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Monoclonal antibodies in breast cancer: A critical appraisal

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ABSTRACT

In breast cancer, mAbs can play multifunctional roles like targeting cancer cells, sometimes directly attacking them, helping in locating and delivering therapeutic drugs to targets, inhibiting cell growth and blocking immune system inhibitors, etc. Monoclonal antibodies are also one of the important successful treatment strategies especially against HER2 but they have not been explored much for other types of breast cancers especially in triple negative breast cancers. Monoclonal antibodies impact the feasibility of antigen specificity, bispecific and trispecific mAbs have opened new doors for more targeted specific efficacy. Monoclonal antibodies can be used diversly and with efficacy as compared to other methods of treatment thus maining it a suitable candidate for breast cancer treatment. However, mAbs treatment also causes various side effects such as fever, trembling, fatigue, headache and muscle pain, nausea/vomiting, difficulty in breathing, rashes and bleeding. Understanding the pros and cons of this strategy, we have explored in this review, the current and future potential capabilities of monoclonal antibodies with respect to diagnosis and treatment of breast cancer.
Data availability: Not applicable

1. Introduction

Breast cancer is an abnormal cell growth present in ducts or lobules and can be broadly grouped as invasive or non-invasive cancer, which occurs in both males and females. The use of monoclonal antibodies in breast cancer restores or enhances the functioning of the immune system (Bayer, 2019). Molecular IgG isotypes are highly prevalent in mAbs production as compared to other immunoglobulins (Gómez-Cebrián et al., 2021). Molecular profiling with routine clinical data is a true effort to refine prognosis and response to therapy in patients diagnosed with breast cancer. Three main molecular markers classify breast cancer patients into subtypes which are estrogen receptor (ER), progesterone receptor (PR), and Human epidermal growth factor receptor-2 (HER2) (Slamon et al., 2001). Estrogen is the main hormone regulating breast cancer cell growth. Progesterone receptors are of two types: PR-α and PR-β, which are viewed as significant markers in carcinogenesis as they are co-dependent collaborators of ER. Erythroblastic oncogene B (ERBB2) or human epidermal growth factor receptor-2 gene (HER2) is a tyrosine kinase oncogene that is intensified or over-expressed in about 20 % of human cancers, characterized by aggressiveness and poor prognosis.

A variety of cancer therapies are currently underway to treat diverse

Abbreviations: ADCs, Antibody Dependent Cells; CD19, Cluster of Differentiation 19 (antigen); MUC28z, a chimeric antigen receptor; FDA, federal drug administration; IL-6, Interleukin 6; IL-8-, Interleukin 8; NCT0, US-FDA clinical trial.gov number affix; PASylation, PASylation technology is a novel method to enhance the pharmacokinetic (PK) properties of biopharmaceuticals; PEG, polyethylene glycol; PEGylation, A biological alternative to PASylation; mAbs, Monoclonal antibodies; T-DM1, it contains a monoclonal antibody called trastuzumab that binds with HER2; IFN-γ, Interferon-gamma; TNBC, Triple Negative Breast Cancer.

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