Functional pyruvate formate lyase pathway expressed with two different electron donors in Saccharomyces cerevisiae at aerobic growth

Pyruvate formate lyase (PFL) is characterized as an enzyme functional at anaerobic conditions, since the radical in the enzyme's active form is sensitive to oxygen. In this study, PFL and its activating enzyme from Escherichia coli were expressed in a Saccharomyces cerevisiae strain lacking pyruvate decarboxylase and having a reduced glucose uptake rate due to a mutation in the transcriptional regulator Mth1, IMI076 (Pdc-MTH1ΔT ura3-52). PFL was expressed with two different electron donors, reduced ferredoxin or reduced flavodoxin, respectively, and it was found that the coexpression of either of these electron donors had a positive effect on growth under aerobic conditions, indicating increased activity of PFL. The positive effect on growth was manifested as a higher final biomass concentration and a significant increase in transcription of formate dehydrogenases. Among the two electron donors reduced flavodoxin was found to be a better electron donor than reduced ferredoxin.

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