Production of 1,3-Propanediol from glucose using Klebsiella pneumoniae

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With the advancement of a biodegradable and biocompatible polyester composed of 1,3 propanediol (1,3-PD), the bioconversion of glycerol and/or glucose to 1,3-PD has gained great attention.
However, no natural microorganisms that could directly convert glucose into 1,3-PD have been found so far. Glucose is a simple and highly preferred carbon and energy source. Furthermore, cellulosic biomass is composed of various carbohydrates source among which glucose is the most prominent. However, there are few studies regarding the utilization of glucose for 1,3-PD production. This work aims at developing strains that can convert glucose to 1,3-PD. Two genes encoding glycerol-3-phosphate dehydrogenase and glycerol-3-phosphatase, responsible for glycerol production from glucose, were expressed successfully along with deletion of both aerobic and anaerobic glycerol assimilation pathways in Klebsiella pneumoniae J2B. Then, production of glycerol and 1,3-PD was studied using several recombinant strains developed in this study. In addition, the further approaches to the problems identified in this study is being investigated.