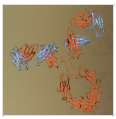

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What is the Arch Enemy of Women Health – A Brief Introduction to Breast Cancer

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1 Works for me dx.doi.org/10.17504/protocols.io.5r7g59n

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1 An Introduction to Breast Cancer

Breast cancer (BC) is regarded as the lethal cancer to women's life on a worldwide scale. The majority of breast cancers are carcinomas that are generated from cells lining the milk-forming ducts of the mammary gland. Breast cancer, as a kind of disease of which the cause can not be clearly identified, is regarded as a heterogeneous disorder. It has a wide variety of pathological entities and the heterogeneity is reflected by the following aspects: cell type composition and proportions' differences, the proliferation ability diversity between glandular and myoepithelial cells, the proliferation of progenitor cells, the therapeutic responses and outcome of patients. Many famous manufacturers are devoted to the antibody production targeted at BC diagnosis and therapy.

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There exist several sub types of BC, which are classified according to whether there are hormone receptors (estrogen and progesterone subtypes) and human epidermal growth factor receptor-2 (HER2).

Sub categories include:
hormone receptor positive and HER2 negative (luminal A subtype),
hormone receptor positive and HER2 positive (luminal B subtype),
hormone receptor negative and HER2 positive (HER2 positive),
hormone receptor negative and HER2 negative (basal-like or triple-negative breast cancers (TNBCs)).

3

1. Main Signaling Pathways in Breast Cancer Therapy
Different sub types of BC are directed by different signaling pathways, for example, hormone receptor positive breast cancers are principally driven by the estrogen/ER pathway; in HER2 positive breast tumors, HER2 activates the PI3K/AKT and the RAS/RAF/MAPK pathways together with stimulating cell growth, survival and differentiation. In patients who are suffering from triple-negative breast cancers, it has been confirmed that there involve deregulation of various signaling pathways (Notch and Wnt/beta-catenin) and EGFR protein. Principally, there are 4 types.
1.1 RTK signaling cascade
1.2 Notch signaling cascade
1.3 Wnt signaling cascade
1.4 Estrogen signaling cascade

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2. BC Diagnosis – Molecular markers for BC
Patterns of gene expression and changed DNA identified in tumor tissue are regarded as the bio markers of tumor besides proteins. Even recognized as an intractable heterogeneous cancer, BC formation is featured with well-defined molecular subgroups which are based upon gene expression profiling relevant to the behavior of these molecular sub types tightly. Former researchers have put forward that the change in result of gene expression profiling have turned the view of BC, which also provides neo tool for the bio markers diagnosis. Actually speaking, the status of ER, PR, and HER2 has been adopted as predictive markers for the identification of a phenotype of high risk and for selecting most efficient therapies. Corresponding recombinant antibody products have gained the status of decisive role in BC diagnosis, like HER2/ErbB2 antibody. Contributed by the technical progress in protein identification plus the sequencing of human genome, a combined program of genomics and proteomics to accomplish better comprehension of BC features and the development of improved therapeutics becomes operable.

DNA and RNA can also be tested in normal paraffin-embedded tissue samples. In the relevant area, attention has been paid to other actionable targets in cancer genomes for precision medicine utilizing the next-generation gene sequencing. To categorize BC into several prognostic groups, DNA micro-arrays and high-throughput reverse transcription-polymerase chain reaction assays for various genes can be applied. Gene assays are used to make prediction of distant recurrence rate in early-stage breast cancer and to influence systemic therapy decisions. The tests rely predominately on the assessing ER and proliferation-related genes, such as Ki-67, and have largely replaced the use of others. The recombinant anti ki67 antibodies extracted from mouse, rabbit or rat recognize MK167, which encodes a nuclear protein

that is associated with and may be necessary for cellular proliferation.

5 3 Targeted Therapy for BC

The above mentioned signaling pathways work predominantly in malignant transformation, prevention of apoptosis, drug resistance and metastasis. More comprehensive understanding of the underlying principle of BC has lead to the identification of a number of molecular targets and development of therapeutics intervention. Consequently, such designed antibody products emerge as the times require, such as BRCA1 antibody, P53 antibody, and EGFR antibody.

6 Conclusion

Life science companies have been focused on the discovery of therapeutic targets for breast cancer, including the RTK signaling pathway, Notch signaling pathway, Wnt/β-catenin pathway, Estrogen/ER signaling pathway, *etc.* It is hopeful that the life technologies antibodies will improve the precision medicine of BC diagnosis and therapy.