Baicalein reduces oxidative stress in CHO cell cultures and improves recombinant antibody productivity

Baicalein reduces oxidative stress in CHO cell cultures and improves recombinant antibody productivity

Oxidative stress that naturally accumulates in the endoplasmic reticulum (ER) as a result of mitochondrial energy metabolism and protein synthesis can disturb the ER function. Because ER has a responsibility on the protein synthesis and quality control of the secreted proteins, ER homeostasis has to be well maintained. When H2O2, an oxidative stress inducer, was added to recombinant Chinese hamster ovary (rCHO) cell cultures, it reduced cell growth, monoclonal antibody (mAb) production, and galactosylated form of mAb in a dose-dependent manner. To find an effective antioxidant for rCHO cell cultures, six antioxidants (hydroxyanisole, N-acetylcysteine, baicalein, berberine chloride, kaempferol, and apigenin) with various concentrations were examined individually as chemical additives to rCHO cell cultures producing mAb. Among these antioxidants, baicalein showed the best mAb production performance. Addition of baicalein significantly reduced the expression level of BiP and CHOP along with reduced reactive oxygen species level, suggesting oxidative stress accumulated in the cells can be relieved using baicalein. As a result, addition of baicalein in batch cultures resulted in 1.7 - 1.8-fold increase in the maximum mAb concentration (MMC), while maintaining the galactosylation of mAb. Likewise, addition of baicalein in fed-batch culture resulted in 1.6-fold increase in the MMC while maintaining the galactosylation of mAb. Taken together, the results obtained here demonstrate that baicalein is an effective antioxidant to increase mAb production in rCHO cells.

General information
Publication status: Published
Organisations: Novo Nordisk Foundation Center for Biosustainability, CHO Cell Line Engineering and Design, CHO Core, iLoop
Corresponding author: Kildegaard, H. F.
Contributors: Kwang Ha, T., Hansen, A. H., Kol, S., Kildegaard, H. F., Min Lee, G.
Number of pages: 10
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Biotechnology Journal
Volume: 13
Issue number: 3
Article number: 1700425
ISSN (Print): 1860-6768
Ratings:
BFI (2018): BFI-level 1
Scopus rating (2018): CiteScore 3.61
Web of Science (2018): Impact factor 3.543
Web of Science (2018): Indexed yes
Original language: English
Keywords: Antioxidant, Baicalein, CHO cell, ER stress, Galactosylation, Oxidative stress
Electronic versions:
DOIs:
10.1002/biot.201700425
Source: FindIt
Source ID: 2392862739
Research output: Contribution to journal › Journal article – Annual report year: 2018 › Research › peer-review