

Smoking and higher mortality in men: New association between smoking, loss of the Y chromosome and cancer

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Credit: Vera Kratochvil/public domain

In a new study, published in *Science*, researchers at Uppsala University demonstrate an association between smoking and loss of the Y chromosome in blood cells. The researchers have previously shown that loss of the Y chromosome is linked to cancer. Since only men have the Y chromosome, these results might explain why smoking is a greater risk

factor for cancer among men and, in the broader perspective, also why men in general have a shorter life expectancy.

Smoking is a risk factor for various diseases, not only lung cancer. Epidemiological data show that male smokers have a greater risk of developing cancer outside the respiratory tract than female smokers. In the present study, which is the result of an international collaboration, the researchers discovered an association between [smoking](#) and genetic damage among men that might explain this sex difference.

'We have previously in 2014 demonstrated an association between loss of the Y chromosome in blood and greater risk for cancer. We now tested if there were any lifestyle- or clinical factors that could be linked to loss of the Y chromosome. Out of a large number of factors that were studied, such as age, blood pressure, diabetes, alcohol intake and smoking, we found that loss of the Y chromosome in a fraction of the [blood cells](#) was more common in smokers than in non-smokers', says Lars Forsberg, researcher at the Department of Immunology, Genetics and Pathology, Uppsala University, and responsible for the study.

The association between smoking and loss of the Y chromosome was dose dependent, i.e. loss of the Y chromosome was more common in heavy smokers compared to moderate smokers. In addition, the association was only valid for men who were current smokers. Men who had been smoking previously, but quit, showed the same frequency of cells with loss of the Y chromosome, as men who had never smoked.

'These results indicate that smoking can cause loss of the Y chromosome and that this process might be reversible. We found that the frequency of cells with loss of the Y chromosome was not different among ex-smokers compared to men who had never smoked. This discovery could be very persuasive for motivating [smokers](#) to quit', says Lars Forsberg.

How loss of the Y chromosome in blood cells, induced by smoking, is connected with the development of cancer throughout the body is still not clear. One possibility is that immune cells in blood, that have lost their Y chromosome, have a reduced capacity to fight [cancer cells](#).

'In summary, we have shown that there is a correlation between a common and avoidable risk factor, that is smoking, and the most common human mutation, loss of the Y chromosome. This finding may in part explain why men in general have a shorter life span than women, and why smoking is more dangerous for men', says Jan Dumanski, professor at the same department of Uppsala University, who has had a leading role in the study.

Previously this year the same investigators [published](#) an association between loss of the Y chromosome and mortality as well as risk for [cancer](#) in [men](#) in *Nature Genetics*.

More information: Smoking Is Associated with Mosaic Loss of Chromosome Y. Jan Dumanski et al., *Science* Dec 4 2014
[www.sciencemag.org/lookup/doi/ ... 1126/science.1262092](http://www.sciencemag.org/lookup/doi/...1126/science.1262092)

Provided by Uppsala University

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