

A fusion-based deep-learning algorithm predicting PDAC metastasis from primary tumour

Núria Malats

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Presentation

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A deep learning algorithm trained on CT imaging predicted pancreatic cancer metastasis with AUC above 0.8 in external validation and identified 66% of occult metastases in a resectable-patient trial.

KEY POINTS

- The speaker reported that the PMPD algorithm, based on a modified ResNet architecture with three modules, achieved an AUC above 0.85 in training cohorts from Spain and China and maintained AUC above 0.8 in external validation from Dutch centers.
- In the PREOPANC-1 trial of resectable patients with no metastases at enrollment, the algorithm predicted 66% of metastases that were discovered during laparoscopy or surgery, suggesting it can detect occult disease not visible on initial imaging.
- The metastasis risk score stratified patients into high- and low-risk groups with significantly different survival and was the strongest independent predictor in multivariate analysis including CA 19-9 and NCCN stage.
- Grad-CAM visualization showed the algorithm focused on tumor edges in metastatic cases, which the speaker suggested may identify metastasis-driving clones, whereas it considered the whole tumor in non-metastatic cases.
- A real-time prospective validation study is underway in hospitals across Spain, the Netherlands, China, and Uruguay, with predictions delivered to radiologists within 20 minutes of image acquisition.
- In discussion, the speaker stated that when the algorithm predicts high metastasis risk without visible lesions, the approach is to start chemotherapy rather than proceed to surgery and to use advanced imaging with close follow-up.

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