Pathway Rebalancing for 3-Hydroxypropionic acid production in engineered *Escherichia coli*

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3-Hydroxypropionic acid (3-HP), which can be converted into many chemicals such as acrylic acid, acrylamide, and propiolactone, is an important platform chemical. It can be biologically produced from glycerol by two consecutive enzymatic reactions, dehydration of glycerol to 3-hydroxypropionaldehyde (3-HPA) and oxidation of 3-HPA. The pathway has been proved efficient, but imbalance between the rates of the two enzymatic reactions often results in the accumulation of the toxic 3-HPA, which severely reduces cell viability and 3-HP production. In this study, we used UTR engineering to maximally increase the activities of glycerol dehydratase (GDHt) and aldehyde dehydrogenase (ALDH) for the high conversion of glycerol to 3-HP. Thereafter, the activity of GDHt was precisely controlled to avoid the accumulation of 3-HPA by varying expression of dhaB1, a gene encoding a main subunit of GDHt. The optimally balanced *E. coli* HGL_DBK4 showed a substantially enhanced 3-HP titer and productivity compared with the parental strain. Especially, the yield on glycerol in a fed-batch experiment was the highest ever reported.