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Role of Imaging in Predicting the Receptor Positivity Status in Lung Adenocarcinoma: A Chapter in Radiogenomics

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Abstract : The upcoming field of radiogenomics has the potential to upgrade the role of imaging in lung cancer management by noninvasive characterization of tumor histology and genetic microenvironment. Receptor positivity like epidermal growth factor receptor (EGFR) and anaplastic lymphoma kinase (ALK) genotyping are critical in lung adenocarcinoma for treatment. As conventional identification of receptor positivity is an invasive procedure, we analyzed the features on non-invasive computed tomography (CT), which predicts the receptor positivity in lung adenocarcinoma. Retrospectively, we did a comprehensive study from 77 proven lung adenocarcinoma patients with CT images, EGFR and ALK receptor genotyping, and clinical information. Total 22/77 patients were receptor-positive (15 had only EGFR mutation, 6 had ALK mutation, and 1 had both EGFR and ALK mutation). Various morphological characteristics and metastatic distribution on CT were analyzed along with the clinical information. Univariate and multivariable logistic regression analyses were used. On multivariable logistic regression analysis, we found spiculated margin, lymphangitic spread, air bronchogram, pleural effusion, and distant metastasis had a significant predictive value for receptor mutation status. On univariate analysis, air bronchogram and pleural effusion had significant individual predictive value. Conclusions: Receptor positive lung cancer has characteristic imaging features compared with nonreceptor positive lung adenocarcinoma. Since CT is routinely used in lung cancer diagnosis, we can predict the receptor positivity by a noninvasive technique and would follow a more aggressive algorithm for evaluation of distant metastases as well as for the treatment.

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