Single-center prospective study to evaluate circulating tumor cells as a monitoring tool in women with early breast cancer treated with neoadjuvant chemotherapy

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Background & objectives

Circulating tumor cells(CTCs) are generally considered a prognostic indicator for patients with various metastatic carcinomas, including metastatic breast cancer. Yet, it is unclear whether CTCs manifest in early breast cancer(EBC), as their occurrence in patients with a recurrence has not been thoroughly evaluated. In the phase 2 HER2E-PAM/PAMILIA study(NCT04817540), we prospectively analyzed molecular subtyping through the PAM50 test in HER2-negative breast cancer patients. This study was designed to determine whether adding HER2-targeted treatment in HER2 enriched molecular subtype increases the pathologic complete rate(pCR). In the exploratory analysis, we tested CTCs count before neoadjuvant chemotherapy(NAC) and analyzed its correlation with pCR and clinicopathologic characteristics.

Methods

A 15 ml blood sample was obtained to analyze CTCs before and after NAC. CTCs were enriched by a negative selection system and identified by immunocytochemistry.

Results

Thirty-one patients were included and tested for CTC enumeration. Twenty-seven patients had a pre-treatment CTC measurement, and four had a pre-and post-treatment CTC measurement. Among 31 patients, 7(22.6%) had triple-negative breast cancer(TNBC), and 24(77.4%) had HR+/HER2- breast cancer. Most received anthracycline- and taxane-based neoadjuvant chemotherapy. The total pre-treatment CTC number was 3.0(median, range 0- 25), and 28 patients(90.3%) were CTC-positive at pre-NAC. During data analysis (February 2023), 19 cases underwent surgery after NAC. 3 of

19(15.8%) patients achieved a pCR. The median number of pre-treatment CTCs was 1.0(range 0-4) in pCR case and 2.8(range 0-10) in the non-pCR case(p=0.281). The pre-treatment CTC number was not high though the clinical T and N stages were high(p=0.99, 0.26). Among three patients who were CTC-negative at pre-NAC, one patient underwent regular follow-up blood sampling after surgery and showed a change in CTC count, but there was no recurrence yet(3 CTCs at surgery, 9 CTCs at six months, 19 CTCs at one year).

Conclusion

Approximately 9 in 10 women with EBC who received NAC had detectable CTCs enriched by a negative selection system. Pre-treatment CTC count was not related to pCR or clinicopathologic characteristics. Of 4 patients with matched pre-/post-treatment results, a high proportion(100%) had persistently detectable CTCs. Hence, CTCs may represent an additional measure of minimal residual disease for patients receiving NAC for breast cancer.