INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Spatial Patterns of Phosphofructokinase Isotypes within Ductal Carcinoma in Situ Lesions Accurately Predict Cancer Recurrences

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OVERVIEW

A novel method to predict recurrence risks of ductal carcinoma in situ (DCIS)

- Measures intracellular location of biomarkers to determine likelihood of recurrence
- May lead to a test which can offer women the chance to forego aggressive treatment

BACKGROUND

Ductal carcinoma in situ (DCIS) is a pre-cancerous condition of the breast in which abnormal cells are limited to the lumen of the milk ducts of the breast but have not spread through the duct walls to become infiltrating ductal cancer. Though DCIS treatment commonly involves surgery and radiotherapy, growing evidence suggests that delineation of those women with either high or low risk for disease recurrence could spare some of the side effect risks from treatment. Unfortunately, existing technology cannot accurately predict recurrence risks for women with DCIS, so the choice between observation alone and aggressive treatment remains difficult for patients and clinicians. So, in spite of improvements in screening for DCIS and invasive ductal carcinoma (IDC), a need exists for better testing to define the subset of women with DCIS who may safely forego treatment and instead choose active surveillance of their condition.

INNOVATION

Researchers at the University of Michigan have developed a method to predict recurrence of ductal carcinoma in situ (DCIS) based upon subcellular localization of phosphofructokinase type L (PFKL), phosphofructokinase/fructose-2,6-bisphosphatase type 4 (PFKFB4), and other biomarkers. Retrospective review of DCIS pathology specimens showed that PFKL and PFKFB4 were found in ductal epithelial cell nucleoli from samples of women who did not experience a disease recurrence, while those same two markers were located near the plasma membrane in samples from those patients who did suffer recurrent disease. The presence of PFKL and PFKB4 at the apical surface of epithelial cells in recurrent samples suggests that carbohydrates are being harvested from the ducts‚Äô luminal spaces as an energy source. Machine learning can be used to categorize differences in the cellular location of PFKL, PFKB4, and phosphorylated glucose transporter protein type 1 (GLUT1) to predict recurrence risks with results that predicted 39% true negatives, 49% true positives, 12% false positives, and no false negatives.

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Category
Diagnostics
Life Sciences

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This high degree of fidelity may lead to an accurate diagnostic test to classify DCIS patients as having high or low recurrence risk.