Fermentation of food products: optimised lactic acid bacteria strains with reduced potential to accumulate biogenic amines

Results in Brief

Molecule transporters in food spoilage

Biogenic amines are a common source of spoilage in fermented foods and beverages. Research scientists have investigated an important component of the biochemical pathway involved in their production.

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Lactic acid bacteria (LAB) are used in the fermentation of foods like yogurt, sauerkraut and sausage. One of their metabolic pathways produces carboxylic acids from carbohydrates. In milk products for example lactose is converted to lactic acid. The acidic nature of the milk is a preservative as most of the other microbes it contains are not so acid resistant.

Of course, LABs have many complex pathways, some of which are not so desirable. One of these is the production of biogenic amines (BAs). Generally, these are the result of the conversion of an amino acid to its corresponding amine, a classic one being histidine to histamine. The biochemical reason behind these particular pathways is energy production.

The European funded project DECARBOXYLATE aimed to study the pathways

involved, the ultimate goal being to develop strains unable to produce biogenic amines. A project team from the University of Groningen in the Netherlands studied molecular components of two types of energy producing pathways, proton motive force and that involving the energy storage molecule ATP (adenosine triphosphate). Regardless of the mode of energy production, there is always a transporter molecule involved in the process. This is responsible for uptake of a precursor molecule and excretion in the cell of the final biogenic amine.

The scientists studied three of these so-called precursor/product exchangers - histidine/histamine, tyrosine/tyramine and agmatine/putrescine. Putrescine, aptly named, gives rise to the rotting smell of decaying meat. Using state of the art techniques, the transporters were identified, characterised for their molecular weight and their mode of action studied.

The genes responsible for the transporters were cloned on transportable pieces of DNA, plasmids. These special plasmids encoded the genes to produce the transporter molecule plus a chemical tag that helps to identify the molecule during study. These plasmids were then transformed into a common LAB, a Lactobacillus, and observed. Control cells were used as a means of comparison of activity.

The results of this work form an important basis for further study of biogenic amine production in food processing. The outcome will be safer, amine free food and a more competitive European food production market.

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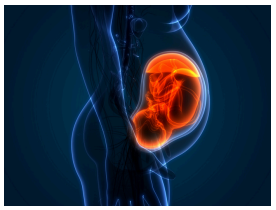

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Project Information

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