

Fine tuning of glyoxylate cycle for production of tyrosine from acetate in *Escherichia coli*

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Acetate is one of promising feedstocks owing to its cheap price and great abundance. Considering that tyrosine production is gradually shifting to microbial production method, its production from acetate can be attempted to further improve the economic feasibility. Here, we engineered a previously reported strain, SCK1, for efficient production of tyrosine from acetate. Initially, the acetate uptake and gluconeogenic pathway were amplified to maximize the flux toward tyrosine. As flux distribution between glyoxylate and TCA cycles is critical for efficient precursor supplementation, the activity of the glyoxylate cycle was precisely controlled by varied expression of isocitrate lyase. Consequently, the engineered strain with optimal flux distribution produced 0.70 g/L tyrosine with 20% of the theoretical maximum yield (1.6-fold and 1.9-fold increase, respectively). This is the first demonstration of tyrosine production from acetate and our strategies would be widely applicable to the production of various chemicals from acetate in future.