Unravelling new strategies for butanol production in Clostridium acetobutylicum using in silico approaches.

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For the last few years, the production of butanol has been the focus of researchers’ attention when looking for alternatives to biofuels’ production. Interesting results have already been achieved with heterologous organisms such as Escherichia coli. However, native producers from Clostridia group still present the best alternative to succeed has they possess all the machinery required and evolutionarily are optimized to produce butanol. However, there are several limitations that need to be assessed in order to control the production of other unwanted end-products such as ethanol, acetone, lactate or succinate that may deviate the fluxes away from butanol. Strategies of metabolic engineering have been on the table for over the last 15 years. However, the targets that seemed obvious at first, have proven not to increment significantly butanol titters showing that C. acetobutylicum metabolism is not as straightforward as it seemed. Going deep into understanding the solventogenic metabolism became therefore, a key step into overcoming the difficulties to channel the metabolism towards butanol production. Several strategies from molecular biology to process engineering, growth cultivation and adaptive evolution to contaminants and toxicity of butanol have been published. In this work, we apply deep in silico analysis in order to learn and understand the peculiarities of this microorganism metabolism and suggest a new strategy to maximize butanol production.
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