Aim: Diffusion-weighted imaging (DWI) makes it possible to detect malignant tumors based on the diffusion of water molecules. It is uncertain whether DWI has advantages over FDG-PET for distinguishing malignant from benign pulmonary nodules and masses. The purpose of this study was to compare the diagnostic performance of DWI and FDG-PET in distinguishing malignant from benign pulmonary nodules and masses, and to clarify the advantages and disadvantages of DWI and FDG-PET.

Methods: One hundred-forty-three lung cancers, 17 metastatic lung tumors, and 29 benign pulmonary nodules and masses were assessed in this study. DWI and FDG-PET were performed.

Results: The apparent diffusion coefficient (ADC) value (1.27 ± 0.35 × 10⁻³ mm²/sec) of malignant pulmonary nodules and masses was significantly lower than that (1.66 ± 0.58 × 10⁻³ mm²/sec) of benign pulmonary nodules and masses. The maximum standardized uptake value (SUVmax: 7.47 ± 6.10) of malignant pulmonary nodules and masses was significantly higher than that (3.89 ± 4.04) of benign pulmonary nodules and masses. By using the optimal cutoff values for ADC value (1.44 × 10⁻³ mm²/sec) and for SUVmax (3.43), which were determined by a receiver operating characteristics curve (ROC curve), the sensitivity (80.0%) of DWI was significantly higher than that (70.0%) of FDG-PET. The specificity (65.5%) of DWI was equal to that (65.5%) of FDG-PET. The accuracy (77.8%) of DWI was not significantly higher than that (69.3%) of FDG-PET for pulmonary nodules and masses. As the percentage of bronchioloalveolar carcinoma (BAC) component in adenocarcinoma increased, the sensitivity of FDG-PET decreased. DWI could not help in the diagnosis of mucinous adenocarcinomas as malignant, and FDG-PET could help in the correct diagnosis of 5 out of 6 mucinous adenocarcinomas as malignant.

Conclusions: DWI has higher potential than PET in assessing pulmonary nodules and masses and DWI can be used in assessment of pulmonary nodules and masses. Both diagnostic devices have their specific strengths and weaknesses which are determined by the underlying pathology of pulmonary nodules and masses.

Disclosure: All authors have declared no conflicts of interest.

Clinical trial identification: The ethical committee of Kanazawa Medical University (the approval number: No.189).