Health Risks of Heated Tobacco Products

GERMAN
CANCER RESEARCH CENTER
IN THE HELMHOLTZ ASSOCIATION

Background

In 2017, tobacco companies have launched heated tobacco products (HTPs) in Germany. These products are promoted as less harmful than conventional cigarettes. Currently, three different HTPs are available in Germany: Iqos from Philip Morris International (PMI), Glo from British American Tobacco (BAT), and Ploom from Japan Tobacco International (JTI).

Several of the studies on the health risks associated with the use of HTPs have been carried out or were funded by the tobacco industry and thus are biased by a conflict of interest. In many cases, studies on heated tobacco products compare their possible health risks to cigarette smoking, especially when studies are conducted by the tobacco industry, instead of investigating possible health effects of the products themselves.

Key points in brief

- *The problem*: Heated tobacco products (HTPs) are marketed as less harmful than conventional cigarettes, but there is no evidence to demonstrate it.
- *The facts*: The aerosol of HTPs contains toxic substances, including carcinogens. HTPs are addictive and may have negative impact on the respiratory and cardiovascular systems. Bystanders inhale toxicants released into the air. HTPs are tobacco products and can't be used as a smoking cessation aid.
- *The solution*: HTPs are tobacco products and should be treated as such. Non-smokers should never use the products and the products should not be used indoors and in the presence of non-users.

What are HTPs?

HTPs have two components: A tobacco insert and a device to heat tobacco. The inserts can come in the form of specially designed tobacco sticks, which resemble small cigarettes. The tobacco inserts are inserted into a rechargeable heating device. By heating them electronically up to around 250 to 350 degrees Celsius a nicotine-containing aerosol is produced.

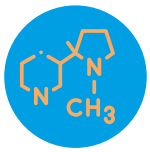
Other than in e-cigarettes, the aerosol is not formed from a liquid but from heated tobacco to which the humectants glycerol and propylene glycol have been added to promote aerosol formation and the release of nicotine and flavourings.

What are the health risks of using HTPs?

The HTP aerosol contains nicotine and numerous harmful substances that are also present in the smoke of conventional cigarettes. Although the overall concentrations of harmful and potentially harmful substances in the aerosol are lower than in cigarette smoke[4,17,25], some substances are present at higher levels than in tobacco smoke, including substances that are harmful to health[28,30]. Propylene glycol and glycerol, which are present at higher levels than in tobacco smoke[9,17], upon heating can produce carcinogenic compounds such as formaldehyde or acrolein[16,26]. In addition, tar (nicotine and water-free particles), benzene, carcinogenic tobacco-specific nitrosamines, carbonyls, furans, phthalates, volatile organic compounds, polycyclic aromatic hydrocarbons, carbon monoxide and particulate matter have been detected in aerosol.[13,17] HTP aerosol also contains other harmful substances not found in tobacco smoke.[3,28]

The long-term adverse health effects of using HTPs, particularly the cancerogenic risks, are currently unknown due to the lack of reliable long-term studies. The aerosol delivers harmful substances into the body. The studies available to date indicate that HTP use has negative impact on the respiratory tract[22] and on the cardiovascular system[13,18] (Figure). HTP use exposes people to

Figure
Health risks of using heated tobacco products.[8,10,20,21,22,27]



Nicotine
- is addictive
- impairs brain development in adolescents
- use during pregnancy: impairs lung and brain development of the unborn child; preterm delivery, stillbirth

Lungs
- eosinophilic pneumonia
- short-term impairment of lung function
- impairment of the function of lung cells

Cardiovascular system
- short-term increase in blood pressure
- impairment of the function of blood vessels
- possible impairment of the function of the inner wall of blood vessels

Other damage
- oxidative stress
- influence on the reading of genes
- damage to cells
- promotion of inflammation
- possible damage to the liver

carcinogenic compounds, including some that are associated with bladder cancer[1,5,12,29]. Nicotine is absorbed from the aerosol as effectively as from tobacco smoke; thus, the addictive potential probably is similar to that of smoking.[6]

HTPs represent health risks and are addictive. Non-smokers should never use them.

Second-hand aerosol

The use of HTPs generates harmful substances such as nicotine, fine and ultrafine particles, carbon monoxide, carbon dioxide and organic compounds which are released into the surrounding air[15,19,24]. High concentrations of carcinogenic substances such as formaldehyde, acetaldehyde and acrolein have also been detected in rooms where HTPs have been used[7,11,23]. Non-consuming bystanders can absorb harmful substances from indoor air into their bodies[25].

Acute symptoms such as asthma attacks and chest pain have been observed in bystanders[14,32]. Long-term health risks cannot be excluded.

Tobacco cessation

HTPs are tobacco products and switching from conventional cigarettes to HTPs does not constitute cessation.

Unlike nicotine replacement therapy (NRT), HTPs have not been certified and tested for efficacy and safety and are not recommended as a smoking cessation aid.[2] To date, there have been no studies evaluating the efficacy of HTPs for smoking cessation.

Conclusion

All forms of tobacco use are harmful, including HTPs. They are addictive and the aerosol they generate contains harmful substances that are released into the body. The available studies indicate that there is a health risk, particularly for the respiratory tract and the cardiovascular system.

Non-smokers should not use the products under any circumstances. As health risks cannot be ruled out for users as well as for bystanders, the products should never be used indoors and in the presence of non-users.

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More information

Further English publications are available at:
https://www.dkfz.de/en/krebspraevention/Downloads/Downloads.html.

Support increases the likelihood of successfully quitting smoking

The World Health Organization (WHO) *Quitting Toolkit* provides resources to help quit smoking, including **toll-free quitlines worldwide**, **text message support**, and **mobile applications**.

Imprint

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