AI model uses serial imaging to predict lung cancer therapy response

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(HealthDay)—For patients with locally advanced non-small cell lung

cancer (NSCLC), deep-learning networks integrating computed tomography (CT) scans at multiple time points can improve clinical outcome predictions, according to a study published online April 22 in *Clinical Cancer Research*.

Yiwen Xu, Ph.D., from Brigham and Women's Hospital in Boston, and colleagues assessed deep-learning networks for predicting clinical outcomes in locally advanced NSCLC. Dataset A consisted of 581 scans from 179 patients with stage III NSCLC treated with definitive chemoradiation with pretreatment and posttreatment images at one, three, and six months of follow-up. Using single seed-point tumor localization, models were developed using transfer learning of convolutional neural networks (CNN) with recurrent neural networks. Pathologic response validation was performed on dataset B, which included 178 scans from 89 patients treated with chemoradiation and surgery.

The researchers found that survival and cancer-specific outcomes (progression, distant metastases, and local-regional recurrence) were predicted by deep-learning models using time series scans. With each additional follow-up scan into the CNN model, model performance was enhanced. Patients were stratified into low and high mortality risk groups by the models, which were significantly associated with overall survival (hazard ratio, 6.16). In dataset B, the model also significantly predicted pathologic response.

"Our research demonstrates that deep-learning models integrating routine imaging scans obtained at multiple time points can improve predictions of survival and cancer-specific outcomes for lung cancer," a coauthor said in a statement.

Two authors disclosed financial ties to the biopharmaceutical and health care industries.

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