Why only some former smokers develop lung cancer

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Canadian researchers are trying to answer why some smokers develop lung cancer while others remain disease free, despite similar lifestyle changes.

Results were presented at the American Association for Cancer Research's Seventh Annual International Conference on Frontiers in Cancer Prevention Research.

According to the Centers for Disease Control and Prevention, more people die from lung cancer than any other cancer type. In fact, according to 2004 data, more people died from lung cancer than breast, prostate and colon cancers combined.

Smoking is the biggest risk factor for developing lung cancer, even after quitting for long periods of time. "More than 50 percent of newly diagnosed lung cancer patients are former smokers," said Emily A. Vucic, a graduate student at the British Columbia Cancer Research Centre, Vancouver, B.C. "Understanding why some former smokers develop lung cancer is clearly important to the development of early detection, prevention and treatment strategies."

The researchers studied how DNA methylation contributes to lung cancer development in former smokers. Methylation is an important event regulating gene expression during normal development. As we age and in cancer, proper patterns of DNA methylation become deregulated throwing off the tight control of gene activity that normally exists.

Using an endoscope, Vucic and colleagues collected bronchial epithelial cells, which are cells that line the lungs, from 16 former smokers. The participants quit smoking more than 10 years ago. Eight participants had surgical removal of non-small cell lung cancer; eight were disease free.

Their results showed differences in methylation levels in lung epithelial cells between former smokers with and without lung cancer.

"Alteration to DNA methylation might potentially explain why some former smokers sustain additional genetic damage resulting in lung cancer," Vucic said. "As methylation is a reversible DNA modification, this knowledge could prompt the development and application of chemopreventive agents and unique therapeutic strategies that target DNA methylation in these patients."

Exposure to cigarette smoke is a major culprit in disease development. "In addition to DNA sequence mutations, cigarette smoke also causes widespread errors in DNA marks, such as DNA methylation, used to regulate gene function and genome stability," Vucic said.

Cigarette smoke exposure has been shown to activate genes that promote cancer and deactivate genes that stop tumor growth, she said. "Studies examining tumors at all levels of DNA disruption will identify events involved in lung cancer development in former smokers."

The researchers are pursuing additional studies to confirm their initial results, Vucic said.

Source: American Association for Cancer Research