BRC Science Highlight
January 2019

Discovery and Functional Characterization of a Yeast Sugar Alcohol Phosphatase

Background/objective

Sugar alcohols (polyols) are common in nature. However, the polyol phosphatase enzymes necessary to produce some commercially valuable polyols, such as sorbitol, from their phosphorylated precursor molecules have been difficult to identify, hampering efforts to engineer yeasts for polyol production. Here, researchers identify a previously unannotated yeast gene as polyol phosphatase Pyp1, which is capable of reducing sorbitol-6-phosphate to sorbitol.

Approach

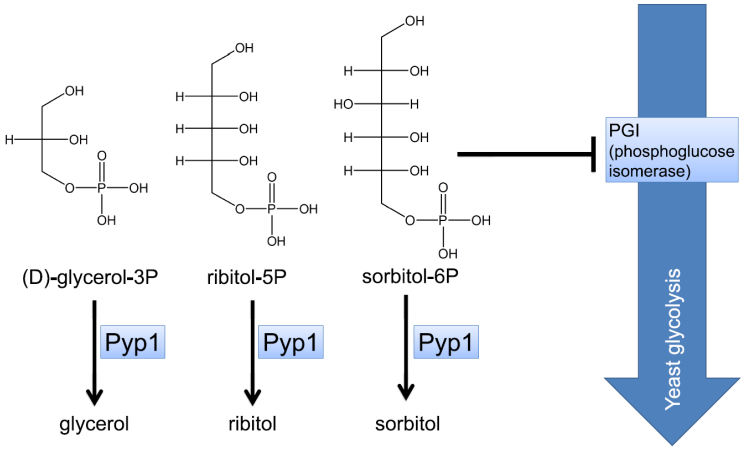
- Putative phosphatase genes were knocked out in *Saccharomyces cerevisiae* (Baker's yeast) mutants.
- LC-MS-based metabolomics analysis was used to identify the function of a previously unannotated gene as a probable polyol phosphatase.
- Further experimentation yielded a functional characterization of the enzyme.

Results

- Yeast gene YNL010W was identified as encoding for a sugar alcohol phosphatase capable of hydrolyzing sorbitol-6 phosphate, ribitol-5-phosphate, and (D)-glycerol-3-phosphate to their respective sugar alcohols.

Significance

- Pyp1 may be harnessed to bioengineer yeasts for production of commercially valuable sugar alcohols.
- Identification of Pyp1 increases our understanding of yeast carbon metabolism and adds to foundational knowledge for future endeavors in yeast bioengineering.



The newly characterized phosphatase Pyp1 produces sugar alcohols via the dephosphorylation of sugar alcohol phosphates

Xu et al. 2018. "Discovery and Functional Characterization of a Yeast Sugar Alcohol Phosphatase." ***ACS Chemical Biology. 13:3011-3020.*** DOI: 10.1021/acschembio.8b00804

CABBI
CENTER FOR ADVANCED BIOENERGY AND BIOPRODUCTS INNOVATION

U.S. DEPARTMENT OF ENERGY