Use of Multiple Imputation to Correct for Bias in Lung Cancer Incidence Trends by Histologic Subtype

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Monday, March 24, 2014
12:10-1:00pm
Speaker will be at the University of Maryland
Video Room 368 - ISR South Basement
Room 1218 LeFrak Hall– Maryland

Abstract
Over the past several decades, advances in lung cancer research and practice have led to refinements of histological diagnosis of lung cancer. The differential use and subsequent alterations of non-specific morphology codes, however, may have caused artifactual fluctuations in the incidence rates for histologic subtypes, thus biasing temporal trends. We developed a multiple imputation (MI) method to correct lung cancer incidence for non-specific histology using data from the Surveillance, Epidemiology, and End Results (SEER) Program during 1975-2010. For adenocarcinoma in men and squamous in both genders, the change to a increasing trend around 2005, after more than ten years of decreasing incidence, is apparently an artifact of the changes in histopathology practice and coding system. After imputation, the rates remained decreasing for adenocarcinoma and squamous in men, and became constant for squamous in women. As molecular features of distinct histologies are increasingly identified by new technologies, accurate histological distinctions are becoming increasingly relevant to more effective 'targeted' therapies, and therefore, are important to track in patients. However, without incorporating the coding changes, the incidence trends estimated for histologic subtypes could be misleading. The MI approach provides a valuable tool for bridging the different histology definitions.