

Oral Presentation

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NIisin Controlled gene Expression (NICE) in *Lactococcus lactis* - versatile applications ranging from membrane proteins to large scale processes

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Background

Lactococcus lactis is one of the best studied bacteria. After its isolation more than 100 years ago, it first received attention as dairy bacterium because of its importance in cheese and butter fermentations. Following the development of genetic engineering, it quickly became the paradigm lactic acid bacterium. Today the genomes of three different strains of the genus *L. lactis* are elucidated and prototype genome-based complete metabolic models are developed. The development of the NIisin Controlled gene Expression (NICE) system about 10 years ago greatly facilitated progress in many areas of research not only in *Lactococcus* itself, but also in all other lactic acid bacteria.

Results

The NICE system is a straightforward, easy to use system (plug-and-play genetic toolbox) for strictly controlled expression of homologous and heterologous genes. The advantages of *L. lactis* as gene expression system over e.g. *E. coli* are that it is food grade (including the selection marker), does not produce endotoxins or inclusion bodies, it has very low protease activity, does not sporulate and it has only one membrane. At present, the NICE system is quickly growing into an important tool for expressing and studying prokaryotic and eukaryotic membrane proteins. Furthermore, the NICE system is growing beyond its initial role as a research tool and is used for the production of oral and live vaccines and for the large scale production (3000 L) of pharmaceutical proteins such as lysostaphin.

Conclusion

The presentation will describe the principle of the NICE system, give an overview of current applications and an outlook on future developments