Ribosomal dimerization factor YfiA is the major protein synthesized after abrupt glucose depletion in Lactococcus lactis - DTU Orbit (14/04/2018)

Ribosomal dimerization factor YfiA is the major protein synthesized after abrupt glucose depletion in *Lactococcus lactis*

We analysed the response of the model bacterium *Lactococcus lactis* to abrupt depletion of glucose after several generations of exponential growth. Glucose depletion resulted in a drastic drop in the energy charge accompanied by an extremely low GTP level and an almost total arrest of protein synthesis. Strikingly, the cell prioritized the continued synthesis of a few proteins, of which the ribosomal dimerization factor YfiA was the most highly expressed. Transcriptome analysis showed no immediate decrease in total mRNA levels despite the lowered nucleotide pools and only marginally increased levels of the yfiA transcript. Severe up-regulation of genes in the FruR, CcpA, ArgR and AhrC regulons were consistent with a downshift in carbon and energy source. Based upon the results, we suggest that transcription proceeded long enough to record the transcriptome changes from activation of the FruR, CcpA, ArgR and AhrC regulons, while protein synthesis stopped due to an extremely low GTP concentration emerging a few minutes after glucose depletion. The yfiA deletion mutant exhibited a longer lag phase upon replenishment of glucose and a faster death rate after prolonged starvation supporting that YfiA-mediated ribosomal dimerization is important for keeping long-term starved cells viable and competent for growth initiation.

General information
State: Published
Organisations: Department of Systems Biology, Metabolic Signaling and Regulation, Novozymes A/S, University of Helsinki, University of Copenhagen
Authors: Breuner, A. (Ekstern), Frees, D. (Ekstern), Varmanen, P. (Ekstern), Boguta, A. M. (Intern), Hammer, K. (Intern), Martinussen, J. (Intern), Kilstup, M. (Intern)
Pages: 1829-1839
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Microbiology
Volume: 162
ISSN (Print): 1350-0872
Ratings:
  BFI (2018): BFI-level 1
  Web of Science (2018): Indexed yes
  BFI (2017): BFI-level 1
  Web of Science (2017): Indexed yes
  BFI (2016): BFI-level 1
  Scopus rating (2016): CiteScore 1.56 SJR 0.805 SNIP 0.648
  Web of Science (2016): Indexed yes
  BFI (2015): BFI-level 1
  Scopus rating (2015): SJR 1.136 SNIP 0.834 CiteScore 2.05
  Web of Science (2015): Indexed yes
  BFI (2014): BFI-level 1
  Scopus rating (2014): SJR 1.448 SNIP 0.978 CiteScore 2.69
  Web of Science (2014): Indexed yes
  BFI (2013): BFI-level 2
  Scopus rating (2013): SJR 1.652 SNIP 1.031 CiteScore 3.34
  ISI indexed (2013): ISI indexed yes
  Web of Science (2013): Indexed yes
  BFI (2012): BFI-level 2
  Scopus rating (2012): SJR 1.596 SNIP 0.974 CiteScore 3.12
  ISI indexed (2012): ISI indexed yes
  Web of Science (2012): Indexed yes
  BFI (2011): BFI-level 2
  Scopus rating (2011): SJR 1.636 SNIP 1.036 CiteScore 3.18
  ISI indexed (2011): ISI indexed yes
  Web of Science (2011): Indexed yes
  BFI (2010): BFI-level 2
  Scopus rating (2010): SJR 1.774 SNIP 0.988