

CT-Pathology Concordance and Optimal CT Solid Component Cutoff in Stage I Lung Adenocarcinoma

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INTRODUCTION

Recent randomized trials have established segmentectomy and sublobar resection as an oncologically appropriate option for selected stage I NSCLC patients, increasing the importance of accurate preoperative CT assessment for surgical planning.

Solid-component size may help predict tumor invasiveness and guide the extent of resection.

Although a 6-mm cutoff has been proposed to distinguish invasive adenocarcinoma from lepidic/non-invasive disease, its validity in Western populations remains uncertain.

We evaluated agreement between CT and pathologic measurements and determined the optimal CT solid-component cutoff for predicting invasive adenocarcinoma in a Brazilian cohort.

METHODS

- **Population:** Adults with early-stage lung adenocarcinoma who underwent surgical resection between January 2023 and July 2025.
- **Eligibility:** Histologically confirmed adenocarcinoma, no prior treatment, and a CT-detected nodule measuring ≤ 3 cm.
- **Measurements:** Total tumor size and solid-component size on preoperative CT and total tumor size and invasive-component size on the surgical pathology report.
- **Analysis:** Lin's concordance correlation coefficient (CCC; 95% CI) to assess CT-pathology agreement; ROC analysis and Youden's index to identify CT cutoffs.
- **Final sample:** 82 patients.

RESULTS

CT-Pathology Agreement

Agreement between CT and pathology measurements was fair for total tumor size (Lin's CCC 0.555, 95% CI 0.387–0.688) and for CT solid-component versus pathologic invasive-component size (Lin's CCC 0.609, 95% CI 0.453–0.728). Although CT solid-component and pathologic invasive-component measurements were positively associated, substantial individual variability remained, indicating that the two methods were not fully interchangeable (Figure 1).

Diagnostic Performance: Solid Component vs. Total Size

CT solid-component size demonstrated excellent discrimination for invasive disease (AUC 0.93, 95% CI 0.87–0.98). The 7.5-mm optimal cutoff yielded 78.4% sensitivity, 100% specificity, 80.5% accuracy, and 89.2% balanced accuracy. This specificity provides a highly reliable rule-in criterion for clinical decisions.

Conversely, total tumor size showed poor discrimination (AUC 0.61, 95% CI 0.37–0.86). Its 95% CI crosses the null value (0.5), indicating a lack of statistical significance as a standalone predictor. The 1.55-cm cutoff yielded limited metrics (63.5% sensitivity, 62.5% specificity, 63.4% accuracy, and 63.0% balanced accuracy).

Overall, solid-component size vastly outperforms total tumor size in predicting invasive adenocarcinoma.

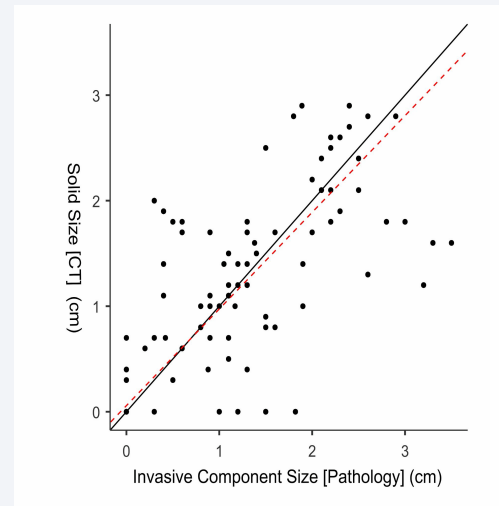


Figure 1. Concordance between CT and pathologic measurements of the invasive component. Scatterplot comparing CT solid-component size with pathologic invasive-component size. The black line represents perfect agreement ($y = x$), and the red dashed line represents the fitted relationship. CT and pathology demonstrated **fair concordance** (Lin's CCC 0.609, 95% CI 0.453–0.728), with clinically relevant variability between individual measurements.

DISCUSSION AND CONCLUSION

- In this Brazilian cohort, **CT showed only fair concordance with pathology**, reinforcing that radiologic measurements should be interpreted cautiously when guiding surgical decisions. **A 7.5-mm solid-component cutoff best predicted invasive adenocarcinoma, serving as a highly specific rule-in criterion.**
- The higher cutoff compared with previous Asian studies suggests potential population-specific differences.
- Larger, multicenter cohorts are needed to validate this threshold and refine CT-based criteria for surgical planning in early-stage lung adenocarcinoma.

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