

Proteomic analysis literature review samples

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i. Executive Summary; Proteomic analysis is the large scale experimental analysis of proteins and their structure that is being used by many industries. The Chinese Hamster Ovary (CHO) cells are considered the primary source for recombinant therapeutics and antibodies. The Proteomic analysis is of prime importance in the CHO cells engineering. With other varied applications, especially in CHO cell engineering, where they are used to modify cells for desired functions. Proteomics has improved product standards and efficiency in many industries. (Baycin-Hezal, et al, 2012)

ii. Background Definition of Proteomics; Proteomics is the study of proteins. Proteomic analysis is the examination of a biological system (e. g. a cell, tissue, organ, organism etc) in order to identify all the proteins in that system (its proteome), at a specific point in time. Since these proteins make up most of the building blocks of biological matter, their identification can help in better understanding, thus leading to benefits (Cravatt, 2013).

Mechanism: Although there are different techniques for proteomic analysis of a sample, the basic mechanism is to separate the proteins from each other and then identify them. Using electric charge or differences in mass, the proteins are separated from each other. Then different properties are tested for identification and even quantities of particular proteins (Heffner, et al, 2014). Applications in Bio-processing; As the knowledge of the protein make-up of biological systems is vital in many bio processing procedures, proteomic analysis is an important step in many bio-processes e. g. biopharmaceutical development, cell engineering food processing, identification of different pathogens anti-bodies, improving understanding of genome, etc. (Heffner, et al, 2014). Proteomic Analysis and CHO cell

engineering: Chinese Hamster Ovary (CHO) cells are widely used for the synthesis of proteins. However, they have not been well understood until recently. With proteomic analysis, the genome and proteome of CHO cells are better understood and modified with gene editing technologies to make their cell lines more robust and modify their cell function for better efficiency (Pei Qi Lui et al, 2010).

iii. Relevant Approaches; Proteomic analysis is being used to understand different cells at a smaller level. This allows for modification and manipulation of cells by different cell engineering techniques. They are used to alter cells' different characteristics by genetic manipulation, to improve cell culture techniques. Proteomic Analysis techniques; in protein mass spectrometry, the proteins are ionized and then identified in the spectrum analyzer. Another strategy is to break the proteins down to smaller peptides by enzymes and then identify the smaller peptides in the spectrum analyzer. By considering the enzymes used and the peptides identified in the analyzer, the initial proteins can be identified. Another method for identifying proteins is through reactions with antibodies, which would react to only specific proteins under specific conditions, giving very accurate information. In separation through gel electrophoresis, the proteins separate from each other in fluid medium when subjected to an electric field, based on their sizes. In liquid chromatography, different diffusion speeds of different proteins in a fluid helps in separating them (Hernandez, Muller & Appel, 2006).

iv. Comparison of different Proteomic Techniques; why are companies so interested in proteomics? ; Proteomic analysis has widespread uses in many

industries. The information gained by this analysis is further used in improving and developing different products, understanding diseases causing agents in order to find cures and developing better cures (Wood, 2011) What are the trends for conducting proteomics analysis? ; Though many prefer mass spectrometry to analyze proteins, sometimes it cannot be precise enough, so other techniques like Laser capture micro-dissection and cellular pre-fractionation are also being used with mass spectrometry for refined results. Two- dimensional polyacrylamide gel electrophoresis is another technique used. In two-dimensional gel electrophoresis, a mixture of proteins is separated by two properties in two dimensions on 2D gels (Kuystermans et al, 2007). How are people using proteomic approach to the cell engineering? ; Proteomic analysis and genomics together with cell engineering techniques are being used nowadays to better understand cellular behavior during bio-processing procedures (Kuystermans et al, 2007). Risks and benefits of these approaches; Compared to other analyzing techniques electrophoresis is less complex and so high performing machines and trained people are not required as much as in other techniques, like mass spectrometry. Also thousands of proteins can be analyzed in a single run. But it comes with its drawbacks because it has limited reproducibility and a comparatively smaller dynamic range.

v. Vendors; Many companies are involved in selling instruments for proteomic analysis. Below are a few recognizable names:

Alpha Omega Technologies, Inc. Alpha Omega Technologies, Inc. 1025 Route 70Brielle, NJ 08730

**Bruker Daltonics 40 Manning Road, Billerica, MA
01821 978-663-3660**

vi. Conclusion; Proteomics is an emerging field. Proteomic analysis is being used in many industries worldwide (pharmaceutical and drugs to name a few) to enhance production and develop more efficient strategies in bio-processing. Two-dimensional polyacrylamide gel electrophoresis is being widely used for this purpose and fares better comparatively. So with the demand, for high value functional information about proteins increasing proteomics is coming up as a beneficial form of science.

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