CRISPR/Cas9 advances engineering of microbial cell factories

CRISPR/Cas9 advances engineering of microbial cell factories

One of the key drivers for successful metabolic engineering in microbes is the efficacy by which genomes can be edited. As such there are many methods to choose from when aiming to modify genomes, especially those of model organisms like yeast and bacteria. In recent years, clustered regularly interspaced palindromic repeats (CRISPR) and its associated proteins (Cas) have become the method of choice for precision genome engineering in many organisms due to their orthogonality, versatility and efficacy. Here we review the strategies adopted for implementation of RNA-guided CRISPR/Cas9 genome editing with special emphasis on their application for metabolic engineering of yeast and bacteria. Also, examples of how nuclease-deficient Cas9 has been applied for RNA-guided transcriptional regulation of target genes will be reviewed, as well as tools available for computer-aided design of guide-RNAs will be highlighted. Finally, this review will provide a perspective on the immediate challenges and opportunities foreseen by the use of CRISPR/Cas9 genome engineering and regulation in the context of metabolic engineering.

General information
State: Published
Organisations: Novo Nordisk Foundation Center for Biosustainability, Synthetic Biology Tools for Yeast
Authors: Jakociunas, T. (Intern), Jensen, M. K. (Intern), Keasling, J. D. (Intern)
Number of pages: 16
Pages: 44-59
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Metabolic Engineering
Volume: 34
ISSN (Print): 1096-7176
Ratings:
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 8.33 SJR 3.54 SNIP 1.864
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 3.611 SNIP 1.822 CiteScore 8.2
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 3.381 SNIP 2.034 CiteScore 7.23
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 4.004 SNIP 2.185 CiteScore 8.43
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.032 SNIP 1.858 CiteScore 6.72
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 3.124 SNIP 2.144 CiteScore 6.75
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 2.373 SNIP 1.802
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 2.575 SNIP 1.421
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.757 SNIP 1.028