

# Plasticizers and Children's Health

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## Environmental Determinants of Health (EDH)

Exposome is complex – multiple exposures at once

Traditionally, less data on childhood environmental exposures

- more difficult to assess
- biomonitoring

## HOW THE ENVIRONMENT IMPACTS OUR HEALTH

People are exposed to risk factors in their homes, work places and communities through:

**AIR POLLUTION**  
including indoors and outdoors



**INADEQUATE WATER, SANITATION and hygiene**



**CHEMICALS**  
and biological agents



**RADIATION**  
ultraviolet and ionizing



**COMMUNITY NOISE**



**OCCUPATIONAL RISKS**



**CLIMATE CHANGE**



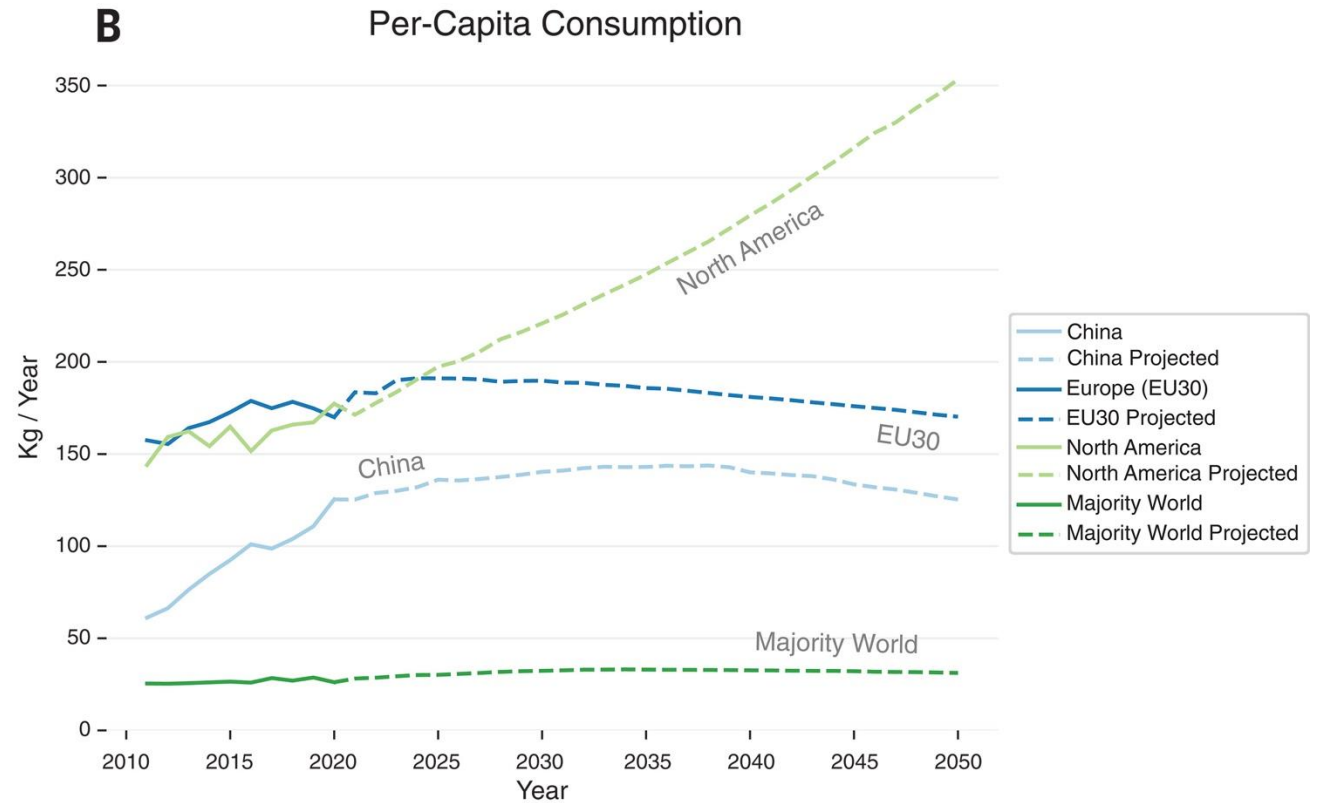
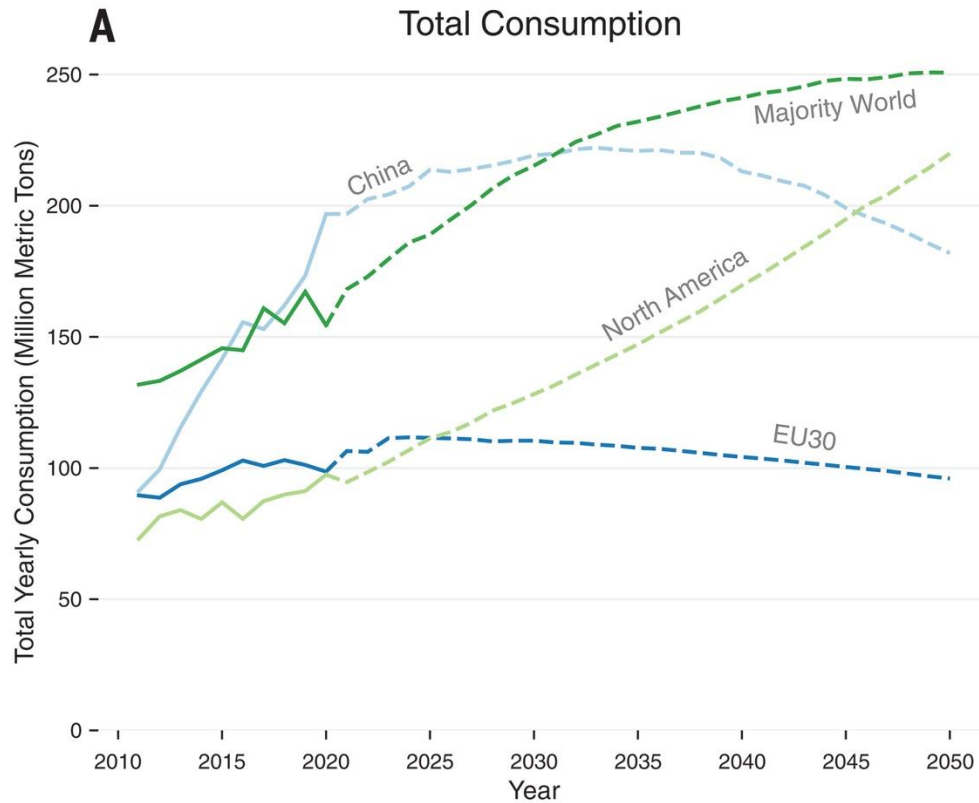
**BUILT ENVIRONMENTS**  
including housing and roads



**AGRICULTURAL PRACTICES**  
including pesticide-use, waste-water reuse

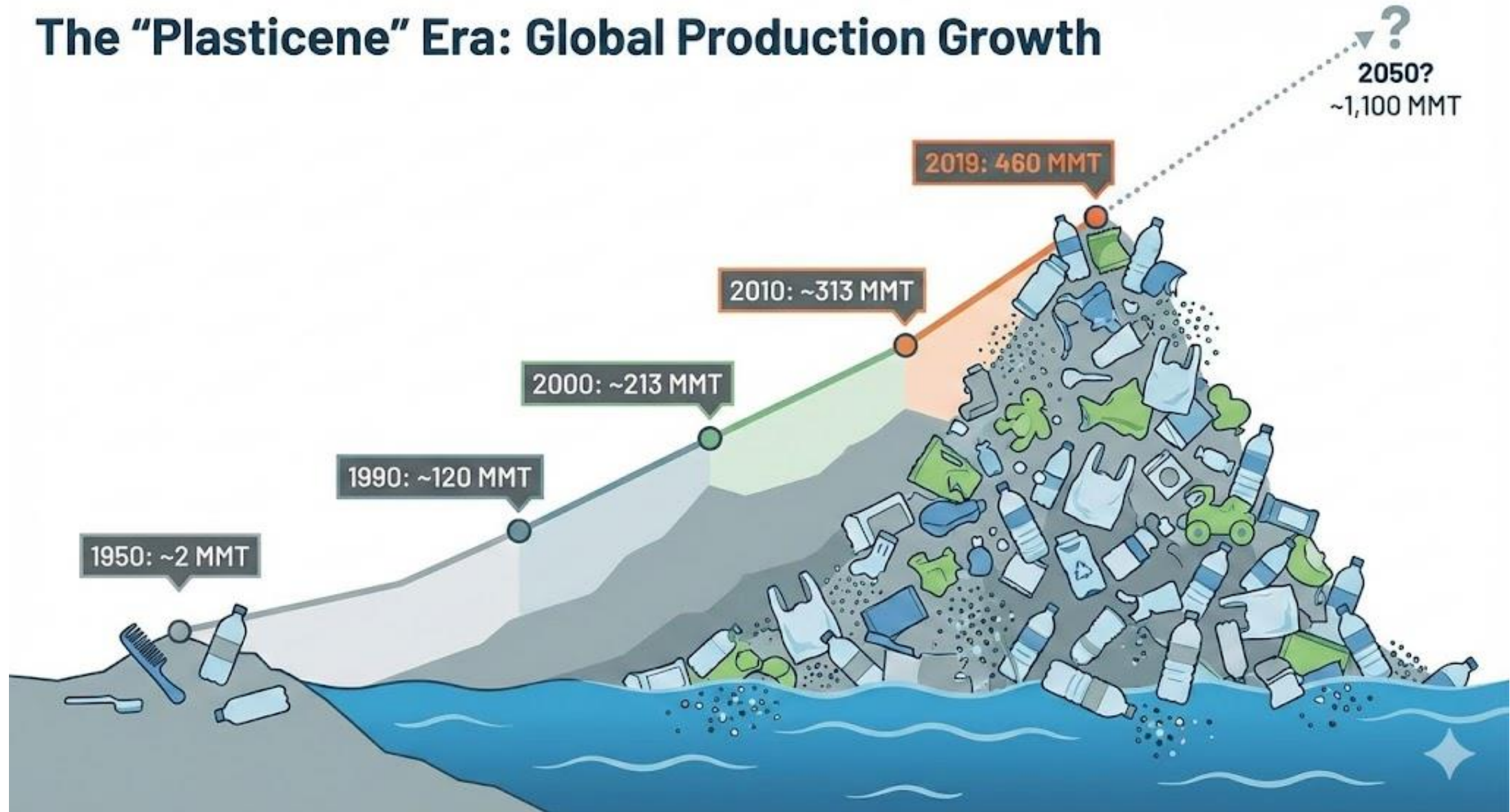


# Plastic Consumption on the World Stage



*Pottinger et al. Pathways to reduce global plastic waste by 2050. Science. 2024*

# The "Plasticene" Era: Global Production Growth



- 1950–2015 Data: Geyer, R., Jambeck, J. R., & Law, K. L. (2017). *Production, use, and fate of all plastics ever made*. Science Advances.
- 2019–2021 Data: OECD (2022). *Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options*.
- 2050–2060 Projections: \* OECD (2022): Predicts plastic use will triple by 2060 to roughly 1,231 MMT.
- World Economic Forum (2016): *The New Plastics Economy*. Predicts production will double by 2050.



© 1999 American Plastics Council



You could think of them as the sixth basic food group. Oh, you certainly wouldn't eat them, but plastic packaging does help pro-

help keep air out. While others let air in to help the food we eat stay fresher longer. Plastics also let you see what you're buying,

## Plastics. An Important Part Of Your Healthy Diet.

tect our food in many ways. •To help lock in freshness, plastic wrap clings tightly to surfaces. To help lock out moisture, resealable containers provide a strong seal. And plastic wrap helps extend the shelf life of perishable produce, poultry, fish and meats. •To prevent spoilage and contamination, some varieties of plastics

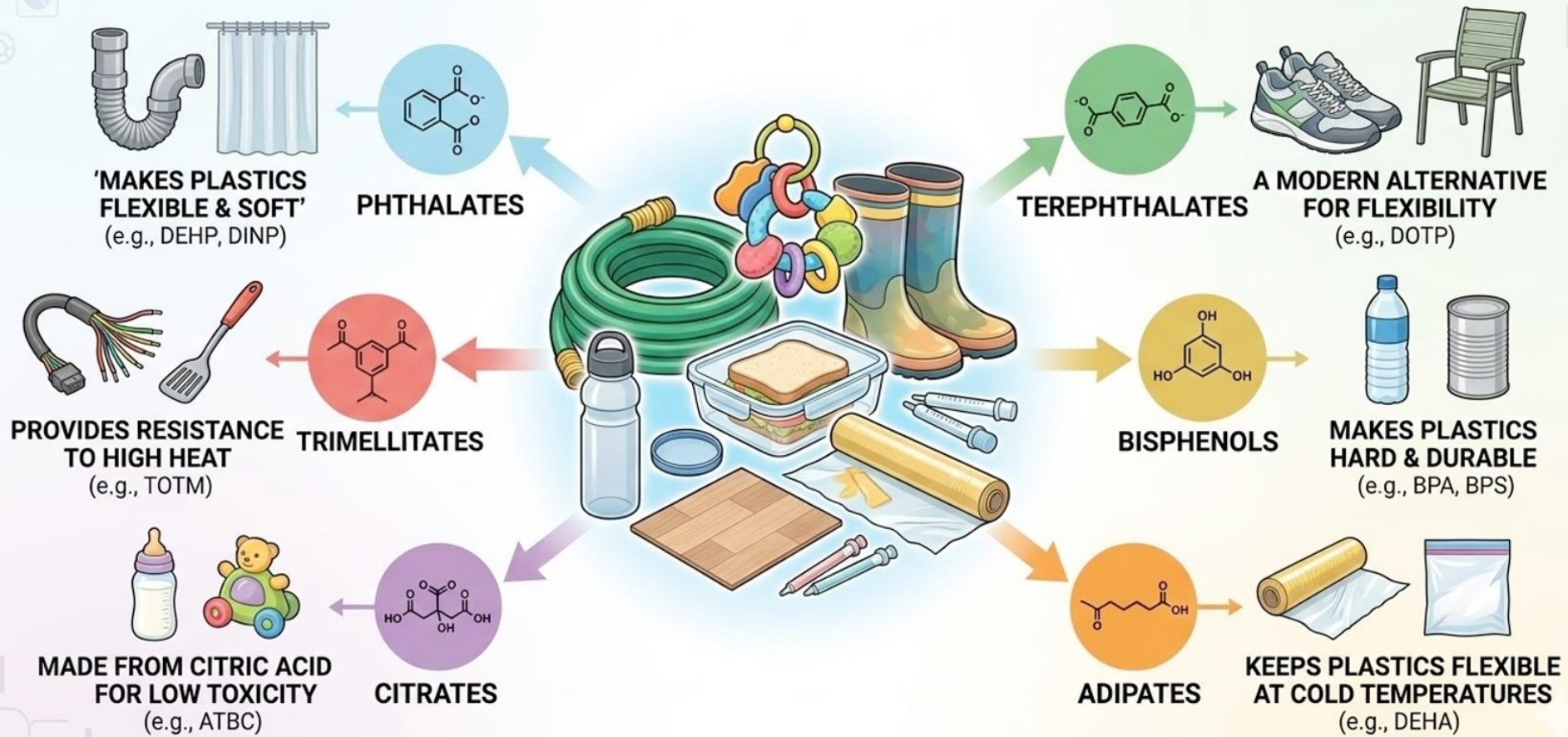
taking the mystery out of shopping. All of which makes them versatile, durable, light-weight and shatter-resistant. •To learn more, call the American Plastics Council at 1.800.777.9500 for a free booklet. Plastics. One part of your diet you may never break.



PLASTICS MAKE IT POSSIBLE.™

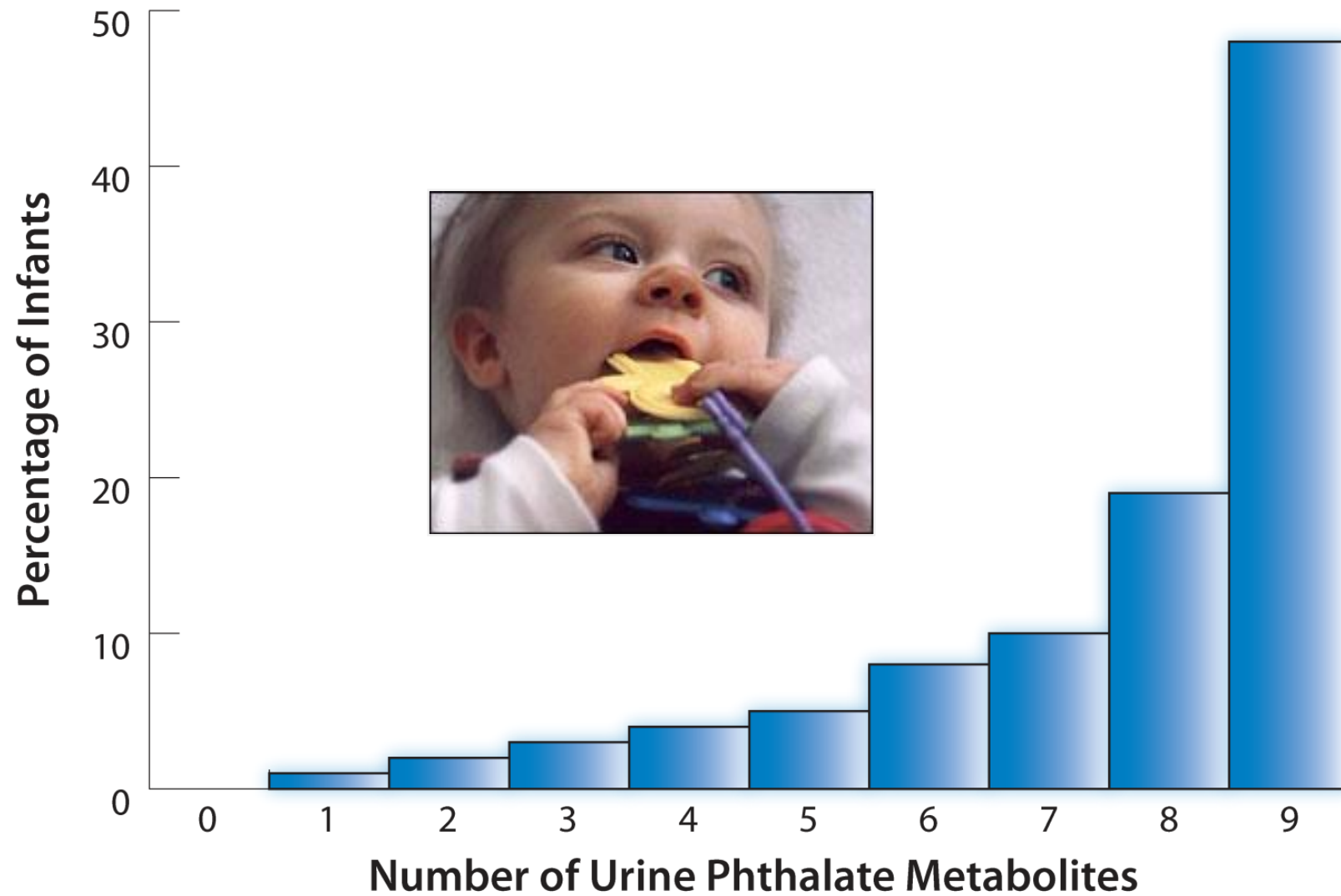
Visit us at: <http://www.plasticsresource.com>

# HOW COMMON CHEMICALS MIGRATE FROM PLASTICS

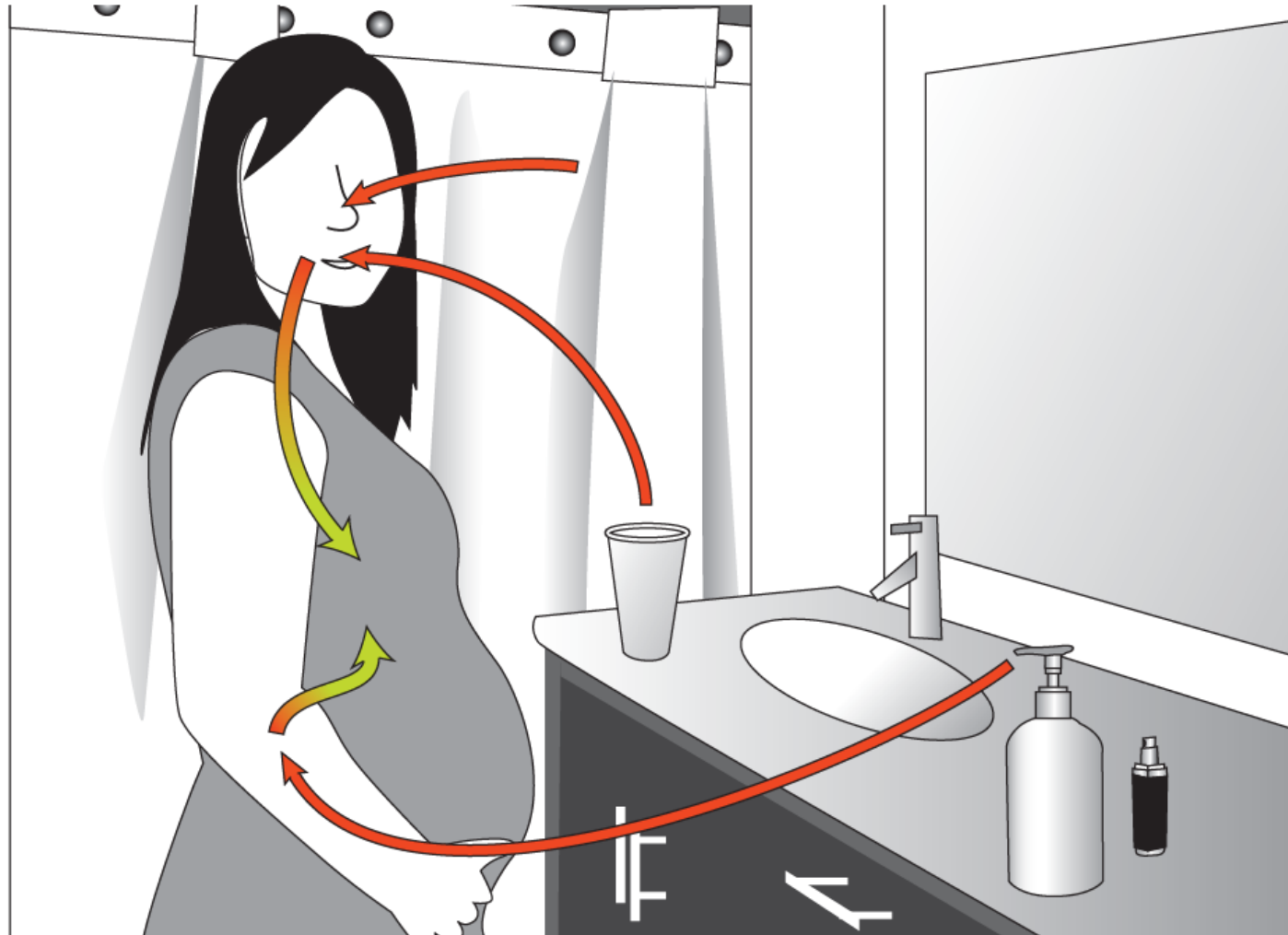


Note: Chemical migration varies by product type, heat exposure, and food contact. For illustrative purposes.

## Number of Phthalate Metabolites Found in Infant Urine Samples (N=163)



# Multiple Routes of Exposure



# Food: A Primary Source of Exposure



Direct: intentionally added to food

ex: colorings, flavorings

Indirect: not intentionally added to foods but reasonably expected to be part of food

ex: materials in food packaging & processing equipment

TECHNICAL REPORT

American Academy  
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

## Food Additives and Child Health

Leonardo Trasande, MD, MPP, FAAP,<sup>a</sup> Rachel M. Shaffer, MPH,<sup>b</sup> Sheela Sathyanarayana, MD, MPH,<sup>b,c</sup>  
COUNCIL ON ENVIRONMENTAL HEALTH

## Phthalates

Soft, flexible plastics – numerous consumer products including flexible tubing used in health care, *short half-lives*

## Bisphenols

Hard polycarbonate plastics – industrial and consumer products, *short half-lives*

## Forever Chemicals PFAS/PCBs

Water contamination – PFAS used in military operations, used on fabrics to prevent staining, teflon coatings, PCBs in old light fixtures, *long half-lives*



CANNED FOOD LINERS



PLASTIC CONTAINERS



EPOXY ADHESIVES



CASH REGISTER RECEIPTS



VINYL FLOORING



FLEXIBLE PVC PIPES



TOYS



CAULKS AND ADHESIVES



FOOD PACKAGING



TEETHING TOYS



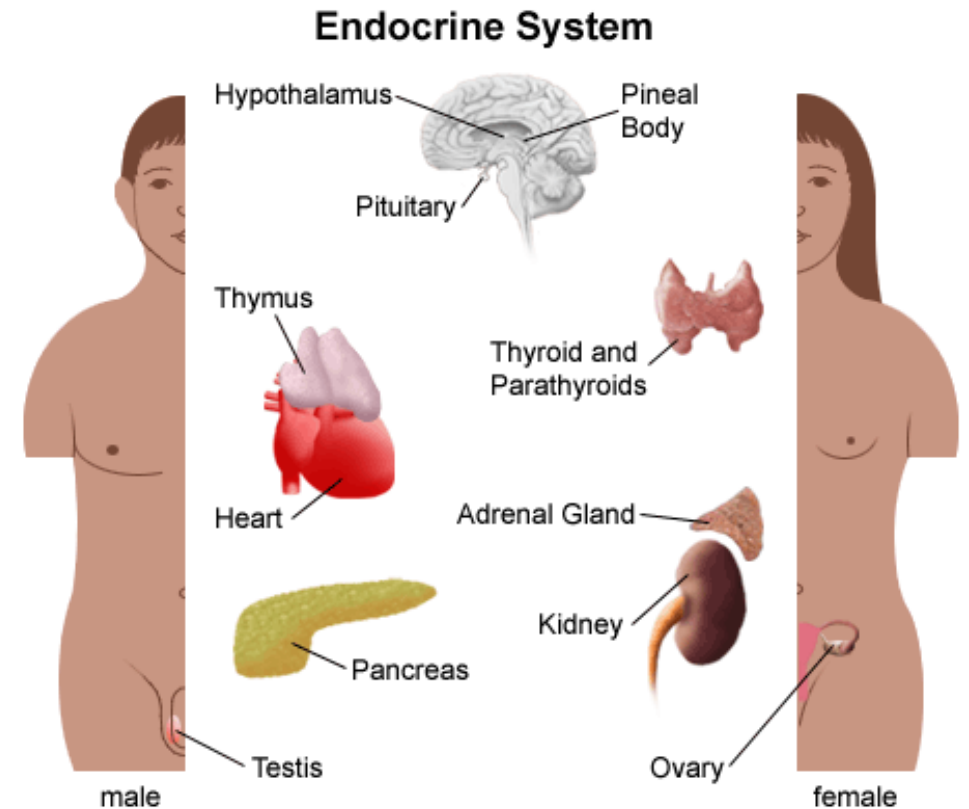
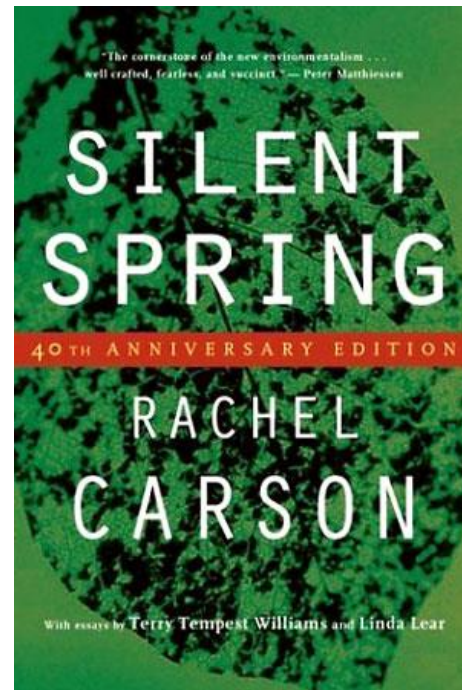
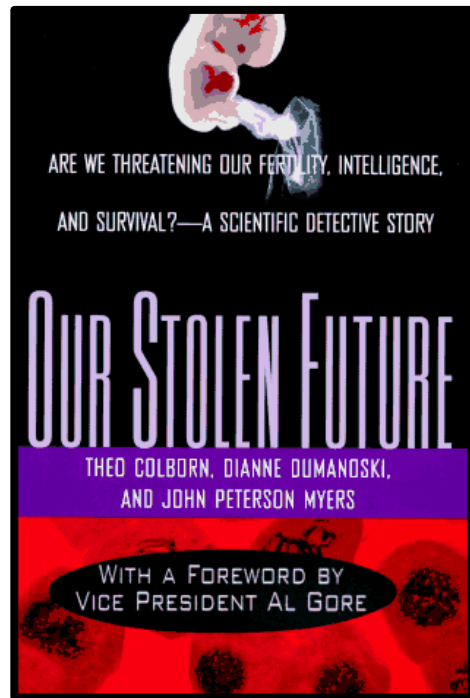
PERSONAL CARE PRODUCTS



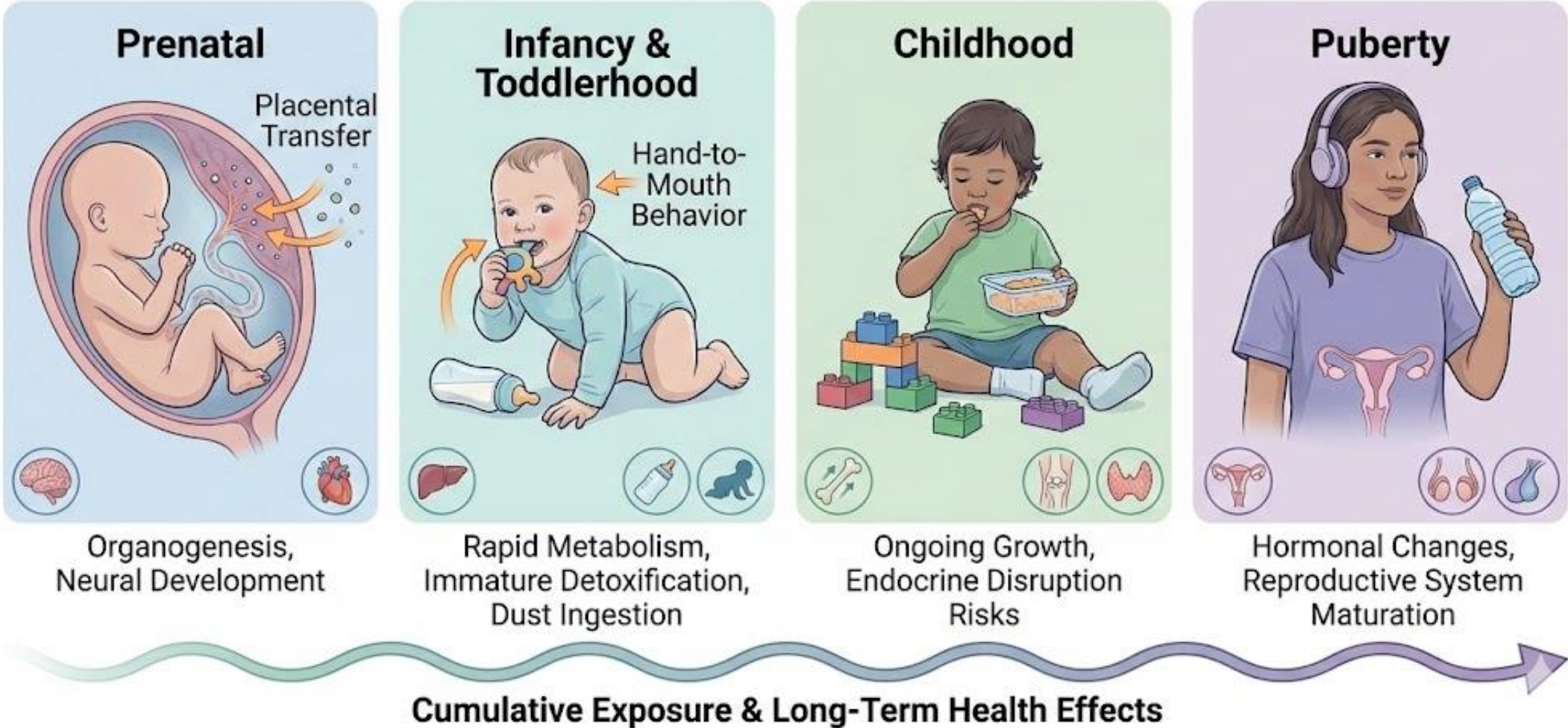
SPORTS EQUIPMENT

# Endocrine Disrupting Chemicals

mimic, block, interfere with hormones in the body and can have lasting effects across generations

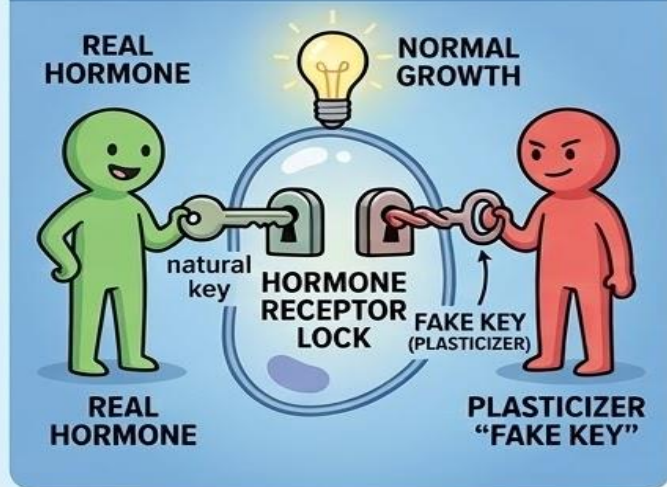


# Windows of Susceptibility: Pediatric Vulnerability to Plastics

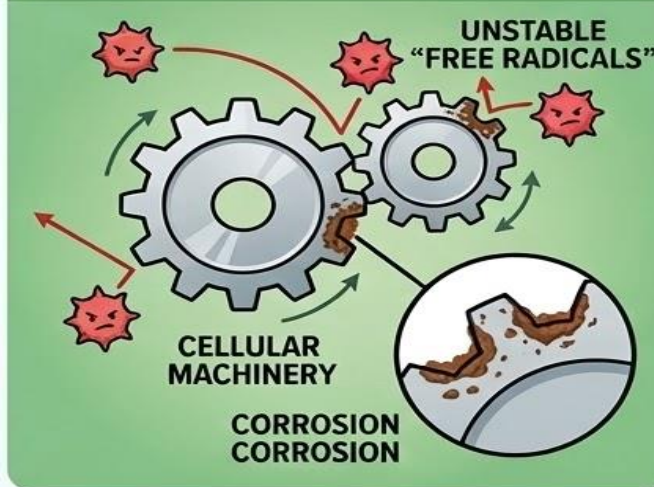


# Why are we Concerned?

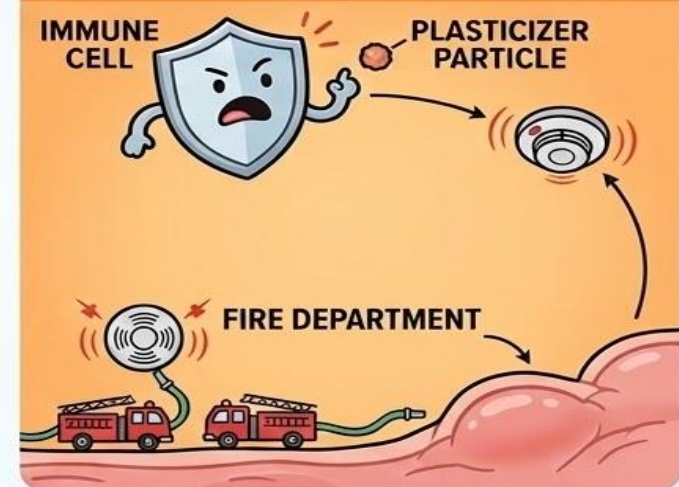
## Endocrine Disruption



## Oxidative Stress

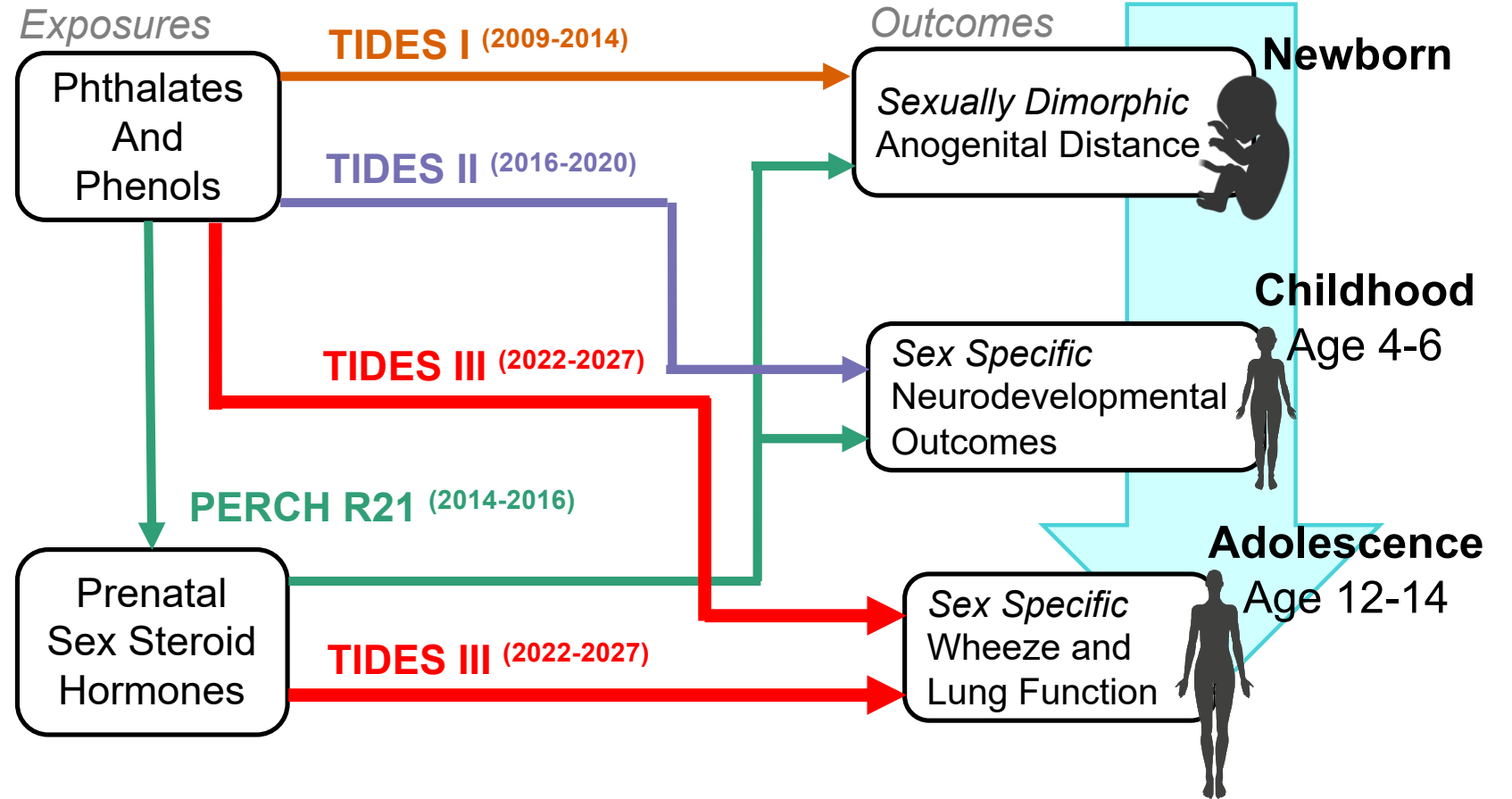


## Inflammation





Examine environmental phthalate (chemicals found in plastics) in pregnancy in relation to newborn through adolescence health outcomes



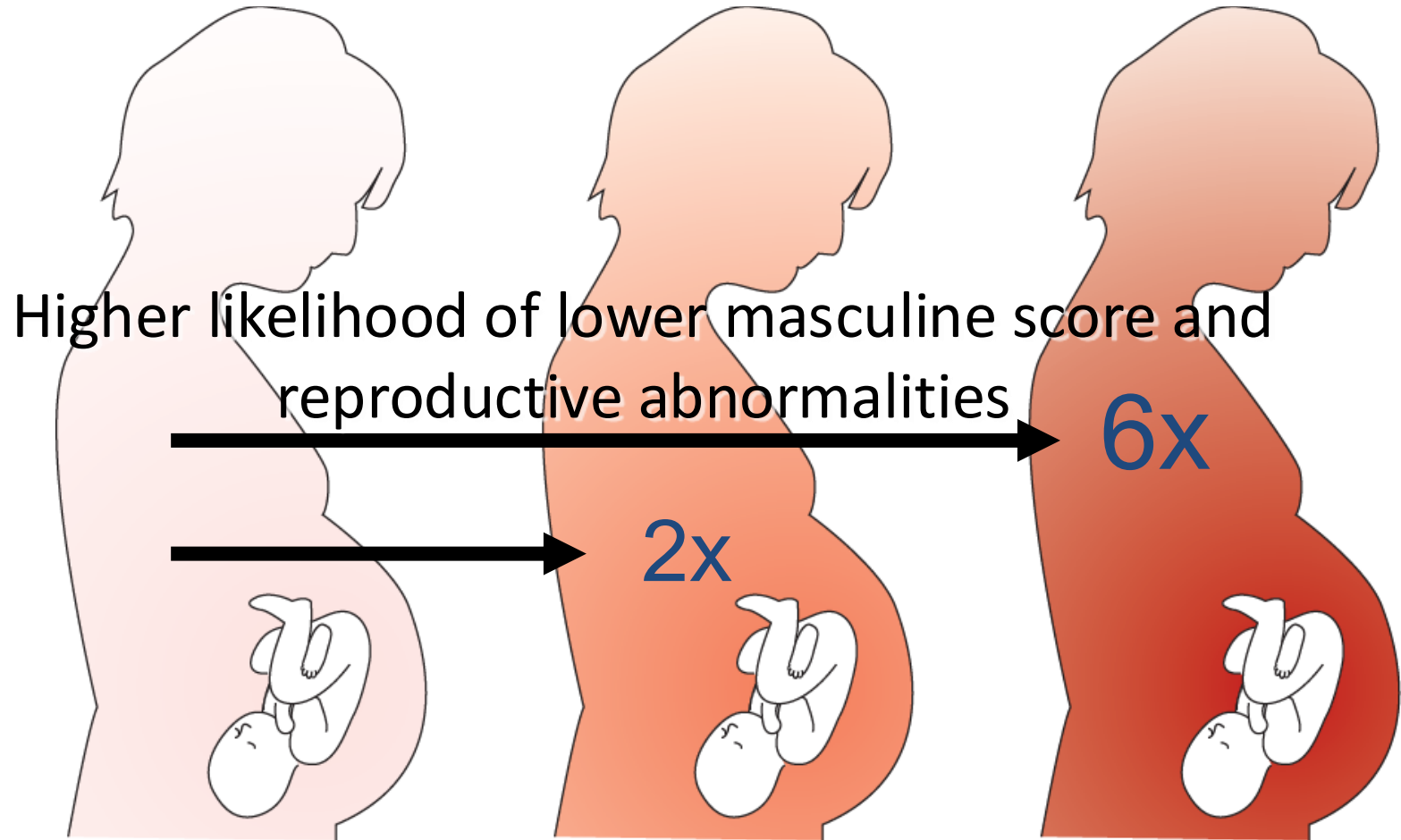
# TIDES I: 2010-2015

- Enrolled & collected data from 798 pregnant women across 4 study sites
- Pregnancy: questionnaires in each trimester, urine samples in each trimester, blood sample in 1st trimester
- Infant Birth: medical record, physical exam
- 12 Months: exam, questionnaires

Goal – To determine if phthalate exposure in pregnancy was related to infant reproductive outcomes

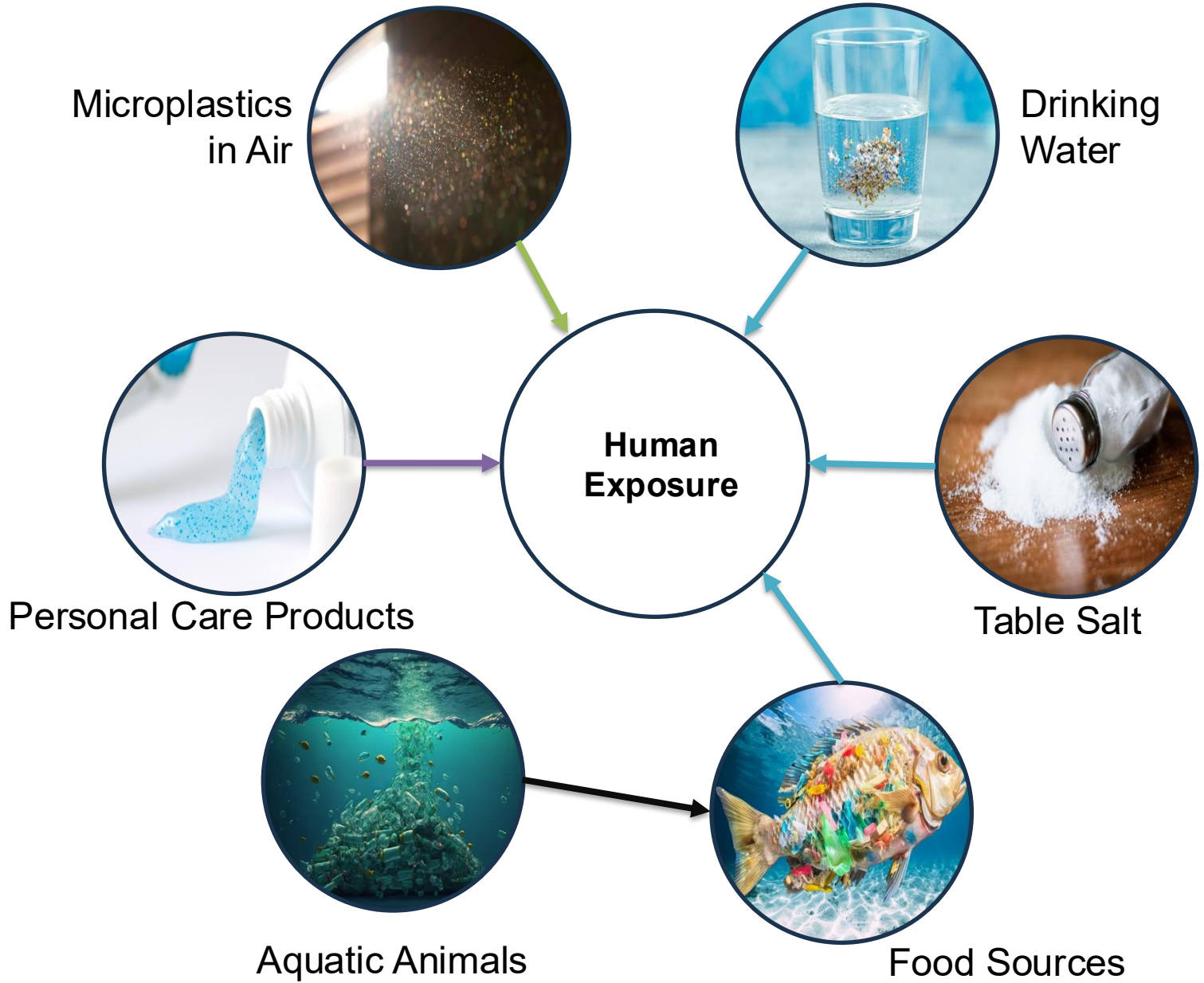
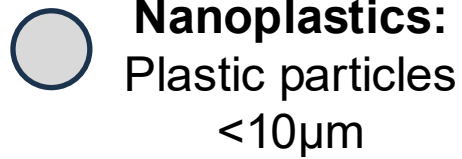
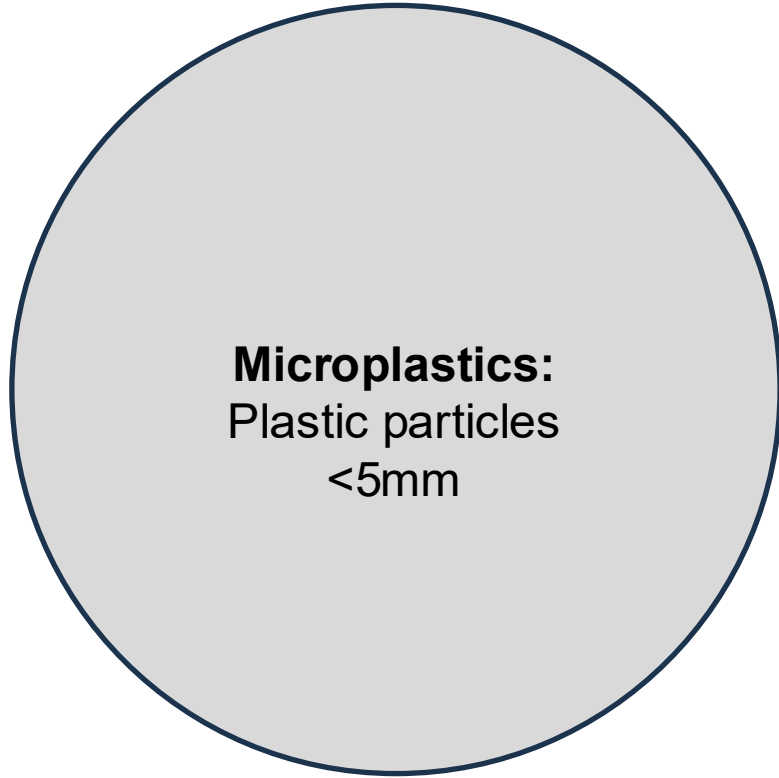
Monoester Metabolite	Percentile (ng/mL)		
	25th	50th	75th
MEHHP	6.0	11.4	20.1

6-12% lower testosterone concentrations in pregnant women for every log unit increase in high molecular weight phthalate exposure

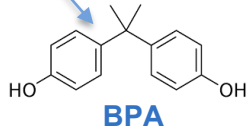
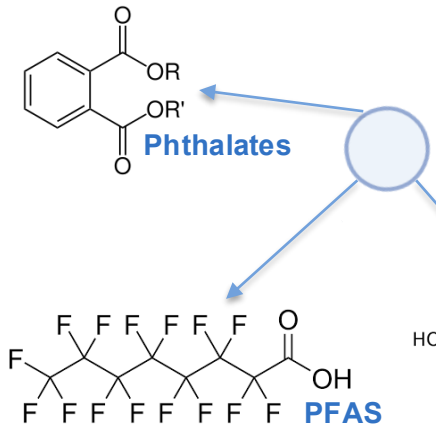




# Microplastics



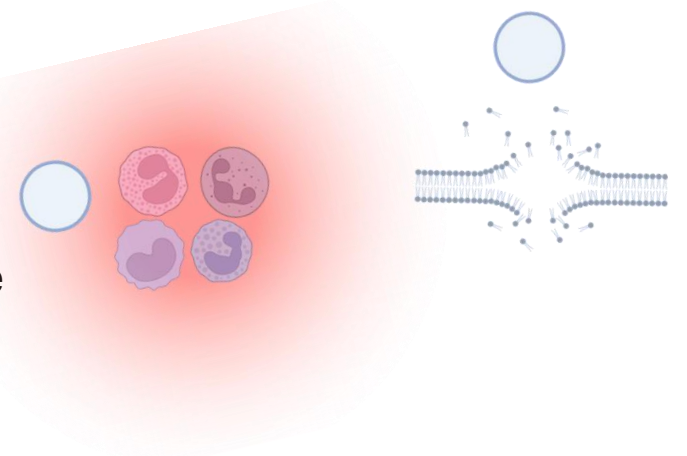
# Mechanisms of Toxicity



**Leaching of endocrine disrupting chemicals**

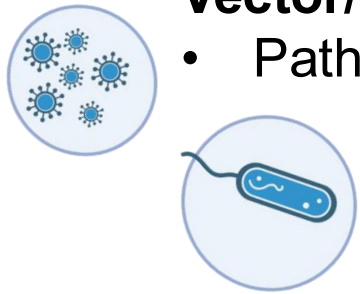
**Physical Irritation**

- Inflammation
- Oxidative stress
- Membrane Damage



**Vector/Medium**

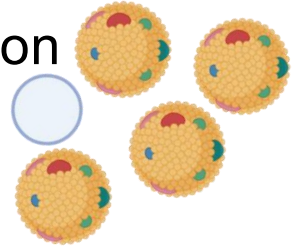
- Pathogenic organisms



**Mechanisms of Toxicity**

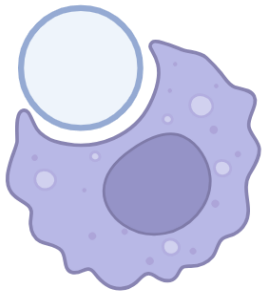
**Disruption of energy homeostasis/Metabolism**

- Lipid accumulation

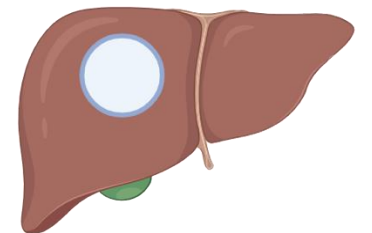
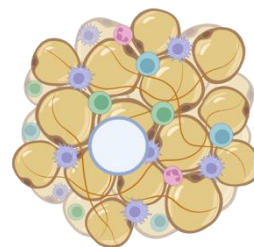


**Immune Dysfunction**

Challenges with particle phagocytosis



**Distal effects: microplastics travel & accumulate in distant tissues**

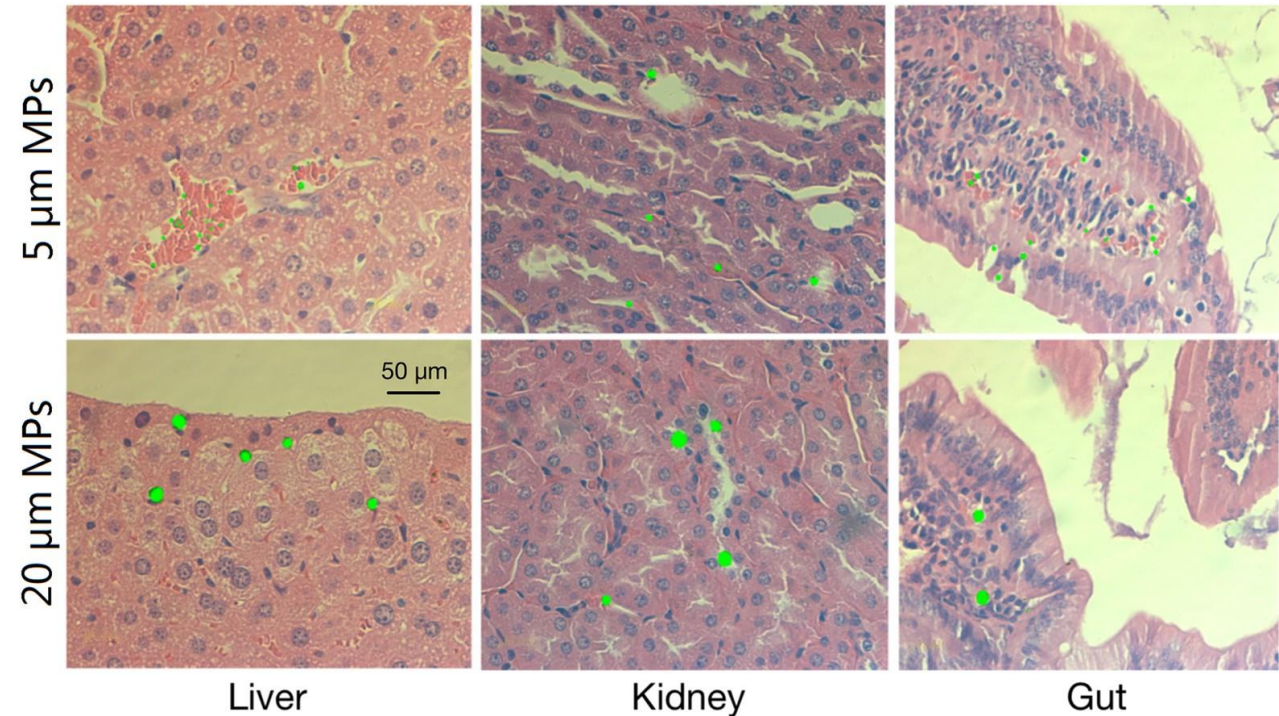


# Research Needs in Pediatric Populations

**Microplastics have also been shown to accumulate in many human tissues/organs:**

- Placenta
- Breastmilk
- cord blood
- Brain
- Spleen
- Colon
- Lung
- Kidney
- Liver
- Gut

*Most studies have focused on detection and not molecular mechanisms or clinical outcomes*



<https://www.nature.com/articles/srep46687>

## Research Needs:

*How do microplastics disrupt developmental and physiological processes? What are the mechanisms of action?*

## Clinical Needs:

*How do microplastics contribute to development of disease and disease course/burden?*

# NIH Environmental Influences on Child Health Outcomes

## ECHO Primary Outcomes of Interest

### Objectives:

Improve the health of children and adolescents by conducting observational and intervention research that will inform high-impact programs, policies, and practices.

PRE-, PERI-  
AND POSTNATAL



UPPER AND  
LOWER AIRWAY



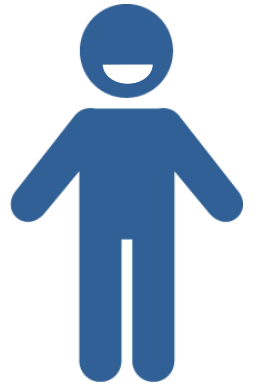
OBESITY



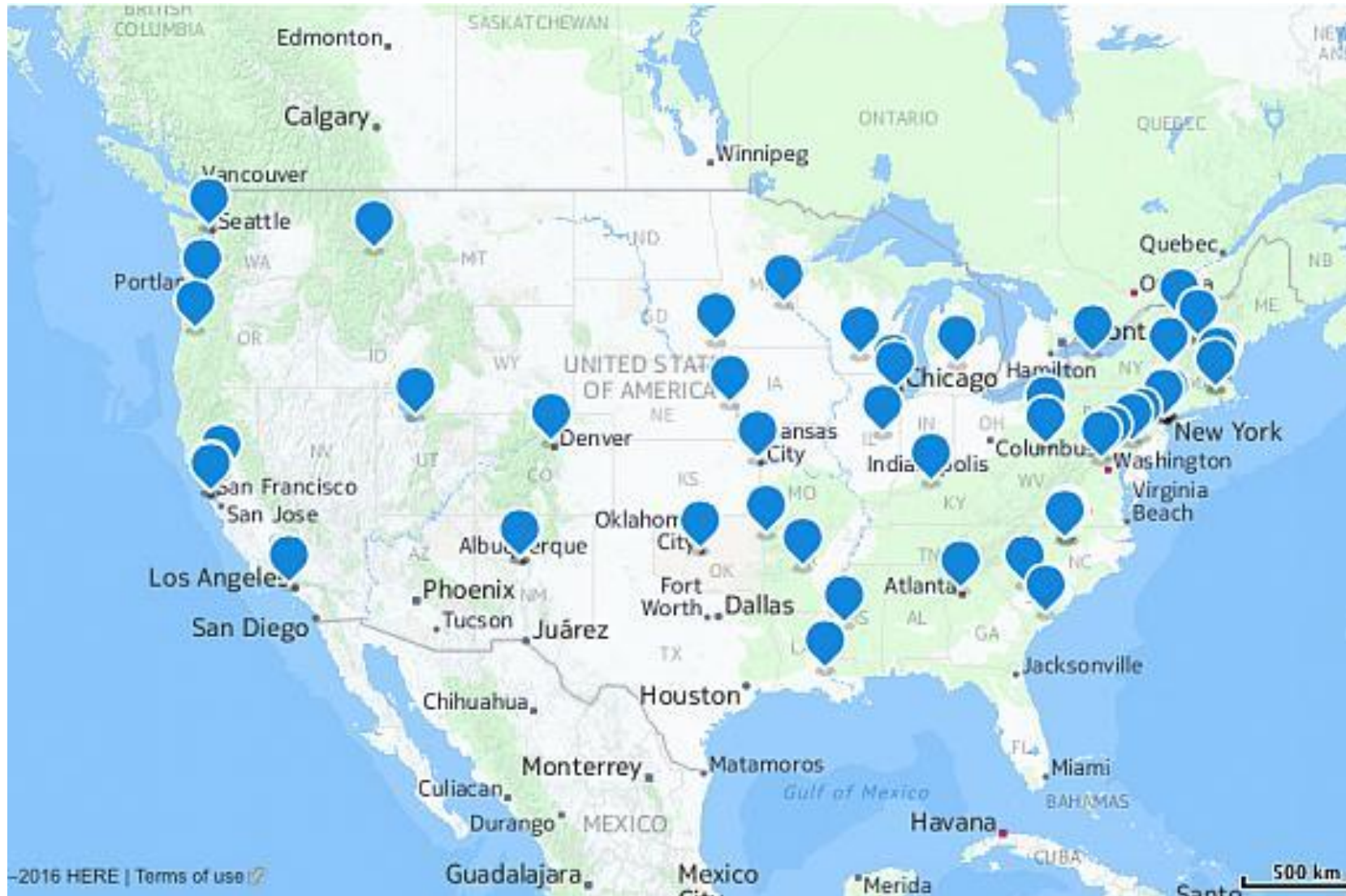
NEURO-  
DEVELOPMENT



POSITIVE HEALTH



# ECHO Study Sites across the US



**NIH DASH – Public Database of Pregnancies and Child Health Outcomes (no identifiers) N=50,000**

**Ancillary Studies Program – any outside investigator can apply to use the data**

<https://echochildren.org/dash/>

# Prescriptions for Prevention: Reducing Plastic Exposure

## The “Three No’s” (Avoid)



### NO HEAT

Never microwave plastic.  
Avoid dishwashing plastic food items.



### NO #3, #6, #7

Check codes: #3 (PVC),  
#6 (Styrene), #7 (Bisphenols)



### NO “FRAGRANCE”

Choose fragrance-free products (avoids phthalates).

## The “Three Yes’s” (Choose)



### YES TO

### GLASS/STAINLESS STEEL

Use for food and drink storage, especially for kids.



### YES TO FRESH/FROZEN

Prioritize fresh or frozen foods over canned goods.



### YES TO DUSTING

Regular wet dusting/mopping removes plastic-laden dust.

*Very little evidence in humans to support interventions – major need*

## 1. EWG'S "SKIN DEEP" & CLEANING GUIDE



SCAN TO SEARCH PERSONAL CARE

Comprehensive database of 140,000+ products, providing safety ratings from 1 (Best) to 10 (Worst). Perfect for checking personal care items and cleaning products for ingredients of concern.

Source: EWG, 2026. For illustrative purposes.

## 2. CLEARYA (WEB EXTENSION & APP)



SCAN TO DOWNLOAD CLEARYA

Browser extension and app that automatically analyzes ingredient lists on major online stores (Amazon, Target, etc.) in real-time, highlighting chemicals of concern and suggesting safer alternatives.

Source: Clearya, 2026. For illustrative purposes.

## 3. DETOX ME (APP BY SILENT SPRING INSTITUTE)



SCAN TO GET DETOX ME

Action-oriented app focused on behavioral changes to reduce exposure to endocrine disruptors in food, water, and home products. Developed by research scientists.

Source: Silent Spring Institute, 2026. For illustrative purposes.

## 4. BEAT THE MICROBEAD (APP & WEBSITE)



SCAN TO CHECK FOR MICROPLASTICS

Specific tool to identify intentionally added microplastic polymers in cosmetics, personal care products, and toothpastes, using barcode scanning and extensive database.

Source: Plastic Soup Foundation, 2026. For illustrative purposes.

# Environmental Working Group Example

## Vaseline Intensive Care Dry Skin Repair Lotion

6

Data Availability: LIMITED

Learn more About EWG's Scores



EWG scientists reviewed the Vaseline Intensive Care Dry Skin Repair Lotion product label collected on August 10, 2021 for safety according to the methodology outlined in our Skin Deep Cosmetics Database. We assess the ingredients listed on the labels of personal care products based on data in toxicity and regulatory databases, government and health agency assessments and the open scientific literature. EWG's rating for Vaseline Intensive Care Dry Skin Repair Lotion is 6.

## Ingredient Concerns

Cancer ⓘ



Developmental & Reproductive Toxicity ⓘ



Allergies & Immunotoxicity ⓘ



Use Restrictions ⓘ



## Other Ingredient Concerns

### HIGH

- Endocrine disruption
- Contamination concerns
- Irritation (skin, eyes, or lungs)
- Miscellaneous
- Organ system toxicity (non-reproductive)
- Occupational hazards
- Use restrictions

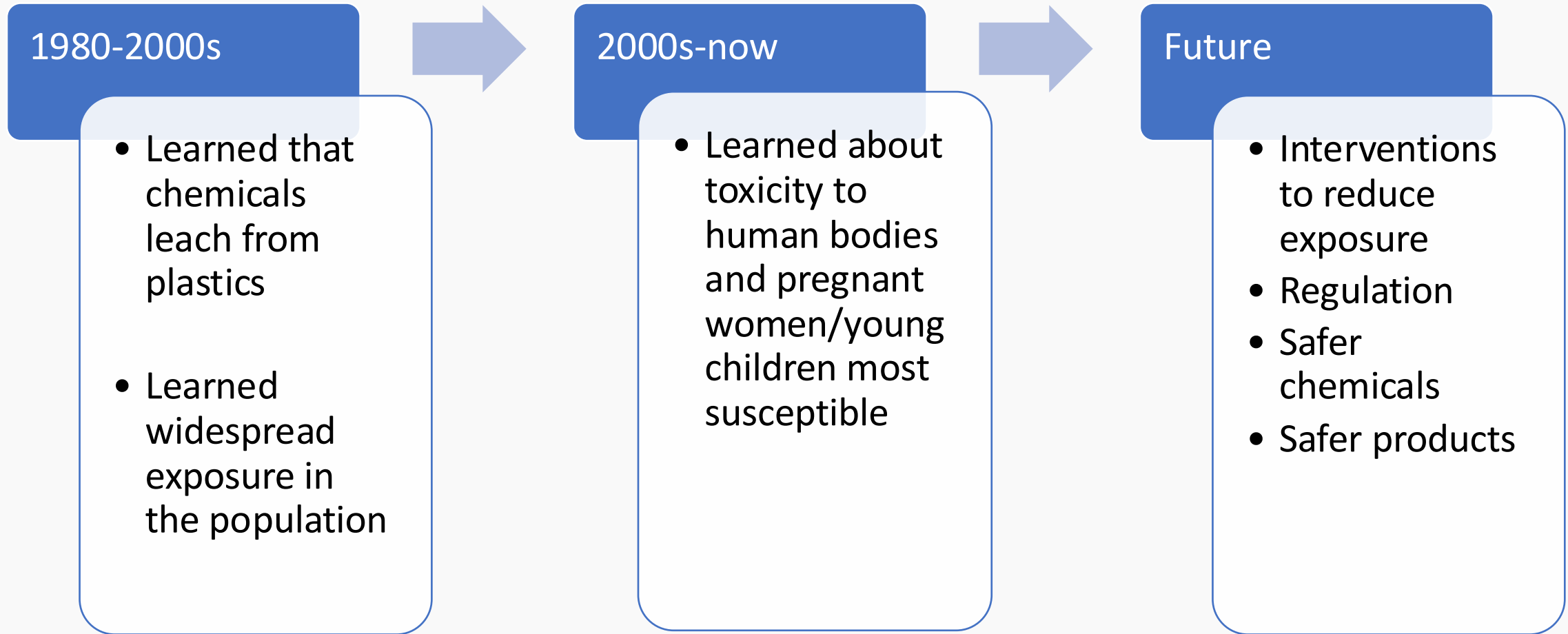
### LOW

- Enhanced skin absorption
- Ecotoxicology

Learn more About Ingredient Concerns

Score	Data Availability	Ingredient	Concern
9	Fair	PROPYLPARABEN	<ul style="list-style-type: none"> <li>• Developmental/reproductive toxicity (moderate)</li> <li>• Allergies/immunotoxicity (moderate)</li> <li>• Use restrictions (moderate)</li> <li>• Endocrine disruption (high)</li> <li>• Ecotoxicology (low)</li> </ul>
8	Fair	FRAGRANCE Appeared as: PARFUM	<ul style="list-style-type: none"> <li>• Allergies/immunotoxicity (high)</li> <li>• Endocrine disruption (moderate)</li> <li>• Non-reproductive organ system toxicity (moderate)</li> <li>• Ecotoxicology (low)</li> <li>• Irritation (skin, eyes, or lungs) (moderate)</li> </ul>
4	Fair	PETROLATUM	<ul style="list-style-type: none"> <li>• Use restrictions (moderate)</li> <li>• Non-reproductive organ system toxicity (moderate)</li> <li>• Contamination concerns (PAHS)</li> </ul>
4	Limited	PHENOXYETHANOL	<ul style="list-style-type: none"> <li>• Allergies/immunotoxicity (low)</li> <li>• Use restrictions (moderate)</li> <li>• Non-reproductive organ system toxicity (moderate)</li> <li>• Irritation (skin, eyes, or lungs) (high)</li> <li>• Occupational hazards (high)</li> </ul>
4	Fair	METHYLPARABEN	<ul style="list-style-type: none"> <li>• Allergies/immunotoxicity (moderate)</li> <li>• Use restrictions (low)</li> <li>• Endocrine disruption (moderate)</li> <li>• Biochemical or cellular level changes (moderate)</li> </ul>

# Past to Future



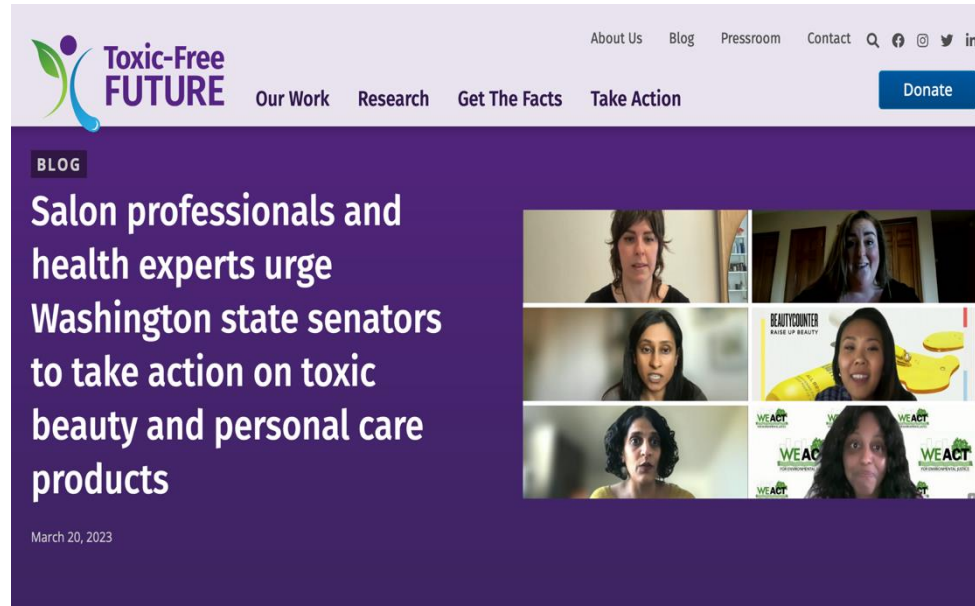
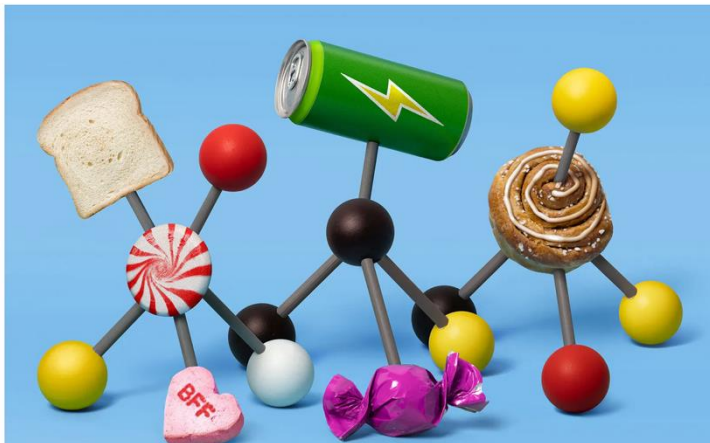
# Working Towards Change – WILL TAKE ALL OF US






The New York Times

## Two States Have Proposed Bans on Common Food Additives Linked to Health Concerns

Here's what to know about the five chemicals, which most often show up in baked goods, candy and soda.

Give this article   458




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Our Work | Research | Get The Facts | Take Action | [Donate](#)

**BLOG**

### Salon professionals and health experts urge Washington state senators to take action on toxic beauty and personal care products

March 20, 2023



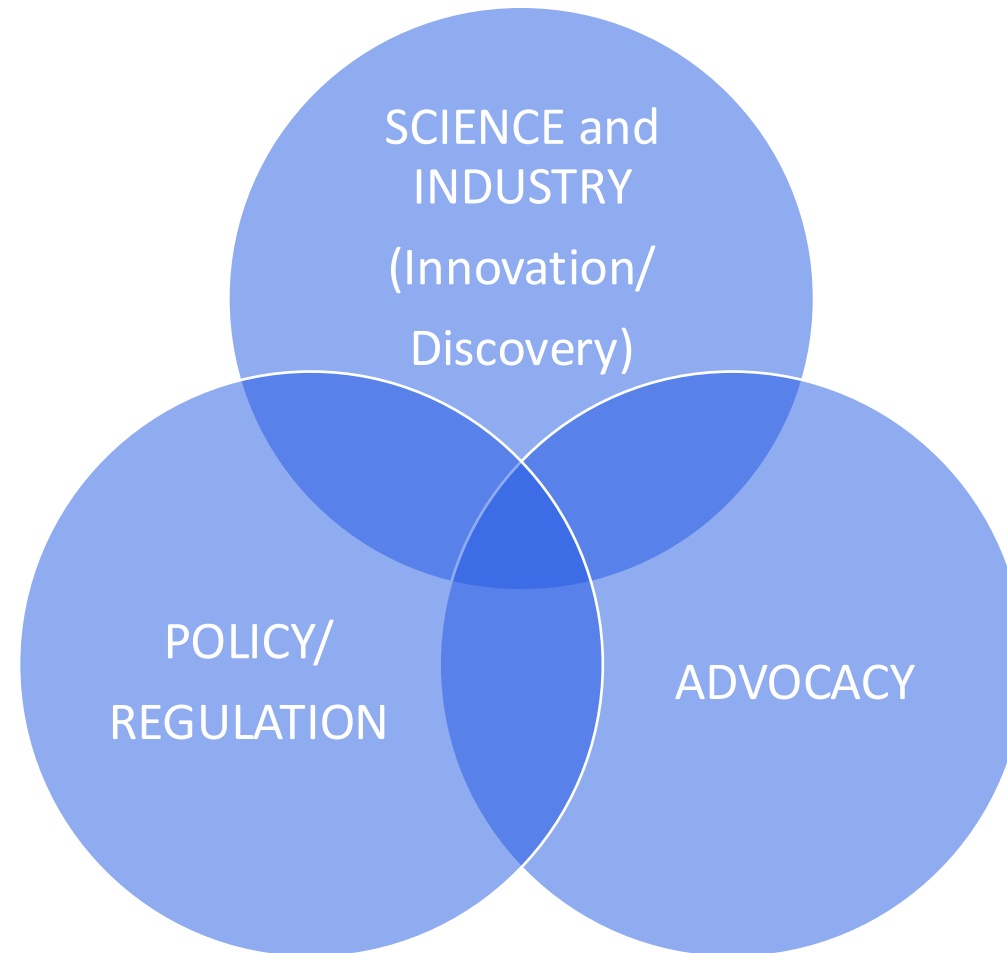
[Get Updates!](#)

WA State Phthalate Advisory Committee Member

Previous EPA TSCA Scientific Advisory Committee Member

# WILL TAKE ALL OF US

Synergy Across Sectors  
and Disciplines



# Acknowledgements

Study Participants

TIDES and MEND Study Teams

NIEHS K12ES033584

NIH 1UH30D035508

NIH R01ES02516

