Secondhand smoke from marijuana: The return of a familiar problem

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1/28/19
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The Bad Ol’ Days
1/2 mile from UCSF!

4/20/2017

4/20/2018
SF, 2017... REALLY!!!
(the return of a familiar problem)

“NOW SERVING CANNABIS FOR BRUNCH
In S.F., gourmet fare infused with artisanal weed
offers medicated spreads to new connoisseurs”
– SF Chronicle 1/22/17
Secondhand smoke (SHS)

- Smoking causes over 140,000 cardiovascular deaths in the US per year.
- Secondhand smoke is estimated to cause ~50,000 US deaths/year, mostly from cardiovascular disease.
- Smoking bans in public places lead to reduction in frequency of heart attacks.
Tobacco secondhand smoke exposure impairs ability of arteries to *vasodilate* when they need to pass more blood

*(Vasodilation: Arteries grow in diameter when necessary)*

Important: Impairment is temporary, but repeated exposures lead to long-term impairment

“Flow-mediated dilation” (*FMD*)
1 minute of secondhand smoke exposure was enough to impair vascular endothelial function in rats

n=8 for all groups

*P<.01 impairment vs. mean of pre-exposure and recovery

Pinnamaneni et al., 2014, Nicotine Tob. Res. 16:584-590
Problem: General public avoids tobacco SHS but many think marijuana SHS is ok

“There’s no nicotine”  “It’s natural”  “It’s medicinal”  “No one said it ISN’T ok”
2. Business Activity/Schedules

Your business activity is: RESEARCHER (i)

Please make any requested changes to your registered schedules below, and select Next to continue.

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Impairment from **one minute** of marijuana SHS persists longer than impairment from tobacco SHS.

~670 µg/m³ particles (PM2.5)
Marijuana SHS for 1 minute lowered FMD for at least 90 minutes; cannabinoid-independent

1 minute exposure (THC-free)

Wang et al., 2016, J Am Heart Assoc 5:e003858
“They totally smoke out the rats”

The smoke was invisible in the exposure chamber
Acute and long-term cardiovascular risk is unclear

Risk of MI goes up ~5-fold in the hour after marijuana use (Mittleman, 2001)

Mortality from MI may or may not increase in marijuana users (Mukamal, 2008; Frost, 2013)

No clear correlation between long-term marijuana use and cardiovascular disease later in life (e.g., Reis, 2017 CARDIA study)

...but, increased MI, heart failure, stroke reported for marijuana users relative to non-users (e.g., Kalla et al., Chami et al., 2017 ACC conference)
Is FMD impaired by *Volcano* vaporizer cannabis aerosol?

Jiangtao Liu, Pooneh Nabavizadeh,
Impairment of endothelial function by one IQOS HeatStick ("heat-not-burn" tobacco product)

Mainstream exposure (5 s smoke + 25 s break) x 10

IQOS

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IQOS

Mainstream exposure (5 s smoke + 25 s break) x 10

Nabavizadeh et al., Tob Cont. 2018
Serum from e-cigarette users inhibits nitric oxide production from cultured endothelial cells

with Suzaynn Schick and Peter Ganz

Mohammadi et al., American Heart Association Annual conference 2018

(...and Carnevale et al. showed that e-cig use impairs FMD in humans)
FMD can be impaired by *Volcano* vaporizer aerosol (preliminary results)

- **Air from vaporizer** (empty chamber; 1 min)
- **Mainstream vaporizer aerosol** (5s every 60s for 5 min)
- **Secondhand vaporizer aerosol** (4.3 cc vapor into chamber; 1 min)
Inhalation of inert particles impairs FMD
(Simple does-it-or-doesn’t-it experiment)

- <100 nm inert carbon particles for 10 min
- Comparable particle number to 600 µg/m³ SHS
Neither THC nor paper smoke are required for marijuana SHS to impair vascular function.

Nicotine is not required for impairment of vascular function by smoke.

One minute of marijuana SHS exposure impairs vascular function for at least 90 minutes, longer than impairment from tobacco SHS.
Mainstream use of IQOS heat-not-burn tobacco product impairs FMD like smoking a cigarette.

E-cigarette use (in humans) causes changes in blood that impair endothelial NO production.

Mainstream and modeled secondhand exposure to Volcano aerosol can impair FMD (preliminary).

Inhalation of inert particles impairs FMD.
Bottom Line:

Breathe clean air

Public exposure to secondhand smoke should be avoided whether the source is tobacco or marijuana.