Creating lung cancer risk models for specific populations refines prediction

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Lung cancer risk prediction models are enhanced by taking into account risk factors by race and by measuring DNA repair capacity, according to research teams led by epidemiologists at The University of Texas M. D. Anderson Cancer Center in two complementary papers appearing in the September issue of *Cancer Prevention Research*.

In the first study to focus on African-Americans, researchers found unique results based on increased exposure to certain risks. Based upon these findings, a specific model was developed to further refine the predictability of lung cancer in this population, according to lead author Carol Etzel, Ph.D., assistant professor in M. D. Anderson's Department of Epidemiology.

"African-Americans have similar risk factors for lung cancer as Caucasians, but the risks tend to be higher, and there is a stronger association with occupational exposures, such as wood dust and asbestos, than we have previously observed for whites," said Etzel. "Additionally, we determined the risks associated with Chronic Obstructive Pulmonary Disease (COPD) are substantially higher than those noted in Caucasian subjects." COPDs, such as emphysema, raise a person's risk for lung cancer.

The study focused on those who self-reported as being black, and who represented approximately 14 percent of the overall study population. Study participants were recruited from M. D. Anderson Cancer Center and the Michael E. DeBakey VA Medical Center in Houston, TX. The

control population, which was matched on the basis of age, sex and ethnicity, was recruited from Houston-area community centers and the Kelsey-Seybold Clinic, Houston's largest multi-specialty physician group practice. The African-American model was validated on an independent sample of African-American lung cancer cases and controls from two lung cancer studies being conducted in metropolitan Detroit.

"The challenge for us is to try to predict which of the United States' estimated 45 million current smokers and 46 million former smokers are at highest risk for developing lung cancer. Accurate prediction models may identify subgroups of these smokers who will benefit most from intensive screening programs and behavioral interventions," said Margaret Spitz, M.D., senior author and professor in M. D. Anderson's Department of Epidemiology.

The previously published Spitz lung cancer risk prediction model was based solely on lung cancer cases and controls among Caucasian subjects. Internal and external validation results showed the predictive power of the new African-American group-specific model to approach 79 percent, versus 66 percent for the original model.

"The predictive abilities are much improved with the new model and underscore the need for further race-specific modeling," said Spitz.

Expanding the Original Model

In the second paper, Spitz, the lead author, demonstrates that the predictive capability of her original model which incorporates clinical and risk factor data, was improved by adding two measures of DNA repair capacity.

The original Spitz model measured the following smoking intensity variables: Pack-years of smoking for current smokers and the age at

which former smokers stopped smoking, physician-diagnosis of hay fever and emphysema, exposure to asbestos and dusts, and family history of cancer.

Suboptimal DNA repair capacity is associated with up to twofold statistically significant increased lung cancer risks. By adding these measures of repair capacity into expanded former smokers and current smokers models' equations, the sensitivity of each were statistically significantly better than the baseline models. However, the sensitivity of these expanded models remains modest and further refining is planned by incorporating data on nutrition and common genetic variation into even more sophisticated models.

According to the authors, "While the uniform advice for any smoker is immediate cessation, reliable prediction models could be helpful in the context of both screening and prevention trials."

The data for both studies were derived from a long-term 17-year study of the epidemiology of lung cancer at M. D. Anderson funded by the National Cancer Institute and led by Spitz. This research was supported by grants from the National Cancer Institute, and the Flight Attendant Medical Research Institute.

Participants of both studies were defined as "never smokers," or those who had smoked fewer than 100 cigarettes in their lifetimes; "former smokers," who had not smoked in more than a year; and "current smokers," which included individuals who had quit smoking within the past 12 months. Smokers were also asked to report their use of mentholated cigarettes, and former smokers the age at which they stopped smoking.

Lung Cancer Facts

Over 85 percent of all lung cancers occur in current or former smokers. Lung cancer causes more deaths than any other cancer, killing more than 160,000 Americans annually and millions worldwide. According to the American Cancer Society, the incidence of lung cancer is close to 40 percent higher in African-American men, the death rate approximately 30 percent higher and the five-year survival rate is 12 percent versus 15 percent for whites.

Spitz added, "The team is working on a similar model targeting the Hispanic population. Our goal is to ultimately develop an interactive risk assessment tool, much like the Gail breast cancer risk assessment tool, to make lung cancer prediction in various populations accessible for treating physicians."

Source: University of Texas M. D. Anderson Cancer Center