



ADVANCES AT MASS GENERAL CANCER CENTER

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Smokers' Perceptions of Lung Cancer Risks

Does lung screening promote smoking cessation?

More than 220,000 new cases of lung cancer are diagnosed each year, usually at a late stage. Cigarette smoking is responsible for 87 percent of lung cancer deaths in men and 70 percent in women. The U.S. Preventive Services Task Force Guidelines recently recommended annual lung

cancer screening for current and former heavy smokers in an effort to detect lung cancers at an earlier, more treatable stage. Many health experts believe it is also important to understand smokers' attitudes regarding their smoking behavior and whether the screening changes their attitudes.

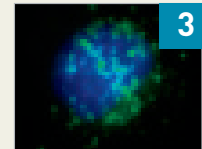
Researchers at Massachusetts General Hospital Cancer Center, led by psychologist

Elyse R. Park, PhD, MPH, undertook a series of studies to examine the effect of lung screening on attitudes and smoking behavior in a subset of participants in the National Lung Screening Trial (NLST) that ran from 2002 to 2004. "An important question, given the high cost of screening, is whether screening motivates smoking cessation and reinforces quitting among former smokers," says Dr. Park.

LUNG SCREENING

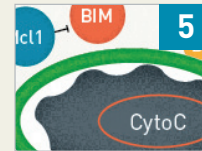
The NLST enrolled 53,545 participants who were current and former heavy smokers 55 years *(continued on page 2)*

INSIDE →



CIRCULATING TUMOR CELLS

Could the transition status of these cells predict the aggressiveness of human cancers?



KRAS-DRIVEN CANCERS

Researchers focus on a combination therapy for the most common oncogene.



OPEN TRIALS

A selection of clinical trials currently enrolling new cancer patients

Smoking Risks: Beliefs and Realities

Key findings from studies by Elyse R. Park, PhD, MPH, reveal differences in current and former smokers' risk perceptions.



Only a third of current and former smokers understood that a pack-a-day smoker's risk of getting lung cancer was 10 times that of a nonsmoker...



...yet the high level of confidence among the majority of former smokers did not entice them to resume smoking.



Current smokers overestimated their personal risk, but underestimated their comparative risk for lung cancer and smoking-related diseases.



Lung screening did not change participants' perceived risk or promote smoking cessation, regardless of screening results.



Most current smokers believed that they would not succeed at smoking cessation, whereas most former smokers believed they would never relapse.



Though few smokers quit, many began engaging in healthier activities.

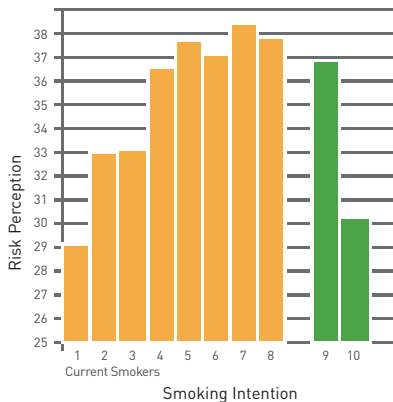
ICONS BY FLYING CHILLI

(continued from page 1) and older with a 30-pack-year smoking history. The trial, which included a baseline screening and a follow-up screening each of the following two years, aimed to determine whether low-dose computed tomography may detect lung cancer earlier than the standard chest X-ray.

Health experts hypothesized that lung

Risk Perceptions by Smoking Intentions

For current smokers, higher risk perceptions corresponded to stronger intentions of quitting, whereas former smokers had lower risk perceptions.



KEY

Current smokers:

- 1: I enjoy smoking so much that I will never consider quitting no matter what happens.
- 2: I never think about quitting but I might someday.
- 3: I rarely think about quitting and have no specific plans to quit.
- 4: I sometimes think about quitting but have no specific plans to quit.
- 5: I often think about quitting but have no specific plans to quit.
- 6: I plan to quit in the next 6 months.
- 7: I plan to quit in the next 30 days.
- 8: I have already begun to cut down and I have set a quit date.

Former smokers:

- 9: I have already quit but I worry about slipping back or relapsing.
- 10: I have quit and I am 100% confident that I will never smoke again.

¹Park, Elyse R, Jamie S Ostroff, William Rakowski, Ilana F Gareen, Michael A Diefenbach, Sandra Feibelmann and Nancy A Rigotti. "Risk Perceptions Among Participants Undergoing Lung Cancer Screening: Baseline Results From the National Lung Screening Trial." *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine* 37, no. 3 (June 2009): 268–279.

²Park, Elyse R, Ilana F Gareen, Amanda Jain, Jamie S Ostroff, Fenghai Duan, Joreen D Sicks, William Rakowski, Michael A Diefenbach and Nancy A Rigotti. "Examining Whether Lung Screening Changes Risk Perceptions: National Lung Screening Trial Participants at 1-Year Follow-Up." *Cancer* 119, no. 7 (April 1, 2013): 1306–1313.

screening may provide an opportunity to change an individual's perception of the risk involved in smoking, and thus motivate current smokers to quit and former smokers to avoid relapse. But not much was known about how current and former smokers perceive their risk, or how screening affects those perceptions.

DETERMINING WHAT SMOKERS ACTUALLY THINK AND DO

Prior to the first baseline screening, 630 NLST participants completed a risk perception questionnaire created by Dr. Park. Previous studies of risk perception had focused primarily on an individual's perception of his/her personal risk (based on objective knowledge of the dangers of smoking) and focused only on lung cancer. This study, published in the June 2009 *Annals of Behavioral Medicine*, also considered other smoking-related diseases (SRDs) and the perception of comparative risk (an individual's risk compared to the average person, others of the same age and sex, and other former/current smokers).¹

The following year, 430 of those participants completed a follow-up questionnaire prior to their second screening to see whether their risk perceptions for lung cancer and SRDs had changed, and whether those changes had affected smoking behavior. The results were reported in the April 2013 issue of *Cancer*.²

In a second follow-up qualitative study, reported in the Sept. 2, 2013 issue of *Nicotine & Tobacco Research*,³ the researchers conducted structured, in-depth phone interviews of 35 randomly selected participants from the 2009 study one to two years after the initial screening. This study sought to

³Park, Elyse R, Joanna M Streck, Ilana F Gareen, Jamie S Ostroff, Kelly A Hyland, Nancy A Rigotti, Hannah Pajolek and Mark Nichter. "A Qualitative Study of Lung Cancer Risk Perceptions and Smoking Beliefs Among National Lung Screening Trial Participants." *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco* (Sept. 2, 2013): 166–173.

determine if screening was a cue for behavioral change; elucidate risk perceptions and underlying behavior change determinants for lung cancer and smoking-related diseases; and explore post-screening intentions and changes.

The results were consistent across the three studies. Despite the fact that many participants understood that

A Call for Screening High-Risk Current and Former Smokers

The United States Preventive Services Task Force (USPSTF) recommends annual low-dose CT screening for current and former smokers at high risk for lung cancer. High risk is defined as:

- individuals age 55–80
- cumulative smoking history of at least 30 pack-years
- must have smoked within the last 15 years
- asymptomatic

All persons undergoing screening should also receive smoking cessation counseling, and they must not have already-diagnosed lung cancer.

The Mass General Cancer Center, in collaboration with Thoracic Imaging, Pulmonary Medicine and Thoracic Surgery, offer a multidisciplinary approach to the detection and treatment of lung cancer.

FOR PATIENTS:

If you think you may be eligible for lung screening, contact your primary care physician to discuss it. Screening CTs should be ordered by your primary physician.

FOR PROVIDERS:

To schedule a low dose CT scan, access the Radiology Order Entry system at <http://mghroe> (within the Partners network) or <http://www.mghroe.org> (outside the Partners network), or call 617-724-9729.

For pulmonary nodule management, patients can be referred to the Lung Screening and Pulmonary Nodule Clinic by sending an email to LungScreeningClinic@partners.org.

continuing to smoke put them at high risk for lung cancer and other SRDs, and that many of them intended to quit smoking when they started the trial, most did not quit. The lung screening test did not appear to affect their risk perceptions and was not in and of itself a cue for changing their smoking behavior. (See infographic on page 1 for more key findings.)

In ongoing work, Dr. Park and Inga Lennes, MD, medical oncology director of Mass General's Lung Screening Clinic and director of quality at Mass General Cancer Center, are administering a modified questionnaire at the Lung Screening Clinic.

A NEED FOR INTERVENTION

"Lung screening may provide a teachable moment, but participants do not teach themselves," concludes Dr. Park. Recently, she and her team examined the effects of physicians' interventions with smokers following lung screening. The results were presented at the 2013 American Society of Clinical Oncology meeting.

If physicians simply ask these smokers about smoking and advise them to quit, they are not likely to do so. However, if physicians actually assist patients—by giving them a counseling referral, a stop-smoking medication prescription or by following up—this increases the likelihood that a patient will quit.

Drs. Park and Lennes plan to develop a computerized risk-based personalized intervention to guide clinicians. "Even a brief intervention," says Dr. Park, "whether by a physician, nurse or counselor, promotes smoking cessation." ■

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Circulating Tumor Cells Transition From State to State

Can epithelial-mesenchymal transition status predict the aggressiveness of human cancers?

Cancer cells reinstate many processes observed mainly in embryonic cells and adult stem cells, including undergoing an epithelial-mesenchymal transition (EMT). In EMT, stationary epithelial cells become mesenchymal, gaining motility, invasiveness and resistance to cell death. In laboratory studies, cancer cells that undergo EMT are more resistant to drug treatment, more invasive and more likely to metastasize than cancers with an epithelial phenotype.

The correlation between EMT and cancer aggressiveness has been well studied in both ex vivo tumors and mice, particularly in breast cancer, which is an epithelial cancer. To investigate EMT in human cancers, Shyamala Maheswaran, PhD, scientific director of the Center for Cancer Risk Assessment at Massachusetts General Hospital Cancer Center, and Daniel A. Haber, MD, PhD, director of the Cancer Center, developed a new method to reliably identify the epithelial and mesenchymal phenotypes in breast cancers. They applied this method to the analysis of circulating tumor cells (CTCs), which may provide a window into the EMT process.¹ (continued on page 4)

CTCs from a Breast Cancer Patient

This index patient underwent one round of treatment with P13K + MEK inhibition, relapsed, underwent a second round of treatment with chemotherapy, and relapsed again, over the course of 12 months. Shown below is the plot of the epithelial (E) and mesenchymal (M) circulating tumor cells (CTCs) isolated from the patient at different points in time. Predominantly epithelial states characterize periods of treatment response (R), while predominantly mesenchymal states characterize periods of disease progression (P).

