomic and genetic tools. The technological breakthroughs in functional genomics, combined with a “generally recognized as safe” (GRAS) status, a relatively simple metabolism, a small genome, and rapid growth, make *L. lactis* an ideal host for the production of valuable ingredients for the industry (food and pharmaceutical).

Glucose is abundant in nature, reasonably cheap, and has been the substrate of choice for the production of high-value metabolites or proteins by *L. lactis*, since it supports high growth rates and biomass yields. A deep understanding of glucose uptake in *L. lactis* might contribute to increase the production yield of biotechnological valuable compounds. We have selected *L. lactis* mutant strains affected in glucose transport, namely uptake rate, affinity and anomeric preference. We found random point mutations that result in single amino changes in the major glucose uptake system of *L. lactis*. In this project, we propose to establish the significance of these mutations to the observed patterns of glucose utilization. To this end, new strains with point mutations will be introduced in the genome using appropriate molecular techniques. Glucose metabolism will be studied by in vivo NMR and the kinetic properties for glucose uptake determined. The feasibility of employing strains with altered glucose transport properties for metabolic engineering of health-promoting plant metabolites will be accessed.

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Duration: 1 year.