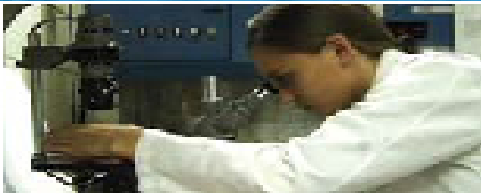
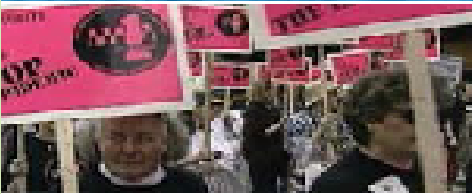




SILENT SPRING INSTITUTE



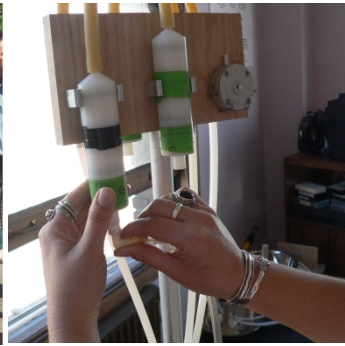
RESEARCHING THE ENVIRONMENT AND WOMEN'S HEALTH

TUR at Home: Lessons from Household Exposure Studies

Robin Dodson, Sc.D., Sarah Dunagan, M.S., Julia Brody, Ph.D.
Silent Spring Institute

TURA 20th Anniversary Symposium and Continuing Education Conference

November 4, 2009, Bedford, MA



Research on the environment and women's health

Collaborations: Harvard, Brown, UC Berkeley, Centers for Disease Control, MBCC, Communities for a Better Environment ...

Funders: National Institutes of Health, National Science Foundation, US EPA, Avon, private donors, foundations ...

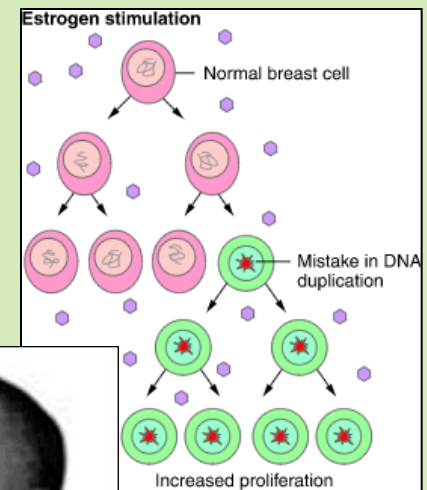
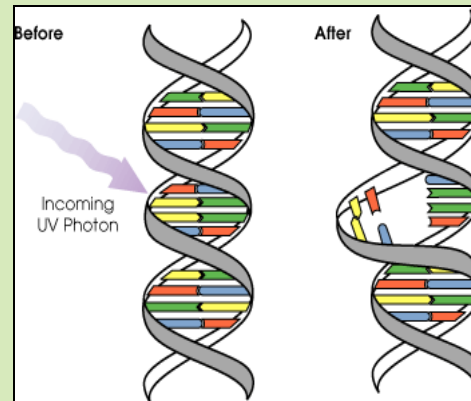
Science publications: *Cancer, Environmental Health Perspectives, Environmental Science & Technology, American Journal of Public Health . . .*

- **Why study pollution in homes?**



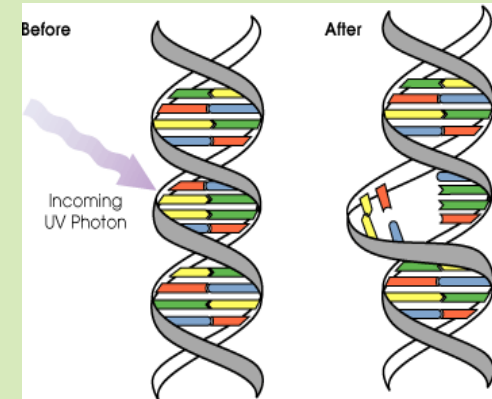
Many chemical suspects

- Carcinogens damage DNA
- Endocrine disruptors may make tumors grow
- Developmental toxicants increase susceptibility



Example Mammary Carcinogens

- ionizing radiation
- gasoline
- auto exhaust, air pollution
- paint remover, solvents
- flame retardants
- pesticides
- moldy grain
- water disinfection byproducts
- nonstick coatings



- benzene
- PAHs
- ethylene oxide

Rudel et al., 2007, Cancer



ENVIRONMENT AND BREAST CANCER: SCIENCE REVIEW

[About](#) [Browse](#) [Search](#) [Key References](#) [Abbreviations](#)

[About](#) [Browse](#) [Search](#) [Key References](#) [Abbreviations](#)

methylene chloride CAS RN 75-09-2

[Chemical Summary](#) [Exposure and Risk Assessment](#) [Cancer Studies](#)

Originating list

Carcinogenicity Potency Database, National Toxicology Program studies, IARC Monographs, Chemical Carcinogenesis Research Information System



Associated chemicals

none

Major use

Chlorinated solvent

Widespread exposure

More Likely

Human exposure summary

Widespread exposure occurs during the production and industrial use of methylene chloride and during the use of a variety of consumer products containing it. Consumer products that may contain the chemical include: fabric cleaners, furniture polish, paint strippers, wood sealant and stains, spray paints, adhesives, shoe polish and art supplies (SRD). Used until 1989 as a propellant for hair spray. Substantial losses to the environment lead to ubiquitous low-level exposures from ambient air and groundwater (IARC 1999 vol.:71 p.25, NTP 11th ROC).



Image from the National Library of Medicine

methylene chloride CAS RN 75-09-2

[Chemical Summary](#) [Exposure and Risk Assessment](#) [Cancer Studies](#)

Cancer studies: Experimental details



National Toxicology Program Technical Report 306, 1986

Link

http://ntp.niehs.nih.gov/ntp/htdocs/LT_rpts/tr306.pdf

Notes

"Clear evidence" in rats is based on the mammary tumors. Rats: 0, 1000, 2000, 4000 ppm:benign mammary tumors in female rats: 5/50, 11/50, 13/50, 22/50. In male rats, they looked at the combined benign mammary tumors and the integumentary ones, for significant increase. In Discussion, for mammary tumors they note Burek 1980 and 1984 for mammary tumors, Nitschke 1982. For "negative" they note National Coffee Association studies of 1982 and 1983 in which much lower levels were used (highest was 250 mg/kg).

<u>Route</u>	<u>Species</u>	<u>Sexes</u>	<u>Strain</u>
inhalation	Rat, mouse	M,F	F344/N rats, B6C3F mice

Doses

Rats: 0, 1000, 2000, 4000ppm, Mice: 0, 2000, 4000ppm; for 6 hrs/day, 5 days/wk for 102 weeks. 50 animals in each group. Age exposure started 8-9 weeks for rats, 7-8 weeks for mice.

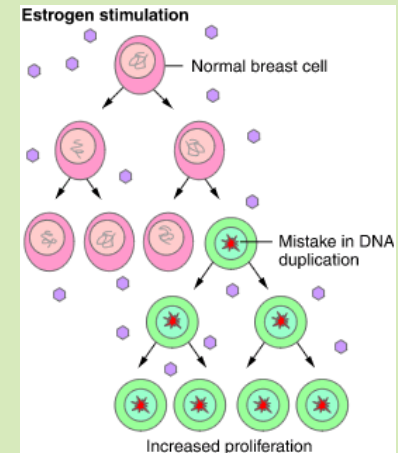
Time after cessation of dosing

1 week

Example Endocrine Disruptors

- oral contraceptives, HRT, DES
- pesticides
- food packaging
- laundry detergent
- hair spray
- fragrances

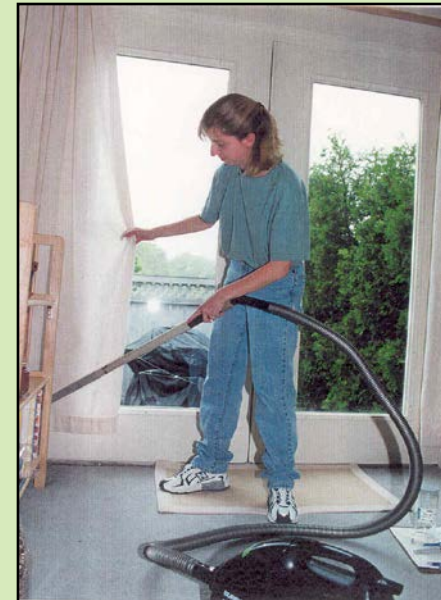
- sunscreen
- plastics
- disinfectants



- phthalates
- parabens
- bisphenol A
- PCBs

Household Exposure Study

- 170 homes
- Air, dust, urine
- 89 endocrine disruptors
- 30 measured for the first time indoors



Rudel et al. 2003 ES&T

Cape Cod, MA



Research

Phthalates, Alkylphenols, Pesticides, Polybrominated Diphenyl Ethers, and Other Endocrine-Disrupting Compounds in Indoor Air and Dust

RUTHANN A. RUDEL,*¹ DAVID E. CAMANN,¹ JOHN D. SPENGLER,² LEO R. KORN,² AND JULIA G. BRODY¹
Silent Spring Institute, 29 Crafts Street,

Introduction

Current widespread interest in a range of health effects potentially associated with endocrine-disrupting compounds (EDCs) has made exposure assessment for these compounds a priority. Studies of potential health effects associated with EDCs have been hampered by lack of information about the major sources of exposure to EDCs. Furthermore, because many EDCs act additively through a common mechanism of action or have antagonistic or other interactive effects by operating at different points in cell signaling systems,

O. Box 28510, Environmental Science and Technology School of Park Drive, Division of Biometrics, New Jersey, Liberty Plaza, 0903-2688

upting compounds es, yet little is mpled indoor air and ganic chemicals ds were detected in se are the first onments for over 30 ected at the

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Environmental Health

Research

PCB-containing wood floor finish is a likely source of elevated PCBs in residents' blood, household air and dust: a case study of exposure
 Ruthann A Rudel*¹, Liesel M Seryak² and Julia G Brody¹

Address: ¹Silent Spring Institute, 29 Crafts Street, Newton, MA 02458, USA and ²Division of Environmental Health Sciences, College of Public Health, The Ohio State University, 320 West 10th Ave., Columbus, OH 43210, USA
 Email: Ruthann A Rudel* - rudel@silentspring.org; Liesel M Seryak - seryak.2@OSU.edu; Julia G Brody - brody@silentspring.org
 * Corresponding author

Environ. Sci. Technol. 2008, 42, 8158-8164

Elevated House Dust and Serum Concentrations of PBDEs in California: Unintended Consequences of Furniture Flammability Standards?

AMI R. ZOTA,*^{1,2} RUTHANN A. RUDEL,¹ RACHEL A. MORELLO-FROSCH,³ AND JULIA GREEN BRODY¹
Silent Spring Institute, Newton, MA, Department of Environmental Health, Harvard School of Public Health, Boston, MA, and Department of Environmental Health and Management and School of Public Health, University of California, Berkeley, CA

Received June 27, 2008. Revised manuscript August 7, 2008. Accepted August 11, 2008.

Studies show higher house dust and body burden PBDE flame retardants in North America than Europe. It is known about exposure variation within North America where California's furniture flammability standard is used. We compared dust samples from 49 homes in California communities with 120 Massachusetts homes with other published studies. Dust concentrations (ng/g) in California homes of BDE-47, -99, and -103 (112-107 000), 3800 (102-170 000), and 684 (<MRL) respectively, and were 4-10 times higher than reported in North America. Maximum concentrations highest ever reported in indoor dust. We then measured whether human serum PBDE levels were also high compared to other North American regions by an 2003-2004 National Health and Nutrition Examination (NHANES), the only data set available with serum representative sample of the U.S. population (n=20). Residence was significantly associated with near higher ΣPBDE serum levels [least square geometric (LSGM) ng/g lipid, 73.0 vs 38.5 (p = 0.002)]. Elevated exposures in California may result from the state's flammability standards; our results suggest the need for research in a larger representative sample.

with Europe (3, 4). Regional variation within the U.S. may result from more stringent furniture flammability standards in California than in other states; however, this possibility has not been evaluated. Three major PBDE commercial mixtures have been commonly used in consumer products: deca-BDE, octa-BDE, and penta-BDE (5). Penta-BDE has been most often mixed into polyurethane foam (PUF) used in furniture, while octa- and deca-BDE are used in electronics and other plastic products (6). Penta-BDE is typically about 3-5% by weight in treated foam, and is easily liberated into dust because it is not chemically bound to the foam product. Penta-BDE has been used almost exclusively in the U.S (6) and mostly in furniture for sale in California in order to comply with

Pollution Comes Home and Gets Personal: Women's Experience of Household Chemical Exposure*

REBECCA GASIOR ALTMAN
Brown University
 RACHEL MORELLO-FROSCH
University of California at Berkeley
 JULIA GREEN BRODY
 RUTHANN RUDEL
Silent Spring Institute
 PHIL BROWN
 MARA AVERICK
Brown University

Journal of Health and Social Behavior 2008, Vol 49 (December): 417-435

We report on interviews conducted with participants in a novel study about envi-

Are U.S. Homes a HAVEN for TOXINS?



KELLYN BEYTS

The most comprehensive analysis to date shows that people are exposed to a wide variety of potentially toxic compounds in their homes.





Rudel et al. 2003 ES&T

- 67 EDCs
- 27 pesticides
- DDT 2/3 of homes
- Phthalates - 100% homes
- Phenols, parabens abundant
- Flame retardants higher than Europe
- All homes above guidelines
- 28 detected EDCs have no health guidelines
- Some people - very high levels

Consumer product source of PCBs

DRUDGERY. DAYS ARE OVER!

Fabuloned Floors show Dust and Dirt!



FABULON

FABULON
FLOOR FINISH

"NEW" FLOORS for OLD...

the FABULON way!

**NO MORE WAXING!
NO MORE SCRUBBING!**

Transform dull, dingy, unattractive floors into "bowling alley" floors with FABULON, the fabulous floor finish... "rwin" of a famous bowling alley finish. FABULON'S so easy to use — needs no filler or sealer — brush or roll it on in minutes! Dries so fast you can do 2 or 3 rooms, complete from start to finish, *all in one day!* Your floors will keep their "new look" too, thanks to FABULON'S hard, tough, stain-resistant film! Easy to clean with a dust mop or damp cloth. And, best of all, FABULON-ed floors never need waxing or scrubbing! Make your old floors "new" — get FABULON today!

Twin" of a famous bowling alley finish

The Weather Lox Products Co. of 415 West 16th Street, is proud to announce its appointment as authorized distributor of FABULON, the sensational "bowling-alley" finish for home floors.

More than a million homeowners today enjoy the lasting beauty and protection of no-scrubbing, no-waxing FABULON-ed floors. Fabulous FABULON—now available at these area dealers:

FREE!

Valuable DO-IT-YOUR-SELF INSTRUCTION MANUAL — "HOW TO FINISH WOOD FLOORS... OLD OR NEW;" 24 pages, illustrated; authentic information on all phases of finishing and refinishing floors; describes latest methods and materials. Usually 10c... but now free at our store.





Richmond, CA

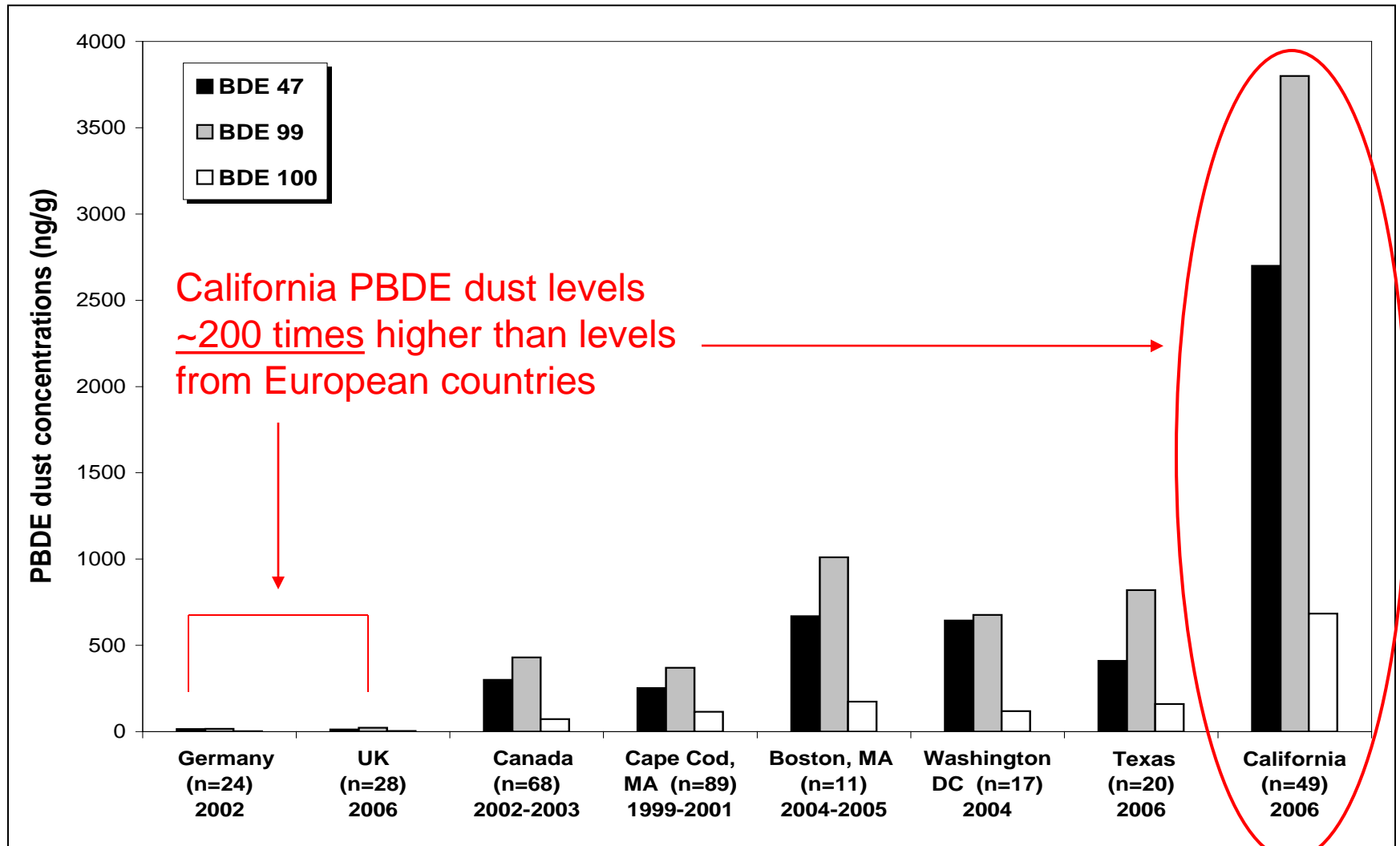


Fingerprint from heavy oil

- High vanadium and nickel outdoors and indoors

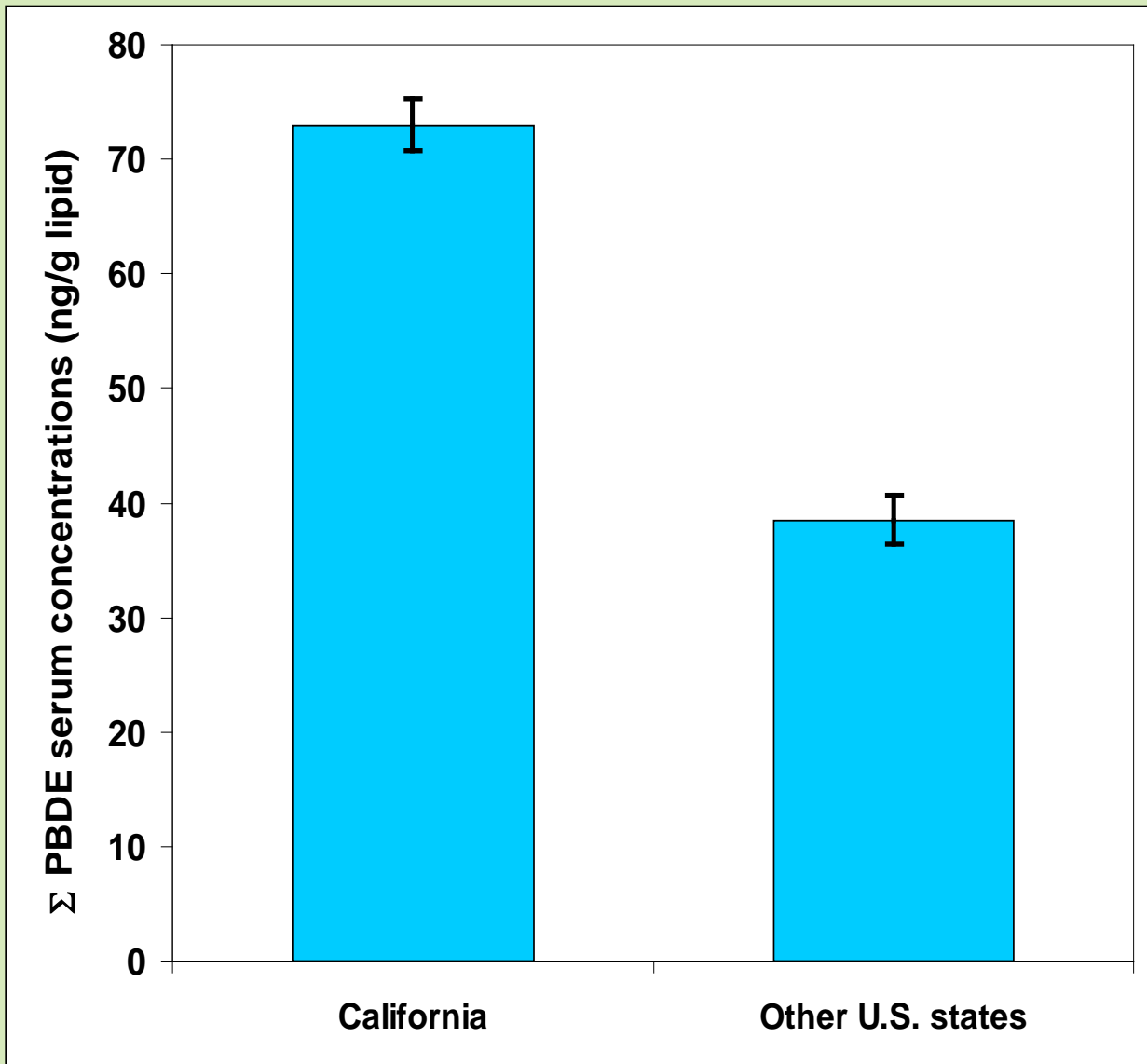


California law increases flame retardants

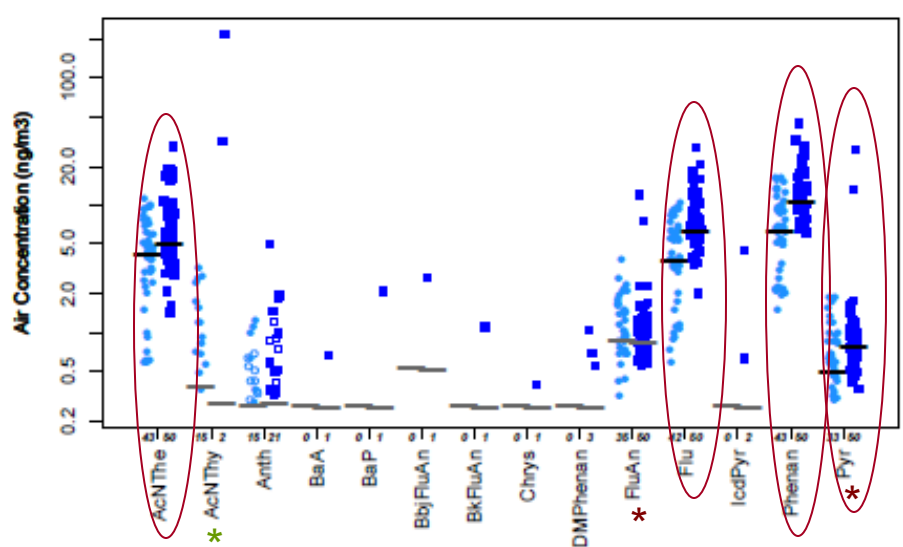
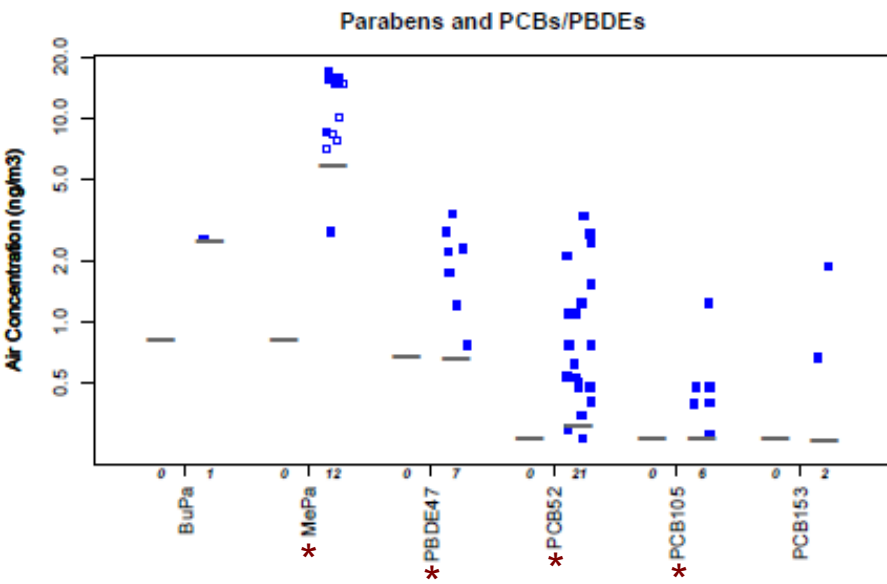
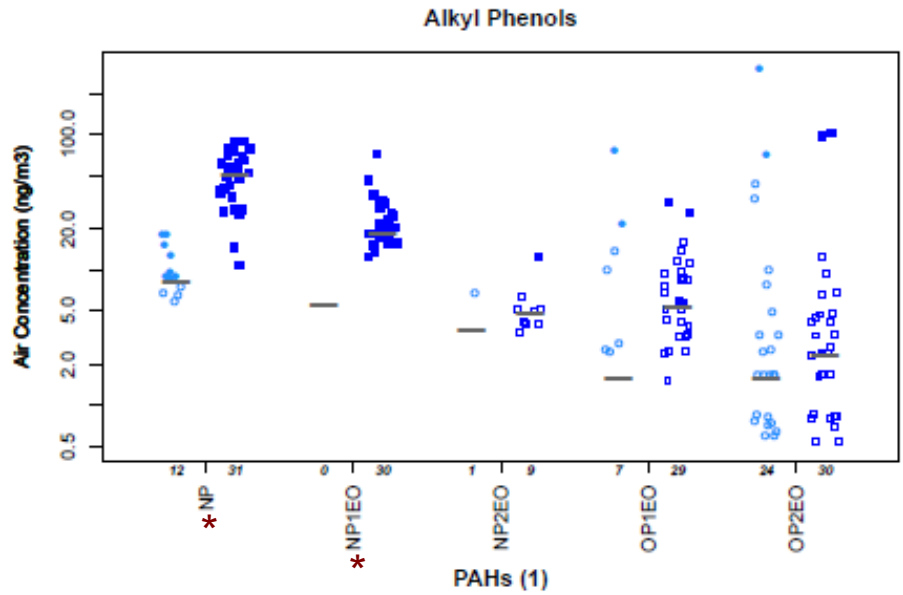
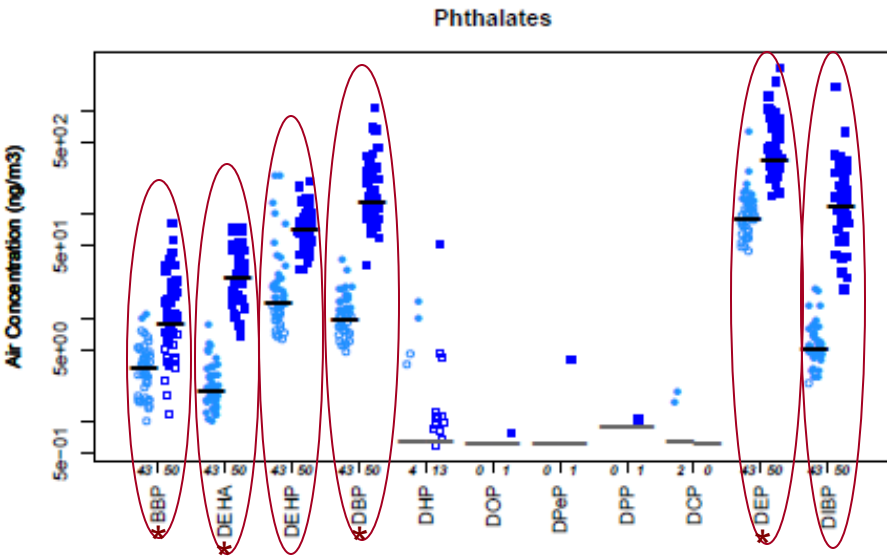


Median PBDE house dust concentrations

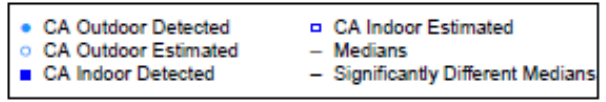
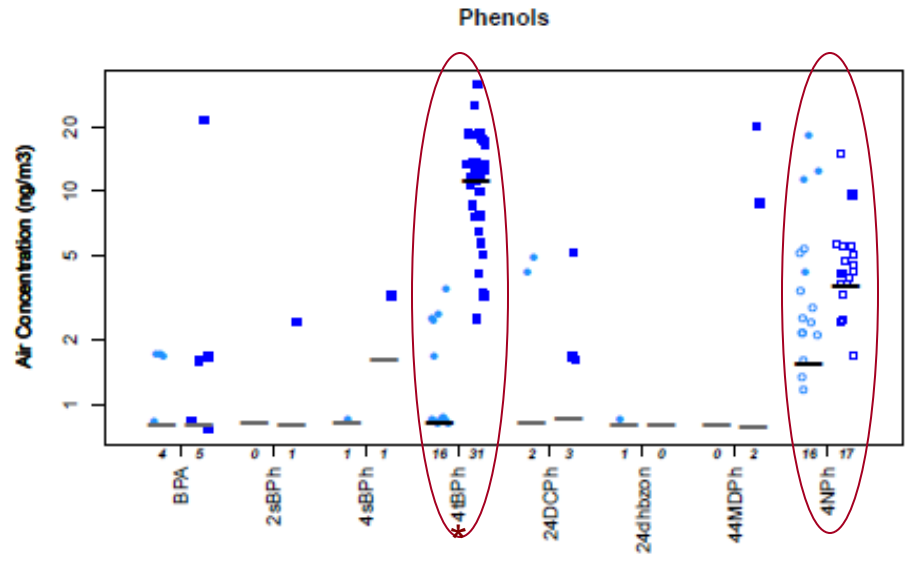
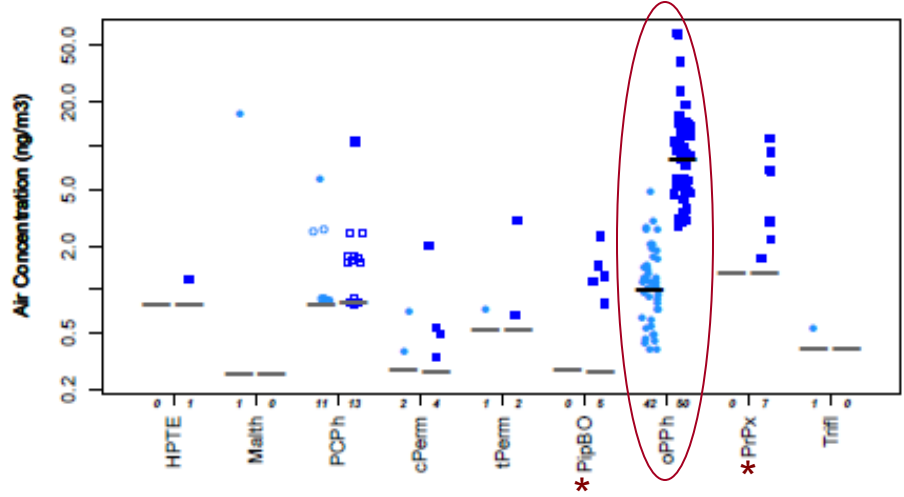
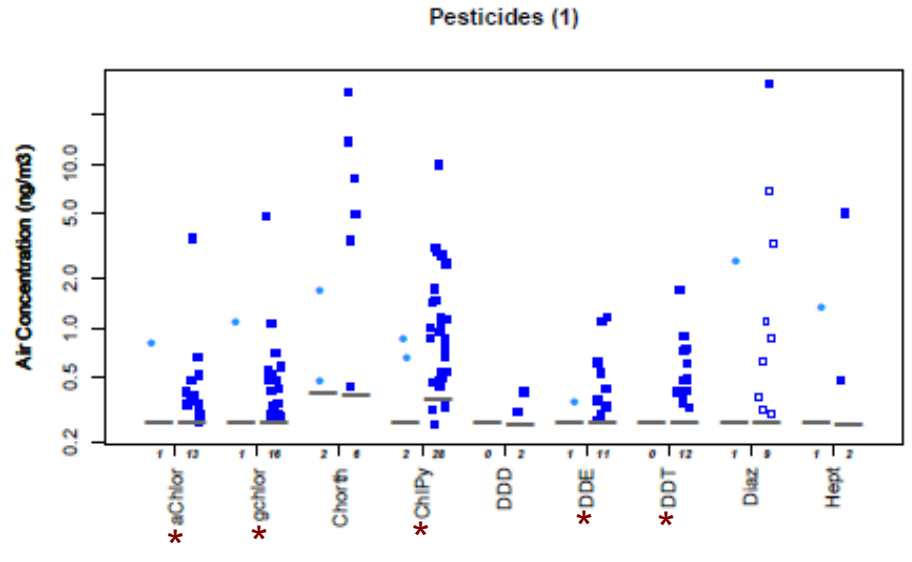
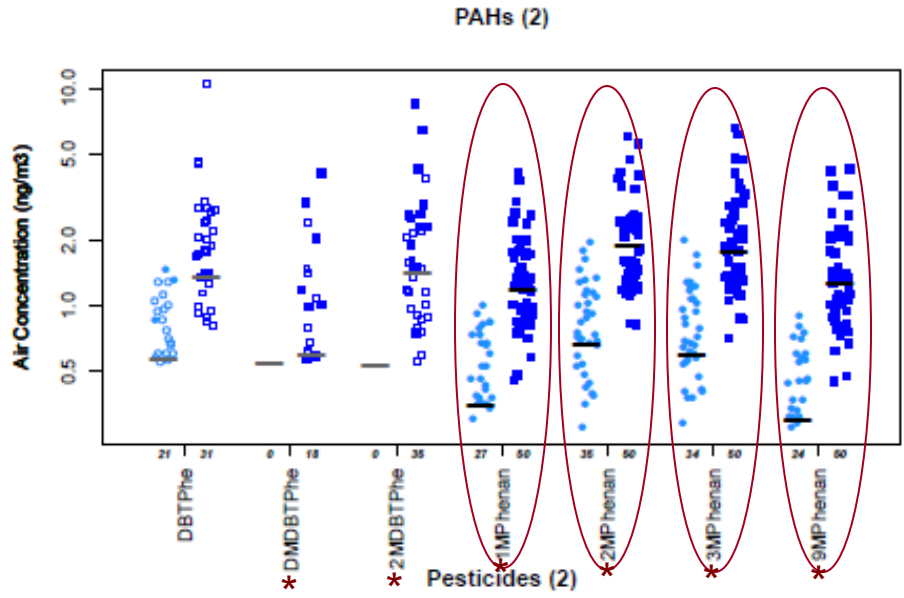
In our bodies: PBDE blood levels in California nearly two fold higher than rest of the U.S.



Analysis conducted with NHANES national survey data from the Centers for Disease Control (n=1771)



● CA Outdoor Detected	□ CA Indoor Estimated
○ CA Outdoor Estimated	— Medians
■ CA Indoor Detected	— Significantly Different Medians

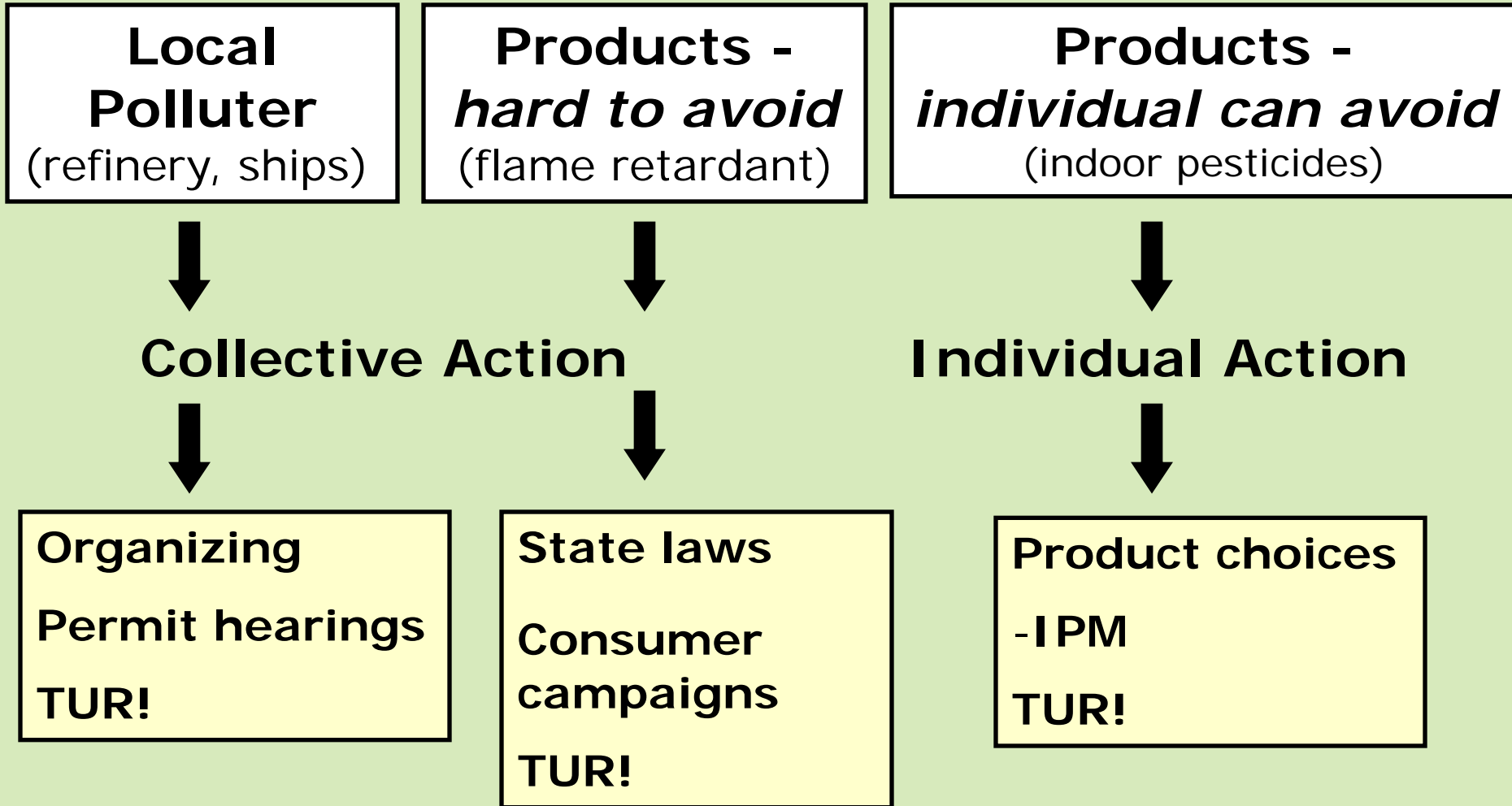




Lessons

- Exposure to EDCs is widespread
- Chemicals used legally in the past have created health risks that are hard to find
- Banning chemical doesn't remove it
- Household exposure can be significant %
- Not knowing ingredients hinders exposure reduction
- Future - test before use!

Exposure Science → Action



What's in it?

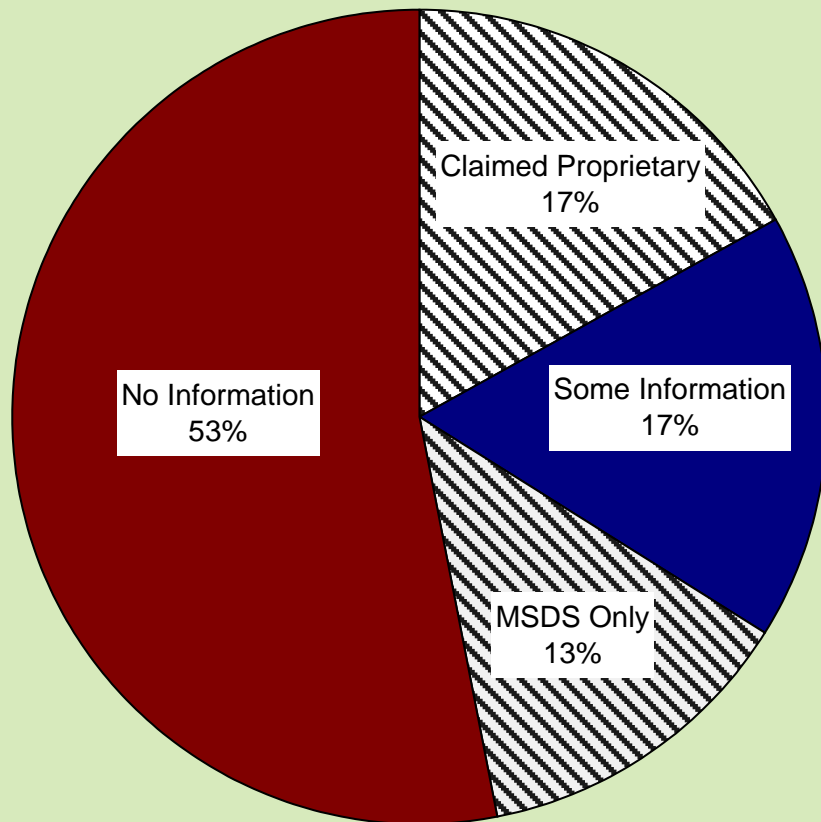


Labeled ingredients: Spring water, natural flavors, CO2

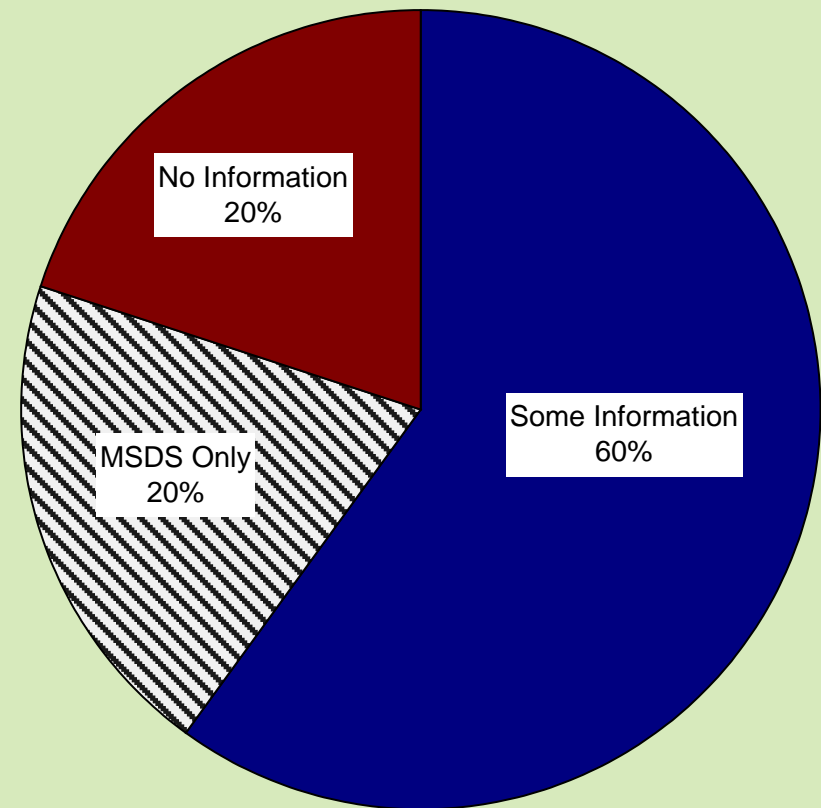
**And in the container?
PET (polyethylene terephthalate), heat stabilizers, UV stabilizers, flame retardants...**

We asked manufacturers what's in their products

- 34 companies/134 products



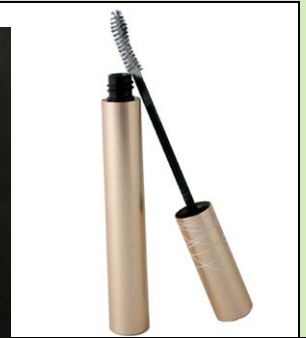
Conventional (n=24)



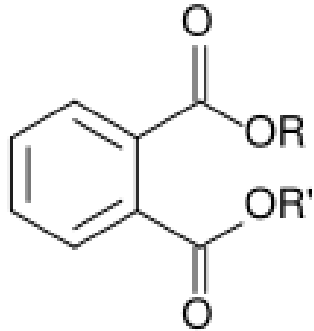
“Alternative” (n=10)

Consumer product testing

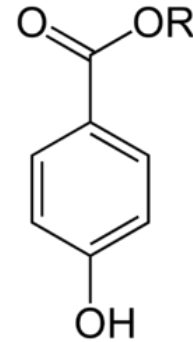
- Over 250 products tested for over 65 chemicals



Compounds of Interest



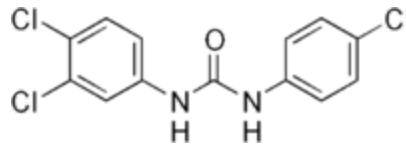
Phthalates



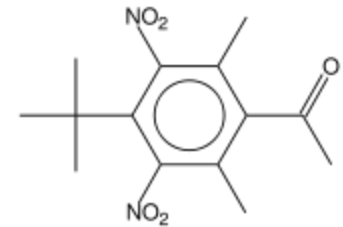
Parabens



Phenols and APEOs
(e.g. 4-nonylphenol)



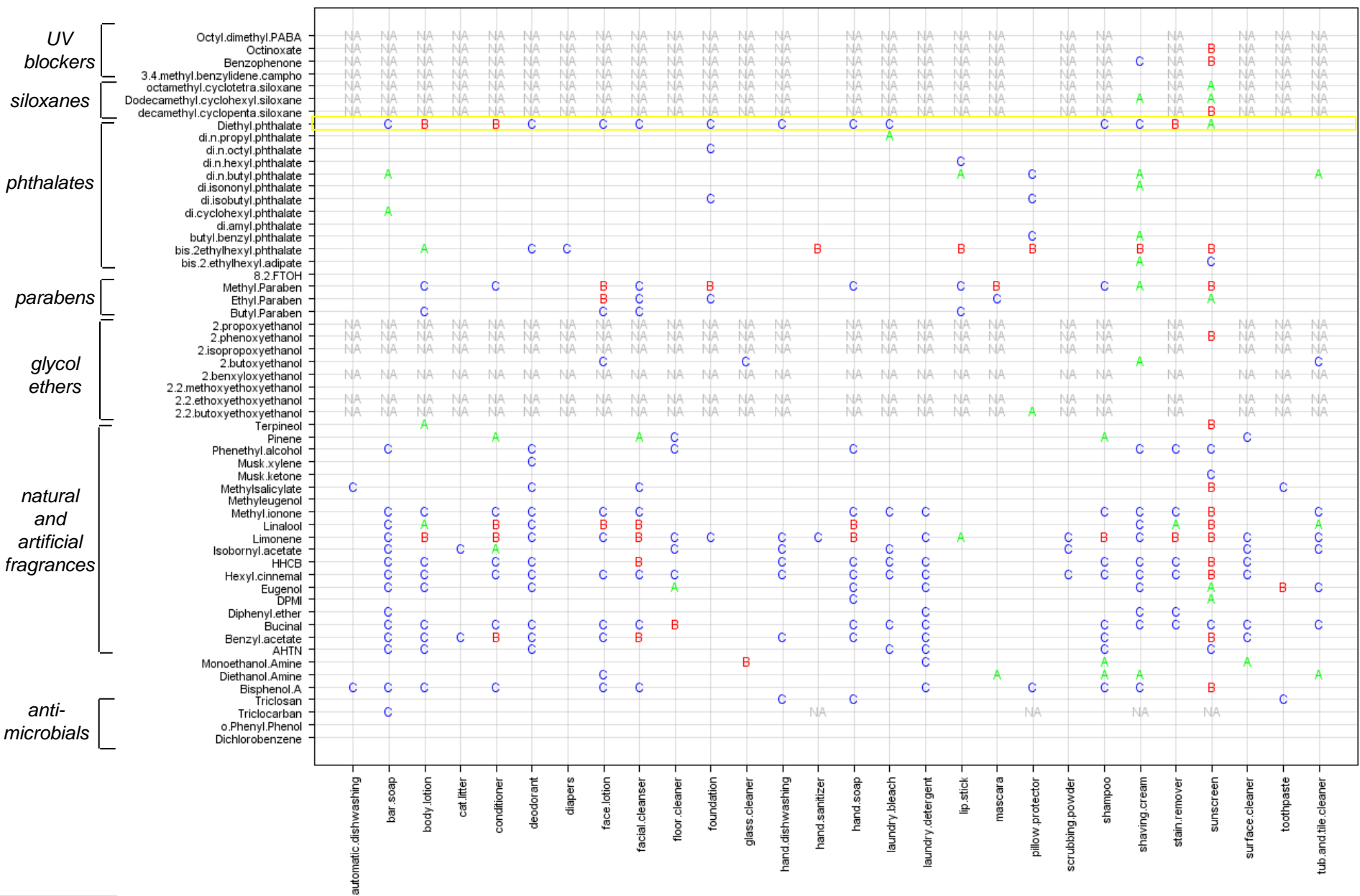
Anti-microbials
(e.g. triclocarban)



Fragrances
(e.g. musk ketone)

Criteria for “Green” Products

- ✓ Primarily plant-based ingredients
- ✓ Paraben-free
- ✓ Fragrance-free (allow some botanical extracts, except tea tree oil and lavender)
- ✓ No ethanalamines
- ✓ Not stain-resistant (e.g. no organofluorines)
- ✓ No anti-microbials (e.g. triclosan, Microban)
- ✓ No alkylphenol-based surfactants
- ✓ No dichlorobenzene
- ✓ No phthalates



What can you do?

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SILENT SPRING INSTITUTE

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HOME

Take Action

Every day we all come into contact with hundreds of chemicals, only a fraction of which have been thoroughly tested for safety. These chemicals enter our homes on the soles of our shoes, in the furnishing we use, in our clothing, in our cars, in our toys, in our linens, and even rubber duckies. Some of these chemicals are known—and yet simply unregulated—carcinogens.

ON THE CRITICAL LIST

Avoid personal care products that list parabens as ingredients. Parabens are endocrine disrupting compounds that are often used as preservatives in cosmetics and such personal care products as deodorants, shampoos, conditioners, hair styling gels, shaving gels, and lotions. Common names for this class of chemicals include butyl paraben, ethyl paraben, methyl paraben, and propyl paraben.

As we build tighter, more energy-efficient homes, chemicals increasingly linger in our air and dust. Indoor air has been described as one of the most serious environmental threats to human health. Yet we still lack data on the sources and implications of many of these toxic exposures.

This lack of data should not paralyze us, though. We can adopt the precautionary principle, which guides us to make decisions based on the information we have now. This principle calls for preventive action in the face of uncertain but suggestive evidence of risk, especially when safer alternatives are available.

Here we offer some ideas for taking action and some profiles for taking inspiration.

[Email this page](#)

Action Kits

- Take Individual Action
 - In Your Personal Care
 - In What You Eat and Drink
 - In Your Selection and Care of Clothing
 - In Your Home
 - In Your Parenting
 - In Your Approach to Life
- Take Community Action
 - In Public Spaces
 - In Schools
 - In Workplaces
 - Among Local Businesses
 - In Hospitals
- Take National Action

Additional Resources for Taking Action

- Take Inspiration**
 - An Innovative Model for Activist-Scientist Alliances
 - Profiles of Advocates

Safer Alternatives Bill

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THE ALLIANCE FOR A HEALTHY TOMORROW

Everyone Has the Right to a Healthy Environment

The Safer Alternatives Bill
Posted on Feb 13, 2009

The Safer Alternatives Bill, An Act for a Competitive Economy Through Safer Alternatives to Toxic Chemicals, is sponsored by Representative Jay Kaufman (D-Lexington) and Senator Steven Tolman (D-Brighton). It will create a pragmatic and flexible program in Massachusetts to replace toxic chemicals with safer alternatives, wherever feasible.

In this economy, the bill is needed more than ever. The Safer Alternatives program will help Massachusetts businesses stay competitive on the global market which is rapidly moving towards a demand for safer products and services. The program will be funded by a fee on toxic chemicals brought into the state primarily by out-of-state firms.

[Read more...](#)



About Us

Making a Healthy Tomorrow

- Safer Alternatives Bill
- Bisphenol-A
- Children's Health Campaigns
- Safe Cosmetics
- Other MA Campaigns
- National Campaigns

Get Involved

Toxics & Our Health

Recent News



- **Exposure research identifies opportunities to build on TURA successes**

A HEALTHIER FUTURE

View a brief introduction to Silent Spring Institute's research on the links between the environment and breast cancer, environmental health issues and the emerging field of green chemistry.

CLICK TO VIEW VIDEO



Silent Spring Institute researches the links between the environment and women's health, especially breast cancer.



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Today's Environmental Health news



FEATURED RESEARCH

Researchers call for better results reporting in breastmilk studies

Flame retardants in some California homes exceed EPA guideline

Pollution in the home is a personal and societal blind spot for society, according to a new study based on Silent Spring Institute's Household Exposure Study

Kaiser builds on Silent Spring research - shows increased breast cancer risk from several common pharmaceuticals

Californians have elevated levels of toxic flame retardants in their bodies and in their homes, according to a new Silent Spring Institute study

Human hormones and

MEDIA COVERAGE

Solvent used in Cape pipes linked to birth defects, *The Cape Cod Times*

Chemical industry extinguishes effort to curb toxic fire retardants, *Sacramento News & Review*

High school student's research on weed battles, *The Cape Cod Times*

National media brings attention to hormones in drinking water and consumer products, *The Colbert Report, The New York Times & National Public Radio*

Could Cape's Cancer Rates Be Linked To The Water?, *WBZ TV*

Fresh Water, Salt Water: Rx in H₂O, *The Cape and Islands NPR Station*

Cape Cod ponds' pollution explored, *Cape Codder*

NEW AT SILENT SPRING INSTITUTE

Join Us for "Strength in Knowing," a Breast Cancer Awareness Program on Sunday, November 8

Boston area screening of the documentary *No Family History*,

High school student's research on her summer internship with Silent Spring Institute

Brody quoted in peer-reviewed article about gaps in media coverage of environmental links to breast cancer

Environmental justice partners win lawsuit blocking Chevron permit

New book highlights Silent Spring Institute's role in environmental breast cancer research

www.silentspring.org