Metabolic engineering of *Clostridium acetobutylicum* for enhanced butyric acid production

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Butyric acid is one of major products in the fermentation of clostridia. In this work, *C. acetobutylicum* was metabolically engineered for highly selective butyric acid production. For this purpose, the second butyrate kinase of *C. acetobutylicum* encoded by the *bukII* gene instead of butyrate kinase I encoded by the *buk* gene was employed. Furthermore, metabolic pathways were engineered to further enhance the NADH-driving force. Batch fermentation of the metabolically engineered *C. acetobutylicum* strain resulted in the production of 32.5 g/L of butyric acid with a butyric-to-acetic acid ratio (BA/AA ratio) of 31.3 g/g from 83.3 g/L of glucose. These results suggested that the buk gene knockout was essential to get a high butyric acid selectivity to acetic acid in *C. acetobutylicum*.
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