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Quantitative Digital Pathology Biomarkers of Neoadjuvant Therapy Response in Breast Cancer

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Abstract:

Neoadjuvant (i.e., pre-operative) chemotherapy (NAC) is indicated for high-risk cancer patients, in part, to reduce the tumor's size with the desired outcome to kill tumor cells completely (known as a pathological complete response (pCR)). Patients who achieve pCR have a significantly lower risk of breast cancer recurrence and longer survival rate. However, a significant proportion of women who are treated with NAC do not achieve a pCR and we currently are unable to ascertain how effectively women's tumors will respond to NAC on an individual level.

We present research on the development of a digital pathology platform, utilizing artificial intelligence (AI), that enables the identification of biomarkers from digitized tumor core biopsy pathology specimens. AI-driven digital pathology biomarkers were studied to develop prediction models that are associated with the likelihood of NAC response. Predicting which patients who are unlikely to respond to NAC will assist in developing adaptive treatments or administering additional treatments that will improve patient outcomes and spare patients who would not benefit from treatment the toxicity caused by ineffective therapies.