

Dublin City University Licensing Opportunity

LIFE SCIENCES

microRNAs in Cell Lines for Biopharmaceutical Production

INTRODUCTION

The majority of biopharmaceuticals are manufactured using Chinese Hamster Ovary (CHO) cells which are grown in large bioreactors. Although the efficiency of CHO-based processes has improved in the last two decades, they are considerably less productive than bacterial or yeast systems. With a market value >\$50bn per annum (70% made in CHO) in the US alone there is significant commercial opportunity for any technology that can deliver enhanced process efficiencies.

BACKGROUND

The **Mammalian Cell Engineering Group** at the National Institute of Cellular Biotechnology (NICB) DCU has focused its research on improving the performance of the CHO production platform by employing genetic engineering approaches in order to achieve these improvements. A major research focus has been on the use of microRNAs (miRNAs or miRs). These short RNA molecules bind to multiple mRNA targets within a cell to down-regulate their expression and are now recognised as a fundamental class of regulatory molecules, rivalling even transcription factors.

As potential engineering tools in the production of biopharmaceuticals they have two extremely attractive properties:

- 1) manipulating their levels within a cell - up or down - does not exert an extra translational burden on the host cell hence avoiding competition with the translation of the 'product';
- 2) modifying the levels of a single miRNA can influence the expression of hundreds of target genes, opening up the possibility of **engineering entire cellular pathways** and processes via a single intervention.

TECHNOLOGY

Dr. Niall Barron and his colleagues were the first in the world to report on differential miRNA expression in CHO cells and to identify a miRNA involved in regulating bioprocessing-relevant phenotypes in CHO cells. The team discovered that miR-7 could be used as a potential genetic tool to improve CHO cell growth in the bioreactor (high cell density in the bioreactor is desirable for an efficient/productive process).

RESEARCH AND IP STATUS

Research is on-going at DCU.

US Pat No: US8476244; was granted to DCU in August 2013 and describes the use of miR-7 engineering to modify CHO cell growth to improve recombinant protein production.

EU Pat No: EP2046970 is pending and includes the use of 20 other miRNAs for engineering CHO behaviour in the bioreactor.



TYPE OF BUSINESS SOUGHT

Available for licensing. We are also interested to talk to companies interested in collaborations and strategic partnerships.

CONTACTS

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RELEVANT PUBLICATIONS

Barron et al. 2011. Engineering CHO cell growth and recombinant protein productivity by over expression of miR-7. *J.Biotechnology* 151(2):204-11

Gammell P, Barron N*, Kumar N, Clynes M., Initial identification of low temperature and culture stage induction of miRNA expression in suspension CHO-K1 cells. *J Biotechnology*, 2007, Jun 30;130(3):213-8.

Barron, N; Piskareva, O; Muniyappa, M; Piskareva, O; Clynes, M; Barron, N* Targeted genetic modification of cell lines for recombinant protein production. *CYTOTECHNOLOGY*,2007, Apr. 53 (1-3): 65-73