Casual Friday Series

Forever Chemicals and the Fires They Start

A Biogenetix Clinical Presentation

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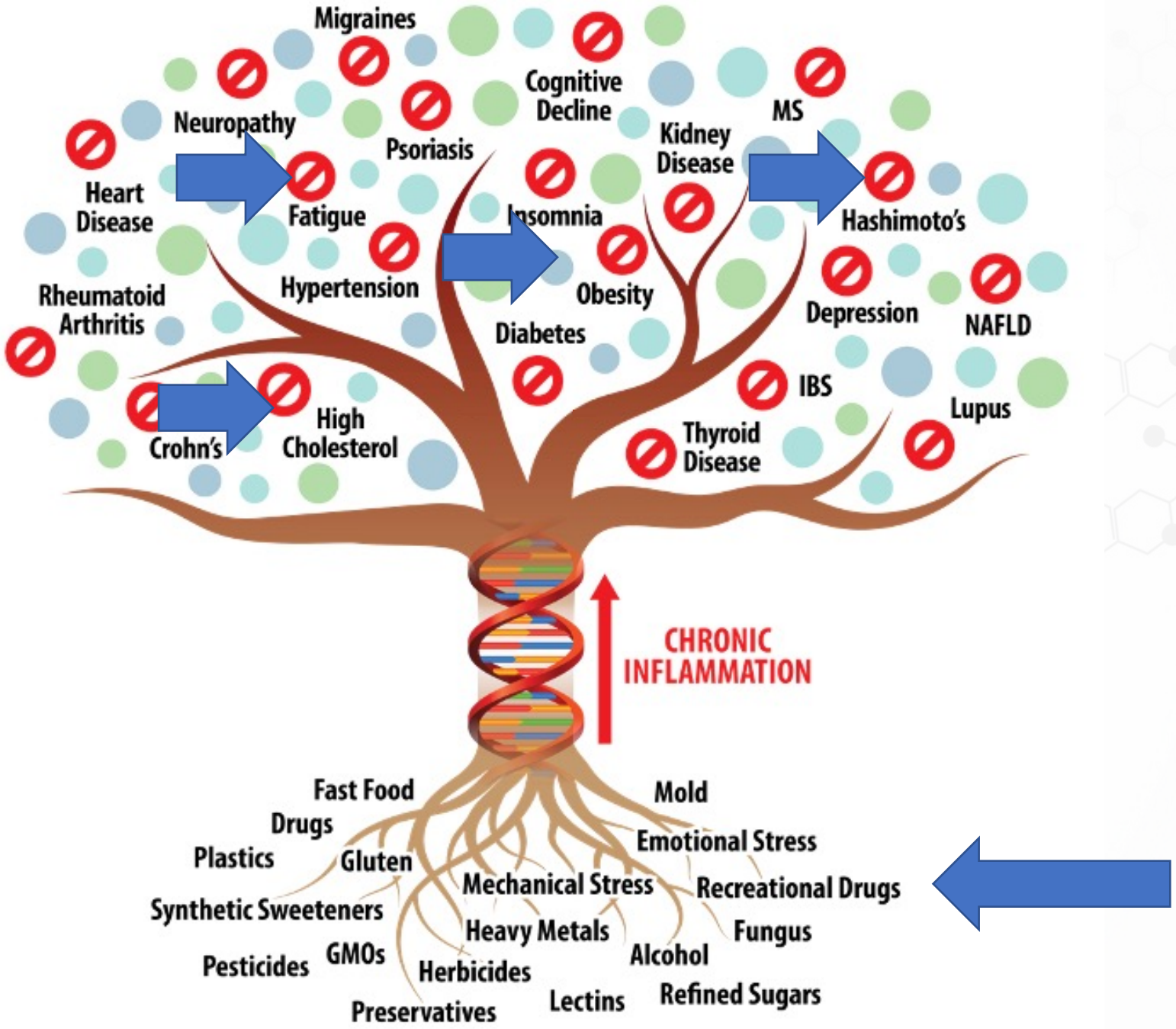
Disclaimer

- *Information in this presentation is not intended to diagnose, treat, reverse, cure, or prevent any disease. While this presentation is based on medical literature, findings, and text, The following statements have not been evaluated by the FDA.*
- *The information provided in this presentation is for your consideration only as a practicing health care provider. Ultimately you are responsible for exercising professional judgment in the care of your own patients.*


Migraines
Neuropathy
Psoriasis
Cognitive Decline
MS
Kidney Disease
Heart Disease
Fatigue
Insomnia
Hashimoto's
Hypertension
Obesity
Depression
NAFLD
Rheumatoid Arthritis
Diabetes
IBS
Lupus
Crohn's
High Cholesterol
Thyroid Disease
CHRONIC INFLAMMATION
Fast Food
Mold
Drugs
Emotional Stress
Plastics
Gluten
Mechanical Stress
Recreational Drugs
Synthetic Sweeteners
Heavy Metals
Fungus
Pesticides
GMOs
Alcohol
Herbicides
Lectins
Refined Sugars
Preservatives

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Bisphenol A (BPA) Factsheet

Print

Bisphenol A (BPA) is used to manufacture polycarbonate plastics. This type of plastic is used to make some types of beverage containers, compact disks, plastic dinnerware, impact-resistant safety equipment, automobile parts, and toys. BPA epoxy resins are used in the protective linings of food cans, in dental sealants, and in other products.

In the *Fourth National Report on Human Exposure to Environmental Chemicals (Fourth Report)*, CDC scientists measured BPA in the urine of 2,517 participants aged six years and older who took part in CDC's National Health and Nutrition Examination Survey (NHANES) during 2003–2004. By measuring BPA in urine, scientists can estimate the amount of BPA that has entered peoples' bodies.

CDC scientists found BPA in the urine of nearly all of the people tested, which indicates widespread exposure to BPA in the U.S. population.

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Per- and Polyfluorinated Substances (PFAS) Factsheet

Print

The per-and polyfluoroalkyl substances (PFAS) are a group of chemicals used to make fluoropolymer coatings and products that resist heat, oil, stains, grease, and water. Fluoropolymer coatings can be in a variety of products. These include clothing, furniture, adhesives, food packaging, heat-resistant non-stick cooking surfaces, and the insulation of electrical wire. Many PFAS, including perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), are a concern because they:

- do not break down in the environment,
- can move through soils and contaminate drinking water sources,
- build up (bioaccumulate) in fish and wildlife.

PFAS are found in rivers and lakes and in many types of animals on land and in the water.

KNOW YOUR ENVIRONMENT. PROTECT YOUR HEALTH.

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The most notorious PFAS chemicals – PFOA, the Teflon chemical, and PFOS, an ingredient in 3M's Scotchgard – were phased out in the U.S. under pressure from the Environmental Protection Agency after revelations of their hidden hazards. (They are still permitted in items imported to this country.) Numerous studies link these and closely related PFAS chemicals to:

- Testicular, kidney, liver and pancreatic cancer.
- Reproductive problems
- Weakened childhood immunity
- Low birth weight
- Endocrine disruption
- Increased cholesterol
- Weight gain in children and dieting adults

https://www.ewg.org/what-are-pfas-chemicals

KNOW YOUR ENVIRONMENT. PROTECT YOUR HEALTH.

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PFOA, PFOS and the related phased-out compounds are called "long chain" chemicals because they contain eight carbon atoms. Since these chemicals have been phased out, the EPA and the **Food and Drug Administration** have recklessly allowed the introduction of scores of "short chain" replacements, with six carbon atoms.

Chemical companies claim this structure makes them safer. But **DuPont admits** that the short-chain chemical **GenX** causes cancerous tumors in lab animals. A 2019 Auburn University study found **that short-chains may pose even worse risks** than long-chains, which supports scientists' growing agreement that **the entire class of PFAS are hazardous**.

https://www.ewg.org/what-are-pfas-chemicals

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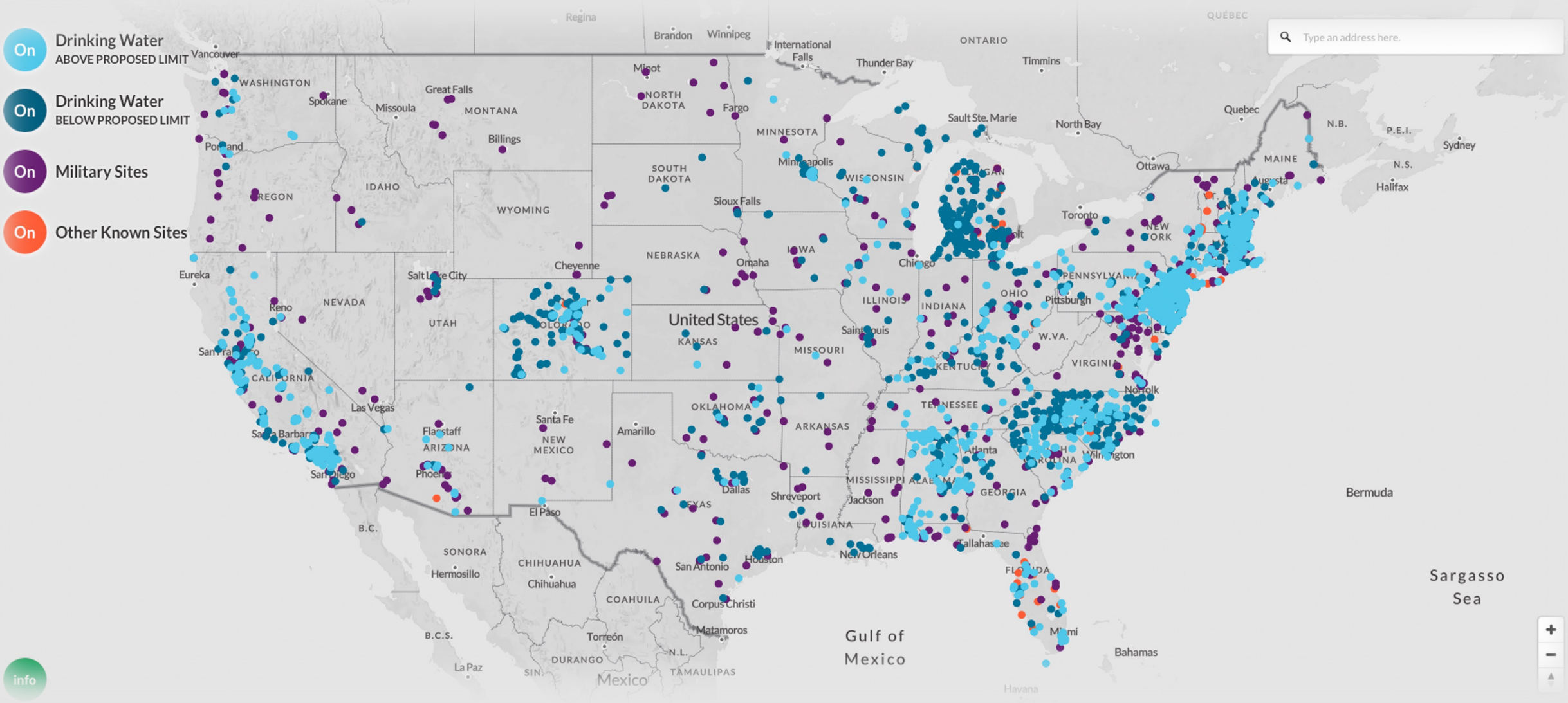
But drinking water is not the main route of PFAS exposure for most Americans:

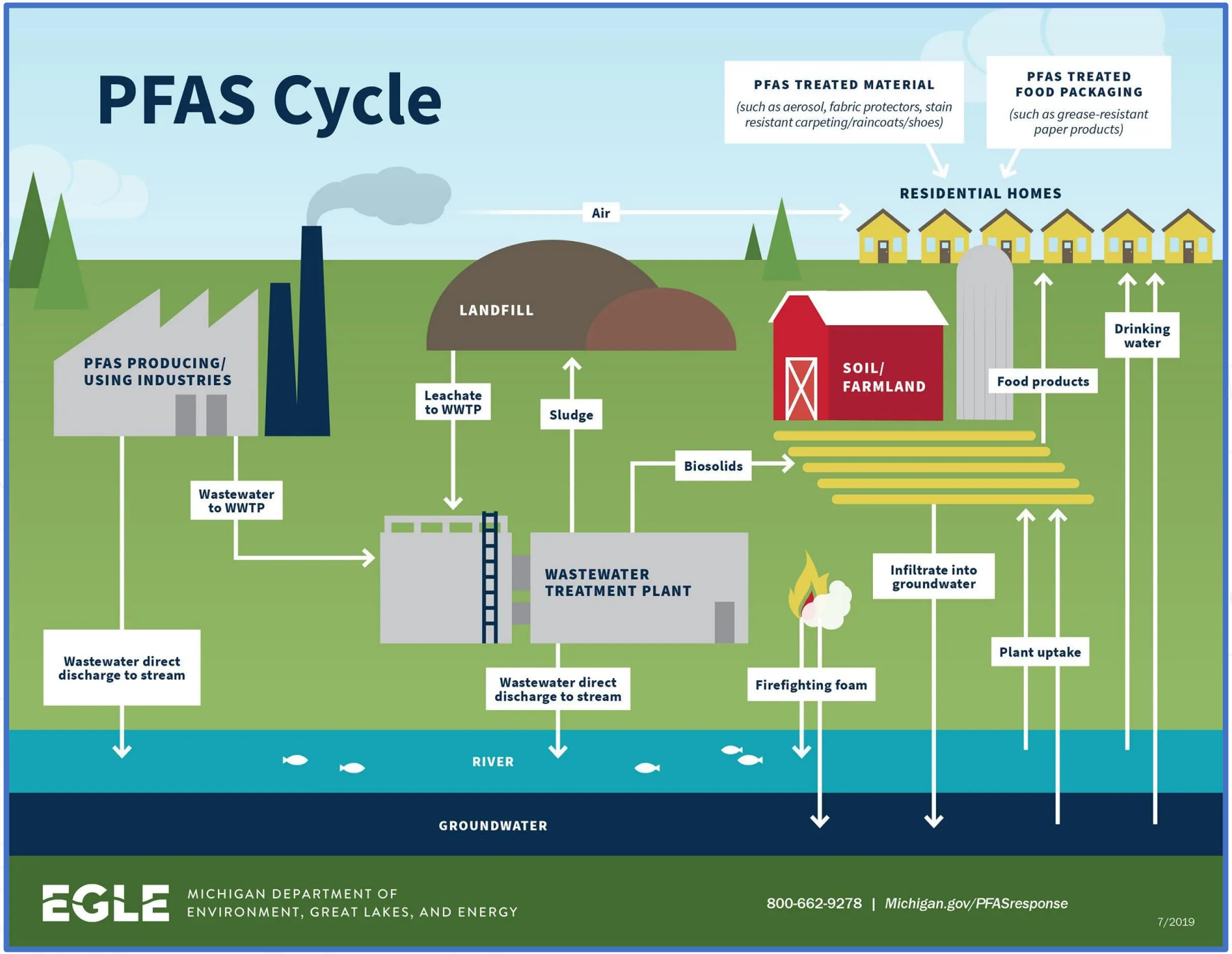
- Although the original PFAS chemical used to make Teflon has been taken off the market, Teflon and other brands of nonstick cookware are still produced with new PFAS that may be no safer.
- PFAS chemicals are widely used to coat paper and cardboard **wrappers for fast food and bakery goods**.
- PFAS chemicals lurk in **stain-resistant furniture and carpets** treated with Scotchgard, Stainmaster and other fabric treatments.
- **Clothes** labeled stain- or water-repellent, such as Gore-Tex jackets, usually contain PFAS chemicals.
- PFAS are even in **personal care products and cosmetics**.

https://www.ewg.org/what-are-pfas-chemicals


PFAS
Domestic &
Imported Sources
WATER-RESISTANT CLOTHING
FIREFIGHTING FOAMS
PAINT
PERSONAL CARE PRODUCTS
COSMETICS
NONSTICK COOKWARE
CARPET
FAST FOOD PACKAGING
PESTICIDES
STAIN-PROOF FURNITURE
MICROWAVE POPCORN BAGS
STAIN-RESISTANT PRODUCTS



https://www.ewg.org/interactive-maps/pfas_contamination/map/


PFAS Cycle
PFAS TREATED MATERIAL
(such as aerosol, fabric protectors, stain resistant carpeting/raincoats/shoes)
PFAS TREATED FOOD PACKAGING
(such as grease-resistant paper products)
RESIDENTIAL HOMES
Air
LANDFILL
PFAS PRODUCING/ USING INDUSTRIES
SOIL/ FARMLAND
Drinking water
Food products
Leachate to WWTP
Sludge
Biosolids
Wastewater to WWTP
WASTEWATER TREATMENT PLANT
Infiltrate into groundwater
Plant uptake
Wastewater direct discharge to stream
Wastewater direct discharge to stream
Firefighting foam
RIVER
GROUNDWATER
EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
800-662-9278 | Michigan.gov/PFASresponse
7/2019

Chemosphere
Volume 268, April 2021, 128852

PFAS exposure and overweight/obesity among children in a nationally representative sample

Sarah Dee Geiger [a b], Ping Yao [c], Michael G. Vaughn [d], Zhengmin Qian [e]

Perfluoroalkyl substances (PFASs) are a class of manmade chemicals commonly used in consumer product manufacturing. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are two of the most highly studied PFASs. Both are present in the blood of the most Americans. PFASs are associated with intermediate cardiovascular disease (CVD) outcomes, but their relationship with obesity, a risk factor for intermediate and advanced CVD, remains largely unconfirmed. In this context, we aimed to explore the relationship between PFASs and both overweight/obesity and abdominal obesity among children.

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Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are types of perfluoroalkyl substances (PFASs), a class of manmade chemicals. PFOA and PFOS are present in nearly every American's bloodstream (Calafat et al., 2007; Fourth National Report, 2018). PFASs have long half-lives, estimated to be 2.7 years for PFOA and 3.4 years for PFOS, so they persist in humans and the environment, bio-magnify in food webs, and bio-accumulate (Li et al., 2018). They are associated with developmental delays, endocrine disruption, cardiovascular disease (CVD), and other adverse health outcomes (Geiger et al., 2013a, 2014; Steenland et al., 2010; Sunderland et al., 2019). PFASs are used in the manufacture of surfactants, lubricants, polishes, paper and textile coatings, food packaging, and fire-retarding foams among many other consumer products (Trasande et al., 2012).

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Along with being a major public health issue in the U.S., childhood obesity is also a risk factor for intermediate and advanced CVD outcomes (Nadeau et al., 2011; Thompson et al., 2007). Body Mass Index (BMI) and waist circumference (WC) have been identified as measures for determining obesity and disease risk (CDC, 2015). The prevalence of obesity in US children has remained relatively unchanged over the last decade, with approximately 13.7 (18.5%) million US children being obese, including 1 in 5 (20.6%) adolescents (CDC, 2019). Similar studies have measured the effects of chemicals, like bisphenol A (BPA), and associations with BMI in children (Trasande et al., 2012), but there

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Overall, we observe a dose-response relationship between PFASs and overweight/obesity among children in a nationally representative sample. Specifically, children in PFOA exposure quartiles 3 and 4 experience significantly elevated ORs for overweight/obesity compared to their counterparts in quartile 1, in the most conservative multivariable-adjusted regression models.

Several studies have examined the relationship between prenatal PFOA and PFOS exposure and anthropometric measures at birth, age …

Exposure to perfluoroalkyl substances (PFAS) and dyslipidemia, hypertension and obesity in adolescents. The Fit Futures study

Maria Averina [a b], Jan Brox [a], Sandra Huber [a], Anne-Sofie Furberg [c d]

Highlights

- 18 PFAS were measured in serum of Norwegian adolescents in the cross-sectional study.
- PFOS, PFNA, PFDA, PFUnDA were positively associated with apo B, total and LDL cholesterol.
- ∑PFAS, PFOS, PFNA, PFDA, PFUnDA were positively associated with the risk of dyslipidemia.
- ∑PFAS, PFHxS, PFOS, PFOA and were positively associated with the risk of hypertension.
- PFHpS and PFHxS concentrations were positively associated with the risk of obesity.

https://www.sciencedirect.com/science/article/pii/S0013935121000347?via%3Dihub

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PMCID: PMC10159273
PMID: 37141244

Associations between Per- and Polyfluoroalkyl Substances Exposures and Blood Lipid Levels among Adults—A Meta-Analysis

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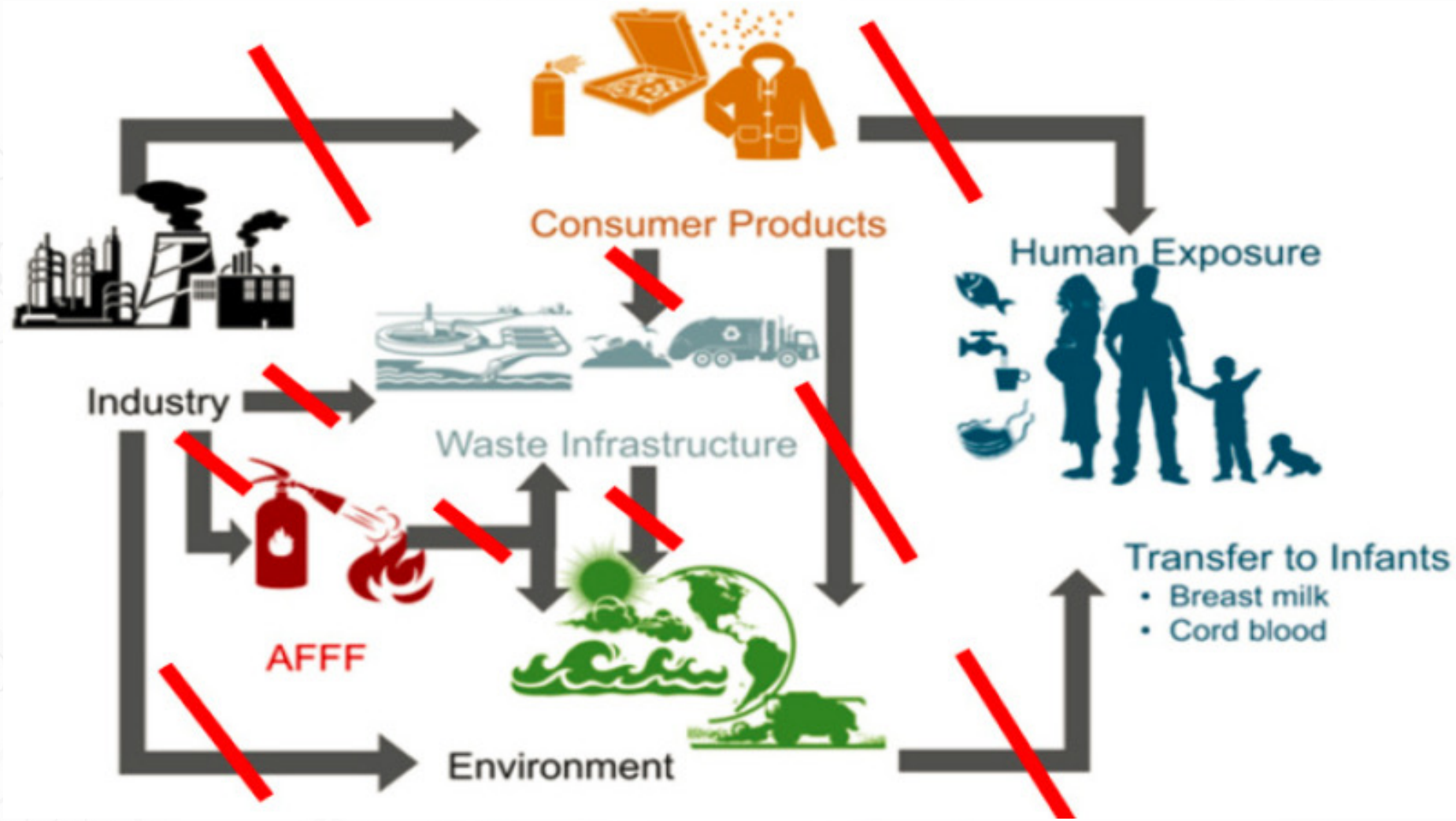
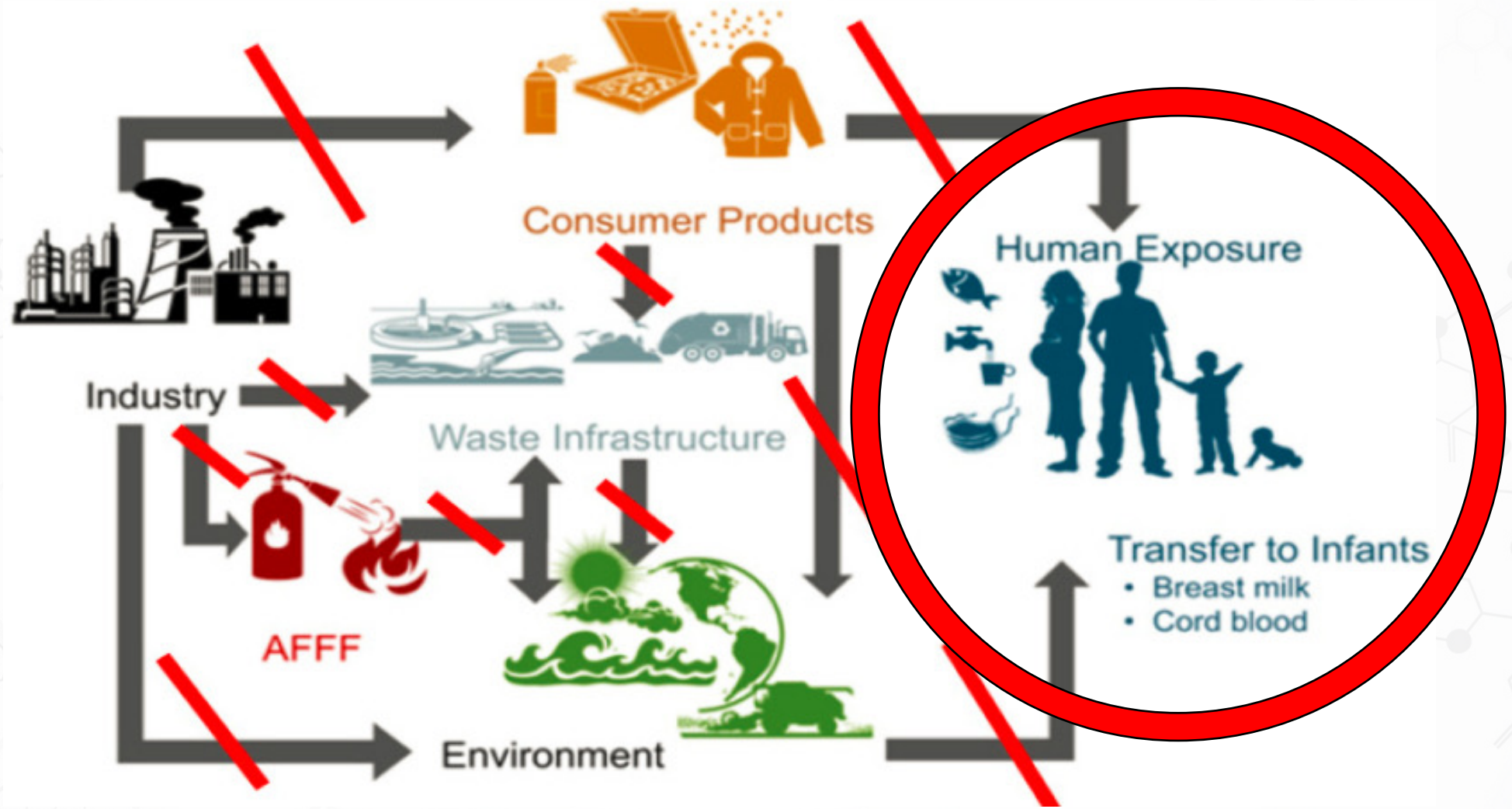
Clinical Significance Blood lipids are causal risk factors for CVD. It is estimated that each 1-mg/dL increase in LDL-C was associated with a 25% increased risk of developing coronary heart disease (CHD).[62] Based on our findings, every 1-IQR increase in PFOA or PFOS levels would be associated with a 37% and 54% increased risk of developing CHD, respectively. Likewise, the risk of developing CHD increased by 0.7% per mg /dL increase in TG levels.[63] In contrast, HDL-C levels were robustly associated with a lower risk of developing CHD.[64,65] It is difficult to extrapolate the present findings regarding various blood lipids to potential changes in CVD risk, and, as such, further studies are needed to directly address associations between PFAS and CVD risk in longitudinal studies. It is also worth mentioning that recent studies demonstrated that lipoprotein particles are a heterogeneous group of subspecies that bear different functions.[66] In particular, HDL-C particles that do not carry apolipoprotein C-III (apoC-III) were associated with a lower risk of developing CHD. In contrast, LDL-C and HDL-C particles that carry apoC-III were associated with an elevated risk of developing CHD. Interestingly, in the Prevention of Obesity Using Novel Dietary Strategies (POUNDS Lost) trial, PFOA levels were significantly associated with higher concentrations of HDL-C and LDL-C that carry apoC-III.[67] Thus, it is critical to further examine the associations between PFAS and the subspecies of blood lipoproteins defined by apolipoproteins and whether PFAS are associated with CVD risk.



https://www.ncbi.nlm.nih.gov/books/NBK584691/#:~:text=For%20PFOA%2C%20the%20dominant%20routes,et%20al.%2C%202008).



https://www.ncbi.nlm.nih.gov/books/NBK584691/#:~:text=For%20PFOA%2C%20the%20dominant%20routes,et%20al.%2C%202008).

Not All In-Home Drinking Water Filters Completely Remove Toxic PFAS

Research by Duke and NC State scientists finds most filters are only partially effective at removing PFAS. A few, if not properly maintained, can even make the situation worse.

- Reverse osmosis filters and two-stage filters reduced PFAS levels, including GenX, by 94% or more in water, though the small number of two-stage filters tested necessitates further testing to determine why they performed so well.
- Activated-carbon filters removed 73% of PFAS contaminants, on average, but results varied greatly. In some cases, the chemicals were completely removed; in other cases they were not reduced at all. Researchers saw no clear trends between removal efficiency and filter brand, age or source water chemical levels. Changing out filters regularly is probably a very good idea, nonetheless, researchers said.
- The PFAS-removal efficiency of whole-house systems using activated carbon filters varied widely. In four of the six systems tested, PFSA and PFCA levels actually increased after filtration. Because the systems remove disinfectants used in city water treatment, they can also leave home pipes susceptible to bacterial growth.

https://pubs.acs.org/doi/10.1021/acs.estlett.0c00004

https://nicholas.duke.edu/news/not-all-home-drinking-water-filters-completely-remove-toxic-pfas

Initial Steps

1. Carbon or RO filtered water.
2. Liver and Gut support.
3. Kidney support.
4. Testing (tox and PFAS panel)

The Wedge Protocol