Different Patterns in the Prognostic Value of Tumor Size for Breast Cancer-specific Mortality Stratified by Joint Hormone Receptor Status in a SEER Population-based Analysis

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BACKGROUND: Traditionally, increasing tumor size has been reported to be associated with increased breast cancer-specific mortality (BCSM). However, it has been noted that this pattern does not hold for small breast cancers. Previous studies usually placed all stage T3 tumors (>5 cm) in one category. We aimed to estimate the prognostic value of tumor size more accurately and characterize the interaction between tumor size and hormone receptor (HoR) status to determine BCSM. HYPOTHESIS: Tumor size might present different effects on BCSM depending on joint HoR status. METHODS: We used the Surveillance, Epidemiology and End Results (SEER) registry to identify 328, 870 female patients diagnosed with invasive ductal breast cancer from 1990 through 2010. Primary study variables included tumor size, joint HoR status and their corresponding relationship. Kaplan-Meier and adjusted Cox proportional hazards models with interaction terms were utilized. RESULTS: The multivariable analysis revealed a significant interaction between tumor size and HoR status ($P < 0.001$). Using tumors 61–70 mm in size as the reference for estrogen receptor-negative (ER-) and progesterone receptor-negative (PR-) disease, the hazard ratio (HR) for BCSM increased with increasing tumor size across nearly all categories. In the ER-positive (ER+) and PR-positive (PR+) group, however, patients with tumors > 50 mm had nearly identical BCSM ($P = 0.127$, $P = 0.099$ and $P = 0.370$ for 51–60 mm, 71–80 mm and > 80 mm tumors, respectively), whereas BCSM was positively correlated with tumors < 51 mm. The observation of identical HRs for BCSM among patients with ER+ and PR+ tumors >50 mm underscores the importance of individualized and tailored therapyt. Our findings may contribute to a better understanding of breast cancer biology.