

## What are “Heat-Not-Burn” tobacco cigarettes, and what are the safety questions?

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### INTRODUCTION

In recent years, the tobacco industry launched a new Heat-Not-Burn tobacco cigarette to address the harms of cigarette smoking.<sup>1</sup> Many countries have laws to protect bystanders from second hand or passive smoke; Philip Morris International Tobacco Company claims that these products are designed to address the health effects of secondhand smoke in an indoor environment. Heat-Not-Burn tobacco products (IQOS: I quit ordinary smoking) are electronic devices, pen-shaped with an iPod-like charger, marketed by Phillip Morris under Marlboro and Parliament brands.<sup>2-4</sup> The system has three main components: a Marlboro-branded tobacco unit (which looks like a mini cigarette), the IQOS holder (which looks like an e-cigarette), and a charger (which looks like an iPod). Users push the tobacco unit into the IQOS holder, press a button to activate a battery-powered heater, and then inhale the nicotine-containing vapor.<sup>3</sup> The device heats disposable tobacco sticks soaked in propylene glycol at 350°C and produces an inhalable aerosol that gives a true taste of tobacco. Philip Morris International claims that its product is smokeless since the tobacco is heated without burning or combustion. However, several studies have stated that smoke can occur in the absence of combustion. The harmful components of tobacco cigarette smoke are products of incomplete combustion (pyrolysis) and the thermogenic degradation of tobacco cigarettes through heat (thermogenic degradation). Typical markers of pyrolysis and thermogenic degradation of tobacco cigarettes are acetaldehyde, an irritant carcinogenic volatile organic compound, benzo[a]pyrene, a carcinogenic polycyclic aromatic hydrocarbon, and carbon monoxide.<sup>2</sup> Heat-Not-Burn products first came to market in 1988 but were not commercially successful.<sup>5</sup> In November 2014, Japan was the focal market

for the newly introduced Philip Morris International's IQOS brand, Heat-Not-Burn tobacco products. Since that introduction, an Internet survey published in 2015 showed that searches for Heat-Not-Burn have substantially increased. Currently IQOS is available in more than 29 countries, but this brand is not yet sold in the United States.<sup>6</sup>

### DISCUSSION

The smoke or aerosols released by IQOS contain substances from pyrolysis that are similar to the constituents found in traditional tobacco cigarette smoke. Auer et al compared the contents and toxic compounds released from IQOS with the compounds released from conventional cigarettes (Lucky Strike Blue Lights) and found the toxic substances were similar to ordinary cigarette smoke. The study also showed the presence of volatile organic compounds, polycyclic aromatic hydrocarbons, and carbon monoxide in IQOS smoke. The IQOS smoke had 84% of the nicotine found in conventional cigarette smoke. Based on their studies and others, these authors stated that heated tobacco, including IQOS, should be banned from indoor smoking like conventional tobacco cigarettes until the health effects of IQOS are further studied by independent research labs. They also strongly recommended implementing Principle 1 Article 8 of the World Health Organization (WHO) convention on tobacco control, which rejects ideas that there is a threshold value for toxic effects from second hand smoke.<sup>2</sup> According to the WHO report, to date there are no heated tobacco products that are less harmful than conventional tobacco products. Even though some industry funded studies claim harmful chemicals are reduced in heated tobacco products, this cannot be translated into a reduction in risk. Due to this unclear evidence, independent studies are

needed to assess the potential effects of second hand emissions released by heated tobacco products.<sup>7</sup> The IQOS brand is not yet sold in the United States. In December 2016, Philip Morris submitted a modified risk tobacco product application to the US Food and Drug Administration (FDA).<sup>8</sup> On January 25, 2018, an independent panel of experts at the FDA discussed IQOS's potential health impacts to determine whether Philip Morris's claims are backed by scientific data. A federal advisory committee recommended that the FDA administration reject a bid by Philips Morris International to sell a smokeless tobacco stick in the United States as a safer product than ordinary cigarettes. Finally, an FDA advisory committee rejected Philip Morris' claims that IQOS reduces the risks related to conventional tobacco smoking.<sup>9–11</sup>

### CONCLUSION AND FUTURE DIRECTION

At present, the Heat-Not-Burn tobacco cigarette, a newly developed tobacco product by Philips Morris International, is not considered a low risk smoke. The majority of the studies are affiliated with manufacturers. There are no independent studies that showed IQOS is less risky than traditional tobacco smoking for the development of lung disease. There is also a concern that young nonsmokers might start using these products and that many individuals might become dual users of these devices and traditional cigarettes. Since heated tobacco products have not been on market for long, it is difficult to assess their potential effects/hazards and to conclude whether or not these products could help in smoking cessation. More independent studies are needed.

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