Reducing Exposures to Harmful Chemicals

Daily exposure to potentially harmful chemicals is virtually unavoidable. They're in the food you eat, the water you drink, and even in the personal care products you use every day. It is easy to feel overwhelmed by the sheer number of exposures. The good news is that small, intentional diet and lifestyle changes can make a big difference. This guide is here to help you take practical steps to reduce your harmful chemical exposure and take charge of your health.

Chemicals Are Linked to Disease Risk

Seven categories of chemicals are especially common and associated with harmful health effects:

Type of Chemical	Definitions and Examples	Potential Harmful Health Effects
Toxic metals	Harmful metals that build up in your body over time Examples include arsenic, cadmium, lead, and mercury.	Exposure to high levels of toxic metals can be harmful to your body.[1] Low to moderate exposure is linked to many health issues, including cardiovascular disease,[2] chronic kidney disease,[3] cancer,[4] changes in thyroid hormone levels,[5] and thyroid cancer.[6]
Plastics and plasticizers	**Plastics** are used in many consumer products, like water bottles and food containers. Examples include polycarbonate and polystyrene. **Plasticizers** are mixed with plastics to make them flexible or durable. They are also found in personal care products like makeup and lotion.[7] Examples include bisphenol A (BPA) and phthalates. **Microplastics** are tiny pieces of plastic debris that result from plastic breakdown.	BPA and phthalates are connected to obesity,[8,9] metabolic syndrome,[10] and diabetes.[11] Polystyrene is linked to liver and kidney cell inflammation.[12] Microplastics are linked to impaired fetal growth,[13] harmful effects on sperm health,[14] and cardiovascular disease.[15]
Pesticides and herbicides	Chemicals used in agriculture and lawn care **Pesticides** kill insects, while **herbicides** kill weeds. Examples include organochlorine (OC) and organophosphate (OP) pesticides and glyphosate, a common herbicide.	Pesticide exposure is connected to Parkinson's disease,[16] cardiovascular disease,[17] colon cancer,[18] harmful effects on sperm health,[19] asthma, wheezing, and diabetes.[20] Herbicide exposure is linked to cancer[21] and reduced fertility.[22]

Type of Chemical	Definitions and Examples	Potential Harmful Health Effects
Industrial pollutants	Released from industrial processes such as the manufacture of electrical equipment and burning of coal and waste. Examples include dioxins, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs).	Dioxins are linked to metabolic syndrome.[23] PCBs are linked to cancer and immune suppression,[24] while PAHs are related to harmful effects on sperm health,[25] type 2 diabetes,[26] and cardiovascular disease.[27]
Flame retardants and non-stick chemicals	Flame retardants are added to materials to prevent or slow the spread of fire. Non-stick chemicals impart non-stick, stain-resistant, or waterproof properties. Known as "forever chemicals" due to their resistance to breakdown,[28] these chemicals share significant overlap in their properties and uses. Examples include polybrominated diphenyl ethers (PBDEs) and polyfluoroalkyl substances (PFAS). PFAS include perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).[29]	PBDEs are linked to gestational diabetes,[30] thyroid cancer,[6] and high blood pressure.[31] PFAS are connected to preterm birth and low birth weight,[32] gestational diabetes and high blood pressure during pregnancy,[33] and kidney and testicular cancer.[34]
Antimicrobial chemicals	Found in consumer products like soap and disinfectants. Examples include parabens and quaternary ammonium compounds (QACs), such as benzalkonium chloride.	Parabens are tied to increased inflammation[35] and eczema in children.[36] QACs are connected to skin and lung irritation.[37]
Airborne chemicals	Released into the air from air pollution, cooking, paint, stains, and furniture finishes. Examples include particulate matter 2.5 ($PM_{2.5}$), tiny particles less than 2.5 microns in diameter, and volatile organic compounds (VOCs), like formaldehyde and benzene.	Air pollutants are linked to asthma and wheezing,[38] metabolic syndrome,[39] type 2 diabetes,[40] cardiovascular disease,[41] cognitive decline and Alzheimer's disease,[42,43] brain cancer,[44] and lung cancer.[45]

Sources of Chemicals and How to Reduce Your Exposure

Potentially harmful chemical exposure occurs through food, water, personal care products, specific healthcare treatments, home environment, work, and hobbies.

There are many practical steps you can take to reduce your exposure to harmful chemicals. Start by selecting just a few things to focus on and build from there.

Clean Up Your Diet

Your diet can be a significant source of chemical exposure. However, by making practical dietary changes, you can minimize your exposure and support your health.

- **Choose low-fat meats or trim the fat from meat.** Some harmful chemicals build up and get stored in animal fats, including PAHs, OCs, OPs, dioxin, PCBs, and PBDEs.[46-50] Limiting animal fat intake may reduce your exposure to these chemicals.
- **Eat at least 25-30 grams of fiber daily.**[51,52] A high fiber intake is associated with reduced levels of toxic metals and PFAS.[53,54] Fiber may bind on to harmful chemicals, increasing their elimination.
- **Eat (or drink) plants alongside meals with fish.** Consuming phytonutrient-rich plant foods, such as garlic, broccoli, and green tea, with a meal that contains fish is associated with reduced mercury absorption.[55,56]

- **Eat a nutrient-dense diet.** A healthy dietary intake of nutrients like calcium, iron, and zinc, is connected to lower toxic metal levels.[57,58] Talk to your healthcare provider about how to test your nutrient levels and optimize your nutrient intake.
- **Be careful about eating freshwater fish.** Freshwater fish are often contaminated with mercury and PFOS.[59,60] Consult local wildlife agencies for guidance before eating freshwater fish.
- **Be careful about eating farmed fish.** Studies suggest that farmed fish have more microplastics and PCBs than wild-caught fish.[61-63] However, not all farmed fish are the same. There are an increasing number of sustainable and ethical options for farmed fish. Do your research before purchasing farmed fish to ensure you choose a high-quality option.
- **Choose safe seafood.** Some types of seafood, like tuna, shark, and swordfish are higher in mercury than others, like salmon and herring. The Environmental Working Group (EWG) offers a seafood guide that can help you choose safe seafood in the U.S.[64] Seafood Watch provides international seafood ratings.[65]
- **Avoid plastic food storage containers.** They may release phthalates into food.[7-9,66,67] Use glass, ceramic, or stainless-steel containers for reheating and storing food.
- **Use stainless-steel or glass water bottles instead of plastic water bottles.** Plastic water bottles are linked to elevated BPA and microplastics in water.[8,12-15,68,69] Beware of "BPA-free" water bottles because these containers may still leach potentially harmful BPA-like chemicals.[70,71]
- **Limit your intake of takeout/fast food.** Water- and oil-resistant PFAS chemicals often line takeout food containers and can migrate into food.[72,73] Some containers have polystyrene, a plastic that can leach into food.[74,75]
- **Bring a reusable stainless-steel mug to the coffee shop.** Disposable coffee cups are lined in plastic, which can leach into hot liquids such as coffee and tea.[76,77] Drinking coffee or tea from your own reusable stainless-steel mug may help you avoid these contaminants.
- **Avoid using plastic wrap to package food.** Plastic wrap can release chemicals such as phthalates and microplastics, which might end up in your food.[7-9,11-13,78,79] Try using beeswax wrap or glass food storage containers with reusable lids.
- **Try to limit your intake of canned foods.** The linings of canned foods contain BPA and BPA alternatives that can leach into the food inside the can.[80-82]
- **Choose loose-leaf tea or tea in biodegradable paper teabags.** Research links plastic teabags to microplastic release into tea.[83,84]
- **Choose organic produce when possible.** Eating organic produce is associated with a lower exposure to pesticides.[85] Refer to the Environmental Working Group (EWG) Shopper's Guide to Pesticides in produce when grocery shopping in the U.S.[86] In Europe, Pesticide Action Network Europe provides similar information about pesticides on fruits and vegetables.[87]
- **Wash produce in baking soda and water.** This strategy is linked to reduced pesticides on the surface of apples and lettuce,[88,89] and might work for other fruits and vegetables. This method may not be ideal for delicate fruits like berries.

Reduce Personal Care and Lifestyle Exposures

Your daily lifestyle choices significantly impact your chemical exposure because many everyday items contain potentially harmful chemicals.[90] By carefully reading labels and seeking safer alternatives, you can take meaningful steps to reduce your exposure.

- **Stop smoking and try to avoid second-hand smoke and third-hand smoke.** Cigarettes on the market contain more than 7,000 chemicals, including harmful PAHs.[91] These chemicals are inhaled directly by smokers but also appear in "second-hand" and "third-hand" smoke. Second-hand smoke comes from burning tobacco products and smoke exhaled by smokers. Third-hand smoke is the residue left behind by tobacco smoke that builds up on surfaces and in dust.
- **Look for personal care products labeled "paraben-free" and "phthalate-free."** These two potentially harmful chemicals are common in personal care products.[7-9,35,36,92,93] Personal care products include any items used to support hygiene and beauty, including makeup, shampoo, conditioner, toothpaste, and deodorant.
- **Avoid products labeled "antibacterial."** These products often contain QACs.[37] Common antibacterial products include hand soap and hand wipes.
- **Watch out for "fragrance" or "parfum" on personal care product labels, including perfume and cologne.** "Fragrance" and "parfum" may contain phthalates.[7-9,94]
- **Try a safe cosmetics database.** To locate safe personal care products in the U.S., consider using something like the EWG's cosmetics database.[95]
- **Choose clothing made with natural materials like cotton, wool, silk, and bamboo, when possible, instead of synthetic materials.** Synthetic fabrics may release microplastics.[12-15,96]

Limit Home and Office Exposures

Since we spend most of our time indoors, our homes and workplaces have become major sources of chemical exposure.[90] In addition, chemical exposure varies based on your neighborhood. Living near a busy roadway, hazardous waste and industrial sites, animal feeding operations, or farmland is linked to chemical exposure.[97-102] No matter where you live, you can take steps to reduce your exposure.

- **Use filtered, reverse osmosis, or distilled water for drinking and cooking.**[103] Tap water and well water may contain contaminants such as phthalates and PFAS.[104-106] The EWG's Tap Water Database provides information about common water contaminants in the U.S.[107] In Europe, the European Environment Agency provides information to help you identify possible water contaminants.[108] Once you know what's in your drinking water, you can get a water filter that helps remove the contaminants.
- **Remove your shoes when entering your home.** Your shoes pick up many substances when you wear them outside. Studies link taking shoes off before entering a building to reduced dust, lower levels of toxic metals indoors, and improved indoor air quality.[109,110]

- **Consider using an air purifier with a HEPA (high-efficiency particulate air) filter in your home or office.** Using an air purifier with a HEPA filter is associated with lower levels of particulate matter, including $PM_{2.5}$, and better indoor air quality.[111,112]
- **Choose fragrance-free and solvent-free cleaning agents.** Fragrances and solvents in everyday cleaning products may reduce indoor air quality and irritate the lungs.[113] The EWG's Guide to Healthy Cleaning can help you shop for safe cleaning products in the United States.[114]
- **Cover or replace old foam furniture.** Furniture with foam cushioning (couches, chairs, etc.) made before 2013 were often produced with materials that contain harmful chemicals. Replacing these older foam furniture pieces is linked to lower levels of flame retardants (PBDEs) in household dust.[115]
- **Avoid non-stick pots and pans.** Most non-stick pots and pans, including Teflon®, contain PFCs, which may migrate into food.[116] Choose food-grade stainless steel, cast iron, enameled cast iron, and oven-safe glass cookware.
- **Use wood cooking utensils instead of plastic.** Plastic cooking utensils are associated with an increased release of microplastics into food.[117]
- **Avoid buying stain-resistant clothing, carpet, or furniture.** Having stain-resistant products and carpeting at home is linked to higher levels of PFAS in household dust.[118]
- **Try to use low- or no-VOC paints, glues, stains, and finishes in your home.** VOCs from home finishes are connected to poor indoor air quality.[119]
- **Avoid products made with particleboard or medium-density fiberboard.** These standard construction and furniture materials release VOCs, which are linked to poor indoor air quality.[120,121]

Minimize Healthcare Exposures

Some healthcare procedures or treatments can expose you to chemicals. Being informed about them can help you make safer choices whenever possible.

- **Find out if your topical prescription cream(s) contain phthalates.** Medical creams are a common source of phthalates.[122] If yours does, discuss your options with your healthcare provider. Do not discontinue any medications.
- **Choose composite over metallic dental fillings.** Metallic fillings can release mercury into your mouth.[123]
- **If you want to have your metal fillings removed, choose a qualified dentist to do the work.** Your dentist should be trained in safe dental amalgam removal because improper metal amalgam removal can release harmful amounts of mercury.[124] The International Academy of Oral Medicine and Toxicology can help you find a qualified dentist.[125]

Reduce Work and Hobby Exposures

Your job can expose you to harmful chemicals. People who work in the automotive industry, agriculture, construction, janitorial or housekeeping services, and the military may have increased chemical exposures.[126-132] Some hobbies can also lead to chemical exposure.

- **If you use chemicals at work, identify your exposures by consulting the Material Safety Data Sheet (MSDS) for every chemical product you use.** MSDS lists all the hazardous ingredients in a product, the chemicals with which the product can react, and adverse health effects. Europe has Extended Safety Data Sheets that provide safety data about various chemicals.[133]
- **Wear and maintain all appropriate personal protective equipment at work.** Keep toxin-contaminated work clothes out of your home.
- **Avoid handling receipts.** BPA coats most receipts, and handling receipts can cause skin to absorb BPA.[134] If you frequently handle receipts at work, consider wearing gloves or wash your hands after handling receipts.
- **Maintain a space separate from your home for hobbies that expose you to metals, solvents, or other chemicals.** Ensure adequate ventilation while performing hobbies. Change your clothes before entering your home and promptly wash contaminated clothes.
- **If you like gardening, use natural gardening methods without chemical pesticides or herbicides.** Beyond Pesticides offers suggestions for starting your own organic garden free of pesticides and herbicides.[135]
- **If you enjoy golfing, change out of your golf clothes once you get home and leave your shoes outdoors.** Many pesticides are applied to golf courses.[136]

Progress Over Perfection

It's impossible to completely avoid all potentially harmful chemicals in today's world, and that's okay. You don't need to be perfect to make positive strides – just doing your best with the suggestions in this guide will help you minimize your exposures and support your health!

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