

# Breast Cancer: Diagnosis Advanced

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Now-a-days the female's breasts originate a major number of deaths for herself. The signatory of their motherhood is most commonly succumbed by malignancy. Breast cancer has accounted for 23% (1.38 million) of the total new cancer cases and 14% (458,400) of the total cancer deaths, placed it most frequent cancer and the leading cause of cancer death in female worldwide [1]. Breast cancer survival rate varies greatly throughout the world, ranging from 80% or above in North America, Sweden and Japan, to around 60% in middle-income countries and below 40% in low-income countries [2]. The projected 3 most common types of cancer in women in 2012 are breast, lung and colon-rectum, accounting for about the estimated cancer cases in women. Breast cancer alone is expected to account for 29% (226,870) of all new cancer cases among women [3]. Breast carcinoma is also the most common cancer in females of South Asia (India, Bangladesh, Nepal, Myanmar). In Bangladesh, the incidence of breast cancer is 26.3% in 2011 [4].

In the management of breast cancer, the advancement of targeted chemotherapy with trastuzumab has made a great achievement to reduce the cancer death in the recent past. This is the issue for developing the diagnostic modality to see the Estrogen Receptor (ER), Progesterone Receptor (PR), and Human Epidermal growth factor Receptor-2/neu (HER2), which needs immunohistochemistry (IHC). The advancement of IHC is a mile-stone in the development of histopathology. Now, in the management of invasive breast cancer, ER, PR, and HER2, these three molecular markers are routinely used. All are targets and / or indicators of highly effective therapies against breast cancer in various clinical settings [5]. Breast cancer is the first type of solid cancer to be successfully treated with molecular targeting therapy. The target is being HER2, validated the general prognostic significance of HER2 gene amplification and protein overexpression in the absence of anti-HER2 target therapy [6,7]. The ability of HER2, as a prognostic factor, is to predict response to hormonal and cytotoxic anti-HER2 targeted therapy, trastuzumab and clinical efficacy of targeting it in a wide variety of clinical settings. The American Society of Clinical Oncology and the College of American Pathologists (ASCO-CAP) convened an expert panel, published a guideline in early 2007 and developed recommendations for optimal HER2 testing performance, to improve the accuracy of HER2 testing in invasive breast cancer and its utility as a predictive marker [8]. The updated committee of ASCO-CAP in 2013 recommended that HER-2 status (i.e. HER-2 negative or positive) should be determined in all patients with invasive (early stage or recurrence) breast cancer on the basis of one or more HER2 test results (negative, equivocal, or positive) [9]. St Gallen International Expert Consensus on the primary therapy of early breast cancer 2013 recommended a standard duration of adjuvant anti-HER2, trastuzumab therapy in HER2 positive patient for one year rather than longer or shorter [10].

Immunohistochemical stains of breast carcinoma biomarkers are currently performed on patient's biopsy or surgical resections. The use of cytologic samples for determining a patient's ER, PR and HER2 status has yet to be validated. It is commonly determined that the breast cancer patients with ER positive has good prognosis, whereas those with HER-2 positive has a very bad prognosis. But it comes to a difficult situation when we get a triple negative case. Clinically, this heterogeneous disease is categorized into three basic therapeutic groups. The ER positive (ER<sup>+</sup>) group is the most numerous and diverse, with several

genomic tests to assist in predicting outcome of ER<sup>+</sup> patients receiving endocrine therapy [11,12]. The HER2 (also called ERBB2) amplified group [13] is a great clinical success because of effective therapeutic targeting of HER2, which has led to intense efforts to characterize other DNA copy number aberrations [14,15]. Triple negative breast cancers (TNBCs), lacking expression of ER, PR, HER2 also known as basal like breast cancers [16] are a group which lack chemotherapy options and have an increased incidence in patients with germ-line BRCA1 mutations [17,18] or of African Ancestry [19]. This is very important to understand the molecular pattern of BRCA1/2 in TNBCs, which are less responsive to chemotherapy.

Thus, the history of histopathology changed a lot in the diagnosis of breast cancers as well as all other cancers. Routine histopathological diagnosis of breast carcinoma stained with Haematoxylin & Eosin (H&E) is just helping us to know the morphological classification, margin clearance and metastasis. But it's of no use in treatment plan and knowing prognosis.

So, we are being more dependent on IHC as well as progressing to molecular diagnosis for BRCA1/2 status.

The Western world and the developed countries could easily adapt with these rapidly changing diagnostic modalities leading to an achievement of high survival rate of breast cancer patients reducing morbidity and mortality. But the under developed and developing countries like Bangladesh and other countries of South Asia are mostly dependent on routine H&E stained morphology based histopathological diagnosis. Lack of facility, awareness and financial ability are lying beneath the failure of development regarding IHC and molecular biology. Different countries of South Asian Region have a few centers mostly serving the rich and affordable population are doing IHC and molecular biology. But majority of the patients staying at villages having very low earning capacity are unable to afford these facilities.

Now, the question of overcoming this situation comes in front of us. But how can we solve the problem? It was seen that some collaborative works could improve in some locality though at a very small range. As the world now became a global village, we can easily come forward to have some collaboration between institutes of developed country and under developed country regarding exchange of technology and data. Because, these 3<sup>rd</sup> world countries are rich in their population, having various kinds of infective and neoplastic diseases, but many of which are not being discovered due to lack of technological facility. If the developed countries come forward to collaborate with different institutes of underdeveloped and developing countries, both the partners will be benefitted and new era may commence in the field of tissue diagnosis.

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