

주최·주관 대한심장혈관흉부외과학회

2024 대한심장혈관흉부외과학회 제56차 추계학술대회

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Characteristics of Resected Lung-RADS 4B Nodules and Their Enhanced Diagnostic Accuracy Using AI

주최·주관 : 대한심장혈관흉부외과학회, 사단법인흉부외과미래포럼

Purpose

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- We aim to examine the false positive rate of Lung-RADS 4B nodules and explore the characteristics of these nodules.
- In addition, we investigate the potential of using CT and AI-based radiomics to reduce this false positive rate.



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- We retrospectively examined the characteristics of nodules classified as Lung-RADS 4B from patients who underwent surgery between 2003 and 2023 after categorizing them into false positive nodules (FPN) group and true positive nodules (TPN) group.
- Using clinical variables, we performed 1:1 propensity score matching between the two groups and then developed an CT image-based deep learning classifier using a Vision Transformer (ViT-B16).
- The dataset was randomly divided into an 80% development set and a 20% test set for model training and evaluation. Model performance was evaluated on the test set based on optimal entropy loss in a 20% validation subset of the development set.

**Propensity scores were calculated using age, sex, smoking status, FEV1, DLCO, DM, HTN, type of nodule, SUVmax, total tumor size, solid component size, CTR, and location.*



Results

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- A total of 5015 Lung-RADS 4B nodules were analyzed, with TPN accounting for 4860 (97%) and FPN for 155 (3%).
- The average age of patients with FPN was 60.3 years, with 61.9% being male and 42.6% being smokers.
- Among the nodules in the FPN group, 81.3% were solid nodules, while 18.7% were GGN.
- The false positive rate for solid nodules was 3.7%, while for GGN it was 1.8%.
- Among the solid nodules, the mean total tumor size for FPN was 2.0 cm, and the SUVmax was 4.2, which was lower compared to that of TPN (6.9) ($p < 0.001$).
- Among the GGNs, the mean total tumor size for FPN was 2.4 cm, with a solid component size of 0.9 cm, a CTR of 0.4, and an SUVmax of 3.0, which was higher compared to that of TPN (1.9) ($p < 0.001$).
- The pathologic diagnosis of FPN was chronic granuloma in 138 (89%) patients, and the rest had chronic inflammation.



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- After propensity score matching, FPN group and PPN group assigned 150 patients, each.
- The Vision Transformer model achieved an Area Under the Receiver Operating Characteristic curve (AUROC) of 0.760.
- Sensitivity and specificity were 0.735 and 0.692, respectively.
- The Positive Predictive Value (PPV) was 0.758, while the Negative Predictive Value (NPV) was 0.667.



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Conclusion

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- We evaluated the false positive rate of Lung-RADS 4B nodule, and its characteristics.
- Using AI learning model, we demonstrated that the accuracy of radiological diagnosis in high-risk nodules can be enhanced.



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