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INTRODUCTION

Image screening of people not considered at high risk for lung cancer based on the USPSTF guidelines is important. Although currently not recommended by medical organizations, the advent of proactive imaging of generally asymptomatic people by screening whole-body MRI (sWB-MRI) has resulted in large patient populations amenable to study the incidence of screen-discovered significant lung nodules that could potentially be cancer.

We performed a retrospective review of the deidentified database of Prenuvo sWB-MRI evaluating the incidence and predictors of suspicious lung nodules in a cohort of average risk patients undergoing elective screening for cancer.

METHODS

Design: Individuals of any age ≥18 years completed an online demographic questionnaire followed by their sWB-MRI. The de-identified collected demographic information on consecutive patients undergoing scans at the eligible 21 Prenuvo clinics in the U.S and Canada between January, 2020 and June, 2025 were used in this study. Most of these MRI patients have a limited smoking history and fall outside of the USPSTF guidelines for high-risk individuals who qualify for screening chest CT scans. We focused on the lung nodules found by MRI and correlated nodule presence with the other known risk factors.

Standardized non-contrast protocols were used, with interpretation by board-certified radiologists using the Clinically Significant Diagnosis (CSD) scoring system (1 to 5). Scores ≥3 were considered clinically significant.

Incidence was summarized descriptively and associations with demographic and risk factors were assessed using univariate tests and multivariable logistic regression. To investigate whether demographic variables and lung cancer risk factors can predict the presence and the number of suspicious or malignant lung nodules, we evaluated them using supervising learning algorithms.

DISCUSSION AND CONCLUSION

Actionable Take Away Message

- Evaluation of the known lung cancer risk factors of this cohort found that there was a significantly higher prevalence of significant nodules in: 1. *older males with a smoking history*, 2. *history of a prior personal cancer* and 3. *those who did not exercise*.
- Applying published Lung-RADS malignancy rates to the observed CSD distribution suggests **116 lung cancers** are found within this cohort, supporting further evaluation of WB-MRI for identifying clinically significant lung nodules in broader populations.
- Future Direction for Research:**
 - Since less than ½ of lung cancers occur in people considered high-risk and screening eligible by USPSTF, the guidelines need broadening to include people with other risk factors in order to discover more early-stage, potentially curable cancers.
 - As MRI technology advances, this method devoid of ionizing radiation and likely more cost-effective, may eventually become the preferred lung screening and functional diagnostic tool, supplanting CT and PET which currently dominate.

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RESULTS

- Of the **117,165 sWB-MRI scans** performed on these low-risk patients, lung nodules were identified in 3,885 patients (3.3%), with 2,319 (1.9%) classified as clinically significant (CSD 3–5), approximating Lung-RADS categories 3–4ABX, and *similar in incidence of actionable nodules found in prior large-population lung CT-scan screening studies*.
- Higher odds of clinically significant nodules were observed in older individuals, males, those with prior cancer, smoking history (especially heavy smoking), and those reporting no exercise (Table 1. Known Lung Cancer Risk Factors)
- No significant associations were found with diet, family history of lung cancer, environmental exposures, alcohol use, diabetes, BMI, hypertension, race, or respiratory disease, likely due to the select population.
- Multivariable analysis confirmed these findings. Figure 1.
- An example of a positive sWB-MRI positive scan is shown in Figure 2.

Figure 1. Multivariable analysis of factors associated with the odds of clinically significant (CSD3-5) lung nodules

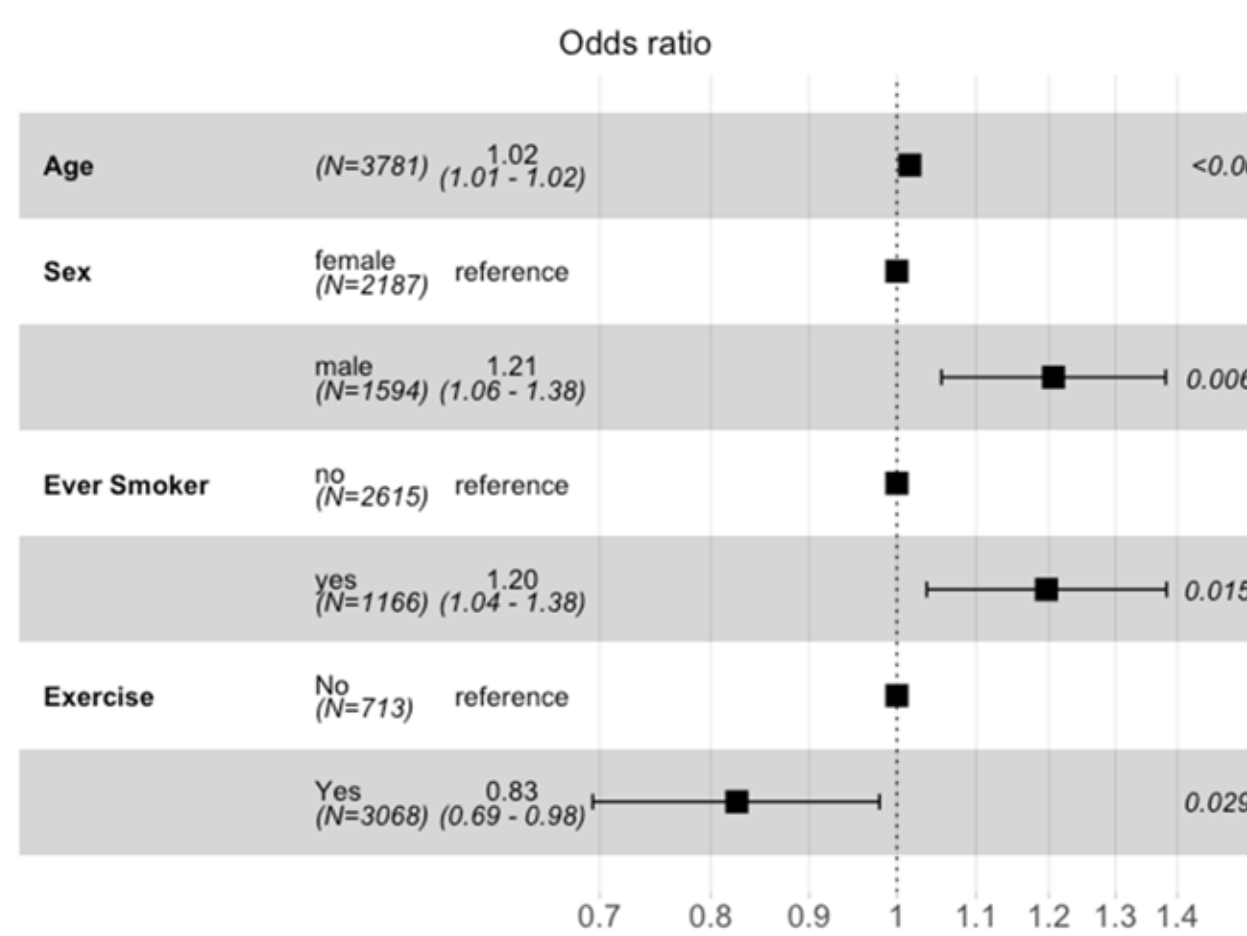


Figure 2. Whole-body MRI of a 39-year-old male non-smoker demonstrating a well-defined left apical pulmonary nodule measuring 1.5 × 1.3 × 1.4 cm. The lesion is slightly hyperintense on T1-weighted imaging and demonstrates intermediate signal intensity on T2-weighted sequences. Finding was graded CSD - 4.

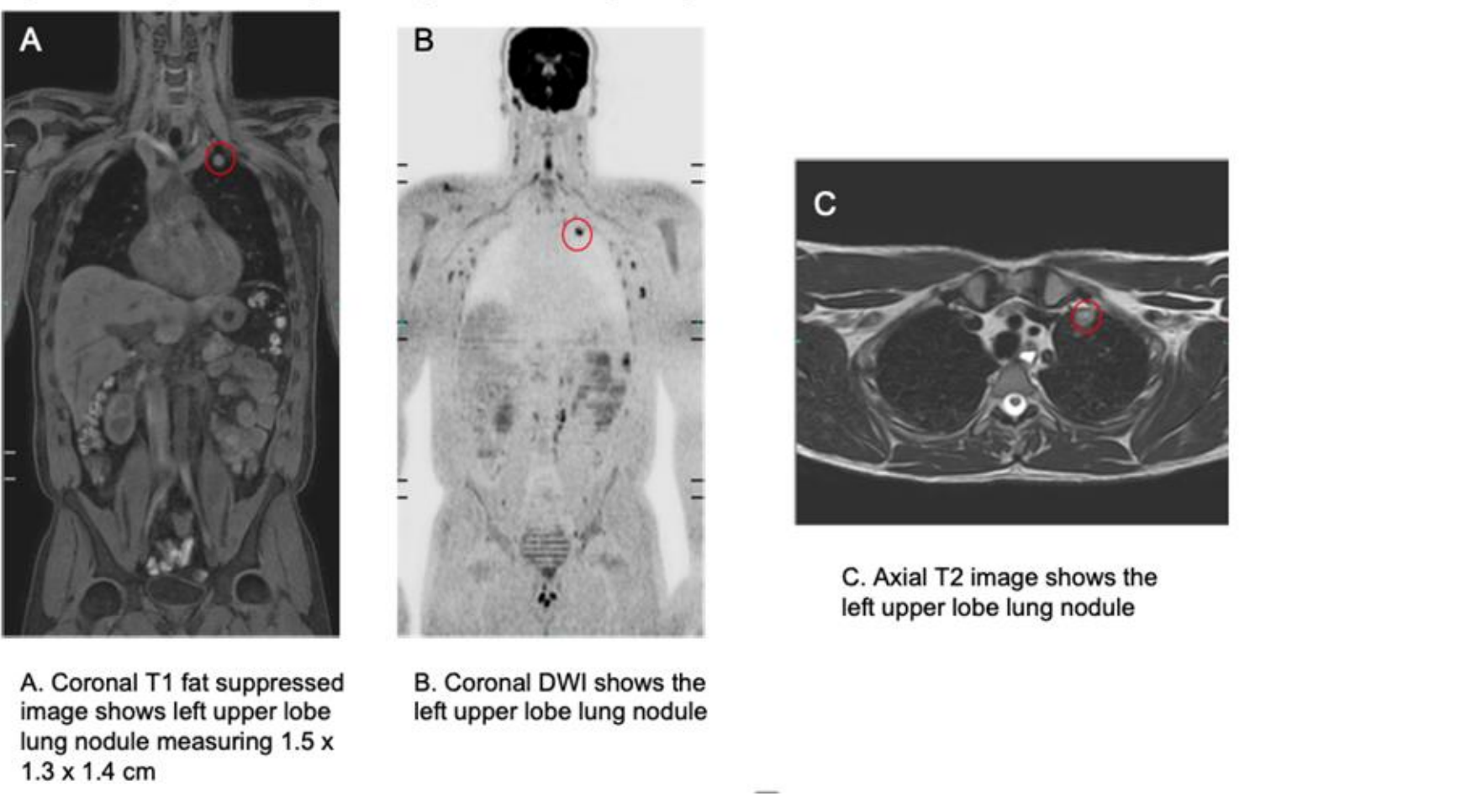


Table 1. Known Lung Cancer Risk Factors

- 1. Smoking**
- a. **Cigarettes 10-35X compared to never smokers.**
 - b. **Cigars and Pipes 7-9X increased risk compared to never smokers.**
 - c. **Cannabis 8% per “joint-year”. 5.7X higher risk in heavy users.**
 - d. **Vaping, likely but uncertain.**
 - e. **Hookah, likely but uncertain.**
- 2. Male.**
- 3. Advanced age (over 50 years old).**
- 4. Personal prior cancers, especially head and neck, breast and cervix, esophagus, bladder, and kidney.**
5. Lung Disease: Chronic obstructive lung disease, pulmonary fibrosis, tuberculosis, asthma, inflammatory lung disease, repeated pneumonia, sarcoidosis.
6. Family history of lung cancer, especially 1st degree relatives.
7. African Americans, Hawaiians.
8. Female of Asian descent.
9. Prolonged second-hand smoke exposure.
10. HIV infection, especially if smokers.
11. Compromised immune system from medicines, infection or other cancers.
12. Occupational ionizing radiation exposure.
13. Prior chest radiation therapy (such as for breast cancer or Hodgkin's disease).
14. Outdoor air pollution, especially 2.5-micron particulates in never smokers.
15. Radon exposure.
16. Inhaled industrial carcinogens that increase the risk of lung cancer (especially in smokers) are asbestos, radioactive ores such as uranium, beryllium, cadmium, silica, vinyl chloride, nickel compounds, chromium compounds, coal products, mustard gas, chloromethyl ethers, diesel exhaust, and in miners.
17. Arsenic in drinking water.
18. Indoor air pollution especially from biomass burning (open fire cooking) inside houses, more common in less developed countries.
19. Possibly heavy talc exposure in talc miners and talc mills.
20. Suspected other lifestyle factors may contribute: Sedentary life style (**lack of exercise**), stress, obesity, underweight, dietary factors such as food preservatives, processed foods, or a high-fat/high-refined sugar inflammatory diet.