



# Validation of the BRODERS classifier (Benign versus aggressive nodule Evaluation using Radiomic Stratification), a novel HRCT-based radiomic classifier for indeterminate pulmonary nodules

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This study reports the independent external validation of the Mayo Clinic BRODERS (Benign versus aggressive nodule Evaluation using Radiomic Stratification) classifier, radiomics model, for the classification into benign and malignant lung nodules. <https://bit.ly/2GNUPSL>

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## ABSTRACT

**Introduction:** Implementation of low-dose chest computed tomography (CT) lung cancer screening and the ever-increasing use of cross-sectional imaging are resulting in the identification of many screen- and incidentally detected indeterminate pulmonary nodules. While the management of nodules with low or high pre-test probability of malignancy is relatively straightforward, those with intermediate pre-test probability commonly require advanced imaging or biopsy. Noninvasive risk stratification tools are highly desirable.

**Methods:** We previously developed the BRODERS classifier (Benign versus aggressive nodule Evaluation using Radiomic Stratification), a conventional predictive radiomic model based on eight imaging features capturing nodule location, shape, size, texture and surface characteristics. Herein we report its external validation using a dataset of incidentally identified lung nodules (Vanderbilt University Lung Nodule Registry) in comparison to the Brock model. Area under the curve (AUC), as well as sensitivity, specificity, negative and positive predictive values were calculated.

**Results:** For the entire Vanderbilt validation set (n=170, 54% malignant), the AUC was 0.87 (95% CI 0.81–0.92) for the Brock model and 0.90 (95% CI 0.85–0.94) for the BRODERS model. Using the optimal

cut-off determined by Youden's index, the sensitivity was 92.3%, the specificity was 62.0%, the positive (PPV) and negative predictive values (NPV) were 73.7% and 87.5%, respectively. For nodules with intermediate pre-test probability of malignancy, Brock score of 5–65% (n=97), the sensitivity and specificity were 94% and 46%, respectively, the PPV was 78.4% and the NPV was 79.2%.

**Conclusions:** The BRODERS radiomic predictive model performs well on an independent dataset and may facilitate the management of indeterminate pulmonary nodules.