New breast cancer staging system emphasizes importance of tumor biology as prognostic indicator

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A new breast cancer staging system developed by researchers at The University of Texas MD Anderson Cancer Center finds that incorporating tumor biology is a critical prognostic indicator for women who undergo neoadjuvant, or pre-surgical, therapy for breast cancer.

The Neo-Bioscore staging system, published in *JAMA Oncology*, incorporates HER2 status, thereby allowing for more precise prognostic stratification of all breast cancer subtypes. Understanding a patient's individual response to therapy could inform clinicians of which patients would benefit from additional therapy.

Historically, breast cancer patients have been staged by the size of the primary tumor, metastasis or disease in the lymph nodes at the time of presentation. Yet, says Elizabeth Mittendorf, M.D., Ph.D., associate professor, Breast Surgical Oncology, this fails to take into account the biology of the tumor, which has shown to be critically important.

These findings build on MD Anderson's earlier development of a breast cancer staging system, CPS+EG, which incorporates preclinical stage (CS), estrogen receptor status (E), grade (G) and post-treatment pathologic stage (PS).

However, explains Mittendorf, the CPS+EG system predated the routine use of trastuzumab (Herceptin) in the neoadjuvant setting, so the staging

system was limited by its inability to provide prognostic information for HER2-positive patients.

"Our initial study found that if we incorporate the clinical and pathologic stage, then we can have more refined stratification of patients' prognosis," says Mittendorf, the study's corresponding author. "We also found that biological factors, such as estrogen receptor status and grade were important."

"This new staging system, Neo-Bioscore, which adds HER2 status, is another piece of the puzzle showing that the biology of breast cancer, with respect to prognosis, is critically important," says Kelly Hunt, M.D., professor and chair, ad interim, Breast Surgical Oncology, also a corresponding author on the study.

For the retrospective study, the researchers evaluated 2,377 MD Anderson breast cancer patients from a prospectively maintained database; all were non-metastatic invasive breast cancer patients treated with neoadjuvant chemotherapy. None of the evaluated patients were included in the development or validation of the CPS+EG staging system.

Clinicopathologic data and stage were determined according to the American Joint Committee on Cancer (AJCC) staging guidelines. All patients received either anthracycline and/or taxane-based neoadjuvant chemotherapy; trastuzumab was administered for those with HER2-positive disease.

The median age was 50 and the median follow-up time was 4.2 years. The five-year disease-specific survival rate was 89 percent.

After neoadjuvant treatment, all patients underwent local therapy - either breast conserving surgery, axillary evaluation and whole breast radiation,

or mastectomy with axillary evaluation, with or without post-operative radiation.

A CPS+EG score was determined for each patient, with HER-2 status added to the model. The novel staging system, Neo-Bioscore, was constructed by adding a point to the CPS+EG score for HER2-negative tumors.

The researchers determined that the cohort validated previous findings: CPS+EG score improved prognostication of patients. They also discovered that when the Neo-Bioscore was applied, there was a shift from the previous CPS+EG scoring, therefore, more refined stratification in 1,786 (or 75 percent) of patients. This shift reflects the number of HER2-negative tumors in the study. Also, when adding HER2, the improvement was highly significant.

Mittendorf says that before this study, there was a paucity of data in the literature incorporating biology into breast cancer staging.

"With this tool, I can give my patients the precise information they are looking for - a more refined prognosis. Also, with this data, we will know which patients are in greatest need of additional therapy," says Mittendorf. "Hopefully these findings will result in more informed conversations between doctor and patient."

With this data, Mittendorf and Hunt hope that guidelines will be updated reflecting the importance of biology in staging and prognosis.

Provided by University of Texas M. D. Anderson Cancer Center