

## Prediction of linear and conformational B cell epitope of HER2 ECD for monoclonal antibody development using immunoinformatic methods

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HER2 is a component of the epidermal growth factor receptor (EGFR or ErbB) family of receptor tyrosine kinases that play important roles in all processes of cell development, and their overexpression is related to many cancers such as: breast, ovarian, and gastric cancer. Anticancer therapies targeting HER2 receptor have shown promise, and monoclonal antibodies (MAbs) against subdomain II and IV of HER2 ECD, Pertuzumab and Herceptin, are currently in use as a treatment for breast cancers. Since, Anti-HER2 antibodies targeting distinct epitopes have different biological functions on cancer cells; in this research linear and conformational B cell epitopes of HER2 ECD, subdomain III were identified by bioinformatic analysis. We attempted to use combination of B cell epitope bioinformatics web servers such as ABCpred, BCPREDS, Bepired, Bcepred and Ellippro for Linear B cell epitope prediction. Then, Discotope, CBtope and SUPERFICIAL software were employed for conformational B cell epitope prediction. In contrast to previously reported epitopes of HER2 ECD we predicted conformational B cell epitopes P1C: 378-393 (PESFDGDPASNTAPLQ) and P2C: 500-510 (PEDECVGEGLA) by integrated strategy and P4: PESFDGD- X – TAPLQ; P5: PESFDGDP X TAPLQ; P6: ESFDGDP X NTAPLQ; P7: PESFDGDP - X – NTAPLQ; P8: ESFDG - XX – TAPLQPEQL and P9: ESFDGDP-X-NTAPLQ by SUPERFICIAL software. These epitopes could be further used to active immunization of mice for the development of new MAb and peptide cancer vaccines that target different epitopes or structural domains of HER2 ECD.

**Keywords:** HER2 receptor; Conformational B cell epitope; Bioinformatics; Monoclonal antibody