



Heat-Not-Burn Tobacco Products: Claims and Science

Philip Morris International (PMI) announced that a heat-not-burn (HNB) product called iQOS will be introduced in late 2016 in a number of Canadian markets, including Toronto and Ottawa. HNB products heat tobacco to temperatures purportedly too low for combustion, creating an aerosol that is inhaled through the mouth. A number of HNB brands and products on the market, such as iQOS, Ploom, and iFuse, use different forms of tobacco and a variety of heating mechanisms. The iQOS uses a specially-designed cigarette inserted into a hand-held heater that heats the tobacco to less than 250 degrees centigrade.¹ The Ploom heats a small capsule filled with moistened, finely shredded tobacco or herbal mix. The iFuse creates an inhalable vapour by heating liquid containing nicotine, then passing it through a tobacco section.²

Key Finding: Heat-not-burn cigarettes are likely coming to Ontario soon and caution is advised considering science on previous generations of these products.

History

Heat-not-burn products are one form of potentially reduced exposure products (PREPS) that the tobacco industry has been working on for decades.³ The iQOS is part of a product line that Philip Morris first introduced to consumers in 1997—the Accord smoking system. In 2007, the Accord system was re-introduced in Switzerland as the Heatbar (patented in 2002). The Accord was not successful as a commercial product, because users felt it was not as satisfying as conventional cigarettes. Smokers would smoke an increased number of cigarettes in an attempt to compensate.⁴ Accord remained on the market from 1998 to 2006, until it was removed because of poor sales. However, because PMI never marketed the Accord as a low exposure cigarette product, smokers may not have had a reason to switch to smoking a less satisfying cigarette. Other cigarette companies marketed unsuccessful heat-not-burn products, notably R.J. Reynolds (RJR) with the Premier and Eclipse cigarettes.

In 2014, PMI started marketing iQOS in Japan⁵ and later in Italy, Switzerland and South Korea. By early 2015, 8% of Japanese ever users of e-cigarettes or HNB had ever used iQOS. In June 2016, PMI claimed that over 100,000 Japanese smokers had switched to iQOS.⁶ Reportedly, PMI intends to market iQOS in Canadian cities, including Vancouver, Toronto, Ottawa and Calgary, later this year.⁷

Science

To date, we have not identified independent scientific assessments of the iQOS or other HNB products recently introduced on the market. We do not know yet if, and/or how, the new HNB products differ from previously marketed products.

Three types of evidence exist for previous incarnations of HNB:

1. Emissions
2. Withdrawal suppression
3. Analysis of industry trial testimony

Emissions

In 2001, the Institute of Medicine found insufficient evidence to conclude that earlier versions of HNB products, including Eclipse, resulted in less harm than regular cigarettes.⁸ In particular, two studies cited by the Institute of Medicine back up these conclusions: Fagerström et al. found that Eclipse produced higher carbon monoxide levels than smokers' usual brand of cigarettes⁹ while a comparison of Eclipse to two conventional low-yield products found that Eclipse produced higher yields of tar and CO.¹⁰ These findings were later supported by Breland et al. who found that Eclipse delivered, on average, 33.3% more CO than smokers' usual brand.¹¹ The authors concluded that these high levels of CO “are inconsistent with a harm-reduction strategy where the goal is to lessen smokers' exposure to potentially lethal smoke constituents”.

In 2002, Slade, Connolly and Lymperis assessed R.J. Reynolds's claims that Eclipse was less harmful than regular tobacco cigarettes.¹² Using independent analyses and critical assessment of RJR studies, they found no basis for these claims. Eclipse was found to be as, or more, toxic than “ultralight” cigarettes and carcinogenic yields were as high as the “ultralights”.

Withdrawal Suppression

HNB products are unlikely to attract smokers to use them as replacements for regular cigarettes unless they are effective at suppressing withdrawal. Breland et al. found that Accord was less effective than regular cigarettes at suppressing withdrawal even though subjects took bigger and longer puffs. The authors concluded that “whatever the reason, inadequate withdrawal suppression may lead to increased use of the product (i.e., behavioral compensation) or continued use of normally marketed cigarettes”. These conclusions are further supported by

the findings of a separate study, which found that even when using Accord 15 times/day, smokers supplemented that use with their own brand of cigarettes.¹³

Analysis of Industry Trial Testimony

Industry scientists testified in court cases that the preponderance of evidence suggested that Accord and Eclipse cigarettes were substantially safer than conventional cigarettes, but they could not state that they were safe cigarettes. In trial testimony, PMI scientists presented HNB as a cigarette product:

Accord is still a cigarette. Okay. You still heat tobacco. You still generate smoke from tobacco. It still has some of the same harmful smoke constituents that normal cigarettes do. It just has less of them. It produces smoke, but less of it.

Discussion

The tobacco industry claims that the current iteration of HNB products is considerably less harmful than cigarettes and is more acceptable to smokers. Similar claims were made for previous generations of these products but were refuted by independent science. To date, we have not found new independent science that has assessed the harm reduction potential or the acceptability of the current generation of iQOS and other HNB products. As iQOS is the third commercial generation of this device, it may include additional product improvements providing satisfaction and ease of use of the electronic system. Smokers accustomed to e-cigarettes may now find the electronic heating device more acceptable. Previously, the tobacco industry did not market HNB as a reduced risk out of a concern that explicit claims of reduced harm might result in increased liability. If independent science finds that the new HNB products do indeed considerably reduce harm and are widely acceptable to smokers, an opportunity would arise for eliminating the sale of the higher risk combustibles.

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References

- 1 Caputi TL. Industry watch: heat-not-burn tobacco products are about to reach their boiling point. *Tobacco Control* 2016 Aug 24.
- 2 World Health Organization. [Further development of the partial guidelines for implementation of Articles 9 and 10 of the WHO FCTC](#). Accessed November 28, 2016.
- 3 Wayne GF. Potential reduced exposure products (PREPs) in industry trial testimony. *Tobacco Control* 2006 Dec 1;15(suppl 4):iv90-7.
- 4 Buchhalter AR, Eissenberg T. Preliminary evaluation of a novel smoking system: effects on subjective and physiological measures and on smoking behavior. *Nicotine & Tobacco Research* 2000 Feb 1;2(1):39-43.
- 5 Tabuchi T, Kiyohara K, Hoshino T, et al. Awareness and use of electronic cigarettes and heat-not-burn tobacco products in Japan. *Addiction* 2016;111: 706–13.
- 6 Gilchrist, M. *Tobacco heating system 2.2, a candidate modified risk tobacco product: cardiovascular disease risk assessment*. Global Forum on Nicotine; June 17, 2016; Warsaw, Poland.
- 7 Weeklyvoice.com. [New heat-not-burn cigarette alternative coming to Canada by end of the year](#). Accessed November 29, 2016.
- 8 Stratton K, Shetty P, Wallace R, Bondurant S, editors. *Clearing the Smoke: Assessing the Science Base for Tobacco Harm Reduction*. Washington: National Academy Press; 2001.
- 9 Fagerström KO, Hughes JR, Rasmussen T, Callas PW. Randomised trial investigating effect of a novel nicotine delivery device (Eclipse) and a nicotine oral inhaler on smoking behaviour, nicotine and carbon monoxide exposure, and motivation to quit. *Tobacco Control* 2000 9(3):327-333.
- 10 Labstat International Inc. [Characterization of Three Low/Ultra Low-“tar” Brands](#). Prepared for the Massachusetts Department of Public Health. Project GC7. September 6, 2000. Accessed November 29, 2016.
- 11 Breland A, Buchhalter A, Evans S, Eissenberg T. Evaluating acute effects of potential reduced-exposure products for smokers: Clinical laboratory methodology. *Nicotine & Tobacco Research* 2002;4 Suppl 2:S131-40.
- 12 Slade J, Connolly GN, Lymperis D. Eclipse: does it live up to its health claims? *Tobacco Control* 2002 Jun 1;11(suppl 2):ii64-70.
- 13 Keely JP, Hughes JR, Hirsch JS. *Effects of a cigarette substitute on ongoing smoking*. Poster presented at the 7th Annual Meeting of the Society for Nicotine and Tobacco Research, 2001; Seattle, Washington.