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Glycosimilarity assessment of biotherapeutics 1: Quantitative comparison of the N-glycosylation of the innovator and a biosimilar version of etanercept

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Highlights

- Glycosimilarity is introduced to quantitatively address N-glycosylation differences
- Practical examples of glycosimilarity assessment are given (innovator and biosimilar)
- Quantitative differences between the N-glycan profiles are discussed

Abstract

The carbohydrate moieties on the polypeptide chains in most glycoprotein based biotherapeutics and their biosimilars plays essential roles in such major mechanisms of actions as antibody-dependent cell-mediated cytotoxicity, complement-dependent cytotoxicity, anti-inflammatory functions and serum clearance. In addition, alteration in glycosylation may influence the safety and efficacy of the product. Glycosylation, therefore, is considered as one of the important critical quality attributes of glycoprotein biotherapeutics, and consequently for their biosimilar counterparts. Thus, the carbohydrate moieties of such biopharmaceuticals (both innovator and biosimilar products) should be closely scrutinized during all stages of the manufacturing process. In this paper we introduce a rapid, capillary gel electrophoresis based process to quantitatively assess the glycosylation aspect of biosimilarity (referred to as glycosimilarity) between the innovator and a biosimilar versions of etanercept (Enbrel® and Benepali®, respectively), based on their N-linked carbohydrate profiles. Differences in sialylated, core fucosylated, galactosylated and high mannose glycans were all quantified. Since the mechanism of action of etanercept is