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Immuno-oncology for targeting breast cancer stem cells

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Breast cancer is the most common cause of female deaths from malignant disease worldwide. Although the survival rate of cancer has improved significantly, it is still necessary to introduce more effective chemotherapeutic drugs, in both adjuvant setting and targeted biologic agents. Primary or acquired resistance to chemo- and radio-therapy is responsible for the failure of many therapeutic modalities. This could be explained by the presence of cancer stem cells (CSCs), which have been identified in a number of solid tumors, including breast cancer. Fortunately, breast CSCs express different molecules on their surface, which can be detected by the immune system, including CD44, CD133, CD10, CD29, ABCG2, EpCAM, CXCR4 and ER.

Immuno-oncology, also known as immunotherapy, is the use of potent immune responses for recognizing and eradicating cancer cells. This strategy has two main advantages in the treatment of breast cancer over traditional chemotherapies and molecularly targeted agents; first, immuno-vaccines can be given over much longer periods in the adjuvant setting, and second, immune-oncology relies on protein expression, but not signaling pathways, of CSCs, which make it difficult for these cells to develop resistance. In breast cancer therapy, immuno-oncology is divided into passive therapy including infusion of tumor specific monoclonal antibodies (mAbs), and active therapy with cancer vaccines. Currently, a number of mAbs conjugated drugs, with the ability to selectively target breast CSCs in preclinical models, are under consideration in clinical trials.

Key words: Immuno-oncology, Breast cancer, Cancer stem cells.