

Asthmatics and Fragrances: Lessons from the Lab and Life

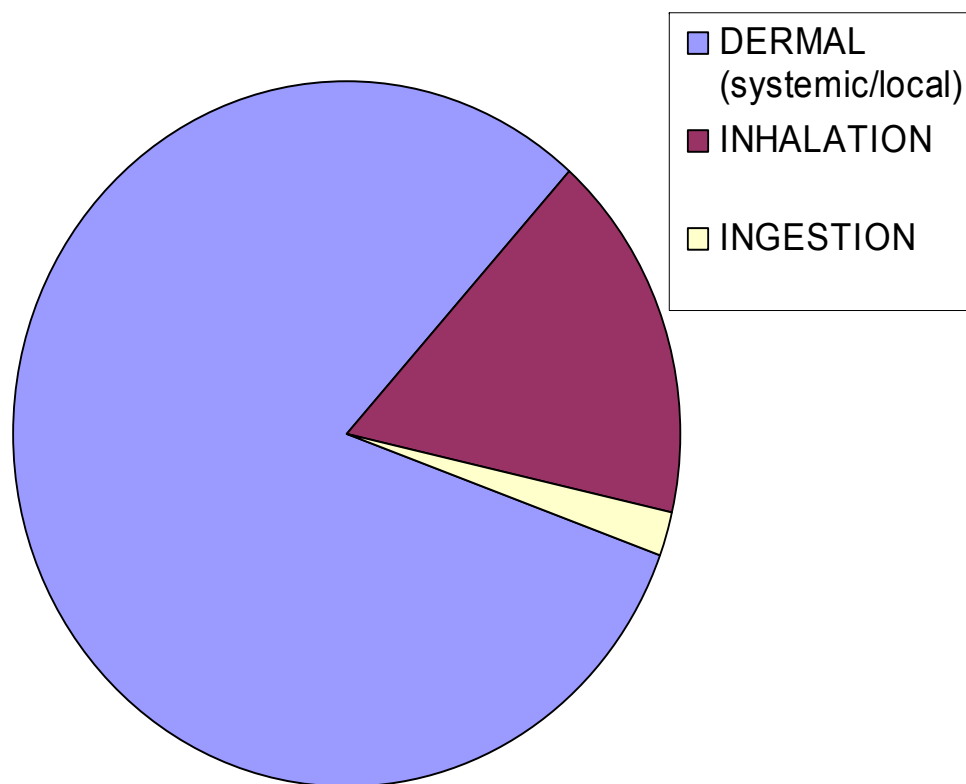


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The Air Care Challenge

Fragrance: Routes of Exposure



- Inhalation is a minor route of exposure, yet generates significant concern...why?

- Lack of control over inhalation exposures

- Inhalation exposure involves both assumed and *acquired risk*

Dermal Fragrance Allergy: Prevalence & Trends (1986-1996)

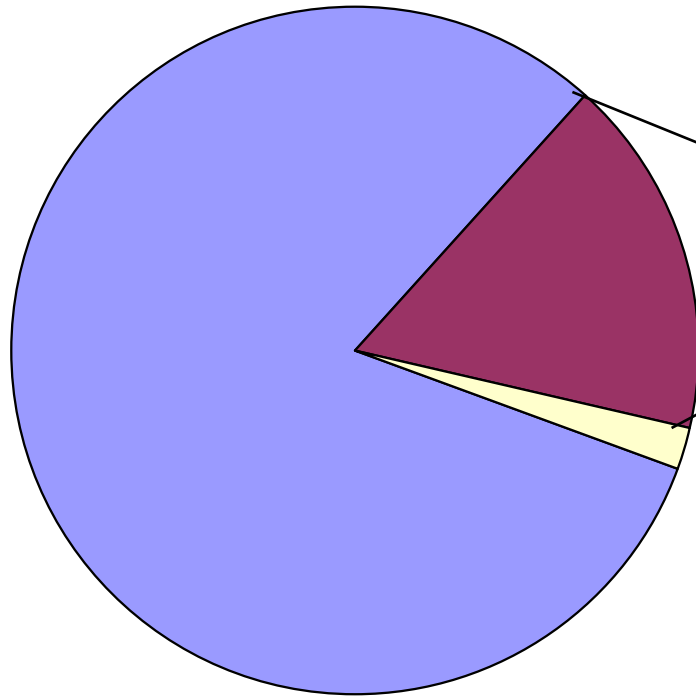
Country	% FM Pos.	% Increase
Hong Kong	19.5	#
Saudi Arabia	15	#
Singapore	13.3	58
USA	11.7	67
Slovenia	11.3	92
Hungary	10.1	#
UK	8	0
Denmark	7.8	140
India	7	#

Activists often point toward these statistics as evidence of a growing public health problem from fragrance exposure

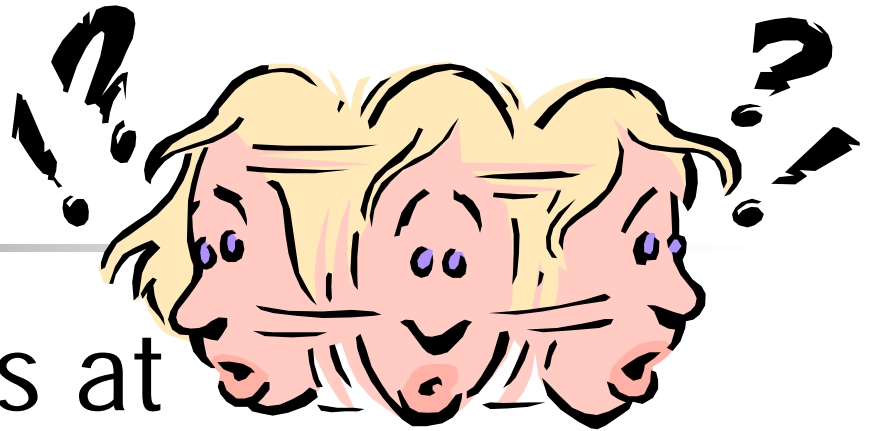
Does increase result from enhanced awareness & testing?

What implications, if any, does dermal allergy have for inhalation risk?

Fragrance: Potential Mechanisms of Adverse Effects From Inhalation



- Respiratory allergen/asthmogen
- UR-irritant trigger for bronchospasm
- Conditioned or psychogenic response to odor



Are asthmatics at
greater risk of
adverse effects
from fragrance?



According to some
credible sources....



“asthma attacks may be triggered or made worse by one or more non-allergic triggers including materials in the air you breathe, such as...room deodorizers, cleaning products, perfumes”

--Asthma & Allergy Foundation of America

“asthma can be worsened by strong odors from painting, cooking or scented products”

-- NHLBI, National Institutes of Health

“perfume, room deodorizers, cleaning chemicals paint and talcum powder are triggers that must be avoided or kept to very low levels in order to control asthmatic symptoms

---American Lung Association



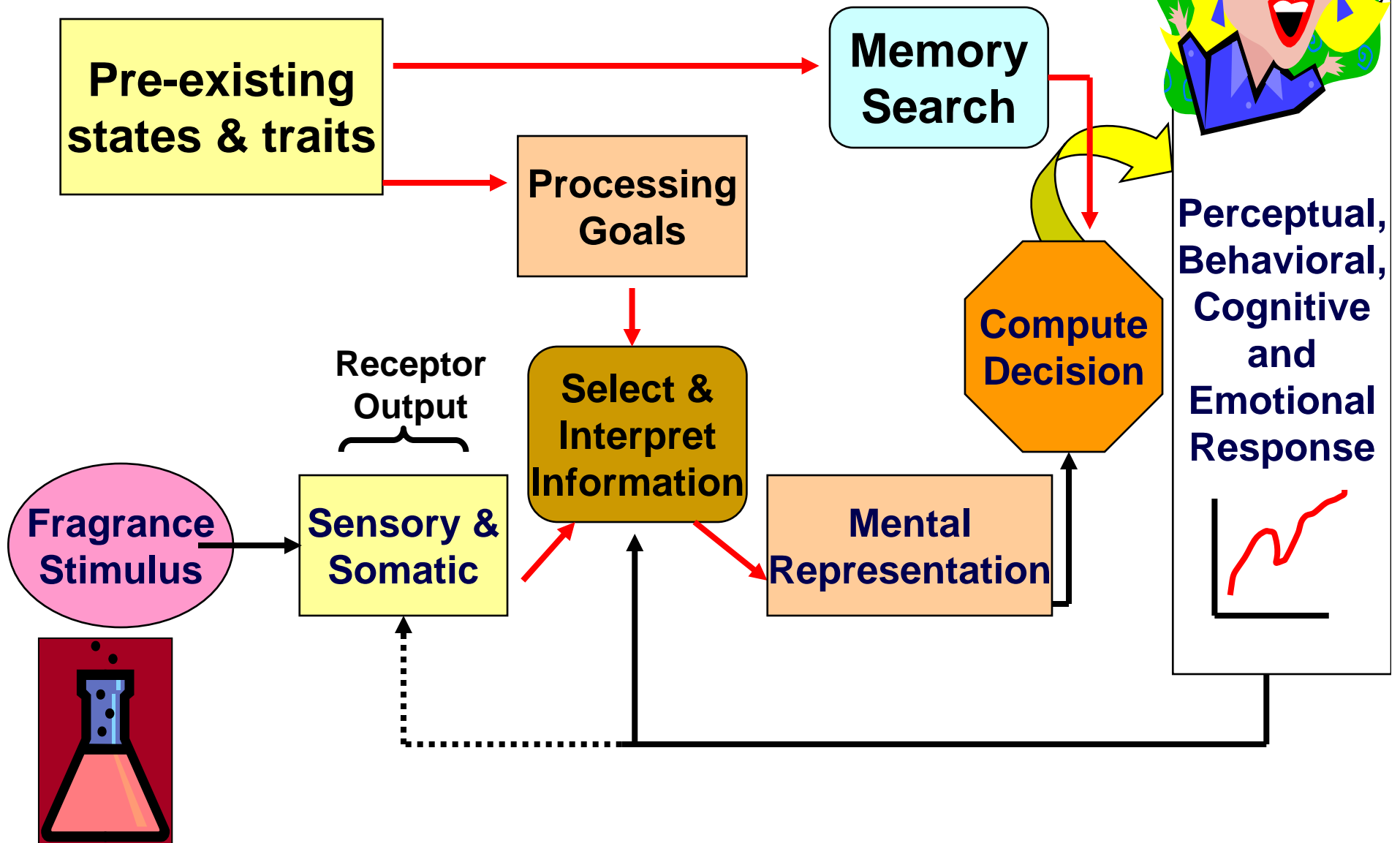
Fragrance Effects

- Asthmatics frequently report adverse symptoms in response to fragrance exposure– Why?
 - Does exposure to fragranced products elicit objective physiological changes in asthmatics?

OR

- Do these individuals attend more to somatic states and more readily report any fragrance-associated sensations?

Cognitive-Perceptual Model of Symptom Perception





Self-Reported Symptom Triggers in Asthmatics & Rhinitics

Factor	Asthmatics	Rhinitics
Tobacco Smoke	72	41
Cold	71	12
Perfume	69	36
Damp	68	18
Carpets	44	28
Printing Ink	38	25
Cooking Fumes	38	7
Fir Trees	15	22

Eriksson et al, *Allergy*, 1987

Self-Reported Symptom Triggers in MCS/IEI Patients & Controls

<u>MCS/IEI</u>	<u>%</u>	<u>HEALTHY CONTROLS</u>	<u>%</u>
<u>Perfumes/Colognes</u>	<u>83</u>	Old Rugs	44
Spray Paint	78	Ammonia	39
<u>Perfumes in Cosmetics</u>	<u>74</u>	Oven Cleaner	39
Cigarette Smoke	74	<u>Perfumes/Colognes</u>	<u>33</u>
Gasoline	70	<u>Perfumes in Cosmetics</u>	<u>33</u>
Garage Fumes	70	Dyes in Cosmetics	33
Diesel Exhaust	70	Varnish	33
Hair Spray	70	Paint Stripper	33
Restroom Deodorizers	61	Incense	33
Air Fresheners	61	Hair Spray	28

Challenge Studies: Fragrance & Asthma

- From 1979-present, 6 published studies have evaluated asthmatic responses to fragrances and/or fragranced products

Study	Lung Function	Nasal Irrit or Cong	Ocular Irrit	Sx
Schleuter (1979)	▼	▲	▲	
Shim et al (1986)	▼			▲
Milqvist (1996)	▼			
Kumar et al (1995)	▼			▲
Milqvist et al (1999)	▼			
Opiekun et al (2003)	—	—	—	▲



Effect of Fragrance Exposure on Asthmatic Symptoms

- 3 Groups: healthy controls, mild & moderate asthmatics
- Upper Airway & Ocular Irritation
 - Self-reported symptoms
 - Eye redness or irritation (ocular hyperemia)
 - Nasal patency
- Lower Airway
 - Pulmonary function assessment



Experimental Protocol

- Two testing days – control (water) and fragrance
- Fragranced product and/or water aerosolized into chamber via spray can to simulate product usage
- Participants remained in chamber for 30-min w/assessments of symptoms at 5 & 30-min post-exposure



Results

- No objective changes in pulmonary function, nasal congestion or ocular irritation were observed following exposure among any group, however...
- Moderate asthmatics reported significantly more nasal congestion following exposure to fragranced product than did healthy controls.
- Self-reporting of greater congestion among asthmatics may reflect bias toward describing adverse health symptoms upon encountering novel fragrance odors



Asthma, Ammonia & Irritation

- Do asthmatics have heightened sensitivity to irritants?
- Do irritants trigger changes in pulmonary function?
 - 25 healthy and 10 mild-moderate asthmatic adults (age 18-55) were evaluated for their ability to detect odor and irritancy of ammonia
 - Lateralization Thresholds
 - Ocular
 - Nasal
 - Odor Detection Thresholds
 - Spirometric Evaluation of Pulmonary Function

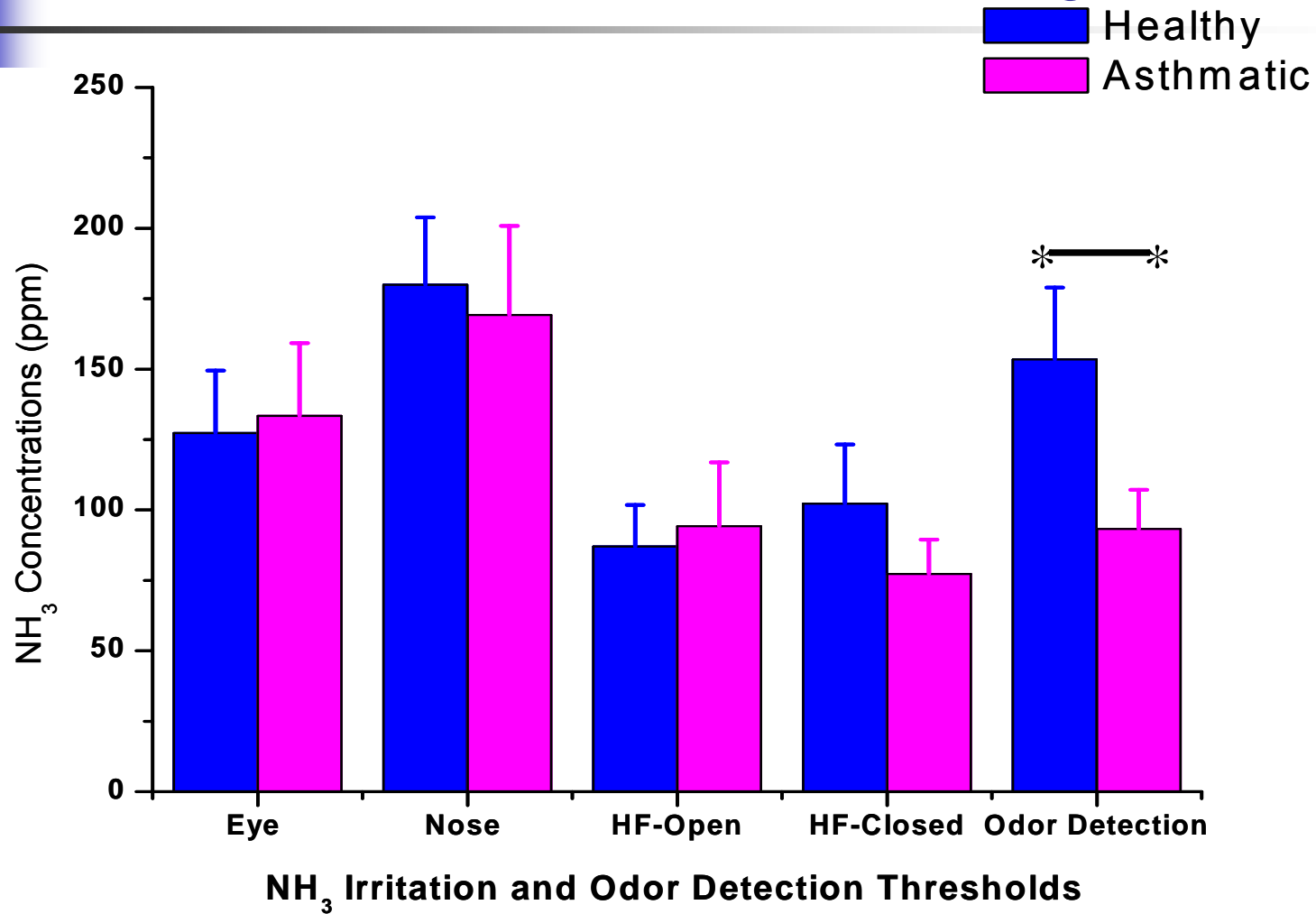
Lateralization Thresholds

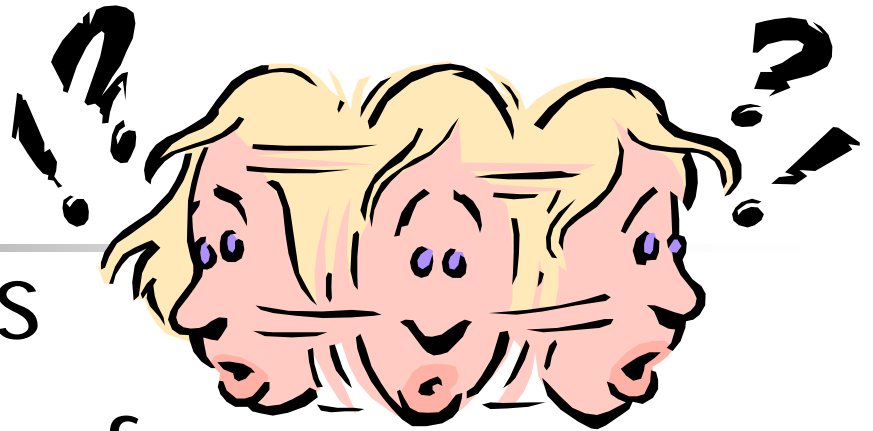


- The lowest concentration that can be localized to the stimulated nostril or eye
- Considered a measure of trigeminal activation (irritation)



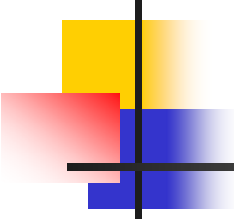
Asthmatics vs. Healthy Controls: Odor and Irritant Sensitivity





Are asthmatics
at greater risk of
adverse effects
from fragranced
products?

- Yes, if exposed to high irritant concentrations
- Possibly, if some materials are found to be respiratory allergens
- Perhaps most importantly, however, they believe they are.....



Factors Influencing Self-Reported Irritation & Symptoms From Fragrance Exposure

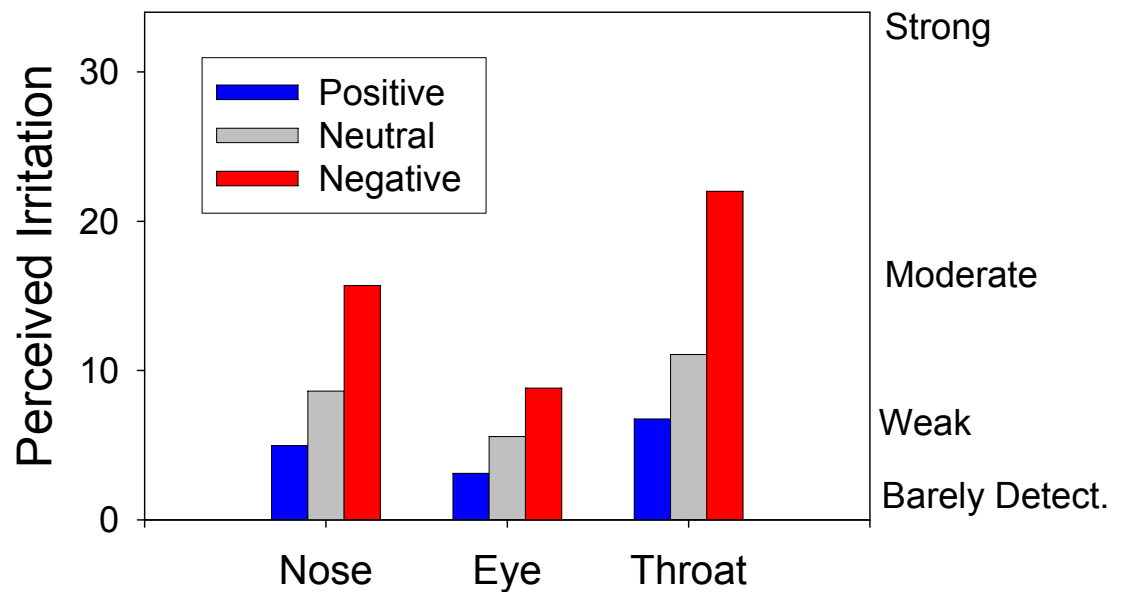
- Potential for chemical to elicit odor and irritancy
- Ability to detect odor at concentrations below irritant threshold
- Individual exposure history (concentration, frequency, duration, nature of context)
- Expectations, beliefs, individual traits



How does information
and labeling
affect adverse
responses to
fragrances?

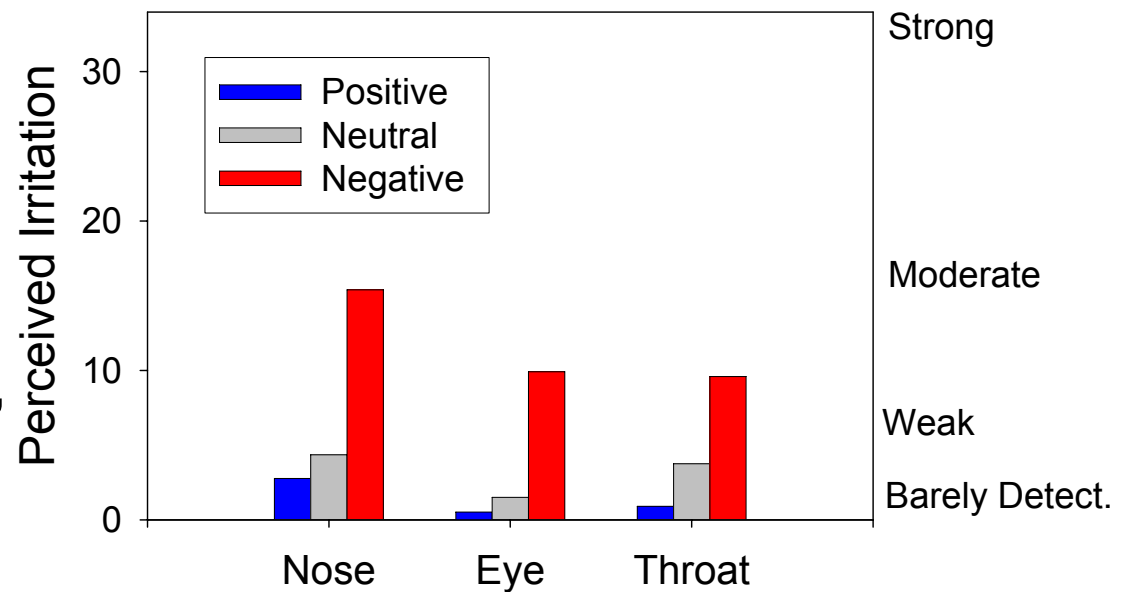
Labeling Effects on Perceived Irritancy of Butanol

- 20- min chamber exposure to n-butanol (50 ppm)
- 3 groups; n=25/gp
- Groups given positive, neutral or negative information about odorant source



Labeling Effects on Perceived Irritancy of Methyl Salicylate

- 20- min chamber exposure to methyl salicylate (15 ppm)
- 3 groups; n=25/gp
- Groups given positive, neutral or negative information about odorant source



Focus Group Asthmatics & Fragranced Products

- 24 severe asthmatics
 - Mixed gender & race, 12 low & 12 hi SES
 - Medication use, > 1 x day; nighttime symptoms
 - Adverse response to odor or fragrance

Questions/discussion targeted fragrances and fragranced product use and tolerance





Fragranced Product Triggers

Low SES

- Bleach
- Colognes/Perfumes
- Hairspray
- Bathroom/kitchen cleaners
- Carpet Cleaners

High SES

- Air fresheners
- *Strong* perfumes
- Bathroom/kitchen cleaners
- Carpet cleaners
- Fabric softeners



Tolerated/Liked Scents

Low SES

- Candles
- Odor neutralizers
- Mild soaps
- Apple
- Cinnamon

High SES

- Vanilla
- Cucumber
- Plumeria
- Lavender
- Rainforest
- Rain breeze



Many asthmatics endorsed the use of fragranced products

“I have to be honest. If it wasn't for my asthma I like fragrances. They're nice. They make you feel good. Okay? There's nothing wrong with that. I think it's wonderful. It kills me that I can't have it.”

“When I go to buy air fresheners, I spray it in the store so I can smell it and see if I get some type of reaction. As long as the smell is mild and appealing to me and I don't get sick, I'll buy it”.



Conclusions

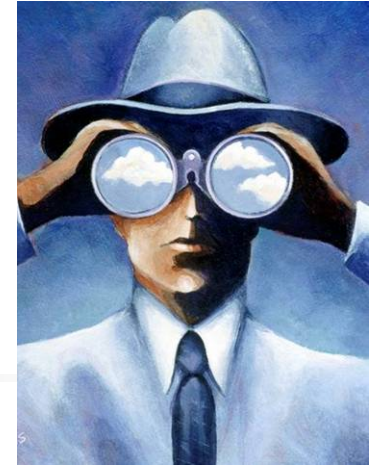
- Little evidence to suggest asthmatics exhibit objective health effects from exposure to fragrances/fragranced products
 - Adverse responses of asthmatics to fragrances that do occur may be triggered by high exposure to irritants (e.g., ethanol vehicle) although some fragrance materials may be respiratory allergens
 - Adverse reactions of many asthmatics may be learned responses or products of expectation and anxiety
 - Asthmatics do not uniformly shun fragranced products, but they do not tolerate strong scents



Conclusions

- Awareness of risk (via media, internet, physicians) can exacerbate symptom reporting of 'true' symptoms
- Perception of risk may promote non-adaptive behaviors
- Adverse effects of fragrances can arise from interactions between physiological responses and psychological interpretations of those effects

A View to the Future



- Industry is currently vulnerable with regard to sound scientific data on inhalation response to fragrances
- Available data are inadequate to determine 'asthmogenic' potential for selected fragrance materials
- Inhalation is a minor exposure route for systemic fragrance effects yet generates disproportional concern over level of 'assumed risk'
 - Thus, risk communication strategies will be a necessary component of overall plan to disseminate empirical results to a skeptical public