

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Particulate matter emissions of four types of one cigarette brand with and without additives: a laser spectrometric particulate matter analysis of second-hand smoke
AUTHORS	Braun, Markus; Fromm, Elsa-Luise; Gerber, Alexander; Klingelhöfer, Doris; Müller, Ruth; Groneberg, David

VERSION 1 – REVIEW

REVIEWER	Najat A. Saliba American University of Beirut, Lebanon
REVIEW RETURNED	11-Jun-2018

GENERAL COMMENTS	<p>The study presents the variation in the PM emission from flavoured and non-flavoured cigarettes. The study design is good and the results are well presented, however, applicable to only this type of cigarette brands.</p> <p>I recommend that the manuscript is accepted for publication following major revisions. The main points to be addressed are:</p> <ol style="list-style-type: none">1. if the manuscript describes ETS, then I suggest that it is mentioned in the title. However, please see the comment below of whether the chamber used for the study represents well ETS.2. The experimental section in the abstract is missing3. The results in the abstract describe PM2.5 only. what happened to the other sizes mentioned in the introduction of the abstract4. The strength and limitations read as one paragraph and not as stand alone points. Point 2 is too long.5. The chamber used for the study as described does not show any ventilation outlet and as such, the set up does not represent Environmental Tobacco Smoke but rather an accumulation of aerosols in a closed environment. In this case, it is preferred to show the relative increase in PM count or mass and not to take the absolute masses and compare them to WHO guidelines. I believe that this section is over ambitious and what is measured does not represent any scenario of exposure.6. Also and along the same line, I am not sure how the authors consider that the chamber is "exactly" representing ETS.7. A graph showing the particle distribution of the different cigarette types is an important addition to the manuscript. Particle size distribution would be also interesting to discuss.
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REVIEWER	Esteve Fernández Catalan Institute of Oncology - University of Barcelona
REVIEW RETURNED	26-Jun-2018

GENERAL COMMENTS	This manuscript presents results from an experiment to compare the PM concentration in the smoke of 4 type of cigarettes of the same
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	<p>brand, with and without additives. The experiments seem to have been well performed but there are some concerns about the data and the writing of the manuscript.</p> <p>My main concern is the interpretation of results, that show "lower" levels of PM_{2.5} in "additive-free cigarettes", whilst the concentrations are extremely high as compared to the reference cigarette. This should be clearly stated in the Discussion, in order to avoid a misleading message that "cigarettes without additives" are less harmful... It is clear that these results support that it is better not to include additives, but the corroboration that the concentrations of PMs are also extremely high in cigarettes without additives needs to be stressed. Otherwise, the message is a bit confusing.</p> <p>1. Abstract, and across the manuscript: The term Environmental Tobacco Smoke (ETS) is no longer preferred in tobacco control research, since it was promoted by the tobacco industry. In the last decade, the term widely accepted and used is Second- Hand Smoke, abbreviated as SHS. Please correct this across the manuscript.</p> <p>2. Abstract: Please include details about the Methods, such as the types of cigarettes, the type of PMs assessed and the instrument of measurement (now in the Objective paragraph).</p> <p>3. Introduction: Please make a clear statement about the objective of the study at the end of the Introduction, without specification of methodological topics, just the objective.</p> <p>4. Methods: why this brand? Please include a justification.</p> <p>5. Methods: Please make clearer that the measurements were done in 19 cigarettes of each type (the 4 experimental and the control). In page 8, lines 16-20 the sentences are a bit ambiguous and it only becomes clear in page 9, line 18. Please re-write lines 16-20 (page 8).</p> <p>6. Methods: The Grimm Portable Laser Aerosol Spectrometer is an optical dust mass device, and this has to be mentioned, and which is its validity to measure PMs as compared with gold-standard gravimetric devices. Moreover, this should be discussed in the Discussion section.</p> <p>7. Results: The p-values shown in Table 3 should be integrated in Table 2. What does the last row of table 2 mean?</p> <p>8. Results: given the number of comparisons done, the authors should consider to correct the statistical level of significance by applying the Bonferroni correction, or other similar technique.</p> <p>Discussion: Please provide a conclusion at the end of this section.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer 1:

The study presents the variation in the PM emission from flavoured and non-flavoured cigarettes. The study design is good and the results are well presented, however, applicable to only this type of cigarette brands.

Answer: We thank the reviewer for this commentary and the positive assessment of our manuscript.

I recommend that the manuscript is accepted for publication following major revisions. The main points to be addressed are:

1. If the manuscript describes ETS, then I suggest that it is mentioned in the title. However, please see the comment below of whether the chamber used for the study represents well ETS.

Answer: Thank you for the relevant hint. We completed the title also in the sense of the editor and the guidelines of the journal. The new title reads as follows:

Particulate matter emissions of four types of one cigarette brand with and without additives: a laser spectrometric particulate matter analysis of second-hand smoke

In addition, we replaced the term Environmental Tobacco Smoke (ETS) with the term Second-Hand Smoke (SHS) not only in the title, but also in the whole manuscript. This was a relevant suggestion of the 2nd reviewer.

2. The experimental section in the abstract is missing.

Answer: Sorry for the missing information. We added it in the design and method chapters of the abstract as follows:

Design: An experimental study of measuring second-hand smoke of cigarettes without exposing test persons or the investigator.

Method: An automatic environmental tobacco smoke emitter (AETSE) generated SHS in an enclosed room with a volume of 2.88m³, followed by measuring of PM (PM₁₀, PM_{2.5} and PM₁) with a laser aerosol spectrometer. Afterwards, the measuring values of the four test cigarette brands and the reference cigarette were statistically analysed.

3. The results in the abstract describe PM_{2.5} only. What happened to the other sizes mentioned in the introduction of the abstract?

Answer: Thank you for the important hint. We described this in the result part of the abstract clearer.

4. The strength and limitations read as one paragraph and not as standalone points. Point 2 is too long.

Answer: We have rewritten this chapter accordingly.

5. The chamber used for the study as described does not show any ventilation outlet and as such, the set up does not represent Environmental Tobacco Smoke but rather an accumulation of aerosols in a closed environment. In this case, it is preferred to show the relative increase in PM count or mass and not to take the absolute masses and compare them to WHO guidelines. I believe that this section is over ambitious and what is measured does not represent any scenario of exposure.

Answer: On the one hand, this objection is absolutely right. During the measurement the chamber is closed to avoid exposing any person to the smoke. Disturbing turbulences of the air are avoided as well. After a measure cycle the chamber will be ventilated. On the other hand, we think this specific scenario is similar to smoke burden in a compact car with closed windows and no ventilation or air conditioning. It is also similar to smoke burden in every closed spaces of comparable size. We compared the measured values to WHO guidelines only to illustrate how massive the PM burden under these conditions is.

We clarified this in the manuscript accordingly.

6. Also and along the same line, I am not sure how the authors consider that the chamber is "exactly" representing ETS.

Answer: Thank you for the hint. Indeed, the term "exactly" is deceptive. We altered this accordingly. The new term is "realistically as possible".

7. A graph showing the particle distribution of the different cigarette types is an important addition to the manuscript. Particle size distribution would be also interesting to discuss.

Answer: Sorry for the missing graph. We added a figure and discussed it in the corresponding section of the manuscript.

Reviewer 2:

This manuscript presents results from an experiment to compare the PM concentrations the smoke of 4 type of cigarettes of the same brand, with and without additives. The experiments seem to have been well performed, but there are some concerns about the data and the writing of the manuscript.

Answer: We thank the reviewer for this commentary and the positive assessment of our manuscript.

My main concern is the interpretation of results, that show "lower" levels of PM_{2.5} in "additive-free cigarettes", whilst the concentration are extremely high as compared to the reference cigarette. This should be clearly stated in the Discussion, in order to avoid a misleading message that "cigarettes without additives" are less harmful... It is clear that these results support that it is better not to include additives, but the corroboration that the concentrations of PMs are also extremely high in cigarettes without additives needs to be stressed. Otherwise, the message is a bit confusing.

Answer: Thank you for the very important hint. This objection is absolutely right. We used the reference cigarette to compare the relative results of this study with previous ToPIQ studies, and as our internal standard, too. Whereas e.g. manufacture processes of different cigarette brands have influences on the amount of PM emissions we tried to minimise such influences by using cigarette types of one brand. The target of this study was to investigate only the influence of additives on PM emissions. Therefore, it is not surprising that the results of the Lucky Strike brands differ from the ones of the reference cigarette that is manufactured by another company. To avoid the misunderstanding, that additive free cigarettes are less harmful we now emphasise in the discussion more clearly the very high level of PM emission also of the additive free types of cigarette.

1. Abstract, and across the manuscript: The term Environmental Tobacco Smoke (ETS) is no longer preferred in tobacco control research, since it was promoted by the tobacco industry. In the last decade, the term widely accepted and used is Second- Hand Smoke, abbreviated as SHS. Please correct this across the manuscript.

Answer: Thank you for this very important comment. We replaced the term Environmental Tobacco Smoke (ETS) with the term Second-Hand Smoke (SHS) throughout the whole manuscript.

2. Abstract: Please include details about the Methods, such as the types of cigarettes, the type of PMs assessed and the instrument of measurement (now in the Objective paragraph).

Answer: We mentioned these details now in the Method paragraph of the abstract.

3. Introduction: Please made a clear statement about the objective of the study at the end of the Introduction, without specification of methodological topics, just the objective.

Answer: We added a short description of the aim of the study at the end of the Introduction paragraph.

4. Methods: why this brand? Please include a justification.

Answer: This is a legitimate question. We justified our selection at the end of the Introduction.

5. Methods: Please make clearer that the measurements were done in 19 cigarettes of each type (the 4 experimental and the control). In page 8, lines 16-20 the sentences are a bit ambiguous and it only becomes clear in page 9, line 18. Please re-write lines 16-20 (page 8).

*Answer: Thank you for the hint. Now we stated at the beginning of the Method chapter the quantity of 19 at the test **and** reference cigarettes. Additionally we transferred line 9-13 (page 8) to the end of the introduction and deleted the first sentence of the Method (line 5-9, page 8), because this is already mentioned at the end of the Introduction.*

6. Methods: The Grimm Portable Laser Aerosol Spectrometer is an optical dust mass device, and this has to be mentioned, and which is its validity to measure PMs as compared with gold-standard gravimetric devices. Moreover, this should be discussed in the Discussion section.

Answer: Thank you for the important hint to compare the LAS-method with gravimetric methods. We added this together with a few other comparisons in the discussion chapter.

7. Results: The p-values shown in Table 3 should be integrated in Table 2. What does the last row of table 2 mean?

Answer: The last row has been deleted. Significant results are now highlighted by bold font type. For the moment, we have decided not to integrate table 3 in table 2, because we think two tables give clearer information.

8. Results: given the number of comparisons done, the authors should consider to correct the statistical level of significance by applying the Bonferroni correction, or other similar technique.

Answer: Thank you for the hint to check the statistical level of significance more exactly. To avoid false-positive results from multiple comparisons, we decided now to test data with a multiple comparison test. An ANOVA could not be performed because variances were heteroscedastic (indicated by Bartlett's test). Thus, we computed a Kruskal-Wallis test followed by the Dunn's multiple comparison test. The very robust statistical data were reported in the adjusted table 3 and in the manuscript accordingly.

Discussion: Please provide a conclusion at the end of this section.

Answer: We added a conclusion at the end of the discussion chapter.

VERSION 2 – REVIEW

REVIEWER	Najat A. Saliba American University of Beirut Beirut, Lebanon
REVIEW RETURNED	29-Aug-2018
GENERAL COMMENTS	The authors have responded to the reviewers comments but need to edit the sentences they added. Most of the paragraphs and sentences need major editing including the bullet points of strength and limitations. The latter paragraph needs to be also shortened so that it becomes more focused.

VERSION 2 – AUTHOR RESPONSE

Reviewer 1:

Please state any competing interests or state 'None declared': I have no conflict of interest

Answer:

Dear Reviewer 1,

Thank you very much for your positive assessment of our article and the hint regarding the point "competing interests". We have placed the declaration "The authors declare no conflict of interest." on page 15 of the manuscript.

The authors have responded to the reviewer's comments but need to edit the sentences they added. Most of the paragraphs and sentences need major editing including the bullet points of strength and limitations. The latter paragraph needs to be also shortened so that it becomes more focused.

Answer: The authors edited the whole manuscript accurately. We also shortened the discussion section accordingly and we hope it is now more focused.