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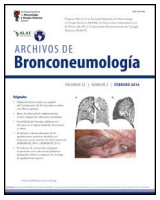

Editorial

Thirdhand Smoke: A Ubiquitous Hidden Threat in Pandemic Times

Humo de tercera mano: una amenaza oculta ubicua en tiempos de pandemia

The COVID-19 pandemic has enforced unprecedent social isolation and worldwide lockdown measures, which lead to a vast increase of the time that we expend at home and, therefore, to our exposure to indoor air pollutants, including tobacco smoke toxicants. The harmful effects associated with passive exposure to tobacco smoke, also known as secondhand smoke (SHS), are widely recognised by society in general. Proof of this awareness is the smoke-free policies in public and workplaces implemented worldwide in the last few decades, following the recommendation of the Framework Convention on Tobacco Control in 2003.[1] Considered carcinogen to humans by the International Agency for Research on Cancer, the health effects associated with SHS exposure include rhinitis, allergic reactions, asthma, respiratory infections, and heart disease, as well as lung cancer, among others.[2–4] Although exposure to SHS has globally decreased by more than 22% since 1990, the number of deaths attributable to SHS exposure were estimated to 900 thousand deaths in 2016, of which 6% were children under 5 years old,[5,6] numbers that cannot be neglected.

Nevertheless, exposure to tobacco smoke toxicants goes beyond SHS exposure, as most of the SHS gases and particles deposit, age, and remain for long periods of time on fabrics, surfaces, in airborne particles, and settled dust forming the so-called thirdhand smoke (THS), a less studied source of exposure to tobacco smoke toxicants.[7] THS can be perceived as the characteristic tobacco smoke smell in clothes and hair after being exposed to SHS or inside rooms and cars where smoking is permitted.

But why should THS be considered a new pathway of passive smoking? Firstly, these residual chemicals accumulate over time on indoor surfaces, remain for months after the last cigarette was consumed, and cannot be easily eliminated by cleaning or ventilation, adding to tobacco smoke exposure a long-lasting dimension not included in SHS.[7,8] Secondly, THS toxicants attached to surfaces as well as airborne and settled particles can be re-suspended, re-emitted into the gas phase, or even react with oxidants and other atmospheric compounds to yield secondary contaminants, some of them with increased toxicity.[9] This is the case of the tobacco-specific nitrosamines (TSNAs), a leading class of carcinogens, whose concentrations could increase after the smoke was deposited indoors.[9] A third reason is THS ubiquity. Recent studies have demonstrated the ubiquitous presence of tobacco-specific contaminants either in outdoor[10] and in indoor environments, including those with strict non-smoking bans.[11] This fact gives tobacco smoke a dimension of active and complex environmental contaminant, whose regulation and health effects have been generally overlooked to date. Finally, the main pathways of exposure to THS toxicants are non-dietary ingestion and dermal absorption, which make young children especially susceptible owing to their hand-to-mouth behaviour and immature metabolism, among other causes.[7]

The World Health Organisation (WHO) estimates that 40% of children are exposed to SHS,[2] but this data does not include THS exposure and, therefore, underestimates the real exposure of tobacco smoke toxicants on children. After two decades of smoking-free laws, domestic environments have become the main sources of tobacco smoke exposure. The cancer risk associated with the exposure to carcinogen N-nitrosamines and TSNAs in THS accumulated in house dust from smokers' homes was estimated to exceed the United States Environmental Protection Agency and WHO recommendations for children under 6 years old.[11] Considering the lack of awareness of THS risks by society in general and the fact that parents who smoke more than 10 cigarettes per day are less likely to believe that THS exposure is harmful to their children and, therefore, to implement strict smoking bans at home,[12] THS exposure of children cannot be overlooked. This latter statement has been particularly relevant during the stay-at-home period due to the COVID-19 pandemic that in many countries has led to an increase in smoking at home[13] and, therefore, to the inherent increase of THS exposure.

In the past decade, many studies have presented evidence of THS harm in animal models and human cell lines, recently reviewed by Jacob et al.[7] THS health effects include the induction of oxidative DNA damage in human cell lines; and significant damage in the liver and lungs, poor wound healing, increased oxidative stress and inflammation, insulin resistance, or hyperactivity in mice exposed to THS, under conditions that mimic exposure of humans.[7] Given this evidence, it is urgent to investigate the effects of THS in children's health and the specific contribution of THS exposure in the occurrence of tobacco-related illnesses.

Hence, exposure to THS is a public health issue of global concern. Although awareness of the dangers of THS exposure increases every year, it is still generally omitted in health and environmental policies. To overcome this, future research must focus on filling the gaps in our current understanding of THS chemistry, toxicology, and, especially, on unravelling the health effects of this exposure on vulnerable populations. The need to respond to these challenges has become more urgent in the context of the current pandemic

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times since air pollution has been demonstrated as a risk factor of covid-19 adverse outcomes[14] and THS exposure might have a relevant role in the occurrence, transmission and progression of covid-19 in vulnerable populations.[15]

The COVID-19 pandemic has put smoking habits in the public eye decreasing the social acceptability of smoking in public and private places. It is our responsibility to take this unique opportunity to strengthen tobacco policies and increase general public awareness of the extensive impact of their smoking behaviour to protect the most susceptible population: children.

Conflict of Interests

The author declares no conflict of interests.

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