Environmental Tobacco Smoke

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ETS Background

• 1964 US Surgeon General Report
• 1975 MN Clean Indoor Air Act
• 1986 US Surgeon General Report on ETS
• 1992 EPA report on ETS and Lung Cancer and other respiratory diseases
• 1999 California EPA report on Health Effects of ETS
Group A Carcinogens

- Arsenic
- Asbestos
- Benzene
- Radon
- Vinyl Chloride
- ETS
Tobacco Smoke Contains…

• Thousands of constituents
• Dozens of Carcinogens and Co-carcinogens
  • Arsenic
  • Nitrosamines
  • Benzene
  • Vinyl Chloride
  • Tar
Estimated Death & Disease from ETS

<table>
<thead>
<tr>
<th></th>
<th>Adults</th>
<th>U.S.</th>
<th>Minnesota</th>
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<tbody>
<tr>
<td>Lung CA</td>
<td>3,000 deaths</td>
<td></td>
<td>60 deaths</td>
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<tr>
<td>CHD</td>
<td>35,000-62,000</td>
<td></td>
<td>700-1240</td>
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<td>Children</td>
<td></td>
<td></td>
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<tr>
<td>SIDS</td>
<td>1,900-2,700</td>
<td>30-50 deaths</td>
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<td>Otitis Media</td>
<td>0.7-1.6 million</td>
<td>14,00-32,000</td>
<td></td>
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<tr>
<td>New asthma</td>
<td>8,000-26,000 cases</td>
<td>160-520 cases</td>
<td></td>
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<tr>
<td>↑ asthma</td>
<td>0.4-1.0 million</td>
<td>8,000-20,000</td>
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Which emits more particulate matter into the air in 30 minutes, a 2L diesel engine or 3 smoldering cigarettes?
Particulate Matter From Cigarettes vs. Diesel Car Exhaust

10-15 x ↑ mean particulate matter (PM) cigarettes vs. diesel exhaust

Invernizzi G. Tob Control 13:219, 2004
Secondhand Smoke Inhalation Study in Rats

- 21 day exposure to mainstream or sidestream smoke
- Rats resisted daily loading into exposure tubes
- Sidestream smoke exposure more toxic
- More rats in sidestream died spontaneously
- Squamous cell metaplasia in ciliated epithelia
Does ETS Cause Lung CA?

• 91,540 Japanese women nonsmokers followed for 14 years
• Husbands were classified by CPD
• Lung cancer deaths determined
• Increased risk of lung cancer in wives…
  • 61% if husband smoked 1-19 cpd
  • 109% if husband smoked 20+ cpd

Lung Cancer Mortality and Smoking

- Non-smoker wives of non-smoker husbands
- Non-smoker wives of husbands with smoking habits
- Women with smoking habits

Standardized mortality rate for lung cancer/100,000

Population at enrollment

ETS and Casino Patrons

- 18 nonsmokers with no ETS exposure for several days prior to 4 hour casino visit
- Spot urine before visit and 24 hour urine after visit
- NNAL – metabolite of tobacco specific-carcinogen NNK
- ↑ urine cotinine (p<0.0001) and total NNAL (p=0.0004) from baseline

Does ETS cause CHD?

- Nurses Health Study (NHS)
- 32,046 nonsmoking women age 36-61
- Free of any CHD
- ETS at home and work was assessed
- Followed for 10 years
NHS Results

• Taking all known risk factors into account…
• “Occasional” ETS exposure: 58% increase CHD
• “Regular” ETS exposure: 91% increase CHD

NO SAFE LEVEL of environmental tobacco smoke
ETS and Coronary Circulation
Acute Effects

• Healthy smokers (n=15) and nonsmokers (n=15)
• Coronary flow velocity reserve measures by transthoracic doppler echocardiography
• Baseline and hyperemic (IV adenosine triphosphatae) phases
• 30 minute ETS exposure in hospital smoking room
• Abrupt reduction in coronary flow velocity reserve in nonsmokers

Otsuka, R. JAMA 286:436-441, 2001
ETS and Coronary Heart Disease

• 4729 men age 40-59 followed for 20 years
• Baseline tobacco use status and serum cotinine
• Nonsmokers classified as light ETS exposure (≤0.7 ng/ml) or heavy ETS exposure (0.8-14.0 ng/ml)
• ↑hazard ratios for heavy ETS exposure especially in first (3.73; CI 1.32-10.58) and second (1.95; CI 1.09-3.48) 5 year follow-up
• Risk of CHD among heavy ETS exposure similar to light smokers (1-9 cpd)

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Does ETS exposure cause lung damage?

• 301 nonsmokers exposed to ETS at home/work
  • Comparing groups exposed to “none” and “a lot”
    • FEV-1 declined 13.2%
    • FVC declined 15.5%

• Alveoli damage
  • Alveoli rupture detectable in 57% of smokers and 33% of nonsmokers with heavy SHS exposure but 4% of nonsmokers with less SHS exposure
FIGURE 1. The stain adhering to the airplane skin behind the outflow valve of a DC-9 is tobacco smoke condensate, “tar,” which can cause a malfunction or even failure of the pressurization system.
Airport smoking areas affect nearby sites

- Air monitors in smoking and adjacent nonsmoking areas at airports in Denver, Atlanta, Las Vegas, Salt Lake City and Washington measured particulate pollution for 2 weeks.

- Average level in micgms/cubic meter 188.7 in smoking areas; 43.7 in adjacent areas vs. 8.0 in smoke free airports ref: MMWR Nov. 20, 2012
SHS exposure in open settings

• When smokers were present, SHS levels were increased in outdoor areas and adjacent smoke-free indoor areas

• Ref: Sureda X et al; Environ health Perspect. 2013, May 7
Third-hand smoke (THS)

• THS is the residual tobacco smoke that remains after a cigarette is extinguished. It can react with indoor nitrous acid to produce a carcinogen.

• It may collect on clothing, furniture or rugs.

• Need for more scientific understanding of the potential dangers of THS
Residential THS exposure

• --THS accumulate in smoker’s homes and persists when smokers move out even after homes remain vacant for 2 months are cleaned and prepared for new residents.

• --Non smokers living in former smoker homes are exposed to THS in dust and on surfaces.

• Ref. (Matt Ge et al; Tob Control, 2011 Jan;20(1))
“Passive Vaping”

- E-cigarette use is “booming”
  - 7% Of US adults in 2012
- Is there danger from “passive vaping”?
Passive vaping

• E-cigarettes – no sidestream smoke
• Exposure to exhaled aerosol smoke
• Low level of formaldehyde, acetaldehyde, isoprene, acetic acid, acetone, propylene glycol and diacetin (Schripp)
  • Ref: Schripp et al; Indoor air 2013;23;25-31
Impact of Smoke-Free Ordinances
...probably the single most important challenge we currently face.

This will have a very direct and major impact on consumption -- an impact which will be as bad as, or worse than, excise tax increases.

We must find stronger arguments to support our position on ETS. We have made this a principal thrust of FM USA's corporate affairs activities. We have formed a task force headed by Nelson Beane, Senior Vice President of Business Development, to develop cogent, effective arguments on the issue. Some will come out of the scientific literature, because many studies do not support the claim that ETS is harmful to the non-smoker.
“We could never win at the local level.”
Victor Crawford, former Tobacco Institute lobbyist

Economic impact of smoke-free policy in NYC: 1 year later

- Employment in bars/restaurants at highest level in over 10 years
- Tax receipts in restaurants/bars up 8.7%
- Bar licenses up by 234 over prior year
- Air quality improved--cotinine down 85%
- 69% of NYC voters approve of the law

*From NYC Department of Health and Mental Hygiene, press release 3/30/04*
Lexington, Kentucky – July 1, 2003

• Urban County Council by vote 11-3 made most public places smoke-free as of Sept. 2003

• “In that single instance, the Council may have improved the health of Lexington more than any action the Board of Health could have done.” – Health Commissioner, John Poundstone, M.D.

• ↓ Smoking prevalence in Fayette County- 27.6% in 2001 → 17.5% in 2005
Smoke-Free Ordinances and Heart Attacks

• Hospital admissions ↓ for AMI

  • Helena, MT: 40 → 16 / month (Sargent, RP. BMJ 328:977, 2004)

  • Pueblo, CO: 257 → 187 / year (Bartecchi, C. Circulation 114:1490, 2006)

  • Piedmont Region, Italy: 11% in one year (Barone-Adesi, F. Eur Heart J 27:2468, 2006)

  • Bowling Green & Kent, OH (Khuder, SA. Prev Med 45:3, 2007)
    • 47% decrease CHD 3 years after ordinance
“The Debate is Over”
The Health Consequences of Involuntary Exposure to Tobacco Smoke

Surgeon General Richard H. Carmona
June 27, 2006
U.S. Surgeon General Report 2006
6 Key Findings


2. Secondhand smoke causes disease and premature death in children and adults

3. ↑ risk of SIDS, acute respiratory infections, ear infections and more severe asthma in exposed children

www.surgeongeneral.gov/library/secondhandsmoke
4. Immediate adverse effects on C.V. system in exposed adults and causes heart disease and lung cancer

5. No risk-free level of exposure

6. Eliminating smoking indoors protects non-smokers but ventilation and/or separation do not.

www.surgeongeneral.gov/library/secondhandsmoke
2006 U.S. Surgeon General Report
Cigarette Company Response

Philip Morris- “We are studying the report.”

R.J. Reynolds- “…..does not change our views about secondhand smoke.”

“There are still legitimate scientific questions concerning the reported risks of secondhand smoke.”

“People who don’t want to work around it don’t have to work at that establishment.”