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Acceleration of glycolysis and D-lactate production by novel global metabolic engineering in yeast

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The use of renewable feed-stocks for producing biofuels and bio-based chemicals by engineering metabolic pathways of yeast *Saccharomyces cerevisiae* has recently become an attractive option. Many researchers attempted to accelerate glycolysis by over-expressing some glycolytic enzymes because most target bio-based chemicals are derived through glycolysis. However these attempts have met with little success. In this study, to create a *S. cerevisiae* strain with high glycolytic flux, we used multi-copy integration to develop a novel global metabolic engineering strategy. Then a novel global metabolic engineering strategy was applied for D-lactate production. Among approximately 350 metabolically engineered strains, YPH499/dPdA3-34 exhibited the highest glucose consumption rate. This strain showed 1.3-fold higher cell growth rate and glucose consumption rate than the control strain YPH499/dPdAW. Real-time PCR analysis revealed that transcription levels of glycolysis-related genes such as *HXK2, PFK1, PFK2, PYK2, PGI1* and *PGK1* in YPH499/dPdA3-34 were increased. Besides, by using global metabolic engineering strategy, D-lactate was efficiently produced. This study successfully developed a novel global metabolic engineering strategy for *S. cerevisiae*, improving glucose consumption rate through optimizing the expression of glycolysis-related enzymes. The method detailed here is a promising approach to optimize *S. cerevisiae* metabolic pathways, thereby improving bio-based chemicals production using this organism.

Biography

Ryosuke Yamada has completed his PhD and Postdoctoral studies from Kobe University, Japan. He has then joined as an Assistant Professor at Osaka Prefecture University, Japan. He has published more than 35 papers in journals related to applied microbiology and biochemical engineering.

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