

Smoking influences gene function, scientists say

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In the largest study of its kind, researchers at the Southwest Foundation for Biomedical Research (SFBR) have found that exposure to cigarette smoke can alter gene expression -- the process by which a gene's information is converted into the structures and functions of a cell. These alterations in response to smoking appear to have a wide-ranging negative influence on the immune system, and a strong involvement in processes related to cancer, cell death and metabolism.

The scientists indentified 323 unique genes whose expression levels were significantly correlated with smoking behavior in their study of 1,240 people. The changes were detected by studying the activity of genes within [white blood cells](#) of study participants.

"Our results indicate that not only individual genes but entire networks of gene interaction are influenced by cigarette smoking," wrote lead author Jac Charlesworth, Ph.D., in the July 15 issue of the open access journal *BMC Medical Genomics*. Charlesworth, formerly at SFBR, is now a research fellow at the Menzies Research Institute at the University of Tasmania in Australia.

The study was funded by the National Institutes of Health and the Azar and Shepperd families of San Antonio, ChemGenex Pharmaceuticals and the AT&T Foundation. The study is part of SFBR's San Antonio Family Heart Study (SAFHS) which includes 40 families in the Mexican American community.

"Previous studies of [gene expression](#) as influenced by smoking have been seriously limited in size with the largest of the in vivo studies including only 42 smokers and 43 non-smokers. We studied 1,240 individuals, including 297 current smokers" Charlesworth said. "Never before has such a clear link between smoking and transcriptomics been revealed, and the scale at which exposure to [cigarette smoke](#) appears to influence the expression levels of our genes is sobering".

"Our results indicate that not only individual [genes](#) but entire networks of gene interaction are influenced by cigarette smoking. It is likely that this observed effect of smoking on transcription has larger implications for human disease risk, especially in relation to the increased risk of a wide variety of cancers throughout the body as a result of [cigarette smoke](#) exposure," Charlesworth said.

More information: Transcriptomic epidemiology of smoking: the effect of smoking on gene expression in lymphocytes, Jac C Charlesworth, Joanne E Curran, Matthew P Johnson, Harald HH Goring, Thomas D Dyer, Vincent P Diego, Jack W Kent Jr, Micheal C Mahaney, Laura Almasy, Jean W MacCluer, Eric K Moses and John Blangero, BMC Medical Genomics (in press), www.biomedcentral.com/bmcmedgenomics/

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