127P: Does radiomics have added value in predicting the development of brain metastases in patients with radically treated stage III non-small cell lung cancer (NSCLC)?

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Introduction

Despite radical intent therapy for patients with stage III non-small cell lung cancer (NSCLC), cumulative incidence of brain metastases (BM) reaches 30%. Current risk stratification methods fail to accurately identify these patients. Radiomics features have been shown to have predictive value for NSCLC.

Aim: develop a model combining clinical risk factors with radiomics features for BM development in patients with radically treated stage III NSCLC.

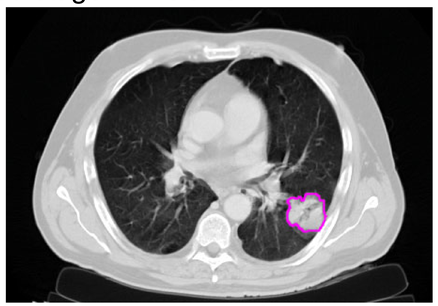

Figure 1. contrast enhanced CT, with primary tumor delineated.

Methods

Retrospective analysis of 2 prospective, multicenter studies.

Inclusion: 18-FDG-PET-CT, contrast-enhanced (CE) chest CT, contrast-enhanced brain MRI/CT staged and radically treated stage III NSCLC.

Exclusion: 2nd primary <2 years of NSCLC diagnosis, prior prophylactic cranial irradiation.

Primary endpoint: BM development any time during follow-up.

List of clinical features (N=8) evaluated, 2 significant (age, histology) for BM development.

Primary lung tumor (CE-CT) radiomics features (N=530) extracted Univariate feature selection based on the area under the curve (AUC) of the receiver operating characteristic (ROC) was performed to identify relevant features. Generalized linear models were trained with these features, and multivariate predictive performance was assessed through the AUC.

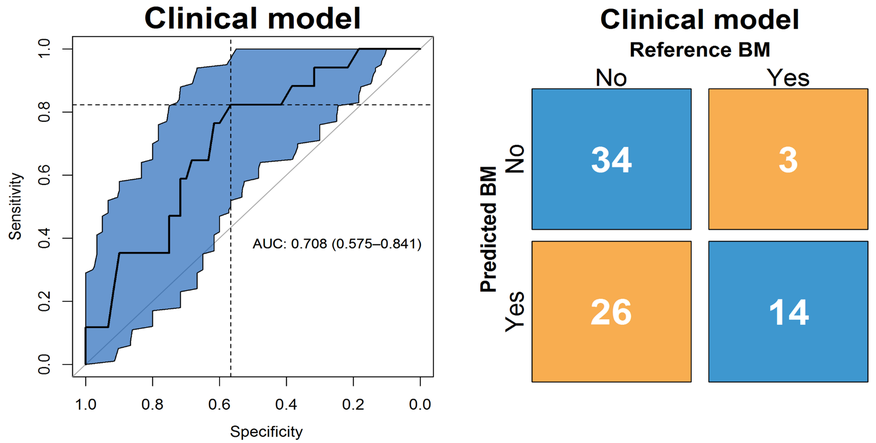

Figure 2. ROC curve and the corresponding 95% CI in blue of the clinical model, with AUC and 95% CI shown. On the y-axis is the sensitivity and on the x-axis the specificity of the model at different classification thresholds. The dashed lines show the sensitivity and specificity for the threshold that was used to make the binary prediction. (B) Confusion matrix with proportions of correct and wrong predictions made by the clinical model (y-axis) relative to the true labels (x-axis).

Results

The AUC of the clinical model (age in years and adenocarcinoma vs. other histologies) is 0.71 (**Figure 2**). The AUC of the radiomics model built on 4 radiomics features is 0.62 (**Figure 3**).

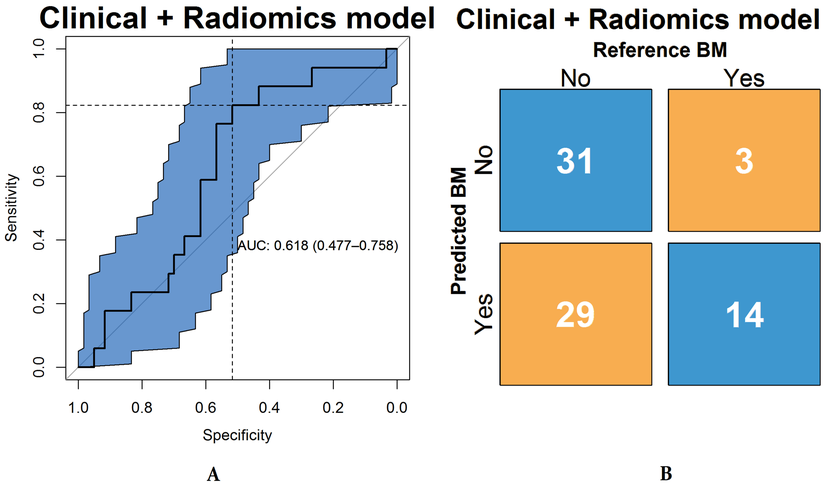

Figure 4: (A) ROC curve and the 95% CI in blue of the clinical & radiomics model, with AUC and 95% CI shown. On the y-axis is the sensitivity and on the x-axis the specificity of the model at different classification thresholds. The dashed lines show the sensitivity and specificity for the threshold that was used to make the binary prediction. (B) Confusion matrix with proportions of correct and wrong predictions made by the clinical & radiomics model (y-axis) relative to the true labels (x-axis).

Conclusion

- Radiomics could not improve on a model built on known predictors (histology, age) of BM development in stage III NSCLC
- A clinical model alone using adenocarcinoma and age in years was able to predict BM with medium good accuracy (AUC of 0.71)
- Future work needs data harmonization and inclusion of more segmentations (e.g. including lymph nodes) to evaluate BM risk

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Conflict of interest
Author declares no related conflict of interest

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