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# Enhanced butyric acid production in *Clostridium tyrobutyricum* by overexpression of rate-limiting enzymes in the Embden-Meyerhof-Parnas pathway

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## Highlights

- *C. tyrobutyricum* was engineered to enhance the Embden-Meyerhof-Parnas pathway.
- Overexpression of *pfkA* and/or *pykA* could increase the NADH and ATP levels.
- The recombinant strains exhibited enhanced resistance to butyric acid and glucose.
- 48.2 g/L butyrate at a productivity of 0.50 g/L·h and yield of 0.38 g/g was obtained.

## Abstract

*Clostridium tyrobutyricum* is an excellent microorganism for bio-based butyric acid production. However, the main obstacles for its industrialization are low butyric acid