Assessing glycolytic flux alterations resulting from genetic perturbations in E. coli using a biosensor

We describe the development of an optimized glycolytic flux biosensor and its application in detecting altered flux in a production strain and in a mutant library. The glycolytic flux biosensor is based on the Cra-regulated ppsA promoter of E. coli controlling fluorescent protein synthesis. We validated the glycolytic flux dependency of the biosensor in a range of different carbon sources in six different E. coli strains and during mevalonate production. Furthermore, we studied the flux-altering effects of genome-wide single gene knock-outs in E. coli in a multiplex FlowSeq experiment. From a library consisting of 2126 knock-out mutants, we identified 3 mutants with high-flux and 95 mutants with low-flux phenotypes that did not have severe growth defects. This approach can improve our understanding of glycolytic flux regulation improving metabolic models and engineering efforts.

General information
State: Published
Organisations: Novo Nordisk Foundation Center for Biosustainability, Bacterial Synthetic Biology, Research Groups
Contributors: Lehning, C. E., Siedler, S., Ellabaan, M. M. H., Sommer, M. O. A.
Pages: 194-202
Publication date: 2017
Peer-reviewed: Yes

Publication information
Journal: Metabolic Engineering
Volume: 42
ISSN (Print): 1096-7176
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 7.95 SJR 3.337 SNIP 1.787
Web of Science (2017): Impact factor 7.674
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 8.33 SJR 3.626 SNIP 1.865
Web of Science (2016): Impact factor 8.142
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 8.2 SJR 3.6 SNIP 1.809
Web of Science (2015): Impact factor 8.201
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 7.23 SJR 3.395 SNIP 2.009
Web of Science (2014): Impact factor 6.767
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 8.43 SJR 4.036 SNIP 2.164
Web of Science (2013): Impact factor 8.258
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 6.72 SJR 2.989 SNIP 1.847
Web of Science (2012): Impact factor 6.859
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 6.75 SJR 3.049 SNIP 2.038
Web of Science (2011): Impact factor 5.614
ISI indexed (2011): ISI indexed yes