Balanced trafficking between the ER and the Golgi apparatus increases protein secretion in yeast - DTU Orbit (19/10/2018)

Balanced trafficking between the ER and the Golgi apparatus increases protein secretion in yeast

The yeast Saccharomyces cerevisiae is widely used as a cell factory to produce recombinant proteins. However, S. cerevisiae naturally secretes only a few proteins, such as invertase and the mating alpha factor, and its secretory capacity is limited. It has been reported that engineering protein anterograde trafficking from the endoplasmic reticulum to the Golgi apparatus by the moderate overexpression of SEC16 could increase recombinant protein secretion in S. cerevisiae. In this study, the retrograde trafficking in a strain with moderate overexpression of SEC16 was engineered by overexpression of ADP-ribosylation factor GTP activating proteins, Gcs1p and Glo3p, which are involved in the process of COPI-coated vesicle formation. Engineering the retrograde trafficking increased the secretion of alpha-amylase but did not induce production of reactive oxygen species. An expanded ER membrane was detected in both the GCS1 and GLO3 overexpression strains. Physiological characterizations during batch fermentation showed that GLO3 overexpression had better effect on recombinant protein secretion than GCS1 overexpression. Additionally, the GLO3 overexpression strain had higher secretion of two other recombinant proteins, endoglucanase I from Trichoderma reesei and glucan-1,4-alpha-glucosidase from Rhizopus oryzae, indicating overexpression of GLO3 in a SEC16 moderate overexpression strain might be a general strategy for improving production of secreted proteins by yeast.

General information
State: Published
Organisations: Novo Nordisk Foundation Center for Biosustainability, Yeast Cell Factories, Chalmers University of Technology
Contributors: Bao, J., Huang, M., Petranovic, D., Nielsen, J.
Number of pages: 8
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: A M B Express
Volume: 8
Article number: 37
ISSN (Print): 2191-0855
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 2.16 SJR 0.574 SNIP 0.799
Web of Science (2017): Impact factor 1.719
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.15 SJR 0.675 SNIP 0.85
Web of Science (2016): Impact factor 1.825
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.38 SJR 0.725 SNIP 0.749
Web of Science (2015): Impact factor 2.167
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.37 SJR 0.726 SNIP 1.055
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.19 SJR 0.611 SNIP 0.97
ISI indexed (2013): ISI indexed no
Scopus rating (2012): CiteScore 1.06 SJR 0.401 SNIP 1.075
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Original language: English
Keywords: Retrograde trafficking, COPI vesicle, Protein secretion, GLO3, Saccharomyces cerevisiae
Electronic versions:
Balanced_trafcking.pdf
DOIs:
10.1186/s13568-018-0571-x