

Correlation of PKM2 Expression With HER2/neu and Additional Breast Cancer Biomarkers  
and its Prognostic Significance

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**Abstract:** Background: Pyruvate kinase M2 (PKM2) has a central role in both tumor development and metastasis, and it has increasingly become a valuable subject for many cancer studies due to its important prognostic value in various tumor types. In this study, we aimed to elucidate the impact of PKM2 expression level on breast cancer prognosis and survival rates and its association with various clinicopathologic characteristics and tumor markers in breast cancer patients. Materials and methods: This retrospective study included sample tissues from patients with breast cancer who did not receive chemotherapy or radiotherapy before surgery. Expression levels of PKM2, estrogen receptor, progesterone receptor, human epidermal growth factor receptor 2 (HER2), and Ki-67 were analyzed using tissue microarray and immunohistochemistry. Results: A total of 164 patients were included with an age range from 28 to 82 years. High PKM2 was observed in 48.8% of cases (80/164). A significant association was found between PKM2 expression and breast cancer molecular subtype and HER2 status (  $P < 0.001$ ). In HER2-negative tumors, there was a significant association between PKM2 expression and tumor grade, TNM stage, pN stage, lymphovascular invasion, and estrogen receptor/progesterone receptor status. Survival analysis revealed that high PKM2 expression levels were associated with decreased overall survival rate in HER2-positive cases with high Ki-67 index. Moreover, in the HER2-positive group, low PKM2 expression level impacted the survival outcome of metastasis (  $P = 0.002$ ). Conclusions: PKM2 is a valuable prognostic and a potential diagnostic and predictive marker in breast cancer. Moreover, the combination of PKM2 with Ki-67 provides excellent prognostic accuracy in HER2-positive tumors.