# Comparison of Two Deep Learning Models and Their Combination for One-Year Lung Cancer Detection in Two Screening Cohorts

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## Purpose

To evaluate Sybil, a deep learning model, a MONAI-based nodule detection model, and a prespecified combination of the two for one-year lung cancer detection in the National Lung Screening Trial (NLST) and the Pamplona International Early Lung Cancer Action Program (P-IELCAP).

## Methods

This retrospective study analyzed 5,110 baseline low-dose CT examinations: 2,343 from NLST and 2,767 from P-IELCAP. The composite OR-stacked model combined Sybil, the MONAI-based nodule model, and a safety-net rule based on MONAI-detected nodules larger than 6 mm with detection confidence above 0.95. Discrimination was assessed using the area under the receiver operating characteristic curve (AUC), alongside operating-point metrics.

## Results

Sixty-five lung cancers were diagnosed within one year. Sybil achieved an AUC of 0.93 in both cohorts; the MONAI-based model achieved AUCs of 0.90 in NLST and 0.79 in P-IELCAP. The composite model detected 63 of 65 cancers (sensitivity, 96.9%) and correctly classified 2,731 of 4,965 non-cancer examinations as negative (specificity, 55.0%). Its positive predictive value was 2.7%.

## Conclusion

The combined AI model showed high sensitivity for one-year lung cancer detection across these two screening cohorts while maintaining moderate specificity. These findings support further evaluation of complementary whole-scan and nodule-focused AI approaches in screening settings.


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