Decoding calcifications in breast cancer: Towards personalized medicine

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Schematic overview of the study design. A multi-omics cohort comprising 316 patients of breast cancer with mammography data. The cohort was stratified according to calcification features. Comparative analyses were conducted across clinicopathological characteristics, multi-omics dimensions, and precision therapeutic strategies. Credit: Cancer Biology & Medicine
A recent study uncovers the molecular signatures of mammographic calcifications in hormone receptor-positive, HER2-negative breast cancer. The research identifies distinct molecular traits associated with calcification status, suggesting that tumors with probably benign calcifications are linked to higher hormone receptor expression and endocrine therapy sensitivity, while tumors with calcifications of high suspicion for malignancy show genomic instability and cell cycle activity, pointing towards the effectiveness of CDK4/6 inhibitors. This molecular stratification may revolutionize precision treatment in breast cancer.

Mammographic calcifications, a common feature of breast cancer, have remained enigmatic in terms of their molecular underpinnings and clinical implications, particularly in the hormone receptor-positive, HER2-negative subtype. The heterogeneity of these calcifications and their association with treatment outcomes highlight a critical need for a comprehensive investigation into their molecular characteristics. Understanding this link is essential for developing personalized treatment strategies that have the potential to improve patient prognosis and survival rates.

Researchers at Fudan University Shanghai Cancer Center have made significant strides in understanding breast cancer calcifications, particularly in hormone receptor-positive, HER2-negative tumors. Their findings, published in *Cancer Biology & Medicine*, offer new insights into the molecular profiles linked to these calcifications. Scheduled for release on April 9, 2024, this study could transform how we approach personalized treatment strategies in breast cancer.

The study examined 316 breast cancer patients, categorizing tumors based on calcification status into calcification-negative tumors, tumors with probably benign calcifications, tumors with calcification of low-moderate suspicion for malignancy and tumors with calcification of high
suspicion for malignancy. Tumors with probably benign calcifications showed elevated hormone receptor expression, activation of the estrogen receptor pathway, enhanced lipid metabolism, and increased sensitivity to endocrine therapy.

On the other hand, tumors with calcification of high suspicion for malignancy were associated with larger sizes, higher rates of lymph node metastasis, increased Ki-67 staining, genomic instability, and cell cycle pathway activation. These findings suggest that patients with highly suspicious calcifications might benefit from CDK4/6 inhibitors.

By establishing links between calcification status and molecular characteristics, the research highlights the potential for precision treatment strategies tailored to individual calcification profiles, offering a significant advancement in the management of hormone receptor-positive, HER2-negative breast cancer.

Dr. Ding Ma, a leading researcher in the study, emphasized the transformative potential of these findings, "Our research links mammographic calcifications with specific molecular features, offering a novel pathway to tailored managements in hormone receptor-positive, HER2-negative breast cancer using readily available clinical imaging data."

In conclusion, this study connects routine mammographic images with underlying molecular characteristics and treatment strategies, providing new insights into the stratified clinical management of hormone receptor-positive, HER2-negative breast cancer.
