

The new way of smoking

When tobacco is heated instead of burned, it gives off fewer potentially health-damaging substances. Carcinogenic substances can still be produced, however.



Smoking tobacco involves great health risks. More than 90 substances in tobacco smoke are classified as carcinogenic or possibly carcinogenic. Attempts have been made for quite some time to reduce the health risk of smoking. Through technical modifications, tar levels have been lowered by roughly 60 percent since the 1950s. This did not reduce the health risk for smokers, however.

Reducing the amount of potentially health-damaging substances in tobacco smoke is an ambivalent objective. Although the technical standards for tobacco products are often improved, this does not necessarily reduce the health risks – at least not where conventional cigarettes are concerned. To give an example: cigarettes with filter ventilation dilute the mainstream smoke, so the people who smoke these “light” or low-nicotine cigarettes inhale less nicotine – but consequently reach for the packet more often or draw more deeply on the cigarette in order to achieve the same nicotine effect. Light products therefore often involve greater health risks.

New technologies without tobacco burning

Conventional smoking always involves a combustion process, so the options for a comprehensive reduction of potentially health-damaging substances are limited. New technologies are shifting these limits. Electronic cigarettes, for example, dispense completely with tobacco and produce aerosols through the atomisation of liquids. With certain liquids, nicotine can also be inhaled with the vapour. As no combustion takes place and no thermal degradation products occur, the toxicological health risks are lower than they are when smoking tobacco cigarettes, but avoiding tobacco altogether is still the best protection. Tobacco heaters, on the other hand, are tobacco products in which the tobacco strands are not ignited but heated electronically to temperatures of up to 350 degrees Celsius. According to tests conducted by the manufacturers, this technology can reduce the levels of the relevant critical substances in the smoke by 80 to 99 percent.

Tobacco heaters: Fewer harmful substances

In order to establish an independent data basis, the BfR examined the emissions from tobacco heaters currently



on sale in Germany. To do so, a standardised mechanical smoking method was used which roughly imitates human smoking behaviour. The results permitted comparison with the data from other test laboratories and with tobacco cigarettes; emissions from the various heaters could also be compared. The tests conducted by the BfR confirm that levels of relevant carcinogenic substances such as benzene and 1,3 butadiene are reduced by more than 99 percent in the smoke from tobacco heaters compared to cigarettes. The reduction for acetaldehyde, formaldehyde and other carbon compounds was roughly 80 to 90 percent. However, the tobacco heaters only gave off slightly less nicotine than conventional cigarettes.

Health significance not yet known

Whether lower health risks are also to be expected from the lower levels of potentially harmful substances is not yet clear. Although model calculations show a 90 percent reduction in tumour potency for the aerosols of tobacco heaters compared to cigarette smoke, which equates to the inhalation of smoke diluted by a factor of ten, the models are based on dose-response relationships in which it is determined experimentally for in-

dividual substances from which dose an effect is to be expected. It is difficult to derive the actual risks from this as even low doses can cause cancer and synergy effects are conceivable.

Tobacco abstinence is the best way to protect health

Due to the considerably lower quantities of potentially damaging substances released from tobacco heaters, the BfR expects reduced risks overall for smokers – provided that they succeed in switching completely to tobacco heaters. A quantitative estimation or assessment of the remaining health risks is not yet possible, however, for individual diseases such as cancer. Tobacco heaters do not reach the risk levels experienced by non-smokers. That can only be achieved through tobacco abstinence. ■

More information:

Mallock et al. 2018. Levels of selected analytes in the emissions of “heat not burn” tobacco products that are relevant to assess human health risks. *Arch Tox* 92: 2145. doi: 10.1007/s00204-018-2215-y (Open Access)