133P - Magnetic Resonance Imaging Radiomics Predicts High and Low Recurrence Risk and is Associated With LncRNAs in Early-stage Invasive Breast Cancer

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Background

There are no satisfying approaches to identify high- and low-risk recurrence patients with early-stage invasive breast cancer in current clinical practice. Several studies indicated that the magnetic resonance imaging (MRI) radiomic profile could predict recurrence risk, but the potential biological underpinning of MRI radiomics remains indistinct.

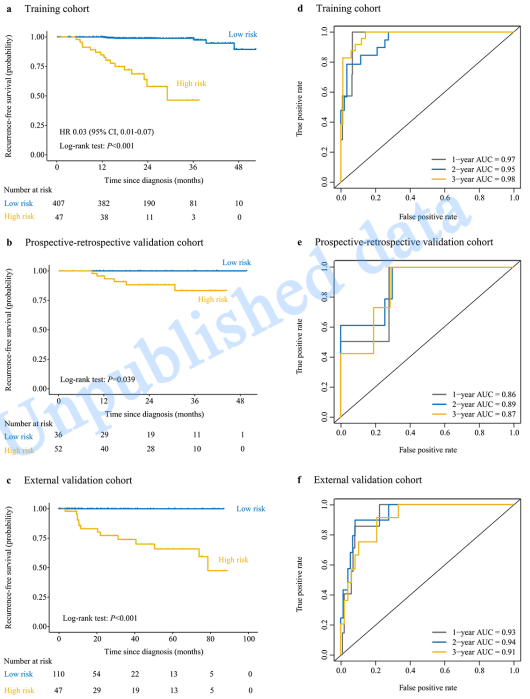
Methods

The key MRI radiomic features were extracted and selected in 799 patients with early-stage invasive breast cancer (training cohort). Then, the MRI-based radiomic signature for recurrence-free survival (RFS) prediction was developed and validated in the prospective validation (n=105) and external validation (n=180) cohorts. 96 of 799 patients were performed RNA-seq with the FFPE samples to obtain lncRNAs data. The key lncRNAs significantly associated with radiomics and RFS were selected by Spearman correlation analysis and univariable Cox proportional hazards regression model.

Results

Figure 1.

The MRI radiomics could identify high and low recurrence risk patients in the training and validation cohorts (all P < 0.05), and achieved high 1-, 2-, 3-year AUCs (0.97, 0.95, and 0.98) in the training cohort, the prospective validation cohort (AUCs of 0.86, 0.89, and 0.87), and the external validation cohort (AUCs of 0.93, 0.94, and 0.91), respectively.



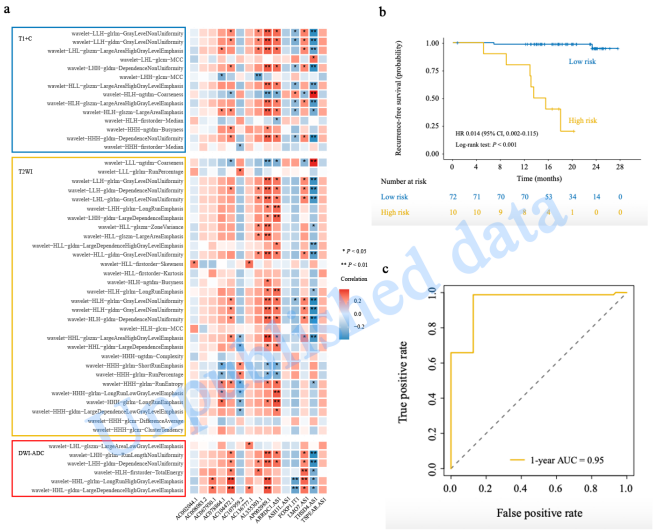


Figure 2.

A total of 15 lncRNAs were identified to be correlated with the key radiomic features and RFS. The signature composed of 15 lncRNAs was found to be significantly associated with RFS (HR 0.014, 95% CI 0.001-0.115, P < 0.001), and achieved AUCs of 0.95 for 12-month RFS prediction.

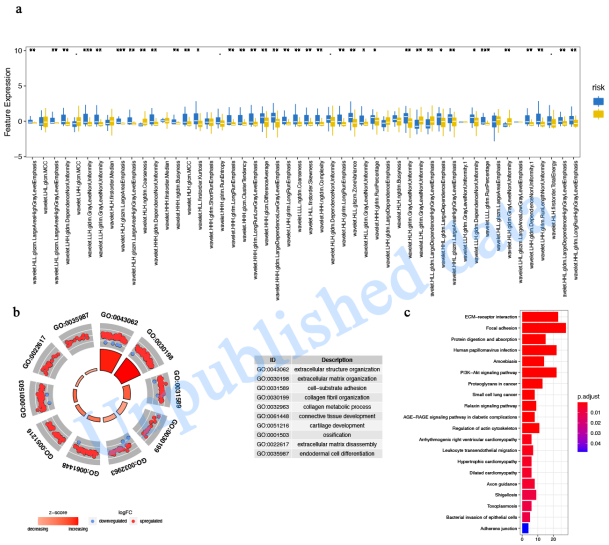


Figure 3.

Furthermore, one of the lncRNAs (AP002989.1) was significantly correlated with radiomic features that changed greatly after neoadjuvant chemotherapy. The differentially expressed genes in AP002989.1 low and high expression groups were enriched in various metastasis-associated physiological processes, such as extracellular structure organization, and were involved in the PI3K-Akt signaling pathway.

Conclusion

This study presented that MRI radiomics could be conveniently used for individualized prediction of RFS, and indicated that radiomics is associated with lncRNAs in early-stage invasive breast cancer.

Conflicts of Interest: The authors have no conflicts of interest to declare.