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Exhaustive Facts Of The Features Of A Whole Lot Of Biomarkers In Breast Cancer

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Abstract

Breast cancer is very commonly seen type of cancer in women globally. In breast cancer one of important diagnosed cancer type is Triple-negative breast cancer (TNBC). It is type of cancer in which there is lack of expression of estrogen receptor (ER), progesterone receptor (PR), and HER2 protein. It's very poor molecular target therapy responsive disease which require very strong validative biomarkers. Biomarker play important role in the detection and management of patients with breast cancer. There are some hallmarks which proposed by Weinberg to characterize cancer and its carcinogenesis. This review article summarize that 10 hallmarks briefly and some biomarkers use to detect and manage breast cancer.

Keyword: Biomarkers, breast cancer, malignancy, triple-negative breast cancer

I. Introduction

Biomarkers are very important and its role increasing in the detection and management of patients with several different type of cancer, including breast cancer. For breast cancer, biomarkers area unit notably helpful within the identification of people at enlarged risk of developing the malignancy atintervals risky families, crucial prognosis at the time of initialdiagnosis, identifying the most appropriate systemic therapy, postoperative surveillance, and monitoring therapy in advanced disease. [1-5]

There are some important hallmarks/features which proposed by Weinberg to characterize cancer and its carcinogenesis, these hall marks include:[1-5]

1) Sustaining proliferative signaling
2) Activating invasion and metastasis
3) Evading immune destruction
4) Resisting cell death
5) Genome instability and mutation
6) Deregulating cellular energetic

II. Biomarkers

A biomarker is Associate in Nursing objectively measured characteristic that describes a traditional or abnormal biological state in Associate in Nursing organism by analyzing biomolecules like desoxyribonucleic acid, RNA, protein, peptide, and biomolecule chemical modifications (5). However, it should be acknowledged that the definition of biomarkers has been evolving over the past decade, with one particularly broad definition by the globe Health Organization suggesting that"A biomarker is any substance, structure or method which will be measured within the body or its merchandise and influence or predict the incidence of outcome or malady." a lot of specifically in terms of clinical utility, a cancer biomarker might live the chance of developing cancer in an exceedingly specific tissue or, or else, might live risk of cancer progression or potential response to medical care. Besides providing helpful info in guiding clinical deciding, cancer biomarkers area unit more and more coupled to specific molecular pathway deregulations and/or cancer pathologic process to justify application of sure therapeutic/interventional methods. The abstract framework of cancer biomarker development has conjointly been evolving with the fast enlargement of our omics analysis capability of clinical biospecimens supported the normal path ofbiomarker deployment.

Cancer biomarkers may be classified into the subsequentsupported their usage. *Predictive biomarkers* predict response to specific therapeutic interventions such as positivity/activation of *HER2* that predicts response to trastuzumab in breast cancer. Similarly, *KRAS*-activating mutations predict resistance to EGFR inhibitors like cetuximab in large intestine cancer. *Prognostic biomarker*, on the other hand, may not be directly linked to or trigger specific therapeutic decisions, but aim to inform physicians regarding the risk of clinical outcomes such as cancer recurrence or disease progression in the future. An example of a prognostic cancer biomarker is the 21-gene recurrence score which was predictive of breast cancer recurrence and overall survival in node-negative, tamoxifen-treated breast cancer. Another class of biomarker, the *diagnostic biomarker*, is used to identify whether a patient has a specific disease condition. Diagnostic biomarkers have recently been implemented for colorectal cancer surveillance by testing for stool cancer DNA. [6]

There are some biomarkers include also which use to determine the prognosis of breast cancer include:[7-10]

1) uPA and PAI-1
2) Oncotype DX
3) MammaPrint
4) CA 15-3

2.0 Biomarker:1 uPA and PAI-1

This are only on biomarker which validate for breast cancer by using level-01 data. The society namely American society of clinical oncology (ASCO) guidelines this may be use for determination of prognosis in patient with newly diagnosed node-negative breast cancer. The guidelines further added that cyclophosphamide-methotrexate-5-fluorouracil (CMF)-based adjuvant chemotherapy "provides substantial benefit, compared with observation alone, in patients with high risk of recurrence as determined by high levelsofuPAandPAI-1. Although extensively validated, uPA and PAI-1 are not widely used in the clinic, the reason being that testing for these biomarkers requires fresh or freshly frozen tissue.[7-10]

2.1 Biomarker:2 Oncotype DX

It's less validated than uPA and PAI-1, and it's more widely use for clinical purpose. In any cancer to determine prognosis it was first multi-gene test. By following the guidelines of ASCO it can use to predict the risk of recurrence of estrogen receptor-positive, lymph node negative breast cancer patients treated with tamoxifen. Currently, Oncotype DX is undergoing validation in 2 massive irregular prospective trials: the Trial distribution personalized choices for Treatment (Rx) (TAILORx) and Rx for Positive Node, Endocrine Responsive carcinoma (RxPONDER) trial. TAILORx could be a irregular phase III clinical trial trial study involving ladies WHO have node-negative, steroid hormone receptor-positive carcinoma that aims to see whether or not endocrine medical care alone or endocrine medical care andchemotherapy is better for women who have an Oncotype DX intermediate recurrence score. On other hand to the TAILORx trial, the RxPONDER trial involves ER-positive patients with one to three positive lymph nodes. The main of this trial is to establish the potential benefit of adjuvant chemotherapy in patients with lymph node-positive breast cancer with a low Oncotype DX score.[7-10]

2.2 Biomarker:3 MammaPrint

This is the another widely investigated multi-gene prognostic test. It's also approved by US FDA, for determining outcome in lymph node-negative breast cancer patients with tumors <5 cm in diameter, it is not yet widely recommended for clinical use by expert panels. This situation, however, may change following the publication of the findings from the ongoing MINDACT randomized clinical trial. The main aim of this trial, which includesbreast cancerpatients with negative or one to three positive nodes, is to confirm if women with a low-risk gene profile by MammaPrint and high risk by clinical and pathological criteria can avoid chemotherapy, without affecting outcome.[7-10]

2.3 Biomarker:4 CA 15-3

The biopsy and surgery of tumor tissue require for the measurement by all of above biomarkers. The CA 15-3 is on eof the best investigated serum based prognostic biomarker which detect soluble moiety of the MUC1 protein. Indeed, a multiplicity of studies has shown that elevated concentration of serumCA153atinitialpresentationisassociatedwithadverseoutcome. A great reason why high preoperative CA 15-3 levels in patients with breast cancer predict poor outcome is that the biomarker signal micro-metastases or occult metastases that are not clinically or radiologically evident. Some other Other serum-based biomarkers shown to have prognostic significance in breast cancer include CEA, soluble HER2, TPA, and TPS (for review, see Refs. Like CA 15-3, these biomarkers are not widely used in determining prognosis in patients with breast cancer. [7-10]

3. MAIN use of this Biomarkers

1. Estrogen Receptor for Predicting Response to Endocrine Therapy
2. HER2 for Pr
3. Edicting Response to Anti-HER2 Therapy
4. Use of biomarkers in the postoperative follow-up of asymptomatic patients following curative surgery
5. Use of biomarkers in monitoring therapy in patients with metastasis
6. Emerging biomarkers for breast cancer
7. Circulating Tumor Cells
8. Circulating Tumor-Derived DNA
9. MicroRNAs[7-10]

III. Conclusion

The cancer is very critical disease and very complex to treat. Biomarkers are main term use in the use of diagnosis, prognosis, and understanding a cancer. It's play vital role in breast cancer to determine its prognosis. Ourreview article concludes the main hallmarks and main biomarkers which involve in the cancer. This biomarker are very useful and use in measurement of several mRNA species, proteins, gene panel testing, and gene sequencing. So on presenting condition of the patient choose the appropriate biomarker to prognosis of patient cancer.

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V. Conflict of interest

The authors declare no conflict of interest

VI. Reference

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