Carbonyl compounds levels in mainstream smoke of cigarillos differ for ISO and human smoking

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Significance

Although significant decline has been observed in using cigarettes over last decade, the consumption of cigar products has doubled [1]. The group of cigar products includes large cigars, cigarillos and little cigars. Cigarillos are typically smaller than traditional cigars and sometimes have a wood or plastic tip. They have different design features than cigarettes which may influence smoking behavior and toxicant exposure from mainstream smoke. Carbonyl compounds are among the compounds responsible for carcinogenicity and toxicity of cigarette smoke. To date, there are very limited data on carbonyl compounds concentration in cigarillos smoke using ISO (cigarettes) and human puff topography from cigarillo smoking. Quantitative assessments of carbonyl compounds in cigarillo smoke are essential to help estimate human and environmental exposure.

![Figure 1: Examples of cigarillos.](image)

Aim of study

The aim of the study was to compare selected carbonyl compounds levels in mainstream smoke from cigarillos using ISO and human puff topography.

Methods

Four popular U.S. cigarillos were investigated (Tiparillo, El Producto Little Coronas, Dutch Master Vanilla Cigarillo and Dutch Master Palma Cigarillo). Mainstream smoke was generated in the laboratory using the automatic smoking simulator Palaszczuk according to two smoking regimes: ISO method and human puff topography (established earlier). Puffing regimes are presented in Table I. Cigarillo products were smoked in triplicates until 9 mm from the product’s mouthpiece. Simultaneously, blank samples were collected to adjust for background concentration of investigated compounds. Mainstream smoke was collected in two impingers, each containing 35 mL of 2,4-dinitrophenylhydrazine solution. Carbonyl compounds were analyzed by HPLC with fluorescent detection (AT 1200, Agilent Technologies Inc.).

![Figure 2: Levels of selected carbonyl compounds in mainstream smoke.](image)

<table>
<thead>
<tr>
<th>ISO</th>
<th>Human puff topography</th>
</tr>
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<tbody>
<tr>
<td>Puff volume [mL]</td>
<td>35</td>
</tr>
<tr>
<td>Puff duration [s]</td>
<td>2</td>
</tr>
<tr>
<td>Intervals between puffs [s]</td>
<td>60</td>
</tr>
</tbody>
</table>

Table I. Puffing regimes.

Results

Significant differences in carbonyl compounds levels were detected as a function of the smoke generation condition ISO vs. human puffing parameters: acetaldehyde (1484 vs. 2616), acrolein (46.5 vs. 101), propionaldehyde (165 vs. 297), crotonaldehyde (31 vs. 69) and butanal (242 vs. 396.5 µg) per 1 g of product.

Conclusion

Carbonyl concentration in mainstream smoke of cigarillo was nearly twice as great when cigarillos were smoked according to human topography standards compared to ISO standards. Measuring carbonyl compounds in cigarillos according to the ISO method underestimates exposure.

Reference


Founding

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Conflict of Interest

A.S. reports personal fees from eSmoking Institute, Poznan, Poland, and nonfinancial support from Chic Group LTD, a manufacturer of electronic cigarettes in Poland, outside the submitted work. The other authors have nothing to disclose.