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Some insights on CHO-based glycoprotein production

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Glycosylation affects biological activities in a broad aspect, especially in terms of therapeutics because it plays a role in the formation of proteins having carbohydrate groups, which affect protein stability so that they function correctly in the body. Therefore, the use of recombinant glycoproteins in therapeutic methods provides an improved treatment option. Chinese hamster ovary cell lines (CHO) are mostly used to produce glycoprotein recombinants due to their rapid growth, high compatibility with the other cultures, and a culture medium that is easy to prepare. CHO glycoprotein products are close to human glycoproteins. Therefore, they can be used to analyse complex systems such as the brain and find therapies for some diseases. The resistance property of these cells against human viruses increases their reliability in commercial production. By far many therapeutic glycoproteins produced from CHOs have been approved by FDA and EMA owing to their advantages. However, some glycosylation types are seen in humans that are not seen in the CHO cell line and vice versa. The α-2,6-sialylation and α-1,3/4-fucosylation occur in humans but in CHO cells, these types of glycosylations do not happen, making it harder to study these glycosylation types on CHO cells. Instead, human cell lines like HEK293 (human embryonic cell line), HuH 7 (human hepatocellular carcinoma cells) and HT1080 (fibrosarcoma cell line) provide a convenient alternative to study such glycosylation types. Other expression systems that are non-mammalian in origin can be used to produce therapeutic glycoproteins using certain glycoengineering strategies, such as sialylation and afucosylation. Other cell engineering strategies are being applied to CHO cells to produce glycoproteins that can be therapeutic and non-immunogenic for human beings. Therefore, through intensive research, advanced CHO and other mammalian cell lines could be designed for the production of human therapeutics in the future.

Keywords: CHO, Glycoprotein, Glycosylation, Mammalian glycoprotein, Therapeutic

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