

Dynamic modeling of the central carbon metabolism of *Saccharomyces cerevisiae*

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David Lao Martil defended his PhD thesis at the department of Biomedical Engineering on October 20th. Credit: Eindhoven University of Technology

Biotechnology involves the use of living organisms or parts of them to carry out a specific purpose. Due to its versatile, robust, and stress

tolerant physiology, the microorganism *Saccharomyces cerevisiae*, also known as baker's yeast, has become one of the workhorses of the biotech industry. In his Ph.D. research, David Lao Martil used computer modeling to investigate the issues encountered when producing vast amounts of yeast.

Like other processes used to make large quantities of biological cells, yeast industrial fermentation processes take place in large vessels. At such large scales, non-ideal mixing occurs and leads to gradients of, for example, nutrients. These extracellular perturbations impact the cells, which activate mechanisms of dynamic response and adaptation.

Central carbon metabolism

Extracellular perturbations alter the behavior of central carbon metabolism (CCM), a very important part of metabolism that is conserved in many living organisms, and plays a key role in illnesses such as cancer.

CCM comprises the core pathways in the cell that convert the substrate into energy and [building blocks](#), which are then used to synthesize products of biotechnological interest. One way to study the effect of [perturbation](#) on CCM is through the development of mathematical models to understand how perturbations in the bioreactor affect intracellular metabolism and optimize cell factory performance.

For his Ph.D. research, David Lao Martil turned to state-of-the-art data sets and computational algorithms to bring progress to these challenges.

The main deliverable from his research is a metabolic kinetic reconstruction developed that serves as a means for predictability and rational manipulation of these metabolic fluxes in the industrial setting.

More information: Dynamic modelling of *Saccharomyces cerevisiae* Central Carbon Metabolism. research.tue.nl/en/persons/david-lao-martil

Provided by Eindhoven University of Technology

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