Supplementary

Response to "Ultrasound-based multiregional radiomics analysis to differentiate breast masses"

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We sincerely appreciate the valuable comments provided by Chen *et al.* (1) on our article titled "Multiregional radiomic model for breast cancer diagnosis: value of ultrasound-based peritumoral and parenchymal radiomics". In this study, we developed and evaluated a multiregional model by integrating ultrasound-based radiomics from different regions (intratumoral, peritumoral, and parenchymal) for diagnosing breast cancer. The findings suggest that the multiregional radiomic model holds promise as a noninvasive and personalized tool to aid in breast cancer diagnosis. However, further improvement and validation are necessary, as highlighted in the comments. We are grateful for all the constructive feedback and welcome any additional valuable insights. Moreover, we would like to express our gratitude to the journal for providing us with a platform for discussion, which plays a vital role in advancing radiomics research.

We appreciate the opportunity to respond to the raised points and provide further clarification. Firstly, we acknowledge the significance of decision curve analysis (DCA) in assessing the clinical usefulness of radiomic models (2). In our study, we assessed the performance of the multiregional radiomic model to determine whether it serves as an independent risk factor, as well as in constructing and evaluating a combined category that includes radiomics and the Breast Imaging Reporting and Data System (BI-RADS) category. It must be admitted that we overlooked the potential of DCA to offer a comprehensive assessment of practical utility. *Figure S1* shows decision curves, demonstrating the clinical utility of the multiregional model, combined category, and BI-RADS category within our pooled test cohort (n=252). Secondly, models that combined the radiomic signature with clinicopathological parameters have the potential to enhance performance in studies of breast cancer (3,4). However, our decision not to incorporate these parameters was mainly influenced by our primary purpose, which was to determine the added value of ultrasound-based peritumoral and parenchymal radiomics, and we have constructed a combined category as a multivariate model. In future studies, we will record more valuable clinicopathological data to complement and strengthen our studies. Thirdly, the development of online web-based calculators for the practical application of radiomic models has been positively received, which provides clinicians with a user-friendly and accessible tool, facilitating the utilization of radiomic models in their daily practice. In pursuit of this goal, we are dedicated to conducting extensive research, such as employing the "DynNom" R package (5). Lastly, we will prioritize conducting comparative analyses of various machine learning algorithms to develop a more precise model in future studies. Comparing the discrimination of different algorithms is a robust way to construct models. Random forest stands out among other classifiers due to its robustness, high accuracy, resistance to overfitting, interpretability, and ability to handle high-dimensional and interaction features (6). Additionally, we employed a feature selection method based on recursive feature elimination using the random forest as a base classifier. Therefore, using the random forest classifier to construct radiomic signatures was a reasonable choice in this study.

In conclusion, while our study demonstrated the multiregional radiomic model in effectively discriminating between malignant and benign breast lesions, we recognize the need to further strengthen the aspects of model construction and evaluation for its clinical application.

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Adhering to a rigorous process and utilizing the radiomics quality score (7) contribute to improving the quality of radiomics studies. Meanwhile, we emphasize the importance of flexibility in research methods to align with study objectives, striking a balance between scientific rigor and innovation. We appreciate the valuable feedback and will incorporate these insights into future research endeavors, aiming for the continued growth and practical implementation of radiomics in healthcare.

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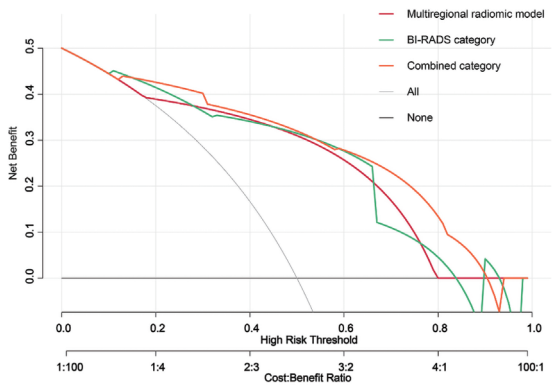

Figure S1 Decision curves for breast cancer diagnosis obtained by using the multiregional radiomic model, BI-RADS category, and combined category in the pooled test cohort (n=252). The multiregional radiomic model, BI-RADS category, and combined category were included as categorical variables in the DCA. BI-RADS, Breast Imaging Reporting and Data System; DCA, decision curve analysis.

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