P329. The L-arabinose isomerase from the food grade *Bacillus subtilis* for the production of tagatose: a natural sweetener

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The increasing concern about adverse health impacts from excessive sugar consumption is the main driving force for the replacement of simple sugar by natural sweeteners (1). Tagatose is a hexose monosaccharide rarely found in nature, namely in some fruits and dairy products. This rare sugar represents a promising sweetener due its low calorie content (1.5 – 2.5 kcal/g), sweetness profile similar to sucrose and prebiotic and anticariogenic properties (2-3).
Biotechnological production of tagatose by enzymatic isomerization arises as alternative to chemical processes. L-arabinose isomerase (L-AI, EC 5.3.1.4) catalyses the conversion of arabinose into ribulose as well as galactose into tagatose. Several L-AIs from different microorganisms have been proposed for bioproduction of tagatose, however the L-AI from *Bacillus subtilis* (BS-L-AI) was reported with unique substrate specificity for L-arabinose and therefore unable to produce tagatose (4).
In this work the *araA* gene encoding L-AI from the food-grade *Bacillus subtilis* (BS-L-AI) was cloned and overexpressed in *Escherichia coli*. The recombinant enzyme was purified and characterized. BS- LAI exhibited maximal activity at 42 °C and pH 7.5 and showed superior thermostability at 32 °C. The enzyme (7mg/mL) was able to convert galactose into tagatose with a maximum conversion yield of 55%. Interestingly, and in contrast with previous studies, our results demonstrated the BS-L-AI production capacity and its potential as biocatalysts for the natural sweetener production.

References
[1] Toews et al. (2019) BMJ 364
[2] Xu et al. (2018) Trends Food Sci. Technol. 78:25–33
[3] Liu et al. (2019) Nat. Commun. 10:1356
[4] Kim et al. (2010) Appl Microbiol Biotechnol 85:1839–1847

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