

Precise tuning of central metabolism for itaconate production from acetate

문조현, 정규열<sup>†</sup>, 노명현, 임현규  
포항공과대학교

(gyjung@postech.ac.kr<sup>†</sup>)

Utilization of abundant and cheap carbon sources can effectively reduce the production cost and enhance the economic feasibility. Acetate is a promising carbon source to achieve cost-effective microbial processes. In this study, we engineered an *Escherichia coli* strain to produce itaconic acid from acetate. Since acetate is known to inhibit cell growth, we initially screened for a strain with a high tolerance to 10 g/L of acetate in the medium, and the W strain was selected as the host. Subsequently, the WC strain was obtained by overexpression of *cad* (encoding *cis*-aconitate decarboxylase) using a synthetic promoter and 5' UTR. However, the WC strain produced only 0.13 g/L itaconic acid because of low acetate uptake. To improve the production, the acetate assimilating pathway and glyoxylate shunt pathway were amplified by overexpression of pathway genes as well as its deregulation. The resulting strain, WCIAG4 produced 3.57 g/L itaconic acid (16.1% of theoretical maximum yield) after 88 h of fermentation with rapid acetate assimilation. These efforts support that acetate can be a potential feedstock for biochemical production with engineered *E. coli*.