Supplementary figure 2.2

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$ ffq -l 2 CRX102287 -o metadata.json
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{
    "PRJNA102287": {
        "accession": "PRJNA102287",
        "title": "Prolonged Maltose-Limited Cultivation of Saccharomyces cerevisiae",
        "description": "Prolonged cultivation (>25 generations) of Saccharomyces cerevisiae in
aerobic, maltose-limited chemostat cultures led to profound physiological changes. Maltose hype
rsensitivity was observed when cells from prolonged cultivations were suddenly exposed to exces
s maltose. This substrate hypersensitivity was evident from massive cell lysis and loss of viab
ility. During prolonged cultivation at a fixed specific growth rate, the affinity for the growt
h-limiting nutrient (i.e., maltose) increased, as evident from a decreasing residual maltose co
ncentration. Furthermore, the capacity of maltose-dependent proton uptake increased up to 2.5-f
old during prolonged cultivation. Genome-wide transcriptome analysis showed that the increased
maltose transport capacity was not primarily due to increased transcript levels of maltose-perm
ease genes upon prolonged cultivation. We propose that selection for improved substrate affinit
y (ratio of maximum substrate consumption rate and substrate saturation constant) in maltose-li
mited cultures leads to selection for cells with an increased capacity for maltose uptake. At t
he same time, the accumulative nature of maltose-proton symport in S. cerevisiae leads to unres
tricted uptake when maltose-adapted cells are exposed to a substrate excess. These changes were
 retained after isolation of individual cell lines from the chemostat cultures and nonselective
 cultivation, indicating that mutations were involved. The observed trade-off between substrate
 affinity and substrate tolerance may be relevant for metabolic engineering and strain selectio
n for utilization of substrates that are taken up by proton symport. Keywords: Evolution Overal
l design: In a recent study (25) we analyzed glucose efflux upon exposure of S. cerevisiae to e
xcess maltose, with yeast cells originating from "young" chemostat cultures (<20 gene
rations). In these experiments no cell lysis was observed upon exposure to excess maltose. Howe
ver, in further work on this subject, we observed an apparent effect of chemostat culture age o
n transport capacity. The aim of the present study was to further investigate the effect of pro
longed maltose-limited chemostat cultivation on the physiology of S. cerevisiae. To this end we
 monitored the affinity for maltose, genome-wide transcript levels, activities of key enzymes,
and physiological responses to maltose excess during long-term cultivation in maltose-limited c
hemostat cultures. Jansen, M. L. A., J. H. de Winde, and J. T. Pronk. 2002. Hxt-carrier-mediate
d glucose efflux upon exposure of Saccharomyces cerevisiaeSaccharomyces cerevisiae to excess ma
ltose. Appl. Environ. Microbiol. 68:4259-4265.",
        "dbxref": "GSE8897",
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