



## Thirdhand Smoke

A Selected Bibliography from the Tobacco Control Reference Catalogue  
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Burton, A. (2011). "Does the smoke ever really clear? : thirdhand smoke exposure raises new concerns". Environmental health perspectives. 119(2): a70-a74.

<http://dx.doi.org/10.1289/ehp.119-a70>

Recent research exploring potential dangers of thirdhand smoke (THS) has received a flurry of coverage in the international media and the scientific press. So how dangerous might THS really be?

Dreyfuss, J. H. (2010). "Thirdhand smoke identified as potent, enduring carcinogen". CA : a cancer journal for clinicians. 60(4): 203-204.

<http://dx.doi.org/10.3322/caac.20079>

Residual nicotine from cigarette smoke reacts with nitrous acid on indoor surfaces to form carcinogenic tobacco-specific nitrosamines (TSNAs). The more a person smokes in the home or car, the more TSNAs are formed and absorbed onto environmental surfaces, and into materials such as cotton, cellulose, upholstery, and carpeting. This is one finding of a potentially seminal new article published recently in Proceedings of the National Academy of Sciences of the United States of America (2010;107:6576-6581).

Kuschner, W. G., S. Reddy, N. Mehrotra, H. S. Paintal. (2011). "Electronic cigarettes and thirdhand tobacco smoke : two emerging health care challenges for the primary care provider". International journal of general medicine. 4: 115-120.

<http://dx.doi.org/10.2147/IJGM.S16908>

Provides a clinician-friendly introduction to two emerging issues - electronic cigarettes and thirdhand smoke - so that clinicians are well prepared to counsel their smoker patients about newly recognized health concerns relevant to tobacco use.

Matt, G. E., P. J. Quintana, H. Destailats et al. (2011). "Thirdhand tobacco smoke : emerging evidence and arguments for a multidisciplinary research agenda".

Environmental health perspectives. 119(9): 1218-1226.

<http://dx.doi.org/10.1289/ehp.1103500>

Reviews recent findings about constituents, indoor sorption-desorption dynamics, and transformations of thirdhand smoke (THS); distribution and persistence of THS in residential settings; implications for pathways of exposure; potential clinical significance and health effects; and behavioural and policy issues that affect and are affected by THS.

Matt, G. E., P. J. E. Quintana, J. M. Zakarian et al. (2011). "When smokers move out and non-smokers move in : residential thirdhand smoke pollution and exposure".

Tobacco control. 20(1): e1.

<http://dx.doi.org/10.1136/tc.2010.037382>

Evaluated dust, surface, air nicotine level, and participant's fingers prior to them moving out of their homes. Childrens' urine was also assessed for cotinine. Dust, surface, and air nicotine levels were reduced after moving out; yet, dust and surfaces were more highly contaminated in the former residences of individuals who smoked.

Petrick, L. M., A. Svidovsky, Y. Dubowski. (2011). "Thirdhand smoke : heterogeneous oxidation of nicotine and secondary aerosol formation in the indoor environment". Environmental science & technology. 45(1): 328-333.

<http://dx.doi.org/10.1021/es102060v>

Thirdhand smoke (THS) can lead to exposure of potentially harmful compounds. The high sorption capacity of nicotine to household furnishings and clothing make these surfaces a potentially dominant source for exposures. In addition to desorption and dermal contact, the sorbed nicotine may participate in heterogeneous ozone reactions resulting in the formation of secondary organic aerosol (SOA) and gas and condensed phase products. Cumulative exposures to these airborne species may be greater for an infant than an adult when both breathing rate and body weight are considered.

Rehan, V. K., R. Reiko, J. S. Torday. (2011) "Thirdhand smoke : a new dimension to the effects of cigarette smoke on the developing lung". American journal of physiology : lung cellular and molecular physiology. 301(1): L1-L8.

<http://ajplung.physiology.org/content/301/1/L1.abstract>

This study measured the effect of two other toxins in thirdhand smoke—1-(N-methyl-N-nitrosamino)-1-(3-pyridinyl)-4-butanal (NNA) and 4-(methylnitrosamino)-1-(3-pyridinyl)-1-butanone (NNK). Researchers found prenatal exposure to thirdhand tobacco smoke components played a much greater role in altered lung function in offspring than postnatal or childhood exposures.

Sleiman, M., L. A. Gundel, J. F. Pankow et al. (2010). "Formation of carcinogens indoors by surface-mediated reactions of nicotine with nitrous acid, leading to potential thirdhand smoke hazards". Proceedings of the National Academy of Sciences of the United States of America. 107(15): 6576-6581.

<http://dx.doi.org/10.1073/pnas.0912820107>

This study showed that residual nicotine from tobacco smoke sorbed to indoor surfaces reacts with ambient nitrous acid (HONO) to form carcinogenic tobacco-specific nitrosamines (TSNAs). Given the rapid sorption and persistence of high levels of nicotine on indoor surfaces, this recently identified process represents an unappreciated health hazard through dermal exposure, dust inhalation, and ingestion. These findings raise concerns about exposures to the tobacco smoke residue that has been recently dubbed "thirdhand smoke."

Thomas, J. L., H. Guo, S. G. Carmella et al. (2011). "Metabolites of a tobacco-specific lung carcinogen in children exposed to secondhand or thirdhand tobacco smoke in their homes". Cancer epidemiology, biomarkers & prevention. 20(6): 1213-1221.

<http://dx.doi.org/10.1158/1055-9965.EPI-10-1027>

Recruited 79 parent-child dyads from homes where the enrolled parent was a cigarette smoker and visited their homes. Parents were asked questions, home ambient air quality was evaluated, and children provided urine samples. Urine was analyzed for total NNAL, total cotinine, total nicotine, and iso-NNAL. 90% of the children had detectable total NNAL in urine; total nicotine and total cotinine were also detected in most samples.

Ueta, I., Y. Saito, K. Teraoka et al. (2010). "Determination of volatile organic compounds for a systematic evaluation of third-hand smoking". Analytical sciences. 26(5): 569-574.

<http://dx.doi.org/10.2116/analsci.26.569>

Thirdhand smoking was quantitatively evaluated with a polymer-packed sample preparation needle and subsequent gas chromatography–mass spectroscopy analysis. Several types of clothing fabrics were exposed to sidestream smoke, and the smoking-related volatile organic compounds (VOCs) evaporated from the fabrics to the environmental air were preconcentrated with the extraction needle.

Winickoff, J. P., J. Friebely, S. E. Tanski et al. (2009). "Beliefs about the health effects of "thirdhand" smoke and home smoking bans". 123(1): e74-e79.

<http://dx.doi.org/10.1542/peds.2008-2184>

Thirdhand smoke is described as lingering cigarette smoke pollution after the cigarette has been put out. This study evaluates the health beliefs of adults about exposing children to thirdhand smoke and whether those attitudes differ between people who smoke and who do not smoke. Believing that thirdhand smoke adversely affects children was independently related with household smoking bans.