

CT Radiomics for Prognostic Prediction of outcome in Pediatric Hodgkin Lymphoma

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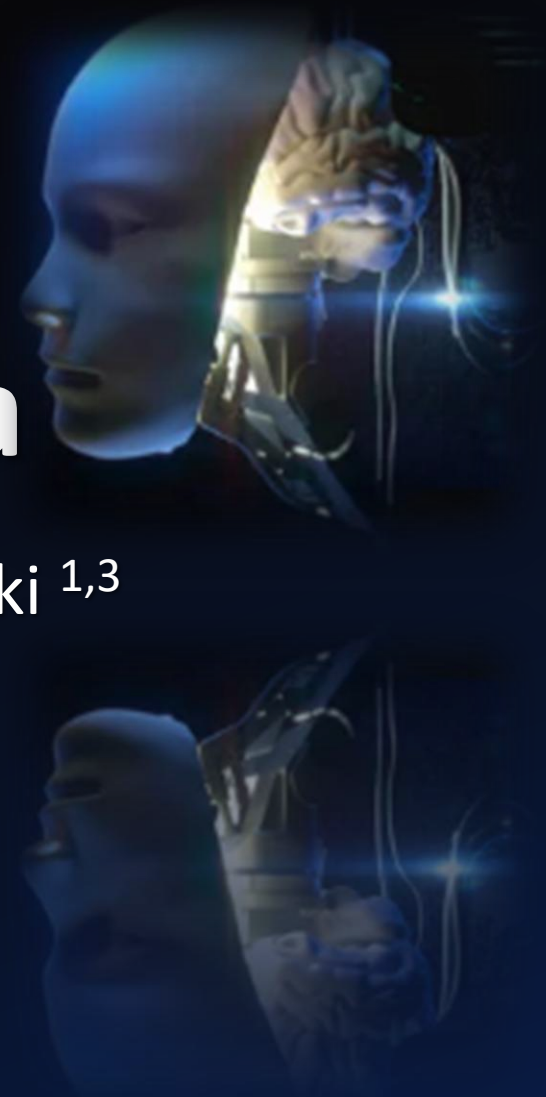
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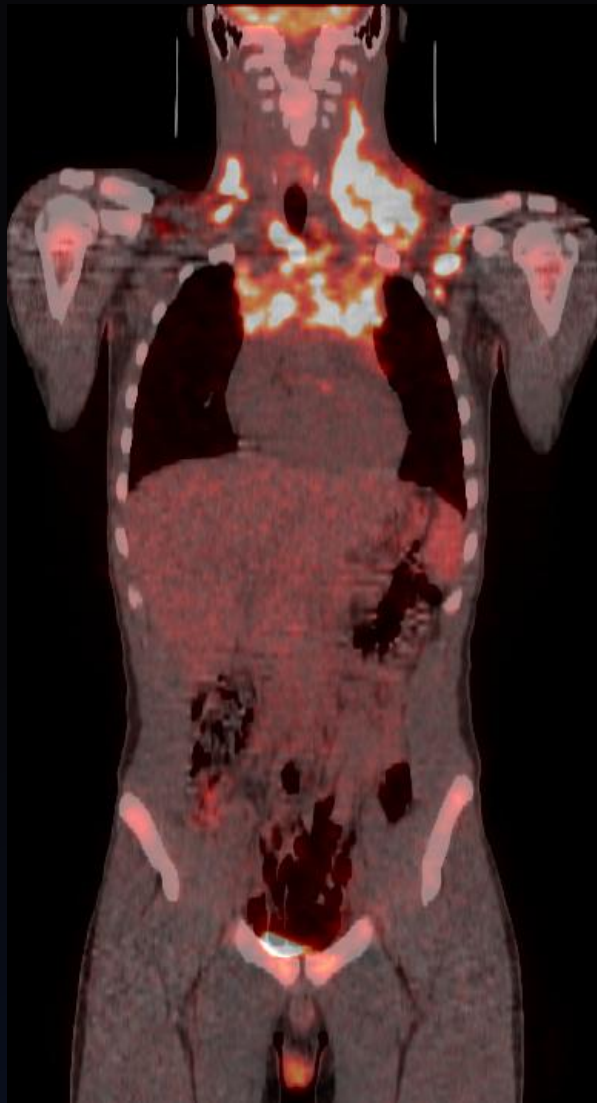


RAMBAM
Health Care Campus

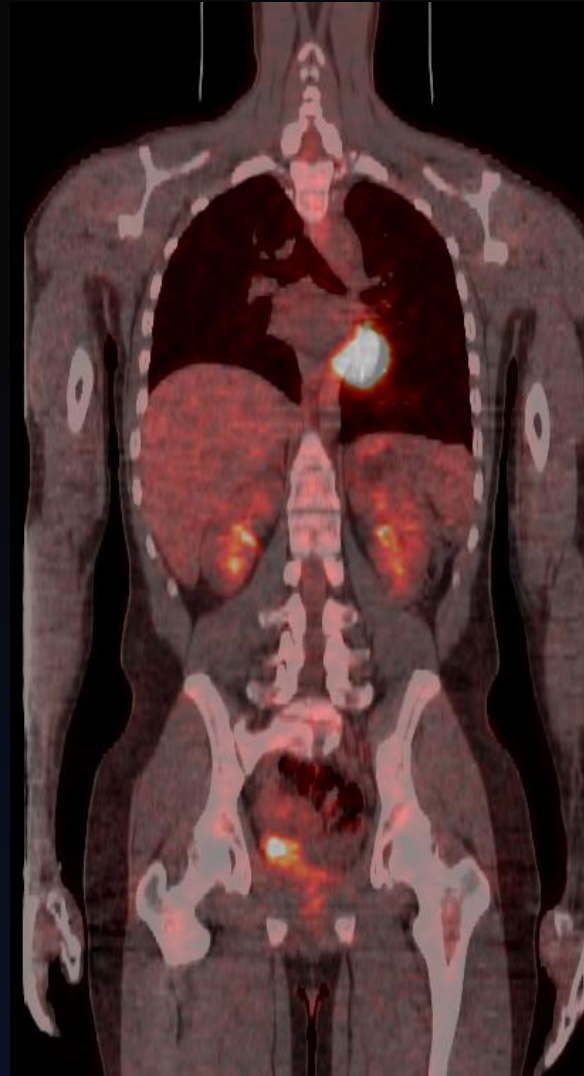


Nothing to disclose.

Common practice in pediatric HL



PETCT at staging



PETCT at interim



Treatment escalation



Up to 30% FP



Treatment de-escalation



<10% FN

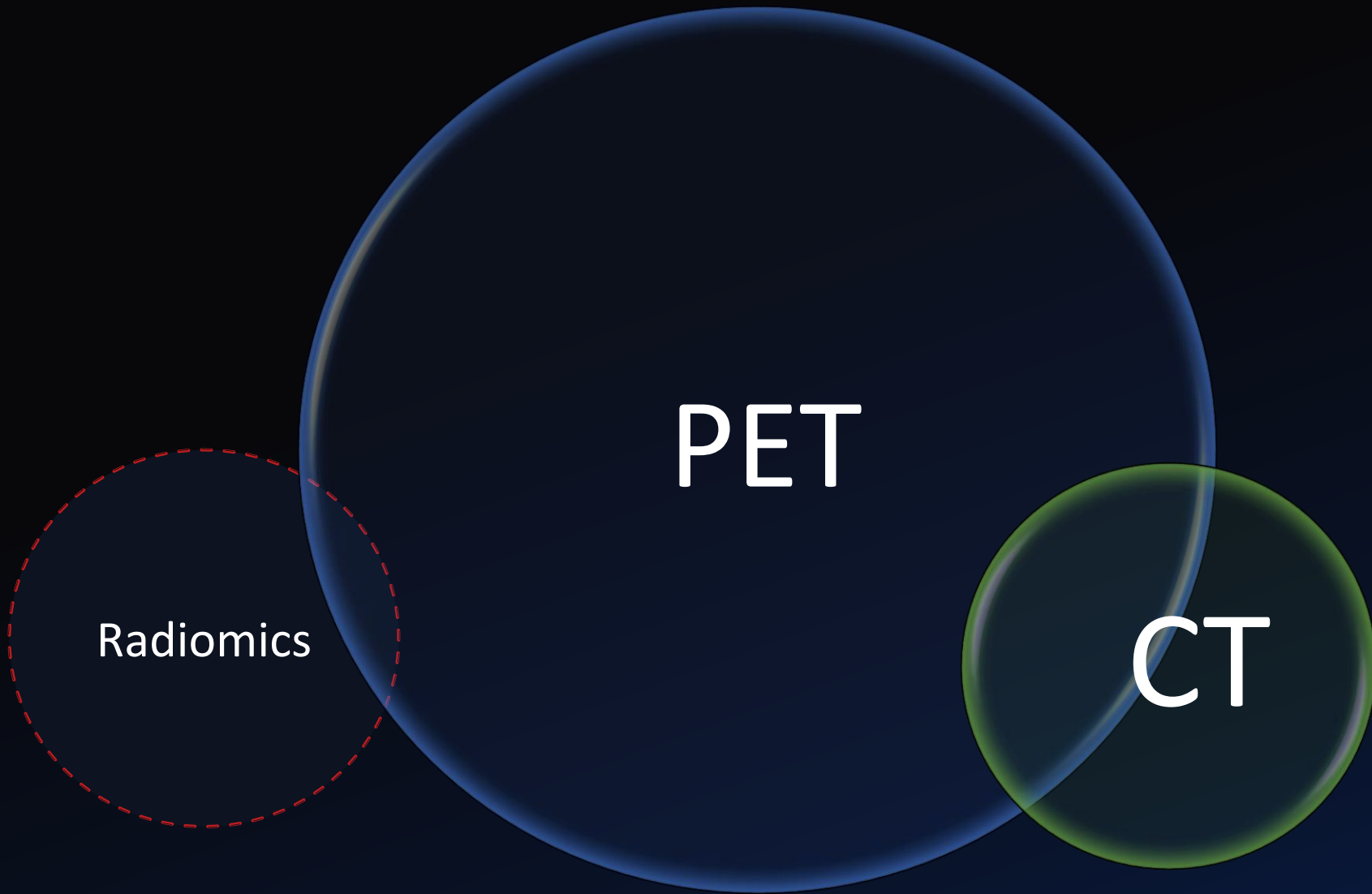
Is CT anatomy Irrelevant ?

> [Pediatr Radiol](#). 2013 Jan;43(1):86-92. doi: 10.1007/s00247-012-2517-9. Epub 2012 Nov 14.

Early interim FDG PET/CT prediction of treatment response and prognosis in pediatric Hodgkin disease—added value of low-dose CT

[Anat Ilivitzki](#)¹, [Lea Radan](#), [Miriam Ben-Arush](#), [Ora Israel](#), [Ayelet Ben-Barak](#)

Integrating low-dose CT with PET improved predictive accuracy compared to PET or low-dose CT alone.



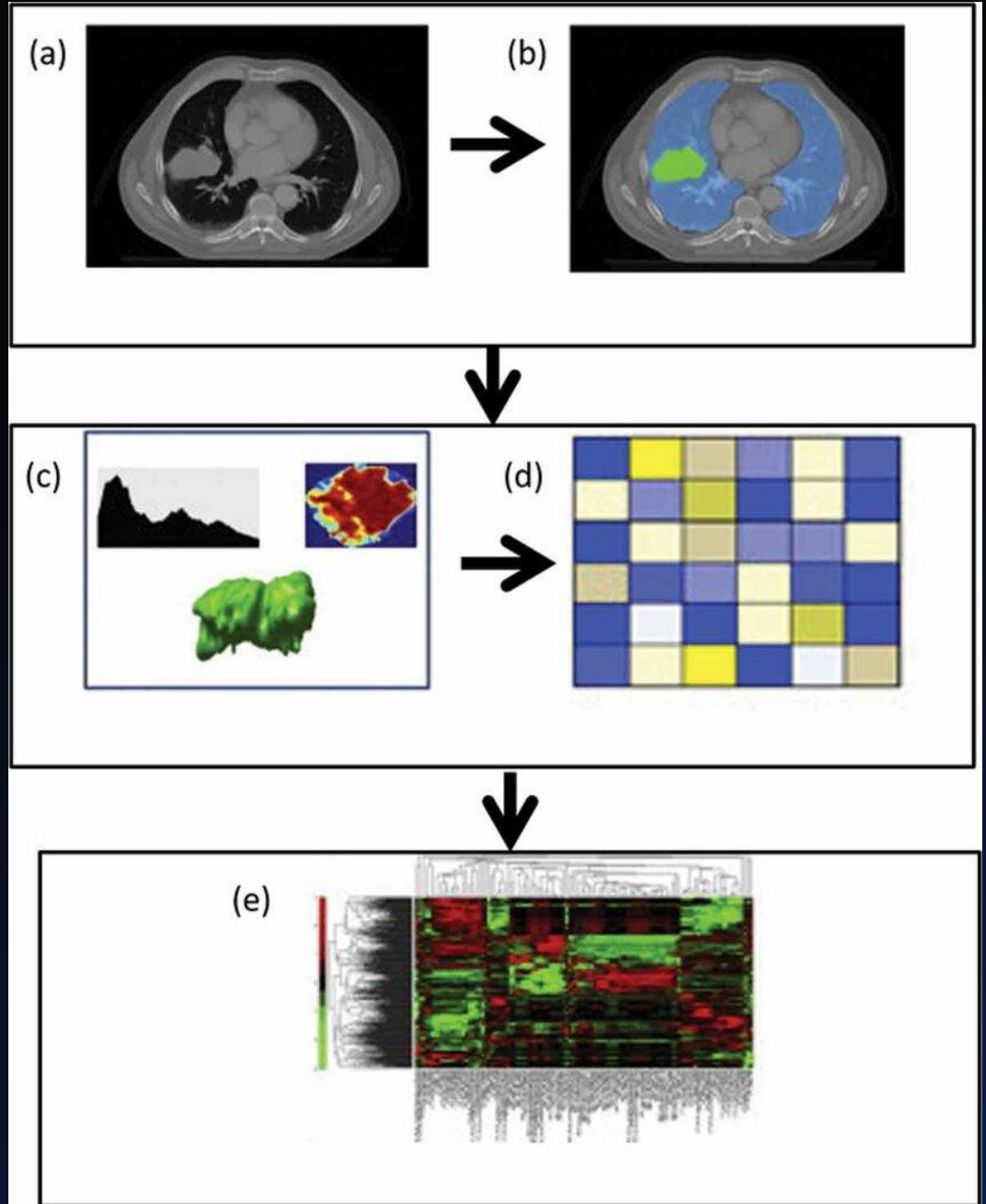
PET

Radiomics

CT

What is radiomics?

Radiomics refers to the extraction of large amounts of **quantitative features** from standard medical images (CT, PET, MRI). It converts images into **mineable data**, capturing information invisible to the human eye.



Study Dataset- COG AHOD0831 trial



137 Patients-

(Stage IIIB/IVB HL)



interim PET/CT



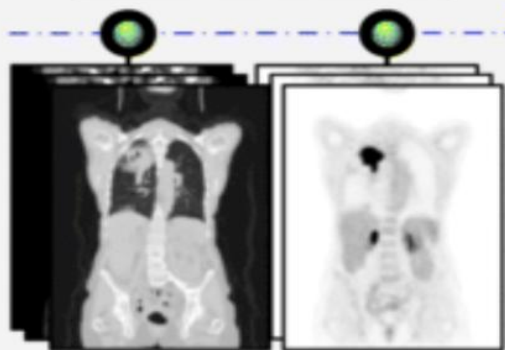
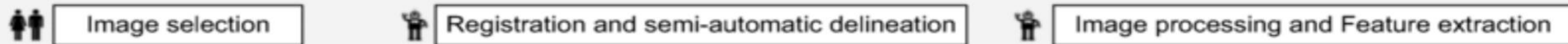
≤ 5 Target Lesions/patient

Standardized lesion count for analysis

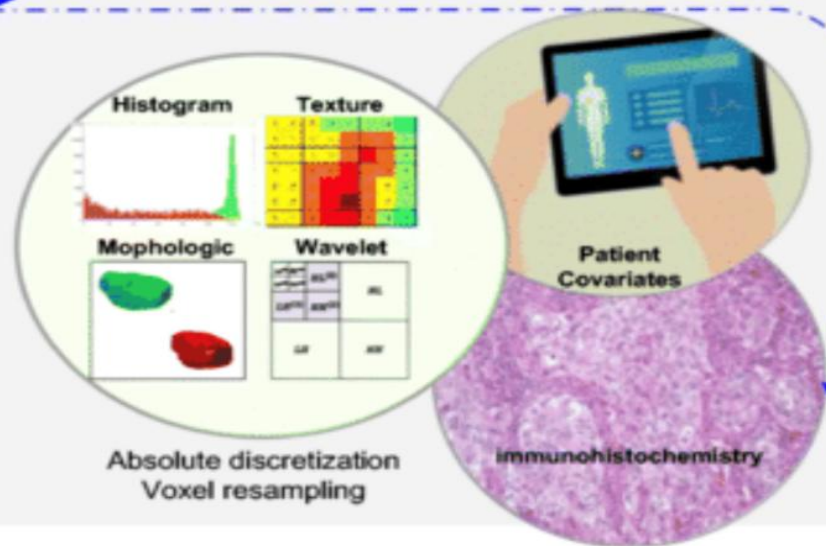
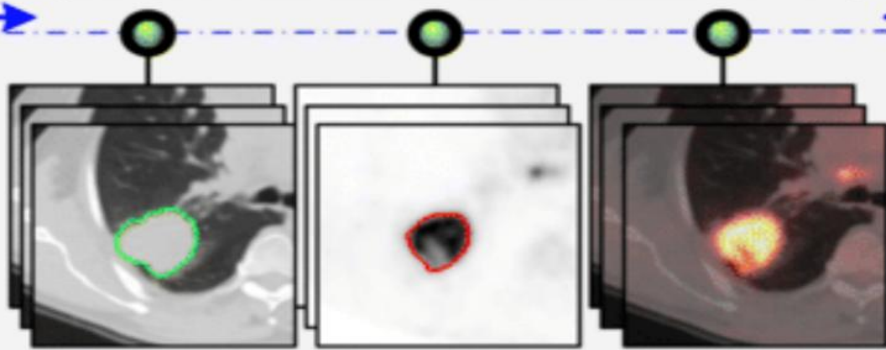


Clinical Data

(Age, Sex, Stage, Bulk, PET Response)

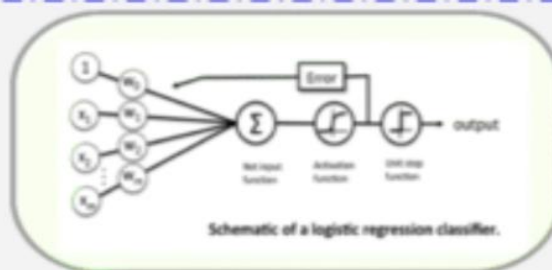
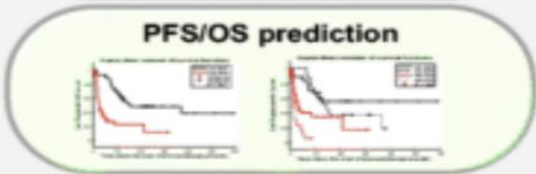
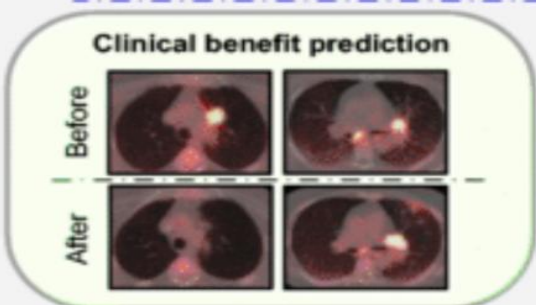


Original PET and CT
The tumor in PET has uptake

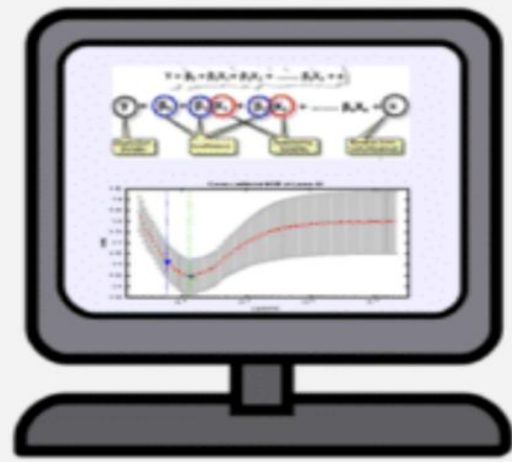
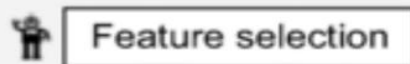


Absolute discretization
Voxel resampling

Precision medicine



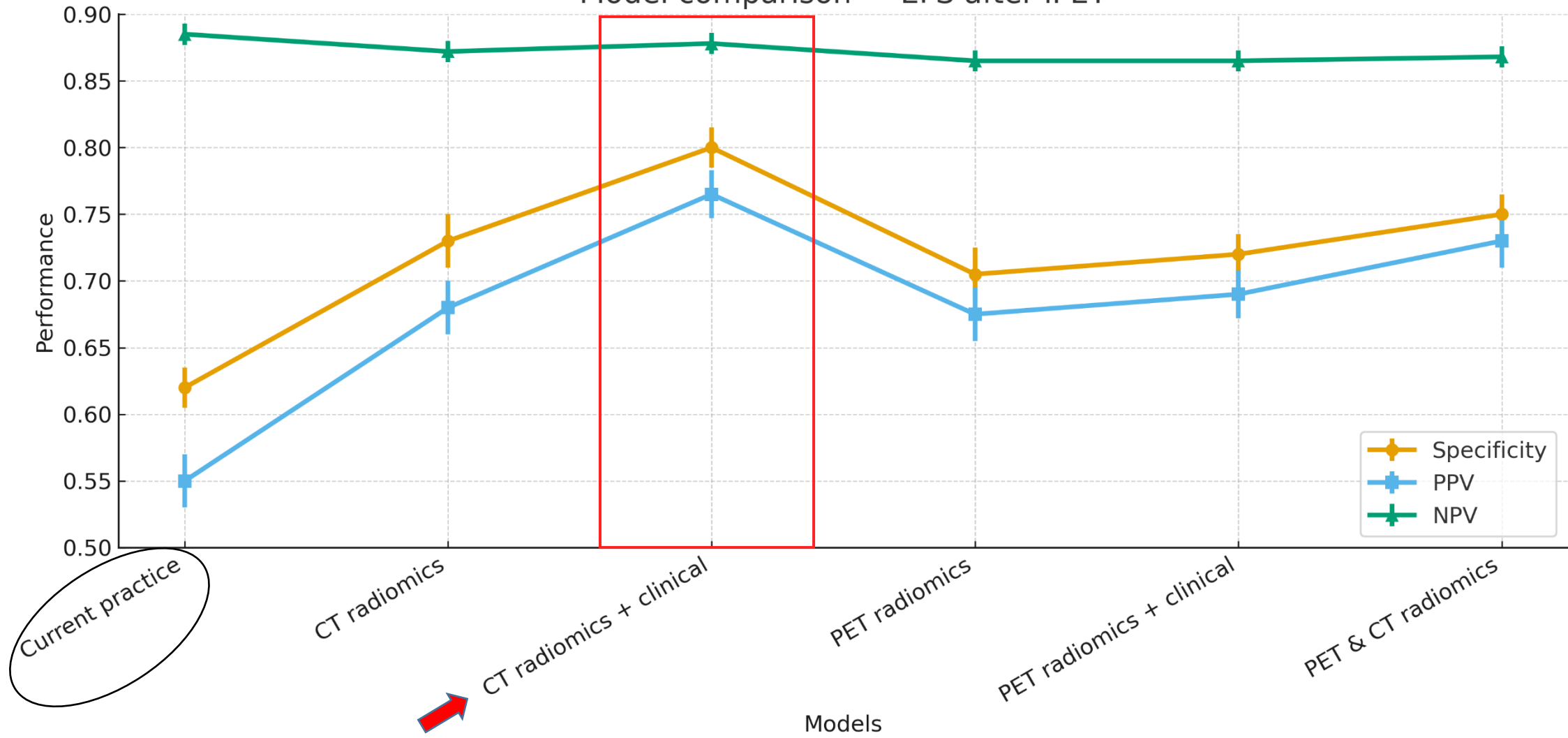
Model	Accuracy	Precision	Recall	F1 Score
Model 1	0.85	0.80	0.90	0.85
Model 2	0.78	0.75	0.82	0.78
Model 3	0.92	0.88	0.95	0.91



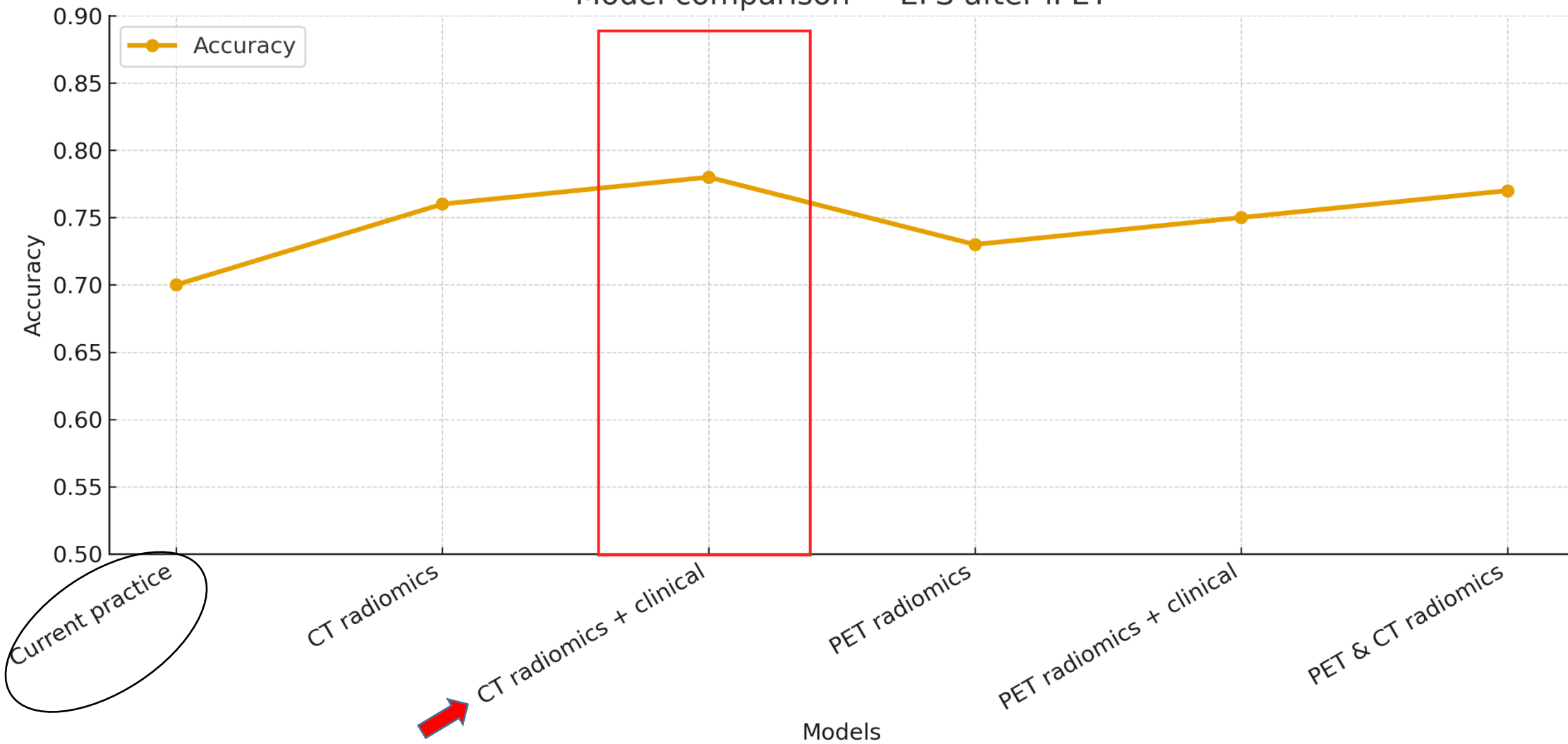
Results

Model	Accuracy	Balanced Accuracy	Sensitivity	Specificity	PPV	NPV
CT radiomics + Clinical (SVM)	0.78 ± 0.10	0.71 ± 0.09	0.59 ± 0.11	0.83 ± 0.10	0.54 ± 0.27	0.89 ± 0.03
CT radiomics (SVM)	0.69 ± 0.23	0.68 ± 0.11	0.67 ± 0.19	0.69 ± 0.32	0.50 ± 0.30	0.91 ± 0.05
SUV radiomics (XGBoost)	0.67 ± 0.12	0.66 ± 0.06	0.65 ± 0.23	0.67 ± 0.29	0.43 ± 0.15	0.91 ± 0.05
CT + SUV radiomics (XGBoost)	0.77 ± 0.07	0.66 ± 0.07	0.49 ± 0.22	0.84 ± 0.10	0.48 ± 0.11	0.87 ± 0.04
SUV radiomics+ clinical	0.77 ± 0.07	0.66 ± 0.07	0.49 ± 0.22	0.84 ± 0.10	0.48 ± 0.02	0.87 ± 0.04
Current practice (Random Forest)	0.63 ± 0.13	0.66 ± 0.04	0.71 ± 0.23	0.61 ± 0.20	0.35 ± 0.09	0.91 ± 0.05

Model comparison — EFS after iPET

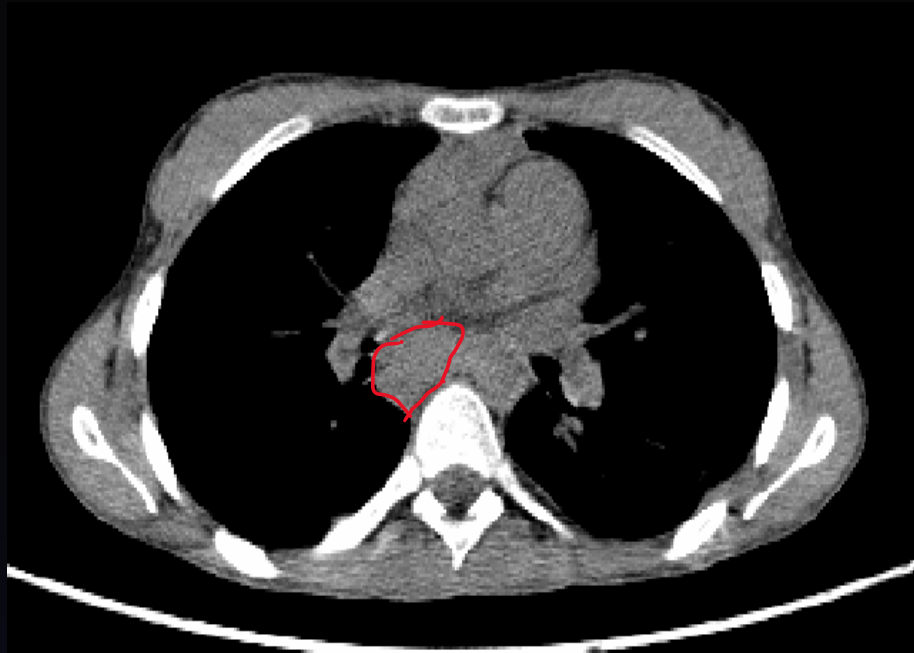


Model comparison — EFS after iPET



radiologists Vs radiomics

CT



PET



The patient had event free survival.
Our model made a **Correct prediction**

Conclusion

- **CT radiomics** provides complementary **anatomical information** not reflected in PET or clinical parameters alone.
- Integrating CT radiomics with clinical data **improves outcome prediction** beyond current iPET-based risk stratification.
- This enhanced predictive power may allow for **precise patient tailored treatment** after interim PET in pediatric Hodgkin lymphoma

References

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Thank you