Proteomic Analysis on Acetate Metabolism in Citrobacter sp. BL-4

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Abstract:

Mass production of glucosamine (GlcN) using microbial cells is a worthy approach to increase added values and keep safety problems in GlcN production process. Prior to set up a microbial cellular platform, this study was to assess acetate metabolism in Citrobacter sp. BL-4 (BL-4) which has produced a polyglucosamine PGB-2. The LC-MS analysis was conducted after protein separation on the 1D-PAGE to accomplish the purpose of this study. 280 proteins were totally identified and 188 proteins were separated as acetate-related proteins in BL-4. Acetate was converted to acetyl-CoA by acetyl-CoA synthetase up-regulated in the acetate medium. The glyoxylate bypass in the acetate medium was up-regulated with over-expression of isocitrate lyases and 2D-PAGE confirmed this differential expression. Using 1H-NMR analysis, the product of isocitrate lyases, succinate, increased about 15 times in the acetate medium. During acetate metabolism proteins involved in the lipid metabolism and hexosamine biosynthesis were over-expressed in the acetate medium, while proteins involved in TCA cycle, pentose phosphate cycle and purine metabolism were down-regulated. Taken together, the results from the proteomic analysis can be applied to improve GlcN production and to develop metabolic engineering in BL-4.

Key Word:

Citrobacter sp. BL-4, proteomics, 1H-NMR, acetate metabolism, polyglucosamine production

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