Development of sucrose-utilizing *Escherichia coli* K-12 strain by cloning β-fructofuranosidases

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Sucrose is a promising carbon source for industrial fermentation. To achieve sucrose catabolism, the sucrose utilization operons are introduced into microorganisms that are unable to utilize sucrose. However, the rates of growth and sucrose uptake in these engineered strains were relatively low to be successfully employed for industrial applications. Here, we report an example of developing sucrose-utilizing microorganisms using *Escherichia coli* K-12. The sucrose utilizing ability was acquired by introducing β-fructofuranosidase from 3 different sucrose-utilizing organisms (*Mannheimia succiniciproducens*, *E. coli* W and Bacillus subtilis). Among them, the *M. succiniciproducens* β-fructofuranosidase was found to be the most effective for sucrose utilization. Analyses of the underlying mechanism revealed that sucrose was hydrolyzed into glucose and fructose in the extracellular space and the liberated sugars could be transported by their respective uptake systems in *E. coli* K-12. [This work was supported by the Advanced Biomass R&D Center (ABC) of Korea Grant funded by the MEST (2010-0029799). Further supports by the WCU Program (R32-2008-000-10142-0) of the MEST were appreciated.]