MRI and Radiomics Predict 10-Year Breast Cancer Recurrence

Breast cancer is complex for clinicians to diagnose owing to how greatly cells within one tumour can vary. This complexity and challenge is highlighted by the fact that a biopsy only targets a sample of cells.

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A new study from Penn Medicine addresses this. Using MRI and radiomics, clinicians can find it easier to understand a person's individual breast cancer through better clarity on the heterogeneity of cancer cells within a tumour.

"If we're only taking out a little piece of a tissue from one part of a tumor, that does not give the full picture of a person's disease and of his or her response to specific therapies," said principal investigator Despina Kontos, from the Perelman School of Medicine at the University of Pennsylvania.

Kontos went on to criticise overtreatment and under treatment which results from current diagnosis methods. "The more steps we can take toward more personalised treatment approaches, the better."

As part of the study, Kontos and her research team wanted to see how a combination of imaging and radiomics could be deployed for personalised tumour characterisation.

With MRI, the team extracted 60 radiomic features (biomarkers) from 95 women with primary invasive breast cancer.

Ten years later, the researchers followed up. They found that scans could accurately predict cancer recurrence when high tumour heterogeneity had been detected at the time of diagnosis.

"Women who had more heterogeneous tumours tended to have a greater risk of tumor recurrence," said researcher Rhea Chitalia, a PhD candidate in the School of Engineering and Applied Science at the University of Pennsylvania.

Clinical trial scans from 2002-2006 were retrospectively analysed and, for each patient, a "signal enhancement ratio" (SER) map was generated. From this map, researchers extracted a range of imaging features to understand their link with conventional biomarkers (gene mutations or hormone receptor status) and patient outcomes.

The algorithm could successfully predict recurrence-free survival after 10 years.

Kontos said the findings were interesting because, while imaging would not necessarily replace the need for biopsies, radiologic methods could provide a more individual profile for personalised care.