

## Hormone Disrupting Chemicals

**DISCLAIMER: the following is not meant to treat anyone with advice or tell you what you should do, such as relative to use of medication, exercise, or changing your diet. The information in this handout is merely offering what has been published in the research literature, as well as based on my professional experience. Talk to a doctor or other appropriate professionals as to what is best for your own specific needs.**

**It should also be appreciated that everyone has their own perspective on how to improve health. Nutritionists do it through food. Physicians do it through medicine. Psychologists do it through changing thoughts, feelings, and behaviors. Consequently, what is offered here is a reflection of my own bias and perspective.**

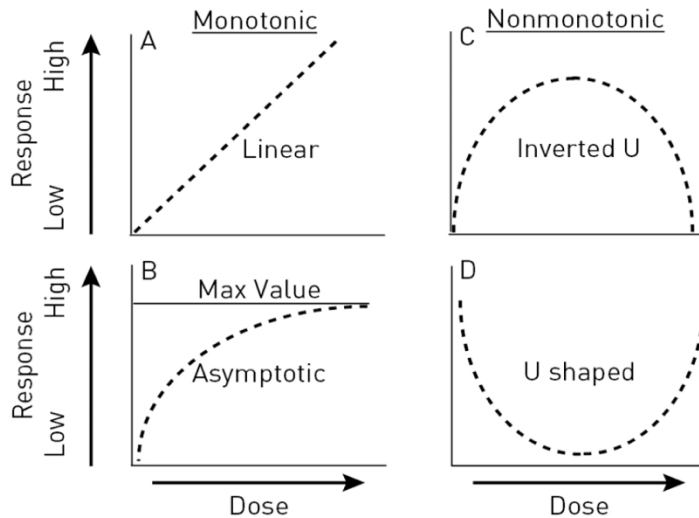
Hormones are powerful chemicals that play many roles in our bodies. They control issues like sexual and gender development, thyroid, blood sugar, appetite and weight control, digestion, sleep cycles, mood, growth and development, and blood pressure.

There are chemicals that we are exposed to that disrupt such hormones and they are sometimes called endocrine disrupting chemicals (EDC). Over 1,000 EDC's are known to exist. As of 2017 the EPA had not banned or regulated even one chemical based on it being an EDC. The FDA did ban triclosan (an antibacterial) due to it being an EDC.

Two researchers, Smith and Lourie wrote a book called "Slow Death by Rubber Duck." They used themselves as guinea pigs. They looked at their baseline levels of chemicals like phthalates and PFOA and then used stuff like air freshener or stain repellent and sat in the room and watched tv. A day or two later their blood levels of such chemicals had gone up significantly. It should also be appreciated that government regulators tend to look for overt poisoning and not chronic effects measured over years or decades.

It has been found that EDCs can impact future generations of those who are exposed. One well known example of this was a drug called DES (diethylstilbestrol) that was used from about 1940-1971, with its heyday in the '50s. Boys and girls born exposed to it in utero were at higher risk for certain cancers, miscarriage, and ectopic pregnancies. Research is now being done on the grandchildren to the women who were exposed.

Nonmonotonic Dose-Response Relationships are Common for Endocrine-Disrupting Chemicals



It has been said that 'The dose makes the poison.' One implication is that that anything consumed at a high enough level of consumption can kill you, even water.

Graphs A & B show the direction of the response does not change as the dose increases. Graphs C & D show the direction of the response changing as the dose increases. So that saying is outdated.

Nontoxic: guide to living healthy in a chemical world, Aly Cohen & Frederick vom Saal.

With that saying comes another implication that low doses are safer. There was research done on DES in mice. High doses were found to block prostate growth while low doses greatly stimulated such growth. The way to understand this is that hormones work in the body at miniscule levels. Very small amounts can turn on some genes. High doses may turn on different genes. And at very high levels genes might be shut down because the level is toxic. Picture this: if you take a single drop of water how many molecules of BPA (discussed directly below) would be found in it? 1? 1,000? 1 million? Nope, 132 billion. And each of those molecules can turn on or off cell receptors just like hormones do. Another example is that high doses of Tamoxifen block breast cancer cells – but low doses of this chemo drug stimulate breast cancer. Even small disruptions in hormones can cause an increased risk in various diseases like diabetes, cancer, cardiovascular, birth defects, premature birth, neurodevelopmental disorders, and infertility.

One example of this hormone disrupting process is that until the 20<sup>th</sup> century the average age of girls hitting puberty was 16-17 years old. Currently some are reaching it before the age of 8. Some of the most widespread and well-studied EDC's include:

- ❖ Bisphenols (BPA and others). BPA was initially developed as a synthetic estrogen and originally given to reduce the risk of issues like miscarriage. It was supplanted in the 1950's when DES (diethylstilbesterol) came along which was 'better and more powerful' (and it was later pulled because it caused problems like cancer). BPA can be found in food and beverage packaging such as the lining of cans for food, cash register receipts, sealants used by dentists, and other consumer products. It is still estrogen-like despite being used for common, non-medical purposes. It can leach into food and beverages, as well as enter our skin. It has been said that 95% of BPA is used to make polycarbonate (#7 as to the plastic type) and epoxy resins. 93% of Americans age 6 on up test positive for BPA according to the CDC. However, it is also used in clothing such as leggings, sport bras, and athletic shirts. Testing done by the

Center for Environmental Health found 14 brands (e.g. Nike, Patagonia, Sweaty Betty, Adidas, Champion, Athleta) that could expose people up to 40 times the safe level of BPA as to California law (3 mcg/day through skin exposure). BPA can be absorbed through the skin such as handling receipts for just seconds or a few minutes. Clothing is meant to be worn for hours at a time, plus people can become sweaty in them so there are reasons to be concerned. 'BPA-free' is not necessarily indicative that a product is safe because the substitute, often BPS, may be equally bad if not worse such as containing a cousin of BPA. Early research shows that BPF and BPS have the same activity as BPA. Nearly 81% of Americans have BPS detectable in their urine, and it can impact cells the ways BPA does. BPS in pregnant mice affects maternal behavior and how the brain is 'wired' (as laid out in an article called 'The Plastic Mother').

- Bisphenols have been linked with cardiac problems along with greater risk of hormone-related cancers such as breast and prostate, along with early onset puberty in girls.
- It can also affect birthweight of babies, premature birth, developmental defects, and recurrent miscarriage, based on a meta-review (Journal of Maternal and Fetal Neonatal Medicine, "Bisphenol A and adverse pregnancy outcomes: a systematic review of the literature" Vasilios Pergialiotis et al, Dec. 2018).
- There is at least an inverse association between BPA and thyroid function as to total T4 and TSH.
- In utero exposure to BPA may be a culprit in some kids developing ADHD hyperactivity (Environment International, "Prenatal exposure to BPA and hyperactivity in children: a systematic review and meta-analysis" Johanna Rochester et al, May 2018). They concluded that BPA is a "presumed human health hazard" for developing hyperactivity, which is a step below 'known hazard.'
- There is also research (Medical Hypotheses, "The effect of BPA exposure on insulin resistance and type 2 diabetes – the impact of muscle contraction" Madison Wade et al, 7/2020) that found that BPA might be a contributor to type 2 diabetes. "BPA impairs the pathway by which insulin stimulates glucose uptake ...[and] insulin resistance is developed."
- A study done in China on factory workers found that men with detectable levels of BPA in their urine were more than
  - 4 times as likely to have low sperm counts
  - 3 times as likely to have poor sperm vitality
  - twice as likely to have lower sperm motility

compared to men with undetectable BPA in their urine.

Then there are the effects on women. Those with the highest levels have an 83% increased risk of miscarriage during the first trimester. BPA is also believed to contribute to PCOS. And exposure to BPA early in life and adulthood has been correlated with poor egg quality and

might be involved with premature ovarian insufficiency leading to an earlier age for menopause. It can also cause breast and prostate cancer. There are links to asthma in school-age girls, and diabetes too.

In animal studies BPA has been shown to alter dopamine, a neurotransmitter in the brain that is implicated in ADHD relative to its role for being alert and focused. BPA may also interact with thyroid hormone which contributes to brain development. The best way to reduce bisphenol intake is to avoid canned foods.

- ❖ Phthalates are xenoestrogens meaning they behave like that hormone when they get into the body. They predispose both women and men to infertility, early menopause, low sperm counts, testicular atrophy, and structural abnormality of the male reproductive system. They also can predispose both genders to estrogen-dependent cancers such as breast, along with asthma, eczema, and rhinitis in kids. Research on dibutyl phthalate involving approximately 10 million 'women years' found a near doubling of risk for breast cancer with cumulative exposure of more than 10,000 mg. ([Journal of Clinical Oncology](#), "Phthalate exposure and breast cancer incidence: a Danish nationwide cohort study" Thomas Ahern et al, July 2019). Acceptable levels set by government exist for only a few chemicals, and they are said not to reflect the most current scientific knowledge about them as to adverse health effects. One example of this is DEHP which has been linked to insulin resistance, high blood pressure, reproductive problems, and early menopause to name some of its effects. And these can occur at levels below those set by the U.S. and European regulators. It was the most common phthalate found in tests done by Consumer Reports with more than half of the products tests having levels above those shown by research as causing problems. Moreover, such people can be exposed to such chemicals through multiple sources and not just a single food. So to say 'An amount of 'x' is safe for this food' overlooks such other sources of exposure that are occurring.

Consumer Reports magazine ran some tests which they published in February 2024 ("The plastic chemicals hiding in your food" Lauren Friedman).

|   | TOTAL PHTHALATES<br>PER SERVING<br>(NANOGRAMS)* |
|---|---|
| <b>BEVERAGES</b>  |   |
| Brisk Iced Tea Lemon (can)  | 7,467   |
| Coca-Cola Original (plastic)  | 6,167   |
| Lipton Diet Green Tea Citrus (plastic)                                  | 4,433   |
| Poland Spring 100% Natural Spring Water (plastic)                       | 4,217   |
| Juicy Juice 100% Juice Apple (plastic)                                  | 3,348   |
| Pepsi Cola (can)  | 2,938   |
| Juicy Juice 100% Juice Apple (cardboard box)                            | 2,260   |
| Gatorade Frost Thirst Quencher Glacier Freeze (plastic)                 | 1,752   |
| Polar Seltzer Raspberry Lime (can)                                      | 0   |
| <b>Canned Beans</b>   |   |
| Hormel Chili With Beans (can)   | 9,847   |
| Bush's Chili Red Beans Mild Chili Sauce (can)                           | 6,405   |
| Great Value (Walmart) Baked Beans Original (can)                        | 6,184   |
| Bush's Baked Beans Original (can)                                       | 3,709   |
| <b>Condiments</b>   |   |
| Mrs. Butterworth's Syrup Original (plastic)                             | 1,010   |
| Hunt's Tomato Ketchup (plastic)   | 574   |
| Sweet Baby Ray's Barbecue Sauce Original (plastic)                      | 22  |
| <b>Dairy</b>  |   |
| Fairlife Core Power High Protein Milk Shake Chocolate (plastic)         | 20,452  |
| SlimFast High Protein Meal Replacement Shake Creamy Chocolate (plastic) | 16,916  |
| Yoplait Original Low Fat Yogurt French Vanilla (plastic)                | 10,948  |
| Tuscan Dairy Farms Whole Milk (plastic)                                 | 10,932  |
| Ben & Jerry's Ice Cream Vanilla (paperboard carton)                     | 6,387   |
| Wholesome Pantry (ShopRite) Organic Whole Milk (carton)                 | 4,620   |
| Great Value (Walmart) Ice Cream Homestyle Vanilla (paperboard)          | 3,068   |
| Jell-O Pudding Snacks Original Chocolate (plastic)                      | 1,756   |
| Sargento Sliced Natural Cheddar Cheese Sharp (plastic)                  | 1,481   |
| Land O'Lakes Butter Salted (paper wrap/cardboard)                       | 581   |

| <b>Fast Food</b>   | PER SERVING<br>(NANOGRAMS)* |
|--|-----------------------------|
| Wendy's Crispy Chicken Nuggets (paperboard)                  | 33,980                      |
| Moe's Southwest Grill Chicken Burrito (aluminum foil)        | 24,330                      |
| Chipotle Chicken Burrito (aluminum foil)                     | 20,579                      |
| Burger King Whopper With Cheese (paper)                      | 20,167                      |
| Burger King Chicken Nuggets (paper bag)                      | 19,782                      |
| Wendy's Dave's Single With Cheese (aluminum foil/paper wrap) | 19,520                      |
| McDonald's Quarter Pounder With Cheese (cardboard)           | 9,956                       |
| Wendy's Natural-Cut French Fries (paperboard)                | 8,876                       |
| Burger King Classic French Fries (paperboard)                | 8,512                       |
| McDonald's Chicken McNuggets (cardboard)                     | 8,030                       |
| Little Caesars Classic Cheese Pizza (cardboard box)          | 5,703                       |
| McDonald's French Fries (paperboard)                         | 5,538                       |
| McDonald's Quarter Pounder Hamburger Patty (varied)          | 5,428                       |
| Taco Bell Chicken Burrito (paper wrap)                       | 4,720                       |
| Domino's Hand Tossed Cheese Pizza (cardboard box)            | 4,356                       |
| Wendy's Dave's Single Hamburger Patty (varied)               | 3,629                       |
| Burger King Whopper Hamburger Patty (varied)                 | 2,870                       |
| Pizza Hut Original Cheese Pan Pizza (cardboard box)          | 2,718                       |

| <b>Grains</b>   | TOTAL PHTHALATES<br>PER SERVING<br>(NANOGRAMS)* |
|---|---|
| General Mills Cheerios Original (paperboard box with plastic bag inside)          | 10,980  |
| Success 10 Minute Boil-in-Bag White Rice (paperboard box with plastic bag inside) | 4,308   |
| Pepperidge Farm Farmhouse Hearty White Bread (plastic bag)                        | 2,184   |

| <b>Infant Food</b>   | TOTAL PHTHALATES<br>PER SERVING<br>(NANOGRAMS)* |
|--|---|
| Gerber Mealtime for Baby Harvest Turkey Dinner (glass with lined lid)            | 4,267   |
| Similac Advance Infant Milk-Based Powder Formula (can)                           | 4,202   |
| Beech-Nut Fruities Pouch Pear, Banana & Raspberries (pouch)                      | 2,826   |
| Gerber Cereal for Baby Rice (plastic)  | 1,599   |
| Happy Baby Organics Clearly Crafted Banana & Strawberries (glass with lined lid) | 1,300   |
| Happy Baby Organic Milk-Based Infant Powder Formula With Iron (plastic)          | 977   |
| Gerber Organic for Baby Pouch Apple Zucchini Spinach Strawberry (pouch)          | 706   |

|  | TOTAL PHTHALATES<br>PER SERVING<br>(NANOGRAMS)* |
|--|---|
| <b>Meat and Poultry</b>  |   |
| Perdue Ground Chicken Breast (plastic)                                 | 9,985   |
| Trader Joe's Ground Pork 80% Lean 20% Fat (plastic wrap)               | 5,503   |
| Premio Foods Sweet Italian Sausage (foam tray with plastic wrap)       | 4,725   |
| Libby's Corned Beef (can)  | 4,088   |
| Bar S Chicken Jumbo Franks (plastic)                                   | 3,295   |
| Stop & Shop Ground Beef 80% Lean 20% Fat (foam tray with plastic wrap) | 2,729   |
| Applegate Naturals Oven Roasted Turkey Breast (plastic)                | 2,295   |
| Swanson White Premium Chunk Chicken Breast (can)                       | 1,376   |
| Johnsonville Smoked Sausage Beef Hot Links (plastic)                   | 912   |

|  | TOTAL PHTHALATES<br>PER SERVING<br>(NANOGRAMS)* |
|--|---|
| <b>Packaged Fruits and Vegetables</b>              |   |
| Del Monte Sliced Peaches in 100% Fruit Juice (can) | 24,928  |
| Green Giant Cream Style Sweet Corn (can)           | 7,603   |
| Del Monte Fresh Cut Italian Green Beans (can)      | 5,264   |
| Progresso Vegetable Classics Vegetable Soup (can)  | 2,888   |
| Birds Eye Steamfresh Cut Green Beans (plastic bag) | 907   |
| Hunt's Tomato Sauce (can)                          | 680   |

|  | TOTAL PHTHALATES<br>PER SERVING<br>(NANOGRAMS)* |
|--|---|
| <b>Prepared Meals</b>  |   |
| Annie's Organic Cheesy Ravioli (can)   | 53,579  |
| Chef Boyardee Beefaroni Pasta in Tomato and Meat Sauce (can)                     | 13,628  |
| Banquet Chicken Pot Pie (paperboard)   | 12,494  |
| Campbell's Chunky Classic Chicken Noodle Soup (plastic)                          | 6,768   |
| Chef Boyardee Big Bowl Beefaroni Pasta in Meat Sauce (plastic)                   | 5,064   |
| Campbell's Chicken Noodle Soup (can)   | 2,848   |
| Red Baron Brick Oven Cheese-Trio Pizza (paperboard box with plastic wrap inside) | 1,707   |

|   | TOTAL PHTHALATES<br>PER SERVING<br>(NANOGRAMS)* |
|---|---|
| <b>Seafood</b>  |   |
| Chicken of the Sea Pink Salmon in Water Skinless Boneless (can) | 24,321  |
| King Oscar Wild Caught Sardines in Extra Virgin Olive Oil (can) | 7,792   |
| Snow's Chopped Clams (can)                                      | 4,380   |
| StarKist Wild Caught Light Tuna in Water (pouch)                | 1,735   |
| StarKist Chunk Light Tuna in Water (can)                        | 1,687   |
| Season Brand Sardines in Water Skinless & Boneless (can)        | 1,258   |

\*Includes the 10 phthalates we tested for: BBP, DBP, DIBP, DCHP, DEP, DEHP, DnHP, DMP, DINP, and DNOP. We also tested for three chemicals used as phthalate substitutes (DEHA, DEHT, and DINCH), and three bisphenols (BPA, BPS, and BPF), which are not shown in this chart.

Some of the common abbreviations for these chemicals are:

- BBP
- DEP
- DIDP
- DINP
- DMP
- DEHP
- DNOP
- DBP

They are used in making plastics so they will be more flexible and over 60% are used to plasticize vinyl. They can be released from such plastic into the air, water, saliva, blood, IV solution, nutritional formulas, and other materials. Depending on how they are used 2-50% of the phthalate content can be released from the product over its life and so it can obviously get into the environment. Fats and oils can draw phthalates out of a product, or by cleaning it in a dishwasher or heating it in a microwave. Wear and tear in the form of micro scratches can cause nanoparticles to break off and contaminate food. Personal care products may contain 20% or more concentration of such chemicals. Other consumer products may contain a concentration as high as 80%. Given how ubiquitous this chemical is it can be detected in the blood or urine of almost everyone. They might contribute to PCOS. They can be found in

- packaging ([e.g. PVC, plastic #3] squeeze bottles, PVC straws.)
- plastic wrap
- medical ventilator tubing, nasal cannula tubing, hemodialysis tubing, cardiopulmonary bypass tubing, catheters, pillow case covers, PVC syringes, PVC urine bags, PVC blood bags, PVC colostomy bags, PVC dentures, a coating ingredient for drugs along with a stabilizer for them
- detergents, liquid soap, shampoos
- auto parts (e.g. PVC auto floor mats)
- candles
- PVC crib rail teether, PVC diaper pants, PVC toys
- perfume
- hair spray
- food containers
- cans
- food wrappers
- pesticides



- textiles
- sex toys made from 'jelly rubber'
- glues
- paint
- printing ink
- building materials
- cosmetics (in 'fragrance'), powders, skin creams, hair spray, nail polish along with enamels and basecoats and manicuring preparations, aftershave, perfumes, and colognes. Environmental Working Group, EWG, did a study, "Not too Pretty: phthalates, beauty products and the FDA" Jane Houlihan et al, 7/8/2002) of 72 name-brand beauty products for the presence of phthalates and found almost three-fourths of them contained some including 9/14 deodorants, all 17 fragrances, 6/7 hair gels, 4/7 mousses, 14/18 hair sprays, and 2/9 hand and body lotions in concentrations ranging from trace amounts to nearly 3% of the product's formulation. None listed phthalates on the ingredient label. Loopholes in federal law allow the chemical to be put into many such products without testing, labeling, or monitoring of health effects. The EU has restricted 1,200 chemicals in such products since the 1970s vs. 11 removed from cosmetics in the U.S. since 1976. Manicurists, cosmetologists, makeup artists and hair salon workers are among the groups of employed workers who are most exposed to hazardous chemicals in the U.S.
- 'new car smell' from car seats and parts
- air fresheners
- kids' toys made from PVC plastic
- toilet bowl cleaners
- prescription and OTC meds, including very commonly proton pump inhibitors (e.g. Prilosec, Protonix) in which they (and DBP in particular) are considered 'inactive' ingredients in them. Other drugs that have them include prescriptions of:
  - Acebutolol, Carbamazepine, Cyclobenzaprine, Didanosine, Diltiazem, Divalproex, Erythromycin, Ethopropazine, Galantamine, Isosorbide, Ketoprofen, Mesalamine, Morphine sulfate (and /naltrexone), Pancrelipase, Potassium chloride, Prochlorperazine, Propranolol, Ranitidine, Sulfasalazine, Theophylline, Thioproperazine, Typhoid vaccine (oral), Valproic acid, Verapamil.
  - OTC: Dimetane allergy extentabs, aspirin-delayed release, bisacodyl, omeprazole, ranitidine, enteric coated fish oil, some brands of garlic (e.g. Walgreens, Wholehealth, Nikken, Planetary Herbal, TopCare, Ail), slow-mag chloride with calcium, vitamin B (Tri-Phos-B), Viva Vitamin C-500,

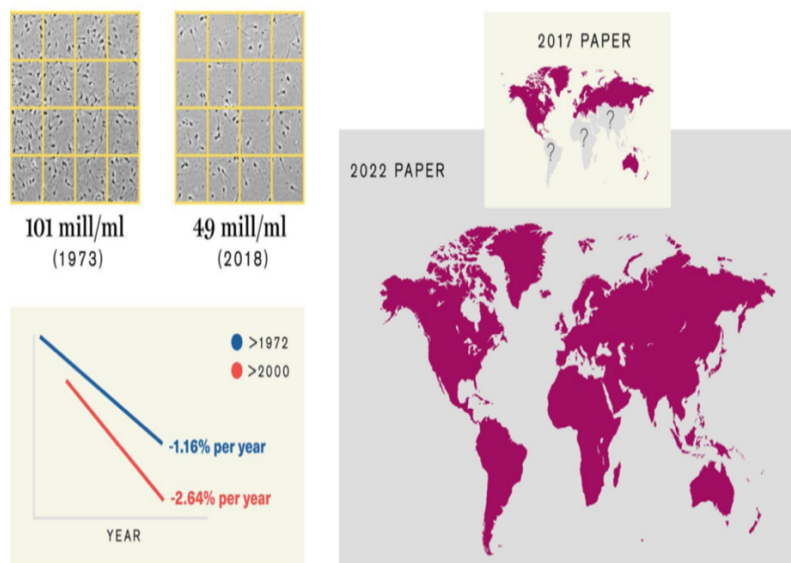
some brands of probiotics (e.g. Advanced natural Ultimate FloraMax, Acidophilus Complex with FOS, Swiss Natural 5 Strain, Bifidus, Probioflor, Lacto-B, Wobenzym N. Other OTC drugs may have an 'enteric coating' without specifying if it contains phthalates, making it impossible to know.

Phthalates can damage the female reproductive system, but the male system appears to be more sensitive.

There were two large studies on sperm count reduction over the years. One in 2017 ([Human Reproduction Update](#), "Temporal trends in sperm count: a systematic review and meta-regression analysis" Hagai Levine et al, Nov.-Dec. 2017) looked at 2510 articles on almost 43,000 men located in N. America, Europe, Australia and New Zealand, and who provided sperm samples between 1973-2011. Findings were sperm count declined significantly, dropping 52.4% over that time period.

Another more recent article by these authors looked at 868 articles published between 2014-2019 and taking men from six continents. The total sperm count decline was 62.3% for men across all the continents since 2000. They concluded that "this world-wide decline is continuing

### Sperm count is declining at an accelerated pace globally



in the 21<sup>st</sup> century at an accelerated pace. Research on the causes of this continuing decline and actions to prevent further disruption of male reproductive health are urgently needed." ([Human Reproduction Update](#), "Temporal trends in sperm count: a systematic review and meta-regression analysis of samples collected globally in the 20<sup>th</sup> and 21<sup>st</sup> centuries" Hagai Levine et al, 11/15/22).

[The Epoch Times](#), "Global sperm counts declining at accelerating rate: new meta-analysis" David Charbonneau, 2/22/203

Another study ([Fertility & Sterility](#), "Increased risk of incident chronic medical conditions in infertile men: analysis of US claims data" Michael Eisenberg et al, March 2016) looked at over 13,000 men who were diagnosed with male factor infertility. Those with low sperm concentrations were 30% more likely to develop diabetes and 48% more likely to develop ischemic heart disease. Another study found that low bone mass and stroke were also more likely in men with low sperm count.

As to why sperm counts are declining there is speculation that it is from phthalates.

Animal research shows that it can damage the testes, prostate gland, epididymis, penis, and seminal vesicles. Human research is finding many of these problems too although cause and effect has not been found. They are suspected of contributing to human health effects such as

- ❖ phthalates coupled with Tylenol (acetaminophen) interferes with the masculinization of male fetuses.
- ❖ declining sperm counts. According to one study average sperm counts in industrialized countries are declining by about 1%/year. The metabolites may lead to sperm suicide (apoptosis, cellular self-destruction).
- ❖ undescended testicles, which has increased in Western countries. Men born with this are at a higher risk for testicular cancer.
- ❖ testicular atrophy and infertility.
- ❖ a penile deformity where the urethral opening is at the bottom rather than the tip (hypospadias).
- ❖ causing damage to the liver, kidney, heart, lungs, and for blood clotting

One phthalate is called DBP, and women of child-bearing age appear to receive the highest exposures so that fetuses can be exposed to it. The CDC found that DBP exposure for over 2 million women of this age may be 20 times greater than is average for the overall population. Plus, such exposure in this group of women was above the federal safety standard. Popular nail care products contain DBP such as polishes, topcoats and hardeners, and include brands like L'Oreal, Maybelline, Oil of Olay and others. An EWG study found 67% of nail polishes contain DBP. (Nail polish is subject to federal labeling requirements and so the ingredient appears on the back of such bottles.)

Another type of phthalate is a chemical abbreviated DEHP. Indoor air concentrations as to it being released by PVC products are such that inhalation of it there is only second to ingestion of DEHP contaminated food. Phthalates are fat soluble so they can get into meat, dairy and processed foods.

It has been found in almost all freshwater and marine environments, along with sewage treatment plants. It also has been found in ocean sediments at sewage outfall points. It is also the most prominent toxic organic chemical found in sewage sludge, and more than 5 billion pounds of such sludge is spread on to land in the US yearly. It has been found in deep-sea jellyfish more than 3000 feet below the surface of the Atlantic Ocean. It even has been found in the Antarctic ice pack ("Aggregate exposures to phthalates in humans" July 2002, Health Care Without Harm.)

The FDA found it was in hospital supplies and that newborn male babies can be exposed to too much of it such as it leaching from plastic tubing, IVs, and food bags (Safety assessment of di(2-ethylhexyl)phthalate (DEHP) released from PVC medical devices" Feb. 2003, Center for Devices

and Radiological Health, FDA.) People who undergo dialysis are exposed to a lot of DEHP from PVC tubing and changes in liver enzymes result. About 250,000 people require dialysis in the U.S.

Other research on it (Journal of Applied Toxicology, “Stereoselectivity and the potential endocrine disrupting activity of di-(2-ethylhexyl) phthalate (DEHP) against human progesterone receptor: a computational perspective” Ishfaq Sheikh, May 2016) found it has been associated with:

- ❖ abnormalities in the reproductive system especially in male infants
- ❖ low sperm counts and lower sperm motility. (One researcher, Shanna Swan out of Mt. Sinai’s Icahn School of Medicine looked at the declining sperm count over the past few decades. She spoke about an impending fertility crisis as a result and projects that if the current trend continues sperm counts could reach zero in 2045 making people an endangered species.)
- ❖ lack of DNA integrity in males
- ❖ endometriosis and miscarriage
- ❖ placental problems with higher rates of low birth weight, premature birth, and fetal loss in lab animals

Other effects of DEHP can be on brain development, behavior, and respiratory health. One study on a DEHP metabolite found that women with the highest urinary concentrations of it were 2 ½ times more likely to report they always or often lacked interest in sex. This is because chemicals like DEHP have an anti-androgenic effect such as lowering testosterone, a hormone that is important for sex drive in women as well as men. Plus, it may interfere with estrogen production in women which can also suppress their libido.

There was research done through the NHANES study of 2007-2008 looking at 1,346 adults who were 20 years and older, and 329 adolescents ages 12-19 (Environmental Health Perspectives, “Relationship between urinary phthalate and BPA concentrations and serum thyroid measures in U.S. adults and adolescents from the NHANES 2007-2008” John Meeker et al, 711/2011). The strongest inverse relationship was between DEHP and total T4, free T4, T3, and thyroglobulin, and a positive relationship with TSH. Those with urine samples in the highest 20% of exposure to DEHP were associated with as much as a 10% decrease in certain thyroid hormones compared to those with urine samples at the lowest 20% of exposure.

There is also some evidence that it may contribute to increased mortality from cardiovascular disease based on a NHANES study from 2001-2010 involving 5,303 people with an average age of about 56 years. “Extrapolating to the population of 55-64 year old Americans, we identified 90,761-107,283 attributable deaths and \$39.9-\$47.1 billion in lost productivity” from cardiovascular mortality being significantly increased by DEHP. (Environmental Pollution, “Phthalates and attributable mortality: a population-based longitudinal cohort study and cost analysis” Leonardo Trasande et al, Jan. 2022). Other research has linked more than 10,000 deaths

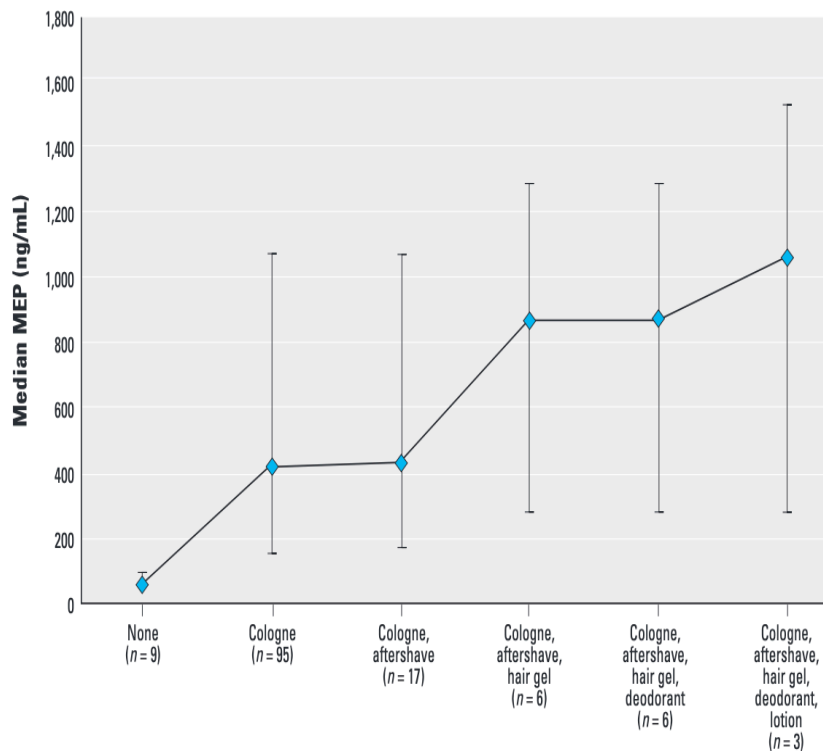
a year due to lower testosterone in men that is attributed to phthalate exposure. There is also research (Journal of Clinical Endocrinology & Metabolism, “Urinary phthalate metabolites are associated with decreased serum testosterone in men, women and children from NHANES 2011-2012” John Meeker et al, 11/1/14) that found that there is an inverse relationship between phthalates and testosterone in both men and women at various stages of life. For example

- ❖ women ages 40-60, higher phthalate exposure was associated with a 10.8-24% decline in testosterone
- ❖ boys ages 6-12 increased concentrations of DEHP was linked to a 24-34.1% drop in testosterone
- ❖ an inverse association was found for men ages 40-60 which they say may have important public health implications as to impacting muscle strength, energy, bone mass, leanness, intellectual abilities, and libido. And it may be associated with more risk of osteoporosis, obesity, type 2 diabetes, metabolic and cardiovascular disease, and erectile dysfunction.

The EPA set levels for DEHP back in 1988 but they have not been revised since then and there is obviously a lot of new data suggesting health effects at even low levels. Still other research has found that DEHP and DBP lead to reduced semen quality and a longer time to achieve pregnancy.

Another of these chemicals, DEP, is less potent in harming the male reproductive system although it can do damage such as reduced sperm count and abnormally large prostate glands in animals. But it is of greater concern for women. In 2000 the CDC found the chemical in every woman of childbearing age that was tested at levels that were of “a substantial internal human dose.”

One meta-analysis looking at over 6,000 pregnant women (JAMA Pediatrics, “Associations between prenatal urinary biomarkers of phthalate exposure and preterm birth: a pooled study of 16 US cohorts” Barrett Welch, et al 7/11/22) found that those with the highest concentrations of certain phthalate metabolites were about 15% more likely to deliver preterm. And the infants were at risk of dying as newborns. The closest connections were with phthalates in nail polish and cosmetics, but also recommended avoiding food wrapped in plastic or put into plastic containers. A national study (Environmental Health Perspectives, “Recent fast food consumption and BPA and phthalates exposure among the U.S. Population in NHANES, 2003-2010” Ami Zota et al, 4/13/2016) looked at 8,877 people in a national study. They found that people with a lot of fast-food intake had 20-40% higher urinary concentrations of phthalate metabolites than those who did not eat at such places. One in particular, DiNP was 39% higher in the urine who ate the most fast foods (at least 35% of their calories) compared to people who had not eaten any fast food recently. DEHP was about 24% higher. For more modest fast consumption, less than 35% of their calories, the two chemicals were higher by about 25% (DEHP) and 15.5% (DiNP).



**Figure 1.** Specific-gravity-adjusted urinary MEP concentration according to combinations of product types used. Data points represent medians; error bars represent 25th and 75th percentiles.

MEP is another phthalate and the one most abundantly found in urine. It may increase the risk of type 2 diabetes, and can act as an estrogenic compound. There is some preliminary evidence that it damages human sperm. Men who use cologne or aftershave within 48 hours of urine collection have higher levels of MEP compared to those who do not use such products. Other products that contain it include hair gel, deodorant, and lotion. For every type of such product used MEP concentrations increased by 33% according to one study.

*Environmental Health Perspectives*, "Personal care product use predicts urinary concentrations of some phthalate monoesters" Susan Duty et al, 11/2005

Another chemical in this family is MBP. Susan Duty's research (from another paper) has also found evidence that high urinary levels are associated with low sperm concentration and motility. There is also some research suggesting that MBP has a disruptive effect on pancreatic beta cells and so may be linked to insulin resistance and type 2 diabetes.

Some studies have shown that phthalates can cause gender confusion in kids exposed to them. One study published in the *International Journal for Reproductive Epidemiology* on 145 preschool kids found that when concentrations of metabolites of DEHP and DBP in mothers' prenatal urine are elevated their sons are less likely to play with male-typical toys and games such as trucks and guns, or engage in play fighting, and more likely to play with dolls. No other phthalate metabolite in-utero was linked to less masculine behavior. Girls' behavior was not associated with phthalate levels in their mother. Researchers are concerned that given testosterone producing the masculine brain exposure to the chemical which has anti-androgen qualities has the potential to alter males' brain development. It has been hypothesized that phthalates may lower fetal testosterone production during a critical window - somewhere within 8-24 weeks of gestation when the testes begin to function, and thereby altering brain sexual differentiation. Such research is still in the early stages. Then there was a Norwegian study that looked at expectant mothers with high phthalate levels in their urine and what happened to their offspring after birth as to ADHD. Those with the highest level of DEHP had almost 3 times the odds of ADHD vs. those in the lowest. (*Environmental Health Perspectives*, "Prenatal phthalates, maternal thyroid

function, and risk of ADHD in the Norwegian mother and child cohort” Stephanie Engel et al, May 2018).

There also was some research done that suggested that 100K American adults die each year from phthalate levels reducing their testosterone function or directly contributing to death from heart disease.

Consumer Reports did a recent study on phthalates in food and published their findings in January 2024. “The findings on phthalates are particularly concerning: we found them in almost every food we tested, often at high levels. The levels did not depend on packaging type, and no one particular type of food – say, dairy products or prepared meals – was more likely than another to have them. ...Organic products were just as problematic: in fact, the highest phthalate levels we found were in a can of Annie’s Organic cheesy ravioli” with 53,579 nanograms. A few of their test results include:

|   | <b>Nanograms</b> |
|---|------------------|
| Brisk Iced tea lemon (can)                              | 7,467            |
| Coke original (plastic)                                 | 6,167            |
| Poland Spring 100% natural spring (plastic)             | 4,217            |
| Juicy Juice 100% apple (plastic)                        | 3,348            |
| Pepsi (can)   | 2,938            |
| Juicy Juice 100% apple (cardboard box)                  | 2,260            |
| Hormel Chili with beans (can)                           | 9,847            |
| Bush’s baked beans original (can)                       | 3,709            |
| Mrs. Butterworth’s syrup original (plastic)             | 1,010            |
| Hunt’s tomato ketchup (plastic)                         | 574              |
| Yoplait Original low fat French vanilla (plastic)       | 10,948           |
| Ben & Jerry’s vanilla ice cream (paper carton)          | 6,387            |
| Jell-O pudding snacks original chocolate (plastic)      | 1,756            |
| Wendy’s crispy chicken nuggets (paperboard)             | 33,980           |
| Moe’s southwest grill chicken burrito (aluminum foil)   | 24,330           |
| Burger King whopper with cheese (paper)                 | 20,167           |
| McDonald’s quarter pounder with cheese (paper)          | 9,956            |
| Burger King classic French fries (paperboard)           | 8,512            |
| Taco Bell chicken burrito (paper wrap)                  | 4,720            |
| Domino’s hand tossed cheese pizza (cardboard)           | 4,356            |
| Cheerios original (paper with plastic bag)              | 10,980           |
| Perdue ground chicken breast (plastic)                  | 9,985            |
| Libby’s corned beef (can)                               | 4,088            |
| Del Monte sliced peaches in 100% juice (can)            | 24,928           |
| Green Giant cream style sweet corn (can)                | 7,603            |
| Campbell’s chunky classic chicken noodle soup (plastic) | 6,768            |
| Chicken of the Sea pink salmon in water skinless (can)  | 24,321           |
| StarKist wild caught light tuna in water (pouch)        | 1,735            |
| StarKist chunk light tun in water (can)                 | 1,687            |

Another article from Consumer Reports also offered in January 2024 notes that phthalates may be replaced with another toxic chemical and it is being called a ‘regrettable substitution’ that may be no better. A few of their findings included:

|  | Phthalates (ng/serving) | Phthalate replacement (ng/servings) |
|--|-------------------------|-------------------------------------|
| Moe’s southwest grill<br>Chicken burrito (alum. foil, 1 order) | 24,330                  | 7,813,659                           |
| Burger King whopper with cheese<br>(paper, 1 sandwich)         | 20,167                  | 1,546,529                           |
| McDonald’s French fries (paper,<br>large)                      | 5,538                   | 1,270,534                           |
| Pizza Hut original cheese pan<br>(cardboard box, 10 pieces)    | 2,718                   | 417,436                             |
| McDonald’s chicken McNuggets<br>(cardboard, 8 pieces)          | 8,030                   | 387,801                             |
| Taco Bell chicken burrito (paper<br>wrap, 1 order)             | 4,720                   | 359,688                             |
| Burger King class French fries<br>(paperboard, large)          | 8,512                   | 166,224                             |
| Domino’s hand tossed cheese pizza<br>(cardboard box, 1/8 pie)  | 4,356                   | 4,152                               |

What is a ‘safe level’ of the phthalates? It depends on whom you ask, or trust. Current regulations were based on male reproductive toxicity. There was some research done on five phthalates (BBP, DIBP, DBT, DCHP, and DEHP). They looked at 38 epidemiological studies and recorded the health effects on men, women and kids and observed exposure levels based on their urine levels. They compared such levels to regulatory limits. Some of the effects on human health were occurring at 1/8,000<sup>th</sup> below the assumed ‘safe’ level. Health problems occurring below the ‘safe level’ were reproductive, neurodevelopmental, behavioral, hormonal, and metabolic. (Environmental Health, “Role of epidemiology in risk assessment: a case study of five ortho-phthalates” Maricel Maffini et al, Nov. 2021). Some of their conclusions included that

current animal-based testing methods to estimate ‘safe’ exposure levels of chemicals could be significantly underestimating actual human health risk if epidemiological data are not considered. ...Our limited case study of five phthalates shows that many of the health effects observed to occur in humans at very low exposure levels are not traditionally evaluated in human toxicology testing. Metabolic, neurodevelopmental and behavioral disorders, obesity, levels of hormones and transport proteins are just a few examples of endpoints not commonly included in toxicity testing guidelines despite their relevance to human health.



Some particulars of the EWG research include:

| <b>Contains phthalates</b>                               | <b>No detected phthalates</b>   |
|--|---|
| <b>DEODORANT</b>   |   |
| Arrid Extra Extra Dry Maximum Strength Solid             | Certain Dri Anti-Perspirant Roll-On                                   |
| Arrid Extra Extra Dry Ultra Clear Ultra Clean Spray      | Dove Powder Anti-Perspirant Deodorant                                 |
| Arrid Extra Extra Dry Ultra Clear Ultra Fresh Spray      | Lady Speed Stick Soft Solid Anti-Perspirant                           |
| Ban Delicate Powder Roll On                              | Secret Anti-Perspirant & Deodorant Platinum Protection Ambition Scent |
| Degree Original Solid Anti-Perspirant & Deodorant        | Soft & Dri Anti-Perspirant Deodorant Clear Gel                        |
| Dove Solid Anti-Perspirant Deodorant                     |   |
| Secret Sheer Dry Regular                                 |   |
| Secret: Powder Fresh Aerosol                             |   |
| <b>FRAGRANCE</b>   |   |
| Calgon Hawaiian Ginger Body Mist                         |   |
| Calgon Turquoise Seas Body Lotion                        |   |
| Charlie Cologne Spray                                    |   |
| Escape by Calvin Klein                                   |   |
| Eternity by Calvin Klein                                 |   |
| Fire & Ice Cologne Spray                                 |   |
| Freedom  |   |
| Jovan White Musk   |   |
| Lancome Paris Tresor                                     |   |
| Liz Claiborne Eau De Toilette Spray                      |   |
| Oscar  |   |
| Parfums de Coeur White Tahitian Ginger Fantasy           |   |
| Poison by Christian Dior                                 |   |
| Red Door   |   |
| The Healing Garden Pure Joy Body Treatment               |   |
| White Diamonds Elizabeth Taylor                          |   |
| Wind Song Extraordinary Cologne by Prince Matchabelli    |   |
| <b>HAIR GEL</b>  |   |
| Clairol Herbal Essences Natural Volume Body Boosting Gel | Physique Extra Control Structuring Gel                                |
| Dep Level 4 Shine Gel                                    |   |
| LA Looks Styling Gel: Extra Super Hold                   |   |
| Suave Naturals Ocean Breeze Extra Control Spray Gel      |   |
| TRESemme European Slick Melting Gel                      |   |
| Pantene Pro V Spray Gel Volumizing Root Lifter           |   |
| <b>HAIR MOUSSE</b>                                       |   |
| Aussie Megahold Mousse                                   | Finesse Touchables Silk Protein Enriched Mousse                       |
| Clairol Herbal Essences Styling Mousse Maximum Hold      | Helene Curtis Thermasilk Heat Activated Mousse for Fine/Thin Hair     |
| Helene Curtis Salon Selectives Rise Up Volumizing Mousse | L'Oreal Paris Studio Line: Springing Curls Mousse                     |
| Pantene Pro V Mousse Body Builder                        |   |

| <b>Contains phthalates</b>  | <b>No detected phthalates</b>                          |
|---|--|
| <b>HAIR SPRAY</b>   |  |
| Aqua Net Professional Hair Spray                                      | Aussie Mega Styling Spray                              |
| Herbal Essences Non Aerosol Hairspray                                 | Helene Curtis Finesse Touchables Silk Protein Enriched |
| Jheri Redding Finishers Flexible Hold Hairspray                       | Helene Curtis Thermasilk Heat Activated Firm Hairspray |
| Pantene Pro V Strong Hold Spray                                       | Suave Naturals Aloe Vera Extra Hold Hairspray          |
| Pantene Pro V Stronghold Healthy Hold Spray                           |  |
| Rave 4x Mega  |  |
| Redken Cat Finishing Spritz   |  |
| Salon Selectives Hold Tight Style Freeze Maximum Hold Finishing Spray |  |
| Sebastian Collection Shaper Plus                                      |  |
| Suave Maximum Hold Hairspray Unscented, non-aerosol                   |  |
| Suave Naturals Extra Flexible Hold Non Aerosol Hairspray Freesia      |  |
| TRESemme European Freeze-Hold Hair Spray                              |  |
| VO5 Crystal Clear 14 Hour Hold  |  |
| Vidal Sassoon Microfine Mist Hair Spray, Aerosol                      |  |
| <b>HAND AND BODY LOTION</b>   |  |
| Jergens Skincare Original Scent Lotion                                | Curel Soothing Hands Moisturizing Hand Lotion          |
| Nivea Crème   | Eucerin Dry Skin Therapy Original Moisturizing Lotion  |
|   | Lubriderm Skin Therapy Moisturizing Lotion             |
|   | Neutrogena Hand Cream                                  |
|   | Suave Naturals Sun Ripened Moisturizing Body Lotion    |
|   | Vaseline Intensive Care Advanced Healing               |
|   | Vaseline Intensive Care Dry Skin Lotion                |
| <b>NAIL POLISH*</b>   |  |
| Avon beComing Radiant Long Last Nail Gloss                            | Kiss Colors Nail Polish                                |
| Cover Girl NailSlicks   | L'Oreal Jet Set Nail Enamel                            |
| Maybelline Express Finish Fast-Dry Nail Enamel                        | L'Oreal Jet-Set Quick Dry Nail Enamel                  |
| Maybelline Ultimate Wear Nail Enamel                                  | Maybelline Shades of Your Nail Color                   |
| Naturistics Super Shine Nail Gloss                                    | Naturistics 90 Second Dry! Super Fast Nail Color       |
| Oil of Olay Nail Laquer   | Revlon Nail Enamel                                     |
| OPI Nail Laquer   | Revlon Super Top Speed                                 |
| Orly Salon Nails French Manicure                                      | Urban Decay  |
| Orly Salon Nails Nail Color   |  |
| Sally Hansen Chrome Nail Makeup                                       |  |
| Sally Hansen Hard as Nails Nail Polish                                |  |
| Sally Hansen Hard as Nails With Nylon Nail Polish                     |  |
| Sally Hansen Teflon Tuff Nail Color                                   |  |
| Tropez Nail Enamel  |  |
| Wet N Wild Crystallic Calcium Enriched Nail Color                     |  |
| Wet N Wild Nail Color   |  |

Source: Environmental Working Group compilation of product testing results from Stat Analysis Corporation, Chicago, Illinois.

\*All results shown reflect data from laboratory chemical analysis except results for nail polish, which stem from an EWG analysis of nail polish ingredient labels and nail polish patent records.

Table 4. DEP is present at very high levels in fragrances

| Product type                   | Product name  | Results (parts per million) |
|--------------------------------|---|-----------------------------|
| <b>DIBUTYL PHTHALATE (DBP)</b> |   |                             |
| Fragrance                      | The Healing Garden Pure Joy Body Treatment            | 890                         |
| Deodorant                      | Arrid Extra Extra Dry Ultra Clear Ultra Fresh Spray   | 200                         |
| Fragrance                      | Poison by Christian Dior                              | 38-260                      |
| Hair spray                     | Aqua Net Professional Hair Spray                      | 160                         |
| Deodorant                      | Arrid Extra Extra Dry Ultra Clear Ultra Clean Spray   | 140-150                     |
| Hair spray                     | Vidal Sassoon Microfine Mist Hair Spray, Aerosol      | 55                          |
| <b>DIETHYL PHTHALATE (DEP)</b> |   |                             |
| Fragrance                      | Red Door  | 28000                       |
| Fragrance                      | Lancome Paris Tresor                                  | 25000                       |
| Fragrance                      | White Diamonds Elizabeth Taylor                       | 23000                       |
| Fragrance                      | Charlie Cologne Spray                                 | 21000                       |
| Fragrance                      | Wind Song Extraordinary Cologne by Prince Matchabelli | 20000                       |
| Fragrance                      | Fire & Ice Cologne Spray                              | 17000                       |
| Fragrance                      | Liz Claiborne Eau De Toilette Spray                   | 14000                       |
| Fragrance                      | Eternity by Calvin Klein                              | 10000                       |
| Fragrance                      | Oscar   | 9400                        |
| Fragrance                      | Escape by Calvin Klein                                | 8900                        |
| Fragrance                      | The Healing Garden Pure Joy Body Treatment            | 7300                        |
| Fragrance                      | Calgon Hawaiian Ginger Body Mist                      | 7200                        |
| Fragrance                      | Parfums de Coeur White Tahitian Ginger Fantasy        | 4200                        |
| Fragrance                      | Poison by Christian Dior                              | 3400-4200                   |
| Deodorant                      | Arrid Extra Extra Dry Maximum Strength Solid          | 2900-3300                   |
| Hair spray                     | VO5 Crystal Clear 14 Hour Hold                        | 1500                        |
| Deodorant                      | Arrid Extra Extra Dry Ultra Clear Ultra Clean Spray   | 1100-1200                   |
| Deodorant                      | Arrid Extra Extra Dry Ultra Clear Ultra Fresh Spray   | 1100                        |
| Fragrance                      | Freedom   | 570                         |
| Hair spray                     | Redken Cat Finishing Spritz                           | 520                         |
| Deodorant                      | Ban Delicate Powder Roll On                           | 400                         |
| Fragrance                      | Calgon Turquoise Seas Body Lotion                     | 350                         |
| Hair spray                     | Jheri Redding Finishers Flexible Hold Hairspray       | 320                         |
| Hair spray                     | Aqua Net Professional Hair Spray                      | 250                         |
| Hair gel                       | LA Looks Styling Gel: Extra Super Hold                | 220                         |
| Hair spray                     | Herbal Essences Non Aerosol Hairspray                 | 210                         |
| Hair spray                     | TRESemme European Freeze-Hold Hair Spray              | 210                         |
| Hair spray                     | Rave 4x Mega  | 170                         |

Table 4 (con't).

| Product type                               | Product name  | Results (parts per million) |
|--|---|-----------------------------|
| <b>DIETHYL PHTHALATE (DEP) (CONTINUED)</b> |   |                             |
| Deodorant                                  | Degree Original Solid Anti-Perspirant & Deodorant                     | 140                         |
| Hair spray                                 | Salon Selectives Hold Tight Style Freeze Maximum Hold Finishing Spray | 140                         |
| Hair gel                                   | Suave Naturals Ocean Breeze Extra Control Spray Gel                   | 130                         |
| Hand and body lotions                      | Jergens Skincare Original Scent Lotion                                | 80-190                      |
| Deodorant                                  | Dove Solid Anti-Perspirant Deodorant                                  | 110-110                     |
| Hair spray                                 | Pantene Pro V Stronghold Healthy Hold Spray                           | 100-140                     |
| Hair spray                                 | Pantene Pro V Strong Hold Spray                                       | 84-88                       |
| Hair mousse                                | Pantene Pro V Mousse Body Builder                                     | 75                          |
| Fragrance                                  | Jovan White Musk  | 67-67                       |
| Deodorant                                  | Secret Powder Fresh Aerosol   | 63                          |
| Hair gel                                   | Pantene Pro V Spray Gel Volumizing Root Lifter                        | 57                          |
| Hair spray                                 | Suave Maximum Hold Hairspray Unscented, non-aerosol                   | 53                          |
| Hair mousse                                | Clairol Herbal Essences Styling Mousse Maximum Hold                   | 50                          |
| Deodorant                                  | Secret Sheer Dry Regular  | 49                          |
| Hair mousse                                | Aussie Megahold Mousse  | 47                          |
| Hair mousse                                | Helene Curtis Salon Selectives Rise Up Volumizing Mousse              | 38                          |
| Hair spray                                 | Suave Naturals Extra Flexible Hold Non Aerosol Hairspray Freesia      | 35-40                       |
| Hair gel                                   | TRESemme European Slick Melting Gel                                   | 36                          |
| Hair gel                                   | Clairol Herbal Essences Natural Volume Body Boosting Gel              | 21-57                       |
| Hand and body lotions                      | Nivea Crème   | 26                          |
| Deodorant                                  | Sure Clear Dry Anti-Perspirant & Deodorant                            | 20                          |
| Hair spray                                 | Sebastian Collection Shaper Plus                                      | 17                          |
| Hair gel                                   | Dep Level 4 Shine Gel   | 14                          |
| <b>DIETHYLHEXYL PHTHALATE (DEHP)</b>       |   |                             |
| Fragrance                                  | Oscar   | 14                          |
| Fragrance                                  | Fire & Ice Cologne Spray  | 13                          |
| Fragrance                                  | Poison by Christian Dior  | 0-25                        |
| <b>BUTYLBENZYL PHTHALATE (BBzP)</b>        |   |                             |
| Hair spray                                 | TRESemme European Freeze-Hold Hair Spray                              | 25                          |
| Hair spray                                 | Pantene Pro V Stronghold Healthy Hold Spray                           | 0-46                        |
| Hair spray                                 | Sebastian Collection Shaper Plus                                      | 11                          |
| Fragrance                                  | Poison by Christian Dior  | 0-29                        |
| <b>DIMETHYL PHTHALATE (DMP)</b>            |   |                             |
| Deodorant                                  | Secret Sheer Dry Regular  | 33                          |

Source: Environmental Working Group compilation of product testing results from Stat Analysis Corporation, Chicago, Illinois.

Results from twenty percent of the products tested (14 products) were verified by confirmatory tests run on up to five individual containers of the product. For only two of these products did phthalate occurrence vary: the laboratory found DEHP and BBzP in one of five bottles of Poison by Christian Dior (DEP and DBP were found in all five bottles tested), and found BBzP in 3 of 5 bottles of Pantene Pro V Stronghold Healthy Hold Spray (but all five contained DEP).

There are beauty products without phthalates, such as:

Table 5. Almost all major cosmetics companies market some products made without phthalates

| Manufacturer or distributor | Products with phthalates                                 | Products with no detected phthalates                  |
|-----------------------------|--|---|
| Alberto-Culver              | TRESemme European Freeze-Hold Hair Spray                 |   |
|                             | TRESemme European Slick Melting Gel                      |   |
|                             | VO5 Crystal Clear 14 Hour Hold                           |   |
| The Andrew Jergens Company  | Ban Delicate Powder Roll On (deodorant)                  | Curel Soothing Hands Moisturizing Hand Lotion         |
|                             | Jergens Skincare Original Scent Lotion                   |   |
| AM Cosmetics, Inc.          | Wet N Wild Crystallic Calcium Enriched Nail Color        |   |
|                             | Wet N Wild Nail Color                                    |   |
|                             | Tropez Nail Enamel                                       |   |
| Avon Products, Inc.         | Avon beComing Radiant Long Last Nail Gloss               |   |
| Beiersdorf, Inc.            | Nivea Crème (hand and body lotion)                       | Eucerin Dry Skin Therapy Original Moisturizing Lotion |
| Carter-Wallace              | Arrid Extra Extra Dry Maximum Strength Solid             |   |
|                             | Arrid Extra Extra Dry Ultra Clear Ultra Clean Spray      |   |
|                             | Arrid Extra Extra Dry Ultra Clear Ultra Fresh Spray      |   |
| Chesebrough-Ponds USA       | Oil of Olay Nail Laquer                                  | Vaseline Intensive Care Advanced Healing              |
|                             |  | Vaseline Intensive Care Dry Skin Lotion               |
| Clairol                     | Clairol Herbal Essences Natural Volume Body Boosting Gel |   |
|                             | Clairol Herbal Essences Styling Mousse Maximum Hold      |   |
|                             | Herbal Essences Non Aerosol Hairspray                    |   |
| Colgate-Palmolive           |  | Lady Speed Stick Soft Solid Anti-Perspirant           |
| Conair                      | Jheri Redding Finishers Flexible Hold Hairspray          |   |
| Coty                        | Calgon Hawaiian Ginger Body Mist                         |   |
|                             | Calgon Turquoise Seas Body Lotion                        |   |
|                             | Jovan White Musk   |   |
|                             | The Healing Garden Pure Joy Body Treatment (fragrance)   |   |
| Del Laboratories, Inc.      | Naturistics Super Shine Nail Gloss                       | Naturistics 90 Second Dry! Super Fast Nail Color      |
|                             | Sally Hansen Teflon Tuff Nail Color                      |   |
|                             | Sally Hansen Hard as Nails With Nylon Nail Polish        |   |
|                             | Sally Hansen Hard as Nails Nail Polish                   |   |
|                             | Sally Hansen Chrome Nail Makeup                          |   |
| Elizabeth Arden             | Red Door (fragrance)                                     |   |
|                             | White Diamonds Elizabeth Taylor (fragrance)              |   |
| Gillette                    |  | Soft & Dri Anti-Perspirant Deodorant Clear Gel        |
| Kiss Products, Inc.         |  | Kiss Colors Nail Polish                               |
| L'Oreal                     | Lancome Paris Tresor (fragrance)                         | L'Oreal Paris Studio Line: Springing Curls Mousse     |
|                             | Redken Cat Finishing Spritz (hair spray)                 | L'Oreal Jet-Set Quick Dry Nail Enamel                 |
|                             | Maybelline Ultimate Wear Nail Enamel                     | Maybelline Shades of Your Nail Color                  |
|                             | Maybelline Express Finish Fast-Dry Nail Enamel           | L'Oreal Jet Set Nail Enamel                           |

Table 5 (con't).

| Manufacturer or distributor | Products with phthalates  | Products with no detected phthalates                                     |
|-----------------------------|---|--|
| Liz Claiborne Cosmetics     | Liz Claiborne Eau De Toilette Spray (fragrance)                       |  |
| Los Angeles Research        | LA Looks Styling Gel: Extra Super Hold                                |  |
| Louis Vuitton               | Poison by Christian Dior (fragrance)                                  | Urban Decay nail polish  |
| Neutrogena                  |   | Neutrogena Hand Cream  |
| Numark Labs                 |   | Certain Dri Anti-Perspirant Roll-On                                      |
| OPI                         | OPI Nail Laquer   |  |
| Orly International, Inc.    | Orly Salon Nails Nail Color   |  |
|                             | Orly Salon Nails French Manicure                                      |  |
| Oscar de la Renta           | Oscar (fragrance)   |  |
| Parfum de Coeur             | Parfums de Coeur White Tahitian Ginger Fantasy (fragrance)            |  |
| Procter & Gamble            | Cover Girl NailSlicks   | Physique Extra Control Structuring Gel                                   |
|                             | Pantene Pro V Mousse Body Builder                                     | Secret Anti-Perspirant & Deodorant<br>Platinum Protection Ambition Scent |
|                             | Pantene Pro V Spray Gel Volumizing Root Lifter                        |  |
|                             | Pantene Pro V Strong Hold Spray                                       |  |
|                             | Pantene Pro V Stronghold Healthy Hold Spray                           |  |
|                             | Secret Sheer Dry Regular (deodorant)                                  |  |
|                             | Secret Powder Fresh Aerosol (deodorant)                               |  |
|                             | Sure Clear Dry Anti-Perspirant & Deodorant                            |  |
|                             | Vidal Sassoon Microfine Mist Hair Spray, Aerosol                      |  |
| Redmond Products            | Aussie Megahold Mousse  | Aussie Mega Styling Spray  |
| Revlon                      | Charlie Cologne Spray   | Revlon Super Top Speed (nail polish)                                     |
|                             | Fire & Ice Cologne Spray  | Revlon Nail Enamel   |
| Schwarzkopf & DEP           | Dep Level 4 Shine Gel (hair gel)                                      |  |
| Tommy Hilfiger              | Freedom (fragrance)   |  |
| Unilever HPC                | Aqua Net Professional Hair Spray                                      | Dove Powder Anti-Perspirant Deodorant                                    |
|                             | Degree Original Solid Anti-Perspirant & Deodorant                     | Finesse Touchables Silk Protein Enriched Mousse                          |
|                             | Dove Solid Anti-Perspirant Deodorant                                  | Helene Curtis Finesse Touchables Silk Protein Enriched (hair spray)      |
|                             | Escape by Calvin Klein (fragrance)                                    | Helene Curtis Thermasilk Heat Activated Firm Hairspray                   |
|                             | Eternity by Calvin Klein (fragrance)                                  | Helene Curtis Thermasilk Heat Activated Mousse for Fine/Thin Hair        |
|                             | Helene Curtis Salon Selectives Rise Up Volumizing Mousse              | Suave Naturals Aloe Vera Extra Hold Hairspray                            |
|                             | Rave 4x Mega (hair spray)   | Suave Naturals Sun Ripened Moisturizing Body Lotion                      |
|                             | Salon Selectives Hold Tight Style Freeze Maximum Hold Finishing Spray |  |
|                             | Suave Maximum Hold Hairspray Unscented, non-aerosol                   |  |
|                             | Suave Naturals Extra Flexible Hold Non Aerosol Hairspray Freesia      |  |
|                             | Suave Naturals Ocean Breeze Extra Control Spray Gel                   |  |
|                             | Wind Song Extraordinary Cologne by Prince Matchabelli                 |  |
| Warner-Lambert              |   | Lubriderm Skin Therapy Moisturizing Lotion                               |
| Wella Group                 | Sebastian Collection Shaper Plus (hair spray)                         |  |

Source: Environmental Working Group compilation of product testing results from Stat Analysis Corporation, Chicago, Illinois.

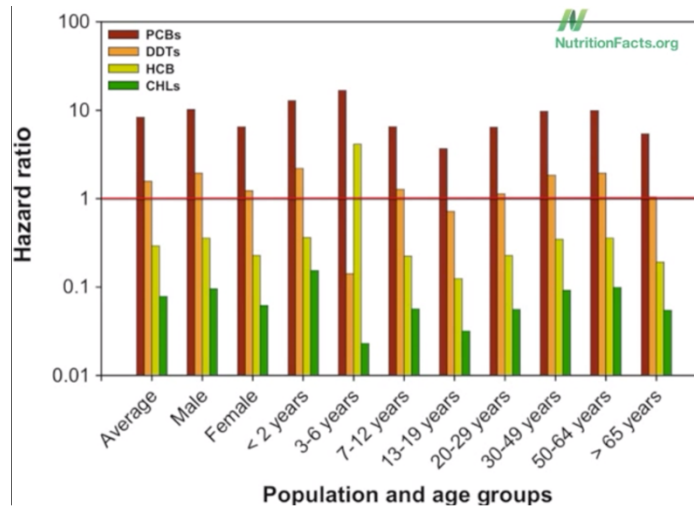
\*All results shown reflect data from laboratory chemical analysis except results for nail polish, which stem from an EWG analysis of nail polish ingredient labels and nail polish patent records.

The good news about phthalates is that they break down quickly in the human body and in the environment with a half-life of about 12 hours. Stop using them and your toxic burden level drops in a day or so. The bad news is that on a per body weight basis kids may have twice as much of some of these chemicals such as DEHP, DBP and BBP as adults. Some of this may be due to kids' bodies not being as good at detoxifying dangerous chemicals. Kids are also putting their dirty hands and all manner of other items in their mouth which exposes them to such chemicals.

Other hormone disrupting chemicals include:

- ❖ DDT, and a breakdown of that pesticide is DDE. DDE has been definitively linked to an increase in BMI in kids. Lab testing of rodents has shown them to become insulin resistant which can lead to diabetes. DDE quadruples the risk of Alzheimer's, and may increase the risk of the disease as much as if you carry the Alzheimer's gene, Apo E4. It builds up in the food chain and so vegetarians have a quarter of the level. Meat, fish, and dairy products are the most contaminated and have 5-10 times the levels than in plant food. DDT was banned decades ago but is still used in other countries. It also lingers in soil, water, and people. Men exposed to it in their teens long ago have defective sperm later in life according to a study and this contributes to male infertility. DDT was banned in the U.S. in 1973, and an international convention in Stockholm banned its use and production in 2001, with 170 countries signing on. But a 2012 report found that "global use of DDT has not changed substantially" since the Stockholm Convention went into effect (Environmental Health Perspectives, "Global trends in the use of insecticides to control vector-borne diseases" Henk van den Berg et al, April 2012).
  - Pesticides in general can have an impact on sperm quality. Pesticides can get into our bodies not just from what we eat but also water we drink and polluted air we breathe.
- ❖ Other pesticides (e.g. herbicides, insecticides, fungicides, mothballs, organochlorines, organophosphates, pyrethroids) can lead to the development of insulin resistance which can lead to a higher incidence of diabetes in particular, along with obesity, metabolic syndrome, PCOS, hypertension and chronic kidney disease. (Pesticide Biochemistry and Physiology, "Pesticides and insulin resistance-related metabolic diseases: evidences and mechanisms" Ali Arab et al, Sept. 2023).
- ❖ PCBs (polychlorinated biphenyls). These were banned in the 1970s but are still in the environment and people are still contaminated with them. Their half-life at least in animals is estimated at 2-10 years, and they are stored in fat tissue. Because of their long-life persistence and being stored in fat they accumulate up the food chain. There was a NHANES cross-sectional study from 1999-2008 involving 31,575 menopausal women over the age of 30, looking at 111 hormone disrupting chemicals. Fifteen were identified as being associated with early menopause, and 9 of these were PCB's (along with three pesticides and two phthalates) with menopause onset being roughly 2-3 years earlier for PCB's (and by 3.8 years for a phthalate). Farmed salmon contain 5-10 times the PCB levels of wild salmon. PCBs are especially dangerous to fetus' health and development and can pass through the placenta and also concentrate in the fat of breast milk. Researchers from

the University of Nottingham took sperm samples from 11 men and 9 dogs from the same region in the U.K. They exposed the sperm to DEHP and a PCB153 which are found in the environment. Sperm motility was decreased, and DNA fragmentation increased. The researchers think dogs may be ‘the canary in the coal mine’ for declines in male fertility and that chemicals used at home and in work environments are the likely culprit. They are known to cause weight gain and diabetes. PCB’s also lower thyroid function.



This is a graph from a recent study. The red horizontal line is where the EPA says there’s a significantly increased risk of cancer. What it shows: every age group is at a PCB level roughly 10 times higher than what is considered safe. And DDT – it is right around the danger level for every age.

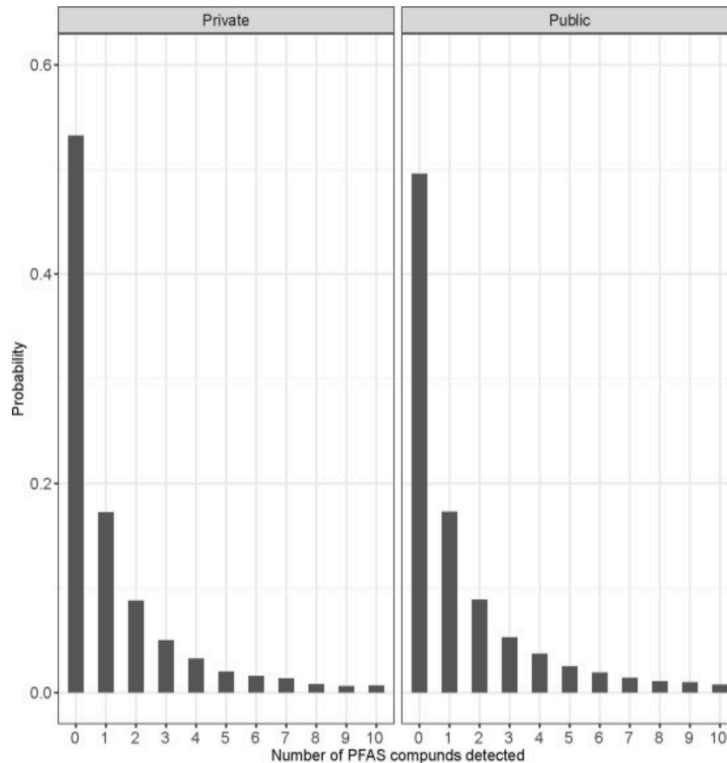
<https://nutritionfacts.org/video/dioxins-in-the-food-supply/>

- ❖ Dioxins are a byproduct of paper bleaching and herbicide production. They can stay in the body for years and build up over time. They may cause cancer, diabetes, learning disabilities and delays, and impact reproductive processes including permanently decreasing sperm quality and count. The number one source for their getting into our bodies is through food. And estimates are that 90% of the dioxins people consume come from beef, dairy, milk, chicken, pork, fish, and eggs. Fish is worst, eggs are #2, and cheese is runner up for high levels. They can also be found in feminine hygiene products. The reason why girls are hitting puberty sooner is from getting more protein from animal sources than plants. And a Korean study (British Journal of Nutrition, “Dietary patterns are associated with sexual maturation in Korean children” Shan Ji Li et al, August 2005) found that dioxins and PCBs in meat and especially fish may be the real cause.

One of the more striking research findings (Diabetes Care, “A strong dose-response relation between serum concentrations of persistent organic pollutants and diabetes” Duk-Hee Lee, et al, July 2006, looking at over 2,000 adults in the national NHANES study 1999-2002) is that there is a higher rate of diabetes among those heavily exposed to toxic pollutants including dioxins, PCBs, and DDE. Those who had the highest level of such chemicals in their blood were 38 times more likely to be diabetic. What was shocking is that “there was no association between obesity and diabetes among subjects with non-detectable limits of [pollutants].” i.e. It is not being overweight, but perhaps only the toxic chemicals above a certain dangerous level in the extra fat we carry that are causing us to become diabetic. Given that such chemicals are getting into us often through food we eat, especially those of animal origin and in particular seafood, it is possible that the relationship could be pointing to still other contaminants in animal products.



❖ PFAS (known sometimes as ‘forever chemicals’ because they last so long, possibly measured in centuries). The EPA says that at least 70 million Americans get their water from where such chemicals are high enough that they require reporting to the Agency, based on a five year review of water systems across the country. Some PFAS chemicals have a reporting



level measured in parts per trillion. What needs to be appreciated is not only that the levels are so tiny but also ‘How often are you exposed to it and for how long?’ This goes back to ‘the dose (does not) make the poison’ as to risk can come from duration over time and not necessarily only from a single exposure. A study by the U.S. Geological Survey (the graph to the left) says that at least 45% of the country’s tap water has one or more PFAS chemicals in it; not all can be detected. (Environmental International, “Per- and polyfluoroalkyl substances (PFAS) in U.S. tap water:

comparison of underserved private-well and public-supply exposures and associated health implications” Kelly Smalling et al, Aug. 2023). Most of the exposure was near urban centers. USGS scientists estimate that the probability of PFAS not being found in tap water is about 75% in rural areas and 25% in urban ones.

They have been used around the world since the 1950’s. There are over 12,000 such chemicals. They bioaccumulate meaning that our bodies build up higher levels of them over time. They also bioaccumulate in other organisms like fish so that we eventually eat them and get yet more of the chemicals into our systems.

They are used in non-stick pans (e.g. Teflon). According to companies that make the stuff along with independent studies the chemical starts to break down somewhere between 400-550°F. Companies claim that temperatures rarely get that high under normal conditions. However studies commissioned by EWG have found that pans with such nonstick coatings can reach over 700°F in under five minutes when preheated on ‘high’ so that toxic fumes can be released. Non-stick drip pans under electric burners can reach temps as high as 1000°F that can release more toxic gases including one called PFIB that a relative of the WW2 nerve gas phosgene.

Moreover, one of these forever chemicals, PFOA, may be in products like pots and pans even though they are labeled as 'PFOA-free' because of how they are manufactured according to Consumer Reports magazine ([www.consumerreports.org/toxic-chemicals-substances/you-cant-always-trust-claims-on-non-toxic-cookware-a4849321487/?EXTKEY=EE2B2PHAC&utm\\_source=acxiom&utm\\_medium=email&utm\\_campaign=20221115\\_cromc\\_engagewkly&bt\\_ee=R5vgDZkRjgHK9%2BNKw%2FTMwZ3k68IZ6GtADmdoZPBlm6Zm0HkWx8Osjmvlwr1Hhds5&bt\\_ts=1668554228967](http://www.consumerreports.org/toxic-chemicals-substances/you-cant-always-trust-claims-on-non-toxic-cookware-a4849321487/?EXTKEY=EE2B2PHAC&utm_source=acxiom&utm_medium=email&utm_campaign=20221115_cromc_engagewkly&bt_ee=R5vgDZkRjgHK9%2BNKw%2FTMwZ3k68IZ6GtADmdoZPBlm6Zm0HkWx8Osjmvlwr1Hhds5&bt_ts=1668554228967)). So avoiding such forever chemicals is trickier than it may seem.

The chemical can be found elsewhere such as in firefighting foams like those used at airports, and in textile coatings. These chemicals can also be found in cleaning products, polishes, waxes, paint, stain resistant carpeting, waterproof clothing (e.g. Gore-tex), 'period panties,' and beauty products that start with fluoro- or perfluoro- such as shaving cream, powders, and lotions. Flight attendants and pilots at some airlines such as Alaska Air, American, Delta and Southwest have had problems when new uniforms were introduced as to their being heavily treated with various chemicals such as to make them stain- and wrinkle resistant. The employees have had numerous health problems result.

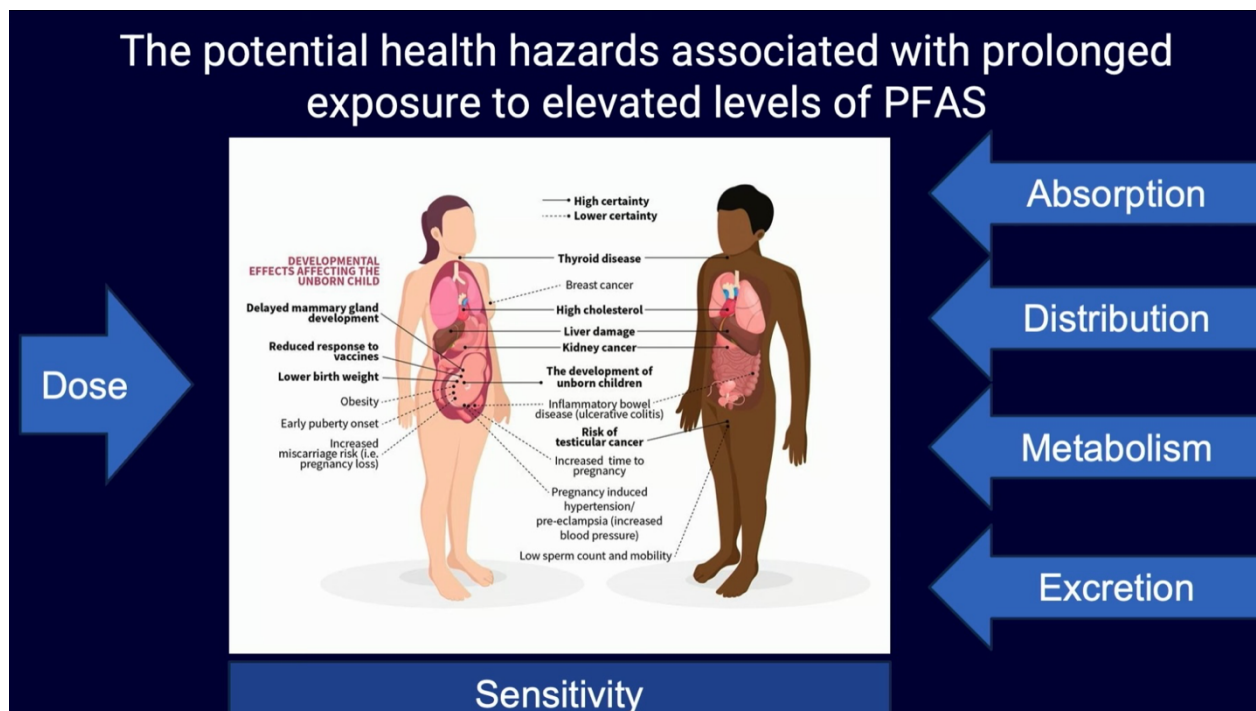
It can be found in some parchment papers used in cooking. ('If you care,' 'Gifbera,' and 'Katbite' parchment papers were found not to have it at least at detectable levels. They use silicone rather than PFAS to make the paper non-stick. It was found in Reynold's, and Costco's brand (Kirkland). <https://www.mamavation.com/food/safest-non-toxic-parchment-paper-without-pfas-forever-chemicals.html>. It can get into products unwittingly and not even known to the manufacturer such as being part of what are called 'slip agents' so that a product slides out of a mold easily at the factory, and in the process it contaminates the item. It mimics androgen and so a man's body thinks it is getting sufficient testosterone and hence levels of that actual hormone go down, which has various consequences including for reproductive purposes. It can cause early menopause, testicular cancer, liver dysfunction, and delayed puberty. It also has adverse effects on the immune system which has implications relative to responding to vaccines by making antibodies, or just fighting off various bugs and the like. There is some research that it can impact infant growth and fetal development, and there is increased risk of kidney cancer in adults according to the GenX exposure study run by NC State University.

This GenX study found 29% of participants in the Cape Fear region of NC fell into the highest risk category of The National Academies of Sciences, Engineering, and Medicine (NASEM) recommendations meaning they are at higher risk for adverse effects. Such people should consider screening for thyroid issues, ulcerative colitis, and various cancers including kidney and testicular. Another 68% fell into the moderate category meaning that sensitive populations could potentially develop adverse health issues and should consider screening too.

EWG did a study that found "just a single serving of freshwater fish per year could equal a month of drinking water laced with the 'forever chemical' PFOS at high levels (48 parts per

trillion which is 2,400 times greater than the EPA interim drinking water health advisory). (Environmental Research, “Locally caught freshwater fish across the United States are likely a significant source of exposure to PFOS and other perfluorinated compounds” Nadia Barbo et al, March 2023). “PFAS contaminate fish across the U.S., with higher levels in the Great Lakes and fish caught in urban areas” according to Tasha Stoiber, PhD an EWG scientist and co-author. <https://www.ewg.org/interactive-maps/pfas-in-US-fish/map/> is a link to an interactive map showing forever chemicals in freshwater fish.

Use of bottled water is not a guarantee you will be PFAS-free. A Johns Hopkins study (published in Water Research, “Detection of ultrashort-chain and other per- and polyfluoroalkyl substances (PFAS) in US bottled water” Steven Chow, et al, August 2021) found 39 of 101 bottled waters tested were contaminated with PFAS. The FDA has not set PFAS limits for bottled water. Most of the contaminated products contained ‘Spring water’ while those treated through reverse osmosis contained less PFAS.



<https://www.youtube.com/watch?v=JhsVv1nTfni>

“Living with the forever chemicals - Dr. Ian Mudway”

Other health effects of PFAS include increased cholesterol levels, changes in liver enzymes, increased risk for high blood pressure, increased risk for preeclampsia, increased risk of some cancers including kidney, pancreatic, lymphoma, bladder, prostate, leukemia, liver and testicular, and a small decrease in infant birth weight. There was also a decade long study (Diabetes Care, “Associations of Perfluoroalkyl and polyfluoroalkyl substances with incident diabetes and microvascular disease” Andres Cardena et al, Sept. 2019) on nearly 1,000 people looking at PFOA in the blood of people. A doubling of that amount was associated with a 14% increase in the risk of diabetes. However, a healthier lifestyle (e.g. weight control, diet

modification, and proper exercise) mitigated such an increase in risk of becoming diabetic. Thyroid hormone concentrations along with sex hormones can also be impacted by the chemicals. NASEM has warned that people with PFAS levels in their blood above 2 ng/ml but below 20 ng/ml may face potential adverse effects especially 'sensitive populations' like pregnant women. Levels above 20 ng/ml potentially face a higher risk. How PFAS affects pregnant women and children needs more research according to them.

There was also a study done called POUNDS Lost (through Harvard's Chan School of Public Health, LSU and Tulane U.; PLoS Medicine, "Perfluoroalkyl substances and changes in body weight and resting metabolic rate in response to weight-loss diets: a prospective study" Gang Liu et al, 2/13/18 ) taking 621 overweight and obese people age 30-70 and controlling their diets for 2 years as to restricted calories. Most weight loss occurred in the first 6 months and there was slow regaining over the next 18 months. The people with the highest levels of five forever chemicals regained the most weight, and they were also correlated with lower resting metabolic rates (i.e. burning fewer calories at rest). i.e. The authors of the study are suggesting that forever chemicals may be playing a role in the current obesity epidemic. Animal studies suggest that these chemicals impact thyroid hormone which obviously affects metabolism. Women in the study had a stronger link to regaining weight than men did. These chemicals interfere with estrogen metabolism which may explain why women are more sensitive to regaining such weight. Research cited in Consumer Reports ("How PFAS can harm your health" Kevin Loria 5/2/24) notes that the chemical inhibits the immune system as to making a person more likely to become sick such as through infections.

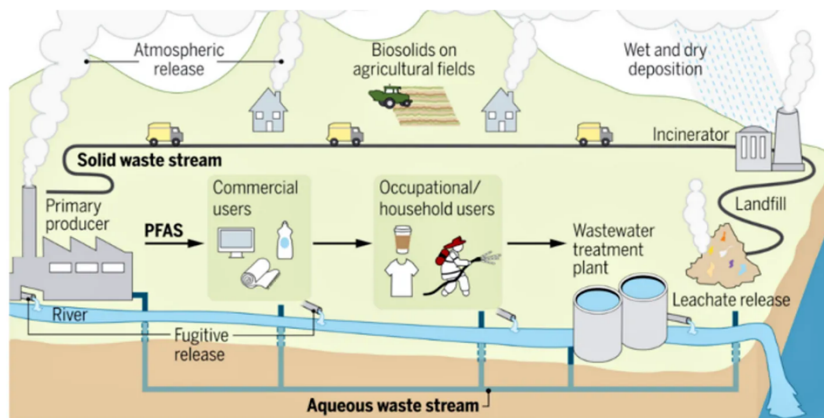
The chemical is in soil and water supplies, and research done between 2006-2018 found it in rainwater gathered from all 30 sites tested (Environmental Science & Technology, "Perfluoroalkyl acids in Great Lakes precipitation and surface water (2006-2018) indicate response to phase-outs, regulatory action, and variability in fate and transport processes" Sarah Gewurtz et al, 6/24/19).

There is also another way that PFAS can contaminate our lives, namely by burning trash in municipal incinerators. About 12% of the U.S. waste stream goes to solid waste incinerators, and there has been minimal research about what happens when PFAS is burnt at them. The EPA does not monitor PFAS at such plants, and instead just looks at chemicals like dioxin, mercury, and lead. Research done at European incinerators discovered that high levels of PFAS were found downwind of such incinerators and concluded that "PFAS cannot be destroyed completely at temperatures used in Waste-to-Energy [municipal waste] incinerators."

Research done at UNC-Wilmington (UNCW) found that the path and distance that airborne molecules travel depends on temperature, humidity, and wind speed, and when the chemical shifts from a gas to a particle. EPA modeling found that over 97% of GenX (a PFAS that is now known to have contaminated the region although it was marketed as a safer replacement of older variations) travelled more than 93 miles. Other research done at Bennington College in VT found a downwind plume of PFAS that extended over about 125

square miles. PFAS has been found at both the North and South Poles. A UNCW professor, Ralph Mead, said that atmospheric deposition is unquestionably one of the routes of PFAS contamination. “From an environmental health and human health perspective, it’s pretty scary.” EWG released a report based on EPA data that found PFAS may be discharged by over 1,500 textile mills in the U.S. Other potential sources of PFAS contamination include landfills, waste disposal facilities, sewage and waste treatment plants. Sewage sludge spread as fertilizer is another way of contaminating our environment. EWG estimates that up to 20 million acres of US croplands have been contaminated in this manner with forever chemicals.

### How PFAS enters the environment



How PFAS enters the environmentCredit: Evich et al., 2022

<https://www.ehn.org/pfas-testing-needed-2657763614.html>

An interactive map showing PFAS contamination can be found at [https://www.ewg.org/interactive-maps/pfas\\_contamination/map/](https://www.ewg.org/interactive-maps/pfas_contamination/map/). Simply put: PFAS is thought to have contaminated approximately 57,412 sites in the U.S., with every state involved (Environmental Science & Technology Letters, “Presumptive contamination; a new approach to PFAA contamination based on likely sources” Derrick Salvatore et al, 10/12/22).

As to how to remove it from your body? There is no proven method to do so. There is anecdotal knowledge of one family that had high levels of four particular ‘forever chemicals.’ They had blood draws (phlebotomy) of 500 cc’s of whole blood every 56 days or so. Over a four-year period there was a significant reduction in the compounds for both parents and four kids. Another approach that has had a little research done on it is through a bile acid sequestrant, cholestyramine which increased the amount of the forever chemicals that came out in stool. Overall, the best approach is to avoid it as much as you can, especially if you are pregnant.

- ❖ One study looked at over 300 mostly conventional makeup products and it was found to be in them overwhelmingly. ‘Stays longer’ and ‘waterproof’ varieties are likely to contain PFAS.
- ❖ ‘Stain proof’ items are also likely to have it.

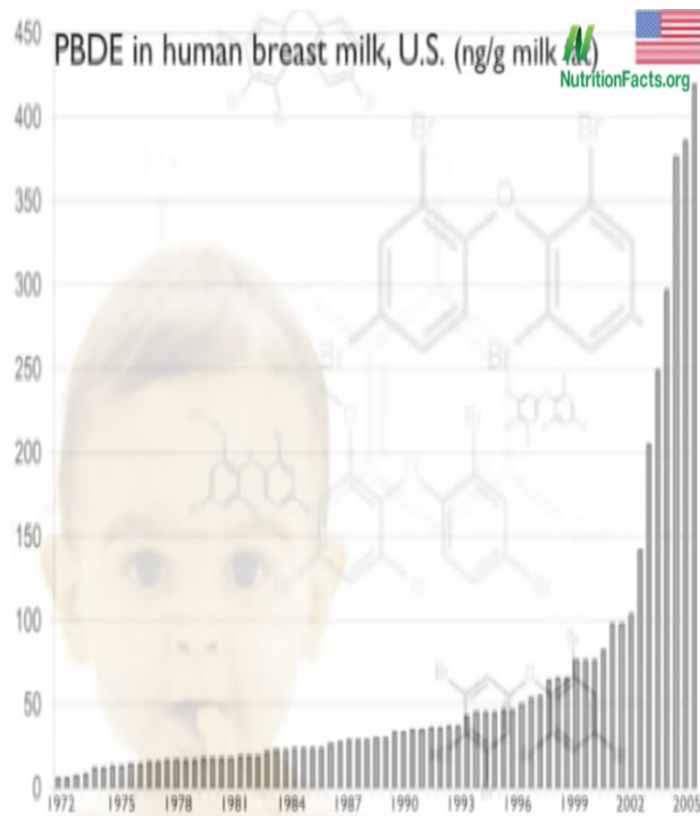
The EPA says there are more than 120,000 locations around the US where people may be exposed to PFAS, with CO topping the list at about 21,400 sites, CA with 13K, and OK at close to 12K.

- ❖ If you live by an airport or a military base the water may well be contaminated (from firefighting chemicals), and so use of a water filtration system is advised. Duke University did one study on a number of water filtration systems as to their ability to remove PFAS chemicals. ([Environmental Science & Technology Letter](#), ‘supporting information for:’ “Assessing the effectiveness of point-of-use residential drinking water filters for Perfluoroalkyl substances (PFAS)” Nicholas Herkert et al, Nicholas School of the Environment, 2020.) Reverse osmosis and two-stage filters performed better at eliminating PFAS.
- ❖ One study on sports bras found PFAS in 65% of them especially in the breathable mesh adjacent to the breast and nipples. <https://www.mamavation.com/product-investigations/sports-bras-pfas-forever-chemicals-purchasing-guide.html>.
- ❖ Active wear and yoga pants also have been found to contain PFAS in 25% of items tested <https://www.mamavation.com/product-investigations/non-toxic-activewear-guide-pfas-workout-leggings-yoga-pants.html>
- ❖ tampons. Mamavation and Environmental Health News ([https://www.mamavation.com/beauty/pfas-tampons.html#Mamavations Investigation of Tampons Indications of PFAS Forever Chemicals Raw Data](https://www.mamavation.com/beauty/pfas-tampons.html#Mamavations%20Investigation%20of%20Tampons%20Indications%20of%20PFAS%20Forever%20Chemicals%20Raw%20Data)) found 22% of samples tested having organic fluorine present which is an indicator for PFAS. Those found to be positive for it were
  - Maxim hygiene organic cotton cardboard applicator
  - organYc complete protection
  - Playtex SPORT regular and super
  - Tampax cardboard applicator unscented
  - Up & Up (Target brand) regular
  - Mamavation and Environmental Health News tested 40 bandages from 18 brands for PFAS, and 65% were found to have organic fluorine ranging from 11-328 ppm. Some of the worst offenders containing more than 250 ppm included Band-Aid
  - ourtone flexible fabric BR45/BR55/BR65,
  - Equate skin tone antibacterial bandages flexible fabric (darkest shade),
  - Up & Up flexible fabric at Target.
  - Some containing more than 100 ppm included
  - CVS Health C60/C70/C80 flexible fabric,
  - Equate flexible fabric antibacterial,
  - Equate Skin Tone antibacterial flexible fabric.
  - Some better ones with <100 ppm included
  - Band-Aid water block tough strip waterproof
  - CVS health gentle fabric hypoallergic large

- CVS health waterproof adhesive
- CVS health waterproof heavy duty antibacterial

Phthalates and volatile organic compounds (VOCs) are other chemicals that can contaminate tampons, along with pesticides all of which may be absorbed through the vaginal wall.

- a study ([cbc.ca/news/business/marketplace-fast-fashion-chemicals-1.6193385](https://www.cbc.ca/news/business/marketplace-fast-fashion-chemicals-1.6193385)) by the Canadian Broadcasting Company looked at 38 sample of children's, adult's, and maternity clothing and accessories, with 20% of them having "elevated levels of chemicals – including lead, PFAS and phthalates – that experts found concerning. ...In 2021, Health Canada published a document stating that the combined exposure of phthalates to the Canadian environment is 'below the levels that are expected to cause death to organisms.' Pip [a biologist at the U. of Winnipeg] thinks this needs to change. 'Given the fact that these chemicals are hormone and developmental disruptors, death [to organisms] is a pretty extreme criterion to determine harm,' she said."
- ❖ Triclosan, which is in anti-microbial and personal care products like liquid body wash, foaming soaps, underarm deodorants, mouthwash, laundry detergents and fabric softeners, some toothpaste, and even in baby toys. It has been found in umbilical cord blood, as well as 97% of breast milk samples in the U.S. and Sweden. It can enter the body through oral mucosa from teeth brushing and skin through hand soaps etc., and affect hormones. Colleen Rogers, a lead microbiologist at the FDA has said "there currently is no evidence that antibacterial soaps are more effective than plain soap and water" (<https://www.fda.gov/consumers/consumer-updates/antibacterial-soap-you-can-skip-it-use-plain-soap-and-water?source=govdelivery>). It interferes with estrogen, androgen, and thyroid hormones, increases the risk of breast cancer due to its estrogenic nature and may stimulate growth of estrogen dependent breast cancer. It may also interfere with sperm production and affect sperm and testicular health. Fetuses exposed to it can be impacted as to neurodevelopmental effects. In adolescent boys it can impact sex hormones, the immune system, and lead to obesity later in life. And it can contribute to antibiotic resistance which is becoming a bigger problem over time and potentially a deadly one. It can also penetrate the skin and so microbes inside your body come into contact with the chemical. It can therefore alter both gut microbiota and endocrine function and impact body weight according to some researchers at Stanford U. (PLoS 1, "Urinary triclosan is associated with elevated body mass index in NHANES", J. Lankester et al, 2013). Absent exposure to it the human body may need over a week to rid itself of the chemical.



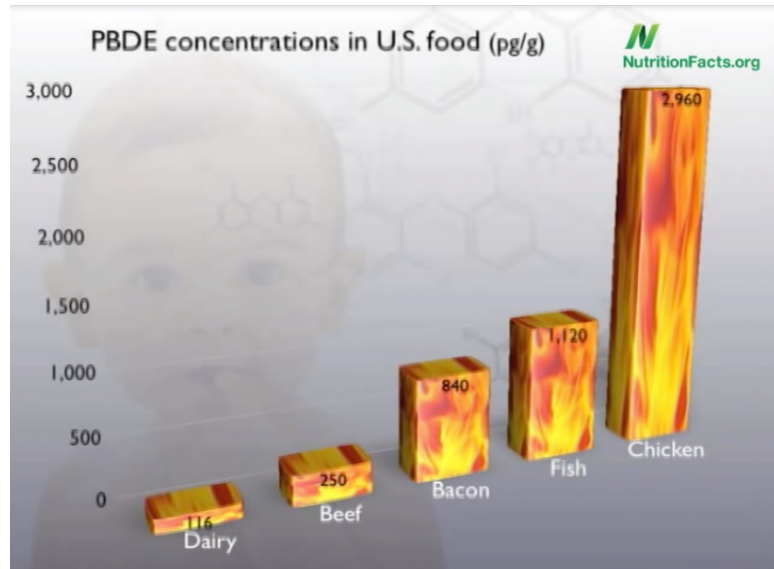
PBDE (polybrominated diphenyl ethers) that are in flame retardants such as for carpets or foam in furniture, along with clothing for workers such as firefighters, and they are known to 'off gas' into the air, attach to dust, and then are breathed in by people. The amount of this chemical found in human breast milk has doubled every five years since 1972. American women have more than those from any other nation in the world. They build up over time in the human body and can impact the thyroid, cause cancer, reproductive problems, and lower IQ. Getting a good air filter to remove such contaminated dust is one means to reduce inhaling the stuff. An estimated 80-93% of toddlers' exposure to flame retardants comes from dust. The CDC found this chemical in 97% of adult Americans in a nationally representative sample (NHANES).

- ❖ You are now allowed to buy furniture that does not contain flame retardants. PBDE replacements like triphenylphosphate and tetrabromo bisphenol A are obesogens (causing weight gain). Effects of PBDEs include thyroid dysfunction, girls getting their periods earlier, lower sperm count, disrupting the development of the brain in young kids including shorter attention span and ADHD, infertility, and breast and testicular cancers. Firefighters being exposed to burning home furnishings with this chemical have elevated rates of multiple myeloma, non-Hodgkin's lymphoma, prostate and testicular cancer.



Where is the PBDE coming from? Fire retardants in food! Dairy, beef, bacon, fish and especially chicken. Vegans have lower levels, and the longer one stays vegan the lower PBDE levels can fall. It can take 20 years to get to something like an 85% reduction, but eventually one's body can cleanse itself of this chemical.

Both graphs above and to the side come from: <https://nutritionfacts.org/video/flame-retardant-chemical-contamination-2/>



- ❖ other pesticides such as Roundup (glyphosate), 2,4-D, Atrazine, Chlorpyrifos, Parathion, Malathion, and other organophosphate pesticides which are the most common type used, comprising 70% of all pesticides. It can impact an enzyme involved with the breakdown of acetylcholine, a neurotransmitter key to memory. The CDC did a nationally representative sample of kids (ages 6-18) and adults and out of 2,310 urine samples 80% were contaminated with glyphosate (<https://www.theguardian.com/us-news/2022/jul/09/weedkiller-glyphosate-cdc-study-urine-samples>). Glyphosate also has been found in a large portion of beer, wine and honey samples that have been tested. It also has been combined with 2,4-D which was a component of Agent Orange in Vietnam, without toxicity testing being done to determine the health consequences. Glyphosate has been linked to higher rates of autism spectrum disorder, chronic kidney disease, celiac disease and gluten sensitivity, and infertility. Organophosphates interfere with how testosterone communicates with cells, lowers that hormone, and alters thyroid hormone levels too.

Atrazine is heavily used on corn, sugar cane, winter wheat, sorghum, and lawn turf. A biologist at UC Berkeley, Tyrone Hayes, has hypothesized that atrazine turns on an enzyme, aromatase, that causes testosterone to be converted into estrogen, which obviously impacts sperm production. Research on frogs with atrazine found that the chemical led to “gonadal abnormalities such as retarded development and hermaphroditism” in 10-92% of a particular frog species. Atrazine has been banned in the European Union but is the second most widely used herbicide in the U.S. The National Defense Research Council found “pervasive” contamination of water across the Midwest and South. It was in 80% of drinking water samples taken from 153 public water systems. Of 20 watersheds sampled in 2007-2008 16 had average concentrations of atrazine at levels higher than shown to harm plants and wildlife. The best way to avoid this chemical is to buy organic produce and to use a drinking water filter.

- ❖ mercury (such as from eating fish that contain it). It is ranked third by the US government's Agency for Toxic Substances and Disease Registry (behind lead and arsenic). It may disrupt the pituitary, thyroid, adrenal glands, and pancreas. There is no safe level for it in the human body. Hormones most affected by it are thought to be insulin, estrogen, testosterone, and adrenaline. Toxic levels of the metal in the pituitary can lead to low function of the gland and subsequent mood disorders so that it appears to be a major factor in teens and others committing suicide. It can cross the placenta and blood brain barrier. It can get into a fetus' brain where it can accumulate and cause brain damage and delays. It binds in particular to a hormone regulating the menstrual cycle and ovulation. It may contribute to Addison's disease. It gets concentrated in muscle.

Exposure to high levels of mercury can cause permanent brain damage, memory loss, heart disease, kidney failure, liver damage, loss of vision, loss of sensation, and tremors. It is also considered an EDC, impacting the adrenals, thyroid, hypothalamus and pituitary gland.

- ❖ arsenic can kill you in various ways such as causing skin, bladder, and lung cancer. It can also impact the hormonal system that regulates how we process sugar and carbs. This can impact weight gain or loss, suppression of the immune system, insulin resistance (which can then lead to diabetes), osteoporosis, growth retardation, and high blood pressure. One way to avoid arsenic exposure is through a water filter that lowers it.
- ❖ lead and cadmium which can be found in food, as well as women's make-up, and kids' toys. Lead harms almost every organ in the body. As to hormones, it lowers sex hormone levels and can disrupt the major stress system (called the HPA axis). It can lead to depression and anxiety as well as high blood pressure and uncontrolled stress.
- ❖ parabens which can be found in personal care products like
  - lotions
  - sunscreens
  - face and skin cleansers
  - toothpaste
  - moisturizers
  - concealers
  - blush
  - mascara
  - shampoo and conditioners
  - shaving gels and cream
  - some deodorants
  - makeup

Parabens can also be found in some baked goods, beverages, syrups, jellies, jams, and preserves. They can affect fertility and might make it into the bloodstream and affect a fetus and birth outcomes such as premature birth and low birth weight. They can mimic estrogen and bind to those receptors on cells, and in some case increase breast cell division and growth of tumors and hence increase breast cancer risk. Adding estrogen-like loads to the body can disrupt body fat and sugar metabolism making people more susceptible to diabetes. EWG also says they can cause changes in the menstrual cycle, decrease sperm production and lower testosterone levels (at least in animal studies), cause skin irritation and rashes. Females, adults under age 60, and non-Hispanic Blacks were found to have the highest levels in their urine based on a CDC study in 2006. Wearing less makeup helps avoid this chemical. A study found that adolescent girls who wore makeup daily had significantly higher levels of propylparaben in their urine compared to those who rarely wore makeup (Journal of Exposure Science & Environmental Epidemiology, “Personal care product use as a predictor of urinary concentrations of certain phthalates, parabens, and phenols in the HERMOSA study” Kimberly Berger et al, Jan 2019).

Parabens are commonly used as a preservative such as to prevent bacteria, mold, and fungus from growing. It is legal to use them in many products that directly come into contact with our skin. (You can find various prefixes before -paraben in such products such as methyl-, propyl-, butyl-, ethyl-, isobutyl-, and isopropyl-. The FDA says they are not harmful. Isopropyl- and isobutylparaben have been banned by the EU and ten southeast Asian countries. Propyl- and butylparaben have greater estrogenic activity and hormone-related issues. Research done at the Harvard School of Public Health suggested that propyl paraben might be associated with diminished fertility. As of 2006 propyl paraben was removed from the list of food additives authorized by the European Union. A CDC researcher reported that 92.7% of Americans tested had propyl paraben in their urine. Methyl paraben was found in 99.1%. (Environmental Health Perspectives, “Urinary concentrations of four parabens in the U.S. population: NHANES 2005-2006” Antonia Calafat et al, May 2010).

Methylparaben does not accumulate in the body and is said to be quickly flushed out of it. Even so, concerns about it persist. Some studies have shown that it may cause cancerous skin damage. Allergic responses are found in some people such as contact dermatitis (e.g. symptoms of itching, bumps and blisters, dry scaly skin, or swelling/tenderness or burning of it). Near the eyes it can cause redness or swelling of the eyelids. It is also a possible EDC and may mimic estrogen, and as such may harm fertility and increase the risk of cancer. There is the possibility that methylparaben may indirectly lead to breast cancer. Even so, the FDA does not regulate this chemical.

- ❖ Perchlorate which is a by-product of aerospace, weapon and drug companies and can be found in drinking water. It robs your thyroid of being able to make the thyroid hormone T4, and also impacts your brain and how well your organs function. It can be found in some boxes of mac ‘n’ cheese, salami, bologna, and plain bagels. Raw produce like broccoli, milk, collard greens or cauliflower may test high in it as well. It has been estimated that virtually every person in the world is exposed to it at some level. But one

way to reduce its effects is to make sure you have enough iodine in your diet. Reverse osmosis water filters can also get rid of it.

- ❖ chlorine can rob cells of iodine and interfere with the production of testosterone. One study found that boys who spent a lot of time in pools prior to puberty were three times as likely to be in the bottom 10% for testosterone levels. Chlorine can obviously be found in many city water supplies, laundry detergents, dyes, insecticides, paint, hot tubs, and paper products.
- ❖ fluoride. It is probably best known as something added to many city water supplies, and to toothpastes and mouthwashes. Twenty-five percent of pharmaceutical drugs are fluorinated. Fluoride displaces iodine which can lead to thyroid dysfunction and autoimmune diseases like Hashimoto's, thyroiditis, and Grave's disease. It can also lower IQ, and can decrease bone health.
- ❖ glycol ethers are commonly found in cleaning products and paint. Common products that include chemicals contain it, such as propylene glycol, ethylene glycol, tripropylene glycol, dipropylene glycol, triethylene glycol, oven cleaners, glass cleaners, floor cleaners, varnishes and lacquers, perfumes, inks and dyes, and cosmetic products. Its effects include reduced fertility, decreased sperm count and quality, testicular atrophy, miscarriage, and harm to developing fetuses. They can also cause extreme liver damage, kidney damages, or pulmonary edema. They may also cause autoimmune disease, anemia, and decreased bone marrow production. Kids exposed to them from paint in their bedrooms had substantially more asthma and allergies. You can avoid them by reading labels and looking for ingredients like 2-butoxyethanol (EBE) and methoxydiglycol (DEGME).
- ❖ polystyrene (plastic #6) better known as Styrofoam as in the coffee cups, also can cause problems. It can leach from products like cups and containers into hot drinks and foods especially if microwaved; temperature is said to play a major role in the chemical leaching from such cups. The leaching is also greater with fatty or oily foods. It has been said that someone who drinks beverages from a Styrofoam cup 4 times/day for three years will ingest about a foam cup's worth of styrene in the process. On a short-term basis the chemical can cause fatigue, reduced concentration, headache, irritation of the skin, eyes and upper respiratory tract, as well as GI distress. More chronic effects can lead to depression and hormonal disruption. The chemical mimics estrogen and can lead to thyroid and menstrual problems. Blood problems including low platelet counts or hemoglobin values have been linked to chronic polystyrene exposure. Chromosomal and lymphatic abnormalities may also result. It is also considered a possible cause of cancer including of the breast and prostate. Mouse research has found an association between the chemical and spontaneous abortions, and it being embryotoxic even beyond the levels of benzene, toluene, or xylene. The FDA says it is safe to use for food products.

There are also less exotic or more accepted chemicals that we can be exposed to that may have an impact on our health. One of these is marijuana which is said to be the most widely used recreational drug in the U.S. A 2015 study out of Denmark found that smoking it once a week was

associated with a 29% lower sperm count. And for males ages 18-28 who used it more than once a week as well as other recreational drugs their total sperm count was reduced by 55%. And animal studies are suggesting that CBD, the second most prevalent active chemical in marijuana, can damage sperm and reduce the ability to fertilize an egg, although research on this is limited. A price is also paid for smoking other stuff like vapor cigarettes. There is some preliminary evidence that this too damages sperm. Men smoking tobacco cigarettes can cause a 15% decline in sperm count, but the numbers can recover if he quits. For a woman smoking during pregnancy it can cause her grown son to have a 40% lower sperm count and that is said to be irreversible.

Even legal drugs like Tylenol (acetaminophen) can take a toll. Sperm abnormalities including DNA fragmentation have been found from its use. Taking the drug in high doses can alter the shape of sperm which then compromises their fertilizing capabilities. Tylenol can also alter the production of testosterone, interfere with insulin being released, and promote the growth of hormone sensitive cancers such as breast, prostate, or endometrial. During pregnancy Tylenol may lead to male fetuses' reproductive tract being changed, along with increasing the risk of asthma, ADHD, lower IQ, and disrupt the maturation of the testes in toddlers. Antidepressant drugs (SSRIs) also may reduce sperm concentration and motility and increase the percentage of abnormal sperm. There is some evidence that for women who take antidepressants the probability of becoming pregnant may be reduced by 25%. SSRIs, antipsychotics and antiseizure drugs may also cause amenorrhea, meaning menstrual irregularities.

There is another side to this issue of harmful chemicals and that is how our bodies respond to them. One part of the immune system is made up of what are called mast cells. They are a type of white blood cell and are found in many tissues such as the eyes, skin, lungs, brain, blood vessels, and GI tract. They are involved with activation of the immune system, the development of autoimmune diseases, and inflammation. If they are constantly being activated by harmful elements they can become overly sensitized, as to 'going off with a hair trigger' and over responding to threats. This has been termed mast cell activation syndrome (MCAS) and also has been labeled TILT (toxicant-induced loss of tolerance) by some. Symptoms of MCAS may include

- ❖ allergies
- ❖ cardiovascular symptoms like low b/o, rapid pulse, irregular heart rate
- ❖ digestive issues like bloating, constipation, diarrhea, cramping, reflux, IBS
- ❖ fatigue
- ❖ inflammation
- ❖ malaise
- ❖ nervous system problems (e.g. brain fog, headaches, anxiety, depression, insomnia, vertigo)
- ❖ respiratory issues (e.g. difficulty breathing, shortness of breath, congestion, throat swelling, dizziness)
- ❖ skin conditions (e.g. hives, itching, swelling, flushing, rashes)

What can trigger MCAS varies widely. Organophosphate pesticides are said to be among the worst for causing TILT. Other triggers include chemicals, perfumes, and fragrances (along with

high histamine foods, pollen, insect bites, alcohol, antibiotics, ibuprofen, opiates, mold, heavy metal exposure, stress, viruses, fungi, bacterial, parasitic, exercise, trauma, hormonal shifts such as in a woman's cycle and emotional stress, temperature changes as to hot and cold extremes, and gut dysbiosis). What such a 'hair trigger' means is that instead of needing a large amount of say some chemical to trigger an immune reaction your body will start going off with miniscule amounts. So saying that some chemical such as in your clothing is 'at a safe level' means nothing if your body develops an over sensitivity to it leading to adverse health consequences.

What to do about all this toxic stuff that is probably in your life? One approach that has some research behind it is through use of infrared or steam saunas. There is evidence they can help eliminate phthalates, flame retardants, BPA, pesticides and PCB's. You should have appropriate cardiovascular health before making use of a sauna and should talk to your doctor if you are unsure about this issue. You need to drink water before or after sauna use as to dehydration as well as consider replenishing electrolytes that are lost to sweating too.

The other obvious approach is to make attempts to avoid it as best you can. Urine levels of some of these chemicals like DEHP can rapidly drop within 24 hours of avoiding them.

Techniques to limit exposure to such chemicals may include:

- ❖ Use more of plastic types 1, 2, 4, and 5 which are 'safer,' and types 3, 6 and 7 should be avoided. Type 3 is PVC (with phthalates), and 6 is polystyrene (e.g. Styrofoam); 7 is 'other types' but it contains bisphenols like BPA. Better yet avoid plastic as much as possible. Do not use plastic ware in the microwave, or for cooking or baking.
- ❖ don't drink water from plastic bottles that have been stored for a long time. Such samples have shown that phthalates, benzene, trihalomethanes, mold, microbes, and arsenic can accumulate in higher concentrations over time. Try to buy 'purified' bottled water rather than 'spring water.'
- ❖ don't drink water from plastic bottles, period. There was one study that looked at 11 brands in nine countries and microplastic was found in more than 90% of the samples tested, with an average of 325 plastic particles for every liter. Of 259 bottles tested 17 were free of plastic contamination (Organic Lifestylemagazine.com, "Drinking bottled water means drinking microplastics, according to damning new study" Michael Edwards, 3/16/2018).
- ❖ not using plastic containers and wrap, and storing food in glass containers
- ❖ use a damp mop, duster, or get a HEPA air filter for your home to minimize phthalates, flame retardants, and other volatile chemicals that can latch on to dust. A 2017 study found that 45 potentially harmful chemicals including phthalates, flame retardants and PFAS's were found in dust in 90% of US households sampled throughout the U.S.
- ❖ use exhaust fans while cooking and showering
- ❖ ban smoking indoors
- ❖ minimize use of candles and wood fires with synthetic logs.

- ❖ don't use air fresheners, spray, plug-in or wicked. They contain phthalates and other chemicals.
- ❖ keep toxic chemicals (e.g. glues, paints, solvents, cleaners, pesticides) in a garage or shed and away from living quarters
- ❖ avoid use of pesticides, insecticide, herbicides and look at natural alternatives (e.g. citric acid, clove oil, vinegar, mulch)
- ❖ replace your garden hose with a National Sanitation Foundation (NSF) certified phthalate-free potable water one
- ❖ don't use a dishwasher for cleaning plastic ware because it can break the chemical bonds of phthalates allowing more to subsequently leach out such as into food or beverages.
- ❖ do not drink from a 'regular' garden hose which may contain phthalates
- ❖ avoid plastic kids' toys and use ones made of natural substances such as wood
- ❖ read labels on cosmetics to help avoid phthalates
- ❖ avoid 'fragrance' in your products
- ❖ avoid cosmetics and personal care products that are labeled 'antibacterial'
- ❖ eat fresh, raw whole foods and avoid or at least quickly remove plastic food packaging that may contain phthalates
- ❖ handle cash register receipts, made with BPA, as little as possible. Some receipts may contain 250-1,000 times the amount of the chemical found in a can of food, as determined by the U. of Missouri Division of Biological Sciences who did research for EWG. BPA also transfers easily from the receipt to the skin and cannot be washed off. Different amounts of BPA are in different types of receipts. "Even holding a receipt for 60 seconds results in a measurable increase in BPA in the blood. Researchers have also found that if your hands are damp or wet with lotion or sanitizer or even water, the speed of BPA absorption into the skin is significantly higher". (<https://consumerproductsexperts.com/blogbites/receipts-and-bpa-a-sneaky-truth>). According to EWG retail workers have on average 30% more BPA in their bodies compared to other adults. Whether this is from handling BPA-coated receipts is unknown. EWG found other occupations that have high levels of BPA and who may handling a lot of receipts include retail food stores, and eating and bar establishments.
- ❖ use natural cleaning products or make your own
- ❖ avoid fabric softeners and dryer sheets
- ❖ filter your tap water if you are concerned about its purity with such chemicals
- ❖ avoid fast food and greasy carryout food which often come in PFAS treated wrappers
- ❖ avoid processed food which has more opportunity to come into contact with plastic during the production process which leads to greater risk of phthalates tainting it.
- ❖ eat more plants. People who eat a diet that is rich in plants (fruits, veggies, grains, nuts & seeds, legumes) have lower levels of phthalates than people eating animal foods.

- ❖ be wary of all fabrics labeled stain- or water repellent, easy-care, anti-odor, or carry Gore-Tex, Scotchgard, Polartec, Stainmaster, or Teflon tags
- ❖ avoid cheap knock-off clothes, and ultra-fast fashion brands . According to some Shein is one such brand.
- ❖ wash clothing with unscented laundry products before first wearing them. Also avoid dryer sheets, fabric softeners, and deodorizers. A study done at U. of Washington ([washington.edu/news/2008/07/23/toxic-chemicals-found-in-common-scented-laundry-products-air-fresheners/](http://washington.edu/news/2008/07/23/toxic-chemicals-found-in-common-scented-laundry-products-air-fresheners/)) found that top-selling laundry products emitted dozens of chemicals including carcinogens.
- ❖ do not dry clean your clothes. The chemicals used are toxic. The most commonly used one is called perchloroethylene (PERC) and is hazardous including being a respiratory and skin irritant, neurotoxicant, liver and kidney toxicant, and also reproductive and developmental toxicant. It is also thought likely to be a carcinogen by all routes of exposure. Try to spot clean items that are typically dry cleaned. If you need to dry clean try to find one that uses liquid carbon dioxide. If you cannot find such a facility, air out dry cleaned items outside in the garage or yard for a day or two without the plastic bag covering it.
- ❖ look at natural fibers for materials like carpets, or better yet use hardwood or ceramic for the lowest potential exposure. Padding for carpets may contain PDBEs.
- ❖ look at clothes made from natural fabrics (e.g. cotton, silk, wool, hemp, cashmere, linen, alpaca, rayon). They can still be treated heavily by toxic chemicals.
- ❖ avoid microwave popcorn bags in that they are often coated with PFAS chemicals on the inside
- ❖ avoid nonstick pans and pots, and opt for stainless steel or cast iron
- ❖ avoid personal care products that have PTFE or fluoro- ingredients (e.g. Oral-B glide floss is made with PTFE).
- ❖ skip optional stain-repellent treatments on new furniture and carpets which are often made with PFAS chemicals.
- ❖ look for 'green' cleaning products that have only a few simple ingredients (e.g. vinegar, baking soda, peroxide, etc.), although terms like 'green,' 'nontoxic,' and 'natural' are unregulated.
- ❖ try to eat more organic produce to avoid the pesticides of conventionally grown food
- ❖ omega-3 fatty acids can offset the effects of BPA, lead, mercury, and dioxin as shown through both animal and human research studies
- ❖ quercetin which can be found in the skin of apples and onions, has been shown to help protect against PCBs, BPA, and methylmercury in animal studies.
- ❖ cruciferous veggies (e.g. broccoli, cauliflower, Brussel sprouts, etc.) help break down many chemicals into less harmful compounds.
- ❖ for men, a new batch of sperm and becoming 'ready to go' (such as learning to swim) are made in something like 90 days, so improving oneself through advice offered here is relatively



quick (vs. women who need to stick to a plan for 9 months as to pregnancy or even longer to become pregnant). To this end, smoking to a light degree with its 4,000 chemicals that are inhaled have adverse effects on semen quality along with sperm motility. Heavy smoking is known to produce abnormal sperm shape. Quitting smoking for 5-15 months may increase sperm count by 50-800%. Caffeine, alcohol, and pesticides found in conventionally grown food also impact the formation of sperm and can lead to low sperm count, poor motility and morphology. Recreational drugs also can affect sperm quality. Give them up.

- ❖ lab testing for 'forever chemical's is often done by local health departments. There are two labs that will test for 31 PFAS compounds. They are Vista Analytical (<https://www.vista-analytical.com/pfas/>) and NMS Labs (<https://www.nmslabs.com/tests/3427SP#analytes>)
- ❖ One company that offers a commercially available urine test for some of these chemicals such as parabens and phthalates is <https://www.millionmarker.com>

And EWG has some online resources to help you make better choices, such as for

- ❖ look up your municipal tap water and its pollution by zip code through <https://www.ewg.org/tapwater/#.W5QcBS2Z034>
- ❖ EWG's water filter guide at [www.ewg.org/tapwater/water-filter-guide.php#.W51qBi2Z034](http://www.ewg.org/tapwater/water-filter-guide.php#.W51qBi2Z034)
- ❖ personal care products (<https://www.ewg.org/skindeep/?inlist=Y>)
- ❖ cleaners (<https://www.ewg.org/skindeep/?inlist=Y>)
- ❖ food (<https://www.ewg.org/foodscores/?inlist=Y>) including EWG's 'Dirty Dozen' additives to avoid (parabens are among them).
- ❖ A guide to baby-safe bottles and formula. <https://www.ewg.org/research/guide-baby-safe-bottles-formula>

Another handout on 'Talking to your doctor about exposure to PFAS' can be found at [https://www.atsdr.cdc.gov/pfas/docs/Talking\\_to\\_Doctor.pdf](https://www.atsdr.cdc.gov/pfas/docs/Talking_to_Doctor.pdf)