

STATISTICAL ANALYSIS OF FACTORS AFFECTING MONOCLONAL
ANTIBODY PRODUCTION BY USING PRINCIPAL COMPONENT ANALYSIS :
PHYSIOLOGICAL CHARACTERISTICS OF CELL LINE

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Thesis submitted in fulfillment of the requirements
for the award of the degree of
Bachelor of Manufacturing Engineering Technology (Pharmaceutical)

Faculty of Engineering Technology
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January 2018

ABSTRAK

Peningkatan pesat dalam permintaan bagi produk biofarmaseutikal telah meningkatkan cabaran dalam pemilihan barisan sel yang memberi penghasilan tinggi dan maksima. Pelbagai usaha telah dilakukan atas teknologi sel kultur untuk barisan sel *Chinese Hamster Ovary* (CHO) bagi mencapai peningkatan dalam produktiviti tertentu barisan sel CHO. Kajian ini mengenal pasti kesan dan hubungan berkenaan pelbagai ciri-ciri fisiologi bagi enam barisan sel CHO dengan produktiviti tertentu barisan sel tersebut yang menghasilkan produktivi antara 2 hingga 50 pg/cell/day. Kami meneliti hubungan antara ciri-ciri fisiologi dan produktiviti tertentu sepanjang fasa pertumbuhan budaya kelompok. Keputusan yang diperolehi telah dianalisis menggunakan Principal Component Analysis (PCA). Kajian kami menunjukkan bahawa secara keseluruhannya, produktiviti tertentu mempunyai korelasi positif dengan jumlah kandungan protein bagi barisan sel. Sementara itu, produktiviti tertentu mempunyai korelasi negatif dengan ketumpatan sel sepanjang pertumbuhan barisan cell. Walau bagaimanapun, korelasi ini tidak dipatuhi oleh barisan sel sepanjang masa pertumbuhannya. Selain itu, kajian ini mendapati terdapat korelasi yang tinggi antara ciri-ciri fisiologi dan produktiviti tertentu pada hujung eksponen dalam fasa pertumbuhan berbanding dengan awal eksponen.

ABSTRACT

Rapid increase in the demand for biopharmaceutical products has posed a challenge in the selection of high producing cell line that produce maximum amount of product. Various advances and efforts has been done on cell culture technology for Chinese Hamster Ovary (CHO) cell lines to achieve an improvement in the specific productivity of CHO cell lines. This study identifies the effects and relationship of various physiological characteristics of a panel of six CHO stable cell lines on the specific productivity (q_p) of cell lines ranging from 2 to 50 pg/cell/day. We examined the correlation between physiological characteristics and specific productivity throughout the growth phase of batch culture. Results obtained were statistically analysed using Principal Component Analysis (PCA). Our research revealed that, overall, specific productivity is positively correlated to the total intracellular protein content of the cell lines. Meanwhile, specific productivity is negatively correlated to the cell density throughout the development of cell lines. However, this correlation was not observed at all-time points throughout the growth phase. Another significant finding from the research is that the correlation between physiological characteristics and specific productivity was the strongest during late exponential 5 of the growth phase as compared to early exponential.