Novel respiratory cell changes identified from cigarette smoke exposure

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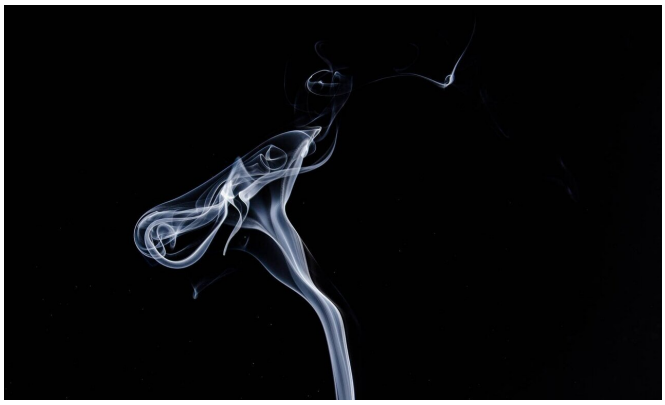

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Cigarette smoking changes the types of cells that are present in the respiratory track and some biological processes necessary for detoxification of cigarette smoke are restricted to specific types of cells.

"Our study describes novel respiratory cell changes that result from cigarette smoke exposure that may be associated with the development of pre-cancerous tissue," explained corresponding author Jennifer Beane, Ph.D., assistant professor of medicine at Boston University School of Medicine. Specifically, the researchers have identified a novel type of cell present in current smokers that remains active even after smoking cessation. Gene expressed by these cells have also been detected in both pre-cancerous lung tissue and lung tumors. Further study of these cells may result in therapies to prevent the development of lung cancer or ways to measure risk of developing lung cancer.

Cigarette smoking is a major risk factor for the development of lung cancer. Lung cancer is the leading cause of cancer death in the U.S. While studies have shown that smoking alters bronchial epithelial function and form, its precise effects on specific cell types and overall tissue composition have been unclear.

Never and current smokers underwent a medical procedure called a bronchoscopy to collect cells from their respiratory tract. Lead author, Grant Duclos, explains "Using a breakthrough approach referred to as ;single-cell genomics', the cells sampled from each subject were isolated and the expression of their genes were measured to identify distinct types of cells and characterize differences in the distribution of the cells between never and current smokers." The results were then confirmed by looking at these differences in tissue sampled from additional never and current smokers.

The researchers believe that a detailed understanding of the molecular consequences of drivers of deadly lung diseases—smoking in particular—will enable them to understand the transition from healthy, normal states to pathological conditions. "We hope that this study and the work that follows it will lead to effective strategies for early detection, prevention and reversal of smoking-associated lung diseases," added co-corresponding author Joshua Campbell, Ph.D., assistant professor of medicine at BUSM.

These finding appear in the journal *Science Advances*.

More information: "Characterizing smoking-induced transcriptional heterogeneity in the human bronchial epithelium at single-cell resolution" *Science Advances* (2019). advances.sciencemag.org/content/5/12/eaaw3413

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