



CT-Derived Body Composition Metrics Predict Major Pathological Response to Neoadjuvant Immunochemotherapy in Non-Small Cell Lung Cancer



¹. Jianfeng Hu MD ¹, Zhifa Wu MD ¹, Jinmiao Chen MD ¹, Haiyan Xu MD ¹, Shixin Chen MD ¹, Qinru Wang MD ¹, Wang Liu MD ¹, Bohang Cui MD ¹, Tao Chen MD ¹, Tao Ye MD ¹, Qi Wan MD, PhD ¹, Xinchun Li MD, PhD ¹, **Yeqing Zhu MD, PhD***

¹Department of Radiology, The First Affiliated Hospital of Guangzhou Medical University, Guangzhou, China, 510120

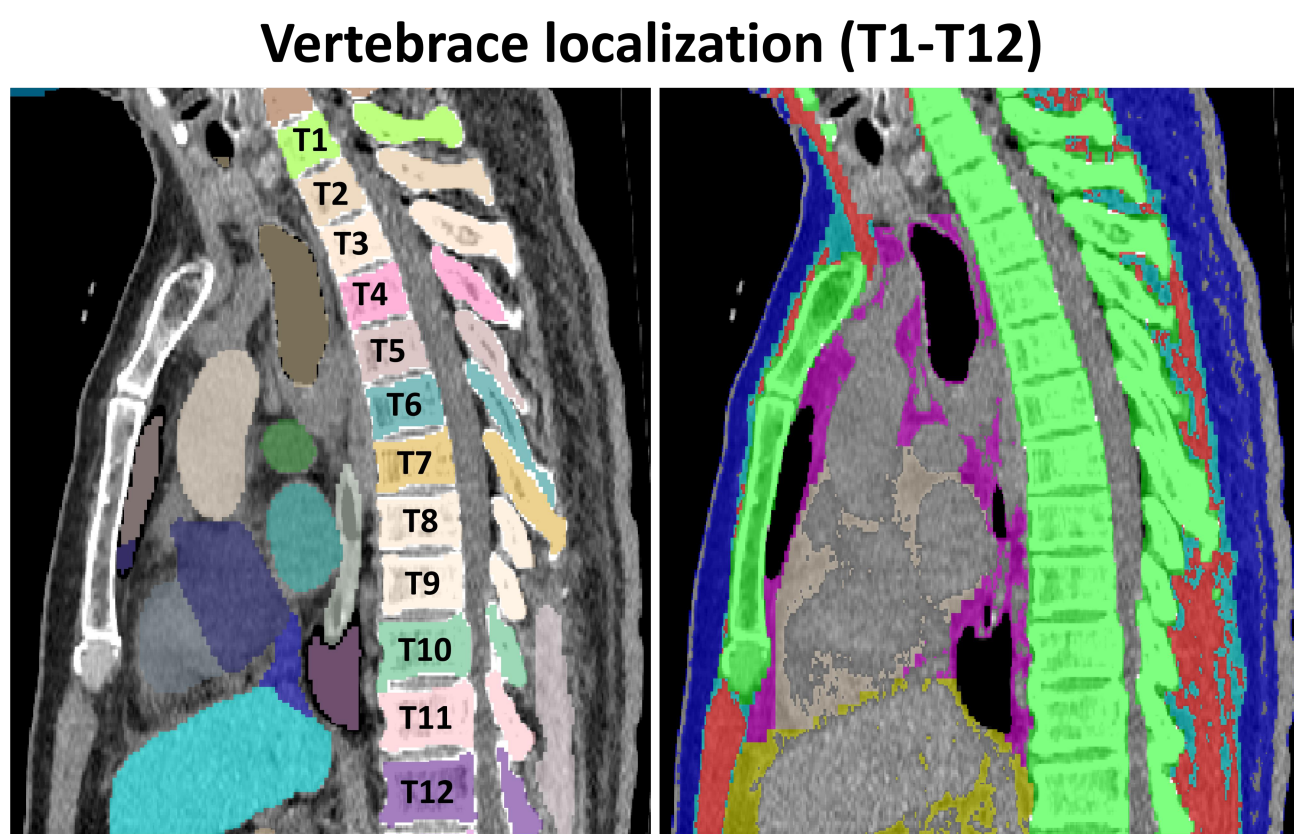
*Correspondence: yeqing.zhu01@gmail.com

INTRODUCTION

- Lung cancer:** leading cause of cancer-related death globally¹.
- Major pathological response (MPR):** one of the surrogate endpoints in clinical trials that are associated with a better prognosis^{2,3}.
- AIM:** To determine whether CT-derived body composition metrics provide incremental value in predicting MPR to neoadjuvant immunochemotherapy (NICT) in patients with Non-Small Cell Lung Cancer (NSCLC).

METHODS

- Automated three-dimensional segmentation based on pre- and post-treatment thoracic CT images at the T1–T12 level⁴.



Body composition tissues

Patients who had pathologically confirmed NSCLC and received neoadjuvant immunochemotherapy between January 2019 and January 2024 in center 1 (n=510)

Patients excluded (n=104)
- unavailable pretreatment CT images (n=73)
- missing MPR result (n=6)
- combination of other primary malignant tumor (n=13)
- CT-to-treatment interval > 1 month (n=7)
- poor imaging quality (n=5)

406 patients were included in this study

MPR group (n=214)
Non-MPR group (n=192)

RESULTS

- NICT led to decreased skeletal muscle volume and increased fat volume, accompanied by reduced density across body composition metrics.(Figure 1,2)
- After time-normalization of dynamic changes, baseline BMI $\geq$ 25 (OR=1.90), baseline skeletal muscle volume index (OR = 1.14, per 100-unit increase), a 1% monthly increase in bone density (OR=1.07) and a 5% monthly increase in paracardial adipose volume index (OR=1.36) were independently associated with MPR.
- The clinical, body composition, and combined models achieved AUCs of 0.655, 0.633, and 0.692, respectively. The combined model was superior to both the clinical ($p=0.042$) and body composition models ($p=0.005$). (Figure 3,4)

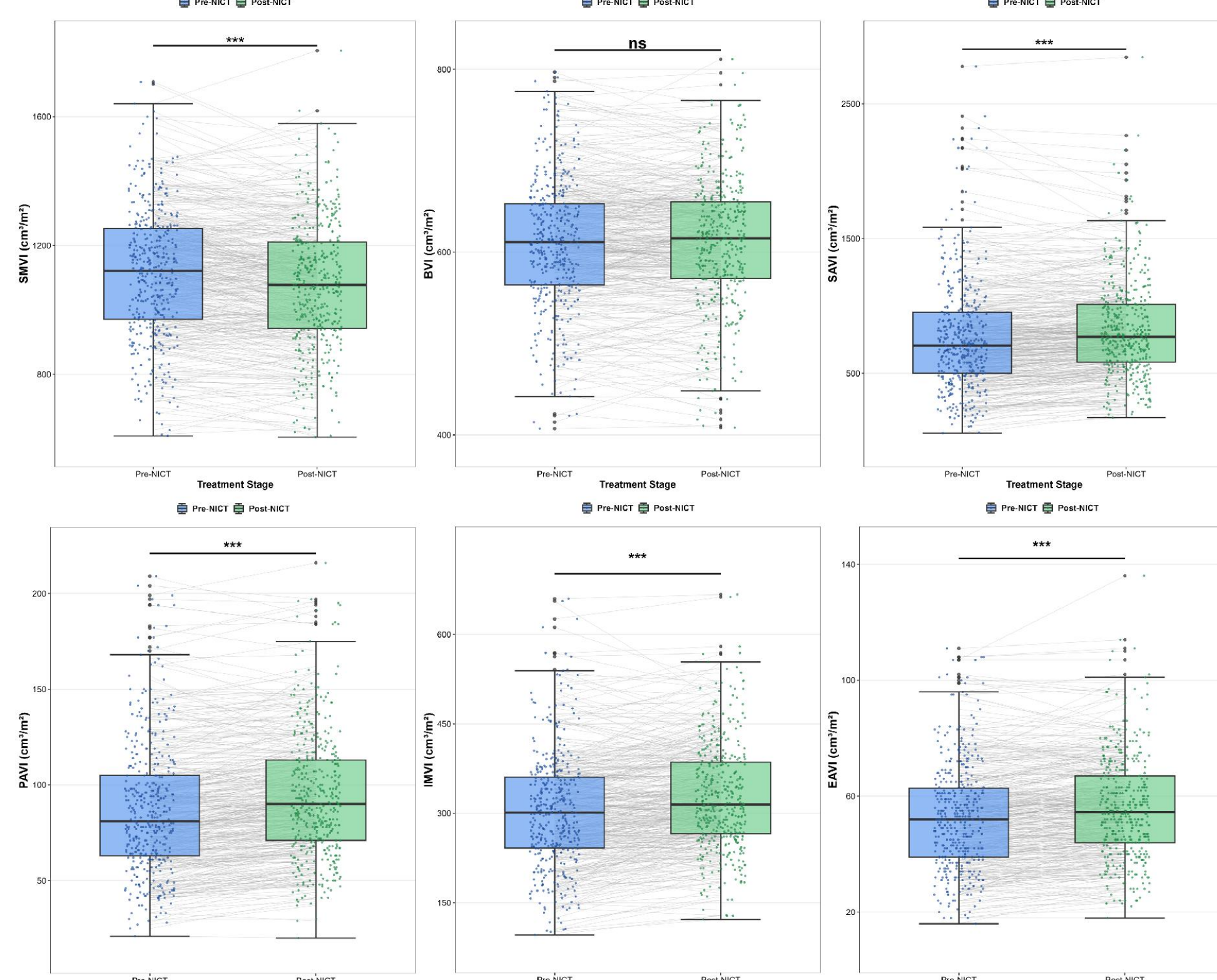


Figure 1: Comparison of volume metrics before and after NICT

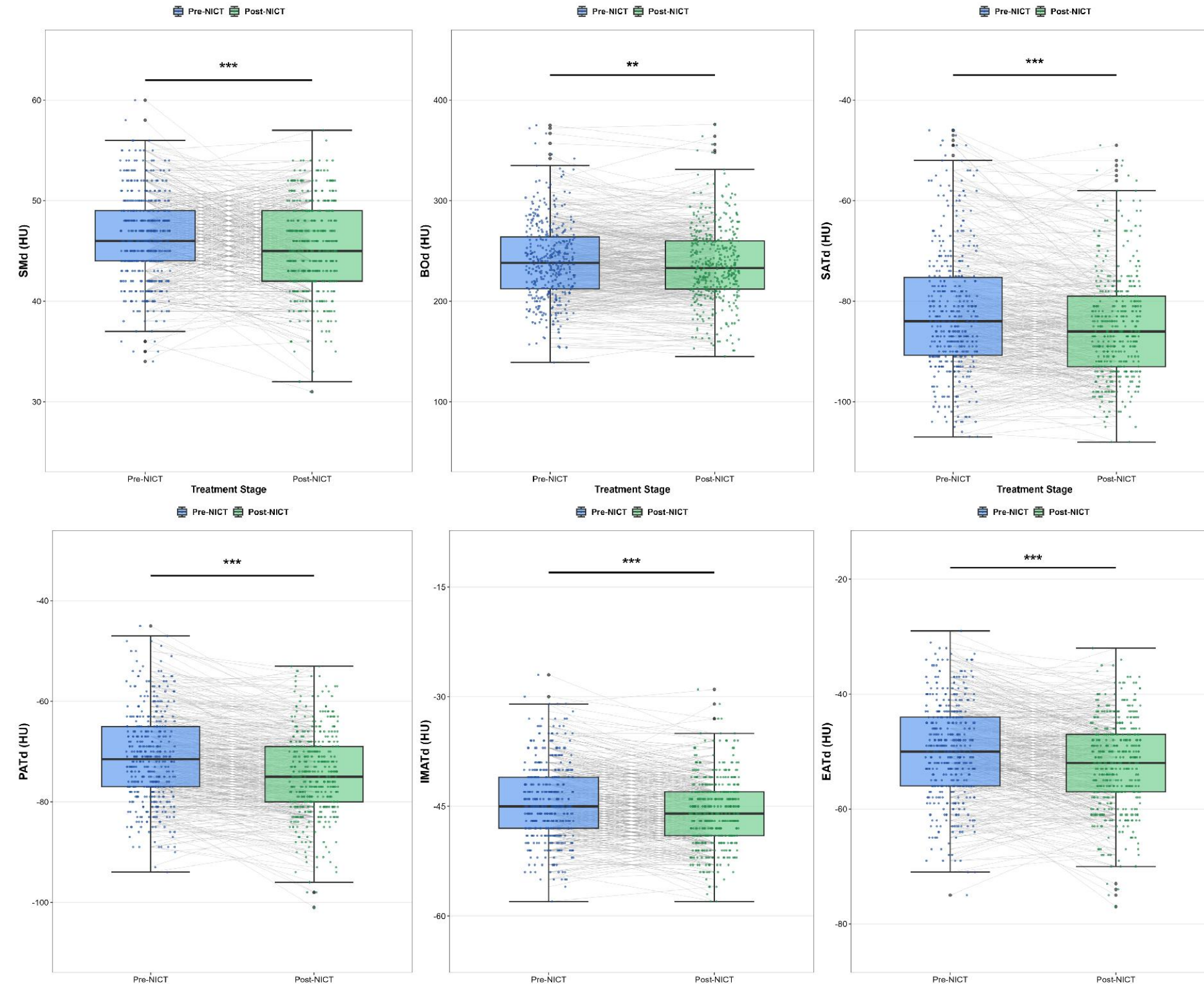


Figure 2: Comparison of density metrics before and after NICT

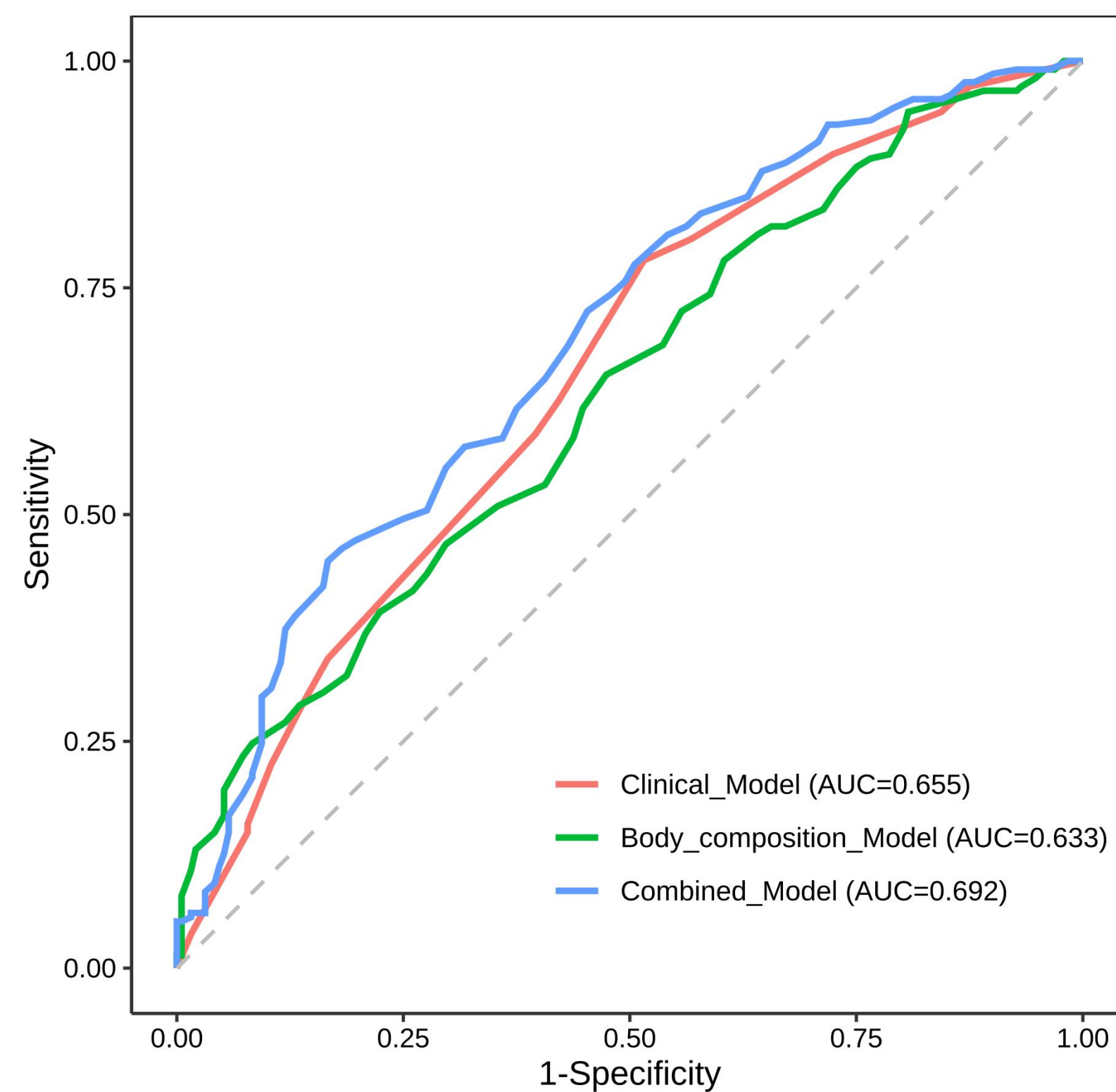


Figure 3: ROC curves comparing three models

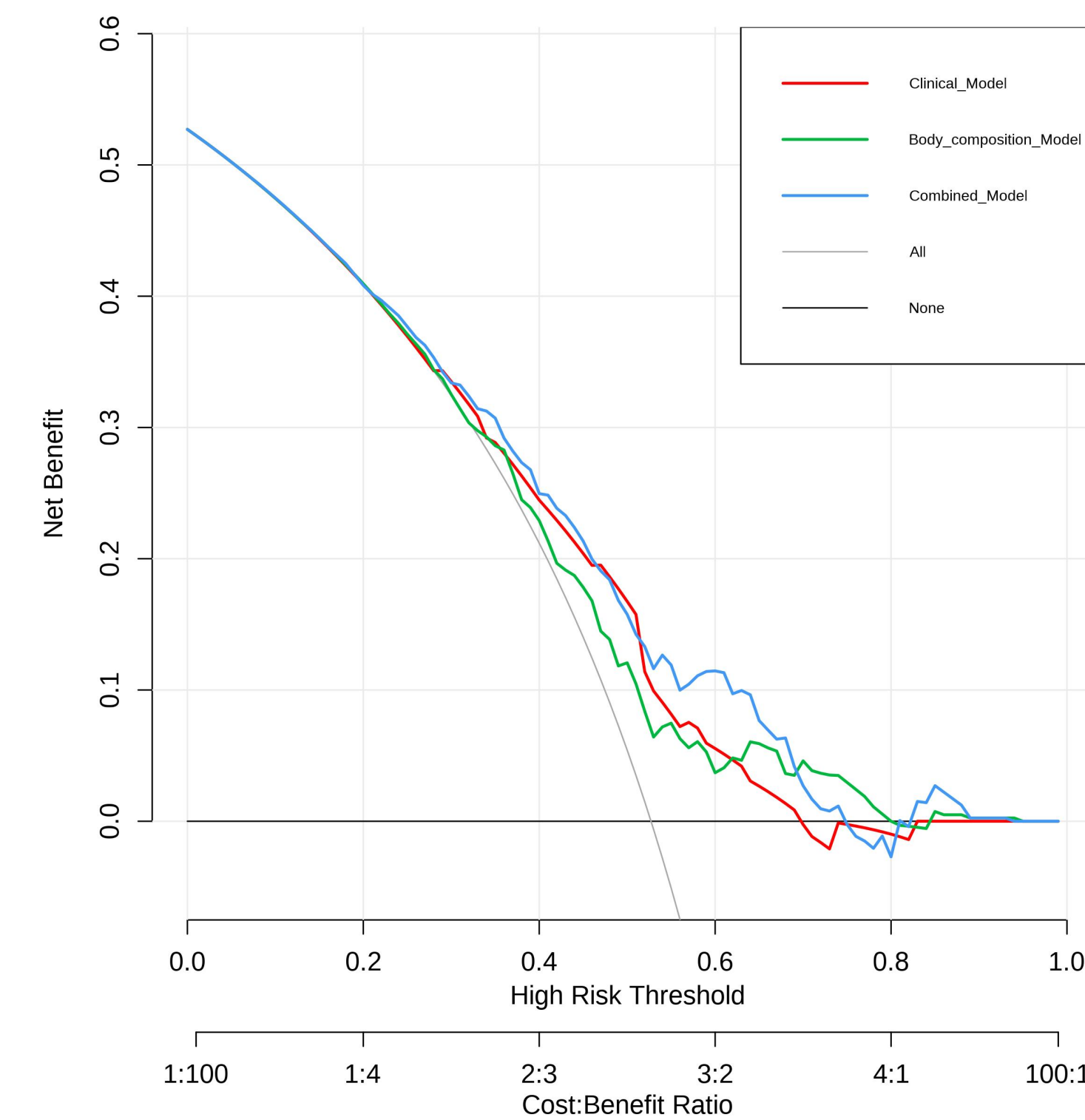


Figure 4: DCA curves comparing three models

DISCUSSION AND CONCLUSION

Actionable Take Away Message

- NICT induced significant alterations not only in muscle and fat volumes but also in their radiodensity, reflecting concurrent changes in tissue quality.
- Automated three-dimensional CT-derived body composition metrics provide incremental predictive value for MPR in patients with NSCLC receiving NICT.

Future Direction for Research

- Multi-institutional study, prospective clinical trial, integration model with AI.

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