

# P2.065: AI-Assisted Measurement of Solid Component Size with an Optimized CT Attenuation Threshold for Early Lung Adenocarcinoma

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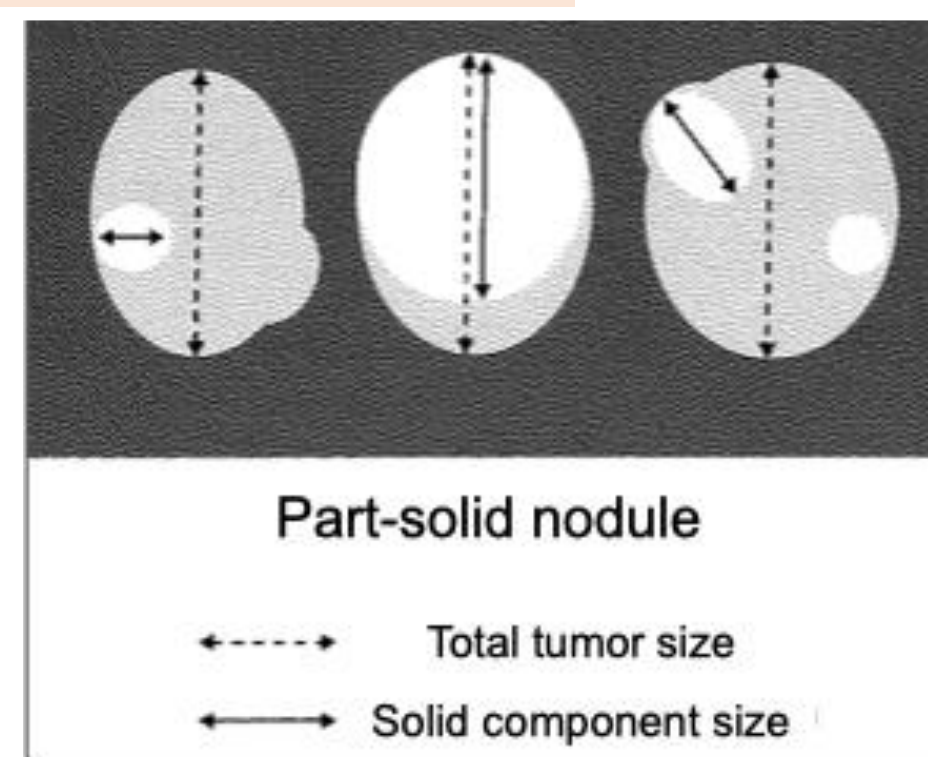
## BACKGROUND& OBJECTIVE

Solid component size on computed tomography (CT) is an important imaging biomarker reflecting tumor invasiveness in lung adenocarcinoma and is used to determine clinical T stage.

Accurate assessment of solid component size on CT is essential for clinical staging and treatment planning, including the extent of pulmonary resection and lymph node dissection.

Although ground-glass opacity (GGO) is defined as increased attenuation that does not completely obscure the underlying bronchial and vascular structures, no objective CT value has been established to distinguish GGO from the solid component, and the boundary is determined visually in conventional measurement. This may lead to measurement variability.

This study aimed to identify an optimal CT threshold for measurement of solid component size based on its agreement with pathological invasive size, using artificial intelligence (AI)-based automatic tumor segmentation.



## CONCLUSIONS

The new method for solid component measurement (−50 HU) showed a strong correlation with pathological invasive size and diagnostic performance similar to conventional measurement.

### Take-away Message

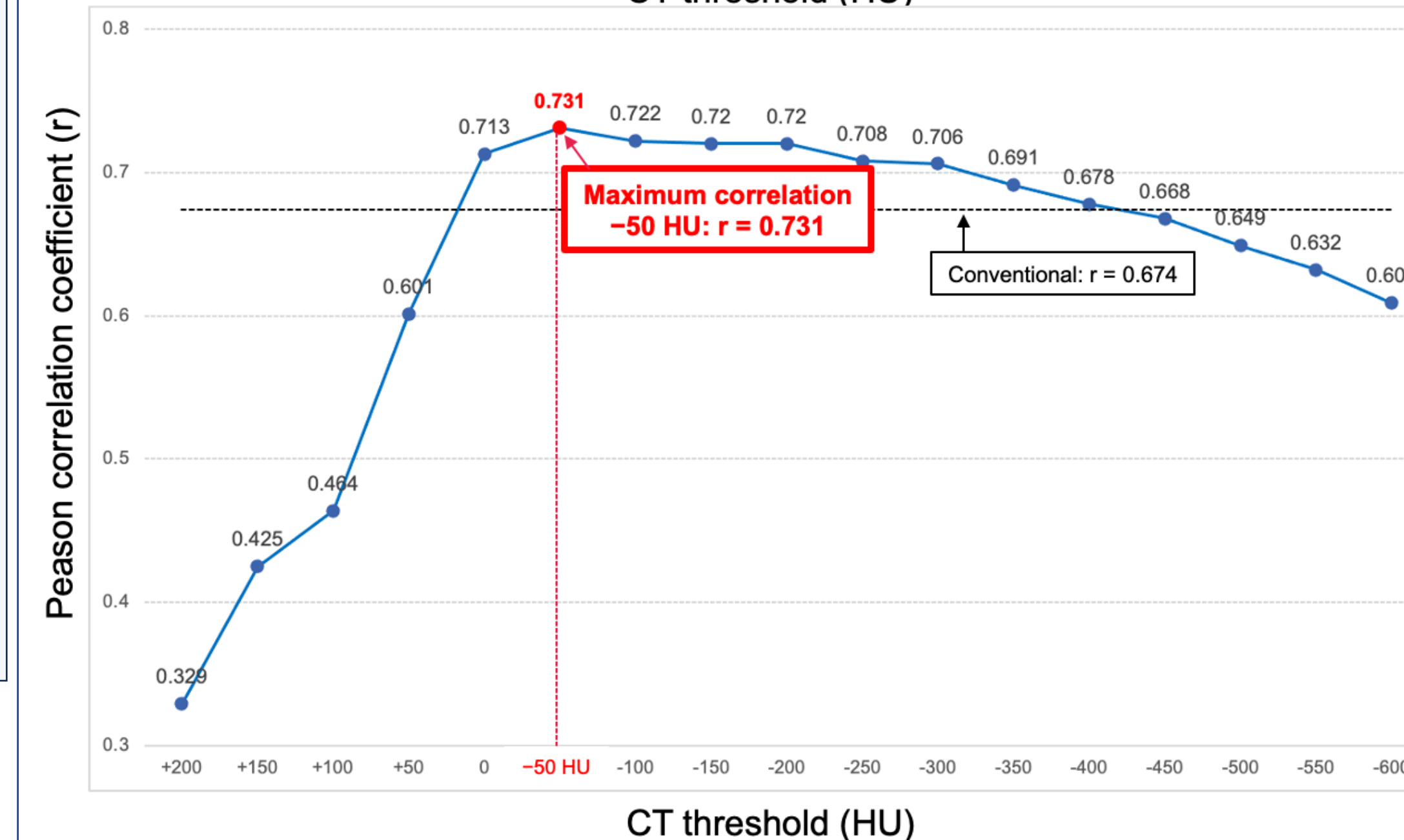
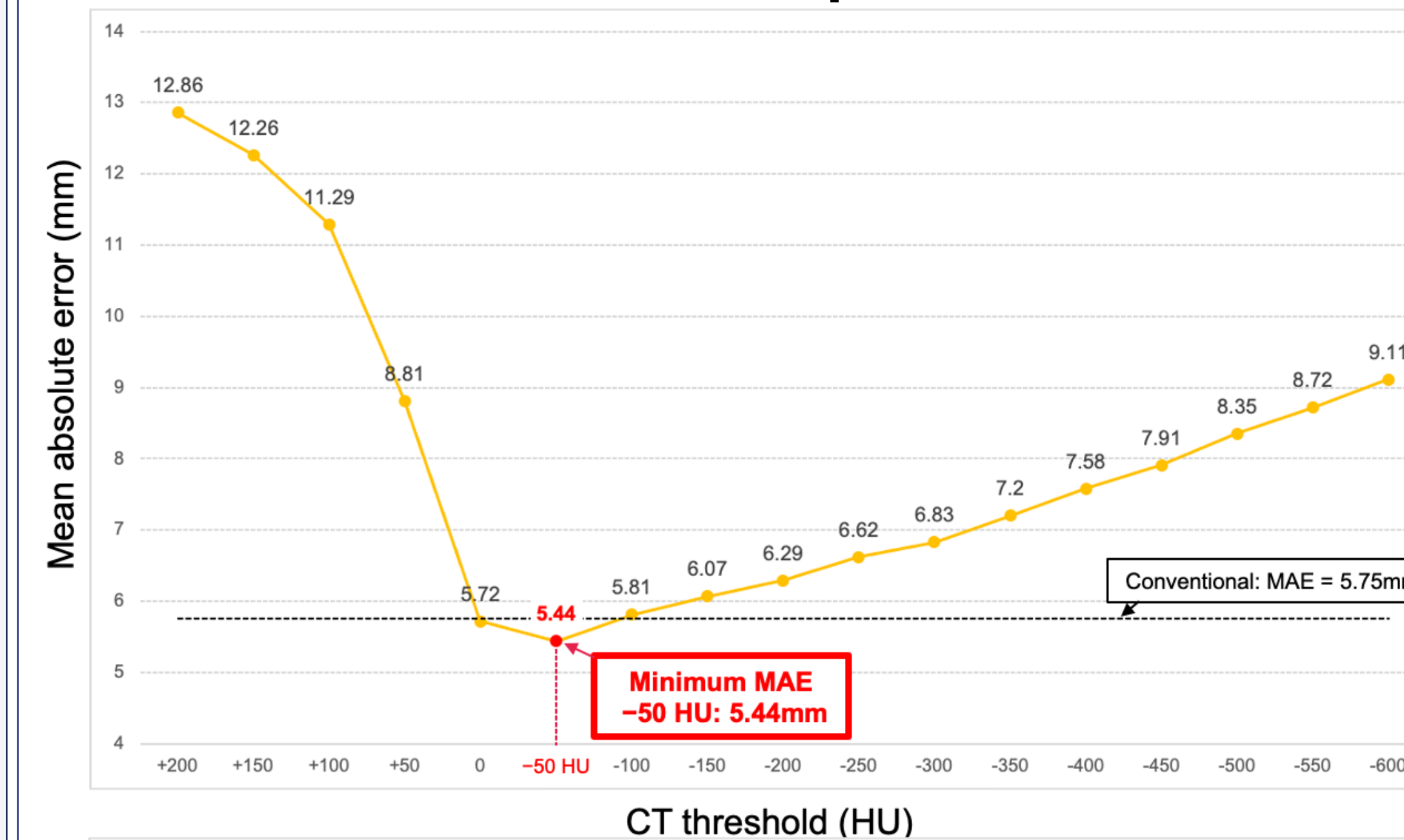
This threshold-based approach provides a simple and objective method for measuring solid component size and may contribute to its standardization.

### Future direction

Multicenter validation followed by prospective evaluation is warranted.

## RESULTS

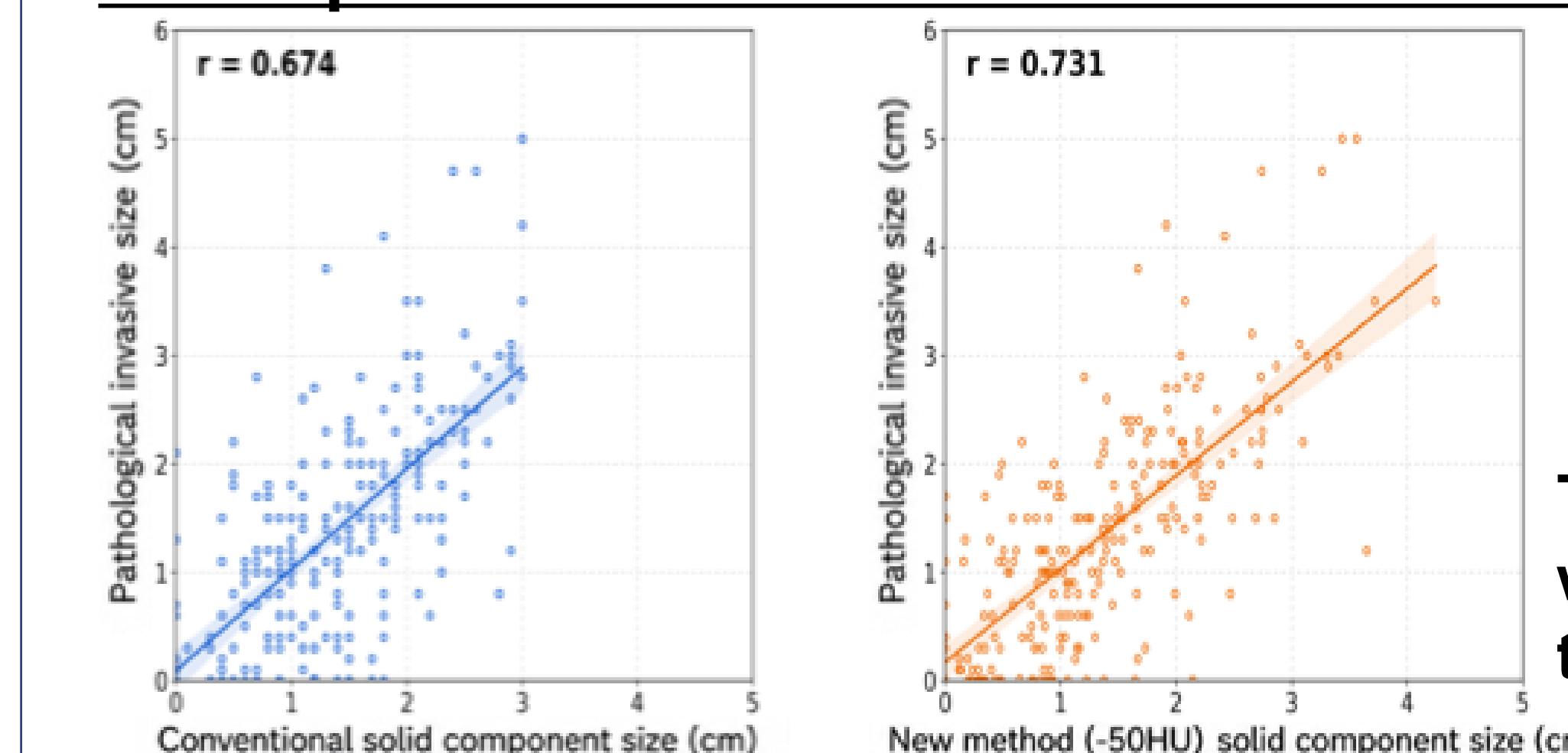
### 1.Determination of the Optimal CT Threshold



The MAE was lowest at −50 HU (5.44 mm), identifying −50 HU as the optimal CT threshold. Pearson correlation was also highest at −50 HU ( $r = 0.731$ ).

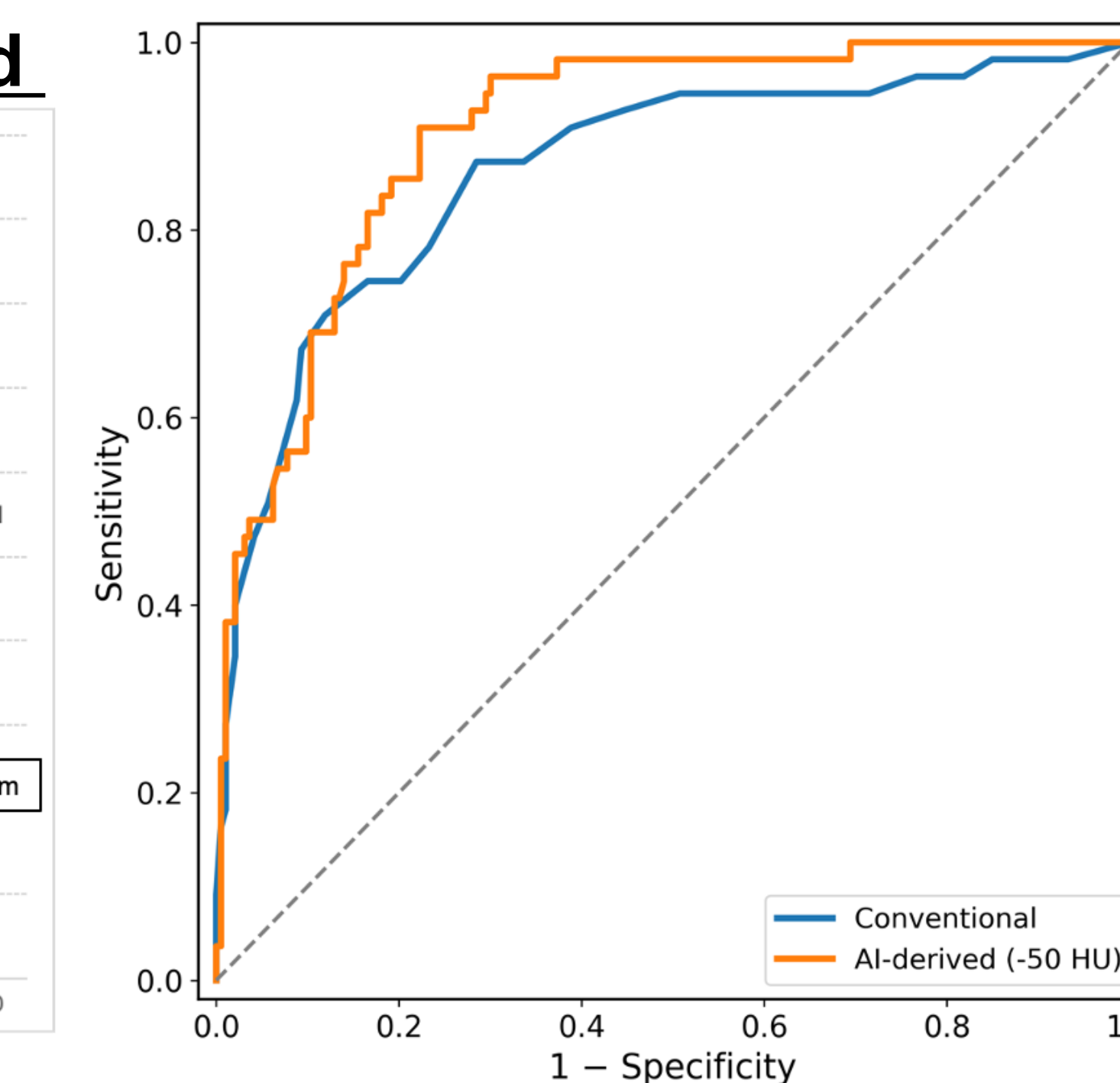
→ **New method: −50 HU threshold**

### 2.Comparison with Conventional Measurement



The new method (−50 HU) showed a strong correlation with pathological invasive size, comparable to that of the conventional method ( $r = 0.731$  vs.  $0.674$ ).

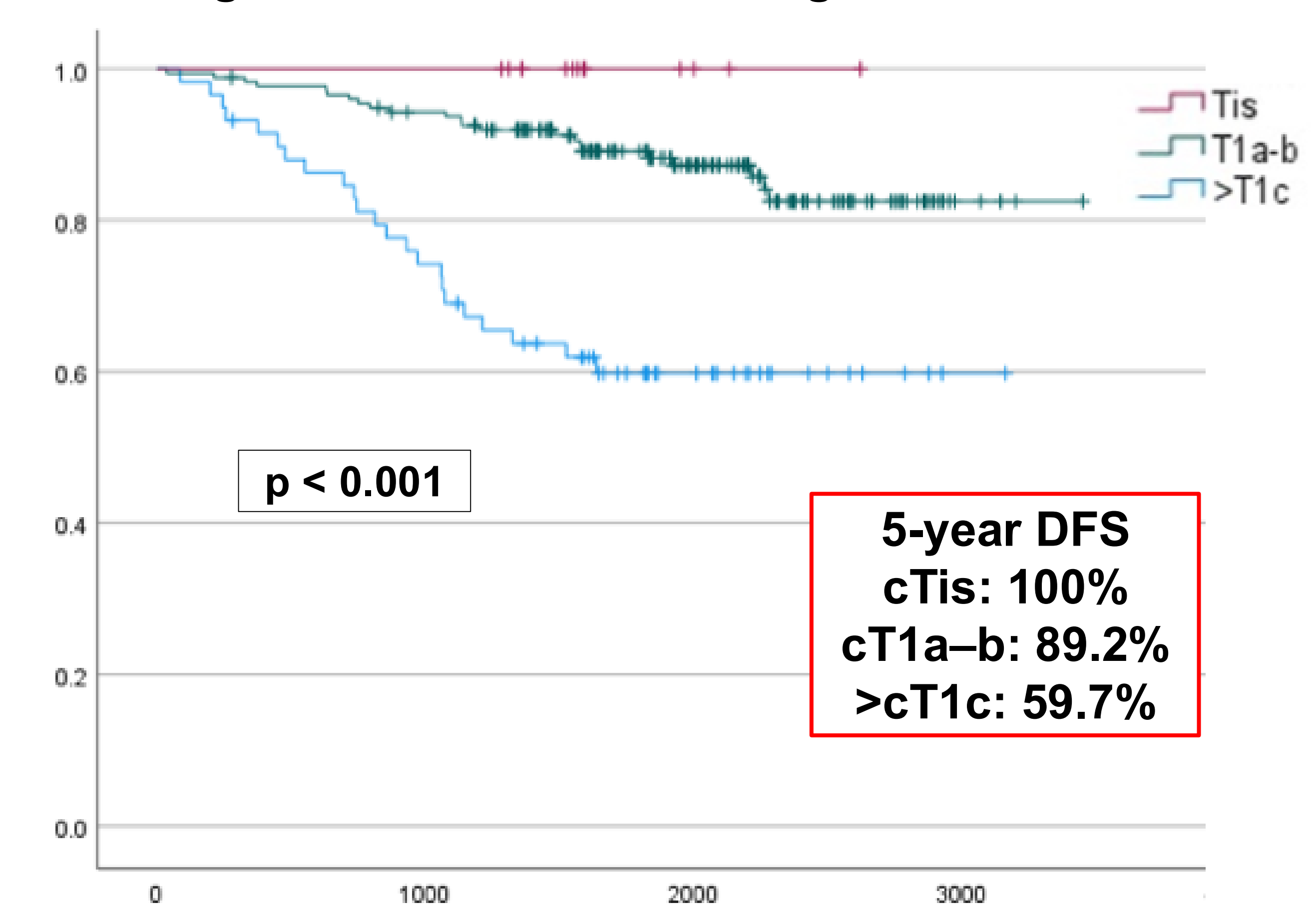
### 3.Diagnostic Performance for Pathological Invasive Size >20 mm



|                | AI-derived (−50 HU) | Conventional |
|----------------|---------------------|--------------|
| AUC            | 0.904               | 0.863        |
| Optimal cutoff | 15.6 mm             | 19.0 mm      |
| Sensitivity    | 90.9 %              | 70.9 %       |
| Specificity    | 77.7 %              | 88.1 %       |

The new method (−50 HU) showed high diagnostic performance for identifying pathological invasive size >20 mm (AUC = 0.904), while the conventional method showed an AUC of 0.863.

### 4.Prognostic Stratification Using the New Method



DFS was significantly stratified according to solid component size measured using the new method (−50 HU) (log-rank  $P < 0.001$ ).

**5-year DFS**  
cTis: 100%  
cT1a–b: 89.2%  
>cT1c: 59.7%

## PATIENTS & METHODS

### Study workflow

Clinical stage 0–IA lung adenocarcinoma (N = 248)

AI-based automatic tumor segmentation

Solid component measurement at multiple CT thresholds +200 to −600 HU (50-HU intervals)

Identification of the optimal CT threshold

Evaluation of the optimized measurement  
Correlation · ROC analysis · DFS

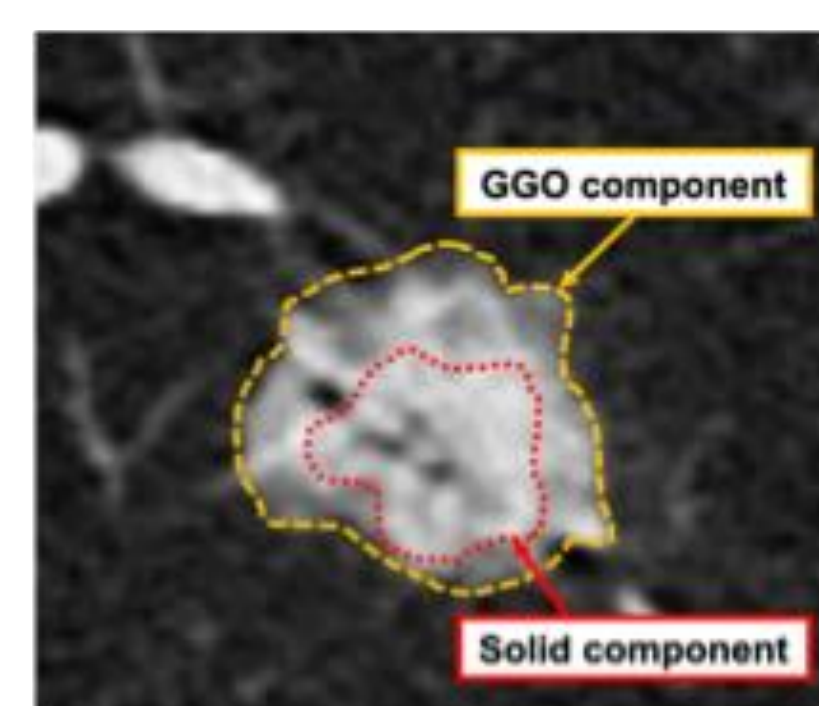
### Patients

This retrospective single-center study included 248 patients with clinical stage 0–IA lung adenocarcinoma who underwent lobectomy or segmentectomy between August 2015 and June 2021. Clinical staging and whole tumor size ( $\leq 3$  cm) were determined using conventional CT assessment.

### Image analysis

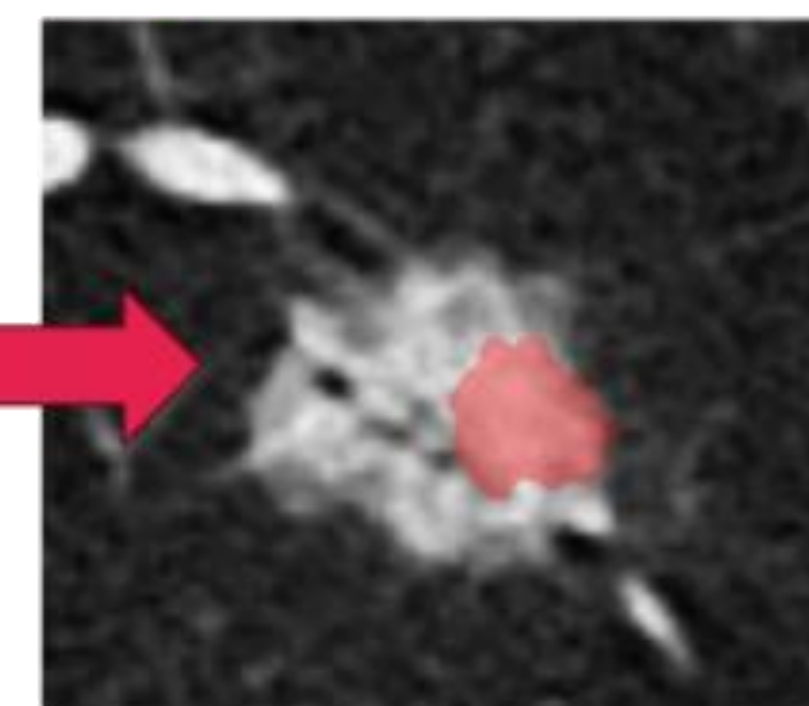
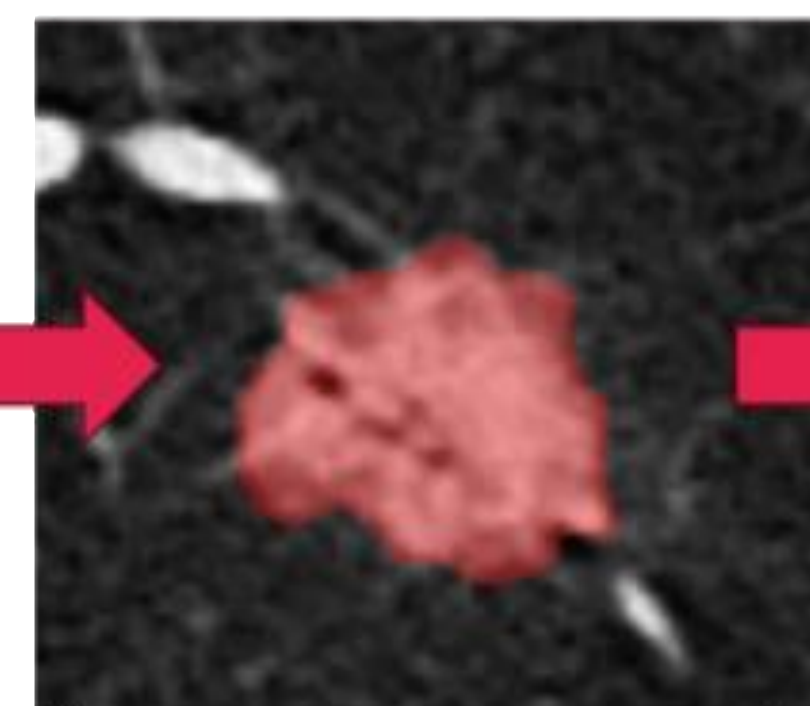
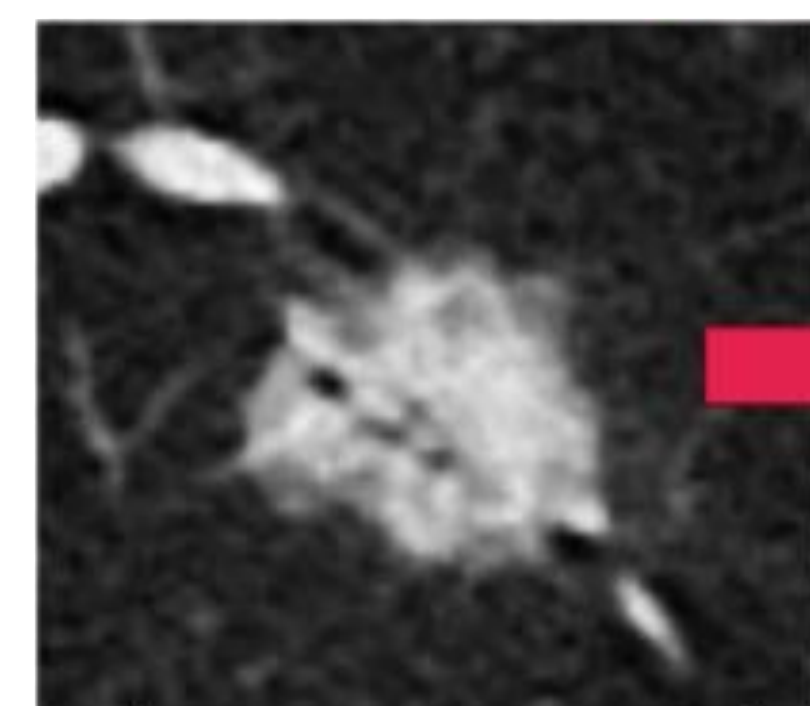
A pretrained AI model was used to automatically segment the entire tumor on preoperative CT images. Solid component size was then determined using predefined CT thresholds. The optimal CT threshold was defined as the threshold with the lowest mean absolute error (MAE) relative to pathological invasive size.

### Conventional measurement



- Visual identification of the GGO–solid boundary
- Manual measurement of the maximum solid component diameter

### Threshold-based measurement



### Statistical analysis

The measurement using the optimal CT threshold was compared with the conventional radiologist-reported measurement (conventional method). Pearson correlation coefficients with pathological invasive size were calculated for both methods. Absolute errors relative to pathological invasive size were compared between the two methods using a paired t-test. Receiver operating characteristic (ROC) analysis was performed for pathological invasive size >20 mm, and disease-free survival (DFS) was assessed using the Kaplan–Meier method.

### AI Use Disclaimer

ChatGPT (OpenAI) was used to assist with English language editing and poster preparation. All scientific content was reviewed and approved by the authors.