

## CcpA, a Pleiotropic Key Regulator in Butanol-producing *Clostridium acetobutylicum*

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Butanol, a four carbon primary alcohol, is an important solvent and transport fuel additive, which can be produced by microbe-based biological process. *Clostridium acetobutylicum* is the typical strain for this purpose with a complicated regulatory system. In this study, a catabolite control protein (CcpA) was functionally identified in *C. acetobutylicum*. It was found that deletion of *ccpA* gene could eliminate glucose repression on xylose metabolism, achieving the simultaneous fermentation of glucose/xylose mixture and will thus benefit the utilization of lignocellulosic biomass in *C. acetobutylicum*.

To dissect CcpA regulatory function globally, DNA microarray was performed to analyze the transcriptional differences between the *ccpA* mutant and its parental strain. It showed that CcpA controls not only carbon metabolism, but also other biochemical and physiological processes. Firstly, CcpA mediates carbon catabolite regulation by repressing the transcription of various genes related to metabolism of non-preferred carbon sources such as xylose and arabinose, but activating the expression of genes responsible for glucose PTS system; Secondly, CcpA is involved in positive regulation of the key genes responsible for acidogenesis and solventogenesis; Thirdly, CcpA is necessary for sporulation of *C. acetobutylicum*, an important trait adversely affecting the solvent productivity. Transcriptional alterations were observed in numerous sporulation-related genes upon *ccpA* inactivation, which should account for the lower sporulation efficiency in the mutant. Following transcriptional analysis, genetic and biochemical validation was also carried out. In summary, CcpA plays a key role in butanol-producing *C. acetobutylicum*.

### Biography

Weihong Jiang is a professor of microbiology in the Key Laboratory of Synthetic Biology, Chinese Academy of Sciences. She received her B.S. degree in biochemistry from Nanjing University in 1982 and Ph.D. degree in microbial physiology and biochemistry from Nanjing Agricultural University in 1988. After that, she did four-year postdoctoral studies on molecular regulation of bacterial metabolism from Purdue University. Dr. Jiang has published over 60 papers in reputed journals. Her recent research is focused on the characterization, metabolic regulation and genetic modification of the microorganisms with industrial importance, such as streptomycetes and clostridia.