

Importance of metabolic state for microbial bioproduction using nonribosomal peptide synthetases (NRPS)

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Goal: For facultative aerobes, oxygen depletion controls the switch from respiratory to fermentative metabolism. Crabtree-positive yeasts are exceptions to this principle as they preferably use fermentation even in the presence of oxygen. While the Crabtree-effect makes model yeasts such as *S. cerevisiae* an ideal host for high production of ethanol, this metabolic quirk can be confounding for other bioproducts. Here, we show that the production of the blue pigment indigoidine (a nonribosomal peptide, NRP) can serve as an indicator for respiratory growth. We observed strong correlation of the production efficiency of this NRP and the metabolic state of the yeast cell, highlighting the importance of understanding the metabolic characteristics of a given production host. NRPS are an important class of biocatalysts that provide access to a wide array of secondary metabolites. The goal of this project is to develop NRPS expression and use it for microbial production of final targets from both pure sugars as well as plant biomass hydrolysates as part of the Joint BioEnergy Institute (URL: www.jbei.org).