

### Precise-tuning of glyoxylate cycle for efficient chemical production

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The glyoxylate cycle is a bypass of the TCA cycle without carbon loss and enables microorganisms to utilize simple organic compounds as their sole carbon source. Despite these characteristics, engineering strategies based on the cycle have been limited a few; the inactivation of a transcriptional regulator (*iclR*) which represses the expression of *aceBAK* in the cycle. Here, we have devised a novel strategy to precisely regulate the glyoxylate cycle rather than the simple amplification. The activity of isocitrate lyase (*aceA*) was taken under control for the overall regulation of the glyoxylate cycle considering its thermodynamic properties. The strategy has been successfully applied to the production of valuable chemicals in *Escherichia coli*. This is the first attempt to precisely control the glyoxylate cycle, and the results suggest that elaborate tuning of the cycle can be a powerful strategy to facilitate production of many other chemicals.