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$\Delta(\text{SUV}_{\text{max}} - \text{SUV}_{\text{peak}})$ Stratifies High- SUV_{max} Tumors for Local Invasive Features in Early NSCLC

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Disclosure

Hayato Nanami, MD

No relevant financial relationships to disclose.

AI Use Disclosure

AI tools were used to assist with language editing and formatting.

The presenting author reviewed and takes full responsibility for all content.

Introduction

- Accurate preoperative assessment of pathological local invasive features is important when considering sublobar resection for early-stage NSCLC.

Aokage K, et al. Lancet Respir Med. 2023;11:540–549

- SUVmax is associated with pathological invasiveness, but its diagnostic performance remains limited.

Suárez-Piñera M, et al. Am J Nucl Med Mol Imaging. 2018;8:100–109
Chen Z, Jiang S, Li Z, Rao L, Zhang X. Acad Radiol. 2020;27:1691–1699

- We evaluated whether Δ improves specificity and NPV while maintaining sensitivity $\geq 90\%$.

Study design and cohort

- cStage IA (8th edition of the TNM classification)
NSCLC undergoing anatomical lung resection
between Dec 2022 and Feb 2026.

- Primary analysis: adenocarcinoma

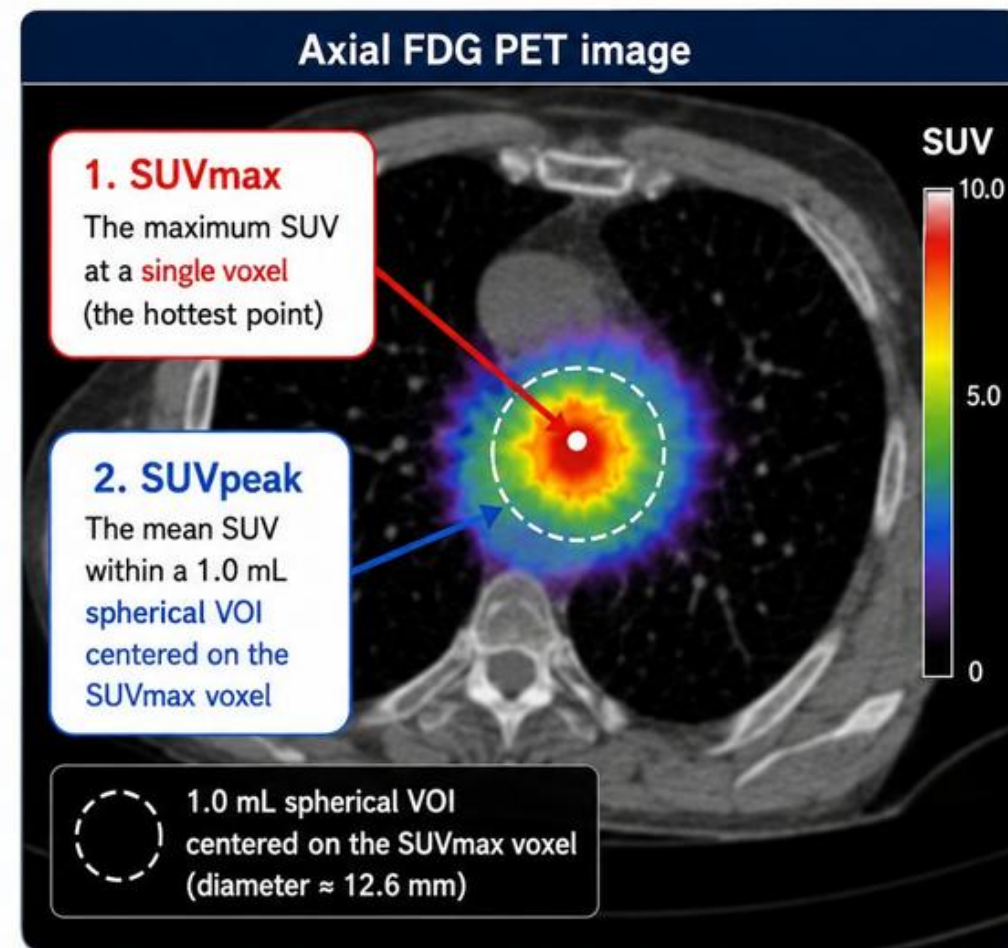
- Sensitivity analysis: overall NSCLC

PET/CT and definitions

- Scanner: Biograph Vision 450.

- Score 1+ = pleural invasion and/or lymphovascular
invasion.

- Threshold: highest specificity among thresholds
achieving sensitivity $\geq 90\%$.



$$\text{Delta } (\Delta) = \text{SUVmax} - \text{SUVpeak}$$

Baseline characteristics by pathological local invasive feature status

Variable	Overall (n=113)	Score 0 (n=72)	Score 1+ (n=41)	P value
Age, years	75(68.0–79.0)	74.5(68.8–79.2)	75(68.0–78.0)	0.572
Male sex	58(51.3%)	34(47.2%)	24(58.5%)	0.247
Histology				0.348
Adenocarcinoma	101(89.4%)	66(91.7%)	35(85.4%)	
Squamous cell carcinoma	12(10.6%)	6(8.3%)	6(14.6%)	
Clinical T category				0.009
cT1a	14(12.4%)	13(18.1%)	1(2.4%)	
cT1b	58(51.3%)	39(54.2%)	19(46.3%)	
cT1c	41(36.3%)	20(27.8%)	21(51.2%)	
CT morphology				<0.001
GGO-containing	62(54.9%)	50(69.4%)	12(29.3%)	
Pure solid	51(45.1%)	22(30.6%)	29(70.7%)	
SUVmax	4.21(2.55–9.40)	2.95(2.21–5.09)	8.54(4.79–13.61)	<0.001
SUVpeak	2.38(1.54–4.45)	1.98(1.40–2.74)	3.89(2.14–7.94)	<0.001
Δ (SUVmax–SUVpeak)	1.59(0.88–4.47)	1.02(0.72–2.33)	3.95(2.26–5.91)	<0.001

Abbreviations: PET/CT, positron emission tomography/computed tomography; SUV, standardized uptake value; GGO, ground-glass opacity;

Values are presented as median (interquartile range) or number (%).

GGO-containing tumors include pure GGO and part-solid tumors.

Score 1+ was defined as the presence of pleural invasion and/or lymphovascular invasion.

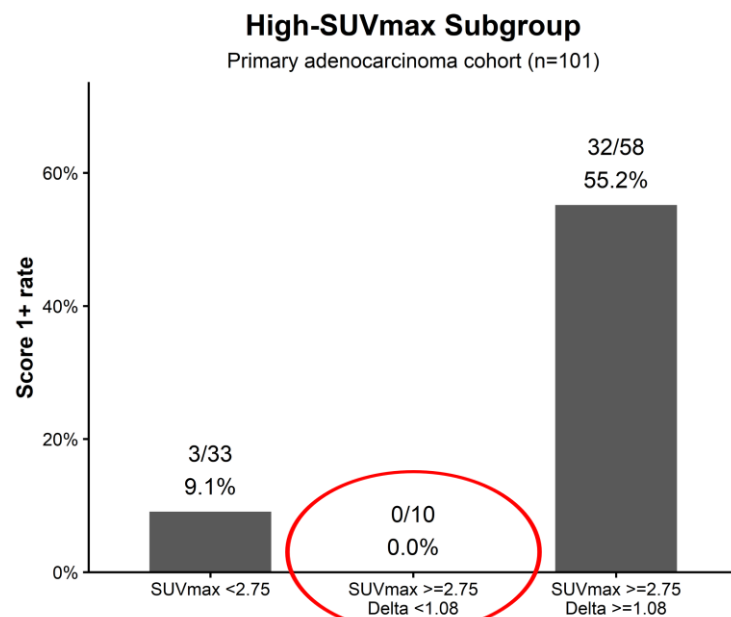
Result

Diagnostic performance for score 1+ in the primary adenocarcinoma cohort under a high-sensitivity strategy

Metric	Cutoff	Sensitivity	Specificity	PPV	NPV	Balanced accuracy
SUVmax	2.75	0.914	0.455	0.471	0.909	0.684
SUVpeak	1.47	0.943	0.303	0.418	0.909	0.623
Δ (SUVmax–SUVpeak)	1.08	0.914	0.606	0.552	0.930	0.760

Abbreviations: SUV, standardized uptake value; NPV, negative predictive value; PPV, positive predictive value.

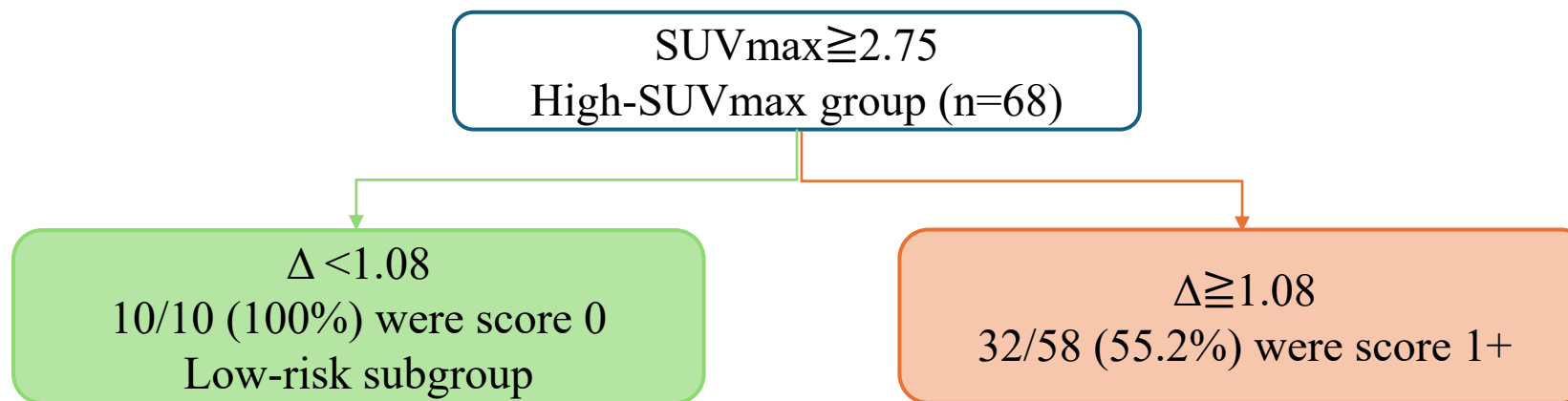
Cutoffs were selected as the thresholds with the highest specificity among candidate thresholds achieving sensitivity $\geq 90\%$ for score 1+.



Interpretation

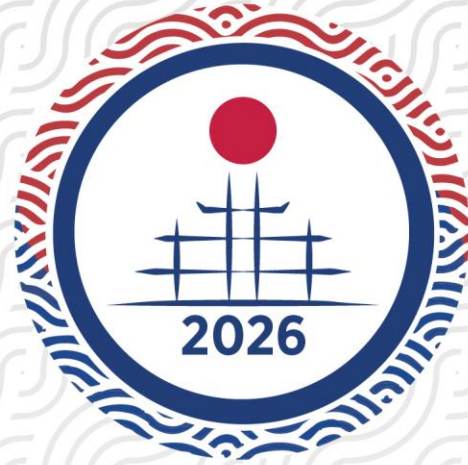
- Among tumors with SUVmax ≥ 2.75 , $\Delta < 1.08$ identified 10 tumors, all of which were score 0.
- High-SUVmax tumors were not a homogeneous risk group.
- Sensitivity analysis in the overall NSCLC cohort showed directionally similar findings.

Key finding



Conclusion

- Δ improved specificity and NPV under a high-sensitivity strategy.
- Δ identified a low-risk subgroup within high-SUV_{max} tumors.
- Δ may help identify low-risk tumors among high-SUV_{max} early-stage adenocarcinomas.



Thank You.