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Risk Factors Associated with a Second Primary Lung Cancer in Patients with an Initial Primary Lung Cancer

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Risk Factors Associated with a Second Primary Lung Cancer (SPLC) in Patients with an Initial Primary Lung Cancer (IPLC)

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INTRODUCTION
Second primary lung cancer (SPLC) is defined as a distinct pulmonary malignancy that arises in different segments of the same lobe or different lobes, displays different histology, and/or is diagnosed two or more years after initial primary lung cancer (IPLC). The risk of development of SPLC after an IPLC is about 1% to 2% per patient year. Appropriate surveillance recommendations that enable early detection of SPLC are essential for increasing life expectancy post treatment of IPLC. Current guidelines for monitoring SPLC development are limited.

The aim of this study was to characterize risk factors associated with the development of SPLC. Our intention was to categorize these considerations for clinical use following treatment of IPLC.

METHODS
Patients diagnosed with IPLC between 2000 and 2017 were identified from the Karmanos Cancer Institute Tumor Registry and included in this retrospective analysis. Individuals who later developed SPLC were matched for age, histology and stage to patients with IPLC who did not develop SPLC.

Age at first diagnosis, gender, histology, family history, race, smoking history, stage of first diagnosis, treatment modality, whether a patient had surgery after IPLC diagnosis, and patient living status were collected and reviewed. Logistic and Cox regression analyses were performed to identify risk factors for SPLC emergence and overall survival.

RESULTS
121 patients diagnosed with IPLC who later developed SPLC were identified and compared to 120 patients with IPLC who did not develop SPLC. Several factors such as stage at first diagnosis, histology, age, and smoking history were not associated with SPLC risk (Table 1). Patients who did not undergo surgical resection had a significantly lower probability of developing SPLC (OR 0.235, 95% confidence interval [CI]: 0.118 to 0.450; p < 0.001, Table 2). Compared to surgical resection patients, individuals who did not have surgery as their primary treatment for IPLC had a significantly higher hazard of death (HR 3.088, 95% CI: 2.114 to 4.512; p < 0.001, Table 3, Figure 1).

CONCLUSION
We demonstrated that surgical resection at first diagnosis was an important factor to consider when screening for SPLC. While healthier individuals were likely to be selected for surgical resection, thereby contributing to longer survival, these were the patients most likely to develop SPLC and who may benefit from lifetime screening. Further prospective studies to better characterize SPLC risk factors is essential for implementing effective surveillance recommendations at the population level.