Tobacco smoke is not limited to second hand smoke

Ana Díez-Izquierdo,[a,b,*] Cristina Lidón-Moyano,[b] and José María Martínez-Sánchez[b]

[a]Pediatric Allergy and Pulmonology Section, Department of Pediatrics, Hospital Universitari Vall d'Hebron, Barcelona, Spain
[b]Group of Evaluation of Health Determinants and Health Policies, Faculty of Medicine and Health Science, Universitat Internacional de Catalunya (UIC-Barcelona), Sant Cugat del Vallès, Spain

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We read with interest "*Thirdhand Smoke Exposure Induces Oxidative Damage, Initiates Skin Inflammatory Disease, and Adversely Alters the Human Plasma Proteome*" by Sakamaki-Ching et al.,[1] which is reported by the authors as the first clinical study identifying the molecular adverse health effects of third-hand smoke (THS) dermal exposure in humans. Tobacco smoke exposure is not limited to Second-Hand smoke (SHS), THS, known as the combination of gases and particles that, after having smoked, persist on surfaces, in dust or even on people's hair, skin and clothing.[2,3] Until now, THS components were demonstrated to have damaging health effects, by being inhaled, ingested, and recently also was demonstrated that were even absorbed through the skin.[1,2] Sakamaki-Ching et al. work provide urinary biomarkers and plasma proteomics pathway analysis of the effects of THS, demonstrating acute dermal THS exposure is not only harmful to humans, but also has the potential to initiate diseases. Although the study only included 10 individuals, it is enough to show that exposure to THS increases tobacco specific biomarkers (as cotinine) in urine, indicating the possible use of such biomarkers to objectively quantify THS exposure, in addition to self-reported information regarding tobacco exposure, and other biomarkers such as nicotine that accumulates on the hands.[1] Moreover, according to Sakamaki-Ching et al. study, THS exposure alters human plasma proteome, initiates mechanisms of skin inflammatory disease, and elevates urinary biomarkers of oxidative harm, these harmful effects being similar to those of cigarette smoking.[1]

Implications on tobacco control politics

Sakamaki-Ching et al. results highlight the need to continue strengthening tobacco control legislations in order to protect non-smokers not only from SHS exposure, but also from THS exposure. In this sense, as there is no minimum free level of exposure, legislations that favor smoke-free spaces have increased progressively worldwide, being the only ones that guarantee protecting the health of non-smokers.[4]

Despite the remarkable advances in recent decades in tobacco control policies, there are still many countries in which there is a lack of resolute legislation against tobacco use, in addition, smoking and exposure to tobacco smoke (SHS and THS) still have high morbidity and mortality worldwide.[5] Current data confirms that despite the fact that sometimes it is not possible to differentiate between exposure to SHS and THS, the side effects seem to be the same.[4] However, more studies are needed to explore the distinctly harmful effects of THS exposure.

Implications on general and pediatric health

The long-term consequences of THS exposure are still being studied. However, there is evidence that exposure to THS increases the risk of developing respiratory symptoms, different types of cancer and even increases the mortality risk.[2] Moreover, there is a 20% increased risk of lung cancer in non-smoking spouses who live with a smoker, and there is also an increased risk in non-smokers exposed at work.[4]

Exposure to THS is therefore particularly dangerous in the paediatric population for different reasons. First, there are behaviors characteristic of certain pediatric stages, such as crawling and taking objects from hand to mouth in infants, which could exacerbate exposure to THS. In addition, unlike the adult population, in pediatrics, the immune system is developing, there is a higher respiratory rate and the skin is thinner, increasing its risk in comparison to adult population.[6,7] In fact, there is growing evidence of the detrimental effect of THS on increasing pediatric asthma exacerbations and other respiratory tract diseases.[8]

In this sense, tobacco control legislations have been implemented in workplaces and in public places with children present, but legislation regulating private homes and cars are still very scarce. Moreover, children after school or kindergarten spend most of their time in private settings, such as homes or cars, unable to avoid exposure if the home has no voluntary regulation to avoid tobacco consumption.[9] In such private venues, falls upon individuals the decision to establish smoke-free home rules, which is based on protecting children

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*Corresponding author. Pediatric Allergy and Pulmonology Section, Department of Pediatrics, Hospital Universitari Vall d'Hebrón, Pg.Vall d'Hebrón 119-129, 08035, Barcelona, Spain.
E-mail address: ana.diez@vallhebron.cat (A. Díez-Izquierdo).

(and non-smokers) from SHS, but neglecting THS protection. This scarce scientific evidence reflects in the public awareness, and even healthcare professionals awareness, being still limited.[2]

Implications on advertising and warning of the effects of THS

The end of the tobacco epidemic continues by favoring smoking cessation policies. Thanks to tobacco control legislations, exposure in pediatrics are mostly in private environments (homes and private vehicles), because, these venues are rarely included in tobacco control legislations, and are where children spend more time after school.

Protection against such exposure must be based on population education by governments and health professionals about THS and its effects. In this sense, the voluntary regulation of tobacco consumption at homes is key, and may be favoured offering, for example, tax discounts. Moreover, tobacco control legislations should consider to regulate tobacco consumption in vehicles, as smoking while driving may be a cause of distraction in addition to a source of exposure to SHS and THS.

To this end, the role of primary care health professionals is key to increase social awareness, as well as knowledge, and therefore to reduce exposure to THS. During the follow-up of the pediatric patient, prevention of exposure to SHS is already carried out, and recommendations can be provided to also avoid THS. Among the main recommendations to reduce THS, if avoiding tobacco consumption is not possible, are frequent ventilation, regular cleaning of exposed surfaces with acidic products such as diluted solutions of white vinegar, as well as weekly vacuuming with HEPA filter (High Efficiency Particulate Air).[10]

Summarizing, although the harmful effects of THS exposure are still being studied, mounting evidence suggests that this exposure may be at least as dangerous as exposure to SHS, highlighting the need to equate THS exposure to SHS exposure in future tobacco control legislations. Moreover, THS is needed to be taken into account as a threat to non-smoker population, especially children, so it is important to work on awareness increase regarding THS health hazards targeting not only the general population but also health professionals.

Contributors

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Declaration of interests

The authors have no conflict of interest to disclose.

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