Stategy for systems biotechnology approach and application to lactate fermentation

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As an emerging technology, systems biotechnology is spotlighted to study living organisms' underlying network structure and its regulatory mechanisms. Systems include genetic and metabolic regulatory networks to a cell, a tissue, or an entire organism. Since systems biotechnology requires investigation of all interacting components simultaneously, high-throughput and efficient computational approaches are required to handle and interpret the volumes of data necessary to understand complex biological systems. In this study, the current approaches of systems biotechnology will be introduced with discussions of the potential problems and limits. The more efficient strategy for future systems biotechnology will be presented with an application to lactate fermentation process. We have previously constructed a metabolic model for *Lactococcus lactis*, composed of 24 enzymatic reaction steps, 29 metabolites, and 4 branch points. The model was used to compare and analyze the lactate metabolism through *in silico* simulation and *in vitro* experimental measurements. Adequate enzyme kinetic equations and parameters were collected to simulate for lactate metabolism from database and literatures. We could obtain various useful informations of lactic acid metabolic network by simulation and adequate experimental measurements.