

Biomarkers in Breast Cancer

Sanjeev Patel*

Department of Cancer Research, Christian Medical College, Vellore, Tamil Nadu, India

Editorial

Biomarkers play a critical role in the identification and treatment of breast cancer patients. As a result, *BRCA1/2* mutation testing is used to estimate risk in families with a high breast and ovarian cancer frequency. For decades, it has been known that certain families had a higher risk of breast cancer. Although abnormalities in a variety of genes have been linked to breast cancer, *BRCA1* and *BRCA2* are the well-studied. Both *BRCA1* and *BRCA2* are tumour suppressor genes that play a role in double-stranded DNA repair. As a result, these genes play a crucial role in protecting DNA integrity. Despite the fact that both genes are involved in DNA repair, their functions are unique and do not overlap. *BRCA1/2* germline testing is now standard practise for assessing risk in families with a high breast or ovarian cancer frequency.

Chemotherapy drugs, hormone therapies, and anti-HER2 agents are among the systemic therapies available for individuals with breast cancer. With so many therapy options available, it's critical that each patient get the most suitable treatment. Fortunately, predictive biomarkers exist for two of the three primary types of treatment, namely, ER and progesterone receptor (PR) for

hormone therapy selection and HER2 gene amplification/over expression for anti-HER2 therapy selection.

Circulating tumour cells (CTCs) are discharged from tumour tissue, just as circulating biochemical indicators. CTCs are also raised in most individuals with advanced disease, but very rarely in those with localized disease, similar to circulating biomarkers.

Nucleic acids (DNA, RNA, and microRNA) are released into the circulation by tumour cells. While most of the DNA released comes from normal cells, tumor-derived genetically altered DNA can make up a small percentage. Tumor-derived DNA makes up about 1.0 percent of total plasma DNA, and it can be as low as 0.01%. Because such mutations are unlikely to occur in normal tissues, genetically changed tumor-derived DNA should be specific for cancer (or premalignant lesions).

Micro RNAs (mi RNAs) are small non-protein coding RNA molecules (19–25 nucleotides) that suppress gene expression after transcription. MiRNAs have been explored as possible biomarkers in a variety of cancer types due to their stability and participation in cancer formation/progression.

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***Address for Correspondence:** Patel S, Department of Cancer Research, Christian Medical College, Vellore, Tamil Nadu, India, E-mail: patelsanjeev74@gmail.com

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