

Title

Quantitative whole-tumor kinetic assessment: comparison between invasive ductal and lobular carcinoma

Authors

Natsuko Onishi, David C. Newitt, Jessica Gibbs, Ruby Guo, Kelly Fahrner-Scott, Wen Li, Ella F. Jones, Lisa Wilmes, Alex Nguyen, Bonnie N. Joe, A. Jo Chien, Laura J. Esserman, Nola M. Hylton

Purpose

Invasive ductal carcinoma (IDC) and invasive lobular carcinoma (ILC) are the first and second most common histological subtype of invasive breast carcinoma, with the prevalence of approximately 85% and 10–20% of diagnoses, respectively. ILC is composed of loosely cohesive cells that are individually dispersed or arranged in lines, infiltrating the healthy tissue with diffuse or multifocal/multicentric growth pattern. This makes it difficult to detect in the early stages and to determine the optimal surgical margin.

Breast MRI has potential to yield not only morphological information but also functional information (e.g. change in dynamic contrast enhancement [DCE] kinetics). In previous reports using visual assessment, ILC showed relatively slow contrast enhancement compared to IDC and wash-out in the late phase was less common. To better understand the difference between IDC and ILC, we aimed to quantitatively investigate whole-tumor DCE kinetics.

Methods

We retrospectively reviewed patients with hormone receptor positive, HER2 negative carcinoma enrolled in the Low Risk Registry, a sub-study of I-SPY 2 TRIAL. These patients were assessed as low recurrence risk based on the MammaPrint 70-gene signature. Patients diagnosed as IDC or ILC by core-needle biopsy and imaged by DCE MRI prior to treatment were included in this study. Using an in-house software, signal enhancement ration (SER) was calculated as the ratio of early to late contrast enhancement, defined by $(S1-S0)/(S2-S0)$, where S0, S1, and S2 represent the signal intensity in the pre-contrast, early phase, and late phase images, respectively. For each patient, median and mean SER values of the whole tumor were generated. Wilcoxon rank-sum test was used to compare SER values between IDC vs. ILC, with $p < 0.05$ considered statistically significant.

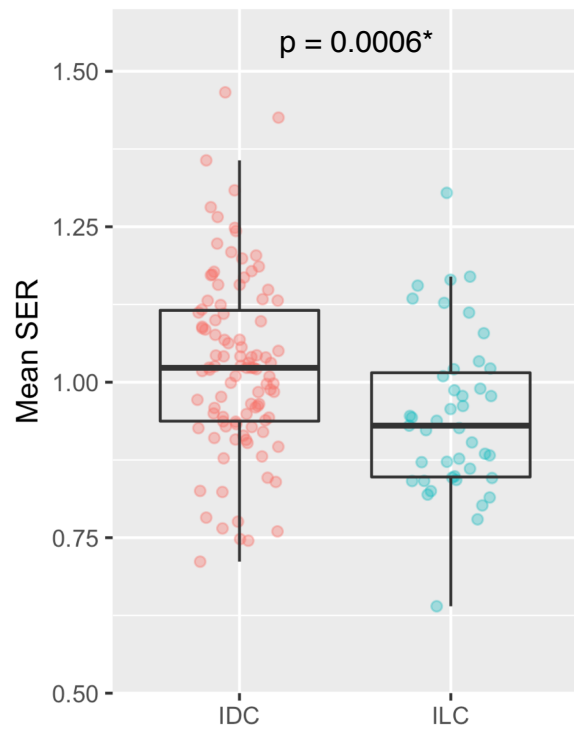
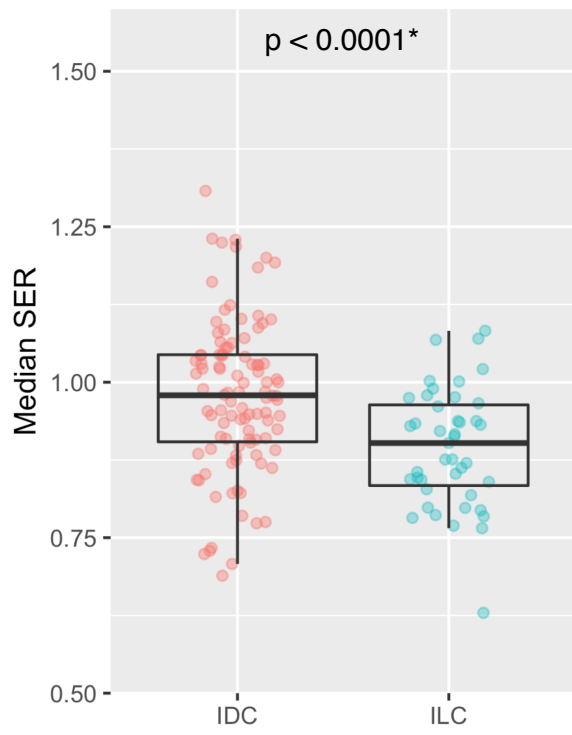
Results

A total of 145 patients (IDC, 102; ILC, 43) were analyzed. ILC showed significantly lower value in median SER than IDC ($p < 0.0001$): 0.902 (IQR, 0.834–0.964) and 0.979 (interquartile range [IQR], 0.904–1.044), respectively. It also showed significantly lower value in mean SER than IDC ($p = 0.0006$): 0.930 (IQR, 0.848–1.015) and 1.023 (IQR, 0.937–1.116), respectively.

Conclusion

ILC showed significantly lower values both in median SER and mean SER than IDC. In the evaluation of functional information derived from DCE kinetics, it might be important to consider the difference between IDC and ILC.

Figure



* $p < 0.05$