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Illuminating the Role of Protein Kinase A in Controlling Yeast Growth in Visible Light

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Abstract

Background: Because some yeasts have evolved a methylotrophic lifestyle, they can use the single-carbon molecule methanol as a source of carbon and energy. Pichia pastoris (also known as Komagataella sp.) is one of them and is commonly employed for the generation of heterologous proteins as well as a model organism for organelle research. Our present understanding of the methylotrophic lifestyle is primarily based on extensive biochemical investigations that discovered numerous important methanol utilisation enzymes and their localization to the peroxisomes, including alcohol oxidase and dihydroxyacetone synthase. The pentose phosphate pathway is thought to be involved in C1

heme, caused by the strong induction of alcohol oxidase, dihydroxyacetone synthase, formaldehyde and formate dehydrogenase, and catalase, is reflected in the strong up-regulation of the corresponding synthesis pathways on methanol. Because of the high outflow towards methanol metabolic enzymes and their cofactors, methanol-grown cells contain more protein but fewer free amino acids. This illustrates a higher flow towards amino acid and protein synthesis, which is also reflected in higher transcript levels, in conjunction with up-regulation of several amino acid biosynthesis genes or proteins.

Conclusions: When taken as a whole, our study demonstrates how coordinated analysis of data from different

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