Three transcription factors (TFs), OxyR, SoxR, and SoxS, play a critical role in transcriptional regulation of the defense system for oxidative stress in bacteria. However, their full genome-wide regulatory potential is unknown. Here, we perform a genome-scale reconstruction of the OxyR, SoxR, and SoxS regulons in Escherichia coli K-12 MG1655. Integrative data analysis reveals that a total of 68 genes in 51 transcription units (TUs) belong to these regulons. Among them, 48 genes showed more than 2-fold changes in expression level under single-TF-knockout conditions. This reconstruction expands the genome-wide roles of these factors to include direct activation of genes related to amino acid biosynthesis (methionine and aromatic amino acids), cell wall synthesis (lipid A biosynthesis and peptidoglycan growth), and divalent metal ion transport (Mn$^{2+}$, Zn$^{2+}$, and Mg$^{2+}$). Investigating the co-regulation of these genes with other stress-response TFs reveals that they are independently regulated by stress-specific TFs.

General information
State: Published
Organisations: Novo Nordisk Foundation Center for Biosustainability, Network Reconstruction in Silico Biology, University of California
Contributors: Seo, S. W., Kim, D., Szubin, R., Palsson, B. O.
Number of pages: 11
Pages: 1289-1299
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Cell Reports
Volume: 12
Issue number: 8
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 8.24 SJR 7.552 SNIP 1.648
Web of Science (2017): Impact factor 8.032
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 8.4 SJR 8.337 SNIP 1.756
Web of Science (2016): Impact factor 8.282
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 8.15 SJR 8.545 SNIP 1.763
Web of Science (2015): Impact factor 7.87
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 7.88 SJR 8.415 SNIP 1.878
Web of Science (2014): Impact factor 8.358
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 7.22 SJR 8.099 SNIP 1.678
Web of Science (2013): Impact factor 7.207
ISI indexed (2013): ISI indexed no
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Web of Science (2012): Impact factor
ISI indexed (2012): ISI indexed no
Original language: English
Electronic versions:
Genome_wide_Reconstruction_of_OxyR_and_SoxRS.pdf