Screening Criteria Evaluation for Expansion in pulmonary Neoplasias (SCREEN)

Objective
The primary objective of the SCREEN study was to determine whether there are differences in overall one-year as well as five-year survival among lung cancer patients that would qualify for the National Lung Screening Trial (NLST) low-dose CT (LDCT) screening criteria (heavy smokers) compared to those that would not meet NLST screening criteria (light or never-smokers). Another primary endpoint of this study was to establish the incidence of lung cancers overall in heavy smokers compared to light or never smokers. Both primary endpoints were also examined among heavy smokers defined as those that met NELSON LDCT screening criteria compared to those that did not meet NELSON criteria (light or never smokers). The hypothesis was that overall survival does not differ between lung cancer patients that are heavy smokers compared to those that are light or never smokers, suggesting that LDCT screening should be studied among light or never-smokers.

Methods
SCREEN is a retrospective cohort study of lung cancer patients at the Queen Elizabeth II Health Sciences Center (QEII HSC) in Halifax, Nova Scotia, Canada. The Nova Scotia Cancer Registry was linked with the QEII Lung Tumor Bank to capture lung cancer patients diagnosed from 2005-2018. Kaplan-Meier curves were derived to compare one-year and five-year survival between lung cancer patients that are heavy smokers and those that are light or never-smokers. Univariate analysis was employed to analyze the impact of age, sex, previous lung cancer history, family history of lung cancer, symptoms, histological cancer diagnosis, differentiation, laterality, stage, rural versus urban location, and geographical radon levels. These results will guide multivariate analysis using COX regression to isolate the independent contribution of smoking history (defined by NLST and NELSON) on overall survival among lung cancer patients.

Results
The SCREEN study included 917 lung cancer patients. The cohort was comprised of 388 (42.3%) heavy smokers using NLST screening criteria. Among heavy smokers, the mean age was 68.8 years and 149 (46.1%) were females, while light or never-smokers comprised a mean age of 65.7 years with 306 (57.8%) females. The Kaplan-Meier curves for one-year and five-year survival are demonstrated in Figure 1. Median survival among heavy smokers and light or never-smokers was 6.9 and 7.1 years, respectively (p = 0.66). Both one-year and five-year Kaplan-Meier survival did not differ among heavy smokers and light or never smokers (HR 1.05; 0.85-1.29). Using NELSON screening criteria, there were 516 (56.3%) heavy smokers. The mean age was 64.5 years and there were 267 (51.7%) females among the heavy smoker group, while light or never smokers were comprised of a mean age of 71.3 years and 218 (54.4%) females. Median survival among heavy smokers and light or never-smokers was 7.5 and 6.1, respectively (p = 0.32). Kaplan-Meier one-year and five-year survival did not differ between lung cancer patients that were heavy smokers and light or never-smokers (HR 0.90; 0.73-1.11).

Conclusions
Both overall one-year and five-year survival does not differ between lung cancer patients that are light or never-smokers and heavy smokers, defined using NLST and NELSON screening criteria. These findings suggest that LDCT screening for the early detection of lung cancer should be studied in light or never-smokers.