

# Histopathology of Lung Adenocarcinoma Based on New IASLC/ATS/ERS Classification: Prognostic Stratification With Functional and Metabolic Imaging Biomarkers

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**Target audience:** Thoracic surgeon, oncologist, onco-radiologist

**Purpose:** We aimed to correlate the results of histopathologic subtyping and grading of lung adenocarcinoma with maximum standardized uptake values (SUVmax) on PET/CT and apparent diffusion coefficient (ADC) values on diffusion-weighted MRI (DWI).

**Methods:** Forty-three patients were included. The SUVmax and mean ADC values of tumors were measured and correlated with the histologic subtypes and grades of lung adenocarcinomas based on the IASLC/ATS/ERS classification scheme. Disease-free survival (DFS) was estimated by using the Kaplan-Meier method, and the log-rank test was used to evaluate differences among three histologic grades or subgroups classified with imaging biomarker study results.

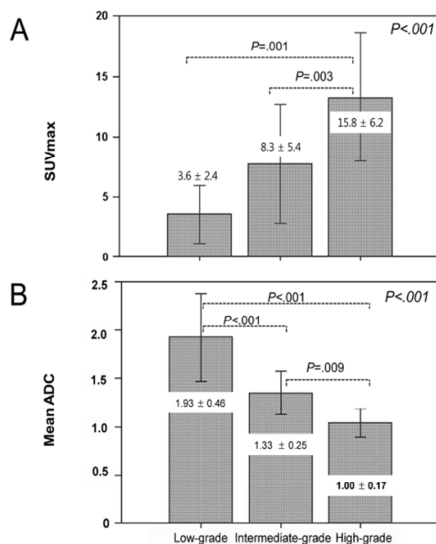
**Results:** Five (12.5 %) tumors belonged to low grade, 30 (70 %) to intermediate grade, and eight (18.5 %) to high grade, and patients with low-grade histology had lower risk of recurrence than those with intermediate- or high-grade histology ( $P = 0.048$ ). A significant difference in SUVmax and mean ADC values was observed among three histologic grades ( $P_s < 0.001$ ). Regarding DFS, lower metabolic (PET) activity or higher functional (DWI) diffusivity showed longer DFS. When patients ( $n = 30$ , 70% of patients) with intermediate histologic grade were subgrouped in consideration of both SUVmax and mean ADC results, combining metabolic and functional criteria helped stratify patients more precisely ( $P = 0.006$ ).

**Conclusion:** SUVmax and mean ADC value correlate well with the histologic grades in lung adenocarcinomas, and combining both imaging biomarker study results leads to more useful stratification of patients into different prognostic subsets than the results of each study.

## References

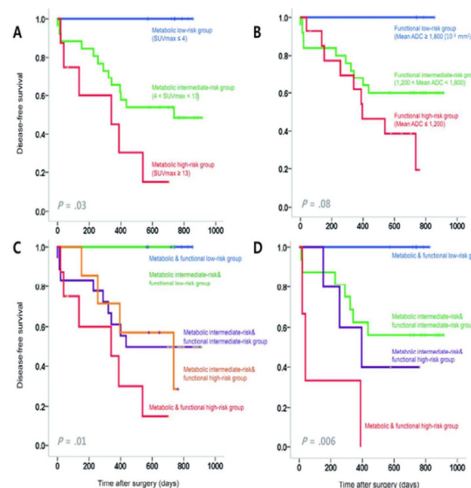
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Figure 1



A. SUVmax of lung adenocarcinomas categorized according to the histologic grade. B. Mean ADC of lung adenocarcinomas categorized according to the histologic grade ( $\times 10^{-3}$  mm<sup>2</sup>/s). Data of ADC and SUVmax are given as mean  $\pm$  SD.

Figure 2



Kaplan-Meier survival curves for DFS based on Imaging Biomarkers  
A. According to metabolic parameter (SUVmax  $\leq 4$  vs.  $4 < \text{SUVmax} < 13$  vs.  $\geq 13$ );  $P = .03$ .  
B. According to functional parameter (mean ADC value [ $\times 10^{-3}$  mm<sup>2</sup>/s]  $\leq 1,200$  vs.  $1,200 < \text{mean ADC value} < 1,800$  vs.  $\geq 1,800$ );  $P = .08$ .  
C. According to combination of metabolic and functional parameter;  $P = .01$ .  
D. According to combination of metabolic and functional parameter only for the patients of the intermediate grade;  $P = .006$ .