

Is that Breath of Fresh Air Really Fresh? Do air fresheners help?

Stanley Fineman, MD, MBA

President-Elect, ACAAI

Associate Clinical Professor

Dept Pediatrics Emory Univerisity School of Medicine

Atlanta Allergy & Asthma Clinic

Disclosures

- President-Elect, ACAA
- Speakers bureau:
 - Astra-Zeneca
 - Merck
 - Genentech/Novartis

Learning Objectives

At the conclusion of this session, participants should be able to:

- List the health effects of indoor air pollution
- Explain the effect of VOC on asthma
- Discuss the impact of air fresheners and fragrances on respiratory health

Patient Mary F

Mary F is a 46 yo female

Chief Complaint: Allergies, current treatment not working.

Hx: AF has had a problem with nasal drainage for the last several years. Her main symptoms include clear nasal discharge which may occur at any time, but in the last few years it has interfered with her job as a airline flight attendant. She has minimal nasal or eye pruritus.

She has tried various nasal sprays and oral antihistamines, but doesn't find these helpful.

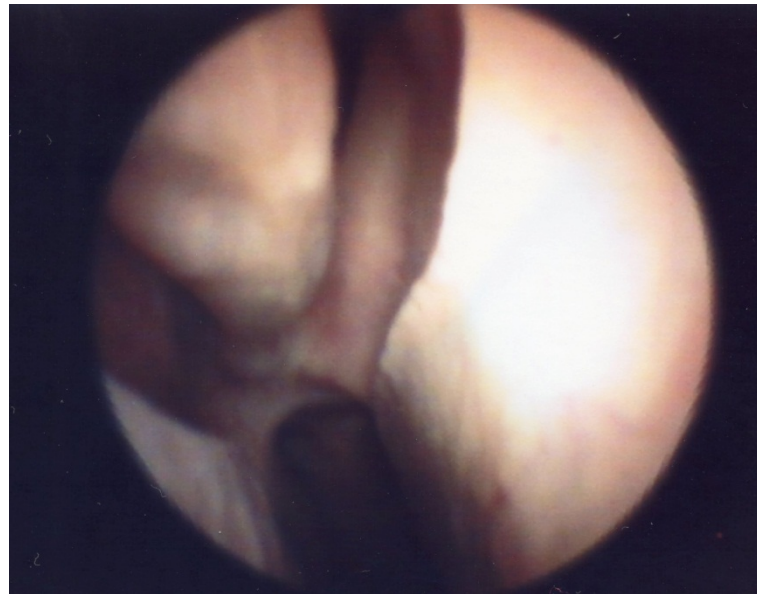
She has been seen by an ENT for the last year and has been using 'allergy drops' daily for 10 months, but still has persistent symptoms.

Patient AF, (cont'd)

- Past history: ROS non-contributory
- Family history: Her sister has had sinus trouble
- Environmental history:
 - She and her family (husband and 2 children) have lived in their 5 yo home since it was built.
 - There is a pet dog and 2 cats.
 - She uses plug-in deodorizers to help keep the home smelling good.
 - She has used the same perfume for years.

Physical Exam

- Nasal exam: erythema of turbinates, deviation of nasal septum.



Remainder of the physical WNL.

Allergy Tests

- All negative, with positive histamine control
 - Including dust mite, animal, pollens and molds

Indoor Air Pollution/Contamination

- Smoking
- Consumer products
- VOC
- Building materials

Indoor air contamination

Environmental tobacco smoke

– Increase in

- Otitis
- Upper and lower respiratory infections
- Incidence of asthma
- Likelihood of developing allergies

Gilmour, et al. Environ Health Perspect 2006;114:627-633

Eisner, et al. Thorax 2005;60:814-821

Etzel. Pediatrics 2003;112:233-239

Indoor Air Contamination (cont'd)

Environmental tobacco smoke

– Immunologic effects:

- Increases Th2 cytokines, IL-4 & IL-10
- Increase in Th2 response in mice during sensitization with OVA and exposed to ETS
- Enhancement of allergen-induced specific IgE and IgG4, increased IL-4, IL-5, and IL-13 in human nasal responses to allergen with exposure to ETS

Seymour et al. Clin Dev Immunol 2003;10:35-42

Rumold et al, J Immunol 2001;167:4765-4770

Diaz-Sanchez, J Allergy Clin Immunol 2006;118:441-446

Indoor Air Contamination (cont'd)

- Volatile organic compound (VOC)
 - Organic chemicals that form a gas or vapor at room temperature, typically from a toxic chemical or solid.
 - They are called organic because they contain carbon.
 - Hydrocarbons include benzene and aromatic hydrocarbons.
 - Chemicals such as formaldehyde, toluene and limonene contain high VOC levels.
 - Can trigger eye and respiratory tract irritation, headaches, dizziness, and memory impairment

http://healthvermont.gov/enviro/indoor_air/voc.aspx

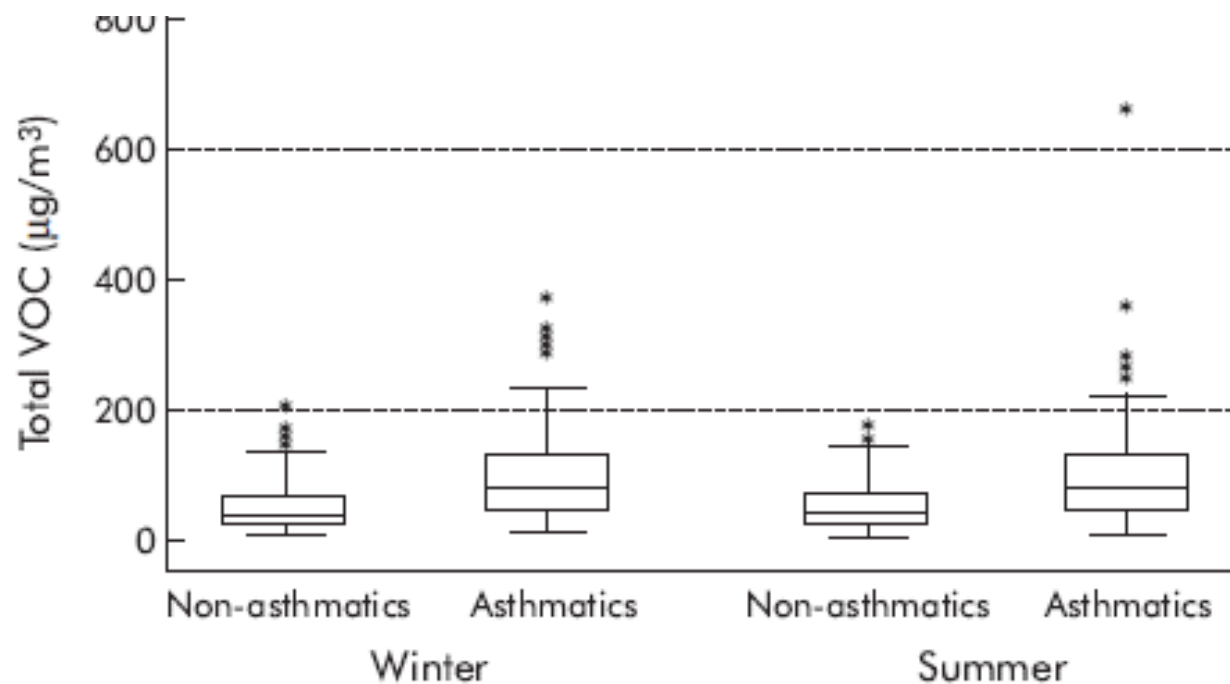
www.epa.gov/iaq/voc.html

<http://www.windows2universe.org/earth/Atmosphere/vocs.html>

Association of domestic exposure to volatile organic compounds with asthma in young children

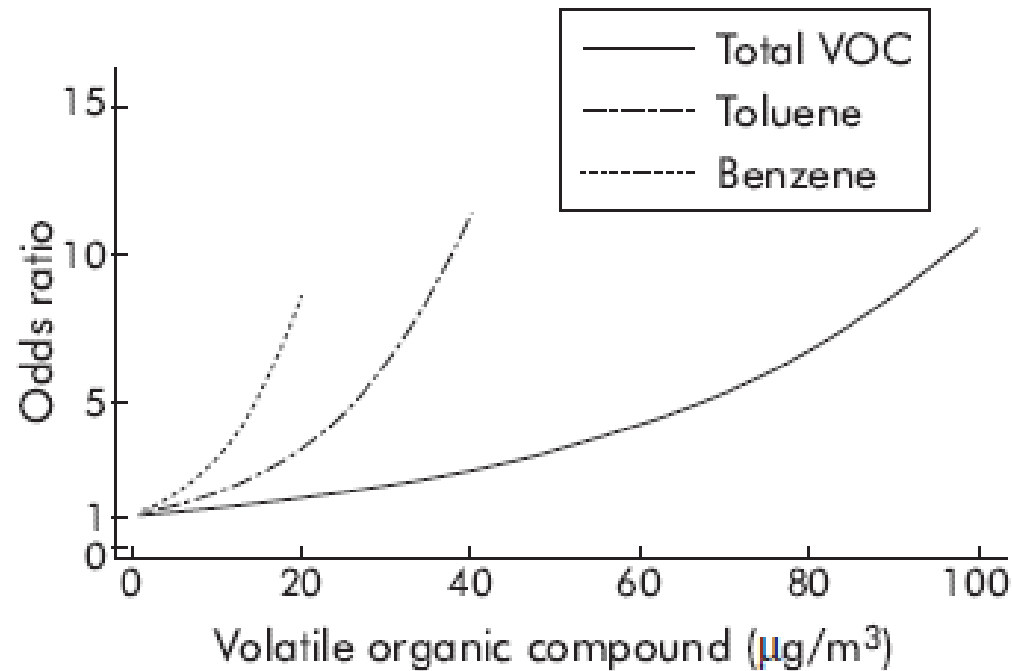
K Rumchev, J Spickett, M Bulsara, M Phillips, S Stick

Thorax 2004;59:746-751. doi: 10.1136/thx.2003.013680



Seasonal differences in exposure levels to VOC

Thorax 2004;59:746-751



Odds ratio: benzene = 2.92, ethylbenzene = 2.54, toluene = 1.84

Conclusions:

Even exposure at levels below currently accepted recommendations increase risk of asthma in children.

Indoor Air Contamination

Asthmatic symptoms and VOC, formaldehyde & CO₂

- Swedish study investigating asthma symptoms with building characteristics and indoor conc of VOC
- Found that dwellings with reduced outdoor air supply had:
 - Increased formaldehyde concentration
 - >100 microgm/m³ in one building
 - Increased CO₂
 - >1000ppm in 26% of dwellings

Indoor Air Contamination

Asthmatic symptoms and VOC, formaldehyde & CO2

- Results:
 - Significant relationship between nocturnal breathlessness and presence of:
 - Wall to wall carpets
 - Indoor CO2 concentration
 - Formaldehyde concentration
 - Other VOCs, particularly terpene
- Conclusions:
 - There is a need to increase outdoor air supply
 - Need to reduce building materials with VOC

History of Air Fresheners

- 1948, 1st air freshener technology developed for dispensing insecticides into pressurize spray using CFC propellant
- 1950s industry used this technology to dispense fragrance chemicals, particularly esters, polymers and aldehydes to counteract odors.
- 1970s shift from CFC to scented candles, reed diffusers, potpourri, and heat release products

Why do consumers like Air Fresheners?

- There has been a shift among home fragrance consumers
 - Pleasant smelling homes are not just for holidays
 - People expect their home to smell great all year
 - Home Fragrance products are considered everyday necessities for many
- Women 25-34 are prime target market
 - Particularly working women, single moms & teen dominated homes
 - They want fresh smelling home with less time to clean.
- A key trend is to incorporate aromatherapy fragrances into products
 - Goal is to market their health and mood-boosting benefits.

Global Cosmetic Industry, 12/07

<http://etherea-aromatics.com/aboutfi.aspx>

Air Freshener Facts

- Scent has the longest memory and is the most powerful emotional motivator
- 80% of Americans purchased some type of air care product in the last year
- In 2006 the US air freshener market was \$979 mill, an increase of 5.7% from 2005.
- Globally the market for Home Air Fresheners was \$5.1 Bil in 2007 and is forecast to grow by 3% annually.
- US candle sales \$2.2 bill in 2006, expected to grow by 2-3% annually.

Star Brite Illumination Marketing Report, 12/06
Global Cosmetic Industry, 12/1/06

Air Freshener Market

- Manufacturers taking advantage of aromatherapy health claims
 - Although there is no required scientific testing
- Marketing is directed at improving Lifestyle
 - Aromatic infusions
 - Aromatherapy
- Air Freshener market estimated to reach \$8.3 Billion in global sales by 2015
 - growth driven by consumer desire to use decorative fragrance products such as candles as well as health and mood boosting aromatherapy fragrances within the home.

Air Freshener Ingredients

- Ingredients
 - Formaldehyde
 - Petroleum distillates, benzene, styrene
 - Terpenes, such as limonene
 - Aldehydes, ketones, esters and alcohols
 - Phosphates, bleach and ammonia
- Plug-in deodorizer found to have more than 20 different VOC with more than 1/3 classified as toxic or hazardous
- 2008 report found that all products tested gave off chemicals considered toxic or hazardous under federal laws.

Air Fresheners – Phthalates

- In 2007 a National Resources Defense Council (NRDC) study found that 12 of 14 air fresheners from Walgreens had phthalates.
- Even air fresheners called “organic” or “green” and some labeled “all-natural” or “unscented” also emitted hazardous chemicals, particularly phthalates.
- Phthalates have been reported to cause hormone abnormalities, childhood developmental problems and cancer.
- Walgreens removed these products from their stores shortly after this report was published.
- In 2008 US passed laws to prevent phthalates in children’s toys.
- SC Johnson has voluntarily reported product ingredients and will be phasing out phthalates by 2012.

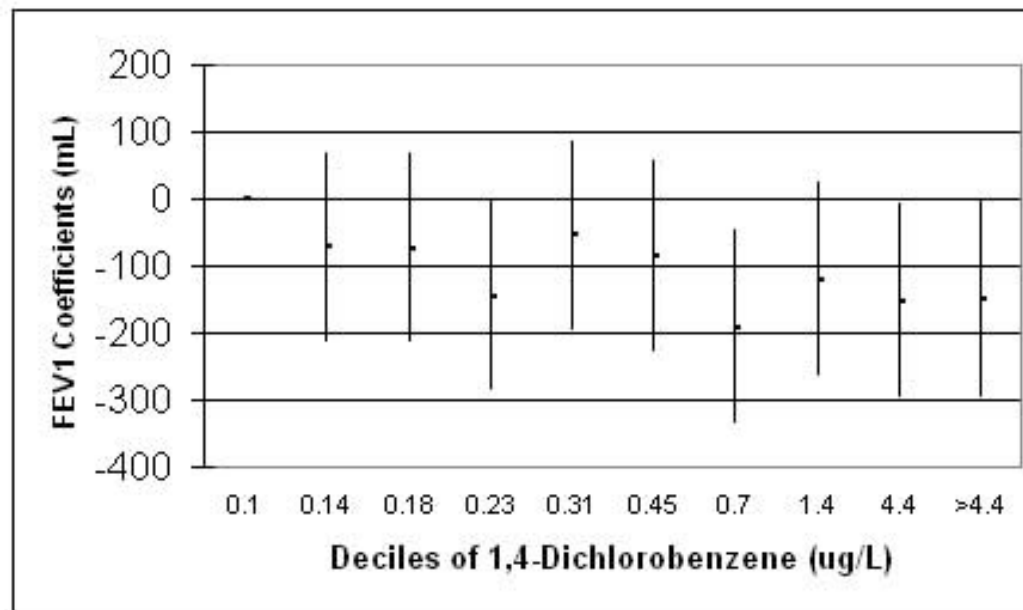
<http://www.nrdc.org/health/home/airfresheners/fairfresheners.pdf>

<http://www.scjohnson.com/en/press-room/press-releases/03-12-2009/SC-Johnson-Leads-on-Product-Ingredient-Responsibility-and-Transparency.aspx>

Indoor Air Contamination

Chemicals in many air fresheners may reduce lung function

- NIH study of 953 adults found:
- 96% of blood samples had detectable levels of 1,4 dichlorobenzene (1,4 DCB)
- 1,4 DCB associated with reduced FEV1



<http://www.niehs.nih.gov/news/releases/2006/airfreshener.cfm>

Prevalence of Fragrance Sensitivity in the American Population

- Data from 2 geographically weighted random samples during 2002-2003 and 2005-2006 (n=1057 and n=1058)

Percentages of Respondents Who Report Health Problems from Air Fresheners or Deodorizers

Respondents	1st Survey	2nd Survey	Average
General population	17.5	20.5	19.0
Asthmatics	29.7	37.2	33.5
Chemically sensitive	55.6	60.2	57.9
MCS	57.7	53.7	55.7

Prevalence of Fragrance Sensitivity in the American Population

Percentages of Respondents Who Find Scented Products on Others Irritating

Respondents	1st Survey	2nd Survey	Average
General population	31.1	29.9	30.5
Asthmatics	37.2	37.9	37.5
Chemically sensitive	74.4	60.2	67.3
MCS	69.2	48.7	59.0

Caress S, Steinemann A. J Environ health 2009;71:46-50.

Prevalence of Fragrance Sensitivity in the American Population

Conclusions:

- 20% of general population and 34% of asthmatics reported health problems from air fresheners.
- 30% of general population and 38% of asthmatics reported problems when exposed to other's scented products.
- 58% of people with chemical sensitivity report health problems from air fresheners.

Scented Candles

- Candle sales approaching \$2 billion/year
- Candles produce:
 - Soot
 - Lead
 - Organic compounds
 - Dibutyl phthalate, diethyl phthalate, toluene & styrene
 - VOC
 - Benzene, toluene, naphthalene, acetaldehyde, ethanol, methyl ethyl ketone

Krause, JD. Univ So Fla, 1999

<http://www.lead.org.au/lanv7n4/L74-9.html>

Scented Candles (cont'd)

- Soot in candles, particularly scented candles
 - Found semivolatile organic compounds:
 - Paraffins
 - Dibutyl phthalate (33/53 samples)
 - Diethyl phthalate (8/53)
 - Bis (2-ethylhexyl) phthalate (7/53)
 - Toluene (7/53)
 - Styrene (3/53)
 - 63% of scented candles produced soot
 - 45% of non-scented candles produced soot

Krause, JD. Univ So Fla, 1999

<http://www.lead.org.au/lanv7n4/L74-9.html>

Scented Candles (cont'd)

- “The toxicity characteristics of candle emissions match those of diesel emissions”
- “Their size, $< 1 \mu\text{m}$, allows penetration into lungs.”

Summary:

“Use of scented candles may contribute significant quantities of pollutants to the indoor environment, especially soot, benzene, & lead.”

Krause, JD. *Characterization of scented candle emissions and associated public health risks*. Univ So Fla, 1999
<http://www.lead.org.au/lanv7n4/L74-9.html>

Other indoor exposures

- Gas and Wood Stoves
 - NO₂ and other combustible products
 - Data is not sufficient to implicate gas or wood stove use as an exacerbating factor for adult asthma.
 - There is some evidence that exposure to NO₂ and other combustible products of gas or wood stoves may be deleterious to children with asthma.

Eisner, et al Occup Environ Med 2003;60:759-764

Blanc et al. J Occup Environ Med 2005;47:362-372

Belanger et al Immunol Allergy Clin North Am 2008;28:507-519

Other indoor exposures

- Building materials
 - Can emit volatile compounds, particularly formaldehyde
 - Plywood
 - Particle board
 - Carpeting
 - Paints

What do we recommend for Mary F?

- Discontinue 'allergy drops'
- Discontinue air fresheners at home
- Discontinue perfume
- Recommend nasal saline
- Consider another trial of topical nasal sprays
 - Corticosteroid
 - Antihistamine
 - Anticholinergic

How can we help our patients?

- Ask about fragrance exposure.
- Counsel patients about problems of fragrances.
- Recommend treatment strategies for patients with fragrance sensitivities.
- Is that Breath of Fresh Air Really Fresh?
- Do air fresheners help?