Editorial

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Published online: 7 June 2007
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Editorial Introduction

The opening of the National Institute for Cellular Biotechnology's (NICB) new state-of the-art 3,200 m² cell culture research facility, was appropriately marked by hosting an international conference entitled "Global mRNA and Protein Expression Analysis Research-applications in cancer and other diseases and in biopharmaceutical production" held in the Helix, Dublin City University on 7th and 8th September 2006. Participants from around the world, representing the clinical, industrial and basic research sectors were in attendance at the symposium and discussions. The biopharmaceutical-related presentations are recorded in this special edition of Cytotechnology.

The NICB is composed of multidisciplinary research teams incorporated in an institute based at Dublin City University, the National University of Ireland Maynooth and Institute of Technology Tallaght. The researchers include Biologists, Chemists, Bioprocess Engineers, Information Technology and Computer Modelling experts along with Communication and Bioethics specialists. The NICB research teams investigate the molecular functions of human and animal cells in order to discover and

develop new treatments and diagnostics for a variety of human diseases, with particular emphasis on cancer, diabetes, infectious diseases and developmental biology.

A major theme of this meeting was to explore how the exciting new developments in global mRNA and protein expression screening technologies might be applied to understanding biopharmaceutical production processes. Since the hamster genome remains un-sequenced, particular challenges still exist in applying expression microarray and proteomic approaches to the CHO cell. This cell, in spite of the trials of time, still remains as the major cellular vehicle of choice for producing recombinant human proteins. Notwithstanding the barriers, quite exciting progress is being made and some of these advances are summarised in this special issue of Cytotechnology.

In this special issue *Darrin Kuystermans* presents a useful overview of the current state of the literature relating to profiling and engineering technologies for improvement of cell culture processes while *Paula Meleady* specifically focuses on the utility of proteomic-based technologies for the characterisation of production cell lines. *Niraj Kumar* reviews the current knowledge on the relationship between process productivity and proliferation control strategies, such as temperature regulation, and in keeping with this theme *Michèle F. Underhill* presents new data describing the proteome of HeLa cells cultivated at sub-physiological temperatures. *Patrick Gammell*,

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who introduced the first description of miRNA profiling and sequencing in CHO at the conference has presented a synopsis of the current understanding of miRNA regulation of proliferation and apoptosis. The difficulties associated with random genomic integration of product coding sequences and approaches towards controlled and targeted genetic modification of cells are reviewed by *Niall Barron* and continuing this topic *Olga Piskareva* presents the first description of LINE-1 elements in CHO cells and also investigates their transcriptional activity. *Nigel Jenkins* outlines the complexities of post-translational modification of therapeutics and presents the future prospects. In a classical engineering approach to process improvement, *Véronique Breguet* introduces new data relating to the immobilization of CHO cells in alginate/poly-L-Lysine microcapsules and relates overall culture performance to the issues such as size and composition of the capsule. Moving away from CHO based systems, *Stephen Carberry and Sean Doyle* introduce the latest advances in proteomic profiling of industrially and clinical relevant fungi including *Aspergillus* whilst *Finbarr O' Sullivan* outlines the methods and challenges surrounding the identification and use of limbal stem cells for clinical applications. Finally *Kevin Scanlon and Mark A. Lieberman* review the issues relating to the commercialisation of medical technology and *Donal O'Mathuna* examines biotechnology from an ethical standpoint. This special issue also contains a guest editorial from one of the founders of European biopharmaceutical cytotechnology, Prof. Michael Comer.

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Dublin May 2007

Guest Editorial

The concept of cytotechnology was born out of several years of cell technology experience and the industrial exploitation of the basic unit of independent

life, the “cell”, the in vitro use of which as a molecular “factory” for the expression of complex substances has had success of the sort that chemists to date can only dream of. The remarkable foresight of a “few” enlightened researchers to use the mammalian cell as a vehicle of manufacture as well as a basis for fundamental studies is having far-reaching influence on providing treatments for diseases and ailments as far apart as blindness and cancer. Names like Ray Spier, Brian Griffiths, van Wesel and a few others provided the foundation of the European Society of Animal Cell Technology and Cytotechnology as it is today. The successive Executive Committees, currently chaired by Florian Wurm, have continued in the excellence and quality they provide to the scientific community to date with leading edge of science and technology to provide the tools necessary to give insight into the fundamental workings and secrets of cells of the animal kingdom, (including human, insect, fish, avian, canine, mouse and even hamster!) to create the understanding required to assist in preserving life as we know it on our vulnerable and delicate planet. Another milestone in the strategic development of animal cell technology in Europe was the establishment of the Animal Cell Technology Industrial Platform (ACTIP). ACTIP is an independent and informal, science-based forum of European companies with an active interest in the use of animal cell technology for the development and production of biopharmaceuticals, vaccines and other preventative or therapeutic approaches. Its primary objectives are to follow cutting-edge development in research, as carried out in EU-funded projects, SMEs, larger companies and academia and to identify areas, which would benefit most from a concerted European research effort. The concept of ACTIP was conceived in 1989 at a cell culture meeting in Dublin City University.

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Dublin May 2007