

Secondhand Marijuana Smoke Is Not Benign

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Although most people know that secondhand tobacco smoke can be harmful,¹ the perception is that marijuana smoking is less harmful to health, less addictive, and more socially acceptable than tobacco use.² In fact, we have heard from parents here in Colorado that they have quit smoking tobacco and now only smoke marijuana because “it’s natural.” In recent years marijuana has been legalized for medical purposes in 23 states, and 4 states and Washington DC have now legalized marijuana for recreational use. Marijuana use in the preceding 30 days is now higher than cigarette use for US 12th grade students (21.4% versus 19.2%).³ States with legal marijuana have typically not allowed marijuana smoking in areas in which tobacco smoking is not allowed, such as restaurants and workplaces, and these regulations usually do not allow marijuana smoking in public outdoor spaces, confining marijuana smokers to their backyards, if they have them, or alternatively, their homes.

The study in this issue of the *Journal of the American Heart Association* by Wang et al, “One minute of marijuana secondhand smoke impairs vascular endothelial function,” is an excellent example of the work that needs to be done to demonstrate the impact of secondhand marijuana smoke (SHMS) on bystanders.⁴ This study found that brief (1-minute) exposure to SHMS in rats caused impaired endothelial function for at least 90 minutes; this is even longer than the impairment the team has found caused by tobacco smoke. Interestingly, the components responsible for the impairment are unknown, but it is not due to the

tetrahydrocannabinol (THC), nicotine, or combusted rolling paper, as the experimenters controlled for all of these exposures. This effect persisted after the transient vasodilatory effect of the marijuana and occurred even with smoke concentrations low enough that the smoke was not visible in the air.

Certainly this study raises concerns about the potential for SHMS to impact cardiovascular health in adults and provides a potential etiology for the prior finding that marijuana use increases the risk of heart attack after use.⁵ And Wang et al make an important call for further research to be done into the impact of SHMS. However, there are several other, related issues that this research can inform.

First, because marijuana use is limited to private homes and apartments, we in the public health community have a significant concern about the impact on other residents in multiunit housing (MUH). Studies have demonstrated that tobacco smoke can infiltrate adjacent apartments⁶ and that residents in MUH have high rates of exposure to nicotine.⁷ We found that children in MUH were significantly more likely to have tobacco smoke exposure, even if they lived in a nonsmoking household.⁸ There is no reason to suspect that SHMS would be less likely to diffuse into adjacent apartments, and this study highlights the potential risk to other residents, especially those who are elderly, disabled, have heart disease, or are children. As more MUH residences restrict tobacco smoking, and the Department of Housing and Urban Development examines whether to ban smoking in publically funded MUH,⁹ we should make sure that marijuana smoking is also included.

The impact on pregnant women and the developing fetus is also a significant concern. It has been very difficult to study the impact of marijuana smoking on the fetus because even in states where recreational marijuana is legal, there are still laws on the books requiring referral to child protective services for a positive marijuana screen at birth. However, medical marijuana is being touted in the lay literature as a treatment for morning sickness,¹⁰ and at least some dispensaries are recommending marijuana to pregnant women as an alternative to drugs for nausea and pain. In 2015 the Colorado Legislature voted down a bill that would have required marijuana dispensaries to post signs warning pregnant

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women of the potential dangers to their unborn child. The current study suggests that a pregnant woman who smokes marijuana, or who is even exposed by a friend or partner, could impact circulation to the fetus, with unknown effects. This would be an excellent area of study for animal models. We know that smoking and SHS exposure in pregnancy have long-lasting effects on children's immune system, lung function, and cognitive development¹¹; we need to ensure that we place the same scrutiny on marijuana.

Finally, we need to consider the impact of SHMS on children. Studies have demonstrated that exposure to tobacco smoke in childhood is associated with negative health consequences in childhood (including an increased risk for viral infection, asthma, cognitive deficits, and behavioral issues)¹¹ and also with an increased risk of disease in adulthood. This is particularly true for diseases of the cardiovascular system: secondhand tobacco smoke increases risk of both heart disease and stroke in adulthood¹¹ and also promotes physiological changes associated with heart disease, such as metabolic syndrome¹² and increased intima-media thickness.¹³ The fact that marijuana smoke exposure also has a measurable impact on endothelial function is a strong indicator that this exposure may be dangerous to children and may have a long-term impact on their cardiovascular health. Parents may not see smoking marijuana around their children as dangerous; this has certainly been my experience clinically, but we need studies of parent's attitudes and behaviors to know for sure.

As Dr Wang and his colleagues point out, we must continue to study the impact of secondhand smoke on both children and adults. The National Institutes of Health could direct funding to this area in order to facilitate the kinds of longitudinal cohort studies that will answer these questions most definitively. The Centers for Disease Control and Prevention have also developed a test that can measure low levels of marijuana smoke exposure,¹⁴ and this could be used on samples from the National Health and Nutrition Examination Survey (NHANES) to provide national estimates of SHMS exposure as well as to give researchers a powerful database to examine correlations with other biomarkers and with health outcomes. Dr Wang's study reminds us that we have no reason to suspect that secondhand marijuana smoke will be benign; vulnerable populations, including elderly and disabled

MUH residents, pregnant women, and children, need to be protected.

Disclosures

None.

References

- Winickoff JP, Friebely J, Tanski SE, Sherrod C, Matt GE, Hovell MF, McMillen RC. Beliefs about the health effects of "thirdhand" smoke and home smoking bans. *Pediatrics*. 2009;123:e74–e79.
- Padilla M, Berg CJ, Schauer GL, Lang DL, Kegler MC. Allowing cigarette or marijuana smoking in the home and car: prevalence and correlates in a young adult sample. *Health Educ Res*. 2015;30:179–191.
- Rolle IV, Kennedy SM, Agaku I, Jones SE, Bunnell R, Caraballo R, Xu X, Schauer G, McAfee T. Cigarette, cigar, and marijuana use among high school students—United States, 1997–2013. *MMWR Morb Mortal Wkly Rep*. 2015;64:1136–1141.
- Wang X, Derakhshandeh R, Liu J, Narayan S, Nabavizadeh P, Le S, Danforth OM, Pinnamaneni K, Rodriguez HJ, Luu E, Sievers RE, Schick SF, Glantz SA, Springer ML. One minute of marijuana secondhand smoke exposure substantially impairs vascular endothelial function. *J Am Heart Assoc*. 2016;5:e003858 doi: 10.1161/JAHA.116.003858.
- Mittleman MA, Lewis RA, Maclure M, Sherwood JB, Muller JE. Triggering myocardial infarction by marijuana. *Circulation*. 2001;103:2805–2809.
- King BA, Travers MJ, Cummings KM, Mahoney MC, Hyland AJ. Secondhand smoke transfer in multiunit housing. *Nicotine Tob Res*. 2010;12:1133–1141.
- Kraev TA, Adamkiewicz G, Hammond SK, Spengler JD. Indoor concentrations of nicotine in low-income, multi-unit housing: associations with smoking behaviours and housing characteristics. *Tob Control*. 2009;18:438–444.
- Wilson KM, Klein JD, Blumkin AK, Gottlieb M, Winickoff JP. Tobacco-smoke exposure in children who live in multiunit housing. *Pediatrics*. 2011;127:85–92.
- Development DoHaU. Instituting smoke-free public housing. 2015. Available at: <http://portal.hud.gov/hudportal/documents/huddoc?id=sSmoke-freepublichousing.pdf>. Accessed December 9, 2015.
- Watts S. I used pot for morning sickness. 2015. Available at: <http://www.thedailybeast.com/articles/2015/11/02/i-used-pot-for-morning-sickness.html>. Accessed June 17, 2016.
- Moritsugu KP. The 2006 Report of the Surgeon General: the health consequences of involuntary exposure to tobacco smoke. *Am J Prev Med*. 2007;32:542–543.
- Weitzman M, Cook S, Auinger P, Florin TA, Daniels S, Nguyen M, Winickoff JP. Tobacco smoke exposure is associated with the metabolic syndrome in adolescents. *Circulation*. 2005;112:862–869.
- Gall S, Huynh QL, Magnussen CG, Juonala M, Viikari JS, Kähönen M, Dwyer T, Raitakari OT, Venn A. Exposure to parental smoking in childhood or adolescence is associated with increased carotid intima-media thickness in young adults: evidence from the Cardiovascular Risk in Young Finns study and the Childhood Determinants of Adult Health Study. *Eur Heart J*. 2014;35:2484–2491.
- Wei B, Wang L, Blount BC. Analysis of cannabinoids and their metabolites in human urine. *Anal Chem*. 2015;87:10183–10187.

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