Carbon monoxide levels after use of heated tobacco products

Heated tobacco products (HTPs) are new tech devices that release nicotine and other volatile compounds into an inhalable aerosol by heating the tobacco. At their operating temperatures, tobacco combustion is unlikely. The aim of this randomized cross-over study was to measure the exposure levels of the combustion marker, carbon monoxide in the exhaled breath (eCO) of subjects after use of two HTPs and to compare these levels with participants' own brand of cigarettes. A total of 12 healthy smokers who reported smoking ?10 conventional cigarettes per day for at least 5 years took part in the study. Product administration consisted of a first round of 10 puffs, which was followed by an identical second round after a 5 min pause in between rounds. After obtaining a baseline eCO value, this measure was recorded at 5, 10, 15, 30, and 45 min after the first puff of the first round. In contrast to combustible cigarettes, no eCO elevations were observed in the exhaled breath after use of the HTPs under investigation in any of the study participants.

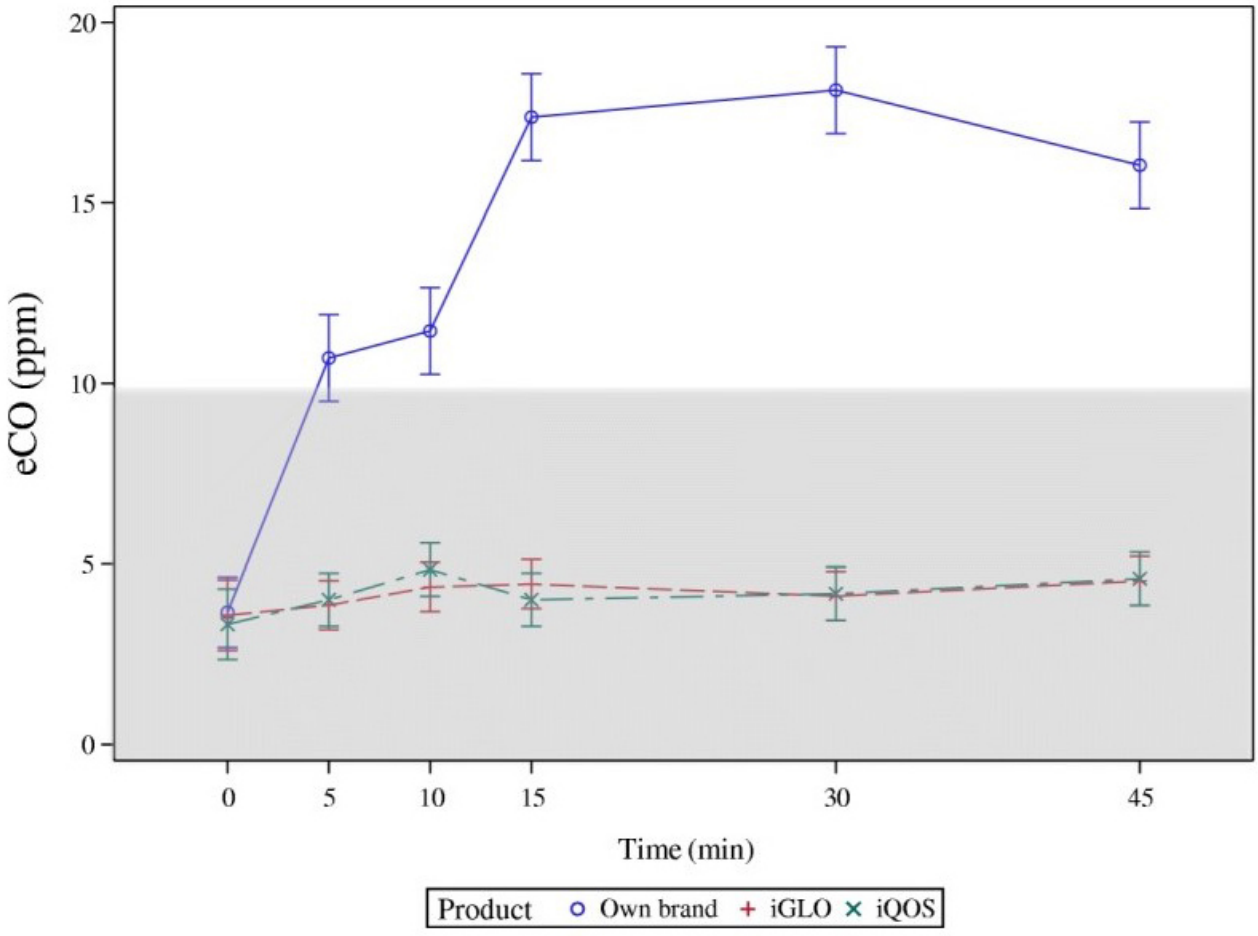

Fig. 1.

Nonetheless, we cannot exclude the presence of toxins generated through pyrolysis in the aerosol of these HTPs. When interpreting the study findings, many factors need to be considered. First, findings from a small study should be interpreted with caution. Yet reassuring, a power analysis of the collected data indicated that 12 subjects were sufficient to detect differences of 3 ppm or

larger, with a power of 80%. Therefore, our randomized crossover trial was more than adequately powered to detect eCO differences between combustible and noncombustible tobacco products. Moreover, eCO elevations larger than 3 ppm were never reported in any of the 12 subjects during HTP use, and most of the eCO changes measured were within the margin of error of the CO monitoring device. Nonetheless, residual combustion (of no clinical significance) cannot be discounted when human exposure studies with low sensitivity measurements are used. Second, the results of the study are product specific under acute laboratory condition of use and cannot be extended to other HTPs or to the same products under investigation after prolonged use. Third, our results appear to support tobacco industry data and may therefore be considered with reluctance. It is important that data reported by the industry is independently verified, as with this investigation. In relation to the wider implications of this study, it is our opinion that non-combustible nicotine sources - that are significantly less harmful than conventional cigarettes - can be a viable solution for those who, for whatever reason, cannot or do not want to give up nicotine, or who want to cut back on smoking or quit altogether.

Therefore, switching to combustion-free products has the potential to act as a gateway out of smoking. The personal preference for a particular product (e.g. e-cigarette vs HTP vs smokeless tobacco products) can play a critical role in increasing the likelihood of successfully abstaining from cigarette smoking. In any case, former smokers already using and smokers intending to use HTPs should receive correct information about their risk-benefit ratio.

As for e-cigarettes, health professionals should consider all the options available to a smoking patient and opt for the ones that provide the greatest probability of quitting for good, including HTPs. For many smokers, one possible outcome may be switching to combustion-free products use for the long-term, while tolerating the small residual risk in return for a higher likelihood of success for smoking cessation and tobacco harm reduction.

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