Impact of cyclooxygenase-2 over-expression on the prognosis of breast cancer patients

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Establishing new predictive and prognostic factors in various cancers is an ongoing challenge for many decades. Biomarkers detected in preclinical studies as predictive and prognostic factors could be potential targets for new drug development. Cyclooxygenase enzyme plays a key role in inflammation and has two isozymes synthesized by cyclooxygenase-1 and cyclooxygenase-2 genes. Cyclooxygenase enzyme was first evaluated in colorectal cancer since its increased synthesis is a known driver for carcinogenesis. Induction of cyclooxygenase-2 gene causes cancer formation by increasing prostaglandin E2 synthesis which results in estrogen production in adipose tissue (1). Besides, prostaglandin E2 shows immunosuppressive effect in the tumor microenvironment promoting tumor progression. Thus, potential role of cyclooxygenase-2 in breast cancer development became the topic of recent studies. Cyclooxygenase-2 gene overexpression was reported in 40-84% of the breast cancer patients depending on the stage of cancer (2). Similarly, cyclooxygenase-2 gene expression increases as the disease progresses from atypical hyperplasia to invasive breast cancer.

Guler et al. (3) investigated this issue in the article entitled "Impact of cyclooxygenase-2 overexpression on the prognosis of breast cancer patients". This study is well-designed in terms of patient homogeneity and inclusion and exclusion criteria. However, a significant effect of cyclooxygenase-2 overexpression on disease-free and overall suvival could not be demonstrated in breast cancer patients. Although this study uniquely investigated the relation between cyclooxygenase-2 overexpression and breast cancer specific survival, no significant correlation could be demonstrated between these parameters as well. Rather smaller number of patients included in the study with limited follow-up time and retrospective nature of the study may be the reason for insignificant results. In addition, the immunohistochemistry method utilized in this study may be less sensitive compared to RT-PCR method in the detection of over-expressed cyclooxygenase-2 gene. However, this study draws the attention of the clinicians towards a new therapeutic target in breast cancer.

As a conclusion, randomized controlled trials including large enough number of patients with a long follow-up period are required to clearly establish the role of cyclooxygenase-2 gene in breast cancer. Inhibition of cyclooxygenase enzyme by non-steroidal anti-inflammatory drugs or selective cyclooxygenase-2 inhibitors or blockade of cyclooxygenase-2 gene induction could be the new chemoprevention and treatment modalities for breast cancer in the future.

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