



P2.075: Nonlinear Association of FDG PET/CT SUVmax With Overall Survival in Lung Cancer: A Single-Center Cohort

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INTRODUCTION

FDG PET/CT SUVmax is routinely reported in lung cancer, yet prognostic studies usually model it as a constant linear term or dichotomize it using a single cutoff. These approaches may obscure variation in mortality risk across the observed range.

We evaluated the adjusted nonlinear association between recorded SUVmax and overall survival in a large real-world cohort.

METHODS

Cohort and outcome. We retrospectively analyzed a complete-case cohort of patients diagnosed with lung cancer at a single center from December 2011 to February 2024. Recorded SUVmax, survival/follow-up, age, sex, and overall stage were required; OS was measured from diagnosis to all-cause death or last contact.

Modeling strategy. The primary analysis used a four-knot restricted cubic spline (RCS; reference SUVmax 2.5) adjusted for age, sex, and overall stage. Continuous Cox and exploratory SUVmax ≥ 10 versus < 10 Cox/Kaplan-Meier analyses were supportive.

Robustness analyses. Proportional-hazards (PH) assumptions were tested; after violation, interval-specific Cox estimates were reported. T-, N-, and M-stratum spline analyses were exploratory, with no formal interaction test.

REFERENCES & DISCLOSURES

REFERENCES

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AI USE DISCLOSURE

OpenAI Codex assisted with language editing, poster layout, and figure assembly. All scientific content and results were verified and approved by the authors.

DISCUSSION AND CONCLUSION

Interpretation. Adjusted mortality hazard followed a distinctly nonlinear pattern, rising steeply to a peak near SUVmax 10.8 (HR ≈ 3.8) and remaining elevated thereafter. A single linear HR or dichotomous cutoff therefore does not capture the full exposure-response relationship; SUVmax 10 is an exploratory display threshold, not a validated clinical decision point.

Time dependence. The PH assumption was violated, so full-follow-up Cox estimates should be interpreted as follow-up-averaged associations. Estimates were weaker after 3 years, but this may reflect fewer late events and changing risk sets rather than a demonstrated loss of prognostic value.

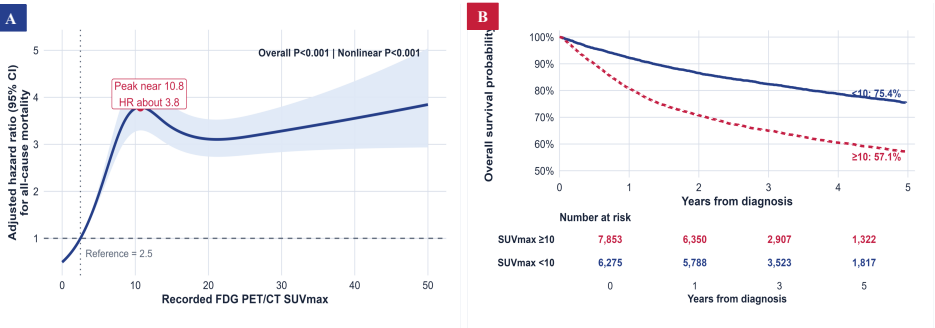
Limitations and next steps. Because this was a retrospective single-center analysis, the findings remain associative and may not generalize beyond this cohort. Residual confounding, unavailable PET protocol/device details, uncertain imaging-date semantics, no formal TNM interaction testing, and no external validation further limit interpretation. Independent cohorts with standardized PET definitions should validate the nonlinear shape and test incremental discrimination, calibration, and clinical utility.

RESULTS: COHORT CHARACTERISTICS

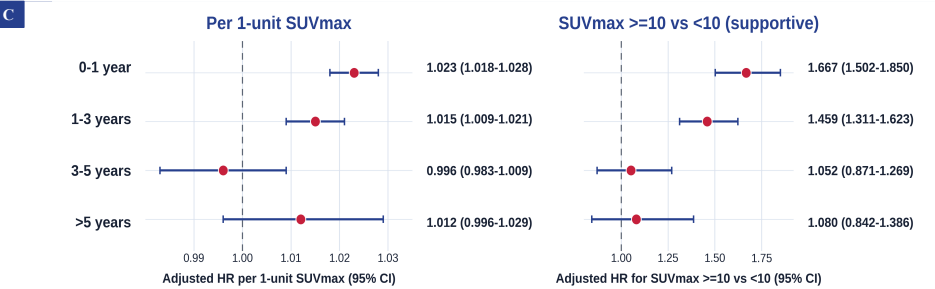
Characteristic	Overall cohort (N=14,128)
Age, years	62 (55-69)
Male sex, n (%)	9,122 (64.6)
Overall stage, n (%)	
Stage I	2,326 (16.5)
Stage II	698 (4.9)
Stage III	3,092 (21.9)
Stage IV	8,012 (56.7)
Recorded SUVmax	11.0 (5.8-16.4)
Observed follow-up, days	994 (651-1,708)
Deaths, n (%)	4,430 (31.4)

Data are median (IQR) or n (%).

RESULTS



A. Adjusted restricted cubic spline for all-cause mortality (reference SUVmax 2.5; adjusted for age, sex, and overall stage). Solid line, HR; shaded area, 95% CI.
B. Kaplan-Meier overall survival by exploratory SUVmax 10 grouping. Three- and five-year OS were 65.0% and 57.1% versus 82.4% and 75.4% for SUVmax ≥ 10 versus < 10 , respectively; numbers at risk are shown.



C. Interval-specific adjusted HRs after proportional-hazards violation. Models adjusted for age and sex and were stratified by overall stage; no interval-specific RCS was fitted.

Primary analysis. Among 14,128 patients (4,430 deaths), the follow-up-averaged continuous Cox estimate was aHR 1.018 per 1-unit higher SUVmax (95% CI 1.015-1.022; $P < 0.001$). The adjusted RCS was strongly nonlinear (overall and nonlinear $P < 0.001$); relative to SUVmax 2.5, the hazard peaked near 10.8 (HR ≈ 3.8) and remained elevated thereafter.

Grouped analysis. SUVmax ≥ 10 versus < 10 was associated with a higher mortality hazard (aHR 1.45, 95% CI 1.36-1.55; $P < 0.001$). Three- and five-year OS was 65.0% and 57.1% versus 82.4% and 75.4%; this cutoff remains exploratory.

Time-varying sensitivity. PH was violated. Associations were strongest during years 0-3; estimates after 3 years included the null, potentially reflecting fewer late events and changing risk sets.

Exploratory subgroup analysis. Within-stratum RCS tests showed nonlinear $P < 0.001$ for T1-T3, N0-N3, and M0-M1, whereas T4 had $P = 0.078$. No formal interaction test was performed, so these results do not establish effect modification.

TAKE-HOME MESSAGE

Recorded SUVmax was associated with mortality in a distinctly nonlinear pattern. Modeling SUVmax continuously with a nonlinear function better represented the observed association than a single linear term or the exploratory cutoff of 10; external validation is required before clinical use.